Conservation Services Programme Annual Research Summary 2013-14

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January 2017

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1. Introduction

1.1 Purpose

This report outlines the research carried out through the 2013/14 Conservation Services Annual Plan, and provides updates on multi-year projects started in previous years.

1.2 Background

The Conservation Services Programme (CSP), part of the Department of Conservation (DOC), originated in 1995 after an amendment to the Fisheries Act 1983 allowed for a Conservation Services Levy to be charged to the fishing industry, to recover the costs of research related to the impact of commercial fishing operations on marine protected species in New Zealand waters, and the development of ways to mitigate bycatch. The Minister of Conservation can also require the production of population management plans, which can include the setting of maximum-allowable levels of fishing-related mortality for threatened species.

1.3. CSP Vision and Objectives

The 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 2013[1].

1.4 Development of the Annual Plan

The Conservation Services Programme Annual Plan 2013/14[2] describes 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 forms 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 2014. 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 2013/14 and to ensure there was no duplication. A formal consultation process was also used as described on the next page.

[1] Available to download from http://www.doc.govt.nz/csp-strategic-statement-2013
[2] Available to download from http://www.doc.govt.nz/conservation/marine-and-coastal/conservation-services-programme/csp-plans/csp-annual-plan-2013-14/

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 2013/14 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 2013/14. This process was developed jointly by the CSP team at the DOC and the Inshore Fisheries team at MPI in consultation with the Seafood Industry Council and the Federation of Commercial Fishermen.

Deepwater observer coverage was developed jointly by the CSP team at DOC and the deepwater fisheries team at MPI.

The public consultation process on the entire plan was as follows:

20 March 2013	Initial CSP research proposals for 2013/14 circulated to stakeholders
22 March 2013	Joint CSP-MPI presentation of initial research proposals to stakeholders
5 April 2013	Close of comments on initial CSP research proposals
17 April 2013	Draft Conservation Services Programme Annual Plan 2013/14 released for public consultation
29 May 2013	Public consultation period closes
14 June 2013	Summary of public submissions and response to comments completed
Mid-June 2013	Director-General of Conservation conveys the Conservation Services Programme Annual Plan 2013/14 as amended in accordance with public comments to the Minister of Conservation

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 agency that provided the services, 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 2013/14 were divided into three main areas:

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

2. Interaction Projects

2.1 INT2013-01 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 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 will continue to purchase baseline services for “offshore” fisheries from MPI Observer Services, given the scale of their operation, which allows observers to be placed strategically across New Zealand Fisheries. Where data collection involves using techniques beyond observation and recording, providers with specific expertise and/or equipment will be considered. For the purposes of providing costings, the rate provided by MPI Observer Services has been used. As such, for the purposes of planning, costings for observer coverage are based on those provided by the MPI Observer Services to provide a best estimate.

Project status

Completed.

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 onboard 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.

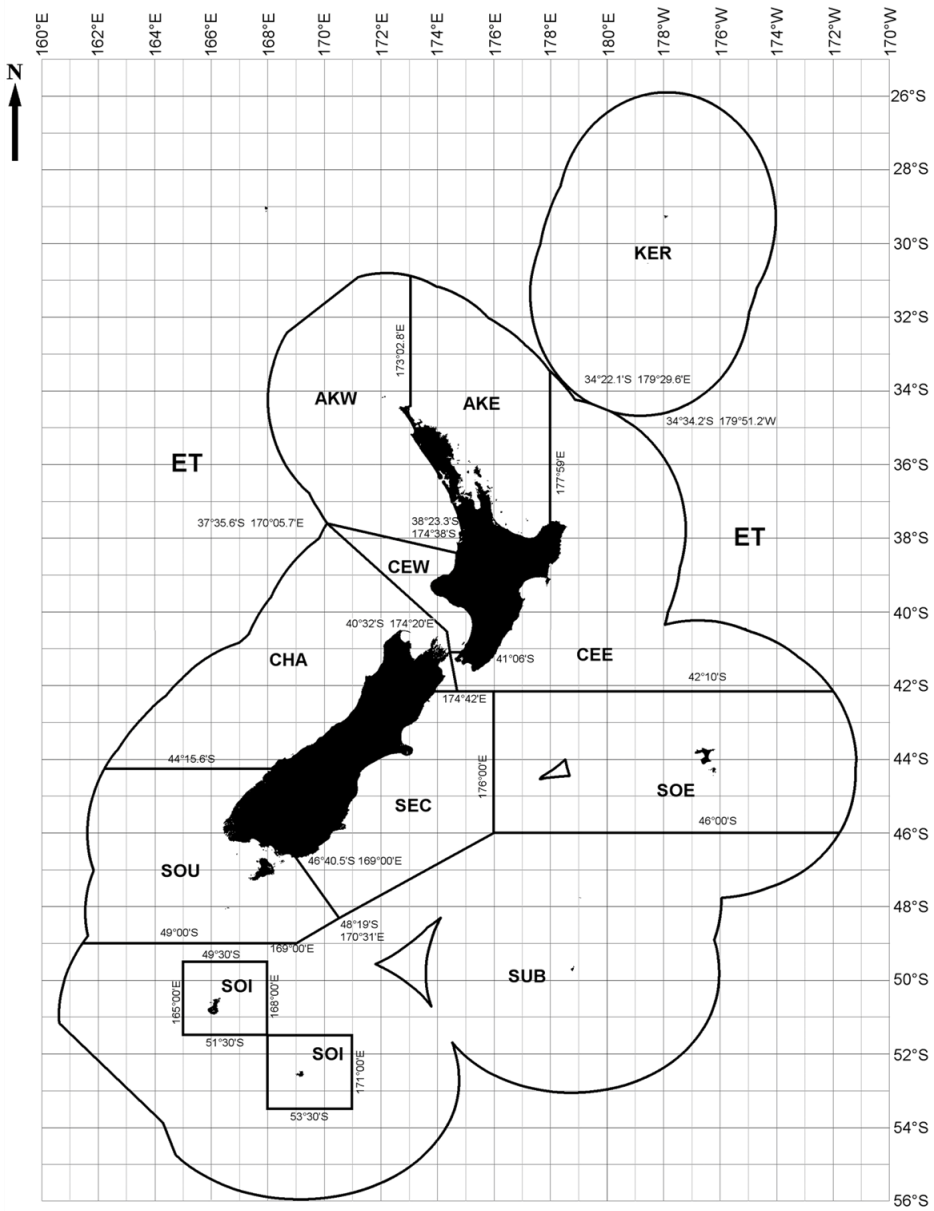
The observer coverage presented in this report extends work conducted in previous years.

The remainder of this document 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.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $1,021,140. Services were provided by the Ministry for Primary Industries Observer Services.

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 dished 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 this fishery. Over recent years there has been a gradual increase in observer coverage in this fishery and the coverage continued to increase slightly in the 2013/14 year. The highest rate of observer coverage occurred in the SOU, SUB and CHA FMAs, with over 40% coverage at each location. The greatest numbers of observed tows were recorded in the CHA FMA, which also had the highest recorded effort.

A total of 313 seabird interactions were observed in this fishery, with over half of them occurring in the SEC and SOU FMAs. A total of 64 marine mammal interactions were reported. Nearly all of the interactions occurred in the CEE (49%) and CHA (43%) FMAs, with a high incidence of mammal interactions recorded in September 2013 in the CEE FMA. As compared to the previous observer year, the rate of seabird captures increased by 76%, and the rate of marine mammal capture increased by 18% (Clemens-Seely et al. 2014a). Three protected fish captures were also observed, all net captured basking sharks. As compared to previous year, the rate of coral catch decreased by 43% (Clemens-Seely et al. 2014a), with most of the catch occurring in the SEC FMA. 85% of the coral catch was soft coral which is not protected under the Wildlife Act 1953.

In summary, 146 trips were conducted onboard 32 vessels, with protected species captures occurring on 71 tips onboard 26 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 2013/14 observer year.

FMA	Effort tows	Observed tows	Coverage (%)	Seabird captures	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows	Protected fish	Protected Fish per 100 tows	Coral catch (kg)	Coral catch per 100 tows (kg)
1. AKE	389	42	10.80	2	4.76	0	0.00	0	0	0.2	0.48
2. CEE	2,087	107	5.13	0	0.00	30	28.04	0	0	0.00	0.00
3. SEC	3,421	1,021	29.85	99	9.70	6	0.59	3	0.29	640.58	62.74
4. SOE	1,799	666	37.02	34	5.11	0	0.00	0	0	14.60	2.19
5. SOU	1,624	662	40.76	89	13.44	1	0.15	0	0	2.40	0.36
6. SUB	1,575	687	43.62	38	5.53	1	0.15	0	0.0	11.60	1.69
7. CHA	5,382	2,176	40.43	51	2.34	26	1.19	0	0	3.40	0.16
8. CEW	35	1	2.86	0	0.00	0	0.00	0	0	0.00	0.00
9. AKW	33	0	-	-	-	-	-	-	-	-	-
Total	**16,345**	**5,362**	**32.81**	**313**	**5.84**	**64**	**1.19**	**3**	**0.06**	**672.78**	**12.55**

Table 2 reports the numbers of interactions by species and fate immediately post interaction. Larger numbers of sooty shearwater, white-chinned petrel and white-capped albatross were caught in this fishery than in previous years (Ramm 2010, Ramm 2012a, Ramm 2012b and Clemens-Seely et al. 2014a and Clemens-Seely et al. 2014b).

Similar to the previous reporting year, marine mammal captures were dominated by New Zealand fur seals, and these generally resulting mortalities. Around 90% of the marine mammal captures occurred during the Cook Strait spawn fishery, from June through September, while majority of the seabird interactions occurred outside of this area from October through December and April through May.

Table 2. Protected species interactions in the hake, hoki, ling and warehou middle depth trawl fisheries during the 2013/14 observer year.

Species Name	Alive	Dead	Decomposing	Unknown	Total
Birds					
Albatrosses (Unidentified)	4	1		1	6
Buller's albatross	7	23			30
Buller's and Pacific albatross		1			1
Campbell albatross		1			1
Cape petrels	3	1			4
Chatham Island albatross		1			1
Common diving petrel	1				1
Fairy prion	5				5
Flesh-footed shearwater	1	1			2
Giant petrels (Unidentified)	2				2
Petrel (Unidentified)	5				5
Petrels, Prions and Shearwaters	2				2
Prions (Unidentified)	5				5
Salvin's albatross	13	30			43
Short-tailed shearwater		2			2
Smaller albatrosses	2			2	4
Sooty shearwater	33	58			91
Southern royal albatross	1				1
Westland petrel	10	2			12
White-capped albatross	13	18			31
White-chinned petrel	37	26			63
White-faced storm petrel	1				1
Birds Total	**145**	**165**	**0**	**3**	**313**
Marine Mammals					
New Zealand fur seal	13	46			59
Common dolphin	1				1
Seals and Sea lions			1		1
Marine Mammals Total	**14**	**46**	**1**		**61**
Protected Fish					
Basking shark	1	2			
Protected Fish Total	**1**	**2**			**3**
Grand Total	**160**	**213**	**1**	**3**	**377**

Tables 3a & b detail the broad method of interaction for each species. Net capture was the most prevalent form of interaction overall. Only 2% of the impact against vessel interactions resulted in mortalities.

Table 3. Method of interaction for a) protected species and b) dead protected species observed in the hake, hoki, ling and warehou middle depth trawl fisheries during the 2013/14 observer year.

a) Protected species released alive

Species Name	Caught in net	Caught on warp door	Impact against vessel	Other	Tangled in line	Unknown	Total
Birds							
Albatrosses (Unidentified)	2		1			1	4
Buller's albatross	5		2				7
Cape petrels	1		1	1			3
Common diving petrel						1	1
Fairy prion			2	1		2	5
Flesh-footed shearwater	1						1
Giant petrels (Unidentified)				2			2
Petrel (Unidentified)	3			1		1	5
Petrels, Prions and Shearwaters				2			2
Prions (Unidentified)	1		3			1	5
Salvin's albatross	9		1	2		1	13
Smaller albatrosses	1	2					3
Sooty shearwater	27		4		1	1	33
Southern royal albatross			1				1
Westland petrel			3	7			10
White-capped albatross	6		2	3		2	13
White-chinned petrel	16		21				37
White-faced storm petrel			1				1
Birds Total	**72**	**2**	**42**	**19**	**1**	**10**	**146**
Marine Mammals							
New Zealand fur seal	13						13
Common dolphin				1			1
Marine Mammals Total	**13**			**1**			**14**
Protected Fish							
Basking shark	1						1
Protected Fish Total	**1**						**1**
Grand Total	**86**	**2**	**42**	**20**	**1**	**10**	**161**

b) Dead protected species

Species Name	Caught in net	Caught on warp or door	Impact against vessel	Other	Tangled in line	Unknown	Grand Total
Birds							
Albatrosses (Unidentified)	1	1					2
Buller's albatross	11	9		1	2		23
Buller's and Pacific albatross		1					1
Campbell albatross	1						1
Cape petrels				1			1
Chatham Island albatross		1					1
Flesh-footed shearwater		1					1
Salvin's albatross	14	13			1	2	30
Short-tailed shearwater	2						2
Smaller albatrosses	1						1
Sooty shearwater	56		1			1	58
Westland petrel	1					1	2
White-capped albatross	12	2			2	2	18
White-chinned petrel	23	1			1	1	26
Birds Total	**122**	**29**	**1**	**2**	**6**	**7**	**167**
Marine Mammals							
New Zealand fur seal	43			1		2	46
Seals and Sea lions	1						1
Marine Mammals Total	**44**	**0**	**0**	**1**	**0**	**2**	**47**
Protected Fish							
Basking shark	2						2
Protected Fish Total	**2**						**2**
Grand Total	**168**	**29**	**1**	**3**	**6**	**9**	**216**

Southern Blue Whiting

The southern blue whiting fishery operates both spatially and temporally separate from other middle depth trawl fisheries. The location of fishing effort is variable and dependent of 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, and Clemens-Seely et al. 2014).

Historically, the southern blue whiting fishery is one of the most highly observed fisheries (Clemens-Seely et al. 2014). In the 2013/14 season there was an increase in the absolute number of tows observed, with 100% observer coverage achieved. The data showed an anomaly in the number of tows reported by observers versus vessels, with two additional tows reported by the observers.

As compared to the previous observer season (2012/13), the rate of seabird captures increased significantly, with over a fivefold increase. The rate of marine mammal captures increased by 84% compared to the 2012/13 year (Clemens-Seely et al. 2014a), with high numbers of both New Zealand fur seal and New Zealand sea lion caught.

In summary, 17 trips were conducted onboard 10 vessels, with protected species captures occurring on 10 trips onboard 8 vessels.

Table 4. Summary of commercial effort, observer effort and protected species captures in the southern blue whiting fishery during the 2013/14 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 (kg)
1. AKE	-	-	-	-	-	-	-	-	-
2. CEE	-	-	-	-	-	-	-	-	-
3. SEC	-	-	-	-	-	-	-	-	-
4. SOE	-	-	-	-	-	-	-	-	-
5. SOU	-	1	-	0	0	0	0	0	0
6. SUB	777	778	100.1	29	3.7	46	6	4.2	1
7. CHA	-	-	-	-	-	-	-	-	-
8. CEW	-	-	-	-	-	-	-	-	-
9. AKW	-	-	-	-	-	-	-	-	-
Total	**777**	**779**	**100.1**	**29**	**3.7**	**46**	**6**	**4.2**	**1**

In table 5, protected species interactions are broken down by species and fate immediately post interaction. Over 70% of the seabird interactions and 90% of the marine mammal interactions resulted in mortalities. All of the protected species interactions occurred from August through September, with especially high interaction rate in August, both for seabirds and marine mammals.

Table 5. Protected species interactions in the southern blue whiting fishery during the 2013/14 observer year.

Species Name	Alive	Dead	Unknown	Total
Birds				
Albatrosses (Unidentified)		1	1	2
Black-browed albatross (Unidentified)	1			1
Cape petrels	2			2
Grey petrel	2	11		13
Prions (Unidentified)	1			1
Salvin's albatross	1	9		10
Birds Total	**7**	**21**	**1**	**29**
Marine Mammals				
New Zealand sea lion	4	17		21
New Zealand fur seal		25		25
Marine Mammals Total	**4**	**42**		**46**
Grand Total	**11**	**63**	**1**	**75**

Tables 6a, b and c detail the method of interaction by species. Net captures were the most common form of interaction and almost exclusively resulted in mortality. Similar to the previous year, a single vessel accounted for over 45% of the species mortalities, most of which were grey petrels and New Zealand fur seal. One unidentified albatross species was recorded with an unknown fate as the bird hit the deck in high winds and was blown overboard before the observer could determine the fate or accurate species of the bird.

Table 6. Method of interaction for a) protected species released alive, b) dead protected species and c) protected species with unknown fate observed in the southern blue whiting fishery during the 2013/14 observer year.

a) Protected species released alive

Species Name	Caught in net	Impact against vessel	Grand Total
Birds			
Black-browed albatross (Unidentified)		1	1
Cape petrels	2		2
Grey petrel		2	2
Prions (Unidentified)		1	1
Salvin's albatross		1	1
Birds Total	**2**	**5**	**7**
Marine Mammals			
New Zealand sea lion	**4**		4
Marine Mammals Total	**4**		**4**
Grand Total	**6**	**5**	**11**

b) Dead protected species

Species Name	Caught in net	Caught on warp or door	Other	Grand Total
Birds				
Albatrosses (Unidentified)		1		1
Grey petrel	11			11
Salvin's albatross	3	6		9
Birds Total	**14**	**7**		**21**
Marine Mammals				
New Zealand sea lion	17			17
New Zealand fur seal	24		1	25
Marine Mammals Total	**41**		**1**	**42**
Grand Total	**55**	**7**	**1**	**63**

c) Protected species with unknown fate

Species Name	Impact against vessel	Grand Total
Birds		
Albatrosses (Unidentified)	1	1
Birds Total	**1**	**1**
Grand Total	**1**	**1**

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.

In comparison to the previous year (2012/13) the overall observer coverage for this fishery has decreased by 59%, with substantial reduces in the CEE and SUB FMAs, but a slight increase in the AKE FMA (Table 7). The rate of mammal captures is comparable to that of the previous year, with two interactions observed, but the rate of seabird captures has more than doubled (Clemens-Seely et al. 2014a).

In summary, 4 trips were conducted onboard 4 vessels. Protected species captures occurred on all 4 of the trips.

Table 7. Summary of the commercial effort, observer effort and protected species captures in the scampi fishery during the 2013/14 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 (kg)
1. AKE	752	103	13.7	14	13.6	0	-	0.0	-
2. CEE	399	3	0.8	0	0.0	-	-	-	-
3. SEC	20	0	0.0	-	-	-	-	-	-
4. SOE	2,018	92	4.6	10	10.9	0	-	25.7	27.9
5. SOU	-	-	-	-	-	-	-	-	-
6. SUB	1,230	56	4.6	2	3.6	2	4	30.0	53.6
7. CHA	11	0	0.0	-	-	-	-	-	-
8. CEW	-	-	-	-	-	-	-	-	-
9. AKW	-	-	-	-	-	-	-	-	-
Total	**4,430**	**254**	**5.7**	**26**	**10.2**	**2**	**1**	**55.7**	**21.9**

Table 8 reports the numbers of interactions by species and fate immediately post interaction. Half of the species interactions occurred in the AKE FMA on a single vessel. Over half of all interacting seabirds were released alive.

Table 8. Protected species interactions in the scampi fishery during the 2013/14 observer year.

Species Name	Alive	Dead	Decomposing	Grand Total
Birds				
Albatrosses (Unidentified)		6		6
Black (Parkinson's) petrel	3			3
Common diving petrel	1			1
Flesh-footed shearwater	10			10
Salvin's albatross		3		3
White-capped albatross		1		1
White-chinned petrel	2			2
Birds Total	**16**	**10**		**26**
Marine Mammals				
New Zealand sea lion			2	
Marine Mammals Total			**2**	**2**
Grand Total	**16**	**10**	**2**	**28**

Tables 9a and b detail the broad method of interaction for each species. Impact against vessel was the most common form of interaction by always resulted in the release of the animals involved. Warp or door captures were the second most common interaction and always resulted in mortalities. The two suspected New Zealand sea lions were in an intermediate state of decomposition and suffered severe damage to the head with the skulls being crushed. This is most likely due caused by the trawl warps/doors.

Table 9. Method of interaction for a) protected species released alive and b) dead and decomposing protected species observed in the scampi fishery during the 2013/14 observer year.

a) Protected species released alive

Species Name	Caught in net	Impact against vessel	Grand Total
Birds			
Black (Parkinson's) petrel		3	3
Common diving petrel		1	1
Flesh-footed shearwater		10	10
White-chinned petrel	2		2
Birds Total	**2**	**14**	**16**
Grand Total	**2**	**14**	**16**

b) Dead and decomposing protected species

Species Name	Caught on warp or door	Grand Total
Birds		
Albatrosses (Unidentified)	6	6
White-capped albatross	3	3
White-chinned petrel	1	1
Birds Total	**10**	**10**
Marine Mammals		
New Zealand sea lion	2	2
Marine Mammals Total	**2**	**2**
Grand Total	**12**	**12**

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 these captures has included white-capped albatross, sooty shearwaters and white-chinned petrels. 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 fishery, with high levels of coverage also being achieved in SOU as the vessels trawl en route to and from SQU6T.

Seabird captures in this fishery tend to vary between years dependent upon the spatial and temporal activity of vessels and it's overlap with breeding seabirds, in particular white-chinned petrels and sooty shearwaters. Compared to the previous observer season (2012/13), the rate of seabird captures has decreased by 29% (Clemens-Seely et al. 2014a). The majority of the seabird captures occurred in the SOU FMA between the months of January and April. The rate of protected fish captures in this fishery is known to be highly variable and in 2013/14 decreased significantly from the year before, with only one basking shark caught.

In summary, 60 trips were conducted onboard 15 vessels. Protected species captures occurred on 47 trips onboard all 15 vessels.

Table 10. Summary of commercial effort, observer effort and protected species captures in the squid fishery during the 2013/14 observer year.

FMA	Effort tows	Observed tows	Coverage (%)	Seabird captures	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows	Protected fish	Protected fish per 100 tows	Coral catch (kg)	Coral catch per 100 tows (kg)
1. AKE	-	-	-	-	-	-	-	-	-	-	-
2. CEE	-	-	-	-	-	-	-	-	-	-	-
3. SEC	94	75	79.79	6	8.00	4	5	0	0.00	0.3	0.4
4. SOE	2	1	50.00	0	0.00	0	0	0	0.00	0.0	0.0
5. SOU	1,211	1,065	87.94	181	17.00	4	0	0	0.00	140.4	13.2
6. SUB	738	614	83.20	32	5.12	4	1	1	0.16	0.9	0.1
7. CHA	-	-	-	-	-	-	-	-	-	-	-
8. CEW	-	-	-	-	-	-	-	-	-	-	-
9. AKW	-	-	-	-	-	-	-	-	-	-	-
Total	**2,045**	**1,755**	**85.82**	**219**	**12.48**	**12**	**0.74074**	**1**	**0.06**	**141.6**	**8.1**

Table 11 reports the numbers of interactions by species and fate immediately post interactions. Similar to previous years, white-chinned petrel, white-capped albatross and sooty shearwater accounted for a large part of the seabird interactions. In addition, a large number of unidentified petrels were reported in this fishing year, these were live released without being photographed and so further identification was not possible.

Table 11. Protected species interaction in the squid fishery during the 2013/14 observer year.

Species Name	Alive	Dead	Unknown	Grand Total
Birds				
Albatrosses (Unidentified)		1		1
Antarctic prion		1		1
Buller's albatross	3	4		7
Buller's and Pacific albatross	1			1
Chatham Island albatross	1			1
Mid-sized petrels & Shearwaters	1		1	2
Common diving petrel	1			1
Petrel (unidentified)	35			35
Procellaria petrels	5	3		8
Salvin's albatross	1			1
Shearwaters	1			1
Smaller albatrosses	1			1
Sooty shearwater	16	30		46
Westland petrel	1	1		2
White-capped albatross	15	32		47
White-chinned petrel	29	33		62
White-headed petrel	1	1		2
Birds Total	**112**	**106**	**1**	**219**
Marine Mammals				
New Zealand fur seal	1	9		10
New Zealand sea lion		2		2
Marine Mammals Total	**1**	**11**		**12**
Protected Fish				
Basking shark	1			1
Protected Fish Total	**1**			**1**
Grand Total	**114**	**117**	**1**	**232**

Tables 12a, b & c detail the broad method of interaction for each species. Net capture was the most prevalent form of interaction overall and was responsible for 80% of all species interactions, and was responsible for 76% of the mortalities. Petrel and shearwater species were caught exclusively in the net while albatross species interacted with both nets and trawl warps. One species was recorded with unknown fate as the bird was released before the observer could assess the injury status.

Table 12. Method of interaction for a) protected species released alive, b) dead protected species and c) protected species with unknown fate observed in the squid fishery during the 2013/14 observer year.

a) Protected species released alive

Species Name	Caught in net	Impact against vessel	Other	Unknown	Grand Total
Birds					
Buller's albatross	3				3
Buller's and Pacific albatross	1				1
Chatham Island albatross			1		1
Mid-sized petrels & Shearwaters		1			1
Common diving petrel				1	1
Petrel (unidentified)	34			1	35
Procellaria petrels	5				5
Salvin's albatross	1				1
Shearwaters	1				1
Smaller albatrosses	1				1
Sooty shearwater	13			3	16
Westland petrel	1				1
White-capped albatross	11	2	1	1	15
White-chinned petrel	24	1	1	3	29
White-headed petrel	1				1
Birds Total	**96**	**4**	**3**	**9**	**112**
Marine Mammals					
New Zealand fur seal	1				
Marine Mammals Total	**1**				
Protected Fish	1				1
Basking shark	1				1
Protected Fish Total	**1**				**1**
Grand Total	**98**	**4**	**3**	**9**	**114**

b) Dead protected species

Species Name	Caught in net	Caught on warp or door	Impact against vessel	Other	Unknown	Grand Total
Birds						
Albatrosses (Unidentified)					1	1
Antarctic prion	1					1
Buller's albatross	3	1				5
Procellaria petrels	3					3
Sooty shearwater	28				2	30
Westland petrel	1					1
White-capped albatross	13	17		1	1	32
White-chinned petrel	29				4	34
White-headed petrel			1			1
Birds Total						
Marine Mammals	**78**	**18**	**1**	**1**	**8**	**106**
New Zealand fur seal	9					
New Zealand sea lion	**2**					
Marine Mammals Total	**11**					**11**
Grand Total	**89**	**18**	**1**	**1**	**8**	**117**

c) Protected species with unknown fate

Species Name	Caught in net	Grand Total
Birds		
Mid-sized Petrels and Shearwaters	1	1
Birds 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. As all the vessels in this fishery are larger than 28m, they are required by law to deploy bird capture mitigation devices.

In the 2012/13 year, observer coverage levels reached the highest percentage since 2004/05 (Rowe 2009, Rowe 2010, Ramm 2010, Ramm 2012a, Ramm 2012b, Clemens-Seely et al. 2014a and Clemens-Seely *et al.* 2014b). This year the observer coverage levels increased again, now reaching 56.4%. The highest numbers of observed tows were reported from the SEC, CHA and CEW FMAs, those areas also had the highest fishing effort. Differences between observed and commercially reported tows are apparent in the data; this may be due to differences in reported target species or FMA.

As compared to the previous observer season (2012/13) the rate of seabird captures decreased by 54% and the rate of mammal capture decreased by 18%. Although the capture rate for seabirds and marine mammals increased last year, analysis of the rates of marine mammal and seabird captures demonstrate an overall decline since the 2004/05 season (Rowe 2009, Rowe 2010, Ramm 2010, Ramm 2012a, Ramm 2012b, Clemens-Seely et al. 2014a and Clemens-Seely *et al.* 2014b).

The highest rate of seabird interactions was reported from the SOU FMA and the highest rate of marine mammal interactions from the CEW area, where 68% of the interaction occurred.

In summary, 86 trips were conducted onboard 17 vessels. Protected species captures occurred on 27 trips onboard 9 vessels.

Table 13. Summary of commercial effort, observer effort and protected species captures in the jack mackerel and barracouta pelagic trawl fisheries during the 2013/14 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 (kg)
1. AKE	29	4	13.79	0	0.00	0	0.00	0.00	0
2. CEE	27	0	0.00	-	-	-	-	-	-
3. SEC	1,581	623	39.41	16	2.57	3	0.48	1.50	0.24
4. SOE	108	127	117.59	3	2.36	0	0.00	1.00	0.79
5. SOU	197	142	72.08	6	4.23	0	0.00	0.30	0.21
6. SUB	-	-	-	-	-	-	-	-	-
7. CHA	1,562	750	48.02	3	0.40	9	1.20	2.20	0.29
8. CEW	1,225	944	77.06	2	0.21	28	2.97	2.30	0.24
9. AKW	312	255	81.73	0	0.00	1	0.39	0.00	0.00
Total	**5,041**	**2,845**	**56.44**	**30**	**1.05**	**41**	**1.44**	**7.30**	**0.26**

Table 14 reports the numbers of interactions by species and date immediately post interaction. The common dolphin accounted for 68% of the marine mammal interactions, which is comparable to the previous year (Clemens-Seely et al. 2014a). All marine mammal interactions in this fishery resulted in mortalities.

Both seabird and marine mammal interactions occurred mostly from October to December which is also the period when the greatest effort is recorded for this fishery.

Table 14. Protected species interaction in the jack mackerel and barracouta pelagic trawl fisheries during the 2013/14 observer year.

Species Name	Alive	Dead	Grand Total
Birds			
Buller's albatross		1	1
Common diving petrel	1	1	2
Fairy prion	2	1	3
Petrels, Prions and Shearwaters	1		1
Prions (Unidentified)	1		1
Salvin's albatross	2	7	9
Smaller albatrosses	1		1
Sooty shearwater	1	1	2
Storm petrels	1		1
White-capped albatross		2	2
White-chinned petrel	1	6	7
Birds Total	**11**	**18**	**30**
Marine Mammals			
Common dolphin		28	28
New Zealand fur seal		13	13
Marine Mammals Total		**41**	**41**
Grand Total	**11**	**59**	**71**

Tables 15a & b detail the broad method of interaction for each species. Net capture was by far the most prevalent form of interaction overall, and 95% of them resulted in mortalities. All of the marine mammal interactions were in the form of net capture.

Table 15. Method if interaction for a) protected species released alive and b) dead protected species observed in the jack mackerel and barracouta pelagic trawl fisheries during the 2013/14 observer year.

a) Protected species released alive

Species Name	Caught in net	Impact against vessel	Other	Unknown	Grand Total
Birds					
Common diving petrel		1			1
Fairy prion			2		2
Petrels, Prions and Shearwaters			1		1
Prions (Unidentified)		1			1
Salvin's albatross	1			1	2
Smaller albatrosses	1				1
Sooty shearwater			1		1
Storm petrels				1	1
White-chinned petrel	1				1
Birds Total	**3**	**2**	**4**	**2**	**11**
Grand Total	**3**	**2**	**4**	**2**	**11**

b) Dead protected species

Species Name	Caught in net	Grand Total
Birds		
Buller's albatross	1	1
Common diving petrel	1	1
Fairy prion	1	1
Salvin's albatross	7	7
Sooty shearwater	1	1
White-capped albatross	2	2
White-chinned petrel	6	6
Birds Total	**19**	**19**
Marine Mammals		
Common dolphin	28	28
New Zealand fur seal	13	13
Marine Mammals Total	**41**	**41**
Grand Total	**60**	**60**

Deep Water Bottom Trawl Fisheries

Orange Roughy, Cardinal, and Oreo species

In deep water bottom trawl fisheries, a main focus is the impact of the trawls on benthic communities, in particular 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.

As compared to the previous reporting year, observer coverage dropped by 6% (Clemens-Seely et al. 2014a). No observer coverage was conducted in the CEE FMA, where 29% of the total effort was recorded.

Observed seabird captures went up from being zero, to a rate of 1.40 seabirds per 100 tows. No marine mammal captures were observed this year.

Due to the nature of the fishery, coral bycatch has historically been significantly higher than for other fisheries, but has been decreasing for the previous years. 492.6 kg of coral catch was reported this year, with majority of the catch observed in the SEC, SOE and SUB FMAs. 70% of the coral catch was coral rubbles and stony corals.

In summary, 10 trips were conducted onboard 6 vessels. Other than coral catch, protected species interactions were isolated to one of the trips.

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 2013/14 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 (kg)
1. AKE	348	24	6.90	-	-	-	-	0.6	3
2. CEE	929	0	0.00	-	-	-	-	-	-
3. SEC	754	61	8.09	3	5	-	-	135.0	221
4. SOE	1,540	154	10.00	2	1	-	-	240.0	156
5. SOU	91	7	7.69	-	-	-	-	2.0	29
6. SUB	219	12	5.48	-	-	-	-	109.0	908
7. CHA	214	78	36.45	-	-	-	-	-	-
8. CEW	2	0	0.00	-	-	-	-	-	-
9. AKW	202	16	7.92	-	-	-	-	6.0	38
Total	**4,299**	**352**	**8.19**	**5**	**1.40**	-	-	**492.6**	**140**

Table 17 reports the number of interactions by species and fate immediately post interaction. Nearly all of the interactions were albatrosses, and in total, 80% of the interactions resulted in mortalities.

Table 17. Protected species interactions in the orange roughy, cardinal and oreo deep water bottom trawl fisheries during the 2013/14 observer year.

Species Name	Alive	Dead	Grand Total
Birds			
Salvin's albatross		1	1
Sooty shearwater		1	1
Cape petrels	1		1
Albatrosses (Unidentified)		1	1
Southern royal albatross		1	1
Birds Total	**1**	**4**	**5**
Grand Total	**1**	**4**	**5**

Table 18a & b detail the broad method of interaction for each species. The one bird listed under other form of interaction was retrieved from the paravane of one of the vessels.

Table 18. Method of interaction for a) protected species released alive and b) dead protected species observed in the orange roughy, cardinal and oreo deep water bottom trawl fisheries during the 2013/14 observer year.

a) Protected species released alive

Species Name	Impact against vessel	Grand Total
Birds		
Cape petrels	1	1
Birds Total	**1**	**1**
Grand Total	**1**	**1**

b) Dead protected species

Species Name	Caught in net	Caught on warp or door	Other	Grand Total
Birds				
Salvin's albatross			1	1
Sooty shearwater	1			1
Albatrosses (Unidentified)		1		1
Southern royal albatross		1		1
Birds Total	**1**	**2**	**1**	**4**
Grand Total	**1**	**2**	**1**	**4**

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. Particularly 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, ether seasonally or sporadically. As a result, observers often spend much of their time on shore or travelling between ports.

Although there has been a decrease in the percentage of coverage in this fishery since 2008/09 (Ramm 2010, Ramm 2012a, Ramm 2012b, Clemens-Seely et al. 2014a and Clemens-Seely et al. 2014b), the coverage this year went up by 279% from the coverage recorded in the previous year (Clemens-Seely et al. 2014a). Much of this coverage increase occurred in the AKE snapper fishery. This was driven out of ministerial directives for high levels of coverage to monitor snapper discards. The SEC, CHA and CEE FMAs had the highest effort but AKE, SEC and AKW had the greatest number of observed tows.

There were no seabird or marine mammal interactions reported for this fishery in the previous year), but this year, 26 seabird and 3 mammal captures were observed. Half of the seabird interactions occurred in the AKE FMA and the marine mammal interactions occurred in the AKE, SEC and AKW FMAs.

In summary, 44 trips were conducted onboard 33 vessels. Protected species captures occurred on 5 trips onboard 5 vessels.

Table 19. Summary of commercial effort, observer effort and protected species captures in the inshore trawl fisheries during the 2013/14 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 (kg)
1. AKE	7,483	907	12.12	13	1.43	1	0.11	7.50	0.83
2. CEE	9,871	77	0.78	1	1.30	-	-	0.40	0.52
3. SEC	13,553	239	1.76	4	1.67	1	0.42	20.10	8.41
4. SOE	266	0	0.00	-	-	-	-	-	-
5. SOU	4,226	1	0.02	2	200.00	-	-	-	-
6. SUB	3	0	0.00	-	-	-	-	-	-
7. CHA	11,596	143	1.23	5	3.50	-	-	-	-
8. CEW	1,531	25	1.63	1	4.00	-	-	-	-
9. AKW	3,262	256	7.85		0.00	1	0.39	71.20	27.81
Total	**51,791**	**1,648**	**3.18**	**26**	**1.58**	**3**	**0.18**	**99.20**	**6.02**

Table 20 reports the number of interactions by species and fate immediately post interaction. Half of the seabird interactions and all of the mammal interactions resulted in mortalities.

Table 20. Protected species interaction in the inshore trawl fisheries during the 2013/14 observer year.

Species Name	Alive	Dead	Grand Total
Birds			
Black (Parkinson's) petrel	5		5
Flesh-footed shearwater	1	6	7
Sooty shearwater	2		2
Petrel (Unidentified)	1		1
White-capped albatross		5	5
Giant petrels (Unidentified)	1		1
Snares Cape petrel	1	1	2
Fairy prion	1		1
Westland petrel	1	1	2
Birds Total	**13**	**13**	**26**
Marine Mammals			
New Zealand fur seal		2	2
Common dolphin		1	**1**
Marine Mammals Total		**3**	**3**
Grand Total	**13**	**16**	**29**

Table 21 a & b detail the broad method of interaction for each species. Net capture was the most prevalent form of interaction overall, accounting for nearly half of the captures.

Table 21. Method of interaction for a) protected species released alive and b) dead protected species observed in the inshore trawl fisheries during the 2013/14 observer year.

a) Protected species released alive

Species Name	Caught in net	Impact against vessel	Unknown	Grand Total
Birds				
Black (Parkinson's) petrel	5			**5**
Fairy prion		**1**		**1**
Flesh-footed shearwater		1		1
Petrel (Unidentified)		1		1
Giant petrels (Unidentified)		1		1
Snares Cape petrel			1	1
Westland petrel	1			1
Sooty shearwater	1		1	2
Birds Total	**7**	**4**	**2**	**13**
Grand Total	**7**	**4**	**2**	**13**

b) Dead protected species

Species Name	Caught in net	Caught on warp or door	Impact against vessel	Other	Grand Total
Birds					
Black (Parkinson's) petrel					
Flesh-footed shearwater	4	2			6
Sooty shearwater					
Snares Cape petrel			1		1
White-capped albatross		4		1	5
Westland petrel		1			1
Birds Total	**4**	**7**	**1**	**1**	**13**
Marine Mammals					
Common dolphin	1				1
New Zealand fur seal	2				2
Marine Mammals Total	**3**				**3**
Grand Total	**7**	**7**	**1**	**1**	**16**

Inshore Setnet

Setnet fisheries have received only sporadic observer coverage in previous years partly due to the difficulty of placing observers onboard these generally very small vessels. Even with low levels of coverage, however, 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 Maui's dolphins.

Observer coverage was initially low in this fishery but increased in 2008/09 due to concerns about Hector's dolphin bycatch. As compared to the 2012/13 observer year, the percentage of coverage for this year increased by 11% (Clemens-Seely et al. 2014a). Observer coverage was executed in the SEC, CHA and CEW FMAs.

There were no seabird captures reported for this year, but eight interactions were reported for marine mammals, in comparison to one mammal capture observed in the previous year (Clemens-Seely et al. 2014a).

In Summary, 15 trips were conducted onboard 8 vessels. Protected species captures occurred on 5 of the trips onboard 4 vessels.

Table 22. Summary of commercial effort, observer effort and protected species captures in the inshore setnet fishery during the 2013/14 observer season.

FMA	Effort tows	Observed tows	Coverage (%)	Seabird captures	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows
1. AKE	8,053	0	0.00	-	-	-	-
2. CEE	931	0	0.00	-	-	-	-
3. SEC	3,827	60	1.57	0.0	0.0	2	3.33
4. SOE	20	0	0.00	-	-	-	-
5. SOU	821	0	0.00	-	-	-	-
6. SUB	2	0	0.00	-	-	-	-
7. CHA	932	10	1.07	0.0	0.0	3	30.00
8. CEW	1,407	495	35.18	1	0.20	4	0.81
9. AKW	7,592	0	0.00	-	-	-	-
Total	**23,585**	**565**	**2.40**	**1**	**0.18**	**9**	**1.59**

Table 26 reports the number of interactions by species and fate immediately post interaction. Five mortalities were recorded this year, all of them were mammals. One Hector's dolphin was caught in the month of November in the SEC FMA and retained.

Table 23. Protected species interactions in the inshore setnet fishery during the 2013/14 observer year.

Species Name	Alive	Dead	Grand Total
Birds			
White-capped albatross	1		1
Birds Total	**1**		**1**
Marine Mammals			
Dusky dolphin		1	1
Hector's dolphin		1	1
New Zealand fur seal	2	4	5
Marine Mammals Total	**2**	**6**	**8**
Grand Total	**3**	**6**	**9**

Tables 27a & b detail the broad method of interaction for each species. Net capture was the most prevalence method of interaction.

Table 24. Method of interaction for a) protected species released alive and b) dead protected species observed in the inshore setnet fishery during the 2013/14 observer year.

a) Protected species released alive

Species Name	Caught in net	Impact against vessel	Grand Total
Birds			
White-capped albatross		1	
Birds Total		**1**	**1**
Marine Mammals			
New Zealand fur seal	2		2
Marine Mammals Total	**2**		**3**
Grand Total	**2**	**1**	**3**

b) Dead protected species

Species Name	Caught in net	Grand Total
Marine Mammals		
Dusky dolphin	1	1
Hector's dolphin	1	1
New Zealand fur seal	4	4
Marine Mammals Total	**6**	**6**
Grand Total	**6**	**6**

Surface Longline Fisheries

Charter Tuna

The charter tuna surface longline fishery (targeting southern bluefin and bigeye tuna) has historically received high levels of observer coverage; in the 2012/13 observer year, however, coverage dropped to half. All of the fishing effort occurs in the areas SOU and CHA. Historically this fishery has had high capture numbers though this has reduced in recent years. Protected species captures have generally been of albatross and petrel species, although some marine mammals, mainly fur seals, have also been captured in this fishery.

All surface longline vessels are required to use seabird bycatch mitigation methods, with the requirement for the use of tori lines while setting and either night setting or line weighting. Some vessels also employ mitigation devices during hauling with brikle curtains and water cannons being most common. Additionally, CSP has provided turtle de-hooking equipment to all foreign charter vessels.

Sixteen seabird captures were observed in 2013/14, with all of them occurring in CHA. The rate and number of marine mammal captures was relatively high in comparison to previous years (Clemens-Seely et al. 2014a), with forty-nine interactions recorded this year.

Similar to previous years, the observer coverage for this fishery was 100%. The data showed an anomaly in the number of tows reported by observers versus vessels, with one additional tow reported by the observers.

In summary, four trips were conducted onboard four vessels. Protected species captures occurred on all trips.

Table 25. Summary of commercial effort, observer effort and protected species captures in the charter tuna surface longline fishery during the 2013/14 observer year.

FMA	Effort lines	Observed lines	Coverage (%)	Number of hooks observed	Seabird captures	Seabirds per 1000 hooks	Mammal captures	Mammal captures per 1000 hooks
1. AKE	-	-	-	-	-	-	-	-
2. CEE	-	-	-	-	-	-	-	-
3. SEC	-	-	-	-	-	-	-	-
4. SOE	-	-	-	-	-	-	-	-
5. SOU	21	22	104.76	63,053	0	0	8	0.13
6. SUB	-	-	-	-	-	-	-	-
7. CHA	165	164	99.39	482,212	16	0.03	41	0.09
8. CEW	-	-	-	-	-	-	-	-
9. AKW	-	-	-	-	-	-	-	-
Total	**186**	**186**	**100.00**	**545,265**	**16**	**0.03**	**49**	**0.09**

Table 29 reports the numbers of interactions by species and fate immediately post interaction. 88% of the total observed interactions resulted in the live release of the animals. All of the captures occurred in May and June.

Table 26. Protected species interactions in the charter tuna surface longline fishery during the 2013/14 observer year.

Species Name	Alive	Dead	Grand Total
Birds			
Buller's albatross	7	8	15
Campbell albatross	1	0	1
Birds Total	**8**	**8**	**16**
Marine Mammals			
New Zealand fur seal	49	0	49
Marine Mammals Total	**49**	**0**	**49**
Grand Total	**57**	**8**	**65**

Tables 30a & b detail the broad method of interaction for each species. Hook capture was responsible for all of the protected species captures observed with the majority of these interactions occurring during the haul.

Table 27. Method of interaction for a) protected species released alive and b) dead protected species observed in the charter tuna surface longline fishery during the 2013/14 observer year.

a) Protected species released alive

Species Name	Caught on hook	Grand Total
Birds		
Buller's albatross	7	7
Campbell albatross	1	1
Birds Total	**8**	**8**
Marine Mammals		
New Zealand fur seal	49	49
Marine Mammals Total	**49**	**49**
Grand Total	**57**	**57**

b) Dead protected species

Species Name	Caught on hook	Grand Total
Birds		
Buller's albatross	8	8
Birds Total	**8**	**8**
Grand Total	**8**	**8**

Domestic Tuna and Swordfish

The domestic tuna and swordfish fishery (targeting bigeye, Southern bluefin and swordfish) has historically had low observer coverage. This is primarily due to 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 de-hookers to aid in the quick and efficient release of not only turtles but also fur seals and a number of shark species.

Coverage in domestic tuna and swordfish has remained fairly constant over the past seven years, fluctuating around six to eight percent coverage (Rowe 2010, Ramm 2010, Ramm 2012a, Ramm 2012b, Clemens-Seely et al. 2014a and Clemens-Seely *et al.* 2014b).

As compared to the previous observer season (2012/13), the rate of seabird capture decreased by 38%, with the highest rate recorded in the CHA FMA. The rate of mammal capture decreased by 99%, with only 3 mammal interactions recorded for this year. In addition, one protected fish interaction and one marine turtle interaction was recorded this year.

In summary, 14 trips were conducted onboard 13 vessels. Protected species captures occurred on 5 of the trips onboard 5 vessels.

Table 28. Summary of commercial effort, observer effort and protected species captures in the domestic tuna and swordfish fishery during the 2013/14 observer year.

FMA	Effort lines	Observed lines	Coverage (%)	Number of observed hooks	Seabird captures	Seabirds per 1000 hooks	Mammal captures	Mammals per 1000 hooks	Protected fish captures	Protected fish per 1000 hooks	Marine turtles captures	Marine turtles per 1000 hooks
1. AKE	921	72	7.82	59,396	3	0.05	1	0.02	1	0.02	0	0.00
2. CEE	526	23	4.37	17,097	3	0.18	0.00	0.00	0.00	0.00	0	0.00
3. SEC	-	-	-	-	-	-	-	-	-	-	-	-
4. SOE	-	-	-	-	-	-	-	-	-	-	-	-
5. SOU	21	0	0.00	-	-	-	-	-	-	-	-	-
6. SUB	-	-	-	-	-	-	-	-	-	-	-	-
7. CHA	446	47	10.54	43,632	14	0.32	2	0.05	0	0.00	0	0.00
8. CEW	7	0	0.00	-	-	-	-	-	-	-	-	-
9. AKW	236	22	9.32	13,960	0	0.00	0	-	-	-	1	0.07
Total	**2,157**	**164**	**7.60**	**134,085**	**20**	**0.15**	**3**	**0.02**	**1**	**0.01**	**1**	**0.01**

Table 32 reports the number of interactions by species and fate immediately post interaction. Nearly all of the seabird interactions resulted in mortalities, eleven of which occurred on a single vessel. Buller's albatross and white-capped albatross were the most commonly caught species of seabirds and the only mammal caught was New Zealand fur seal. Additionally there was one Spiny-tailed devil ray and one marine turtle captures recorded, but both were released alive.

Table 29. Protected species interactions in the domestic tuna and swordfish fishery during the 2013/14 observer year.

Species Name	Alive	Dead	Total
Birds			
Albatrosses (Unidentified)	0	1	1
Black-browed albatross (Unidentified)	1	0	1
Buller's albatross	0	8	8
Gibson's albatross	0	1	1
Great albatrosses	0	1	1
Grey petrel	0	1	1
Southern royal albatross	1	0	1
White-capped albatross	0	5	5
White-chinned petrel	0	1	1
Birds Total	**2**	**18**	**20**
Marine Mammals			0
New Zealand fur seal	2	1	2
Marine Mammals Total	**2**	**1**	**3**
Protected fish			
Spine-tailed devil ray	1		
Protected fish Total	**1**		**1**
Marine Turtles			
Marine Turtles	1		
Marine Turtles Total	**1**		**1**
Grand Total	**6**	**19**	**25**

Tables 33a & b detail the broad method of interaction for each species. Hook capture accounted for all of the protected species interactions, with one exception of a Buller's albatross getting tangled in a line.

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 2013/14 observer year.

a) Protected species released alive

Species Name	Caught on hook	Total
Birds		
Black-browed albatross (Unidentified)	1	1
Southern royal albatross	1	1
Birds Total	**2**	**2**
Marine Mammals		
New Zealand fur seal	2	2
Marine Mammals Total	**2**	**2**
Protected fish		
Spine-tailed devil ray	1	1
Protected fish Total	**1**	**1**
Marine Turtles		
Marine Turtles	1	1
Marine Turtles Total	**1**	**1**
Grand Total	**6**	**6**

b) Dead protected species

Species Name	Caught on hook	Tangled in line	Total
Birds			
Albatrosses (Unidentified)	1		1
Buller's albatross	7	1	8
Gibson's albatross	1		1
Great albatrosses	1		1
Grey petrel	1		1
White-capped albatross	5		5
White-chinned petrel	1		1
Birds Total	**17**	**1**	**18**
Marine Mammals			
New Zealand fur seal	**1**		1
Marine Mammals Total			**1**
Grand Total	**18**	**1**	**19**

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 SEC, SOE 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 has been created. In this grouping, the offshore bottom longline fishery is characterised as all BLL vessels over 34 m in overall length. In addition, all autoliners (vessels setting over 5000 hooks per day) are characterised as offshore bottom longliners due to the difference in fishing practices and risk profile from the inshore bottom longliners.

Due to this new characterisation, it would be inconsistent to compare the coverage and catch rate this fishing year to the previous ones. The 2013/14 fishing year was back-calculated in order to have some comparison for the 14/15 fishing year.

The percentage of observer coverage for this fishery was 8.02%, with all observations recorded in the SEC, SOE and SUB FMAs. There were 44 seabird captures observed, with most of them occurring in the SOE FMA in October 2013. There were no mammal captures observed this fishing year.

In summary, five trips were conducted onboard four vessels. Protected species interactions occurred on three of the trips onboard two vessels.

Table 31. Summary of commercial effort, observer effort and protected species captures in the offshore bottom longline fishery during the 2013/14 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 (kg)
1. AKE	71	0	0.00	0	-	-	-	-
2. CEE	151	0	0.00	0	-	-	-	-
3. SEC	262	53	20.23	174,476	0	0.00	9.00	0.0516
4. SOE	2543	125	4.92	709,300	41	0.06	2.00	0.0028
5. SOU	125	0	0.00	0	-	-	-	-
6. SUB	420	109	25.95	1,117,000	3	0.00	-	-
7. CHA	0	-	-	-	-	-	-	-
8. CEW	1	0	0.00	0	-	-	-	-
9. AKW	5	0	0.00	0	-	-	-	-
Total	**3,578**	**287**	**8.02**	**2,000,776**	**44**	**0.02**	**11.00**	**0.0055**

Table 35 reports the numbers of interactions by species and fate immediately post interaction. 93% of the interactions occurred on one vessel and nearly all the captures resulted in mortality.

Table 32. Protected species interactions in the offshore bottom longline fishery during the 2013/14 observer year.

Species Name	Alive	Dead	Grand Total
Birds			
Albatrosses (Unidentified)		1	1
Buller's albatross		1	1
Cape petrels	1		1
Salvin's albatross		5	5
Short-tailed albatross		1	1
Wandering albatross (Unidentified)	2		2
White-chinned petrel		32	32
Sooty shearwater		1	
Birds Total	**3**	**41**	**44**
Grand Total	**3**	**41**	**44**

Tables 36a & b detail the broad method of interaction for each species. Hook capture was the most prevalent form of interaction, with only one capture recorded with an unknown method of interaction.

Table 33. Method of interaction for a) protected species released alive and b) dead protected species in the offshore bottom longline fishery during the 2013/14 observer year.

a) Protected species released alive

Species Name	Hook capture	Other	Grand Total
Birds			
Cape petrels	1		1
Wandering albatross (Unidentified)	1	1	2
Birds Total	**2**	**1**	**3**
Grand Total	**2**	**1**	**3**

b) Dead protected species

Species Name	Hook capture	Unknown	Grand Total
Birds			
Albatrosses (Unidentified)	1		1
Buller's albatross	1		1
Salvin's albatross	5		5
Short-tailed albatross	1		1
White-chinned petrel	32		32
Sooty shearwater		1	1
Birds Total	**40**	**1**	**41**
Grand Total	**40**	**1**	**41**

Inshore bottom longline – Ling, Bluenose, Hāpuku, and Bass

As with other inshore fishing methods, observer coverage in the inshore bottom longline fishery has been generally 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.

Because of the high variety of vessels and fishing grounds in the bottom longline fisheries, a new characterisation has been created. In this grouping, the inshore bottom longline fishery is characterised as all BLL vessels under 20 m in overall length, and all vessels between 20-34 m in overall length that set 5000 or less hooks per day.

Due to this new characterisation, it would be inconsistent to compare the coverage and catch rate this fishing year to the previous ones. The 2013/14 fishing year was back-calculated in order to have some comparison for the 14/15 fishing year.

The observer coverage for the inshore bottom longline fishery in 2013/14 only reached 1.17%, with 95,571 hooks observed. The only observed lines were in the AKE and CEW FMA, with one seabird capture recorded in AKE. No marine mammal captures were observed this year.

In summary, six trips were conducted onboard four vessels. Protected species captures occurred on one trip onboard one vessel.

Table 34. Summary of commercial effort, observer effort and protected species captures in the inshore bottom longline fisheries during the 2013/14 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	1,291	33	2.56	52,471	1	0.019	0.30	0.0057
2. CEE	1,767	-	-	-	-	-	-	-
3. SEC	607	-	-	-	-	-	-	-
4. SOE	219	-	-	-	-	-	-	-
5. SOU	281	-	-	-	-	-	-	-
6. SUB	-	-	-	-	-	-	-	-
7. CHA	1,146	-	-	-	-	-	-	-
8. CEW	661	44	6.66	43,100	0	0.000	-	-
9. AKW	612	-	-	-	-		-	-
Total	**6,584**	**77**	**1.17**	**95,571**	**1**	**0.010**	**0.30**	**0.003**

Table 23 reports the number of interactions by species and fate immediately post interaction. Table 24 detail the broad method of interaction for each species. Hook capture was the only form of interaction reported.

Table 35. Protected species interactions in the inshore bottom longline fisheries during the 2013/14 observer year .

Species Name	Alive	Grand Total
Birds		
Fluttering shearwater	1	1
Birds Total	**1**	1
Grand Total	**1**	**1**

Table 36. Method of interaction for protected species released alive in the bottom longline fisheries during the 2013/14 observer year.

a) Protected species released alive

Species Name	Hook capture	Grand Total
Birds		
Fluttering shearwater	1	1
Birds Total	**1**	**1**
Grand Total	**1**	**1**

Bottom longline - Snapper

Throughout the past eight years, coverage has been irregular in the snapper fishery. In 2009/10, nearly 8% of the fishing effort was observed, but in the 2012/13 observer year, coverage was 0.52%. This year the observer coverage increased to 6.82%, with a total of 371 lines observed in the AKE and AKW FMAs.

There were fifty observed seabird captures including seven black petrels, with nearly all of them occurring in the AKE FMA. No mammal captures were documented in the fishery this year. The majority of captures resulted in mortalities and 78% of the seabird interactions occurred in February 2014 on a single vessel. This vessel was subsequently contacted by seabird liaison officers to discuss their mitigation techniques and the events surrounding the captures.

In summary, 26 trips were conducted onboard 24 vessels. Protected species interactions occurred on 7 of the trips onboard 7 vessels.

Table 37. Summary of commercial effort, observer effort and protected species captures in the snapper bottom longline fishery during the 2013/14 observer year.

FMA	Effort lines	Observed lines	Coverage (%)	Number of hooks observed	Seabird captures	Seabirds per 1000 hooks	Mammal captures	Mammals per 1000 hooks	Coral catch (kg)	Coral catch per 1000 hooks (kg)
1. AKE	5,341	363	6.80	748,643	49	0.065	0	0	6.6	0.00882
2. CEE	5	0	0	0	0	0	0	0	0	0
3. SEC	-	-	-	-	-	-	-	-	-	-
4. SOE	-	-	-	-	-	-	-	-	-	-
5. SOU	-	-	-	-	-	-	-	-	-	-
6. SUB	1	0	-	-	-	-	-	-	-	-
7. CHA	41	0	-	-	-	-	-	-	-	-
8. CEW	1	0	-	-	-	-	-	-	-	-
9. AKW	54	8	14.81	10,700	1	0.093	0	0	0	0
Total	**5,443**	**371**	**6.82**	**759,343**	**50**	**0.066**	**0**	**0.00**	**6.6**	**0.00869**

Table 38 reports the numbers of interactions by species and fate immediately post interaction. 82% of the interactions resulted in mortalities.

Table 38. Protected species interactions in the snapper bottom longline fishery during the 2013/14 observer year.

Species Name	Alive	Dead	Grand Total
Birds			
Black (Parkinson's) petrel	1	6	7
Black-backed gull	1		2
Buller's shearwater	1	6	7
Flesh-footed shearwater	5	26	31
Fluttering shearwater	1	3	4
Birds Total	**9**	**41**	**51**
Grand Total	**9**	**41**	**50**

Tables 39a & b detail the broad method of interaction for each species. Hook capture accounted for all of the protected species interactions.

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 2013/14 observer year.

a) Protected species released alive

Species Name	Hook capture	Grand Total
Birds		
Black (Parkinson's) petrel	1	1
Black-backed gull	1	1
Buller's shearwater	1	1
Flesh-footed shearwater	5	5
Fluttering shearwater	1	1
Birds Total	**9**	**9**
Grand Total	**9**	**9**

b) Dead protected species

Species Name	Hook capture	Grand Total
Birds		
Black (Parkinson's) petrel	6	6
Black-backed gull		
Buller's shearwater	6	6
Flesh-footed shearwater	26	26
Fluttering shearwater	3	3
Birds Total	**41**	**41**
Grand Total	**41**	**41**

Purse Seine Fisheries

Skipjack Tuna

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

As compared to the previous year, the observer coverage decreased by 14.5% (Clemens-Seely et al. 2014a). Similar to the previous two years, there were no observations of seabird or mammal captures recorded. This year there was one observed protected fish capture, which is a decrease from the previous year when eleven protected fish captures were recorded.

In summary, four trips were conducted onboard four vessels. Protected species interactions occurred on one of the trips onboard one vessel.

Table 40. Summary of commercial effort, observer effort and protected species captures in the purse seine fishery during the 2013/14 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
1. AKE	237	76	32.07	0	0.00	0	0.00	1	3.12
2. CEE	3	0	-	-	-	-	-	-	-
3. SEC	0	0	-	-	-	-	-	-	-
4. SOE	0	0	-	-	-	-	-	-	-
5. SOU	0	0	-	-	-	-	-	-	-
6. SUB	0	0	-	-	-	-	-	-	-
7. CHA	144	15	10.42	0	0.00	0	0.00	0	0.00
8. CEW	70	4	5.71	0	0.00	0	0.00	0	0.00
9. AKW	21	0	-	-	-	-	-	-	-
Total	**475**	**95**	**20.00**	**0**	**0.00**	**0**	**0.00**	**1**	**1.05**

Table 41 Reports the numbers of interactions by species and fate immediately post interaction. Only one interaction was recorded this year, a spine-tailed devil ray which was released alive.

Table 41. Protected species interactions in the purse seine fishery during the 2013/14 observer year.

Species Name	Alive	Dead	Total
Protected Fish			
Spine-tailed devil ray	1		1
Protected Fish Total	**1**		**1**
Grand Total	**1**		**1**

Table 42 details the method of interaction recorded for the protected species interactions in the purse seine fishery. The only interaction was a Spine-tailed devil ray caught in the net.

Table 42. Method of interaction for protected species interactions observed in the purse seine fishery during the 2013/14 observer year.

Species Name	Caught in net	Total
Protected Fish		
Spine-tailed devil ray	1	1
Protected Fish Total	**1**	**1**
Grand Total	**1**	**1**

Other Fisheries

Observers placed in both Danish seine and albacore troll fisheries have recorded seabird captures. One diving petrel was reported caught in the net on a Danish seine trip and was subsequently released alive. Australasian gannet and a flesh-footed shearwater were hook captured and subsequently released alive during albacore troll coverage.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $722,815. Services were provided by the Ministry for Primary Industries Observer Services.

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2.2 INT2013-02 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 the offshore Foreign Charter Vessel fleet, 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 multi-year project that is due for completion in December 2016. The reporting for 2013-14 is now complete.

Summary of the methods and key findings

This summarises identification work completed on dead birds caught and returned and/or using photographs from 1 July 2013 to 31 March 2014. A total of 239 seabirds (comprising of 19 taxa) were returned from 32 vessels between 1 July 2013 and 31 March 2014. Seabirds returned to date were dominated by five species (white-chinned petrel *Procellaria aequinoctialis* (n = 77, 32.2%), Salvin's albatross *Thalassarche salvini* (n = 47, 19.7%), NZ white-capped albatross *Thalassarche steadi* (n = 40, 16.7%), sooty shearwater *Puffinus griseus* (n = 32, 13.4%) and Buller's albatross *Thalassarche bulleri bulleri* (n = 11, 4.6%)). These five species accounted for 86.6% of all returns to date. The remaining 14 taxa had either captures of between two and nine individuals or single captures. Due to the length of some fishing trips and subsequent transport it is possible some birds captured in this period may not have been received at the time of writing the quarterly report. Any further specimens received will be reported at a later date in the final report.

Examination of photographs from Ministry of Primary Industries observers gave a total of 57 birds that were reported captured or photographed as bird interactions with fishing vessels (and may include some non-capture interactions) for this period. A total of 19 seabirds were photographed and another 36 interactions were recorded by observers for the period 1 July 2013 to 31 March 2014. Of these records, 46 were of live bird interactions and 11 birds were dead. Complete examination of these photographs could not be compared with the full (1 July 2013 to 31 March 2014) Ministry of Primary Industries Central Observer Database ("COD") extract information as WMIL received an extract with data missing for January and March 2014.

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. Services were provided by Wildlife Management International Ltd.

Review milestones:

- Presentation of yearly results at the CSP TWG meeting on 20 May 2014;
- Presentation of yearly results at the CSP TWG meeting on 4 May 2015.

Citations

Bell, E. 2015. Identification of seabirds captured in New Zealand fisheries: 1 July 2013 – 30 June 2014. Report prepared by Wildlife Management International for the New Zealand Department of Conservation, Wellington, 43p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/identification-of-seabirds-captured-in-nz-fisheries-2013-14/

2.3 INT2013-03 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

Completed.

Summary of the methods and key findings

New Zealand fur seals *Arctocephalus forsteri* make up the majority of the by-catch with 103 animals (verified and unverified combined) representing 64.8% of all by-catch. The short-beaked common dolphin *Delphinus delphis* was the next largest group (29 animals, 18.2% of total), followed by the New Zealand sea lion *Phocarctos hookeri* (24 animals, 15.1% of total). The other species represented are the Dusky dolphin *Lagenorhynchus obscurus,* Hector's dolphin *Cephalorhynchus hectori* and one unidentifiable pinniped (but either NZ fur seal or NZ sea lion), represented by one animal each and 0.6% of total catch.

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. Services were provided by Anton van Helden Marine Mammal Consultant.

2.4 INT2013-04 Optimisation of observer data collection protocols

Overall objective

To review the data collected by fisheries observers in relation to understanding the interaction with protected species, and refine efficient protocols for future data collection.

Specific objectives

1. To examine the information historically collected by observers on factors relevant to protected species interactions.
2. To provide recommendations on refinement or development of data collection protocols to allow for more informative and efficient data collection.

Rationale

The data collected by observers are used primarily to inform fisheries management, risk assessment and mitigation development. Historically, much of this information was in the form of ad-hoc observations and diary comments, with various protocol improvements over time (e.g. development of standardised CSP Protected Species Abundance Form). As our understanding of protected species interactions has developed, so has our understanding of the factors which influence these interactions. Therefore it is timely and appropriate to have a reassessment, from a protected species perspective, of the data collected by observers. This will identity the most useful observations and where necessary refine and standardise the protocols and recording factors. The work will allow for more efficient use of observer time and more timely analysis of data returned. With refinement of CSP objectives currently underway as part of the development of a new CSP Strategic Statement, this project will ensure observer data collection protocols will be fully aligned to the new objectives going forward.

Project status

Completed.

Summary of the methods and key findings

The deployment of independent fisheries observers is widely recognised as a key component of best practice fisheries management. In New Zealand, observers have been a critical component of the commercial fisheries management regime since the mid-1990s. The data collection approaches and protocols used by observers in New Zealand fisheries have generally become more detailed over time, as well as covering a greater number and diversity of protected species groups and fishing gears.

Here, we review the strategic framework that generates information needs that may be addressed by fisheries observers and evaluate current observer data collection protocols in that context. The review covers international and national agreements, legislation, policies, management plans, and international approaches to observer data collection, as well as manuals, briefing notes, protocols, and forms used by observers in New Zealand fisheries. Broadly, the strategic documents reviewed focused on the achievement of sustainability in environmental management and/or the conservation of biological diversity. Information needs that creates for New Zealand in relation to commercial fisheries encompass the characteristics of the fishing operations, the nature and extent of protected species captures, the status of captured animals, the operational and environmental

factors that may contribute to captures, and, measures in place to avoid or reduce captures. Protocols and forms currently used by observers to collect data from New Zealand fisheries partially address these information needs. Scope for improvement includes ensuring clarity and consistency in observer instructions, the addition of new fields or amendments to current fields on current data collection forms, the creation of new forms to capture additional information, and, the discontinuation of forms, fields, and metrics that are redundant or no longer useful.

Priority areas in which to improve information collection relate to longline gear and protected species bycatch mitigation, purse seine gear and protected species interactions, mitigation of seabird strikes on trawl warps, cryptic mortality of protected species interacting with commercial fisheries, and coral bycatch. However, the most significant current impediment to meeting information needs is the paucity of observer coverage achieved in some fisheries, especially smaller-vessel fisheries operating in inshore areas. Ultimately, this results in a piecemeal understanding of protected species interactions with New Zealand commercial fisheries and compromises New Zealand's ability to deliver on domestic and international obligations. Regular review of the data collection approaches observers implement, combined with ensuring effective coverage of New Zealand commercial fisheries, will maximise the current and future benefits gained from observer deployments.

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. Services were provided by Dragonfly Science Ltd.

Review milestones:

- Presentation of methodology at the CSP TWG meeting on 21 November 2013;
- Presentation of draft final report at the CSP TWG meeting on 12 December 2014.

Citations

Pierre, J. P., Thompson, F. N., and Mansfield, R. 2015. Optimisation of protocols employed by New Zealand government fisheries observers for protected species data collection. Report prepared by Dragonfly Data Science for the New Zealand Department of Conservation, Wellington. 79p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/optimisation-of-protocols-employed-by-new-zealand-government-fisheries-observers-for-protected-species-data-collection/

2.5 INT2013-05 Assessment of cryptic seabird mortality on trawl warps and longlines

Overall objective
To estimate appropriate fishery and species group specific scalars to allow the robust quantification of total mortality from standard observed levels of seabird captures.

Specific objectives
1. To estimate appropriate fishery and species group specific scalars to allow the robust quantification of total mortality from standard observed levels of seabird captures.
2. To provide recommendations on future data collection, to refine these estimates further and monitor change over time.

Rationale
Recent level-2 seabird risk assessment identified the considerable uncertainty in scalars to account for unobserved or unobservable seabird mortality, or cryptic mortality. Whilst scalars have been estimated for some fisheries, their suitability to the full range of New Zealand trawl and longline fisheries is mostly untested. This project will focus designing data collection protocols, and analysis of results, to develop scalars for the inshore trawl and bottom longline fisheries, where quantitative information on cryptic mortality is particularly sparse. It is envisaged that the CSP Observer Programme will provide a platform for the collection of at-sea information.

Project status
Completed.

Summary of the methods and key findings
Understanding the nature and extent of protected species interactions between commercial fisheries and marine protected species is an essential component of best practice fisheries management. Interactions between protected species and fishing gear may be lethal or non-lethal. Mortalities due to injuries incurred during these interactions can result in the death of protected species at the time interactions occur, or sometime afterwards.

Challenges with detecting mortalities when they occur (e.g., due to dead animals not being landed on the vessel deck) or when mortalities are delayed (e.g., due to injuries that eventually cause death) result in underestimates of the true extent of protected species bycatch. Mortalities occurring in such circumstances may be termed “cryptic”. While the potential for cryptic mortalities associated with fishing operations has been acknowledged for some time, uncertainty associated with the nature and extent of cryptic mortality limits the confidence with which current estimates of this mortality can be applied. In this project, we explore scalars of cryptic mortality appropriate to the New Zealand context, based on fishery and seabird-species groups.

We review available information to inform the exploration of these scalars, and recommend options to improve the estimation of cryptic mortality in specific species/fishery groupings. Our review shows that while some empirical information is available particularly relating to pelagic longline fisheries and trawl warp strikes, overall, the knowledge base constrains the accuracy with which cryptic mortality can be assessed. To improve the estimation of cryptic mortality of seabirds in New Zealand fisheries, the information gaps considered most important to resolve relate to bottom

longline fisheries, trawl net captures, aerial warp strikes, and subsurface attacks on longline baits. Work on this project continues.

Project logistics summary statement

This project was planned as a two year project covering the periods 01 July 2013-30 June 2014 (proposed cost $40,000) and 1 July 2014-30 June 2015 (proposed cost $70,000). Following feedback received during the procurement of these services, the project was restricted to a one year review project during 2014-15 to provide recommendations on potential future data collection. The implemented project was funded jointly by CSP and MPI. The CSP component was 100% funded via Conservation Service Levies on the fishing industry. Services were provided by Dragonfly Science Ltd.

Review milestones:

- Presentation of draft final report at the CSP TWG meeting on 25 November 2014.

Citations

Pierre, J. P., Richard, Y., and Abraham, E. R. 2015. Assessment of cryptic seabird mortality due to trawl warps and longlines. Report prepared by Dragonfly Data Science for the New Zealand Department of Conservation, Wellington. 51p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/assessment-of-cryptic-seabird-mortality-due-to-trawl-warps-and-longlines/

3. Population Projects

3.1 POP2012-02 New Zealand sea lions – demographic assessment of the cause of decline at the Auckland Islands

NOTE: This multi-year project (POP2012-02) was consulted on in 2012/13.

Overall objectives

To determine the key demographic factors driving the observed population decline of New Zealand sea lions at the Auckland Islands.

Specific objectives

1. To identify which demographic parameters are the key drivers of the observed population decline of New Zealand sea lions at the Auckland Islands.
2. To identify potential demographic mechanisms through which both direct and potential indirect effects of fishing can impact on the population level of New Zealand sea lions at the Auckland Islands, or increase the susceptibility of the population to such effects.

Rationale

New Zealand sea lions are classified as Nationally Critical, 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 75% 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. Over the last decade there has been a considerable decline in pup production at the Auckland Islands, and while disease events have occurred over this period, direct fishing bycatch is the major known anthropogenic impact on the population. In contrast, pup production appears to have increased on Campbell Island, the second major breeding location for the species. A literature review to identify potential indirect effects of commercial fishing on the Auckland Islands population as part of CSP project POP2010-01 has recently been completed. The review highlighted a number of key information gaps that currently prevent a full understanding of any such potential indirect effects.

In order to manage the commercial fisheries impacts on New Zealand sea lions at the Auckland Islands it is critical to understand the key demographic factors driving trends in the population and how fishing impacts on these parameters, or how any demographic processes influencing the population may alter its susceptibility to fishing impacts. This project aims to both identify these key parameters and identify the mechanisms through which fishing impacts are influencing these parameters and hence influencing the population trend.

Project status

Completed.

Summary of the methods and key findings

State space demographic models fitted to mark-recapture, pup census and age distribution observations were developed using NIWA's demographic modelling software SeaBird to estimate year-varying survival, probability of pupping and age-at-first-pupping.

For the Sandy Bay population, variation was observed in all demographic rate estimates when using the optimal model configuration. Generally low pupping rates (including occasional years with very low estimates), a declining trend in cohort survival to age 2 since the early 1990s and relatively low adult survival (age 6-14) since 1999 may be sufficient to explain declining pup counts at Sandy Bay since the late 1990s. Similar time-trends in survival at age were obtained with respect to year for the Dundas population when adopting a similar model configuration to that used for Sandy Bay.

In addition, a correlative assessment was conducted with the aim of identifying the potential causes of demographic variation and population change in NZ sea lions at the Auckland Islands.

Year-varying demographic rate estimates for females at Sandy Bay were related to a collated dataset of climatic, dietary, biological and fishery-related observations. Hypothetical biological and demographic responses to candidate drivers of population change were identified prior to the correlative assessment.

In most cases, the time series of available data were short and were mostly available for the period of population decline and this compromised the power of correlative assessments.

A correlation with cohort survival to age 2 years was consistent with disease-related mortality affecting a decline in survival after 2005. Prior to 2005, pup mass at 3-weeks appeared to have been a good predictor of cohort survival to age 2.

Poor correlations were obtained when relating survival at ages 2-5 (juveniles) or age 6-14 (adults) to estimated captures and interactions in the Southern arrow squid trawl fishery at the Auckland Islands (SQU6T). However, a strong negative correlation was observed between survival at ages 6-14 (1999-2004) and cohort survival to age 2 in the previous year (1998-2003), which would be consistent with the high energetic costs of lactation affecting maternal survival during this time period.

Climate indices including Inter-decadal Pacific Oscillation (IPO) and sea surface height (SSH) were well-correlated with the occurrence of an array of key prey species in the diet, from an analysis of scats. However, a longer time series of climate and diet data, with cyclic fluctuations, would be needed to establish a causative correlation with diet.

Variable diet composition, a decline in maternal condition, changes in milk quality and in pup mass, and depressed pupping rates, are all consistent with changes in nutritional status, though some of these responses could also occur in response to pup mortality that was not driven by nutritional stress.

Project logistics summary statement

This project was 90% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $50,000. Services were provided by the National Institute of Water and Atmospheric Research.

Review milestones:

- Initial results presented at CSP TWG meeting on 20 May 2014,
- Draft final report presented at the CSP TWG meeting on 26 August 2014.

Citation

Demographic assessment:
Roberts, J., and Doonan, I. 2014. NZ sea lion: demographic assessment of the causes of decline at the Auckland Islands: demographic model options – demographic assessment. Report prepared by the National Institute of Water and Atmospheric Research for the New Zealand Department of Conservation, Wellington. 142p.

Correlative assessment:
Roberts, J., and Doonan, I. 2014. NZ sea lion: demographic assessment of the causes of decline at the Auckland Islands: demographic model options – correlative assessment. Report prepared by the National Institute of Water and Atmospheric Research for the New Zealand Department of Conservation, Wellington. 58p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/nz-sea-lion-demographic-model-auckland-islands/

3.2 POP2012-06 Salvin's albatross – population estimate and at-sea distribution

NOTE: This multi-year project (POP2012-06) was consulted on in 2012/13.

Overall objective

To estimate the at-sea distribution and population size and trend of Salvin's albatross at the Bounty Islands.

Specific objectives

1. To determine the foraging range of Salvin's albatross at the Bounty Islands.
2. To estimate the population size of Salvin's albatross at the Bounty Islands.
3. To determine the population trend of Salvin's albatross at the Bounty Islands with reference to historic data.

Rationale

Salvin's albatross is endemic to New Zealand, with the main breeding population at the Bounty Islands. Salvin's albatross has been recorded bycaught predominantly in trawl fisheries, in relatively high numbers, and has been identified as at potentially high risk from commercial fisheries impacts. There is poor knowledge of Salvin's albatross currently, limited mainly to study of the small population at The Snares Islands. In late 2011 an expedition to the Bounty Islands collected population information on Salvin's albatross on two islands, and initial results suggest a substantial population decline since 2004, in addition to apparent declines from 1997 to 2004. The apparent decline in population combined with relatively high fisheries risk makes obtaining robust population information for this species a high priority requirement to ensure fisheries impacts can be adequately managed. An aerial census of the Bounty Islands was also completed in 2010, and whilst this method showed promise as a suitable monitoring method, ground-truthing is required. No tracking data has been collected for Salvin's albatross at the Bounty Islands. Determining the population trend and foraging ranges of the Bounty Islands population has also been recognised internationally as a research priority.

Project status

Completed.

Summary of the methods and key findings

Salvin's albatrosses *Thalassarche salvini* is an abundant albatross species present throughout the year on all continental shelf areas around New Zealand. This species is essentially endemic to New Zealand, breeding mainly on the Bounty Islands and the Western Chain of The Snares.

The population status of this species is poorly known. In October 2010 and 2013 we completed aerial surveys of the Bounty Islands and photographed all albatross colonies we observed. The photographs were used to compile photo-montages of each colony, and these images were used to count the breeding birds on each island. Ground counts of nesting Salvin's albatrosses were also undertaken on Proclamation Island on 23 October 2013, to determine the proportions of nests containing eggs and non-breeding birds present in the colony. These ground counts indicated that the mean proportion of breeding birds in the colony between 1000 to 1600 hours was 0.74 (range 0.71 — 0.77). The mean proportion of occupied nests that contained eggs over the same period was 0.90 (range 0.88 — 0.91).

Estimated annual counts for all breeding sites in the Bounty Islands were adjusted to account for the presence of non-breeding birds, giving an estimate of the annual breeding pairs in 2013 of 39,995 (95% CI 39,595 — 40,395). For purposes of comparison, we applied the same correction factor to 2010 counts as well, as we have no other basis for determining the proportion of non-breeding birds present in the colony at the time of the 2010 counts. These adjusted figures for 2010 (31,786 annual breeding pairs, 95% CI 31,430 — 32,143) indicate that substantially more birds (26%) were breeding in 2013.

Aerial survey of the Bounty Islands proved to be an effective method of rapidly assessing the population size of Salvin's albatross in the Bounty Islands, and our population estimates of represent the first complete population surveys of the species on the archipelago. The proportion of loafing birds in the colonies (25.8%) was high, but this may be normal at this stage (mid-incubation period) of the albatross breeding cycle. If future aerial counts are to be conducted, consideration could be given to conducting surveys earlier in the breeding cycle when the proportion of non-breeding birds present is likely to be lower.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $80,000 for the period 1 July 2012-30 June 2013, and $120,000 for the period 1 July 2013-30 June 2014. Services were provided by the National Institute of Water and Atmospheric Research (population data review and at-sea tracking) and Latitude 42 Environmental Consultants Pty Ltd (2013 aerial survey).

Review milestones:

- Presentation of at sea distribution at the CSP TWG meeting on 6 June 2014;
- Draft report tabled on 25 July 2014.

Citations

Aerial population estimate:
Baker, G.B., Jensz, K., Sagar, P. 2014. Final Report. 2013 Aerial survey of Salvin's albatross at the Bounty Islands. Report prepared by Latitude 42 Environmental Consultants Pty Ltd for the New Zealand Department of Conservation, Wellington. 10p.

At-sea distribution:
Thompson, D., Sagar, P., Torres, L. Charteris, M. 2014. POP2012-06 Salvin' albatross at-sea distribution draft report. Salvin's albatrosses at the Bounty Islands: at-sea distribution. Report prepared by the National Institute of Water and Atmospheric Research for the New Zealand Department of Conservation, Wellington. 13p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/salvins-albatross-research-aerial-survey-2013/

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/salvins-albatross-at-sea-distribution-2012-13/

3.3 POP2013-01 New Zealand sea lion population project (Auckland Islands)

Overall objective

To estimate New Zealand sea lion pup production in the Auckland Islands and collect data to allow the estimation of key demographic parameters

Specific objectives

1. To estimate New Zealand sea lion pup production at Enderby, Figure of 8 and Dundas Islands.
2. To mark New Zealand sea lion pups at Enderby and Dundas Islands following established techniques.
3. To conduct a three to five week period of resighting previously marked animals at Enderby Island.
4. To update the New Zealand sea lion database.

Rationale

New Zealand sea lions are classified as Nationally Critical, 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 75% 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 has recently been completed. The review highlighted a number of key information gaps that currently prevent a full understanding of any such potential indirect effects.

In order to manage the commercial fisheries impacts on New Zealand sea lions at the Auckland Islands it is critical to understand the population level and key demographic factors driving trends in the population. CSP project POP2012-02 is currently analysing 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 This project will extend the time series of population data available.

The current SQU6T Operational Plan[3] includes a trigger point related to New Zealand sea lion pup production at the Auckland Islands, and this project will provide the estimate for 2013/14.

Project status

Completed.

[3] See http://www.fish.govt.nz/en-nz/Consultations/Archive/2011/Squid+fishery+around+the+Auckland+Islands/default.htm

Summary of the methods and key findings

Blue Planet Marine (BPM) was contracted by the Conservation Services Programme (CSP) of the Department of Conservation (DOC) to provide services for CSP Project 4522 – New Zealand sea lion ground component for the 2013/14 summer field season. The field component of the work was undertaken from January 6 until 11 March 2014 and was completed successfully. This report provides a summary of the work completed. In summary:

New Zealand sea lion monitoring was undertaken between 9 January and 9 March 2014 at Figure of Eight Island (n=1d), Dundas Island (n=3d) and Enderby Island (n=59d) in the Auckland Islands group. The research closely followed previously used methodology with a few minor exceptions (e.g. monitoring at Dundas Island was 2 days earlier than previously). Overall, the research went well and achieved all stated objectives.

Pup production was estimated for New Zealand sea lion colonies at Sandy Bay (n=290), Dundas Island (n=1,213), Figure of Eight Island (n=72) and South East Point (n=0) with total pup production for the Auckland Islands in 2013/14 estimated as 1575. This total represents an 18% decline on the estimate from 2013 and is the third lowest total pup production recorded for the Auckland Islands.

711 pups were double flipper tagged at Sandy Bay (n=287), Dundas Island (n=400), Figure of Eight Island (n=24) and South East Point (n=0) up until 20th January 2014.

A total of 11,076 individual tag, brand and micro-chip resightings were made during the field season. Most of the resighting records were from tags (n=9,982; 90%) with brand and micro-chip resighting comprising approximately 5% each (n=530 and 560 respectively). This season represents the highest ever number of resighting records collected; five times more than in 2012/13 and 1.4 times more than the previously highest season in 2002/03 (2012/13 = 2,262; 2011/12 = 6,914; 2002/03 = 8,139). Most resightings (99%) were collected on Enderby Island and most (95%) of these at Sandy Bay.

Preliminary estimates of pup mortality to the date of the mark recapture are comparable to previous 'non-epidemic' years with the caveat that these figures do not represent full season surveys as in previous years and so should be viewed as a minimum. Pup mortality estimates to the date of the mark recapture are: Sandy Bay 2%, Dundas Island 6% and Figure of Eight Island 14%. Total pup mortality to 8 March was 73 pups. Data on the cause of death were not included as a deliverable of the DOC CSP contract but this work was undertaken independently by Massey University and Deepwater Group Ltd. It will be reported separately.

Mean pup weights at Sandy Bay were 5% lower than 2012/13 for males and females. Mean pup weights at Dundas Island were 8% and 5% lower than 2012/13 for males and females respectively.

Project logistics summary statement

This project was 90% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $200,000. Services were provided by Blue Planet Marine.

Review milestones:

- Ground survey methodology report for 2013/14 tabled at the CSP TWG meeting on 21 November 2013;
- Presentation of draft ground count results at the CSP TWG meeting on 6 March 2014;
- Presentation of final results at the CSP TWG meeting on 17 April 2014.

Citation

Childerhouse, S., Hamer, D., Maloney, A., Michael, S., Donnelly, D., and Schmitt, N. 2014. Final Report CSP Project 4522 New Zealand sea lion ground component 2013/14. Report prepared by Blue Planet Marine for the New Zealand Department of Conservation, Wellington. 31p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/new-zealand-sea-lion-ground-survey-2013/

3.4 POP2013-02 White-capped albatross population estimate (Auckland Islands)

Overall objective
To estimate the population size and trend of white-capped albatross at the Auckland Islands using aerial survey methods.

Specific Objective
1. To estimate the population size of white-capped albatross at the Auckland Island.
2. Determine the population trend of white-capped albatross at the Auckland Island

Rationale
White-capped albatross is endemic to New Zealand and breeds predominantly on the Auckland Islands. This species has been one of the most commonly recorded bycaught protected species in New Zealand waters, particularly in off-shore trawl fisheries, and was identified as one of the seabird species at highest risk from New Zealand commercial fisheries. Updated information on the population trend will assist in determining the susceptibility of this population to fisheries impacts as well as allow future assessment of ongoing fisheries management in regards to impacts on this species. Population modelling in a fisheries context concluded that global fishing bycatch (but not New Zealand fishing only) presents a risk to population viability and highlights the absence of information on juvenile survival and age at first breeding. Updated information on the population trend will assist in determining the susceptibility of this population to fisheries impacts as well as allow future assessment of ongoing fisheries management in regards to impacts on this species.

Project status
Completed.

Summary of the methods and key findings
White-capped albatrosses *Thalassarche steadi* are endemic to New Zealand, breeding on Disappointment Island, Adams Island and Auckland Island in the Auckland Island group, and Bollons Island (50-100 pairs) in the Antipodes Island Group. Between 2006/07 and 2013/14 (hereinafter 2006 and 2013, respectively) we undertook repeated population censuses of the white-capped albatrosses breeding in the Auckland Islands using aerial photography. These population censuses were carried out in either December or January each year to estimate population size and track population trends.

In 2013 we estimated that there were 89,552 (95%CI 88,953 — 90,151), 5,542 (5,393 — 5,691) and 184 (157— 211) annual breeding pairs at Disappointment Island, South West Cape and Adams Island, respectively, based on the raw counts, giving a total for these sites of 95,278 (94,661 — 95,895) breeding pairs.

To assess population trend in total counts we used an appropriate Generalised Linear Model where the response was specified as an over dispersed Poisson distribution and the link was logarithmic. To allow for possible non-linear trend effects we used regression splines with a single knot at 2010. We also assessed trend using software program TRIM (TRends and Indices for Monitoring Data), the standard tool used by the Agreement for the Conservation of Albatrosses and Petrels (ACAP).

Evidence from a series of 'close-up' photographs taken each year (2007-2013) indicates that the number of non-breeding birds present in the colonies differed somewhat between December and January. The proportion was very low in December counts (1-2% of birds present), but higher in the January counts (14% of birds present). Estimated annual counts for all three breeding sites in the Auckland Islands were adjusted to account for the presence of non-breeding birds, giving adjusted estimates of annual breeding pairs of 116025, 90036, 96118, 73838, 76119, 92692, 102273 and 74031 for each year from 2006 to 2013 inclusive. These adjusted figures were used as inputs into models used for assessment of population trend.

Trend analysis for all sites combined using regression splines showed no clear evidence for systematic monotonic decline over the 8 years of the study. This is particularly so if the count for 2006 is excluded. Given this we do not have sufficient evidence to reject the null hypothesis of no systematic trend in the total population. The population size estimates computed from the TRIM model indicate an average growth rate of -3.16% per year (lamda = 0.9684 ± 0.001; assessed by TRIM as moderate decline. We note, however, that a simple linear trend analysis, as performed by TRIM is not well suited to a data set with high inter-annual variability. Trend analysis using regression splines is more appropriate to such data sets, and the TRIM analysis is only presented because it is currently used by ACAP to assess population trends in albatross populations.

In a global review of fisheries-related mortality of shy and white-capped albatrosses it was estimated that 8,000 white-capped albatrosses were killed each year as a result of interactions with trawl and longline fisheries in the Southern Ocean. This level of mortality highlights the need to continue to acquire accurate population estimates and trends for white-capped albatross populations to assess the impact of fisheries operations on this species. Although annual counts over the last seven years indicate the population is stable, ongoing population monitoring is recommended to clarify if current levels of fishing mortality are sustainable.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $60,000. Services were provided by Latitude 42 Environmental Consultants Pty Ltd.

Review milestones:

- Presentation of operational plan at the CSP TWG meeting on 21 November 2013;
- Presentation of draft final report at the CSP TWG meeting on 17 April 2014.

Citation

Baker, G.B., Jensz, K. Cunningham, R. 2014. White-capped albatross aerial survey 2014. Report prepared by Latitude 42 for the New Zealand Department of Conservation, Wellington. 21p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/white-capped-albatross-population-estimate-2014/

3.5 POP2013-03 Gibson's albatross population study (Auckland Islands)

Overall objective

To estimate the population trend, fecundity and age-class survival of Gibson's albatross at the Auckland Islands.

Specific objectives

1. To estimate the population size and trend of Gibson's albatross at the Auckland Islands.
2. To estimate the adult survival of Gibson's albatross at the Auckland Islands.

Rationale

This taxon (*Diomedea antipodensis gibsoni*) is endemic to New Zealand and breeds only at the Auckland Islands. Reported incidental captures have been predominantly from surface longline fisheries. The population has exhibited a marked decline in the population since 2005 due to reductions in adult survival, proportion of adults breeding and breeding success. Adult survival was the parameter contributing most uncertainty to the risk ratio. Further information on population size and trend, and updated estimates of adult survival will inform updated fisheries risk assessment work and allow future assessment of ongoing fisheries management in regards to impacts on this taxon.

Project status

Completed.

Summary of the methods and key findings

The size and trend of the Gibson's wandering albatross population is estimated by counts of active nests in representative parts of their main breeding area, Adams Island, and by mark-recapture estimate of the size of the population in a large & intensively monitored study area there. Albatross nests are counted annually in one low, one medium and one high nest-density area, which collectively supports about 25% of the total population. Nests are counted at the end of the laying period by walking in strips through each block, guided by GPS. Population size and survivorship are estimated by mark-recapture analysis of data collected in a 61 ha study area of medium density albatross nesting habitat. Each year during repeated visits to the study area in January and February the following is undertaken: the nesting success of the previous year's nests are assessed and all chicks produced banded; all birds nesting within the study area are banded or their existing bands recorded and their nests marked and mapped; and all banded non-breeding birds visiting are recorded.

Following a substantial decline in the number of breeding birds and nests in 2005 and 2006 there has been a gradual increase in the number of nests, though the number of birds has remained approximately stable at a new low level. This is because the proportion of birds nesting has increased, while the size of the breeding population remains unchanged. While still lower than before the population crash, nesting success has improved. In time this may replenish the pre-breeding population bank which has been shrinking as birds are pulled into the breeding population to replace all those lost in the population crash. However, if it happens at all, this will be a slow

process, as there has now been nearly a decade when only small number of birds bred and success was very poor.

Adult survivorship is still lower than it was before the crash in 2005 and 2006, though there is now less of an imbalance between male and female survivorship.

The situation for Gibson's albatross has improved since 2006, but it is still far from a healthy population. We are unable to estimate from our data on the breeding population the rate of change occurring in the whole pop i.e. whether it is continuing to decline. Time will tell. 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.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $60,000. Services were provided by Albatross Research.

Review milestones:

- Presentation draft final report at the CSP TWS meeting on 6 June 2014.

Citation

Elliott, G., and Walker, K. 2014. Gibson's wandering albatross at Adams Island—population study. Report prepared by Albatross Research for the New Zealand Department of Conservation, Wellington. 13p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/gibsons-albatross-research-adams-island-2014/

3.6 POP2013-04 Black petrel population project

Overall objective

To estimate the population trend, fecundity and age-class survival of black petrel at Great Barrier Island (Aotea Island).

Specific objectives

1. To estimate the black petrel population size at Great Barrier Island and describe the population trend by comparing the estimate to relevant existing data.

Rationale

Black petrels are endemic to New Zealand and breed only on Great Barrier Island (Aotea Island) and Hauturu/Little Barrier Island. Black petrels have been observed caught in trawl, surface longline and bottom longline fisheries. Recent level-2 seabird risk assessment identified this species as at greatest risk from commercial fishing in New Zealand, and found estimates of adult survival to be a major source of uncertainty. Considerable research on black petrels on Great Barrier Island and estimates of key population parameters for Great Barrier Island have been made, though estimates of juvenile survival remain highly uncertain. Further time-series data will improve our understanding of the population dynamics and allow future assessment of ongoing fisheries management in regards to impacts on this species.

Project status

Completed.

Summary of the methods and key findings

This report is part of an ongoing long-term study of the black petrel, *Procellaria parkinsoni*, on Great Barrier Island (Aotea Island) that was begun in the 1995/96 breeding season. During the 2013/14 breeding season, 410 study burrows within the 35-ha study area near Mount Hobson were checked and intensively monitored. Of these, 266 were used by breeding pairs, 101 by non-breeding adults, and the remaining 43 burrows were unoccupied.

By 1 May 2014, 185 chicks were still present in the study burrows and 2 had already fledged, corresponding to a breeding success of 70.3%. Nine census grids were monitored within the study area and accounted for 157 of the inspected burrows and 152 study burrows, with 95 burrows being used for breeding. Ninety-two chicks from earlier breeding seasons were recaptured within the Mount Hobson colony area this season (a total of 172 'returned chicks' have been caught since the 1999/2000 season).

Analysis of the stratified census grid and mean transect data estimated that there were 2097 to 2465 birds present in the 35-ha area around Mount Hobson (Hirakimata). Modelling of the black petrel population on Great Barrier Island (Aotea Island) was updated and indicated the population trend may lie anywhere between -2.3% and +2.5% per annum driven primarily by uncertainty over juvenile survival (with the current estimate suggesting a declining population).Thirty-three high-resolution GPS i-Got-U™ data-loggers and 17 Lotek™ LAT1900-8 time-depth recorders were deployed between January 2014 and February 2014 on breeding black petrels to obtain at-sea distribution and foraging behaviour. The at-sea distribution of black petrels was derived from 20 full or partial GPS tracks.

Birds foraged around the northern New Zealand and towards East Cape. Foraging behaviour showed black petrels dived to a maximum of -34.3 m, with over 80% of dives less than 5 m. The majority of dives (67%) were during the day.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $60,000. Services were provided by Wildlife Management International Ltd.

Review milestones:

- Presentation of preliminary analysis of demographic parameters and the population project at the CSP TWG meeting on 20 May 2014;

Citation

Bell, E.A., Mischler, C., Sim, J.L., Scofield, P., Francis, C., Abrahams, E., and Landers, T. 2014. At-sea distribution and population parameters of the black petrels (*Procellaria parkinsoni*) on Great Barrier Island (Aotea Island), 2013/14. Report prepared by Wildlife Management International Ltd. for the New Zealand Department of Conservation, Wellington. 98p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/black-petrel-at-sea-distribution-and-population-estimate-2013-14/

3.7 POP2013-05 Development of coral distribution modelling

Overall objective

To describe the distribution of deep sea corals in relation to areas where they are at risk of interactions with commercial fishing gear.

Rationale

A number of protected coral taxa are known to be bycaught in commercial fisheries in New Zealand, particularly deepwater trawls targeting orange roughy or oreo species. In order to understand the risk to protected corals, and ensure commercial fishing impacts on protected corals is minimised, it is important to quantify the spatial extent of these impacts. This project will expand on recent work to more robustly identify the distribution of deep sea corals by utilising additional sources of information relevant to the distribution of corals. This information will form a vital component of future risk assessment and fisheries management of areas where corals are at highest risk of interactions with commercial fishing gear.

Project status

Completed.

Summary of the methods and key findings

This project was split in to two subprojects:

1. *Refined habitat suitability modelling for protected coral species in the New Zealand EEZ.*

The estimated distributions of protected coral species within the New Zealand region have been updated with recently constructed environmental grids for seafloor saturation levels of aragonite and calcite, forms of calcium carbonate integral to the formation of the endoskeleton of cold-water corals. The new models focussed on distributions of key individual species and genera: four species of reef-building scleractinian corals, four genera of alcyonacean corals, and four genera of antipatharian corals.

The variables with the most influence across all of the models were dynamic topography and bottom temperature. Surprisingly, aragonite and calcite saturation had only a moderate influence in most of the models. As most of the presence records were at locations with supersaturated aragonite and calcite, it was postulated that saturation values above this level may produce only a limited improvement in the corals ability to incorporate these carbonate ions into their skeletons.

A substantial predicted overlap with the 20-year trawl footprint (>50%) occurs across the EEZ for *Goniocorella dumosa*, and low overlaps (<25%) are predicted for *Enallopsammia rostrata, Primnoa spp*., and *Bathypathes spp*. On the Chatham Rise, overlaps >50% occur for *Goniocorella dumosa*, *Solenosmilia variabilis*, *Madrepora oculata*, *Keratoisis spp*. and *Lepidisis spp*., and all genera of antipatharians except for *Bathypathes*; an overlap of <25% occurs only for *Keratoisis spp*. & *Lepidisis spp*. For all taxa, however, there exist substantial areas of predicted presence outside of the historic trawl footprint in various refuges across the EEZ.

2. *Pilot ecological risk assessment for protected corals*.

A Productivity-Susceptibility-Analysis (PSA) was carried out for 15 protected coral species or groups assessing the relative risk to protected coral species from deepwater bottom trawling for orange roughy fishery on the Chatham Rise. The PSA produces a plot of susceptibility and productivity scores, and also derives an overall relative risk index. The results can give scientists and managers a better understanding of this type of ecological risk assessment (ERA) methodology, as well as the various aspects and characteristics of a coral species and the fishery that contribute to its risk, and inform potential management approaches.

The assessment considered various sources of information on the distribution of corals and fishing that provided information on the "availability" and "encounterability" attributes. Knowledge of the shape and size of corals, and studies on trawling impacts helped assess the "selectivity" of a trawling encounter, and then biological data such as age, growth, reproduction, colonisation, and dispersal were used to evaluate the "productivity" of a coral species or group, which reflects its ability to recover from trawling.

Black corals (at the order level, and the genus *Bathypathes*) and the gorgonian coral genus *Paragorgia*, were classified as high risk. Most reef-building scleractinian corals, as well as other gorgonian coral taxa, were medium risk, and cup corals and hydrocorals were relatively low risk. These results were consistent with expectations based on the form and biology of the corals, and knowledge of trawling impacts.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $60,000. Services were provided by the National Institute of Water and Atmospheric Research.

Review milestones:

- Draft final report presented at the CSP TWG Technical Working Group on 25 November 2014.

Citation

Anderson, O., Tracey, D., Bostock, H., Williams, M., and Clark, M. 2014. Refined habitat suitability modelling for protected coral species in the New Zealand EEZ. Report prepared by the National Institute of Water and Atmospheric Research for the New Zealand Department of Conservation, Wellington. 46p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/protected-coral-distribution-modelling-2014/

3.8 POP2013-06 Update protected fish review: oceanic whitetip shark

Overall objective

To describe population information and the nature and extent of interactions with commercial fishing for oceanic white-tip sharks, to the extent possible from existing information.

Specific objectives

1. To review existing information to describe the nature and extent of interactions between commercial fishing and oceanic white-tip sharks.
2. To identify information gaps in the understanding of the nature and extent of interactions between commercial fishing and oceanic white-tip sharks, and provide recommendations for further research to address any gaps identified.
3. To review existing information to describe population information relevant to assessing risk from commercial fishing to oceanic white-tip sharks.
4. To identify population information gaps relevant to assessing risk from commercial fishing to oceanic white-tip sharks, and provide recommendations for further research to address any gaps identified.

Rationale

The oceanic whitetip shark was afforded absolute protection under the Wildlife Act 1953 in January 2013. This project aims to supplement the review of information on all other protected fish species, conducted as part of CSP project POP2011-03. This information is required in order to understand the nature and extent of adverse effects of commercial fishing on oceanic whitetip sharks, and will identify key information gaps in existing information.

Project status

Completed.

Summary of the methods and key findings

The oceanic whitetip shark, Carcharhinus longimanus, was protected under the Wildlife Act in 2013. This study documents and describes its interactions with commercial fisheries in New Zealand waters, and locates and describes the available population information relevant to assessing the risk to this species. Information on catches was obtained from the literature, commercial catch statistics, and observer records. The catch distribution, seasonality, fishing method, and reported totals are described. Population and biological characteristics are reviewed.

The oceanic whitetip shark is a tropical species that is rarely seen or caught in northern New Zealand. Only 19 observer and two commercial fishery records were located (one of which occurred in both datasets). All records came from surface longlines set in the Kermadec Fisheries Management Area or off the northeastern coast of North Island. Captures around North Island were made in the warmer months of the year whereas captures in the Kermadec FMA were made mainly in the cooler months. Most (84%) of the observed sharks were alive when hauled to the vessel, and about half were processed in some way with the remainder being discarded. Few of the observed sharks were sexed or measured, but those that were comprised equal numbers of males and females, and ranged between 158 and 190 cm fork length.

Given the low commercial reporting rate (1 out of 19 observed sharks) and the low observer coverage of domestic surface longliners, our estimate of the interaction of the surface longline fisheries with oceanic whitetips is substantially under-estimated. Despite that, oceanic whitetips are clearly not caught very often, and are not regarded as a high priority species for research or management.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $8,000. Services were provided by the National Institute of Water and Atmospheric Research.

Review milestones:

- Report tabled at CSP TWG Presentation 26 August 2014.

Citation

Francis, M. P., and Lyon, W. S. 2014. Review of commercial fishery interactions and population information for the oceanic whitetip shark, a protected New Zealand species. Report prepared by the National Institute of Water and Atmospheric Research for the New Zealand Department of Conservation, Wellington. 15p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/review-of-commercial-fishery-interactions-and-population-information-for-the-oceanic-whitetip-shark/

4. Mitigation Projects

4.1 MIT2013-01 Sea trials of the Kellian line setter

Overall objective

To test the at-sea feasibility, and to the extent possible, the effectiveness, of reducing the availability of hooks to seabirds by using the improved Kellian line setter, in inshore bottom longline fisheries.

Specific objectives

1. To identify the range of bottom longline gear configurations and conditions that allows effective and safe use of the device by conducting experimental at-sea trials.
2. To describe line sink profiles of bottom longlines set through the device, as a proxy for mitigation effectiveness.
3. To provide recommendations on any further development and refinement of the device that may be required to enable reliable, effective and safe use in commercial bottom longline fishing operations.

Rationale

Recent level-2 seabird risk assessment has highlighted the high degree of potential risk that small vessel (inshore) bottom longline fisheries pose to a number of protected species, such as black petrels and flesh-footed shearwaters. Preliminary results from CSP project MIT2011-04 indicates that substantial improvements in design of the Kellian line setting device have been achieved and a modified prototype suitable for deployment in a commercial fishing environment will shortly be available. The findings from that project are due to be finalised in July 2013. This project will conduct at-sea testing of the modified prototype.

Project status

In progress.

Summary of the methods and key findings

A total of 6 trips were conducted on board the fishing vessel Kotuku, a 10 m bottom longliner fishing from Tauranga. Each trip involved a series of deployments and test runs, generally in calm sea conditions. GoPro cameras were employed to record the attitude of the setter in the water and the passage of fishing gear through the setter.

The setter was deployed and vessel speed was gradually increased from 2 - 4.5 knots, and the tow rope was gradually payed out to a maximum length of 15m. The linesetter sat reasonably straight at low speeds (< 2 knots), pulling slightly to starboard. With a longer tow rope and at higher speeds the setter ran progressively further off to starboard and at a shallower angle, before breaking the surface at about 4 knots. The KLS 2 also appeared to roll over at speed, such that the ball was further out to starboard than the top.

Over the following four trips a series of systematic changes were made to the setter to improve its performance. Changes included adding an adjustable paravane beside the funnel, increasing the

weight of the ball, increasing the length of the stud above the ball, moving the towing point, and adding a second paravane above the ball.

For each of the trips a series of test runs were performed with different settings. Speed through the water (4.5 knots) and tow rope length (10 m) were kept consistent for all runs. The horizontal angle of the setter behind the boat, the depth it was running at, its attitude in the water (angle of pitch and roll) and the loading on the towline were recorded. Following each trip data was analysed, modifications to the setter made, and a 'run sheet' or test plan was formulated to trial different settings for the subsequent trip.

This iterative approach involved balancing of the various forces acting on the line setter so that it ran at depth and straight behind the boat. The extra weight further below the setter also provided more stability, making it less sensitive to small adjustments and less susceptible to towing at large angles of roll. During trip 5 a small amount of gear was deployed through the setter with a couple of momentary hook catch ups, and on examining the video footage it was thought that a more normal set with a longer longline, and more tension in the backbone, would produce a more representative and consistent indication of performance.

A short set through the linesetter was performed with reasonable tension in the backbone, slightly more than would be used under normal fishing conditions, as it was thought that this would help keep the line in the setter. A 15 m tow rope was used, such that the setter ran at an estimated depth of 4 - 4.5 m, and speed through the water was initially 4, and then increased to 5, knots. Hooks were initially set slowly but as no problems were noted they were clipped on at normal (4 m) spacing for the majority of the set. Three hundred baited hooks were set through the device with three weights and 2 floats added to the line after the hooks. On examination of the video footage from the set the line came out of the back roller as the setter was lowered into the water. Therefore the set was conducted with the line running under the back roller. The setter tracked straight behind the boat with minimal (< 5 degrees) clockwise roll and a pitch angle of approximately 15 degrees nose down. The longline rubbed the front edge of the funnel but generally the passage of hooks was clean, either under or beside the funnel. A couple of traces were lost, and a couple of baits were seen coming off on the video, but overall the setter performed well and allowed the line to be set at depth and to catch some fish.

The developments outlined above may be best achieved by taking the setter back to the Australian Maritime College where modifications could be made and subsequent performance assessed in the flume tank. Ideally the setter could then be briefly taken to sea in Australia to confirm that the results from the flume tank can be then be achieved behind a vessel at speeds of 5 - 6 knots. Further development in the flume tank would also provide the opportunity to fine tune the funnel shape and paravane settings to optimise performance, prior to continuing further sea trials in New Zealand where operational performance and workability of the setter can be assessed under normal fishing conditions.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $110,000. Services were provided by Latitude 42 Environmental Consultants Pty. Ltd.

Review milestones:

- Presentation of the proposed methods at the CSP TWG meeting on 21 November 2013;

- CSP Project update posted on 6 May 2015 – draft report describing the sea trials and subsequent design refinements of the Kellian Line setter. Report can be found here http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-conservation-services/baker-et-al-2015-kls-sea-trials-performance-testing-ms3-report-may-2015.pdf

4.2 MIT2013-02 Surface longline mitigation

Overall objective

To test a range of mitigation methods which reduce the availability of surface longline hooks to seabirds at line setting.

Specific objectives

1. To conduct sea trials of a range of mitigation methods which reduce availability of hooks to seabirds.
2. To provide a comparison of these methods in their mitigation effectiveness, highlighting strengths and drawbacks and applicability to differing surface longline configurations and operations.
3. To provide recommendations on any further development and refinement of methods to enable reliable and safe use in commercial surface longline operations.

Rationale

Surface longline fisheries globally have accounted for significant levels of seabird bycatch, and despite the introduction of a number of mandatory mitigation methods for this fishing method in New Zealand , recent level-2 seabird risk assessment has identified that surface longline fisheries still poses considerable risk. International research into seabird mitigation measures has had a considerable focus on developing novel methods for surface longline fisheries, and a number of methods have recently been developed that show good potential to reduce the availability of baited hooks to seabirds, whilst not causing additional safely or operational difficulties for fishermen. Work in New Zealand to test some of these methods is underway as part of CSP project MIT2012-04. The delivery of this project will be dependent on findings reported from MIT2012-04.

Project status

Complete.

Summary of the methods and key findings

Characteristics of surface longline gear that exacerbate the risk of seabird bycatch include its relatively light weight and long snoods, which keep hooks within reach of seabirds for significant periods, the attractiveness of baits to seabirds, and the very long lengths of lines that are deployed with hooks attached. Despite the existence of measures that are effective in reducing seabird bycatch in surface longline fisheries, continued captures in these fisheries demonstrate that the available approaches do not preclude the existence of significant bycatch risk. In particular, safety concerns with line weighting appear to dissuade fishers from utilising this effective bycatch reduction method.

In this project, we explored three novel approaches designed to improve the safety of line-weighting: safe leads, lumo leads, and hook pods. Safe leads comprise a rubber core through which the monofilament snood passes. A lead weight is attached on each side of this core, secured by an o-ring. The safe lead is able to move down the snood when the snood stretches. Lumo leads comprise a lead-filled plastic cylinder which can be fluorescent, through which the snood passes. The unit is secured on the snood by a secure-fitting screw top. Similar to safe leads, lumo leads move on snoods when the monofilament becomes stretched (and therefore narrower in diameter). Therefore, both

safe leads and lumo leads can slide down the snood and fall off if a fish bites off the snood below the weight. This action dampens potentially dangerous recoil. Hook pods operate differently, in that the pod covers the barb of the hook until the unit opens under the pressure of submersion to a certain depth. We tested these three novel line-weights across seven trips on three inshore surface longline vessels fishing in New Zealand waters in 2013 and 2014.

In 2013, at-sea trials were incorporated into normal government fisheries observer coverage. However, this approach was not entirely effective, such that in 2014, at-sea trials were conducted on a vessel engaged in a charter-type arrangement. This approach provided much better opportunities for data collection. The performance of safe leads and lumo leads was determined using time depth recorders to explore gear sink rates and snood-by-snood documentation of fish catch. The performance of hook pods was explored by assessing the practicality of these devices and exploring the depths at which the enclosed hooks were exposed. The final report documenting the findings of this project is currently in preparation.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $70,000. Services were provided by Dragonfly Science Ltd.

Review milestones:

- Presentation of progress report and recommendations at the CSP TWG meeting on 21 November 2013;
- Presentation of draft final report at the CSP TWG meeting on 12 December 2014.

4.3 MIT2013-03 Characterisation of smaller vessel deep water bottom longline operations in relation to risk factors for seabird capture

Overall objective

To characterise the smaller vessel deep water bottom longline fishery with respect to factors relating to seabird capture.

Specific objectives

1. To review observer, fisher, and catch effort data on vessel operations and findings from previous mitigation projects in deep water bottom longline fisheries, and identify key risk factors for seabird interactions.
2. To characterise the range of bottom longline vessels over 20m with respect to factors relation to seabird captures
3. To provide recommendations on mitigation practices in this fishery.

Rationale

Recent level-2 risk seabird assessment has identified considerable risk, and uncertainty, posed by a subset of the bottom longline fishery executed by smaller deep water vessels. In conjunction with targeted observer coverage in that fishery (see CSP project INT2013-01), this project will characterise the range of bottom longline fishing operations and how these have changes over time to identify key factors related to seabird capture, including hook sink rates and mitigation practices currently used.

Project status

Completed.

Summary of the methods and key findings

Amongst bottom longline fisheries, the highest risk to seabirds and the greatest uncertainty in risk estimation have been linked to vessels less than 34 m in overall length that do not target snapper or bluenose. In this project, we characterised, with respect to seabird capture, bottom longline fishing activity executed by these vessels operating in deeper water. We also identified the reasons for the high seabird bycatch risk identified amongst these vessels, and the high uncertainties associated with that risk.

Using Ministry for Primary Industries' data, we confirmed that the bottom longline fleet could be effectively characterised using three size-based vessel strata. Further, the number of hooks is broadly correlated with vessel sizes. Small vessels (< 20 m in overall length) mostly target snapper, set less than 5,000 hooks per day, and less than 500,000 hooks per year. Large vessels (> 34 m) primarily target ling, set more than 10,000 hooks per day, and more than 2,000,000 hooks per year. Between these groups, medium-sized vessels target a range of species, including ling, bluenose, hapuku, school shark, and ribaldo, set less than 10,000 hooks per day and around 500,000 hooks per year.

Amongst this focal group of medium-sized vessels, government fisheries observers have never covered more than 5% of hooks. Amongst medium-sized bottom longline vessels, seabirds most

commonly reported caught by fishers from the 2008/09 to the 2012/13 fishing years were white-chinned petrel, sooty shearwater, Salvin's albatross, grey petrel, Westland petrel, and Chatham albatross. These species also dominate the limited observer records of seabird captures. There is considerable diversity in the operations and gear types used by medium-sized bottom longline vessels, including the use of both integrated-weight line and external weighting approaches, J hooks and circle hooks, manual baiting and autoline systems, and monofilament and tarred rope backbones.

The nature and extent of seabird bycatch reduction approaches deployed amongst medium-sized longline vessels is not well understood given the paucity of observer information. However, the available information is sufficient to broadly characterise factors exacerbating seabird bycatch risks. These include the discharge of fish waste during hauling, inconsistent use of streamer lines and that streamer lines used are of poor construction, the use of line-weighting regimes that expose baited hooks to foraging seabirds for extended periods and distances astern vessels, and day-setting. Significant information gaps remain. However, the combination of knowledge available on fishing activities undertaken by bottom longline vessels 20–34 m in length, and mitigation measures relevant to these fisheries, is sufficient to provide for the reduction of seabird bycatch risks but needs to be supported with improved information collection across amongst this vessel group.

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. Services were provided by Johanna Pierre Environmental Consulting Ltd.

Review milestones:

- Draft final report presented at the CSP TWG meeting on 6 June 2014.

Citation

Pierre, J.P., Thompson, F.N., and Cleal, J. 2014. Seabird interactions with the deepwater bottom longline fleet. Report prepared by Dragonfly Science for the New Zealand Department of Conservation, Wellington. 36p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/characterisation-of-smaller-vessel-deepwater-bottom-longline-operations/

4.4 MIT2013-05 Development of bird baffler design for offshore trawl vessels

Overall objective

To assess, and improve where necessary, the design, durability and performance of bird bafflers currently deployed on trawl vessels >28 m in length.

Specific objectives

1. To design and construct one or more improved bird baffler design(s).
2. To conduct at sea trials of the improved baffler(s) in order to assess efficacy and utility of the design.
3. To produce recommendations in the construction of bird baffler designs in a variety of media in order to maximise uptake in commercial fisheries.

Rationale

Previous work on the assessment and improvement of seabird scaring devices on trawlers >28 m in length, identified that further work is required to improve the design and performance of bird bafflers currently in use. This project will aim to work collaboratively with vessel operators to identify and construct improved bird bafflers.

Project status

Ongoing, currently in at-sea trial stage.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $70,000. Services were provided by Clement & Associates.

Review milestones:

- Presentation of proposed methods at the CSP TWG meeting on 21 November 2013.

Non-research mitigation project proposals

The following projects are for non-research services that aim to avoid, remedy or mitigate the impacts of commercial fishing on protected species.

4.5 MIT2012-05 Protected species bycatch newsletter

NOTE: This multi-year project (POP2012-05) was consulted on in 2012/13.

Overall objective

To produce a newsletter to communicate protected species-related information to trawl and longline fishermen.

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, and the newsletter will serve as a vehicle for communication to fishermen, fishing companies, and other interested parties. An evaluation of previous examples of this work indicates that this format shows promise in reaching a broad sector of the fishing community and wider stake holders, and provides recommendations for further development.

Project status

Completed.

Summary of the Methods and Key Findings

Twelve issues of Bycatch Bylines were distributed between September 2012 and June 2014. Newsletters have included stories on protected species management, bycatch reduction measures, legislative changes, research relevant to commercial fisheries, and global contexts for these issues. The newsletter was distributed directly to 996 recipients. This included 812 fishers, 16 regional offices of the Ministry for Primary Industries (MPI), 10 industry associations and Commercial Stakeholder Organisations (CSOs), 145 CSP stakeholders, and 13 other recipients including seafood industry workers and scientists, who were added to the distribution list on request.

The newsletter was also made available online through the Department of Conservation's website. To solicit feedback on the newsletter at the end of the project term, a 10-question survey was electronically distributed to 576 recipients including fishers, CSOs and MPI regional offices. Survey responses were received from 3.1% of recipients. Amongst respondents, 50% said that others they knew read the newsletter. All considered it interesting, at least sometimes. More than half (56%) had accessed links to additional information about a story. Respondents mostly (78%) deemed bimonthly circulation appropriate.

When asked to rank current content from most (1) to least (6) preferred topics, individual responses varied, but newsletter sections scored almost the same across all respondents (summed rank scores: 15 – 17). Comments included that updated information and relevance were the best features of the

newsletter, the publication was good overall and didn't require improvement, and that the focus on protected species could be broadened given the scope of issues fishers are dealing with.

Other feedback received during the project included fisher comments on mitigation measures, support for the newsletter content and style from practitioners working on bycatch, and government fisheries observers advising that the newsletter has been seen on vessels at sea and that it is being read and discussed by fishers. Recommendations for future editions include:

- updating the distribution list;
- confirming whether email recipients would prefer to receive a direct-delivered hard copy;
- confirming the viability of distribution arrangements with CSOs and MPI regional offices;
- considering expanding the scope of the newsletter content, and,
- including information on government fisheries observer coverage.

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 Johanna Pierre Environmental Consulting Ltd.

Review milestones:

- 2013/14 annual review presented at the CSP TWG meeting on 6th of June 2014.

Citation

Pierre, J. 2014. MIT2012-05 Protected Species Bycatch Newsletter. *Bycatch Bylines*. Report prepared by Johanna Pierre Environmental Consulting for the New Zealand Department of Conservation, Wellington. 9p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/protected-species-bycatch-newsletter-bycatch-bylines/

Bycatch Bylines - Issue 1, October 2012

Bycatch Bylines - Issue 2, November 2012

Bycatch Bylines - Issue 3, January 2013

Bycatch Bylines - Issue 4 March 2013

Bycatch Bylines - Issue 5 April 2013

Bycatch Bylines - Issue 6 June 2013

Bycatch Bylines - Issue 7 August 2013

Bycatch Bylines - Issue 8 October 2013