Conservation Services Programme
FINAL
Annual Research Summary
2018-19

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1. Introduction

1.1 Purpose

This report outlines the research carried out through the Conservation Services Programme Annual Plan 2018/19 and provides updates on multi-year projects started in previous years.

1.2 Background

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

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

1.3. CSP Vision and Objectives

The Conservation Services Programme (CSP) vision is that:

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

The suite of research and other conservation services delivered as part of the CSP fall 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 2018[1].

[1] Available to download from https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/resources/csp-strategic-statement-2018.pdf

1.4 Development of the Annual Plan

The Conservation Services Programme Annual Plan 2018/19[2] described the conservation services to be delivered as the Conservation Services Programme (CSP), and subject to cost recovery from the commercial fishing industry. As such, this Annual Plan formed the basis for levying the commercial fishing industry under the Fisheries Act 1996. For further background information on CSP, including extracts of relevant legislation, refer to the Conservation Services Programme Strategic Statement. In the development of this Annual Plan a series of discussions were held with Fisheries New Zealand (FNZ) staff to harmonise the CSP and FNZ research programmes for 2018/19 and to ensure there was no duplication. A formal consultation process was also used as described below.

1.5 Consultation process

The Annual Plan took account of feedback from stakeholders, and was approved, along with the final costs to be levied, by the Minister of Conservation.

The collaborative processes used to develop the 2018/19 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 2018/19. This process was developed jointly by the CSP team at DOC and the Inshore Fisheries team at FNZ.

-Deepwater and Highly Migratory Species (HMS) observer coverage was developed jointly by the CSP team at DOC and the deepwater and HMS fisheries team at FNZ.

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

7 December 2017	Initial CSP RAG meeting – review and gap analysis.
February 2018	Updated medium term research plans, initial list of research proposals and draft CSP RAG prioritisation framework circulated to CSP RAG.
28 February 2018	Second CSP RAG meeting to discuss and prioritise initial research proposals.
14 March 2018	Additional feedback received from CSP RAG on research proposals and their prioritisation.
27 April 2018	Draft Conservation Services Programme Annual Plan 2018/19 released for public consultation.
28 May 2018	Public consultation period closes.
19 June 2018	Summary of public submissions and response to comments completed.
June 2018	Director-General of Conservation conveys the Conservation Services Programme Annual Plan 2018/19, amended in accordance with public submissions, to the Minister of Conservation for agreement.

1.6 Explanation of reporting structure

This report first describes the objectives and rationale for each project, then provides an update on project status and a summary of the key results and recommendations from the projects. A project logistics summary statement is included detailing the service provider, the project budget (excluding

[2] Available to download from https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/plans/csp-annual-plan-2018-19.pdf

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 2018/19 were divided into three main areas:

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

2. Interaction Projects

2.1 INT2018-01 Observing commercial fisheries

Overall objective

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

Specific objectives

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

Rationale

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

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

Project status

Complete.

Summary of the methods and key findings

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

Observer coverage is, where possible, planned jointly with FNZ 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.

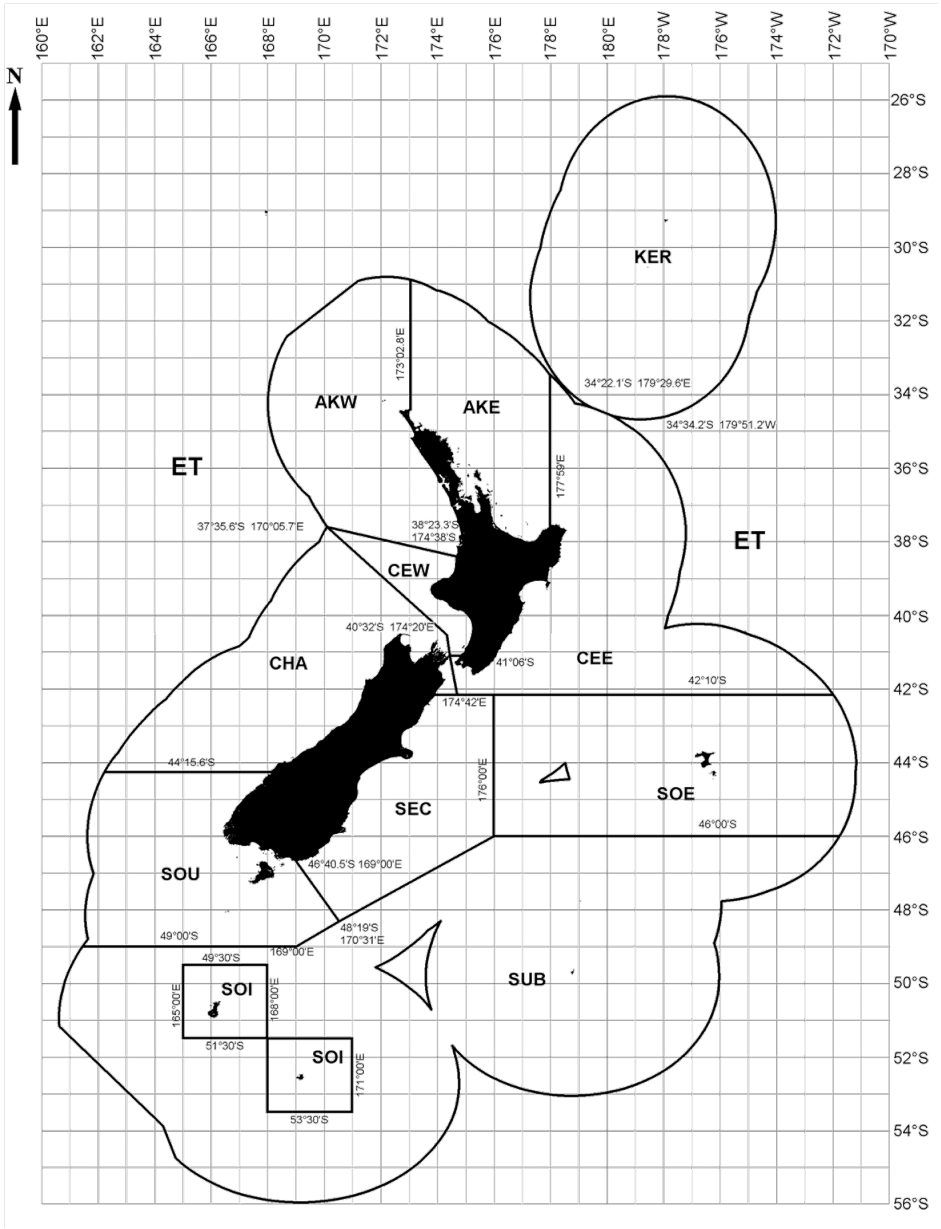
While the majority of the 'poorly understood' fisheries operate in the inshore area (i.e. to around 200 m depth), some small vessels, particularly bottom longline vessels under 36 m, will operate in deeper waters such as the Chatham Rise. Details of the approach used to set days in these fisheries are 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 on work conducted in previous years.

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

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



Key:

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

Middle Depth Trawl Fisheries

Hoki, Hake, Ling and Warehou species

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

Table 1 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. In the 2018/19 observer year the commercial effort decreased by 11% from the previous year and the amount of observed tows decreased by 9% (Weaver 2019).

The number and rate of seabird captures decreased by 57%, with 80 seabird captures in comparison to 185 in the previous observer year (2017/18) (Weaver 2019). The rate of marine mammal captures increased by 5% and two protected fish captures occurred (none the year prior). A total of 45.9kg of coral bycatch was observed this year, a 32% decrease in coral catch in comparison the previous observer year (2017/18) (Weaver 2019).

In summary, 106 observed trips were conducted aboard 41 vessels, with protected species captures occurring on 54 trips aboard 24 vessels (51% of observed trips involved protected species captures and 58% of vessels had protected species captures).

Table 1. Summary of commercial effort, observer effort and protected species interactions in the hoki, hake, ling and warehou middle depth trawl fisheries during the 2018/19 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird interactions	Seabirds /100 tows	Mammal captures	Mammals /100 tows	Protected fish captures	Protected fish/100 tows	Coral catch (kg)	Coral catch /100 tows
1. AKE	316	27	8.5	-	-	-	-	-	-	0.5	1.9
2. CEE	1,768	124	7.0	4	3.2	13	10.5	-	-	-	-
3. SEC	2,154	572	26.6	13	2.3	3	0.5	-	-	9.8	1.7
4. SOE	1,445	354	24.5	10	2.8	-	-	-	-	12	3.4
5. SOU	1,047	421	40.2	18	4.3	-	-	-	-	3.6	0.9
6. SUB	1,109	459	41.4	11	2.4	4	0.9	2	0.4	17.6	3.8
7. CHA	5,891	2,302	39.1	24	1.0	23	1.0	-	-	2.4	0.1
8. CEW	5	-	-	-	-	-	-	-	-	-	-
9. AKW	25	-	-	-	-	-	-	-	-	-	-
Total	**13,760**	**4,259**	**31.0**	**80**	**1.9**	**43**	**1.0**	**2**	**0.05**	**45.9**	**1.1**

Table 2 reports on the numbers of interactions by species and fate immediately post interaction for the 2018/19 observer year. Overall, 74% of protected species interactions resulted in mortalities.

New Zealand fur seals were the most commonly bycaught species overall and white-capped albatrosses were the most commonly bycaught seabird species.

Table 2. Protected species interactions in the hake, hoki, ling and warehou middle depth trawl fisheries during the 2018/19 observer year.

Species	Alive	Dead	Grand Total
Seabirds			
Albatrosses (Unidentified)	4	1	5
Buller's albatross	1	11	12
Buller's and Pacific albatross	1	3	4
Chatham Island albatross		1	1
Common diving petrel	4		4
Fairy prion		1	1
Great albatrosses	1		1
Grey-backed storm petrel	1		1
Procellaria petrels		1	1
Salvin's albatross	4	8	12
Sooty shearwater		7	7
Southern royal albatross		1	1
Wandering albatross (Unidentified)		1	1
Westland petrel		3	3
White-capped albatross	2	12	14
White-chinned petrel	3	9	12
Seabirds Total	**21**	**59**	**80**
Marine Mammals			
New Zealand fur seal	11	30	41
New Zealand sea lion		2	2
Marine Mammals Total	**11**	**32**	**43**
Protected Fish			
Basking shark	1	1	2
Protected Fish Total	**1**	**1**	**2**
Grand Total	**33**	**92**	**125**

Tables 3a and b detail the broad method of interactions for each species. Net capture was the most prevalent form of interaction overall, with 72% of these resulting in mortalities. The 30 captures of New Zealand fur seals that resulted in mortalities occurred across four FMA's, but these were predominantly in CEE and CHA (7 captures in CEE, 21 captures in CHA), continuing a pattern observed in the three previous observer years (2015/16- 2017/18).

Table 3. Method of interaction for a) protected species released alive and b) dead protected species observed in the hake, hoki, ling and warehou middle depth trawl fisheries during the 2018/19 observer year.

a) Protected species released alive

Species	Caught in net	Impact against vessel	Other	Grand Total
Seabirds				
Albatrosses (Unidentified)	3		1	4
Buller's albatross	1			1
Buller's and Pacific albatross	1			1
Common diving petrel		4		4
Great albatrosses	1			1
Grey-backed storm petrel		1		1
Salvin's albatross	2	1	1	4
White-capped albatross	1		1	2
White-chinned petrel	3			3
Seabird Total	**12**	**6**	**3**	**21**
Marine Mammals				
New Zealand fur seal	11			11
Marine Mammal Total	**11**			**11**
Protected Fish				
Basking shark	1			1
Protected Fish Total	**1**			**1**
Grand Total	**24**	**6**	**3**	**33**

b) Dead protected species

Species	Caught in net	Caught on warp or door	Unknown	Other	Grand Total
Seabirds					
Albatrosses (Unidentified)				1	1
Buller's albatross	3	5	3		11
Buller's and Pacific albatross	2	1			3
Chatham Island albatross		1			1
Fairy prion	1				1
Procellaria petrels	1				1
Salvin's albatross	3	5			8
Sooty shearwater	6		1		7
Southern royal albatross				1	1
Wandering albatross (Unidentified)	1				1
Westland petrel	3				3
White-capped albatross	2	9		1	12
White-chinned petrel	8		1		9
Seabird Total	**30**	**21**	**5**	**3**	**59**
Marine Mammals					
New Zealand fur seal	30				30
New Zealand sea lion	2				2
Marine Mammal Total	**32**				**32**
Protected Fish					
Basking shark	1				1
Protected Fish Total	**1**				**1**
Grand Total	**63**	**21**	**5**	**3**	**92**

Southern Blue Whiting

The southern blue whiting fishery is both spatially and temporally distinct from other middle depth trawl fisheries. The location of fishing effort is variable and dependent on the presence of spawning aggregations of southern blue whiting. Most effort occurs in the waters around Campbell Island in the subantarctic region. Unlike other middle depth trawl fisheries, protected species interactions tend to be dominated by marine mammal captures, specifically fur seals. Sea lion captures have also occurred in most previous fishing years at variable levels (up to 14) (Rowe 2009, Rowe 2010, Ramm 2010, Ramm 2012a, Ramm 2012b, Clemens-Seely et al. 2014., Clemens-Seely & Hjorvarsdottir 2016, Hjorvarsdottir 2016, Hjorvarsdottir 2017, Hjorvarsdottir & Isaacs 2018).

Table 4 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. This fishery received full observer coverage this year and had a slightly decreased amount of effort in comparison to the 2017/18 year (down by 6%). The number of seabird captures in the 2018/19 observer year has increased from the previous year (2017/18) by 43% (Weaver 2019). Mammal captures also increased this year by 90% from the previous observer year (2017/18) (Weaver 2019).

In summary, 14 observed trips were conducted on board ten vessels, with protected species captures occurring on eight trips on board seven vessels (57% of observed trips involved protected species captures and 70% of these vessels had protected species interactions in 2018/19).

Table 4. Summary of commercial effort, observer effort and protected species interactions in the southern blue whiting fishery during the 2018/19 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird interactions	Seabirds /100 tows	Mammal captures	Mammals /100 tows
1. AKE	-	-	-	-	-	-	-
2. CEE	-	-	-	-	-	-	-
3. SEC	-	-	-	-	-	-	-
4. SOE	-	-	-	-	-	-	-
5. SOU	-	-	-	-	-	-	-
6. SUB	458	458	100	10	2.2	19	4.1
7. CHA	-	-	-	-	-	-	-
8. CEW	-	-	-	-	-	-	-
9. AKW	-	-	-	-	-	-	-
Total	**458**	**458**	**100**	**10**	**2.2**	**19**	**4.1**

Table 5 reports the numbers of interactions by species and fate immediately post interaction for the 2018/19 observer year. 86% of the observed interactions resulted in mortalities.

Table 5. Protected species interactions in the southern blue whiting fishery during the 2018/19 observer year.

Species	Alive	Dead	Grand Total
Seabirds			
Campbell albatross		1	1
Fairy prion	1		1
Grey petrel		6	6
Grey-backed storm petrel	2		2
Seabird Total	**3**	**7**	**10**
Marine Mammals			
New Zealand fur seal	1	16	17
New Zealand sea lion		2	2
Marine Mammal Total	**1**	**18**	**19**
Grand Total	**4**	**25**	**29**

Tables 6a and b detail the broad method of interactions by species. Net capture was the most prevalent form of interaction with protected species (76% of interactions). 72% of the protected species interactions that resulted in mortalities involved marine mammals.

Table 6. Method of interaction for a) protected species released alive and b) dead protected species observed in the southern blue whiting fishery during the 2018/19 observer year.

a) Protected species released alive

Species	Caught in net	Impact against vessel	Grand Total
Seabirds			
Fairy prion		1	1
Grey-backed storm petrel		2	2
Seabird Total		**3**	**3**
Marine Mammals			
New Zealand fur seal	1		1
Marine Mammal Total	**1**		**1**
Grand Total	**1**	**3**	**4**

b) Dead protected species

Species	Caught in net	Caught on warp or door	Impact against vessel	Other	Grand Total
Seabirds					
Campbell albatross			1		1
Grey petrel	4	1		1	6
Seabird Total	**4**	**1**	**1**	**1**	**7**
Marine Mammals					
New Zealand fur seal	16				16
New Zealand sea lion	1			1	2
Marine Mammal Total	**17**			**1**	**18**
Grand Total	**21**	**1**	**1**	**2**	**25**

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.

Table 7 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. Commercial effort decreased by 9.5% in comparison to the year prior (2017/18). Observer coverage of the fishery in 2018/19 increased by 15% from the previous observer year (2017/18). Observed tows were distributed between AKE, CEE, SOE and SUB FMAs, with the greatest number of tows observed in the SOE and SUB FMAs.

Seabird captures decreased by 75% from the previous observer year (2017/18) (Weaver 2019). Marine mammal captures remain fairly low, with three caught this year in comparison to one in 2017/18. Coral bycatch remains high in this fishery, though there was a 38% decrease in observed coral catch from the 219 kgs observed in 2017/18 (Weaver 2019). As seen in 2017/18, the majority of this catch occurred on one trip in the SOE FMA.

In summary, 14 observed trips were conducted on board ten vessels, with protected species captures occurring on nine trips aboard nine vessels (64% of trips involved protected species captures and 90% of vessels that operated within this fishery during the 2018/19 year had protected species captures).

Table 7. Summary of commercial effort, observer effort and protected species interactions in the scampi fishery during the 2018/19 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird interactions	Seabirds /100 tows	Mammal captures	Mammals /100 tows	Coral catch (kg)	Coral catch /100 tows
1. AKE	563	84	14.9	2	2.4	-	-	-	-
2. CEE	449	9	2.0	-	-	-	-	-	-
3. SEC	-	-	-	-	-	-	-	-	-
4. SOE	1,660	245	14.8	4	1.6	-	-	135.6	55.3
5. SOU	-	-	-	-	-	-	-	-	-
6. SUB	1,452	257	17.7	5	1.9	3	1.2	0.1	0.0
7. CHA	34	-	-	-	-	-	-	-	-
8. CEW	-	-	-	-	-	-	-	-	-
9. AKW	-	-	-	-	-	-	-	-	-
Total	**4,158**	**595**	**14.3**	**11**	**1.8**	**3**	**1.2**	**135.7**	**22.8**

Table 8 reports the number of interactions by species and fate immediately post interaction.

Table 8. Protected species interactions in the scampi fishery during the 2018/19 observer year.

Species	Alive	Dead	Grand total
Seabirds			
Buller's albatross		1	1
Procellaria petrels	1		1
Salvin's albatross		2	2
Shearwaters		1	1
Sooty shearwater		1	1
Storm petrels	1		1
Wandering (Snowy) albatross	1		1
White-capped albatross	1	1	2
White-chinned petrel		1	1
Seabird Total	**4**	**7**	**11**
Marine Mammals			
New Zealand sea lion	1	2	3
Marine Mammal Total	**1**	**2**	**3**
Grand Total	**5**	**9**	**14**

Tables 9 a and b detail the broad method of interactions for each species.

Table 9. Method of interaction for a) protected species released alive and b) dead protected species observed in the scampi fishery during the 2018/19 observer year.

a) Protected species released alive

Species	Caught in net	Impact against vessel	Other	Grand Total
Seabirds				
Procellaria petrels	1			1
Storm petrels			1	1
Wandering (Snowy) albatross		1		1
White-capped albatross	1			1
Seabird Total	**2**	**1**	**1**	**4**
Marine Mammals				
New Zealand sea lion	1			1
Marine Mammal Total	**1**			**1**
Grand Total	**3**	**1**	**1**	**5**

b) Dead protected species

Species	Caught in net	Caught on warp or door	Grand Total
Seabirds			
Buller's albatross		1	1
Salvin's albatross		2	2
Shearwaters	1		1
Sooty shearwater	1		1
White-capped albatross		1	1
White-chinned petrel	1		1
Seabird Total	**3**	**4**	**7**
Marine Mammals			
New Zealand sea lion	2		2
Marine Mammal Total	**2**		**2**
Grand Total	**5**	**4**	**9**

Squid

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

Particularly in the SQU6T area around the Auckland Islands (within the SUB FMA), the observer coverage is focused on recording New Zealand sea lion captures. Sea Lion Exclusion Devices (SLEDs) are used by all vessels operating in the SQU6T fishery. The majority of observer coverage in the squid fishery has been targeted at the SQU6T area, with high levels of coverage also being achieved in SOU as the vessels trawl 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 its overlap with breeding seabirds, in particular, white-chinned petrels and sooty shearwaters.

Table 10 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. Commercial fishing effort increased by 56% and observed tows increased by 46% on the year prior (2017/18). Seabird interactions also increased by 26% in comparison to 2017/18. As with previous observer years, the majority of the seabird captures occurred in the SOU and SUB FMAs. The rate of mammal captures increased by 72% from the previous observer year (2017/18) (Weaver 2019). Coral catch increased substantialy- 8,015.7 kgs this year in comparison to 2.3 kgs in 2017/18. Protected fish captures increased by 60% from the year prior (2017/18).

In summary, 72 observed trips were conducted on board 23 vessels, with protected species captures occurring on 59 trips on 22 vessels (82% of trips involved protected species captures and 96% of vessels that operated within this fishery during the 2018/19 year had protected species captures).

Table 10. Summary of commercial effort, observer effort and protected species interactions in the squid fishery during the 2018/19 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird interactions	Seabirds /100 tows	Mammal captures	Mammals /100 tows	Protected fish captures	Protected fish /100 tows	Coral catch (kg)	Coral catch /100 tows
1. AKE	3	-	-	-	-	-	-	-	-	-	-
2. CEE	-	-	-	-	-	-	-	-	-	-	-
3. SEC	1,350	865	64.1	30	3.5	1	0.1	-	-	78.7	9.1
4. SOE	103	93	90.3	3	3.2	3	3.2	-	-	12.1	13.0
5. SOU	2,117	1,902	90.0	257	13.5	20	1.1	3	0.2	7919.3	416.4
6. SUB	770	721	93.6	59	8.2	7	1.0	4	0.6	5.6	0.8
7. CHA	1	-	-	-	-	-	-	-	-	-	-
8. CEW	-	-	-	-	-	-	-	-	-	-	-
9. AKW	2	-	-	-	-	-	-	-	-	-	-
Total	**4,346**	**3,581**	**82.4**	**349**	**9.7**	**31**	**0.9**	**7**	**0.2**	**8,015.7**	**223.8**

Table 11 reports the numbers of interactions by species and fate immediately post interactions. Similar to previous years, white-chinned petrels, white-capped albatross and sooty shearwaters accounted for a large part of seabird interactions. The seven protected fish captures occurred in the SUB and SOU FMAs between January and April 2019.

Table 11. Protected species interactions in the squid fishery during the 2018/19 observer year.

Species	Alive	Dead	Grand total
Seabirds			
Albatrosses (Unidentified)	2	3	5
Buller's albatross	3	12	15
Buller's and Pacific albatross	2	3	5
Common diving petrel		1	1
Giant petrels (Unidentified)	2		2
Mottled petrel		1	1
Petrel (Unidentified)	7		7
Procellaria petrels	7		7
Salvin's albatross	2	1	3
Shearwaters		1	1
Shy albatross	2		2
Smaller albatrosses	1		1
Sooty shearwater	18	59	77
Southern royal albatross	2		2
Storm petrels	2		2
White-capped albatross	18	58	76
White-chinned petrel	40	102	142
Seabird Total	**108**	**241**	**349**
Marine Mammals			
New Zealand fur seal	3	22	25
New Zealand sea lion		6	6
Marine Mammal Total	**3**	**28**	**31**
Protected Fish			
Basking shark	3	1	4
White pointer shark	3		3
Protected Fish Total	**6**	**1**	**7**
Grand Total	**117**	**270**	**387**

Tables 12a and b detail the broad method of interactions for each species. Net capture was the most prevalent form of interaction and 69% of these interactions resulted in mortalities.

Table 12. Method of interaction for a) protected species released alive and b) dead protected species in the squid fishery during the 2018/19 observer year.

a) Protected species released alive

Species	Caught in net	Caught on warp/ door	Impact against vessel	Unknown	Other	Grand Total
Seabirds						
Buller's albatross	3					3
Buller's and Pacific albatross	1				1	2
Giant petrels (Unidentified)	2					2
Petrel (Unidentified)	7					7
Procellaria petrels	4				3	7
Salvin's albatross	1	1				2
Shy albatross	2					2
Smaller albatrosses	1					1
Sooty shearwater	15		3			18
Southern royal albatross	1				1	2
Storm petrels	1			1		2
White-capped albatross	15		1		2	18
White-chinned petrel	38				2	40
Seabird Total	**93**	**1**	**4**	**1**	**9**	**108**
Marine Mammals						
New Zealand fur seal	2				1	3
Marine Mammal Total	**2**				**1**	**3**
Protected Fish						
Basking shark	3					3
White pointer shark	2				1	3
Protected Fish Total	**5**				**1**	**6**
Grand Total	**100**	**1**	**4**	**1**	**11**	**117**

b) Dead protected species

Species	Caught in net	Caught on warp or door	Unknown	Other	Grand Total
Birds					
Albatrosses (Unidentified)		3			3
Buller's albatross	10	2			12
Buller's and Pacific albatross	2	1			3
Common diving petrel	1				1
Mottled petrel	1				1
Salvin's albatross		1			1
Shearwaters	1				1
Sooty shearwater	56	1		2	59
White-capped albatross	30	22	1	5	58
White-chinned petrel	91	1	3	7	102
Seabird Total	**192**	**31**	**4**	**14**	**241**
Marine Mammals					
New Zealand fur seal	22				22
New Zealand sea lion	5			1	6
Marine Mammal Total	**27**			**1**	**28**
Protected Fish					
Basking shark	1				1
Protected Fish Total	**1**				**1**
Grand Total	**220**	**31**	**4**	**15**	**270**

Pelagic Trawl Fisheries

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), not setting while dolphins are present close to the vessel and using dolphin dissuasive devices (DDDs) on all JMA7 night tows. All the vessels in this fishery are larger than 28m and are required by law to deploy bird capture mitigation devices.

Table 13 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. Commercial effort in this fishery decreased 13% on the previous year (2017/18) (Weaver 2019). The observer coverage levels in this fishery decreased by 20% on the previous observer year (2017/18), with the highest number of observed tows in CHA, CEW and SOU FMAs.

The number of seabird captures decreased by 18% in the 2018/19 observer year in comparison to the previous year (2017/18) and no marine mammal captures occurred, in comparison to eight in 2017/18 (Weaver 2019). Coral catch in 2018/19 increased by 77% on the year prior.

In summary, 64 observed trips were conducted aboard 13 vessels, with protected species captures occurring on 13 trips on board seven vessels (20% of trips involved protected species captures and 54% of vessels that operated within this fishery during the 2018/19 year had protected species captures).

Table 13. Summary of commercial effort, observer effort and protected species interactions in the jack mackerel and barracouta pelagic trawl fishery during the 2018/19 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird interactions	Seabirds /100 tows	Coral catch (kg)	Coral catch /100 tows
1. AKE	3	-	-	-	-	-	-
2. CEE	100	-	-	-	-	-	-
3. SEC	1,417	275	19.4	2	0.7	10.3	3.7
4. SOE	196	84	42.8	-	-	0.6	0.7
5. SOU	453	422	93.1	28	6.6	-	-
6. SUB	-	-	-	-	-	-	-
7. CHA	1,286	594	46.2	1	0.2	0.1	0.02
8. CEW	570	501	87.9	-	-	-	-
9. AKW	132	126	95.4	-	-	-	-
Total	**4,157**	**2,002**	**48.2**	**31**	**1.5**	**11**	**0.55**

Table 14 reports the number of interactions by species and fate immediately post interaction. Sooty shearwaters, white-chinned petrels and white-capped albatross were the most commonly caught seabird species. No common dolphin interactions occurred this year (one capture the year prior).

Table 14. Protected species interactions in the jack mackerel and barracouta pelagic trawl fisheries during the 2018/19 observer year.

Species	Alive	Dead	Grand total
Seabirds			
Albatrosses (Unidentified)		1	1
Cape petrels	1		1
Mid-sized Petrels & Shearwaters	1		1
Sooty shearwater	2	7	9
Storm petrels	1		1
White-capped albatross	4	5	9
White-chinned petrel	1	8	9
Grand Total	**10**	**21**	**31**

Tables 15a and b detail the broad method of interaction for each species. Net capture was the most prevalent form of interaction overall and was responsible for 95% of the interactions that resulted in mortalities.

Table 15. Method of interaction for a) protected species released alive and b) dead protected species observed in the jack mackerel and barracouta pelagic trawl fisheries during the 2018/19 observer year.

a) Protected species released alive

Species	Caught in net	Impact against vessel	Other	Grand Total
Seabirds				
Cape petrels	1			1
Mid-sized Petrels & Shearwaters		1		1
Sooty shearwater	2			2
Storm petrels			1	1
White-capped albatross	3		1	4
White-chinned petrel	1			1
Grand Total	**7**	**1**	**2**	**10**

b) Dead protected species

Species	Caught in net	Caught in warp door	Grand Total
Birds			
Albatrosses (Unidentified)		1	1
Sooty shearwater	7		7
White-capped albatross	5		5
White-chinned petrel	8		8
Grand Total	**20**	**1**	**21**

Deep Water Bottom Trawl Fisheries

Orange Roughy, Cardinal and Oreo Species

This trawl fishery spans all FMAs and also takes place in areas outside of the NZ EEZ. In deep water bottom trawl fisheries, one of the main focuses of observer coverage is to describe the impact of the trawls on benthic communities, more specifically protected corals. Seabird behaviour and abundance are also monitored around the vessels in this fishery. Discards and offal management, as well as the mandatory use of bird scaring devices, are employed by the fleet to mitigate seabird interactions.

Table 16 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. There was a slight increase (6%) in commercial fishing effort over the past year and similar observer coverage in comparison to the previous observer year (2017/18) (Weaver 2019).

The rate of seabird captures decreased by 9% in 2018/19, with ten observed captures in comparison to 11 captures in the 2017/18 observer year (Weaver 2019). Coral catch for this observer year decreased by 86% from 3,668 kgs in 2017/18 to 526.9 kgs in 2018/19. The majority of the coral bycatch occurred in the SUB FMA.

In summary, 31 observed trips were conducted aboard ten vessels, with protected species captures occurring on 19 trips on board seven vessels (61% of trips involved protected species captures and 70% of vessels that operated within this fishery during the 2018/19 year had protected species captures).

Table 16. Summary of commercial effort, observer effort and protected species interactions in the orange roughy, cardinal and oreo deep water bottom trawl fisheries during the 2018/19 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird interactions	Seabirds /100 tows	Mammal captures	Mammals /100 tows	Coral catch (kg)	Coral catch /100 tows
1. AKE	92	15	16.3	-	-	-	-	-	-
2. CEE	882	41	4.6	-	-	-	-	1.9	4.6
3. SEC	605	194	32.1	3	1.5	1	0.5	68	35.1
4. SOE	1,905	533	28.0	6	1.1	-	-	45.2	8.5
5. SOU	83	22	26.5	-	-	-	-	77	350.0
6. SUB	245	145	59.2	1	0.7	-	-	242.7	167.4
7. CHA	499	61	12.2	-	-	-	-	-	-
8. CEW	1	-	-	-	-	-	-	-	-
9. AKW	289	128	44.3	-	-	-	-	92.1	72.0
Total	**4,601**	**1,139**	**24.8**	**10**	**0.9**	**1**	**0.1**	**526.9**	**46.3**

Table 17 reports the number of interactions by species and fate immediately post interaction.

Table 17. Protected species interactions in the orange roughy, cardinal and oreo deep water bottom trawl fisheries during the 2018/19 observer year.

Species	Alive	Dead	Grand total
Seabirds			
Albatrosses (Unidentified)	3		3
Chatham Island albatross		2	2
Fairy prion	1		1
Salvin's albatross		2	2
White-chinned petrel	1	1	2
Seabird Total	**5**	**5**	**10**
Marine Mammals			
New Zealand fur seal		1	1
Marine Mammal Total		**1**	**1**
Grand Total	**5**	**6**	**11**

Tables 18a and b detail the broad method of interaction for each species.

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 2018/19 observer year.

a) Protected species released alive

Species	Impact against vessel	Other	Grand Total
Seabirds			
Albatrosses (Unidentified)		3	3
Fairy prion	1		1
White-chinned petrel		1	1
Grand Total	**1**	**4**	**5**

b) Dead protected species

Species	Caught in net	Caught on warp or door	Grand Total
Seabirds			
Chatham Island albatross		2	2
Salvin's albatross	2		2
White-chinned petrel	1		1
Seabird Total	**3**	**2**	**5**
Marine Mammals			
New Zealand fur seal	1		1
Marine Mammal Total	**1**		**1**
Grand Total	**4**	**2**	**6**

Inshore Fisheries

Inshore Trawl

Inshore fishing within the New Zealand EEZ is an immensely diverse activity, with large amounts of variation in individual practice and effort. In the case of trawl and bottom longline, it becomes difficult to draw a simple distinction between the inshore and offshore sectors, as a number of vessels make seasonal shifts across this artificial boundary. Individual vessels can range in size from just two metres in length to over 30 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 low due to the inherent difficulties of placing observers on small vessels in remote ports. Additionally, many of the fishers only operate part time, either seasonally or sporadically. As a result, observers often spend much of their time on shore or travelling between ports.

Table 22 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. Coverage decreased slightly in 2018/19 observer year, with an overall coverage of 4%, in comparison to 5.9% in the 2017/18 observer year (Weaver 2019). Observer coverage in the AKW FMA accounted for 57% of observed tows across all FMAs in this fishery.

The rate of seabird interactions decreased by 94% from 55 captures observed in 2017/18 to three in 2018/19. No marine mammal captures occurred in 2018/19 in comparison to five marine mammal captures in 2017/18 (Weaver 2019). Coral catch was similar to the year prior.

In summary, 33 observed trips were conducted aboard 13 vessels, with protected species captures occurring on three trips on board three vessels (9% of trips involved protected species captures and 23% of vessels that operated within this fishery during the 2018/19 year had protected species captures).

Table 22. Summary of the commercial effort, observer effort and protected species interactions in the inshore trawl fisheries during the 2018/19 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird interactions	Seabirds /100 tows	Coral catch (kg)	Coral catch /100 tows
1. AKE	3,037	202	6.7	-	-	1	0.5
2. CEE	6,495	29	0.4	2	6.9	5	17.2
3. SEC	9,126	-	-	-	-	-	-
4. SOE	347	-	-	-	-	-	-
5. SOU	2,892	-	-	-	-	-	-
6. SUB	1	-	-	-	-	-	-
7. CHA	10,310	2	0.02	-	-	-	-
8. CEW	1,211	51	4.2	-	-	-	-
9. AKW	1,952	1,117	57.2	1	0.1	-	-
Total	**35,371**	**1,401**	**4**	**3**	**0.2**	**6**	**0.4**

Table 23 reports the number of interactions by species and fate immediately post interaction.

Table 23. Protected species interactions in the inshore trawl fisheries during the 2018/19 observer year.

Species	Alive	Dead	Grand Total
Seabirds			
Black (Parkinson's) petrel		1	1
Buller's shearwater	1		1
White-faced storm petrel	1		1
Grand Total	**2**	**1**	**3**

Tables 24a and b detail the broad method of interaction for each species. All protected species interactions that were categorised as impacts against the fishing vessel, were released alive.

Table 24. Method of interaction for a) protected species released alive and b) dead protected species observed in the inshore trawl fisheries during the 2018/19 observer year.

a) Protected species released alive

Species	Impact against vessel	Grand Total
Seabirds		
Buller's shearwater	1	1
White-faced storm petrel	1	1
Grand Total	**2**	**2**

b) Dead protected species

Species	Caught in net	Grand Total
Seabirds		
Black (Parkinson's) petrel	1	1
Grand Total	**1**	**1**

Inshore Setnet

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

Observer coverage was initially low in this fishery but increased in 2008/09 due to concerns about Hector's dolphin bycatch. However, in recent years, the coverage has dropped again due to other priorities, such as observer coverage of inshore trawling on the west coast of the North Island and black petrel interactions in the Hauraki gulf.

Table 25 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. Fishing effort in 2018/19 increased by 2% from the 2017/18 fishing year, observer coverage reduced by 25% (Weaver 2019). The rate of seabird captures decreased by 23% from 22 interactions in 2017/18 to 17 observed seabird interactions in 2018/19. The number of marine mammal captures remained the same as the year prior. No protected fish or corals were caught in observed sets in 2018/19.

In summary, 17 observed trips were conducted aboard nine vessels, with protected species captures occurring on nine trips aboard six vessels (53% of trips involved protected species captures and 67% of vessels that operated within this fishery during the 2018/19 year had protected species captures).

Table 25. Summary of commercial effort, observer effort and protected species interactions in the inshore setnet fishery during the 2018/19 observer year.

FMA	Effort Sets	Observed Sets	Coverage (%)	Seabird interactions	Seabirds /100 sets	Marine mammal captures	Marine mammals /100 sets
1. AKE	5,218	-	-	-	-	-	-
2. CEE	730	-	-	-	-	-	-
3. SEC	3,519	140	4.0	9	6.4	-	-
4. SOE	13	-	-	-	-	-	-
5. SOU	546	101	18.5	7	6.9	6	5.9
6. SUB	2	-	-	-	-	-	-
7. CHA	617	-	-	-	-	-	-
8. CEW	921	130	14.1	1	0.8	2	1.5
9. AKW	4,914	-	-	-	-	-	-
Total	**16,480**	**371**	**2.3**	**17**	**4.6**	**8**	**2.2**

Table 26 reports the number of interactions by species and fate immediately post interaction. 73% of the interactions in 2018/19 resulted in the mortalities. A Fiordland crested penguin and yellow-eyed penguin were caught in the SOU FMA, and four shags in the SEC FMA, all these interactions resulted in mortalities.

Table 26. Protected species interactions in the inshore setnet fishery during the 2018/19 observer year.

Species	Alive	Dead	Unknown	Grand Total
Seabirds				
Cape petrels	1			1
Common diving petrel	1			1
Fiordland crested penguin		1		1
Shags		2		2
Sooty shearwater	1	1		2
Spotted shag		2		2
Stewart Island shag		3		3
Storm petrels	1			1
Westland petrel	1			1
White-capped albatross	1			1
White-chinned petrel		1		1
Yellow-eyed penguin		1		1
Seabird Total	**6**	**11**		**17**
Marine Mammals				
New Zealand fur seal		8	1	9
Marine Mammal Total		**8**	**1**	**5**
Grand Total	**6**	**19**	**1**	**26**

Tables 27a and b detail the broad method of interaction for each species. Net capture accounted for 76% of interactions, with 100% of these interactions resulting in mortality of the species involved.

Table 27. Method of interactions for a) protected species released alive and b) dead protected species observed in the setnet fishery during the 2018/19 observer year.

a) Protected species released alive

Species	Impact against vessel	Other	Grand Total
Seabirds			
Cape petrels	1		1
Common diving petrel		1	1
Sooty shearwater	1		1
Storm petrels		1	1
Westland petrel	1		1
White-capped albatross		1	1
Grand Total	**3**	**3**	**6**

b) Dead protected species

Species	Caught in net	Grand Total
Seabirds		
Fiordland crested penguin	1	1
Shags	2	2
Sooty shearwater	1	1
Spotted shag	1	1
Stewart Island shag	3	3
White-chinned petrel	1	1
Yellow-eyed penguin	1	1
Seabird Total	**11**	**11**
Marine Mammals		
New Zealand fur seal	8	8
Marine Mammal Total	**8**	**8**
Grand Total	**19**	**19**

Surface Longline Fisheries

Domestic Tuna and Swordfish

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

Table 28 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. Commercial effort reduced 5% in comparison to the previous year (2017/18). Observer coverage in domestic tuna and swordfish decreased by 10% in 2018/19, in comparison to the previous observer year (2017/18) (Weaver 2019). AKE FMA had the highest amount of effort and observed lines in the 2018/19 observer year.

The rate of seabird captures decreased by 14% from 66 interactions in 2017/18 to 57 seabird interactions observed in 2018/19 (Weaver 2019). The number of marine mammal captures decreased by 65% from 26 observed interactions in the 2017/18 observer year to 17 in 2018/19. No protected fish or marine reptile captures were observed this year.

In summary, 22 observed trips were conducted aboard 19 vessels, with protected species captures occurring on eight trips aboard eight vessels (36% of trips involved protected species captures and 42% of vessels that were observed within this fishery during the 2018/19 year had protected species captures).

Table 28. Summary of commercial effort, observer effort and protected species interactions in the domestic tuna and swordfish fishery during the 2018/19 observer year.

FMA	Effort lines	Observed lines	Coverage (%)	Number of hooks observed	Seabird interactions	Seabirds /1000 hooks	Marine mammal captures	Marine mammals /1000 hooks
1. AKE	913	160	17.5	150,878	12	0.1	3	0.02
2. CEE	714	18	2.5	15,460	-	-	-	-
3. SEC	269	14	5.2	13,400	8	0.6	-	-
4. SOE	7	-	-	-	-	-	-	-
5. SOU	2	-	-	-	-	-	-	-
6. SUB	1	-	-	-	-	-	-	-
7. CHA	421	51	12.1	49,290	37	0.8	14	0.28
8. CEW	3	1	33.3	530	-	-	-	-
9. AKW	66	5	7.6	2,740	-	-	-	-
Total	**2,396**	**249**	**10.4**	**232,298**	**57**	**0.2**	**17**	**0.07**

Table 29 reports the number of interactions by species and fate immediately post interaction. The overall number of interactions this observer year decreased by 25% in comparison to 99 interactions in 2017/18 observer year (Weaver 2019). White-capped albatross were the most common protected species interaction in the 2018/19 observer year (22% of all interactions). Overall, 65% of protected species interactions resulted in mortalities.

Table 29. Protected species interactions in the domestic tuna and swordfish fishery during the 2018/19 observer year.

Species	Alive	Dead	Grand Total
Seabirds			
Antipodean albatross		5	5
Black (Parkinson's) petrel		5	5
Buller's albatross	2	10	12
Buller's and Pacific albatross	1	1	2
Fairy prion	1		1
Flesh-footed shearwater		1	1
Gibson's albatross		1	1
Great albatrosses	1		1
Westland petrel	3	5	8
White-capped albatross	2	14	16
White-chinned petrel	2	3	5
Seabird Total	**12**	**45**	**57**
Marine Mammals			
New Zealand fur seal	13	3	16
Orca	1		1
Marine Mammal Total	**14**	**3**	**17**
Grand Total	**26**	**48**	**74**

Tables 30a and b detail the broad method of interaction for each species. Hook capture was the most prevalent form of interaction, with 70% of these resulting in mortalities. The number of interactions leading to mortality by hook capture decreased by 19%, in comparison to the previous observer year (2017/18) (Weaver 2019). The orca interaction occurred in the AKE FMA and involved a calf that was hooked by the lip but broke away.

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 2018/19 observer year.

a) Protected species released alive

Species	Caught on hook	Tangled in line	Impact against vessel	Grand Total
Seabirds				
Buller’s albatross	2			2
Buller's and Pacific albatross	1			1
Fairy prion			1	1
Great albatrosses		1		1
Westland petrel	2		1	3
White-capped albatross	2			2
White-chinned petrel		2		2
Seabird Total	**7**	**3**	**2**	**12**
Marine Mammals				
New Zealand fur seal	13			13
Orca	1			1
Marine Mammal Total	**14**			**14**
Grand Total	**21**	**3**	**2**	**26**

b) Dead protected species

Species	Caught on hook	Tangled in line	Grand Total
Seabirds			
Antipodean albatross	5		5
Black (Parkinson's) petrel	4	1	5
Buller's albatross	10		10
Buller's and Pacific albatross	1		1
Flesh-footed shearwater	1		1
Gibson's albatross	1		1
Westland petrel	5		5
White-capped albatross	14		14
White-chinned petrel	3		3
Seabird Total	**44**	**1**	**45**
Marine Mammals			
New Zealand fur seal	3		**3**
Marine Mammal Total	**3**		**3**
Grand Total	**47**	**1**	**48**

Bottom Longline Fishery

Deepwater Bottom Longline- Ling

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 the overall hook set. 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 applied since the 2014/15 CSP annual research summary. In this new grouping, the offshore bottom longline fishery is characterised as: all bottom longline vessels over 34m in overall length, and all vessels between 20-34m in overall length that set over 5000 hooks per day.

Table 1 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. Commercial effort increased by 9% and observer coverage decreased by 36% in 2018/19. The number of seabirds captured in this fishery increased by one (5% increase), with 19 observed captures in 2018/19 in comparison to 18 captures in 2017/18 (Weaver 2019).

In summary, seven observed trips were conducted aboard six vessels, with protected species captures occurring on five trips aboard five vessels (71% of trips involved protected species captures and 83% of vessels that were observed within this fishery during the 2018/19 year had protected species captures).

Table 31. Summary of commercial effort, observer effort and protected species interactions in the offshore bottom longline fishery during the 2018/19 observer year.

FMA	Effort lines	Observed lines	Coverage (%)	Number of hooks observed	Seabird interactions	Seabirds /1000 hooks
1. AKE	24	-	-	-	-	-
2. CEE	2	-	-	-	-	-
3. SEC	474	14	3.0	72,853	7	0.10
4. SOE	1,694	289	17.1	2,654,731	5	0.002
5. SOU	17	-	-	-	-	-
6. SUB	691	21	3.0	89,050	6	0.067
7. CHA	327	18	5.5	100,200	1	0.010
8. CEW	7	-	-	-	-	-
9. AKW	-	-	-	-	-	-
Total	**3,236**	**342**	**10.6**	**2,916,834**	**19**	**0.007**

Table 32 reports the numbers of interactions by species and fate immediately post interaction.

Table 32. Protected species interactions in the offshore bottom longline fishery during the 2018/19 observer year

Species	Dead	Grand Total
Seabirds		
Chatham Island albatross	2	2
Grey petrel	3	3
Petrel (Unidentified)	1	1
Salvin's albatross	2	2
Seabird - Small	1	1
Westland petrel	2	2
White-chinned petrel	8	8
Grand Total	**19**	**19**

Table 33a details the broad method of interaction for each species. Hook capture was the main observed form of interaction, with all protected species interactions resulting in mortality.

Table 33. Method of interaction for a) dead protected species in the offshore bottom longline fishery during the 2018/19 observer year.

a) Dead protected species

Species	Caught on hook	Tangled in line	Grand Total
Seabirds			
Chatham Island albatross	2		2
Grey petrel	3		3
Petrel (Unidentified)	1		1
Salvin's albatross	2		2
Seabird - Small	1		1
Westland petrel	2		2
White-chinned petrel	6	2	8
Grand Total	**17**	**2**	**19**

Inshore Bottom Longline

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

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

Because of the high variety of vessels and fishing grounds in the bottom longline fisheries, a new characterisation was applied since the 2014/15 CSP annual research summary. In this new grouping, the inshore bottom longline fishery is characterised as: all bottom longline vessels under 20m in overall length, and all vessels between 20-34m in overall length that set 5000 hooks or less per day.

Table 34 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. In comparison to the previous observer year (2017/18), commercial effort increased by 4% and observer coverage increased by 31% in 2018/19. The number of seabird captures increased to nine captures observed this year compared with three from the previous year (Weaver 2019). Coral bycatch decreased on the previous year (2017/18) by 89%. No marine mammal captures were observed in 2018/19, one marine mammal capture occurred the year prior (2017/18).

In summary, 19 observed trips were conducted aboard 17 vessels, with protected species captures occurring on six trips aboard six vessels (32% of these trips involved protected species captures and 35% of vessels that were observed within this fishery during the 2018/19 year had protected species captures).

Table 34. Summary of commercial effort, observer effort and protected species interactions in the inshore bottom longline fisheries during the 2018/19 observer year.

FMA	Effort lines	Observed lines	Coverage (%)	Number of hooks observed	Seabird interactions	Seabirds /1000 hooks	Coral catch (kg)	Coral catch /1000 hooks
1. AKE	1,065	67	6.3	104,769	3	0.03	-	-
2. CEE	2,722	23	0.8	69,200	1	0.01	2	0.03
3. SEC	400	18	4.5	65,656	1	0.02	-	-
4. SOE	340	-	-	-	-	-	-	-
5. SOU	295	-	-	-	-	-	-	-
6. SUB	-	-	-	-	-	-	-	-
7. CHA	607	74	12.2	128,923	4	0.03	2	0.02
8. CEW	449	21	4.7	19,101	-	-	-	-
9. AKW	692	13	1.9	17,292	-	-	-	-
Total	**6,570**	**216**	**3.3**	**404,941**	**9**	**0.02**	**4**	**0.01**

Table 35 reports the number of interactions by species and fate immediately post interaction. 67% of protected species interactions resulted in mortality.

Table 35. Protected species interactions in the inshore bottom longline fisheries during the 2018/19 observer year.

Species	Alive	Dead	Grand Total
Seabirds			
Black (Parkinson's) petrel	2		2
Cape petrels	1		1
Flesh-footed shearwater		1	1
Westland petrel		3	3
White-chinned petrel		2	2
Grand Total	**3**	**6**	**9**

Tables 36a and b detail the method of interaction for each species. The cape petrel was located on the fishing vessel and recorded by the observer as having a broken leg though it was unclear whether it was a result of interacting with the vessel or fishing gear.

Table 36. Method of interaction for a) protected species released alive and b) dead protected species observed in the inshore bottom longline fisheries during the 2018/19 observer year.

a) Protected species released alive

Species	Caught on line	Other	Grand Total
Seabirds			
Black (Parkinson's) petrel	2		2
Cape petrel		1	1
Grand Total	**2**	**1**	**3**

b) Dead protected species

Species	Caught on hook	Tangled in line	Unknown	Grand Total
Seabirds				
Flesh-footed shearwater	1			1
Westland petrel	2		1	3
White-chinned petrel	1	1		2
Grand Total	**4**	**1**	**1**	**6**

Bottom Longline - Snapper

Throughout the past ten years, observer coverage has been irregular in the snapper fishery. Fluctuating between < 1% up to 8% (Hjorvarsdottir 2016). This fishery is predominantly conducted in the AKE FMA by vessels under 20m in length.

Table 37 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. In comparison to 2017/18, there was a 12% increase in commercial fishing effort, but observer coverage of the fishery decreased by 38% in 2018/19. In the 2018/19 observer year, four seabird captures were observed, in comparison to 14 captures in 2017/18 (a 71% reduction). No protected fish captures occurred in comparison to one in 2017/18 (Weaver 2019).

In summary, 14 observed trips were conducted aboard 13 vessels, with protected species captures occurring on four trips on four vessels (29% of these trips involved protected species captures and 31% of vessels that were observed within this fishery during the 2018/19 year had protected species captures).

Table 37. Summary of commercial effort, observer effort and protected species interactions in the snapper bottom longline fishery during the 2018/19 observer year.

FMA	Effort lines	Observed lines	Coverage (%)	Number of hooks observed	Seabird interactions	Seabirds /1000 hooks
1. AKE	4,698	96	2.0	220,010	3	0.02
2. CEE	2	-	-	-	-	-
3. SEC	-	-	-	-	-	-
4. SOE	-	-	-	-	-	-
5. SOU	-	-	-	-	-	-
6. SUB	-	-	-	-	-	-
7. CHA	32	-	-	-	-	-
8. CEW	14	14	100	11,116	1	0.09
9. AKW	97	1	1.0	3,500	-	-
Total	**4,843**	**111**	**2.3**	**234,626**	**4**	**0.02**

Table 38 reports the numbers of interactions by species and fate immediately post interaction. There was an 73% decrease in the overall number of protected species interactions in comparison to the previous observer year (2017/18) (Weaver 2019). The majority (75%) of interactions resulted in mortalities.

Table 38. Protected species interactions in the snapper bottom longline fishery during the 2018/19 observer year.

Species	Alive	Dead	Grand Total
Seabirds			
Flesh-footed shearwater		3	3
Little blue penguin	1		1
Grand Total	**1**	**3**	**4**

Tables 39a and b detail the broad method of interactions. The little blue penguin interaction occurred in the AKE FMA and was hooked by the wing. The skipper carefully removed this and the bird was inspected for any other injuries prior to being returned to the water.

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 2018/19 observer year.

a) Protected species released alive

Species	Caught on hook	Grand Total
Seabirds		
Little blue penguin	1	1
Grand Total	**1**	**1**

b) Dead protected species

Species	Caught on hook	Tangled in line	Grand Total
Seabirds			
Flesh-footed shearwater	2	1	3
Grand Total	**2**	**1**	**3**

Purse Seine Fisheries

Skipjack Tuna

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

Table 40 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. Commercial effort increased by 25% and the amount of observed tows decreased 46% in comparison to 2017/18. Seabird and mammal captures are mostly non-existent or very low in this fishery (Clemens-Seely et al. 2014, Clemens-Seely & Hjorvarsdottir, 2016, Hjorvarsdottir 2017, Hjorvarsdottir & Isaacs 2018, Weaver 2019). Once again, this observer year (2018/19) no seabird or mammal captures were observed. However, four captures of spine-tailed devil rays were observed, all in the AKE FMA, a 50% reduction on protected fish captures in 2017/18 (Weaver 2019).

In summary, two trips were conducted aboard two vessels, with protected species captures occurring on a single trip/vessel.

Table 40. Summary of commercial effort, observer effort and protected species captures in the purse seine fishery during the 2018/19 observer year.

FMA	Effort tows	Observed tows	Coverage (%)	Protected fish captures	Protected fish /100 tows
1. AKE	183	36	19.7	4	11.1
2. CEE	-	-	-	-	-
3. SEC	-	-	-	-	-
4. SOE	-	-	-	-	-
5. SOU	-	-	-	-	-
6. SUB	-	-	-	-	-
7. CHA	-	-	-	-	-
8. CEW	13	-	-	-	-
9. AKW	38	-	-	-	-
Total	**234**	**36**	15.4	**4**	**11.1**

Table 41 reports the numbers of interactions by species and fate immediately post interaction, and the method of the interaction recorded. Net capture was the only method of interaction, and resulted in the live release of the animal in every case.

Table 41. Protected species interactions, and the method of interaction for species release alive in the purse seine fishery during the 2018/19 observer year.

Species	Alive	Grand Total
Protected fish		
Spine-tailed devil ray	4	4
Grand Total	**4**	**4**

Mackerel & Other

The purse seine fishery targeting English mackerel, jack mackerel, kahawai, pilchard, snapper, trevally and other minor species is observed independently from the purse seine fishery targeting skipjack tuna because of temporal differences in fishing seasons as well as some differences in fishing practices and net construction.

Table 42 presents a summary of commercial fishing effort and observer effort in this fishery during the 2018/19 observer year. The commercial fishing effort of the fishery was mainly carried out in the AKE FMA, although some fishing effort was conducted in CEE, CEW and AKW FMAs.

Observer coverage of this fishery has historically been low and no observed trips occurred this year.

Table 42. Summary of commercial effort, observer effort and protected species interactions in the purse seine mackerel fishery during the 2018/19 observer year.

FMA	Effort tows	Observed tows	Coverage (%)
1. AKE	390	-	-
2. CEE	8	-	-
3. SEC	-	-	-
4. SOE	-	-	-
5. SOU	-	-	-
6. SUB	-	-	-
7. CHA	-	-	-
8. CEW	1	-	-
9. AKW	12	-	-
Total	**411**	**0**	**0**

Precision Seafood Harvesting (PSH)

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

Although PSH falls under the trawling sector, the technology used differs in fundamental ways, which could cause differences in the incidental capture rate of protected species, thus, observer reporting is carried out separately. This is the third year PSH has been reported on.

Table 43 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2018/19 observer year. The use of PSH in both mid and bottom trawl tows increased by 7% in the 2018/19 year, highlighting the continued uptake of the technology over the trawl fleet. The observer coverage in this fishery increased by 42% on the previous year (2017/18). Commercial fishing effort occurred across all FMA's, and observed trips occurred across all FMA's except CEW and AKW. In 2018/19, 20 observed seabird interactions were recorded in the PSH fisheries decreasing by 26% from the previous year (2017/18) when 27 seabirds were captured. 138.2 kgs of coral bycatch was observed in the 2018/19 year, a large increase on the 19.6 kg of protected coral catch in the 2017/18 observer year. The majority (98%) of the coral bycatch consisted of spiny white hydrocorals (*Lepidotheca* spp.). No marine mammal or protected fish captures occurred in the 2018/19 observer year.

In summary, 22 observed trips were conducted aboard 13 vessels, with protected species captures occurring on nine of these trips aboard seven vessels (41% of these trips involved protected species captures and 54% of vessels that were observed within this fishery during the 2018/19 year had protected species captures).

Table 43. Summary of commercial effort, observer effort and protected species interactions in the Precision Seafood Harvesting trawl fisheries during the 2018/19 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird interactions	Seabirds /100 tows	Coral catch (kg)	Coral catch /100 tows
1. AKE	2,475	128	5.2	3	2.3	135.3	105.7
2. CEE	207	17	8.2	1	5.9	-	-
3. SEC	970	349	36.0	13	3.7	0.1	0.0
4. SOE	308	50	16.2	2	4.0	2.8	5.6
5. SOU	33	26	78.8	-	-	-	-
6. SUB	30	30	100.0	1	3.3	-	-
7. CHA	166	140	84.3	-	-	-	-
8. CEW	125	-	-	-	-	-	-
9. AKW	528	-	-	-	-	-	-
Total	**4,842**	**740**	**15.3**	**20**	**2.7**	**138.2**	**18.7**

Table 44 reports the number of interactions by species and fate immediately post interaction. 60% of protected species interactions in this fishery resulted in mortalities in 2018/19.

Table 44. Protected species interactions in the Precision Seafood Harvesting trawl fisheries during the 2018/19 observer year.

Species	Alive	Dead	Grand Total
Seabirds			
Albatrosses (Unidentified)	1		1
Fairy prion	1		1
Petrels, Prions and Shearwaters	1		1
Salvin's albatross	3	3	6
Seabird - Small	1		1
Sooty shearwater		3	3
Westland petrel		1	1
White-capped albatross		1	1
White-chinned petrel		4	4
White-faced storm petrel	1		1
Grand Total	**8**	**12**	**20**

Tables 45a and b detail the broad method of interactions.

Table 45. Method of interaction for a) protected species released alive and b) dead protected species observed in the Precision Seafood Harvesting trawl fisheries during the 2018/19 observer year.

a) Protected species released alive

Species	Caught in net	Other	Grand Total
Seabirds			
Albatrosses (Unidentified)		1	1
Fairy prion		1	1
Petrels, Prions and Shearwaters	1		1
Salvin's albatross		3	3
Seabird - Small		1	1
White-faced storm petrel		1	1
Grand Total	**1**	**7**	**8**

a) Dead protected species

Species	Caught in net	Caught on warp or door	Grand Total
Seabirds			
Salvin's albatross	3		3
Sooty shearwater	3		3
Westland petrel	1		1
White-capped albatross	1		1
White-chinned petrel	3	1	4
Grand Total	**11**	**1**	**12**

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $949,622. Services were provided by Fisheries New Zealand Observer Services.

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

Overall objective

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

Specific objectives

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

Rationale

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

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

Project status

Complete.

Summary of the methods and key findings

1 July 2016 to 30 June 2017

A total of 169 specimens were identified to finest taxonomic level possible and appropriate updates made to the Centralised Observer Database (COD). Sample processing is ongoing and there are now 26 coral tissue samples held in storage for future genetic studies. There were also 163 images identified and 112 protected coral images geo-referenced. Efforts were made to use trip number and image properties (date, time), to help populate the data poor images with georeferenced information.

Bottom trawling in all regions has contributed to the highest counts of coral mortality. Coral bycatch samples were also returned from long line tows but in lower numbers.

1 July 2017 to 30 June 2018

A total of 206 specimen samples, those collected during the reporting period as well as historical observer and research trawl survey specimen identifications, were identified to the lowest taxonomic level. Updates were then made to the Centralised Observer Database (*COD*). To meet the second project objective, a sub-sample of each live specimen is taken for future genetic analysis. Forty-nine coral tissue samples are now held in storage for future genetic studies.

Coral samples have been returned from both within the New Zealand Exclusive Economic Zone as well as the High Seas Fisheries Management Areas. Of the specimen samples received, and digital images processed, bottom trawling targeting deep-sea fish species has contributed to the highest counts of coral mortality. Coral bycatch samples were also returned from bottom longline tows but in lower numbers.

Identification of protected corals from digital images provided by observers were possible for 277 protected coral images, 214 of which were able to be georeferenced. Efforts were made to use trip number and image properties (date, time), to help populate the data poor images with georeferenced information.

1 July 2018 to 30 June 2019

A total of 12 observer collected coral specimen samples were collected and identified during this reporting period. An additional 17 historical observer and 8 trawl survey samples were identified to achieve target sample numbers. Updates were then made to the MPI Centralised Observer Database (*COD*).

A total of 239 specimens were identified (observer identification confirmed or amended) from digital images. Of the 239 specimens, 178 were protected coral taxa, and 169 of these were able to be georeferenced, leaving nine protected coral specimens with no associated position information due to missing station number or incomplete data. Sub-samples from specimens with live tissue were taken for future genetic studies (n= 50 samples now accumulated).

Recommendations

To ensure a greater degree of confidence in data quality and for significant gains in efficiency we recommend:

- That the instructions to Government Observers on methods to capture images at-sea (Tracey et al. 2017) need to be stressed via the MPI Observer Programme, with emphasis on including a label in the image when photographing the specimen with details of the station number/ tow number and if possible, that the station number be included in the image file name.
- The Observer programme provide the Observer with specimen labels and that they are consistently used when photographing the specimen.
- The Observer consistently highlight or tick ‘image taken’ on the benthic materials form.

- A discussion with CSP and MPI to improve the process of logging of station number information upon receipt of the digital images take place early 2019 to avoid having to reconstruct information from qualitative examination of Observer data.
- That the camera's time stamp be set correctly. This detail could be added to the Instructions to Observers document.
- Observers be given GPS-enabled cameras.

We do note that it can be difficult to reflect the time period accurately to match a station when photographs are taken. This is because the Observers may not always be able to take photos of the samples until after their shift ends or after some period of storage e.g., in a fridge or freezer, rather than immediately upon the collection of the specimen. If the time clock is set correctly however, then this will save time when interrogating databases and forms.

Project logistics summary statement

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

Review milestones:

- Methodology presented at the CSP TWG meeting on 16 November 2016
- 2016/17 Final Annual Report made available on the CSP webpage on 22 November 2017
- 2017/18 Final Annual Report made available on the CSP webpage in February 2019
- 2018/19 Final Annual Repot made available on the CSP webpage in January 2020

Citation

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

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Weblink

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

Overall objective

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

Specific objectives

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

Rationale

Large numbers of seabirds frequent New Zealand commercial fishing waters. Birds with significant differences in conservation status can appear morphologically similar. The accurate determination of the taxon of seabirds captured in New Zealand fisheries is vital for examining the potential threat to population viability posed by incidental fisheries captures. Observers on commercial vessels are not always able to identify seabirds at sea with high precision and the assessment of the age-class, sex and provenance of captured individuals requires necropsy 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 Owned 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 into Ministry for Primary Industries databases and will inform seabird bycatch estimates, ongoing risk assessments, research and modelling of the effects of fisheries bycatch on seabird populations. Furthermore, the mode of capture and associated information will enable robust analyses to be made around the factors contributing to seabird capture events and inform the development of appropriate mitigation strategies.

Project status

Complete.

Summary of the methods and key findings

This summarises identification work completed on dead birds bycaught and returned and/or using photographs covering three reporting periods; (i) 1 July 2016 to 30 June 2017, (ii) 1 July 2017 to 30 June 2018 and (iii) 1 July 2018 to 30 June 2019.

1 July 2016 to 30 June 2017

A total of 955 seabird interactions were observed in NZ commercial fisheries between 1 July 2016 and 30 June 2017. Of these, 193 (comprising 19 taxa) were returned from 46 vessels for necropsy. Seabirds returned were dominated by five species (Salvin's albatross, Buller's albatross, sooty shearwater, NZ white-capped albatross and white-chinned petrel). These accounted for 78.2% of all returns. All birds returned from longline fisheries had injuries consistent with hooks or entanglement in the bill, throat or wing. In contrast, most birds (79.4%) returned from trawl fisheries were killed in the net, cod-end or pound, with 10.7% killed by warp interaction. Four birds were killed by striking the deck of a vessel. Birds had higher mean fat scores than the year prior, and discards, including offal, appear to continue to attract seabirds. In addition to the seabirds returned for necropsy, examination of the Ministry for Primary Industries Central Observer Database and images provided by Government observers gave a further 762 seabirds reported or photographed as interactions (both dead or live captures) with 60 fishing vessels. Over two-thirds (69.9%) of the seabirds reported in these interactions were released alive. Out of these 762 records of seabird interactions, photographs were taken of 252 seabirds consisting of 18 taxa.

1 July 2017 to 30 June 2018

A total of 796 seabird interactions were observed in NZ commercial fisheries between 1 July 2017 and 30 June 2018. Of these, 251 (comprising 22 taxa) were returned from 17 longline (n = 97 birds), 30 trawl (n = 143 birds) and 5 set net (n = 11 birds) vessels for necropsy. Seabirds returned were dominated by six species (flesh-footed shearwater, Salvin's albatross, sooty shearwater, Buller's albatross, white-chinned petrel and NZ white-capped albatross). All birds returned from longline fisheries had injuries consistent with being hooked or entangled in the bill, throat or wing. In contrast, most birds (79.7%) returned from trawl fisheries were killed in the net, cod-end or pound, with 10.4% likely to have been killed by warp interaction. Four birds were killed by striking the deck of the vessel. Birds had slightly higher mean fat scores than the year prior (2016/17). Over 25% of returned seabirds had consumed discards or offal. In addition to the seabirds returned for necropsy, examination of the Ministry for Primary Industries Central Observer Database and images provided by Government observers gave a further 545 seabirds that were reported or photographed as interactions (both dead or live captures) with 57 fishing vessels. Two-thirds (66.6%) of the seabirds reported in these interactions were released alive. Out of these 545 seabird interactions, photographs were taken of 241 seabirds consisting of 19 taxa.

1 July 2018 to 30 June 2019

A total of 644 seabird interactions were observed in NZ commercial fisheries between 1 July 2018 and 30 June 2019. Of these, 247 (comprising 23 taxa) were returned from 16 longline (n = 66 birds), 37 trawl (n = 173 birds) and five set net (n = eight birds) vessels for necropsy. Returned seabirds were dominated numerically by six species Westland petrel, Salvin's albatross, Buller's albatross, sooty shearwater, white-chinned petrel and New Zealand white-capped albatross. All birds returned from

longline fisheries had injuries consistent with being hooked or entangled in the bill, throat or wing. In contrast, most birds (81.5%) returned from trawl fisheries were killed through entanglement in the net, cod-end or pound, with 16.8% likely to have been killed by warp interaction or entanglement. Three birds were killed by striking the deck of the trawl vessel. Birds had higher mean fat scores in comparison to birds from the last fishing year. In addition to the seabirds that were returned for necropsy, examination of the Ministry for Primary Industries Central Observer Database (COD) and images provided by Government observers gave a total of a further 417 seabirds that were reported as interactions or photographed (as dead or alive captures) aboard 58 fishing vessels (and may include some non-capture interactions). Half (51.8%) of the seabirds reported in these interactions were released alive. Out of these 417 records of seabird interactions, photographs were taken of 223 seabirds consisting of 20 taxa.

Recommendations

Image quality varied widely across all reporting periods, with poor images being particularly common for birds that were alive and seen aboard for short periods. Images for dead birds have improved with multiple images taken for each specimen. Recommendations are made to improve photo-identifications in the future.

Wherever possible, all seabird interactions should be photographed and recorded. If possible, haul and sample information should be included in the image. Images (with scale if possible) include the head and bill from the side and above, body (full body and side shots), wings (above and below) and shots of the feet whenever possible. This is particularly important for dead birds. Photo logs are completed for all images (which can be correlated to date and time stamps from the camera). Descriptions of the interaction would also help with the identification and matching of images. Photograph numbers are recorded on the observer non-fish bycatch form. Photographs (and extracts from the MPI observer logbooks) should be provided regularly throughout the fishing year for species identification. It is also crucial that all returned specimens have the CSP tag cable tied to the seabird to allow it to be matched up with the corresponding bycatch event in the database.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $80,000 per annum over three years. Services were provided by Wildlife Management International Ltd.

Review milestones:

- Methodology presented at the CSP TWG meeting on 16 November 2016
- 2016/17 Final Annual Report made available on the CSP webpage on 15 December 2017
- 2017/18 Final Annual Report made available on the CSP webpage on 22 November 2018
- 2018/19 Final Annual Report made available on the CSP webpage on 20 December 2019

Citation

Bell, E.A., Bell, M.D. (2017). INT2016-02 Identification of seabirds caught in New Zealand fisheries, 1 July 2016 to 30 June 2017. Annual Technical Report to the Conservation Services Programme, Department of Conservation. Wellington, New Zealand. 31 p.

Bell, E.A., Bell, M.D. (2018). INT2016-02 Identification of seabirds caught in New Zealand fisheries, 1 July 2017 to 30 June 2018. Annual Technical Report to the Conservation Services Programme, Department of Conservation, Wellington, NZ. 38 p.

Bell, E.A., Bell, M.D. (2019). INT2016-02 Identification of seabirds caught in New Zealand fisheries, 1 July 2018 to 30 June 2019. Annual Technical Report to the Conservation Services Programme, Department of Conservation, Wellington, NZ. 34 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/int2016-02-seabird-id-final-2019.pdf

https://www.doc.govt.nz/contentassets/d544ed98dc154cab907b33e5f4dad6fb/int2016-02-seabird-id-final-2018.pdf

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/int2016-02-seabird-id-final-2019.pdf

2.4 INT2017-02 Supporting the utility of electronic monitoring to identify protected species interacting with commercial fisheries

Overall objective

To enable the optimal collection of protected species interaction data via electronic monitoring systems.

Specific objectives

1. Develop tools to aid in the effective identification of protected species from camera footage.
2. Provide training materials for remote viewers of fisheries data to enable the collection of robust data on the nature of interactions.

Rationale

Electronic monitoring through use of video and sensor data has been implemented in a number of fisheries around the world for a variety of management needs. The utility of these systems for the monitoring of protected species interactions is dependent on robust, objective based planning and adequate investment in upskilling of footage reviewers. In New Zealand, the Ministry for Primary Industry's Integrated Electronic Monitoring and Reporting System (IEMRS) has set in place ambitious timelines for roll out throughout the New Zealand fishing fleets. Overall objectives of IEMRS are not limited to protected species monitoring. However, to ensure maximum utility and therefore value of the system, it will be critical that footage reviewers are adequately skilled in protected species identification and the nature of their interactions with fishing operations.

Project status

Phase one was completed in 2017/18 and remainder of budget was returned to industry.

Summary of the methods and key findings

Monitoring commercial fisheries provides essential information to enable effective fisheries management. This project involved an extensive review investigating the types of threatened, endangered, and protected species (TEPS) interactions that electronic monitoring (EM) has been used to explore, and training given to analysts to detect and describe those interactions. The review encompassed published and unpublished reports, social media posts, and the websites of practitioners, companies, agencies, and multilateral bodies known to use or promote EM. Experts were also consulted directly to collect information on work that is underway but not yet publicly available.

The majority of EM programmes to date that have focused on TEPS interactions were trials or pilots, with a smaller number of operational programmes underway. Information reviewed showed that EM has been widely tested and proven effective in monitoring captures of a range of TEPS in fishing gears. When EM imagery captures these interactions, species identification is possible in most cases. Life status can also be determined when animals are vigorously moving, especially when brought on deck prior to release. Detection of unusual or unexplained behaviour, that may result from crews wishing to avoid a TEPS capture being recorded by EM, is also possible. EM has been explored (but found less effective) for monitoring seabird interactions with trawl warps and third wires.

Other effective applications of EM that are relevant to the impacts of fishing on TEPS include monitoring handling of these species after capture, deployment of mitigation devices (e.g. tori lines, pingers, turtle exclusion devices), and detecting the presence of fish waste discharge within camera views. Collecting robust quantitative information on the abundance of TEPS present in the air or in the water around vessels and fishing gear is difficult using EM.

Species identification using EM imagery has been approached by practitioners using a number of methods, e.g. employing analysts who are trained and work as at-sea observers or who have received observer training, using field guides, species lists, and images of species of interest. Characteristics such as body size, morphology, colour, and distinctive markings are all important to facilitate identifications.

In many reports and published papers, the training provided to EM analysts is not described. However, because EM analysts are the source of data, the training process has a strong bearing on data quality and therefore end-user confidence in datasets produced. In studies where training is described, it routinely incorporates elements such as core instruction, self-tests and practice runs after which feedback is provided, and a formal assessment that documents analyst competence. When a particular level of competence is reached in the formal assessment, this provides an assurance of a commensurate level of data quality.

The detection of interactions between TEPS and fishing gear occurs after a number of other steps in the EM process chain. For example, monitoring objectives and business requirements must be clearly defined, EM cameras must be deployed in appropriate positions on-vessel, system specifications (e.g. frame rate) must be optimised to record interactions, and crew activities aboard must occur such that these objectives and requirements can be addressed. Once EM imagery is captured, the review process provides for the extraction of data on TEPS. As part of a rigorous monitoring process, data extraction must be repeatable and auditable. However, the development of standards to underpin EM is in its early days.

Recommendations

- Data standards are developed and documented to specify the information that EM analysts are tasked with extracting from imagery
- Quality assurance standards are developed for EM review
- Training materials and programmes are prepared to enable EM analysts to populate data fields and to document their findings
- The development of training materials is initiated where requirements are already understood
- Photos and videos taken by fisheries observers are catalogued and stored for use as part of EM training materials and potentially for machine learning
- NZ remains abreast of the regional development of EM process and data standards
- Practitioners in NZ and internationally are encouraged to make available EM process and data standards, review protocols and training materials

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 per annum over two years. Services were provided by Johanna Pierre Environmental Consulting Ltd.

Review milestones:

- Draft final report made available on the CSP webpage on 5 June 2018
- Final report made available on the CSP webpage on 1 October 2018

Citation

Pierre, J. P. (2018). Using electronic monitoring imagery to characterise protected species interactions: A primer and review. Final report prepared for Conservation Services Programme project INT2017-02. Department of Conservation, Wellington. 42 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/int2017-02-final-report-em.pdf

2.5 INT2017-03 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

Phase one and two was completed in 2018/19 and year three is in progress.

Summary of the methods and key findings

1 July 2016 to 30 June 2017

162 marine mammal bycatch events occurred during this period, 113 of these events had photos of sufficient quality to allow for expert identification of taxa. Observer identification of marine mammals was 100% correct in this year. Nineteen protected fish were bycaught during this period, with one case of an incorrect ID (one spine tail devil ray recorded as a manta ray, subsequently updated in COD database following expert ID). Two turtles were bycaught during this time period and both observer ID's were correct.

1 July 2017 to 30 June 2018

115 marine mammal bycatch events occurred during this period, 82 of these events had photos of sufficient quality to allow for expert identification of taxa. Observer identification of marine mammals was 100% correct in this year. Twenty protected fish were bycaught during this period, with all ID's presumed correct (not all events had corresponding observer photos). Four turtles were bycaught during this time period will all observer ID's correct.

1 July 2018 to 30 June 2019

106 marine mammal bycatch events occurred during this period, 89 of these events had photos of sufficient quality to allow for expert identification of taxa. Observer identification of marine mammals was 100% correct in this year. Eight protected fish were bycaught during this period, with all ID's correct. No turtles were bycaught during this time period.

Recommendations

Marine mammals

The estimation of age class was difficult from the available data and photos for many events. Better photos should be taken to allow for more reliable age class determinations and if accurate ages are required, then tooth samples should be collected and processed.

There were some events for which no photos were available, or the photos taken were of poor quality. The instructions provided to observers should be reviewed and an increased effort should be made to collect a full range of good quality photos from all interaction events.

Correct assignment of sex was good for males but relatively poor for females and very few events were able to be assessed due to a lack of appropriate photos. Additional training and/or training materials should be made available to observers to help with sex determination. If an accurate sex determination is required, then consideration should be given to using DNA molecular methods from samples collected from each individual.

Protected fish and reptiles

All observed interactions require photographs or video footage where possible for expert ID.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $15,000 per annum over three years.

Review milestones:

- Draft final reports made available on the CSP webpage on 18 October 2019
- Final reports made available on the CSP webpage on 19 November 2019

Citations

Childerhouse S, Johnston O. 2019. INT2017-03: Identification of marine mammals captured in New Zealand fisheries 2016/17. Prepared for the Department of Conservation. Cawthron Report No. 3422. 20 p.

Childerhouse S, Johnston O. 2019. INT2017-03: Identification of marine mammals captured in New Zealand fisheries 2017/18. Prepared for the Department of Conservation. Cawthron Report No. 3422. 19 p.

Childerhouse S, Johnston O. 2019. INT2017-03: Identification of marine mammals captured in New Zealand fisheries 2018/19. Prepared for the Department of Conservation. Cawthron Report No. 3439. 18 p.

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https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/int2017-03-mm-id-2016-17.pdf

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/int2017-03-mm-id-2017-18.pdf

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/draft-reports/int2017-03-mm-id-2018-19.pdf

2.6 INT2018-02 Trialling innovative electronic monitoring (EM) systems for small vessels

Specific objectives

1. To trial one or more innovative EM systems designed specifically for small vessels, and vessels which do not have an adequate power source for existing EM systems used in New Zealand fisheries.
2. To assess the effectiveness of the EM system(s) trialled to collect protected species interaction data and ensure the system is adequate for reporting on interactions for management purposes.

Rationale

Electronic monitoring, through use of video and sensor data, has been implemented in a number of fisheries around the world for a variety of management needs. The utility of these systems for the monitoring of protected species interactions is dependent on robust, objective based planning and adequate investment in upskilling of footage reviewers. In New Zealand, the Ministry for Primary Industry's Digital Monitoring scheme (formerly IEMRS) has set in place ambitious timelines for roll out throughout the New Zealand fishing fleets.

Inshore fishing within the New Zealand EEZ is an immensely diverse activity, with large amounts of variation in individual practice and effort. In addition, there is a large variation in individual vessel size, ranging from just two meters in length to over thirty meters. One of the challenges with observing the inshore fisheries is the difficulty of placing observers on small vessels in remote ports, in a fleet where vessels often only operate part time, either seasonally or sporadically.

Due to historically low levels of observer coverage, and the challenging nature of this fishing sector, using electronic monitoring technology may be feasible, if the technology is a viable tool for monitoring the incidental catch of protected species. However, many of the small vessels in the inshore fleet, such as those under 7m, do not have adequate infrastructure such as power supplies and storage for existing EM systems used in New Zealand fisheries, thus trialling innovative EM systems will be crucial for the potential electronic monitoring of some of the vessels from the inshore fleet.

Project status

Returned to industry.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $50,000 per annum over two years.

2.7 INT2018-03 Development of observer photograph protocols and curation

Specific objectives

1. To review observer protocols for photographing bycaught protected species.
2. To review the process of collection and recording of photograph metadata.
3. To scope an improved database for observer photographs.

Rationale

Digital photo images and associated metadata collected by observers provide an invaluable resource for the identification of protected species that are bycaught in, or otherwise interact with, commercial fisheries. Although a general photography protocol exists, the quality of these photographs is often variable, and researchers using the data for identification have recommended improvements to the current processes. Updated protocols and guidelines that are more detailed will improve the successful utilisation of this form of observer data.

Image data is currently captured in the photo log. This data helps identify the location of interactions between the protected species and fishing gear and identify factors that may have contributed to the interaction.

Project status

In progress.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $30,000 per annum over two years.

2.8 INT2018-04 Improving the collection of data and samples from bycaught basking sharks

Specific objectives

1. To create tools that provide commercial fishers with information on how to collect biological samples from bycaught basking sharks.
2. Provide commercial fishers with permits to retain bycatch basking sharks.

Rationale

Basking sharks are caught incidentally in New Zealand trawl and setnet fisheries, with most captures in the recent years reported from deepwater trawl fisheries. They were protected in December 2010, and the last review of bycatch was undertaken in 2017. Due to their naturally low population sizes, presumed slow growth rates, and very low reproductive rates, basking sharks are believed to be vulnerable to over-fishing.

The life history, movement and behaviour of basking sharks make them particularly hard to study. Consequently, information on their populations and biology is difficult to obtain and depends on a slow, incremental accumulation of knowledge about them. Targeted research on basking sharks is likely to be difficult and expensive. The limited availability of specimens, the low chance of encountering one on any particular vessel, and the difficulty of working on a large animal during a commercial fishery operation, all hinder the collection of biological data. Furthermore, the paucity of surface sightings of basking sharks in recent decades makes them difficult to locate for tagging studies.

Before the protection of basking sharks in December 2010, most reported captures came from observers. However, after the protection and the introduction of the NFPS form at the same time, reports of captures by commercial fishers have provided a more comprehensive data source than observer reports. Additional opportunistic research activities aboard commercial fishing vessels will offer increased opportunity to further understanding of the population characteristics of basking sharks and therefore their susceptibility to fisheries impacts. This includes increasing the priority of observer research activities for basking sharks, as well as supplementing fishers with the right tools and encouraging them to sample any bycaught basking sharks when an observer is not on board.

Project status

In progress.

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 per annum over two years.

2.9 INT2018-05 Updated analysis of spine-tailed devil ray post release survival

Specific objectives

1. To provide updated estimates of post release survival of *Mobula japanica* bycatch in purse seine fisheries.
2. To identify operational, biological and environmental factors which effect the likely hood of post-release mortality.
3. To provide recommendations on the most effective methods to reduce post release mortality.

Rationale

CSP project MIT2011-01 was undertaken to better understand factors effecting the risk of spine-tailed devil ray (*Mobula mobular)* interactions in purse seine fisheries around northern New Zealand and investigate post release mortality rates. As part of this project, live bycaught rays were tagged with s-PAT and mini-PAT tags in order to track movement and survival post release. Initial findings from six events in the 2012/13 season were analysed and published by Francis in 2014. Since this initial analysis, a further nine tags have been deployed across a range of vessels and conditions.

Analysis of the data collected from these nine tags will significantly refine post release mortality estimates and the factors which drive it.

Project status

Complete.

Summary of the methods and key findings

Spine-tailed devil rays (*Mobula mobular*) are frequently taken as bycatch in purse-seine fisheries targeting skipjack tuna (*Katsuwonus pelamis*) around the northern North Island. Devil rays are a protected species, and they are returned to the water following capture. In previous research projects carried out for the Department of Conservation, we estimated the survival of devil rays returned to the sea, determined the factors that influence the capture and post-release survival of devil rays, and made recommendations on ways to reduce and mitigate devil ray captures. In this report, we update some of our previous analyses using observer and tagging data to the end of the 2018–19 fishing year, and also update the recommendations.

In the period 2013−2019, observers recorded 22 devil rays caught in skunked sets (in which the tuna catch was nil or minimal) and 36 devil rays caught in successful sets. Devil rays caught in skunked sets were released while in the water (36%) or after lifting aboard in the net (64%). Devil rays caught in successful sets were mainly (81%) brought aboard in the brail net. Since 2013, vessels may have avoided setting on ray-associated tuna schools, and this may have reduced the number of devil rays caught. When devil rays have been caught, there is evidence of improved handling. Data from before and since 2013 show that there were similar proportions of skunked and successful sets, and similar aboard handling, in the two periods, but there has been a recent increase in the frequency of vessels opening the net on skunked sets to let devil rays go in the water. By reducing the handling and physical and physiological trauma caused by lifting devil rays aboard, their chances of survival have probably increased.

Fourteen devil rays were successfully tagged with 'pop-up' tags, which enabled determination of whether devil rays had survived 30 days following tag and release. Four of the first seven devil rays tagged in 2013–2015 (57%) died. However, only one of seven devil rays tagged in 2016–2018 (14%) died. All mortalities resulted from skunked sets followed by lifting of devil rays aboard in the net. In contrast, all devil rays that were caught in successful sets were brailed aboard, and all of them survived. The number of devil rays tagged is too small to draw strong conclusions, but a reduction in the mortality rate of released devil rays is consistent with observed improvements in handling and releasing methods used by purse seine crews.

Recommendations

Recommendations within the report focus on guidance for avoiding ray captures and reducing ray mortality:

1. Vessels should not set on tuna schools that are associated with rays.
2. Vessels should avoid fishing in the north-east coast of North Island hotspot area.
3. Rays should be removed from the net while still in the water. If not, they should be brailed out early in the brailing process.
4. Rays should not be dragged aboard in the sacked net.
5. Physical handling of rays on deck should be minimised.
6. Vessels should use a cargo net to return rays to the sea.
7. Vessels should not use a rope sling to return rays to the sea.

In addition to these, data from spotter pilots could be analysed to determine (a) whether pilots are routinely recording ray sightings, and (b) to provide more information on the spatial and temporal distribution of rays, particularly in relation to defining the hotspot area in north-eastern North Island.

Additional fields should be added to the Protected Ray Interactions form such as whether a cargo net is used, whether a ray was brailed early or late in the brailing process and any other details around the ray handling approach.

An updated analysis of commercial data is recommended as it would provide a larger data set from which to determine whether there have been any changes in the distribution of fishing effort, or ray captures and capture rates, in relation to factors such as month, location and seabed depth.

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 over one year.

Review milestones:

- Results presented at the CSP TWG on 7 November 2019
- Final report made available on the CSP webpage on 25 November 2019

Citation

Francis, M., Jones, E. (2019). Updated analysis of spine-tailed devil ray post release survival. NIWA client report 2019317WN. Final report prepared for Conservation Services Programme project INT2018-05. Department of Conservation, Wellington. 21 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/int2018-05-updated-analysis-of-spine-tailed-devil-ray-final-report.pdf

3. Population Projects

3.1 POP2017-02 Indirect effects of fishing on New Zealand sea lions

Specific objectives

1. Analyse and process a range of opportunistic and historic diet samples.
2. Characterise the effect of diet on sea lion demographics at the Auckland Islands since 1997.
3. Compare changes in prey availability and commercial fishing catch rate across a similar period.

Rationale

Female New Zealand sea lion nutritional stress has been identified as a potential drive of population decline through a range of mechanisms, e.g. reduced pup production, smaller pups, and reduce female survivorship. Nutritional stress, in turn, may be cause by the absence of prey species with high nutritional value, such as can be caused by the removal of sea lion prey species (e.g. hoki and squid), an indirect effect of commercial fishing.

It was acknowledged during the development of the New Zealand sea lion Threat Management Plan that analysis of historic faecal, scat and blubber samples would improve our understanding of female nutritional stress and the subsequent impacts on the population. It is proposed that any new opportunistic samples and historic samples be analysed and made available for further demographic modelling and bioenergetic assessment.

New Zealand sea lion diets have been investigated using stomach contents and regurgitates, as well as from fatty acid composition and stable isotope analysis of blubber samples. While the former methods have provided data for many years, they remain snapshots of diets that may be biased by differential digestion and egestion rate of particular tissues (e.g. hard parts such as beaks and otoliths). The fatty acid composition of predators has the potential to reflect diets over longer periods, and to be unbiased by digestion and egestion rates. However, some fatty acid will be preferentially assimilated and metabolised (converted) by the predator, so predators' fatty acid composition rarely reflects diet fatty acids directly. This process of assimilation and modification need to be accounted for. This can be achieved by using a set of conversion coefficients estimated from previous captive feeding trials. Bayesian modelling can be applied to compare population demographics with the range of methods used for diet data collection. This project will focus largely, but not exclusively, on the data rich period of 2000-2006.

Project status

Returned to industry.

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 over two years ($30,000 in year one, $50,000 in year two).

3.2 POP2017-03 Salvin's albatross Bounty Islands population project

Specific objectives

1. To estimate the population size of Salvin's albatross at the Bounty Islands.
2. To describe the at-sea distribution of Salvin's albatross breeding at the Bounty Islands.

Rationale

The Conservation Services Programme Seabird medium term research plan 2017 (CSP seabird plan 2017) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds[3] bjectives. It was developed at the request of the CSP Research Advisory Group. Key components of research described in the CSP seabird plan 2017 for delivery in 2017/18 were identified and prioritised by the CSP RAG.

This project covers prioritised components involving field work for Salvin's albatross at the Bounty Islands. Recent population estimates of Salvin's albatross at the Bounty Islands (part of CSP project POP2012-06) using ground and aerial methods found contrasting evidence in regards population trend. The at-sea foraging distribution of this population is described from only a small sample size of individuals due to device failure in a recent study (also part of POP2012-06).

Project status

Phase one was completed in 2018/19 and year two is in progress.

Summary of the methods and key findings

This research included both ground-based and aerial-based population work in the 2018/19 year. Ground-based work involved deploying 14 transmitting Global Positioning System (GPS) tracking devices and 54 geolocation data loggers (Global Location Sensing (GLS) tags) on breeding birds on Proclamation Island, Bounty Islands. In addition, 98 birds (including the birds fitted with GPS and GLS tracking devices) were fitted with a red numeric plastic band to facilitate identification without the need for recapture. A total of 12 transect counts were undertaken to determine the proportion of breeding birds ashore and six time-lapse cameras were deployed so that they covered about 41 nests in the study area. Retrieval of the GLS devices is planned for November 2019.

Aerial work involved photography of the islands in mid-October 2018 via a series of parallel transects conducted via a fixed-wing aircraft modified to permit photography via two co-located port-holes installed in the floor of the aircraft. It was anticipated that at this time, birds would have completed egg laying and that most of the birds that attempted to breed in 2018/19 would still be attending active nests. Photomontages were constructed of each transect flown and from these a complete series of overlapping images that covered the entire area of the islands where albatrosses were nesting was created. Counts of all Salvin's albatrosses were then made using MOUSECOUNT software. The estimated total count of nesting Salvin's albatross pairs (Apparently Occupied Sites - AOS) to be 57,350 (95%CI 56,871 — 57,829). Analysis of close-up photographs showed 72% of the birds visible in photographs were sitting on nests. Ground counts at Proclamation Island indicated the proportion of

[3] National Plan of Action – 2013 to reduce the incidental catch of seabirds in New Zealand Fisheries. Available for download at: http://www.mpi.govt.nz/

birds assessed as apparently occupying sites was 0.65. However, the mean proportion of birds occupying a nest site containing an egg was 0.47 (range 0.41-0.52).

The estimated annual counts for all breeding sites in the Bounty Islands, adjusted to account for the presence of non-breeding birds, differed greatly, depending on the source of the correction factor used. The estimates derived from corrections were 41,723 (95% CI 41,315 — 42,132) and 26,955(95% CI 26,626 — 27,283) annual breeding pairs, based on close up photos taken across all colonies, and ground counts on Proclamation Island, respectively. It recommended that future aerial counts are undertaken a month earlier, at the completion of egg-laying, when there is likely to be substantially fewer loafing birds present in the colonies.

The total mean estimated Area of Occupancy of Salvin's albatross in October 2018 was 18.371 ha (range 17.649-18.905).

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $120,000 per annum over two years.

Review milestones:

- Results presented at the CSP TWG on 31 May 2019
- Final reports for 2018/19 published on the CSP website in June 2019

Citation

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

Baker, B. (2019). 2018 aerial survey of Salvin's albatross at the Bounty Islands. Final report to the Conservation Services Programme, Department of Conservation. Latitude 42, Australia. 11 p.

Sagar, P., Charteris, M., Parker, G., Rexer-Huber, K., Thompson, D. (2018). Salvin's albatross: Bounty Islands population project. Final report to the Conservation Services Programme, Department of Conservation, prepared by NIWA. 18 p.

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https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/pop2017-03-bounty-islands-ground-component.pdf

3.3 POP2017-04 Seabird population research: Auckland Islands 2017-20

Overall objective

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

Specific objectives

1. Estimate adult survival, other demographic parameters and the population size of Gibson's albatross on Adams Island.
2. Estimate adult survival, other demographic parameters and the population size of White-capped albatross on Disappointment Island.

Rationale

The Conservation Services Programme Seabird medium term research plan 2017 (CSP seabird plan 2017) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds[4] Objectives. It was developed at the request of the CSP Research Advisory Group. Key components of research described in the CSP seabird plan 2017 for delivery in 2017/18 were identified and prioritised by the CSP RAG. This proposal covers prioritised components involving field work at the Auckland Islands, which have been developed to maximise cost and logistical efficiencies between components. Supporting rationale for all the components is summarised in the CSP seabird plan 2017.

Project status

Phase one and two completed in 2017/18 and 2018/19 and year three is in progress.

Summary of the methods and key findings

White-chinned petrels. Marked and unmarked burrows were checked for banded white-chinned petrels, some of which had GLS trackers. The breeding status of the occupant was determined and un-banded breeders were given bands. Three GLS were recovered and 47 banded white-chinned petrels were recaptured (recapture rate 0.27). The study area now contains 230 banded white-chinned petrels in 131 marked burrows. Further re-sighting effort is needed to estimate demographic parameters reliably.

Gibson's albatross. All nests in the study area were checked for leg-banded birds. Un-banded breeding birds were banded. Nest counts were conducted in the three census blocks counted annually. Nesting success has returned to levels recorded before the 2005 crash and appears to have stabilised, with 61% productivity in the 2017–2018 breeding season. The survival rate of adult males and females is now similar though survival remains below pre-crash levels. Breeding numbers in 2018–2019 continued to slowly increase. The total estimated number of breeding pairs of Gibson's albatrosses in 2018–19 was 4,180, just under half the number of pairs breeding in 2004 (i.e., 8,728) before the population crashed. With annual mortality slightly higher than it used to be the total population is

[4] National Plan of Action – 2013 to reduce the incidental catch of seabirds in New Zealand Fisheries. Available for download at: http://www.mpi.govt.nz/

substantially smaller than it used to be and more than a decade of low chick production, population recovery is likely to be slow.

White-capped albatross. Banded white-capped albatrosses were re-sighted in the study area, and nest cameras were collected. A further 122 breeding white-capped albatrosses were banded bringing the study colony total to 679 birds banded. In total 0.34 of banded birds were re-sighted in the very short 2.5-d visit. Four GLS were retrieved, and one further bird which had lost its GLS (or had it removed) was re-sighted. Nest cameras gave up to 9½ months of data from deployment in January 2018. Chick success, or the survival of a chick from hatching to fledging, was lower than expected at 0.29 (5 out of 17 nests). Chicks fledged ~27 July (range 12 July–23 August), and adults returned to the colony from ~30 September. Low chick success is a concern since breeding success (survival from egg lay to fledging) will be lower than chick success. To estimate breeding success, nest cameras must follow the full breeding season, and all parameters (chick success, dates of fledging and adult return) would benefit from following more nests than in this nest camera trial. Aerial photographs of the Disappointment Castaways B area were taken 7 February. 260 suitable photos have been archived for interpretation. The main difference to previous aerial photography work is the timing: photographs in 2019 were taken 3 weeks later. Nest counts from these photographs will have to be corrected for breeding failures during incubation.

Recommendations

White-chinned petrel: four years of recapture data are not sufficient for robust demographic rate estimates. Monitoring should continue for the project to yield useful data for demographic parameter estimates for white-chinned petrels.

Gibson's albatross: population recovery will remain slow since annual mortality remains a little higher than in the past, the total population is substantially smaller, and there has been more than a decade of low chick production. Gibson's albatross conservation status remains of concern, monitoring the size of the population and its structure and trend on Adams Island should remain a priority.

White-capped albatross: future visits should focus on re-sighting. A visit of at least five days is recommended to further increase re-sighting rates. To estimate breeding success from nest cameras over the full breeding season, cameras need to be in place over two years, with battery and SD cards replaced at the annual visit.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. This is a three-year project and the planned cost for the project was $90,000 per annum over three years.

Review milestones:

- Results for 2017/18 presented at the CSP TWG on 24 May 2018
- Final reports for 2017/18 published on the CSP webpage in December 2018
- Results for 2018/19 presented at the CSP TWG meeting on 31 May 2019
- Final report for 2018/19 year made available on the CSP webpage in June 2019

Citation

Rexer-Huber, K., Thompson, D.R., Parker, G.C. (2018). White-capped albatross mark-recapture study at Disappointment Island, Auckland Islands. Report to the Conservation Services Programme, Department of Conservation. Parker Conservation, Dunedin. 15 p.

Elliot, G., Walker, K., Parker, G., Rexer-Huber, K. (2018). Gibson's wandering albatross population study and census 2017/18, June 2018. Report prepared by Albatross Research for the Conservation Services Programme, Department of Conservation. 16 p.

Rexer-Huber, K., Elliott, G., Thompson, D., Walker, K., Parker, G.C. (2019). Seabird populations, demography and tracking: Gibson's albatross, white-capped albatross and white-chinned petrels in the Auckland Islands 2018–19. Final report to the Conservation Services Programme, Department of Conservation. Parker Conservation, Dunedin. 19 p.

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https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/pop2017-04-auckland-is-seabirds-final.pdf

3.4 POP2017-06 Indirect effects on seabirds in north-east North Island region

Overall objective

The overall objective of this two-year project is to address priority recommendations from project INT2016-04 to better understand the indirect effect of commercial fishing on seabirds in the north-east North Island through changes in food availability within fish work-ups.

Specific objectives

1. Identify the range of potential seabird prey species within fish work-ups.
2. Identify food fed to chicks of key surface feeding seabirds.
3. Compare prey availability in fish work-ups with the diet of the target seabird species.
4. Collect baseline population data on surface nesting seabirds on a sample of northern offshore islands to monitor long-term changes in populations.

Rationale

This project builds on the findings of INT2016-04 (Indirect effects of commercial fishing on Buller's shearwater and red-billed gulls). Results from INT2016-04 were presented at the CSP Technical Working Group on 16 March 2016. The objectives of this proposed project will be refined based on discussion with, and feedback from, the Technical Working Group.

A range of commercial fisheries target aggregations of surface shoaling fish. Purse seining is commonly used to capture these fish schools. The dense fish schools create a phenomenon known as fish work-ups. These fish drive up prey items to the sea surface and observations suggest that this forms an important food source for a range of seabird species. There is currently poor knowledge of both the diet of surface-foraging seabirds and what prey items are being made available to seabirds from fish work-ups. This is currently limiting our understanding of the mechanisms through which changes in the distribution and/or abundance of fish work-ups may be driving seabird population changes (population status and annual breeding success). Recent population abundance data is incomplete or unknown for many seabird species that interact with surface feeding fish shoals, limiting the assessment of population trends over time.

Field research will be focussed on key northern offshore island sites such as the Mokohinau Islands, Hen and Chicken Islands, Poor Knights, and Three Kings, where species such as red-billed gull, white-fronted tern, Australasian gannet, fairy prion, Buller's shearwater and fluttering shearwaters breed. Research is needed to further our understanding of the diet, foraging ecology, breeding success and population status of these species that regularly forage in association with fish work-ups. Sampling prey availability within fish work-ups and in the same water surface zones under normal conditions (without fish shoals present) would provide further information on the range of potential prey species made available to seabirds by fish work-ups.

Project status

Complete.

Summary of the methods and key findings

Methods included zooplankton sampling, documenting seabird behaviours, their feeding in association with work ups, diet samples collected from six seabird species within colonies and collecting new information on populations.

This study has revealed is that there is considerable variety in the feeding associations for seabirds, not only in relation to the different types of fish schools and activity, but also with marine mammals and their feeding on fish and squid. The variety of prey that have been identified from samples collected from the six species further indicates a complex suite of feeding and foraging associations.

While all six species in this study have been observed feeding away from fish school activity, and on occasion in very large numbers spread across large areas, the drawcard of fish school activity, and for some seabirds, marine mammal activity, signals the availability of 'fast food' for large numbers of these birds, using sight, smell (in the case of Procellariiformes) and potentially sound to home in on these concentrations.

If changes in the distribution and/or abundance of fish work ups and other activity are driving seabird population changes (population status and annual breeding success), then further examination of fish school dynamics in relation to seabird associations is urgently required. Provided future research is planned strategically and over multiple years, the wider Hauraki Gulf region, with its diversity of seabird species and the accessibility to predator-free breeding colonies, offers the perfect system in which to utilise seabirds as indicators of change in the marine environment at different spatial scales.

Recommendations

Key goals going forward:

1. Develop a strategic, long term approach to study marine food webs within the region, focusing on seabirds to highlight interactions, especially where they relate to fisheries and other threats.
2. Investigate the dynamics of all fish school types across multiple seasons.
3. The research into the diet of target seabird species to be ongoing, linked to high resolution tracking and incorporating innovative approaches such as ecophysiology.
4. Develop a strategic, long term approach to determine population trends and breeding success for target species within the wider Hauraki Gulf region.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $40,000 per annum over two years. Services were provided by Northern New Zealand Seabird Trust.

Review milestones:

- Methodology presented at the CSP TWG meeting on 7 December 2017
- Interim results (milestones 2&3) presented at the CSP TWG meeting on the 24 May 2018
- Interim results (milestone 4) made available on the CSP webpage on 30 November 2018
- Draft results presented at the CSP TWG meeting on 17 July 2019
- Final reports made available on the CSP webpage in August 2019

Citation

Gaskin, C., Kozmian-Ledward, L., Jeffs, A. (2019). Indirect effects on seabirds in the northern North Island region. Final report of at-sea fish shoal sampling prepared by NNZST for the Conservation Services Programme, Department of Conservation. POP2017-06. 40 p.

Gaskin, C., Kozmian-Ledward, L., Jeffs, A., Adams, N., Doyle, E. (2019). Indirect effects on seabirds in the northern North Island region. Final report of seabird diet sampling prepared by NNZST for the Conservation Services Programme, Department of Conservation. POP2017-06. 50 p.

Gaskin, C., Adams, N., Kozmian-Ledward, L., Jeffs, A. (2019). Indirect effects on seabirds in the northern North Island region. Final report on comparison of fish shoals and seabird diet prepared by NNZST for the Conservation Services Programme, Department of Conservation. POP2017-06. 48 p.

Gaskin, C., Frost, P., Friesen, M. (2019). Indirect effects on seabirds in the northern North Island region. Final report on seabird colony and population assessments prepared by NNZST for the Conservation Services Programme, Department of Conservation. POP2017-06. 23 p.

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3.5 POP2017-07 The age and growth of New Zealand protected corals at high risk

Overall objective

Develop a methodology to determine the age and growth characteristics of key high risk New Zealand cold-water coral species.

Rationale

Clark et al (2014; part of CSP project POP2103-05) predicted the distribution of deep sea corals in relation to areas where they are at risk of interactions with commercial trawl gear targeting orange roughy and oreo species on the Chatham Rise. One component of this work was the development of a pilot ecological risk assessment (ERA) for protected corals in New Zealand. Risk assessments such as these are key tools for informing management approaches in that they provide a better understanding of the various characteristics of coral species and the fishery that contribute to risk determination. The key limitation of this pilot ERA was data paucity on coral productivity. This relates directly to the "recoverability" of corals from disturbance, which is a key factor in further developing an ERA for protected corals in New Zealand waters. There is currently a paucity of information surrounding deep sea coral regeneration times following trawl disturbances or other damage. A key priority in filling this information gap is research that will allow estimation of the age and growth characteristics of key New Zealand cold-water coral species such as the black corals (*Bathypathes* spp) as well as select gorgonian groups highlighted by the pilot ERA as high risk, such as the primnoid seafans and the genus *Paragorgia*.

Project status

Complete.

Summary of the methods and key findings

Year 1: A literature review describing the methods to age coral species was carried out and a recommendation to obtain accurate age and growth data for a key protected coral species made.

The main methods applied to measure age and growth of deep-sea corals can be split into three key applications: (1) direct observation e.g., in situ measurements or in-aquaria experiments of linear growth or surface extensions; polyp addition rate; estimation of calcification rates (e.g., using the buoyant weight technique), (2) enumeration of skeletal growth bands and (3) radiometric analyses. The advantages and disadvantages of these methods were highlighted in the Final Report. The recommendations built on the recent risk assessment that identified deep-sea species such as black corals (at the order level Antipatharia, and the genus *Bathypathes*), and the gorgonian coral genus *Paragorgia*, as being at high risk from the effects of bottom trawling. The most appropriate method to obtain accurate age and growth data for a previously determined 'High Risk' protected coral species (Antipatharian black coral genus *Bathypathes* (Family *Schizopathidae*)), was described. The development of methodology considered matters including: Research species, Sample sizes needed, Spatial distribution of samples, and Analytical methods.

Year 2: Ten individual colonies of the Antipatharian black coral species *Bathypathes patula* were selected from the NIWA Invertebrate Collection (NIC) and aged. Corals were selected based on their size, completeness of the colony (whole colony from base to tip), and the regional water mass within which they grew. Corals from the Chatham Rise and the Bay of Plenty were selected as the water

masses for these two regions are reasonably well understood. Thin section preparations of the main-stem of the ten specimens were observed with compound microscopes. Two interpretation protocols were defined to describe the zone structure observed, both coarse and fine zones, and counts were made of these structures. Four of the specimens were also sampled for radiocarbon assay. The radiocarbon isotope (14C) age data results were used to independently verify if either of the developed zone counting protocols reflected annual periodicity. Neither fine zone method was verified, indicating the developed zone counting protocols could not be used to generate reliable age estimates for *B. patula*. It is worth considering, however, that the 14C ages have wide errors due to calibration, and the zone counts, while a conservative estimate compared to the 14C results, fall within the confidence intervals of the calendar age. This helps provide some support for longevity when comparing the zone counts with 14C dates. The identification of one of the selected coral colonies was revised during the study to *B. alternata*. This specimen was aged using zone counts but 14C dates were lost during processing.

Twenty radiocarbon results were used to derive the age and growth rates estimates presented here. The radiocarbon results from this work show *B. patula* to be a long-lived species, attaining ages in excess of 385 years, with linear growth rates of 5.2–9.6 mm yr-1, and radial growth rates ranging from 11.1–35.7 µm yr-1. The delicate nature of these organisms along with their longevity and slow growth rates means a low resilience and low recoverability from anthropogenic activities such as fishing and mining.

Recommendations

Year 1: The Literature review recommended which method may be most appropriate for obtaining accurate age and growth data for key deep-sea protected coral species. It was proposed the Antipatharian black coral genus *Bathypathes* (species *B. alternata* or *B. patula*) be aged by applying the analytical method of radiocarbon (14C) dating in tandem with preparing around 10 thin basal sections to obtain zone counts.

Year 2: Observed zone structure may not display annual periodicity and we continue to recommend reliable validation methods such as 14C and lead 210 dating to age corals. Worth noting is the 14C ages in our study had wide errors due to calibration, and the zone counts fell within the confidence intervals of the calendar age.

We continue to recommend reliable validation methods such as 14C and lead 210 dating to age corals. Selecting appropriate species to age would be based on the results of studies carried out to date and species that were seen as high risk e.g., black coral species and species of the octocoral Paragorgia.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $25,000 per annum over two years. Services were provided by NIWA.

Review milestones:

- Methodology was presented on at the CSP TWG meeting on 23 March 2018
- Draft final report made available on the CSP webpage 3 December 2018
- Final report made available on the CSP webpage in March 2019

Citations

Tracey, D., Bostock, H., Shaffer, M. (2018). Ageing methods for protected deep-sea corals: A review and recommendation for an ageing study. Report prepared by NIWA for the Conservation Services Programme, Department of Conservation, POP2017-07. 35 p.

Marriott, P., Tracey, D., Bostock, H., Hitt, N., Fallon, S. (2019). The age and growth of New Zealand protected corals at high risk: *Bathypathes patula*. Final Report prepared by NIWA for the Conservation Services Programme, Department of Conservation, POP2017-07. NIWA Client Report 2019036WN. 23 p.

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https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/pop2017-ageing-deep-sea-corals-final.pdf

3.6 POP2018-01 Improved habitat suitability modelling for protected corals in New Zealand waters

Overall objective

To carry out improved habitat suitability modelling for protected corals in the New Zealand region to help identify areas of risk from interactions with commercial fishing gear.

Rationale

A number of protected coral taxa occur as bycatch in commercial fisheries in New Zealand. In order to refine our understanding of the overlap between commercial fishing effort and corals and to assess potential fishing impacts across their distribution, it is important to quantify the spatial extent of corals in New Zealand in relation to these impacts. This project will expand on the work done by Anderson et al. 2014, by carrying out improved and refined habitat modelling using new data, including *in situ* coral records collected by researchers and the CSP Observer Programme during the past four years, the trawl footprint for the most recent fishing year available, and a regional environmental layer. Shallow water coral data (<200 m) will be included in the modelled outputs. Updating the predicted distribution maps for protected corals defines areas of suitable habitat, helps to assess risk from commercial fishing, and informs the management of these fragile and long-lived animals.

Project status

In progress.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $30,000 per annum over two years.

3.7 POP2018-02 Hoiho population and tracking project

Specific objective

1. To collect key demographic data on poorly studied hoiho colonies.
2. To collect dietary and condition data at poorly studied colonies to allow for comparison between sites.
3. To improve fine scale distribution and foraging data.

Rationale

The Conservation Services Programme Seabird medium term research plan 2017 (CSP seabird plan 2017) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives.

Hoiho (Yellow-eyed penguins) are listed as Endangered in both the NZ Threat classification and with the IUCN. They face a range of threats, both marine and terrestrial, and recent poor breeding success and disease events at some colonies have highlighted the precarious nature of hoiho (Ellenberg & Mattern 2012; Webster 2018). Direct fishing mortality, particularly in setnets, along with indirect effects of habitat modification and reduction of prey availability adversely affect hoiho, particularly on the mainland, Rakiura and Whenua Hou populations.

Key knowledge gaps lie in having representative tracking data over all sites and life stages to better understand foraging behaviour and fisheries overlap, and the site-specific identification of prey items to determine drivers for differing breeding success, animal condition and disease susceptibility.

Project status

In progress.

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 per annum over two years.

3.8 POP2018-03 New Zealand Sea Lion: Auckland Islands pup count

Specific objectives

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

Rationale

New Zealand sea lions are classified as Nationally Critical (Baker et al. 2010) and are incidentally killed each year in southern commercial trawl fishing operations targeting species including squid, scampi and southern blue whiting. The foraging areas of New Zealand sea lions at the Auckland Islands have been shown to overlap with commercial trawl fishing activity, particularly SQU6T and SCI6A. Approximately 70% of New Zealand sea lions breed at the Auckland Islands, where population data has been collected since the mid-1990s, including estimates of pup production and re-sighting of marked animals. Since 2001 there has been a considerable decline in pup production at the Auckland Islands. A literature review to identify potential indirect effects of commercial fishing on the Auckland Islands population as part of CSP project POP2010-01 (Bowen 2012) highlighted a number of key information gaps that currently prevent a full understanding of any such potential indirect effects, including time series data of population dynamics as collected in this project. CSP project POP2012-02 analysed population data collected during previous years in order to determine the key demographic factors driving the observed population decline of New Zealand sea lions at the Auckland Islands. It found that low pupping rates, a declining trend in cohort survival to age 2 and low adult survival may explain declining pup counts in one studied population (Roberts et al. 2014).

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

Project status

Phase one was completed in 2018/19 with phase two in progress.

Summary of the methods and key findings

During the 2018/19 field season, a total pup production estimate of 1,679 was acquired for sea lion colonies at Enderby Island (Sandy Bay 319, South East Point 0), Dundas Island (1,295) and Figure of Eight Island (65). This estimate is 6% lower than the 2017/18 estimate of 1,792; 44% lower than the peak pup count of 3,021 in 1997/98, and 12% higher than the lowest recorded pup count of 1,501 in 2008/09. The 2018/19 estimate appears to continue a relatively stable trend over the past 11 years following steady declines since the 1990s.

Flipper tags and microchips were used to permanently mark 767 pups (312 at Enderby, 400 at Dundas, and 55 at Figure of Eight). One hundred pups on each of Enderby and Dundas Islands were weighed and measured.

The population monitoring conducted in 2018/19 also included 44 daily counts of sealions at Sandy Bay, six whole-island sea lion counts of Enderby Island, and 3,296 total tag resightings acquired from the Auckland Islands (once matching occurred to remove any re-sights that were not comparable to an existing tag). Sea lion pup mortality investigations for 2018/19 were reported separately. The project outputs contribute to ongoing research aiming to inform future management decisions for the species.

Recommendations

- A suggested earlier start date/longer field season in order to be present for births and to acquire a complete season count of dead pups (and thus a more accurate pup production estimate). Development of clear goals and guidelines on the areas in which to search for animals in the daily count and in the dead run to allow for consistency over the years.
- Determine and take additional action steps to move forward with *Klebsiella pneumonia* research (i.e. ivermectin controls/ trials, etc.)
- Perform more precise recording on "planks for pups" such as on ramp additions, rescues before and after placement etc.
- Further advancement in the development of the shark/distinct scaring photo ID library if specific shark predation type data is desired to be derived from it.
- Additional time spent on Dundas to allow for effort into resighting there.
- Ensure continued use of the M-R as the estimate method for Dundas.
- Potentially change to different PIT tags for Dundas, and if so, change to one that would have options of a fixed scanner.

Project logistics summary statement

This project was 90% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $100,000 over four years. Services were provided by internally recruited staff.

Review milestones:

- Final results for 2018/19 presented at the CSP TWG meeting on 26 March 2019
- Final report for 2018/19 published on the CSP website in June 2019

Citation

Dodge, H. (2019). New Zealand Sea Lion Monitoring and Pup Production at The Auckland Islands 2018/19. Final report for the Conservation Services Programme. 32 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/pop2018-03-sea-lion-pup-count-auckland-islands.pdf

3.9. POP2018-04 Flesh-footed shearwater: Population monitoring

Specific objectives

1. To estimate the current population size of flesh-footed shearwaters at Motumahanga Island, Taranaki.
2. To obtain updated estimates of the population size of flesh-footed shearwaters nesting at the Chicken Islands (Lady Alice, Whatupuke and Coppermine Islands)
3. To estimate key demographic parameters of flesh-footed shearwater at Lady Alice Island/Mauimua and Ohinau Islands.
4. To carry out simultaneous tracking of flesh-footed shearwaters at Lady Alice (Hauraki Gulf) and Ohinau Islands (Bay of Plenty) in one breeding season during the incubation and early chick rearing period.
5. To describe the breeding phenology, particularly egg-laying dates at two breeding sites to assess if inter-annual and site variation exists.

Rationale

The Conservation Services Programme Seabird medium term research plan 2017 (CSP seabird plan 2017) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives. This proposal delivers on recommendations arising from POP2015-02, which was implemented to address priority population estimate gaps and better estimate key demographic rates.

Population monitoring of flesh-footed shearwaters on Ohinau and Lady Alice Islands was carried out under CSP project POP2015-02. It was recommended that ongoing and repeated monitoring of both islands should continue so a more robust conclusion about the population trends of flesh-footed shearwaters in New Zealand can be made. It was recommended that recapture efforts need to be consistently large scale to provide a robust mark-recapture dataset and help determine survivorship. It was also found that the precise breeding phenology was not well understood, and the timing of past surveys relative to egg-laying can greatly influence population estimates. Further investigation of laying dates is thus proposed to ensure comparable and accurate monitoring can be achieved in future years (by assessing annual and site related variability in this parameter).

Previous research under project POP2015-02 did not include the breeding site at Motumahanga Island in Taranaki. Recent captures in the bottom longline fishery in this area has highlighted concern for this population, where the only population estimates date from the late 1980s.

Tracking of flesh-footed shearwaters in 2017-18 has shown that these birds can exhibit broad variability in foraging behaviour with birds tracked in 2018 travelling much further offshore than those tracked in 2017. A project to track birds from both a Hauraki Gulf colony (Lady Alice Island) and Bay of Plenty colony (Ohinau Island) in the same breeding season will determine whether birds from these populations mix at sea during incubation and early chick rearing periods. Also, this will help improve our understanding of fisheries risk by assessing the relative rates of inshore (<50km offshore) versus pelagic (>50km offshore) foraging trips.

Project status

Phase one of this project was completed in 2018/19, phase two is in progress

Summary of the methods and key findings

During the 2018/19 season 247 and 264 study burrows on Ohinau and Lady Alice Island were monitored respectively. The breeding success on Ohinau Island was 62%, down from 68% in the previous season. Breeding success on Lady Alice Island remained consistently low at 52%. There was no significant difference in breeding success between the two islands. Burrowscope (control) burrows, had a higher measured breeding success on both islands, however, the difference was not statistically significant. We were able to identify both partners in 81% of burrows on Ohinau Island and 95% of burrows on Lady Alice Island. An additional 868 flesh-footed shearwaters were banded over both islands this season, including 453 chicks banded on Ohinau Island alone.

Burrow transects were carried out on Lady Alice Island to gather data for an updated population estimate for the island. 371 transects, each covering 40m², were completed within nine different colonies on the island. Occupancy rates varied greatly between colonies with the majority of flesh-footed shearwaters occupying burrows in colonies on the northern side of the island. Colonies to the east, west and south were either mixed-species colonies, or primarily grey-faced petrel colonies. There is an estimated total of 3,217 occupied burrows (2,180 – 4,255, 95% CI) on Lady Alice Island.

A complete survey of burrows on Motumahanga Island revealed a total of 562 burrows occupied by flesh-footed shearwaters. This represents a significant increase from the 1989/90 estimate of just 100 burrows.

Recommendations

The continuing increase in population estimates is a surprising result as other literature indicates that flesh-footed shearwaters are in decline in New Zealand, and globally. The four islands that we have surveyed; Middle, Ohinau, Lady Alice and Motumahanga Islands, have all shown substantial increases from previous estimates.

For the 2019/20 season, the same breeding group of study burrows will be monitored. We will also continue to monitor burrowscope burrows to determine if our handling of birds is negatively impacting the burrows we monitor. Multiple seasons of breeding success data will be important for working out what “normal” success levels are and thus aid in population modelling. Night work will continue to be carried out to maximise the banded populations on both islands. With there already being a large portion of birds on both islands banded, more focus can be put on to recapturing banded birds, and developing robust estimates for adult and juvenile survival rates.

In addition to the burrow monitoring, at least 25 breeding flesh-footed shearwaters will be tracked from Ohinau and Lady Alice Island simultaneously during incubation and chick-rearing. Tracking both populations simultaneously will eliminate possible seasonal or inter-annual variations observed in previous tracking.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $100,000 per annum over 3 years. Services were provided by Wildlife Management International Limited.

Review milestones:

- Final results for 2018/19 presented at the CSP TWG meeting on the 17 July 2019
- Final 2018/19 report published on the CSP website in August 2019

Citation

Crowe, P., Bell, M. (2019). Flesh-footed shearwater population monitoring and estimates: 2018/19 season. Report prepared by Wildlife Management International Limited for the New Zealand Department of Conservation, Wellington. 32 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/pop2018-04-flesh-footed-shearwater-research-final-report.pdf

3.10. POP2018-05 Westland petrel population estimate

Specific objectives

1. To estimate the population size of the Westland petrel.

Rationale

The Conservation Services Programme Seabird medium term research plan 2017 (CSP seabird plan 2017) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives. This proposal delivers priority research components of the CSP seabird plan 2017 related to Westland petrel, which is to progress routine population monitoring for this species. The last population estimate dates back to 2011 (Waugh et al 2015). Supporting rationale for all the components of this project are summarised in the CSP seabird plan 2017.

Project status

Complete.

Summary of the methods and key findings

Colony surveys were undertaken on 16 days between the 9th of July - 28th of August 2019. A total of 18 out of 28 colonies were surveyed, which hold approximately 97-98% of the population. The remaining colonies were inaccessible due landslides and windfall from three ex-tropical cyclones between 2014 and 2018, and a few very small colonies that have challenging access and a lack of previous survey data thus were not visited. At each colony randomised walking 2m wide transects were completed, which counted burrows, with a minimum distance of 20 meters between transects. A minimum of 30 burrows were burrow scoped at each colony for the presence or absence of a bird and its breeding status. Colony boundaries were mapped by observers where no burrows were found or where physical boundaries defined e.g. bluffs.

The data collection resulted in 376 transects in 2019 which can be added to the 462 transects from 2007, 2008, 2011, 2014, 2015, 2016 and 2017. These were mainly at Study, Noisy Knob, Rowe, Middle and Liddys, providing multi-year comparison for these most accessible colonies, which comprise over 75% of the Westland Petrel population.

Burrowscoping for occupancy data: A minimum of 30 burrows was set at each colony visited, though at one colony only 17 burrows were inspected due to small numbers of burrows at that site. A total of 649 burrows were inspected in 2019, with totals for other years being 222 in 2001, 485 in 2008, 543 in 2011, 38 in 2012, 111 in 2013, 166 in 2015, 105 in 2015, 1197 in 2016 310 in 2017 and 144 in 2018. These were inspected most years at Study Colony and Rowe colony. The data analysis is ongoing and will include mobilising data from Baker et al's 2011 write up.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $20,000 over one year.

Review milestones:

- Final results were presented at the CSP TWG meeting on 5 March 2020
- Final abstract published on the CSP website in March 2020

Citation

Waugh, S., Barbraud, C., Delord, K., Simister, K., Baker, G., Hedley G., Wilson, K., Rands, D. 2019. Changes in population density and response to storm damage for Westland petrels 2007 – 2019. Report prepared for the Conservation Services Programme, Department of Conservation.

Weblink

https://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/201819/westland-petrel-population-size-estimate/

3.11. POP2018-06 Protected coral connectivity in New Zealand

Specific objectives

1. Review existing literature examining genetic connectivity for New Zealand corals.
2. Asses genetic study connectivity of a key deep-sea coral species highlighted by the pilot ecological risk assessment (ERA) as 'high risk', which will further inform the to support the identification of distinct populations for management purposes.

Rationale

The management and conservation of deep-sea coral communities requires an understanding of how coral populations are connected in environments that are challenging to monitor. Larval or gametic connectivity between populations underpins coral genetic diversity, which in turn influences population resilience and ability to adapt to natural and anthropogenic stresses. The recolonisation potential of protected deep-sea corals in impacted areas is largely unknown for several key groups in the New Zealand region and highlights an information shortfall when carrying out ecological risk assessments (ERA's). Outputs of this work will spatially define multi-specific coral genetic units ('populations') across New Zealand, which can be used to identify potential source and sink areas, can contribute to our understanding of coral resilience, and can help to develop appropriate management measures.

Project status

In progress.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $40,000 over one year.

4. Mitigation Projects

4.1 MIT2017-01 Protected species liaison project

Overall objectives

1. To provide liaison officers to the relevant inshore and surface longline fishing fleets, to assist those fleets to reduce their protected species bycatch.
2. To coordinate the liaison officer roles with wider efforts targeted at protected species bycatch reduction in relevant fisheries to achieve the greatest reduction in bycatch possible.

Specific Objectives

Objective	Fishery	Area
1	Surface Longline	A – Northern North Island
		B – West Coast South Island
2	Bottom longline	A – Northern North Island
3	Inshore Trawl	A – East Coast South Island
		B – Northern North Island
		C – West Coast South Island
4	Setnet	A – East Coast South Island
		B – South Coast South Island

Rationale

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

Over the past four years, liaison officers have been iteratively rolled out across a series of inshore and HMS fisheries, prioritised based on risk. In the past, this roll out has focused on seabird interaction, however with increased embedding of this programme it is now appropriate to expand to other protected species interactions, namely marine mammal, turtle, and protected fish and benthos interactions. The scope of this project also expands to include a wider range of inshore fishing methods.

The process to date has involved development and documentation of vessel specific mitigation practices in Seabird Management Plans, implementation of these plans into vessel practice, review by government fisheries observers, and subsequent review and improvement where relevant. Currently there are a series of parallel and complimentary processes in place tasked with embedding operational

procedures into inshore fishing activities. A coordination role as part of this project will be critical to aligning these approaches to ensure that maximum value will be gained.

The liaison role will include issuing mitigation gear to vessel operators as well as an education component. Conservation Management Measure CMM2008-03 requires Western Central Pacific Fisheries Commission (WCPFC) Members to adopt the United Nations Food and Agriculture Organisation (FAO) Guidelines to Reduce Sea Turtle Mortality where appropriate.

Project status

Phase two was completed in 2018/19 with phase three in progress.

Summary of the methods and key findings

Liaison officers were deployed in inshore fisheries around New Zealand from 2017 – 2019. In 2017/19, focal fisheries were surface longline, Fisheries Management Area 1 (FMA 1) bottom longline, and Otago coastal trawl. In 2018/19, work in these fisheries continued, and was augmented by broader coverage of coastal trawlers, preliminary work on set net vessels in the north of the North Island and southeast of the South Island, and opportunistic coverage of vessels using other methods (Danish Seine, jig, dredge/trawl). To reduce travel costs in 2018/19, Liaison officer work was structured into regions with all fishing methods included in the Programme covered by each regionally focused liaison officer. The number of liaison officers increased from four in 2017/18 to five in 2018/19.

In 2018/19, 54 PSRMPs were reviewed and updated from previous versions (21 surface longline, 24 bottom longline, and nine trawl RMPs), and new plans were developed for 72 vessels (five surface longline, four bottom longline, 58 trawl, two set net, one Danish seine, one dredge and one jig PSRMPs). Over 2017-2019, plans had been developed for 155 vessels by the end of this project. Plans covered both regulatory measures and voluntary approaches to protected species bycatch reduction. In 2018/19, seven observer audit forms were received by the liaison coordinator. These audits were completed during observer placements on surface longline vessels. In one case, the audit information showed conformance with the vessel's PSRMP. In two cases, non-conformance was recorded but practice differed in a positive direction, to further reduce bycatch risk (e.g. heavier snood weights). Five vessels were reported not conforming with PSRMP fish waste discharge practices.

Liaison officers conducted a series of port calls visiting vessels and sharing information with vessel operators, skippers and crew. They also provided information relevant to protected species and bycatch mitigation, and mitigation materials. Liaison officers gave advice from shore in response to some bycatch events, when notified that vessels had reached specified bycatch triggers at sea. (Triggers were developed as a risk management tool, to prompt vessel operators to evaluate their mitigation strategies and seek liaison officers' input to work on reducing future capture risks). In 2018/19, 16 trigger events were reported from surface longline, eight from bottom longline, and 2 from trawl vessels. Liaison officers responded to triggers by working with operators to identify and address bycatch risks to reduce the likelihood of future captures when possible.

A coordinator supported liaison officer activities, communicated with Programme participants and stakeholders and provided whole-of-programme reporting throughout the project term.

Recommendations

It is recommended that efforts to ensure consistency among the work of liaison officers continue as this programme develops further in future years. Confirming the Programme objectives (and ensuring

fit with policy drivers) ahead of the 2019/20 year is also recommended, especially given the review of the National Plan of Action – Seabirds in 2019. From there, confirming the purpose of PSRMPs and (if appropriate to purpose) ensuring that measures included in these plans are auditable, will improve the collective understanding of operational practices at sea and ways to further reduce bycatch risks.

The efficacy of the liaison programme depends on fishers and liaison officers connecting, and the implementation of bycatch mitigation practices being monitored at sea. Both of these components are essential for the programme to deliver the best return on investment, that is, reducing the risk of protected species bycatch at sea.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $140,000 per annum over three years.

Review milestones:

- Final results for 2017/18 presented at the CSP TWG meeting on the 9 Oct 2018
- Final report for 2017/18 published on the CSP website in November 2018
- Final results for 2018/19 presented at the CSP TWG meeting on 7 Nov 2019
- Final report for 2018/19 published on the CSP website on 22 November 2019

Citation

Pierre, J. (2018). Protected species liaison coordination 2017/18. Final report for CSP project MIT2017-01. Prepared by JPEC Environmental Consulting for the Department of Conservation, Wellington. 36 p.

Pierre, J. (2019). Protected species liaison coordination 2018/19. Final report for CSP project MIT2017-01. Prepared by JPEC Environmental Consulting for the Department of Conservation, Wellington. 63 p.

Weblink

https://www.doc.govt.nz/contentassets/4d83b3260a4d43d5afe98dcf193b90b5/mit2017-01-ps-coordination-final-report.pdf

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/mit2017-01-ps-ccordination-final-report.pdf

4.2 MIT2017-02 Characterisation and development of offal management for small vessels

Project Objectives

1. To characterise offal management strategies for trawl and longline vessels <28m both domestically and internationally.
2. To analyse these practices against protected species abundance and bycatch.
3. To provide recommendations on best practice offal management.

Rationale

Discharge of offal is one of the main factors leading to aggregations of seabirds around fishing vessels, leading to increased risk of interaction. In larger vessel fisheries (>28m), offal management has received extensive research; accordingly, regulation and operational practices constrain the activity to reduce risk of protected species interaction. Smaller vessel fisheries have received far less research into this subject and practices across the fleet are more variable, safety and stability concerns have been cited as limitations.

Despite the lack of regulation and potential operational constraints, offal management strategies are practice by sectors of the smaller vessel fleet. To ensure the greatest reduction in risk to seabirds it is important that all vessels attain operate offal management strategies effectively.

Project status

Phase one was completed in 2017/18 and remainder of budget was returned to industry.

Project logistics summary statement

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

4.3 MIT2018-01 Protected species engagement project

Project Objectives

1. To provide identification tools targeted at commercial fishermen to improve their understanding of protected species interacting with their fishing operations.
2. To develop and produce pictorial guides for fishers on handling protected species after capture in fishing operations.
3. To produce short videos on key mitigation measures to demonstrate the techniques required to deploy the gear.
4. To communicate protected species-related information, handling methods and mitigation measures to commercial 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, however, appropriate communication of this generally involves interpretation of research outputs to cater to specific audiences. Project MIT2014-01 used a hard copy and web-based newsletter to provide a medium for this communication (Pierre 2016). Project MIT2018-01 will pick up on several recommendations from MIT2016-01, but also explore other methods of communication to commercial fishermen such as through workshops, tailored for different fishing sectors in order to communicate the relevant information in an efficient way. The changes and expansion of the scope will allow increase in target audience exposure and uptake.

Project status

Complete.

Summary of the methods and key findings

Findings from project MIT2016-01 identified the need for producing pictorial guides on protected species handling and short videos demonstrating deployment of key mitigation gear supported with additional, existing identification tools. The overarching objective for these resources is to reduce the negative impact of commercial fishing on protected species by providing clear and concise information on current mitigation methods and best practice guidelines.

Six mitigation videos (tori lines, bird bafflers, sink rates, hook shielding devices, discard management and light management) and a protected species handling guide were developed in English and translated into five languages; Indonesian, Japanese, Korean, Russian and Ukrainian. A specific section of the DOC website was created to house these new resources alongside existing identification guides (view the Resources for Fishers page here). Social media was utilised to communicate the availability of the resources to fishers and the wider public. These will also be shown and distributed to crew via vessel visits conducted by Protected Species Liaison officers.

Recommendations

- Stage multiple social media campaigns to increase viewership

- Change the order of videos on the webpage to reduce any bias in viewing due to placement
- Advertise the resources in places relevant to the target market, e.g. industry magazines, online channels and resources, have a presence at industry gatherings
- Get feedback on the resources from target market via an online form, phone call or liaison officers
- Short video interviews with skippers talking about their challenges and successes with mitigation methods and reducing bycatch
- Ensure videos can be downloaded for viewing outside of network range

Project logistics summary statement

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

Review milestones:

- Final results were presented at the CSP TWG meeting on 5 March 2020
- Final report published on the CSP website in March 2020

Citation

Tidswell, P. 2020. Protected species engagement project. Final Report prepared by Port Group for the Conservation Services Programme, Department of Conservation. 16p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/final-reports/mit2018-01-protected-species-engagement-final-report.pdf

4.4 MIT2018-02 Haul mitigation for small longline vessels

Project Objectives

1. To develop effective and practical options to mitigate the capture of seabirds on haul in small vessel longline fisheries.

Rationale

Historically most research and development of resources has been invested in line setting mitigation methods, however, a significant portion of interactions, between longline vessels and seabirds occur at hauling. While many of these result in live releases, injuries are often sustained, and the long-term fate of the animals is unclear. Additionally, dehooking and untangling seabirds poses a health and safety risk to crew as well as unnecessary delays to fishing operations. Therefore, it is mutually beneficial to invest in strategies which effectively mitigate against interactions at hauling.

Project status

In progress.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $75,000 over one year.

4.5 MIT2018-03 Setting mitigation for small longline vessels

Project Objectives

1. To test one or more existing devices for setting baited hooks at depth in order to assess efficacy in New Zealand conditions.

Rationale

The small vessel surface longline fishery poses substantial risk to most high and very high risk seabirds (see Table 7 of the CSP seabird plan 2017) despite current mitigation requirements and use, implementation of proven mitigation strategies is known to be variable both within and between these fleets.

Ensuring that baited hooks are unavailable to seabirds depends largely upon their sink rate, this is primarily influenced by the amount of weight and floatation on the line, variables which also have effects on target catch and fishing operation. Several devices have been developed to mechanically force the line or hooks to a preset depth immediately aft of the vessel. Significant research and development have been undertaken on these devices, however, to date none have reached the commercial application stage.

To provide robust advice on best practice to fishers it is important that new or adapted mitigation options are backed up with adequate testing of efficacy across a range of New Zealand conditions and fishing operational variables.

Project status

In progress.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $75,000 over one year.

4.6 MIT2018-04 Options for temporal and spatial management of key fisheries to reduce risk of interactions with protected species

Project Objectives

1. Designing options for quantitatively assessable spatial and temporal management of key fisheries using available fisheries, environmental, and biological data;
2. Provide recommendations on key data gaps which limit the ability to measure the effectiveness of potential options.

Rationale

Significant research has gone into mitigation methods for fisheries interactions with protected species. However, in some cases, such as set-netting interactions with seabirds, no proven mitigation methods have been identified outside of spatial/temporal restrictions. Due to the inherent trade-offs with such restrictions it is critical that decisions are underpinned with best available information and transparent robust process.

Using, as an example, penguin and other seabird interactions with setnet fisheries this project will draw together empirical evidence and expert advice to provide a range of options for spatial and temporal management considering their associated costs and benefits.

Project status

On hold.

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 over one year.