Conservation Services Programme
DRAFT
Annual Research Summary
2021-22

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Table of Contents

1. Introduction

1.1 Purpose

This report outlines the research carried out through the Conservation Services Programme Annual Plan 2021/22 and provides updates on multi-year projects started in previous years.

The Conservation Services Programme is one component of the Department of Conservation (DOC)'s wider bycatch programme and describes those services delivered as 'conservation services'. DOC has recently established a more extensive fisheries bycatch programme as a result of the availability of additional funding through the Biodiversity Budget 2018[1].

Other DOC bycatch related projects are summarised within the appendix of this report. These projects are not levied from the commercial fishing industry and therefore do not follow the same consultation and review process as research that is undertaken through the Conservation Services Programme.

1.2 Background

The Department of Conservation has the statutory duty to protect certain marine animals as defined by 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.

[1]Available to download from: https://www.doc.govt.nz/news/budget-2018/docs-budget-2018-explained/

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 objectives for CSP are provided in the Conservation Services Programme Strategic Statement[2].

1.4 Development of the Annual Plan

The Conservation Services Programme Annual Plan 2021/22[3] described the conservation services to be delivered as the Conservation Services Programme, 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 2021/22 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 2021/22 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 2021/22. 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:

18 December 2020	Updated medium term research plans, initial list of research proposals and CSP RAG prioritisation framework circulated to CSP RAG.
8 March 2021	CSP RAG meeting to discuss and prioritise initial research proposals.
22 March 2021	Additional feedback received from CSP RAG on research proposals and their prioritisation.
21 April 2021	Draft CSP Annual Plan 2021/22 released for public consultation.
25 May 2021	Public consultation period closed.
1 July 2021	Summary of public submissions and response to comments completed.

[2] Available to download from: https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/resources/rag-resources/csp-strategic-statement-2020.pdf

[3] Available to download from: https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/plans-and-submissions/202122/final-csp-annual-plan-2021-22.pdf

9 July 2021	Director-General of Conservation conveyed the Conservation Services Programme Annual Plan 2021/22, amended in accordance with public submissions, to the Minister of Conservation for agreement.

1.6 Report 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, project budget (excluding administration costs) and review milestones. Additionally, a citation and weblink are provided to access the final research reports online.

Conservation Services Programme activities in 2021/22 were divided into three main areas:

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

1.7 COVID-19

DOC is very cognisant that COVID-19 has had an impact and will continue to have an impact, including fishing activities, observer coverage and the delivery of research. This was accounted for in the CSP 2021/22 work programme. DOC remains committed to working with Fisheries NZ, Treaty partners, industry contacts and fishers, and with all interested stakeholders to respond to future changes.

2. Interaction Projects

2.1 INT2021-01 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 help to identify where the most significant interactions are occurring. The information can also be used to inform development of ways to mitigate those interactions and adverse effects. Such data contribute to assessments of the risks posed to protected species by commercial fishing and whether mitigation strategies employed by fishing fleets are effective at reducing protected species captures.

The CSP Observer Programme continued to purchase baseline services for “offshore” fisheries from 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 FNZ 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[4]. 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.

Reporting of protected species interactions in New Zealand commercial fisheries relies on observer data and commercial fishing effort data. The following analysis covers all fishing events that ended between **1 July 2021 - 30 June 2022.**

The preparation of data for this report generally follows the same procedure as previous years and any future changes will be documented within this report. Fisheries New Zealand also report on protected species captures using observer-recorded captures and fisher-reported captures to inform protected species capture estimation at a fishery wide scale. These are reported by fishing year (1 October 2021-30 September 2022).

Where possible, data grooming protocols align with FNZ, though some differences do occur, notably:

- This summary includes vessel impacts/deck strikes where it is possible to link the interaction with a fishing event.
- For protected species that were neither photographed or necropsied, the observer identification is considered correct (unless a DOC species expert is very confident a misidentification has occurred, e.g. a species being identified well beyond its known range).
- All protected species groups are included in this summary.

A total of 676 observed protected species interactions occurred during the July 2021 - June 2022 reporting period. Of these, there were 553 seabirds, 110 marine mammals, 7 protected fish, 6 turtles and 2,073 kgs of protected coral. White-chinned petrels were the most frequently observed protected species interaction during this year (n=186). This summary 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

[4] Available to download here: https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/pre-2019-annual-plans/approved-mcs-annual-plan-2011-12.pdf

1). Protected species interactions are then broken down by fate of the animal (live or dead) and location of capture.

Table 1 presents a summary of commercial fishing effort, observer effort and observer coverage, in addition to protected species captures (including seabirds, marine mammals, protected fish and reptiles) and protected coral catch, in each fishery with observer coverage during the 2021/22 observer year.

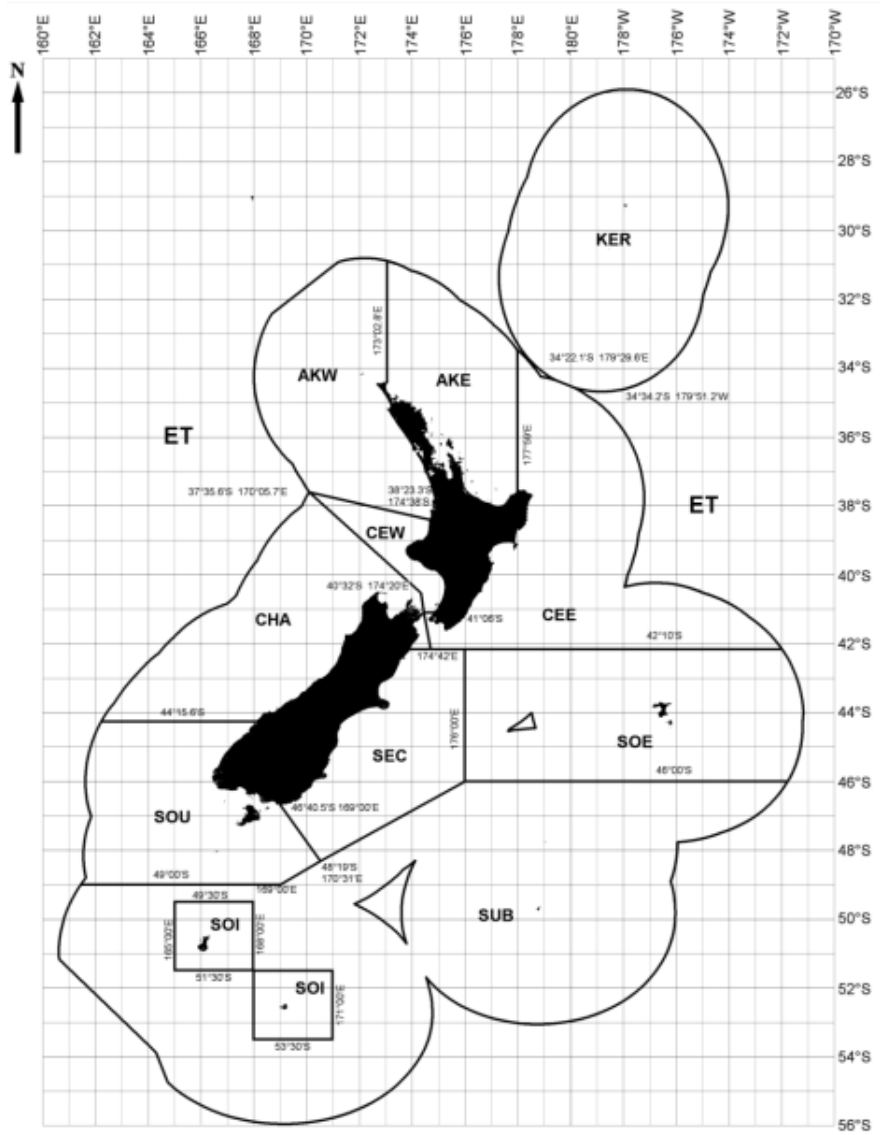
During the 2021/22 year, observer coverage was affected by watchkeeping practices on some vessels, primarily smaller vessels operating in the inshore and surface long line vessels. Further information can be found on the Fisheries New Zealand website[5].

Table 1. Summary of commercial effort, observed effort and protected species interactions in fisheries with observer coverage > 0% during the 2021/22 observer year.

Fishery	Effort tows /lines /nets	Observed tows/lines /nets	Coverage (%)	Protected species captures	Coral catch (kg)
Middle Depth Trawl - Hoki, Hake, Ling and Warehou	10,438	4,070	39.0	156	61.5
Middle Depth Trawl - Southern Blue Whiting	441	340	77.1	11	-
Middle Depth Trawl - Scampi	4,497	379	8.4	5	0.2
Middle Depth Trawl - Squid	3,241	2,999	92.5	208	1,252.5
Pelagic Trawl - Mackerel and Barracouta	5,129	2,278	44.4	53	0.1
Deepwater Bottom Trawl	4,364	1,418	32.5	15	755.7
Inshore Trawl	28,526	1,016	3.6	17	-
Inshore Setnet	16,861	616	3.7	35	1.0
Surface Longline	1,608	124	7.7	109	-
Deepwater Bottom Longline	4,968	389	7.8	44	-
Inshore Bottom Longline	6,359	176	2.8	-	0.4
Bottom Longline - Snapper	4,150	105	2.5	5	1.4
Purse Seine - Skipjack	47	-	-	-	-
Purse Seine - Other	516	82	15.9	8	-
Precision Seafood Harvesting (PSH)	2,281	402	17.6	10	1.0

[5] https://www.mpi.govt.nz/fishing-aquaculture/sustainable-fisheries/commercial-fishing-monitored-by-fisheries-observers/

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 2 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2021/22 observer year. In the 2021/22 observer year the commercial effort decreased by 11.8% from the previous year and observer coverage decreased by 8.0%.

The number of seabird captures observed in 2021/22 decreased by 7.5%, with 123 seabird captures in comparison to 133 in the previous observer year (McGovern & Weaver 2022). Marine mammal captures increased by 29.1%, from 24 in 2020/21 to 31 in 2021/22. Two protected fish captures occurred, compared with the three in 2020/21 (McGovern & Weaver 2022). A total of 61.5 kg of coral bycatch was observed this year, in comparison to the 70.9 kg of coral bycatch observed in 2020/21.

In summary, 106 observed trips were conducted aboard 36 vessels, with protected species captures occurring on 55 trips aboard 29 vessels (51.9% of observed trips, and 80.5% of vessels, involved protected species captures).

Table 2. Summary of commercial effort, observer effort and protected species interactions in the hoki, hake, ling and warehou middle depth trawl fisheries during the 2021/22 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird captures	Seabirds /100 tows	Mammal captures	Mammals /100 tows	Protected fish captures	Protected fish/100 tows	Coral catch (kg)	Coral catch /100 tows
1. AKE	270	17	6.3	11	64.71	-	-	-	-	-	-
2. CEE	1,026	150	14.6	2	1.33	16	10.67	-	-	-	-
3. SEC	2,856	914	32.0	28	3.06	2	0.22	-	-	51.8	5.67
4. SOE	1,381	579	41.9	22	3.80	-	-	-	-	3	0.52
5. SOU	1,027	527	51.3	17	3.23	-	-	1	0.19	0.4	0.08
6. SUB	873	547	62.7	26	4.75	-	-	1	0.18	6.3	1.15
7. CHA	2,977	1,333	44.8	17	1.28	13	0.98		-	-	-
8. CEW	11	1	9.1	-	-	-	-		-	-	-
9. AKW	17	2	11.8	-	-	-	-		-	-	-
Total	**10,438**	**4,070**	**39.0**	**123**	**3.02**	**31**	**0.76**	**2**	**0.05**	**61.5**	**1.51**

Table 3 reports on the numbers of interactions by species and fate immediately post interaction for the 2021/22 observer year. 67.3% of protected species interactions resulted in mortalities. White-chinned petrels were the most commonly bycaught seabird species, New Zealand fur seals were the most bycaught species overall.

Table 3. Protected species interactions in the hake, hoki, ling and warehou middle depth trawl fisheries during the 2021/22 observer year.

Species	Alive	Dead	Total
Seabirds			
Albatrosses (Unidentified)	3	-	3
Buller's albatross	1	11	12
Buller's and Pacific albatross	2	2	4
Cape petrels	-	1	1
Common diving petrel	-	1	1
Fairy prion	-	1	1
Flesh-footed shearwater	11	-	11
Giant petrels (Unidentified)	-	1	1
Great albatrosses	4	-	4
Petrel (Unidentified)	1	-	1
Petrels, Prions and Shearwaters	3	-	3
Prions (Unidentified)	2	-	2
Procellaria petrels	1	4	5
Pterodroma petrels	1	-	1
Salvin's albatross	3	20	23
Smaller albatrosses	-	1	1
Snares Cape petrel	-	1	1
Sooty shearwater	-	2	2
Southern royal albatross	2	-	2
Wandering albatross (Unidentified)	1	-	1
Westland petrel	-	3	3
White-capped albatross	7	2	9
White-chinned petrel	3	27	30
White-faced storm petrel	-	1	1
Seabirds Total	**45**	**78**	**123**
Marine Mammals			
New Zealand fur seal	4	27	31
Marine Mammals Total	**4**	**27**	**31**
Protected Fish			
Basking shark	2	-	2
Protected Fish Total	**2**	**0**	**2**
Total	**51**	**105**	**156**

Tables 4a and b detail the method of interaction for each species. Net capture was the most prevalent form of interaction overall, with 73.4% of these interactions resulting in mortalities.

Table 4. 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 2021/22 observer year.

a) Protected species released alive

Species	Brought on board	Caught in net	Impact against vessel	Total
Seabirds				
Albatrosses (Unidentified)	1	0	2	3
Buller's albatross	-	0	1	1
Buller's and Pacific albatross	-	2	-	2
Flesh-footed shearwater	-	11	-	11
Great albatrosses	2	2	-	4
Petrel (Unidentified)	-	0	1	1
Petrels, Prions and Shearwaters	-	0	3	3
Prions (Unidentified)	-	0	2	2
Procellaria petrels	-	0	1	1
Pterodroma petrels	-	0	1	1
Salvin's albatross	-	2	1	3
Southern royal albatross	1	1	-	2
Wandering albatross (Unidentified)	-	1	-	1
White-capped albatross	1	3	3	7
White-chinned petrel	-	2	1	3
Seabird Total	**5**	**24**	**16**	**45**
Marine Mammals				
New Zealand fur seal	-	4	-	4
Marine Mammal Total	**0**	**4**	**0**	**4**
Protected Fish				
Basking shark	-	2	-	2
Protected Fish Total	**0**	**2**	**0**	**2**
Total	**5**	**30**	**16**	**51**

b) Dead protected species

Species	Caught in net	Caught on warp or door	Impact against vessel	Other/ unknown	Total
Seabirds					
Buller's albatross	5	6	-	-	11
Buller's and Pacific albatross	1	-	1	-	2
Cape petrels	1	-	-	-	1
Common diving petrel	1	-	-	-	1
Fairy prion	-	-	-	1	1
Giant petrels (Unidentified)	-	1	-	-	1
Procellaria petrels	4	-	-	-	4
Salvin's albatross	11	9	-	-	20
Smaller albatrosses	-	1	-	-	1
Snares Cape petrel	1	-	-	-	1
Sooty shearwater	2	-	-	-	2
Westland petrel	3	-	-	-	3
White-capped albatross	2	-	-	-	2
White-chinned petrel	25	1	-	1	27
White-faced storm petrel	-	-	1	-	1
Seabird Total	**56**	**18**	**2**	**2**	**78**
Marine Mammals					
New Zealand fur seal	27	-	-	-	27
Marine Mammal Total	**27**	**0**	**0**	**0**	**27**
Total	**83**	**18**	**2**	**2**	**105**

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, McGovern & Weaver, 2022).

Table 5 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2021/22 observer year. There was a 30.1% increase in fishing effort in this fishery in this observer year, however the number of observed tows was comparable to the previous year, resulting in a 22.9% decrease in observer coverage.

Seabird captures in the 2021/22 observer year has decreased from the previous year by 60% (there were four seabird interactions in 2021/22 compared to 10 seabird interactions in 2020/21) (McGovern & Weaver 2022). Marine mammal captures decreased this year by 22.2% from the previous observer year (there were nine captures observed in 2020/21).

In summary, eight observed trips were conducted aboard eight vessels, with protected species captures occurring on six trips aboard six vessels (75% of observed trips involved protected species captures and 75% of these vessels had protected species interactions in 2021/22).

Table 5. Summary of commercial effort, observer effort and protected species interactions in the southern blue whiting fishery during the 2021/22 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird captures	Seabirds /100 tows	Mammal captures	Mammals /100 tows
1. AKE	-	-	-	-	-	-	-
2. CEE	-	-	-	-	-	-	-
3. SEC	-	-	-	-	-	-	-
4. SOE	-	-	-	-	-	-	-
5. SOU	-	-	-	-	-	-	-
6. SUB	441	340	77.1	4	1.18	7	2.06
7. CHA	-	-	-	-	-	-	-
8. CEW	-	-	-	-	-	-	-
9. AKW	-	-	-	-	-	-	-
Total	**441**	**340**	**77.1**	**4**	**1.18**	**7**	**2.06**

Table 6 reports the numbers of interactions by species and fate immediately post interaction for the 2021/22 observer year. 72.7% of the observed interactions resulted in mortalities.

Table 6. Protected species interactions in the southern blue whiting fishery during the 2021/22 observer year.

Species	Alive	Dead	Total
Seabirds			
Southern royal albatross	-	2	2
Storm petrels	-	1	1
White-bellied storm petrel	1	-	1
Seabirds Total	**1**	**3**	**4**
Marine Mammals			
New Zealand fur seal	-	3	3
New Zealand sea lion	2	2	4
Marine Mammals Total	**2**	**5**	**7**
Total	**3**	**8**	**11**

Tables 7a and b detail the method of interaction by species. 62.5% of the protected species interactions that resulted in mortalities involved marine mammals. Three sea lions were found caught in the SLED on different trips.

Table 7. Method of interaction for a) protected species released alive and b) dead protected species observed in the southern blue whiting fishery during the 2021/22 observer year.

a) Protected species released alive

Species	Caught in SLED	Caught in net	Impact against vessel	Total
White-bellied storm petrel	-	-	1	1
New Zealand sea lion	1	1	-	2
Total	**1**	**1**	**1**	**3**

b) Dead protected species

Species	Caught in SLED	Caught on warp or door	Caught in net	Impact against vessel	Total
Seabirds					
Southern royal albatross	-	1	1	-	2
Storm petrels	-	-	-	1	1
Seabird Total	**0**	**1**	**1**	**1**	**3**
Marine Mammals					
New Zealand fur seal	-	-	3	-	3
New Zealand sea lion	2	-	-	-	2
Marine Mammal Total	**2**	**0**	**3**	**0**	**5**
Total	**2**	**1**	**4**	**1**	**8**

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 8 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2021/22 observer year. Commercial effort decreased by 11.1% in comparison to the year prior (2020/21). Overall observer coverage decreased by 22.2% in 2021/22 (McGovern & Weaver 2022).

The number of seabird interactions in the 2021/22 observer year has decreased significantly by 79.2%, from 24 seabird interactions in 2020/21 to five in 2021/22. There was 0.2 kg of coral bycatch in this fishery in 2021/22, a slight decrease from the 0.4 kg that was bycaught in 2020/21 (McGovern & Weaver 2022).

In summary, 11 observed trips were conducted aboard 10 vessels, with protected species captures occurring on four trips aboard four vessels (36.4% of trips involved protected species captures and 40% of vessels that operated within this fishery during the 2021/22 year had protected species captures).

Table 8. Summary of commercial effort, observer effort and protected species interactions in the scampi fishery during the 2021/22 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird captures	Seabirds /100 tows	Coral catch (kg)	Coral catch /100 tows
1. AKE	440	58	13.2	-	-	-	-
2. CEE	537	29	5.4	1	3.45	-	-
3. SEC	6	-	-	-	-	-	-
4. SOE	2,099	156	7.4	1	0.64	-	-
5. SOU	-	-	-	-	-	-	-
6. SUB	1,415	136	9.6	3	2.21	0.2	0.15
7. CHA	-	-	-	-	-	-	-
8. CEW	-	-	-	-	-	-	-
9. AKW	-	-	-	-	-	-	-
Total	**4,497**	**379**	**8.4**	**5**	**1.32**	**0.2**	**0.05**

Table 9 reports the number of interactions by species and fate immediately post interaction.

Table 9. Protected species interactions in the scampi fishery during the 2021/22 observer year.

Species	Alive	Dead	Total
Buller's and Pacific albatross	1	-	1
Salvin's albatross	-	1	1
Storm petrels	1	-	1
White-capped albatross	2	-	2
Total	**4**	**1**	**5**

Table 10 details the method of interaction for each species that was released alive. Deck strike was the most prevalent form of interaction overall. The Salvin's albatross that died due to interaction was recorded as being caught on warp door.

Table 10. Method of interaction for protected species released alive in the scampi fishery during the 2021/22 observer year.

Species	Impact against vessel	Caught in net	Total
Buller's and Pacific albatross	-	1	1
Storm petrels	1	-	1
White-capped albatross	2	-	2
Total	**3**	**1**	**4**

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. Being over 28 m 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 discarding 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. Commonly, the bulk of the seabird captures have included white-capped albatrosses, sooty shearwaters and white-chinned petrels and this trend continues into the current year.

Table 11 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2021/22 observer year. Commercial fishing effort decreased by 14.2%, however the observed tows was comparable to the previous year, resulting in a 13.3% increase in observer coverage from the previous year (McGovern & Weaver 2022).

Seabird interactions decreased by 18.8%, from 224 in 2020/21 to 182 in 2021/22. As with previous years, the majority of observed seabird interactions occurred in the SOU and SUB FMAs. Marine mammal captures decreased by 26.6%, and protected fish captures increased by 33.3% from the previous observer year (2020/21). Coral bycatch decreased from 3,203.2 kg in 2020/21 to 1,252.5 kg in 2021/22 (McGovern & Weaver 2022). The majority of the coral bycatch occurred in the SOU FMA.

In summary, 70 observed trips were conducted aboard 23 vessels, with protected species captures occurring on 48 trips aboard 23 vessels (68.6% of trips involved protected species captures and 100% of vessels that operated within this fishery during the 2021/22 year had protected species captures).

Table 11. Summary of commercial effort, observer effort and protected species interactions in the squid fishery during the 2021/22 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird captures	Seabirds /100 tows	Mammal captures	Mammals /100 tows	Protected fish captures	Protected fish /100 tows	Coral catch (kg)	Coral catch /100 tows
1. AKE	-	-	-	-	-	-	-	-	-	-	-
2. CEE	-	-	-	-	-	-	-	-	-	-	-
3. SEC	906	748	82.6	11	1.47	5	0.67	-	-	43.4	5.80
4. SOE	224	221	98.7	2	0.90	6	2.71	-	-	20.6	9.32
5. SOU	977	965	98.8	63	6.53	8	0.83	1	0.10	819.6	84.93
6. SUB	1,134	1,066	94.0	106	9.94	3	0.28	3	0.28	368.9	34.61
7. CHA	-	-	-	-	-	-	-	-	-		-
8. CEW	-	-	-	-	-	-	-	-	-		-
9. AKW	-	-	-	-	-	-	-	-	-		-
Total	**3,241**	**3,000**	**92.6**	**182**	**6.07**	**22**	**0.73**	**4**	**0.13**	**1,252.5**	**41.75**

Table 12 lists the protected coral species bycaught in 2021/22, with *Dendrobathpathyes* spp. (black corals) being the most commonly bycaught species, and was recorded as two large bycatch events across two separate trips.

Table 12. Protected species of coral bycaught in the squid trawl fishery during the 2021/22 observer year.

Species	Weight (kg)
Black corals	5.2
Bottlebrush coral	5.4
Bushy hard coral	25.9
Bushy lace coral	0.1
Caryophyllia spp.	0.3
Conopora spp.	0.1
Coral (Unidentified)	73.8
Coral rubble	67
Coral rubble-dead	225
Crested cup coral	0.3
Dendrobathypathes spp.	706
Flabellum cup corals	14.2
Gorgonian coral	3.9
Metallic coral	0.7
Primnoa spp.	20
Rasta coral	100
Stony branching corals	0.6
Stony corals	4
Total	**1,252.5**

Table 13 reports the numbers of interactions by species and fate immediately post interactions. As with the previous year, white-chinned petrels were the most commonly bycaught protected species. All but one marine mammal capture resulted in mortality; the surviving individual was a fur seal that was able to be released from the net alive. There were four seabird interactions in this fishery that were recorded as deck strikes, but could not be associated with a fishing event and therefore not included in this report.

Table 13. Protected species interactions in the squid fishery during the 2021/22 observer year.

Species	Alive	Dead	Total
Seabirds			
Albatrosses (Unidentified)	5	-	5
Buller's albatross	5	10	15
Buller's and Pacific albatross	3	1	4
Common diving petrel	2	1	3
Fairy prion	-	2	2
Giant petrels (Unidentified)	2	-	2
Grey-headed albatross	2	-	2
Mid-sized Petrels & Shearwaters	1	-	1
Mottled petrel	1	-	1
Petrel (Unidentified)	9	1	10
Petrels, Prions and Shearwaters	-	2	2
Prions (Unidentified)	2	-	2
Salvin's albatross	-	5	5
Shearwaters	1	-	1
Snares Cape petrel	1	-	1
Sooty shearwater	3	9	12
Southern royal albatross	1	-	1
Westland petrel	1	1	2
White-capped albatross	14	13	27
White-chinned petrel	13	71	84
Seabirds Total	**66**	**116**	**182**
Marine Mammals			
New Zealand fur seal	1	20	21
New Zealand sea lion	-	1	1
Marine Mammals Total	**1**	**21**	**22**
Protected Fish			
White pointer shark	3	1	4
Protected Fish Total	**3**	**1**	**4**
Total	**70**	**138**	**208**

Tables 14a and b detail the method of interaction for each species. Net capture was the most prevalent form of interaction overall and was responsible for 88.4% of the interactions that resulted in mortalities.

Table 14. Method of interaction for a) protected species released alive and b) dead protected species in the squid fishery during the 2021/22 observer year.

a) Protected species released alive

Species	Brought on board	Caught in net	Impact against vessel	Caught in SLED	Total
Seabirds					
Albatrosses (Unidentified)	-	5	-	-	5
Buller's albatross	2	3	-	-	5
Buller's and Pacific albatross	-	2	-	1	3
Common diving petrel	-	-	2	-	2
Giant petrels (Unidentified)	-	2	-	-	2
Grey-headed albatross	-	2	-	-	2
Mid-sized Petrels & Shearwaters	-	1	-	-	1
Mottled petrel	-	-	1	-	1
Petrel (Unidentified)	1	7	1	-	9
Prions (Unidentified)	-	-	2	-	2
Shearwaters	-	1	-	-	1
Snares Cape petrel	-	-	1	-	1
Sooty shearwater	-	2	1	-	3
Southern royal albatross	-	-	-	1	1
Westland petrel	-	1	-	-	1
White-capped albatross	4	6	3	1	14
White-chinned petrel	1	12	-	-	13
Seabird Total	**8**	**44**	**11**	**3**	**66**
Marine Mammals					
New Zealand fur seal	-	1	-	-	1
Marine Mammal Total	**0**	**1**	**0**	**0**	**1**
Protected Fish					
White pointer shark	-	-	-	3	3
Protected Fish Total	**0**	**0**	**0**	**3**	**3**
Total	**8**	**45**	**11**	**6**	**70**

b) Dead protected species

Species	Caught in SLED	Caught on warp or door	Caught in net	Impact against vessel	Other/ unknown	Total
Seabirds						
Buller's albatross	-	-	9	-	-	9
Buller's and Pacific albatross	-	1	1	-	-	2
Common diving petrel	-	-	-	1	-	1
Fairy prion	-	-	2	-	-	2
Petrel (Unidentified)	-	-	1	-	-	1
Petrels, Prions and Shearwaters	-	-	2	-	-	2
Salvin's albatross	-	3	2	-	-	5
Sooty shearwater	-	-	8	1	-	9
Westland petrel			1			1
White-capped albatross	-	6	6	-	1	13
White-chinned petrel	-	-	71	-	-	71
Seabird Total	**0**	**10**	**103**	**2**	**1**	**116**
Marine Mammals						
New Zealand fur seal	1	-	19	-	-	20
New Zealand sea lion	1	-	-	-	-	1
Marine Mammal Total	**2**	**0**	**19**	**0**	**0**	**21**
Protected Fish						
White pointer shark	-	-	-	-	1	1
Protected Fish Total	**0**	**0**	**0**	**0**	**1**	**1**
Total	**2**	**10**	**122**	**2**	**2**	**138**

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 28 m and are required by law to deploy a seabird scaring device.

Table 15 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2021/22 observer year. Commercial effort in this fishery decreased slightly by 5.1% since the previous year (2020/21), and the number of observed tows increased, resulting in a 40.1% increase in overall observer coverage in this fishery from the previous observer year (2020/21).

The number of seabird captures increased by 11.4% in the 2021/22 observer year in comparison to the previous year (2020/21). Marine mammal captures increased by 33.3%, from nine captures in 2020/21 to 12 captures in 2021/22. Coral bycatch in 2021/22 decreased by 98% in comparison to the year prior (5 kgs in 2020/21) (McGovern & Weaver 2022).

In summary, 55 observed trips were conducted aboard 18 vessels, with protected species captures occurring on 15 trips aboard 111 vessels (27.3% of trips involved protected species captures and 61.1% of vessels that operated within this fishery during the 2021/22 year had protected species captures).

Table 15. Summary of commercial effort, observer effort and protected species interactions in the jack mackerel and barracouta pelagic trawl fishery during the 2021/22 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird captures	Seabirds /100 tows	Mammal captures	Mammals /100 tows	Reptile captures	Reptile /100 tows	Protected fish captures	Protected fish /100 tows	Coral catch (kg)	Coral catch /100 tows
1. AKE	1	-	-	-	-	-	-	-	-	-	-	-	-
2. CEE	48	-	-	-	-	-	-	-	-	-	-	-	-
3. SEC	1,585	582	19.6	8	1.37	5	0.86	-	-	-	-	0.1	0.03
4. SOE	326	327	100.3	10	3.06	1	0.31	-	-	-	-	-	-
5. SOU	399	311	77.9	18	5.79	4	1.29	-	-	-	-	-	-
6. SUB	-	-	-	-	-	-	-	-	-	-	-	-	-
7. CHA	1,898	601	31.7	1	0.17	1	0.17	1	0.17	1	0.17	-	-
8. CEW	761	424	55.7	2	0.47	1	0.24	-	-	-	-	-	-
9. AKW	111	32	28.8	-	-	-	-	-	-	-	-	-	-
Total	**5,129**	**2,277**	**44.4**	**39**	**1.71**	**12**	**0.53**	**1**	**0.04**	**1**	**0.04**	**0.1**	**0.00**

Table 16 reports the number of interactions by species and fate immediately post interaction. Salvin's albatross was the most commonly bycaught seabird species.

Table 16. Protected species interactions in the jack mackerel and barracouta pelagic trawl fisheries during the 2021/22 observer year.

Species	Alive	Dead	Total
Seabirds			
Buller's albatross	-	6	6
Chatham Island albatross	-	1	1
Northern giant petrel	1	1	2
Petrels, Prions and Shearwaters	-	2	2
Prions (Unidentified)	1	1	2
Procellaria petrels	1	-	1
Salvin's albatross	4	5	9
Sooty shearwater	-	4	4
Southern royal albatross	-	2	2
Storm petrels	1	-	1
White-capped albatross	1	5	6
White-chinned petrel	-	2	2
White-faced storm petrel	-	1	1
Seabirds Total	**9**	**30**	**39**
Marine Mammals			
Dusky dolphin	-	4	4
New Zealand fur seal	-	8	8
Marine Mammals Total	**0**	**12**	**12**
Protected Fish			
White pointer shark	-	1	1
Protected Fish Total	**0**	**1**	**1**
Reptiles			
Leatherback turtle	-	1	1
Reptiles Total	**0**	**1**	**1**
Total	**9**	**44**	**53**

Tables 17a and b detail the method of interaction for each species. Net capture was the most prevalent form of interaction overall and was responsible for 63.6% of the interactions that resulted in mortalities.

Table 17. 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 2021/22 observer year.

a) Protected species released alive

Species	Brought on board	Caught in net	Impact against vessel	Total
Northern giant petrel	-	-	1	1
Prions (Unidentified)	-	-	1	1
Procellaria petrels	-	-	1	1
Salvin's albatross	1	3	-	4
Storm petrels	-	-	1	1
White-capped albatross	-	-	-	1
Total	**1**	**3**	**4**	**9**

b) Dead protected species

Species	Caught on warp or door	Caught in net	Impact against vessel	Other	Total
Seabirds					
Buller's albatross	-	5	-	1	6
Chatham Island albatross	1	-	-	-	1
Northern giant petrel	-	-	1	-	1
Petrels, Prions and Shearwaters	-	-	2	-	2
Prions (Unidentified)	-	-	1	-	1
Salvin's albatross	2	2	-	1	5
Sooty shearwater	-	3	1	-	4
Southern royal albatross	-	-	-	2	2
White-capped albatross	-	4	-	1	5
White-chinned petrel	-	2	-	-	2
White-faced storm petrel	-	-	1	-	1
Seabirds Total	**3**	**16**	**6**	**5**	**30**
Marine Mammals					
Dusky dolphin	-	4	-	-	4
New Zealand fur seal	-	8	-	-	8
Marine Mammals Total	**0**	**12**	**0**	**0**	**12**
Protected Fish					
White pointer shark	-	-	-	1	1
Protected Fish Total	**0**	**0**	**0**	**1**	**1**
Reptiles					
Leatherback turtle	-	1	-	-	1
Reptiles Total	**0**	**1**	**0**	**0**	**1**
Total	**3**	**28**	**6**	**6**	**44**

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 18 presents a summary of commercial fishing effort, observer effort and protected species captures in the deep water trawl fishery during the 2021/22 observer year. There was a slight decrease of 7.2% in commercial fishing effort over 2021/22, however the number of observed tows increased, resulting in a 12.1% increase in overall observer coverage in comparison to the previous observer year (2020/21).

The rate of seabird captures increased by 50% in 2021/22, with 15 observed captures in comparison to 10 captures in the 2020/21 observer year (McGovern & Weaver 2022). Coral bycatch for this observer year decreased by 47%, from 1,425.5 kgs in 2020/21 to 755.7 kgs in 2021/22 (McGovern & Weaver 2022). The majority of the coral bycatch occurred in the SOE FMA.

In summary, 26 observed trips were conducted aboard 12 vessels, with protected species captures occurring on 20 trips aboard nine vessels (76.9% of trips involved protected species captures and 75% of vessels that operated within this fishery during the 2021/22 year had protected species captures).

Table 18. Summary of commercial effort, observer effort and protected species interactions in the orange roughy, cardinal and oreo deep water bottom trawl fisheries during the 2021/22 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird captures	Seabirds /100 tows	Coral catch (kg)	Coral catch /100 tows
1. AKE	69	5	7.2	-	-	-	-
2. CEE	680	124	18.2	2	1.61	7.8	6.29
3. SEC	454	157	34.6	-	-	16.9	10.76
4. SOE	1,635	746	45.6	5	0.67	451.3	60.50
5. SOU	38	38	100.0	6	15.79	62	163.16
6. SUB	230	131	57.0	-	-	93.6	71.45
7. CHA	892	141	15.8	2	1.42	2.8	1.99
8. CEW	1	-	-	-	-	-	-
9. AKW	365	76	20.8	-	-	121.3	159.61
Total	**4,364**	**1,418**	**32.5**	**15**	**1.06**	**755.7**	**53.29**

Table 19 lists the protected coral species bycaught in 2021/22, with bushy hard coral (*Goniocorella dumosa*) being recorded as the most commonly bycaught species.

Table 19. Protected species of coral bycaught in the orange roughy, cardinal and oreo deep water bottom trawl fisheries during the 2021/22 observer year.

Species	Weight (kg)
Bamboo coral	97.1
Bamboo corals	9.5
Bathypathes spp.	2.7
Black corals	2.5
Bottlebrush coral	1.2
Bubblegum coral	137.2
Bushy hard coral	353.1
Calyptrophora spp.	6
Caryophyllia spp.	0
Conopora spp.	1
Coral (Unidentified)	13.4
Coral rubble	0.7
Deepwater branching coral	1.5
Dendrobathypathes spp.	1
Golden corals	7.5
Gorgonian coral	4.6
Hydrocorals	0.6
Iridescent coral	2.2
Leiopathes spp.	3
Lillipathes spp.	0.2
Metallic coral	1
Parantipathes spp.	0.5
Primnoa spp.	1
Primnoidae (Family)	0.4
Red hydrocorals	0
Solitary bowl coral	0.4
Stony branching corals	99.8
Stony corals	7.6
Total	**755.7**

Table 20 reports the number of interactions by species and fate immediately post interaction.

Table 20. Protected species interactions in the orange roughy, cardinal and oreo deep water bottom trawl fisheries during the 2021/22 observer year.

Species	Alive	Dead	Total
Common diving petrel	5	1	6
Giant petrels (Unidentified)	-		0
Northern giant petrel	-	2	2
Petrels, Prions and Shearwaters	3	-	3
Salvin's albatross	1	-	1
Southern giant petrel	-	1	1
Southern black-browed albatross	1	-	1
Storm petrels	-	1	1
Total	**10**	**5**	**15**

Tables 21a and b detail the method of interaction for each species. Deck strike was the most prevalent form of interaction overall.

Table 21. Method of interaction for a) observed protected species released alive and b) dead protected species in the orange roughy, cardinal and oreo deep water bottom trawl fisheries during the 2021/22 observer year.

a) Protected species released alive

Species	Impact against vessel	Caught in net	Total
Common diving petrel	5	-	5
Petrels, Prions and Shearwaters	3	-	3
Salvin's albatross	-	1	1
Southern black-browed albatross	1	-	1
Total	**9**	**1**	**10**

b) Dead protected species

Species	Caught in fishing gear	Impact against vessel	Total
Common diving petrel	-	1	1
Northern giant petrel	2	1	2
Southern giant petrel	-	1	1
Storm petrels	-	1	1
Total	**2**	**4**	**5**

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 m. 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. During the 2021/22 year, observer coverage was affected by watchkeeping practices on some vessels, in particular smaller vessels operating in the inshore and surface long line vessels.

Table 22 presents a summary of commercial fishing effort, observer effort and protected species captures in the inshore trawl fishery during the 2021/22 observer year. Commercial effort decreased by 13% over 2021/22 and observer coverage decreased significantly by 45.3% since the previous year (McGovern & Weaver 2022).

Seabird interactions decreased by 10.5%, from 19 captures observed in 2020/21 to 17 captures in 2021/22 (McGovern & Weaver 2022). There were no marine mammal captures observed in 2021/22, in comparison to the three captures in 2020/21 (McGovern & Weaver 2022). No coral bycatch was observed in 2021/22 compared to the 19 kg observed in 2020/ (McGovern & Weaver 2022).

In summary, 37 observed trips were conducted aboard 30 vessels, with protected species captures occurring on seven trips on board seven vessels (18.9% of trips involved protected species captures and 23.3% of vessels that operated within this fishery during the 2021/22 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 2021/22 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird captures	Seabirds /100 tows
1. AKE	2,589	112	4.3	4	3.57
2. CEE	4,364	167	3.8	3	1.80
3. SEC	7,599	426	5.6	10	2.35
4. SOE	31	-	-	-	-
5. SOU	2,754	82	3.0	-	-
6. SUB	1	-	-	-	-
7. CHA	7,442	1	0.0	-	-
8. CEW	1,368	-	-	-	-
9. AKW	2,378	208	8.7	-	-
Total	**28,526**	**996**	**3.5**	**17**	**1.71**

Table 23 reports the number of interactions by species and fate immediately post interaction. Salvin's albatross was the most commonly bycaught species.

Table 23. Protected species interactions in the inshore trawl fisheries during the 2021/22 observer year.

Species	Alive	Dead	Total
Albatrosses (Unidentified)	-	1	1
Flesh-footed shearwater	3	-	3
Petrels, Prions and Shearwaters	1	-	1
Procellaria petrels	-	1	1
Salvin's albatross	8	-	8
Storm petrels	1	-	1
Wandering (Snowy) albatross	1	-	1
White-capped albatross	-	1	1
Total	**14**	**3**	**17**

Tables 24a and b detail the method of interaction for each species. Capture in fishing gear was the most prevalent interaction type.

Table 24. Method of interaction for a) protected species released alive and b) dead protected species observed in the inshore trawl fisheries during the 2021/22 observer year.

a) Protected species released alive

Species	Brought on board	Caught on warp or door	Caught in fishing gear	Impact against vessel	Total
Flesh-footed shearwater	1	-	-	2	3
Petrels, Prions and Shearwaters	-	-	-	1	1
Salvin's albatross	-	-	6	2	8
Storm petrels	-	-	-	1	1
Wandering (Snowy) albatross	-	1	-	-	1
Total	**1**	**1**	**6**	**6**	**14**

b) Dead protected species

Species	Caught on warp or door	Caught in fishing gear	Total
Albatrosses (Unidentified)	1	-	1
Procellaria petrels	-	1	1
White-capped albatross	1	-	1
Total	**2**	**1**	**3**

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 28 m, 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. During the 2021/22 year, observer coverage was affected by watchkeeping practices on some vessels, primarily smaller vessels operating in the inshore and surface long line vessels.

Table 24 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2021/22 observer year. Fishing effort in 2021/22 decreased by 10.8% from the 2020/21 fishing year, and overall observer coverage decreased by 22.9% (McGovern & Weaver 2022).

The rate of seabird captures slightly decreased by 4.8%, from 27 observed interactions in 2020/21 to 26 in 2021/22 (McGovern & Weaver 2022). The number of marine mammal captures decreased by 30.8%, from 13 in 2020/21 to nine in 2021/22. Four protected fish were caught in observed sets in 2020/21 whereas none were observed by caught in 2021/22. The amount of coral bycaught in 2021/22 decreased to 1 kg, compared to 18 kgs of corals bycaught in 2020/21 (McGovern & Weaver 2022).

In summary, 16 observed trips were conducted aboard nine vessels, with protected species captures occurring on six trips aboard six vessels (37.5% of trips involved protected species captures and 66.7% of vessels that operated within this fishery during the 2021/22 year had protected species captures).

Table 25. Summary of commercial effort, observer effort and protected species interactions in the inshore setnet fishery during the 2021/22 observer year.

FMA	Effort sets	Observed sets	Coverage (%)	Seabird captures	Seabirds /100 sets	Mammal captures	Mammals /100 sets	Coral catch (kg)	Coral catch /100 sets
1. AKE	4,621	-	-	-	-	-	-	-	-
2. CEE	1,150	-	-	-	-	-	-	-	-
3. SEC	3,741	493	13.2	19	3.85	8	1.6	1	0.20
4. SOE	-	-	-	-	-	-	-	-	-
5. SOU	980	117	11.9	7	5.98	1	0.9	-	-
6. SUB	-	-	-	-	-	-	-	-	-
7. CHA	326	6	1.8	-	-	-	-	-	-
8. CEW	376	-	-	-	-	-	-	-	-
9. AKW	5,667	-	-	-	-	-	-	-	-
Total	**16,861**	**616**	**3.7**	**26**	**4.22**	**9**	**1.5**	**1.0**	**0.16**

Table 26 reports the number of interactions with inshore setnet fishery by species and fate immediately post interaction. 97.1% of the interactions in 2021/22 resulted in the mortalities. All 17 Otago shags were captured during one trip, and the six Fiordland crested penguins were caught during another single trip.

Table 26. Protected species interactions in the inshore setnet fishery during the 2021/22 observer year.

Species	Alive	Dead	Total
Seabirds			
Fiordland crested penguin	-	6	6
Otago shag	-	17	17
Yellow-eyed penguin	-	3	3
Seabirds Total	**0**	**26**	**26**
Marine Mammals			
Dusky dolphin	1	1	2
New Zealand fur seal	-	7	7
Marine Mammals Total	**1**	**8**	**9**
Total	**1**	**34**	**35**

Table 27 details the method of interaction for each species recorded as dead. Net capture accounted for 100% of interactions, including the dusky dolphin that was released alive.

Table 27. Method of interactions for dead protected species observed in the setnet fishery during the 2021/22 observer year.

Species	Caught in net
Seabirds	
Fiordland crested penguin	6
Otago shag	17
Yellow-eyed penguin	3
Seabird Total	**26**
Marine Mammals	
Dusky dolphin	1
New Zealand fur seal	7
Marine Mammal Total	**8**
Total	**34**

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 and line cutters 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 2021/22 observer year. Commercial effort decreased by 15.3% in comparison to the previous year (2020/21). There was a significant decrease of 31.9% in overall observer coverage in this fishery since the previous observer year (2020/21). This decrease can mostly be attributed to the difficulties in placing observers on smaller vessels affected by watchkeeping practices.

The number of seabird interactions observed in 2021/22 increased by 127.3%, with 75 interactions observed in 2021/22 compared to 33 in 2020/21 (McGovern & Weaver 2022). The number of marine mammal observed captures also increased by 52.6% from 19 observed interactions in 2020/21 to 29 in 2021/22 (McGovern & Weaver 2022). The number of marine reptile captures decreased by 77.3%, from 22 observed interactions in 2020/21 to five in 2021/22 (McGovern & Weaver 2022). There were no protected fish captures observed in 2021/22, in comparison to one the year prior.

In summary, 10 observed trips were conducted aboard nine vessels, with protected species captures occurring on 10 trips aboard nine vessels (100% of trips involved protected species captures and 100% of vessels that were observed within this fishery during the 2021/22 year had protected species captures).

FMA	Effort Lines	Observed Lines	Coverage (%)	Number of hooks observed	Seabird captures	Seabirds /1000 hooks	Mammal captures	Mammals /1000 hooks	Reptile captures	Protected fish /1000 hooks
1. AKE	531	33	6.2	26,668	5	0.19	1	0.04	3	0.11
2. CEE	336	9	2.7	6,054	-	-	3	0.50	2	0.33
3. SEC	341	29	8.5	27,720	47	1.70	9	0.32	-	-
4. SOE	-	-	-	-	-	-	-	-	-	-
5. SOU	-	-	-	-	-	-	-	-	-	-
6. SUB	1	-	-	-	-	-	-	-	-	-
7. CHA	326	45	13.8	51,390	23	0.45	16	0.31	-	-
8. CEW	-	-	-	-	-	-	-	-	-	-
9. AKW	71	8	11.3	7,146	-	-	-	-	-	-
10. KER	2	-	-	-	-	-	-	-		-
Total	**1,608**	**124**	**7.7**	**118,978**	**75**	**0.63**	**29**	**0.24**	**5**	**0.04**

Table 28. Summary of commercial effort, observer effort and protected species interactions in the domestic tuna and swordfish fishery during the 2021/22 observer year.

Table 29 reports the number of interactions by species and fate immediately post interaction. White-chinned petrels were the most common protected species interaction in the 2021/22 observer year (28% of all interactions). Overall, 57.8% of interactions resulted in mortalities.

Table 29. Protected species interactions in the domestic tuna and swordfish fishery during the 2021/22 observer year.

Species	Alive	Dead	Total
Seabirds			
Black (Parkinson's) petrel	3	-	3
Buller's albatross	1	8	9
Buller's and Pacific albatross	1	2	3
Flesh-footed shearwater	2	-	2
Giant petrels (Unidentified)	1	-	1
Grey petrel	-	3	3
Smaller albatrosses	-	1	1
Sooty shearwater	1	-	1
Southern royal albatross	-	1	1
Storm petrels	1	-	1
Westland petrel	1	5	6
White-capped albatross	2	12	14
White-chinned petrel	2	28	30
Seabirds Total	**15**	**60**	**75**
Marine Mammals			
Bottlenose dolphin	1	-	1
New Zealand fur seal	24	3	27
Orca	1	-	1
Marine Mammals Total	**26**	**3**	**29**
Reptiles			
Leatherback turtle	5	-	5
Reptiles Total	**5**	**0**	**5**
Total	**46**	**63**	**109**

Tables 30a and b detail the method of interaction for each species. Hook capture accounted for 100% of mortalities.

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 2021/22 observer year.

a) Protected species released alive

Species	Caught on hook	Impact against vessel	Total
Seabirds			
Black (Parkinson's) petrel	2	1	3
Buller's albatross	1	-	1
Buller's and Pacific albatross	1	-	1
Flesh-footed shearwater	2	-	2
Giant petrels (Unidentified)	-	1	1
Sooty shearwater	-	1	1
Storm petrels	-	1	1
Westland petrel	-	1	1
White-capped albatross	1	1	2
White-chinned petrel	-	2	2
Seabird Total	**7**	**8**	**15**
Marine Mammals			
Bottlenose dolphin	1	-	1
New Zealand fur seal	24	-	24
Orca	1	-	1
Marine Mammals Total	**26**	**0**	**26**
Reptiles			
Leatherback turtle	5	-	5
Reptiles Total	**5**	**0**	**5**
Total	**38**	**8**	**46**

b) Dead protected species

Species	Caught on hook
Seabirds	
Buller's albatross	8
Buller's and Pacific albatross	2
Grey petrel	3
Smaller albatrosses	1
Southern royal albatross	1
Westland petrel	5
White-capped albatross	12
White-chinned petrel	28
Seabird Total	**60**
Marine Mammals	
New Zealand fur seal	3
Marine Mammal Total	**3**
Total	**63**

Bottom Longline Fishery

Deepwater Bottom Longline

The offshore bottom longline fishery is observed to monitor seabird and marine mammal interactions. A relatively small fleet conducts a large amount of fishing effort in terms of 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.

Previously, the deepwater bottom longline fishery has been characterised as all bottom longline vessels over 34 m in length, and all vessels between 20-34 m that set over 5000 hooks/day. To align reporting with FNZ, the deepwater bottom longline fishery will now be defined as: Vessels 20 m in overall length and greater, and all autoliners.

Table 31 presents a summary of commercial fishing effort, observer effort and protected species captures in the deepwater bottom longline fishery during the 2021/22 observer year. Commercial effort decreased by 21.1%, however the number of observed lines was comparable to the previous year, resulting in an increase of 25.8% in overall observer coverage in 2021/22.

The number of seabirds captured in this fishery increased by 29.4%, from 34 captures in 2020/21 (McGovern & Weaver 2022) to 44 observed interactions in 2021/22. There was no coral bycatch observed in 2021/22, compared to 3 kg in 2020/21 (McGovern & Weaver 2022).

In summary, six observed trips were conducted aboard five vessels, with protected species captures occurring on four trips aboard three vessels (66.7% of trips involved protected species captures on 60% of vessels that were observed within this fishery during the 2021/22 year).

Table 31. Summary of commercial effort, observer effort and protected species interactions in the deepwater bottom longline fishery during the 2021/22 observer year.

FMA	Effort Lines	Observed Lines	Coverage (%)	Number of hooks observed	Seabird captures	Seabirds /1000 hooks
1. AKE	202	-	-	-	-	-
2. CEE	123	27	22.0	22,581	-	-
3. SEC	236	18	7.6	141,100	-	-
4. SOE	1,388	67	4.8	523,627	4	0.01
5. SOU	241	-	-	-	-	-
6. SUB	625	102	16.3	1,569,500	37	0.02
7. CHA	2,039	160	7.8	217,562	3	0.01
8. CEW	76	15	19.7	10,744	-	-
9. AKW	38	-	-	-	-	-
Total	**4,968**	**389**	**7.8**	**2,485,114**	**44**	**0.02**

Table 32 reports the number of interactions in the deepwater bottom longline fishery by species and fate immediately post interaction. 100% of interactions resulted in mortalities. White-chinned petrels were the most commonly bycaught protected species, comprising 90.9% of all captures.

Table 32. Protected species interactions in the deepwater bottom longline fishery during the 2021/22 observer year.

Species	Alive	Dead	Total
Campbell albatross	-	1	1
Sooty shearwater	-	1	1
Westland petrel	-	2	2
White-chinned petrel	-	40	40
Total	**0**	**44**	**44**

Table 33 details the method of interaction for each species recorded as dead.

Table 33. Method of interaction for dead protected species observed in the deepwater bottom longline fishery during the 2021/22 observer year.

Species	Caught on hook	Tangled in line	Total
Campbell albatross	1	-	1
Sooty shearwater	1	-	1
Westland petrel	2	-	2
White-chinned petrel	38	2	40
Total	**42**	**2**	**44**

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 on 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. Since 2008, regulations on mitigation were introduced for all bottom longline vessels, requiring 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.

Previously, the inshore bottom longline fishery has been characterised as all bottom longline vessels under 20 m, and all vessels between 20-34 m in length that set 5000 hooks or less/day. To align reporting with FNZ, the inshore bottom longline fishery will now be defined as: Vessels under 20 m in overall length, excluding autoliners.

Table 34 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2021/22 observer year. In comparison to the previous observer year, commercial effort decreased by 16.4% and overall observer coverage decreased by 46.2% in 2021/22. This decrease can mostly be attributed to the difficulties in placing observers on smaller vessels affected by watchkeeping practices.

There were no seabird captures observed in 2021/22, compared with the 37 captures observed in 2020/21. The total coral bycatch observed in 2021/22 was 0.4 kgs, compared to 3.4 kg in 2020/21 (McGovern & Weaver 2022).

In summary, seven observed trips were conducted aboard seven vessels, with protected species captures occurring on one trip aboard one vessel (14.3% of these trips involved protected species captures and 14.3% of vessels that were observed within this fishery during the 2021/22 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 2021/22 observer year.

FMA	Effort Lines	Observed Lines	Coverage (%)	Number of hooks observed	Coral catch (kg)	Coral catch /100 tows
1. AKE	954	13	1.4	30,144	-	-
2. CEE	2,030	55	2.7	53,475	-	-
3. SEC	343	14	4.1	6,000	-	-
4. SOE	352	-	-	-	-	-
5. SOU	590	29	4.9	24,700	0.4	1.38
6. SUB	-	-	-	-	-	-
7. CHA	956	3	0.3	2,000	-	-
8. CEW	460	-	-	-	-	-
9. AKW	674	62	9.2	28,325	-	-
Total	**6,359**	**176**	**2.8**	**144,644**	**0.4**	**0.23**

Bottom Longline - Snapper

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

Table 35 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2021/22 observer year. In comparison to 2020/21, there was a 23.9% decrease in commercial fishing effort, and overall observer coverage of the fishery decreased by 40.5% in 2021/22. This decrease can mostly be attributed to the difficulties in placing observers on smaller vessels affected by watchkeeping practices.

In the 2021/22 observer year, observed seabird captures decreased by 83.9%, with five seabird captures observed in 2021/22, in comparison to 31 captures in 2020/21 (McGovern & Weaver 2022). Coral bycatch decreased from 3.1 kg in 2020/21 to 1.4 kg in 2021/22. No marine mammal captures were observed in 2021/22, compared to one observed capture in 2020/21. No protected fish captures occurred in the 2021/22 observer year, while four captures were observed in 2020/21 (McGovern & Weaver 2022).

In summary, 10 observed trips were conducted aboard nine vessels, with protected species captures occurring on four trips aboard four vessels (40% of these trips involved protected species captures and 44.4% of vessels that were observed within this fishery during the 2021/22 year had protected species captures).

Table 35. Summary of commercial effort, observer effort and protected species interactions in the snapper bottom longline fishery during the 2021/22 observer year.

FMA	Effort Lines	Observed Lines	Coverage (%)	Number of hooks observed	Seabird captures	Seabirds /1000 hooks	Coral catch (kg)	Coral catch /1000 hooks
1. AKE	3,887	99	2.5	321,050	5	0.016	1.4	0.00
2. CEE	-	-	-	-	-	-	-	-
3. SEC	-	-	-	-	-	-	-	-
4. SOE	-	-	-	-	-	-	-	-
5. SOU	-	-	-	-	-	-	-	-
6. SUB	-	-	-	-	-	-	-	-
7. CHA	80	-	-	-		-	-	-
8. CEW	48	-	-	-	-	-	-	-
9. AKW	135	6	4.4	7,350	-	-	-	-
Total	**4,150**	**105**	**2.5**	**328,400**	**5**	**0.01**	**1.4**	**0.00**

Table 36 reports the number of interactions by species and fate immediately post interaction. Hook capture accounted for 100% of interactions.

Table 36. Protected species interactions in the snapper bottom longline fishery during the 2021/22 observer year.

Species	Alive	Dead	Total
Flesh-footed shearwater	-	3	3
Fluttering shearwater	-	1	1
Red-billed gull	1	-	1
Total	**1**	**4**	**5**

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.

Commercial fishing effort in the skipjack tuna purse seine fishery significantly decreased by 81.9% since the previous year (2020/21). There was no observer coverage in this fishery during the 2021/22 observer year, and therefore no protected species interactions were observed.

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 37 presents a summary of commercial fishing effort and observer effort in this fishery during the 2021/22 observer year. There was a slight decrease of 2.8% in commercial effort in 2021/22, however the number of observed tows slightly increased, resulting in a 16.9% increase in overall observer coverage in 2021/22.

Eight seabird captures were observed in 2021/22 compared to one in 2020/21. No marine mammal or protected fish captures occurred in the 2021/22 observer year, compared to four marine mammal captures and one protected fish capture in 2020/21 (McGovern & Weaver, 2022).

In summary, three observed trips were conducted aboard three vessels, with protected species captures occurring on three trips/vessels (100% of these trips involved protected species captures and 100% of vessels that were observed within this fishery during the 2021/22 year had protected species captures).

Table 37. Summary of commercial effort, observer effort and protected species interactions in the fisheries during the 2021/22 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird captures	Seabirds /100 tows
1. AKE	463	82	17.7	8	9.76
2. CEE	21	-	-	-	-
3. SEC	-	-	-	-	-
4. SOE	-	-	-	-	-
5. SOU	-	-	-	-	-
6. SUB	-	-	-	-	-
7. CHA	4	-	-	-	-
8. CEW	28	-	-	-	-
9. AKW	-	-	-	-	-
Total	**516**	**82**	**15.9**	**8**	**9.76**

Table 38 reports the number of interactions in the purse seine fisheries by species and fate immediately post interaction. Net capture accounted for 100% of the interactions.

Table 38. Protected species interactions in the purse seine fisheries during the 2021/22 observer year.

Species	Alive	Dead	Total
Common diving petrel	4	3	7
Fluttering shearwater	-	1	1
Total	**4**	**4**	**8**

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, and enables 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. These portals minimise bycatch by increasing the likelihood of undersized and non-target species escaping the net. 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 sixth year PSH has been reported on.

Table 39 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2021/22 observer year. PSH fishing effort in both mid and bottom trawl increased by 36.8% in the 2021/22 year in comparison to the year prior (McGovern & Weaver 2022). Overall observer coverage in this fishery decreased by 11.4% since the previous year (2020/21).

The number of seabird interactions decreased by 37.5%, from 16 observed interactions in 2020/21 to 10 observed interactions in 2021/22 (McGovern & Weaver 2022). Coral bycatch decreased from 5.2 kg (2020/21) to 1 kg in the 2021/22 observer year (McGovern & Weaver 2022).

In summary, eight observed trips were conducted aboard five vessels, with protected species captures occurring on two of these trips aboard two vessels (25% of these trips involved protected species captures and 40% of vessels that were observed within this fishery during the 2021/22 year had protected species captures).

Table 39. Summary of commercial effort, observer effort and protected species interactions in the PSH fishery during the 2021/22 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird captures	Seabirds /100 tows	Coral catch (kg)	Coral catch /100 tows
1. AKE	1,305	106	8.1	3	2.83	1.0	0.94
2. CEE	42	-	-	-	-	-	-
3. SEC	346	150	43.4	3	2.00	-	-
4. SOE	184	73	39.7	4	5.48	-	-
5. SOU	-	-	-	-	-	-	-
6. SUB	1	-	-	-	-	-	-
7. CHA	94	93	98.9	-	-	-	-
8. CEW	120	-	-	-	-	-	-
9. AKW	266	-	-	-	-	-	-
Total	**2,358**	**422**	**17.9**	**10**	**2.37**	**1.0**	**0.24**

Table 40 reports the number of interactions by species and fate immediately post interaction.

Table 40. Protected species interactions in the PSH fishery during the 2021/22 observer year.

Species	Alive	Dead	Total
Albatrosses (Unidentified)	1	-	1
Great albatrosses	1	-	1
Petrels, Prions and Shearwaters	4	-	4
Salvin's albatross	-	4	4
Total	**6**	**4**	**10**

Table 41 details the method of interactions for each species released alive. The four Salvin's albatross that died due to the interaction were caught in fishing gear.

Table 41. Method of interaction for observed protected species released alive in the PSH fishery during the 2021/22 observer year.

Species	Brought on board	Impact against vessel	Total
Albatrosses (Unidentified)	-	1	1
Great albatrosses	1	-	1
Petrels, Prions and Shearwaters	-	4	4
Total	**1**	**5**	**6**

Troll - Albacore

The troll fishery in New Zealand targets albacore tuna over the summer period (December – May), primarily on the west coasts of the North and South Islands. Roughly 90% of albacore tuna caught in New Zealand are caught using this method. Vessels in the fishery are typically 12-24 m in length, operating with crews of two to five. Being seasonal, albacore fishing usually forms one of several fishing activities for the vessels involved.

Commercial albacore trollers in New Zealand tow 12-18 lines simultaneously from the vessel's stern and from long outrigger poles mounted amidships. The line lengths or depths are adjusted to permit hauling of any one line without tangling or interfering with the others.

Observer coverage in this fishery has occurred opportunistically in the past.

In summary, one observed trips was conducted aboard one vessels with no protected species captures occurring.

Pot fisheries- Ling

Pot fishing can present many advantages to other fishing methods in its ability to reduce bycatch and impact on the seafloor. Whilst its use in fisheries such as rock lobster (and many other species) is well established, the potting method has also proven to be a viable harvesting method for the large bottom-dwelling fish ling. There is interest in this method being utilised for further target species also e.g., scampi, gurnard and rig.

Observer coverage in the pot fishery has occurred sporadically in the past alongside set net coverage. Interactions with seabirds and marine mammals are relatively low, though pot lines can create an entanglement risk. There are no current mitigation methods for this fishery.

In summary, one observed trip was conducted aboard one vessel, with no protected species captures occurring.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $2,433,951. Services were provided by Fisheries New Zealand Observer Services.

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Hjorvarsdottir, F. & Isaacs, R. 2018. Conservation Services Programme Annual Research Summary 2016-17. Report prepared by the Conservation Services Programme of the New Zealand Department of Conservation, Wellington. 91p.

McGovern, H. & Weaver, S. 2022. Conservation Services Programme Annual Research Summary 2020-21. Report prepared by the Conservation Services Programme of the New Zealand Department of Conservation, Wellington. 85 p.

2.2 INT2019-02 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 DNA analysis, 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).
5. 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 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 most 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 a lower cost than returning carcasses and performing necropsy. To maximise cost efficiencies 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). A new addition to this protocol is the collection of feather samples from bycaught seabirds to allow genetic determination of identification for difficult species groups.

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

Information gained through this project will link to Fisheries NZ databases, seabird bycatch estimates, and will inform ongoing risk assessment, research and modelling of the effects of fisheries bycatch on seabird populations. Further, the mode of capture and associated information will enable robust

analyses to be made of the factors contributing to seabird capture events and inform the development of appropriate mitigation strategies.

Project status

Complete.

Summary of the methods and key findings

Between 1 July 2021 and 30 June 2022, a total of 568 seabirds were reported as incidental interactions with commercial fishing vessels by on-board New Zealand Government Observers; of these 242 seabirds were returned for necropsy, and 326 were recorded as interactions (photographed (n = 144) or non-photographed (n = 182)) as deceased or alive captures. 242 individual seabirds, grouped into 23 species, were killed incidentally as bycatch and returned for necropsy. Seabirds were returned from 45 individual vessels, comprised of 12 longline (n = 98 seabirds), 28 trawl (n = 118 seabirds), two purse seine (n = 6 seabirds), and three set net (n = 20 seabirds) vessels, and were dominated numerically by four bycatch species: white-chinned petrel (n = 83, 34.3%), Buller's albatross (n = 33, 13.6%), New Zealand white-capped albatross (n = 25, 11.3%), and Salvin's albatross (n = 21, 8.7%). These four species accounted for 66.9% of all returned seabirds. All birds returned from longline fisheries had injuries consistent with being hooked in the bill, throat, or wing. Most birds returned from trawl fisheries were caught through entanglement in the net, cod-end, or pound (66.1%), with 15.2% likely to have specifically interacted with the warp. The cause of death for seven birds was deck strike on trawl vessels. Birds had a lower mean body fat score in comparison to birds from the previous three survey years. Discards, including offal, appear to continue to be an attractant for many seabirds. In addition to the seabirds that were returned for necropsy, examination of the Ministry for Primary Industries (MPI) Central Observer Database (COD) and images provided by Government Observers gave a total of a further 326 seabirds that were reported as interactions or photographed (as dead or alive captures) aboard 52 fishing vessels. Over half (54%) of the seabirds reported in these interactions and photographs were released alive. Out of these 326 records of seabird interactions, photographs were taken of 144 seabirds consisting of 16 species. Image quality had improved compared to previous reporting periods.

Recommendations

1. Wherever possible, all seabird interactions are photographed and recorded. If possible, haul and sample information should be included in the image.
2. 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.
3. Photo logs are completed for all images (which can be correlated to date and time stamps from the camera). Cameras are programmed to show correct date and time. Descriptions of the interaction would also help with the identification and matching of images.
4. Photograph numbers are recorded on the observer non-fish bycatch form.
5. Photographs (and extracts from the MPI observer logbooks) are provided regularly throughout the fishing year for photo-identification.
6. Training and instruction on the use of the cameras and on how to take suitable photographs for identification use (i.e. number of images, type of images, date, and time stamps etc.) is provided for all observers.

Project logistics summary statement

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

Review milestones

- Draft final report for 2021/22 made available on the CSP webpage in June 2023
- Final report for 2021/22 made available on the CSP webpage in July 2023

Citation

Bell, E. & Larcombe, S. 2023. Identification of seabirds caught in New Zealand fisheries, 1 July 2021 to 30 June 2022. INT2019-02 final annual report prepared by WMIL for the Conservation Services Programme, Department of Conservation. 38 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/int2019-02-identification-of-seabirds-caught-in-nz-fisheries-1-july-2021-30-june-2022-final-report.pdf

2.3 INT2019-04 Identification and storage of cold-water coral bycatch specimens

Project objectives

1. Identify coral bycatch that cannot be identified by fisheries observers to the finest taxonomic level (assign codes to coral specimens to the species level wherever possible, when this is not possible; identify specimens to genus or family level).
2. Record all identified coral specimens and ensure storage in an appropriate taxonomic collection.
3. Update coral identification information for Fisheries Observers.

Rationale

The 2010 amendment of Schedule 7A of the Wildlife Act 1953 protects all hard corals, including: black corals (all species in the order Antipatharia); gorgonian corals (all species in the order Alcyonacea (previously known as Order Gorgonacea)); stony corals (all species in the order Scleractinia); and hydrocorals (all species in the family Stylasteridae). Identifying coral bycatch that cannot be identified by 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.

This project will improve the ability of observers to identify protected corals and so improve the quality of data collected. 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

Between 1 July 2021 and 30 June 2022, a total of 54 physical specimens in 48 samples were collected by Observers and returned for identification during the reporting period. Sub-samples from each live specimen were taken for future genetic studies (n=32) not all specimens had sufficient live tissue for subsampling. Additionally, there were four historical physical samples (five specimens) collected by Observers with revised higher-level identifications made during the reporting period. A total of four research trawl collected specimens in four samples are also reported here. Corrected identifications (where the Observer identification is revised by a coral expert), have been made where necessary in the COD database, with both the original and amended identifications retained. All raw data extracts are provided in the Appendices and as separate excel files. There were 290 specimens identified from digital images of catch reported as coral during the reporting period; 170 were protected coral taxa, and while Observers provided a label showing trip and tow number information for only 88 of the 273 processed images, all images were able to be georeferenced. The remaining 120 specimens were of non-protected corals or other non-coral taxa. Data summaries of protected coral by-catch occurring in New Zealand region fisheries are presented by Fisheries Management Areas (FMA), fishing method, and target fishery. The greatest number of protected coral specimen counts by images came from the

South-East (SOE, FMA4) and South-East Coast (SEC, FMA3) regions. Most were taken by bottom trawl operations targeting the deep-sea species orange roughy and hoki. Similarly, most protected corals identified from physical specimens came from Auckland West (AKW, FMA9) bottom trawl operations targeting orange roughy.

Recommendations

Digital Images need to be taken with a label that includes trip and station data, and the coral specimen, or a sub-sample of the specimen, the MPI number, and a species code. This information helps experts verify the identification. Over time, standardised easy-to-use pre-printed labels for Observers to include in photographs should improve this process and hence the accuracy of accompanying metadata.

The MPI sample number and the initial Observer three-letter identification code are crucial components in the data matching process used for updating the COD database with the expert ID of the physical specimens. he initial MPI sample number and three-letter code written on the specimen label corresponds to the sample number and code used on the benthic form. If Observers decide to change their identification code later while filling out electronic or paper catch forms, we ask that they please provide a comment in the benthic form if they are not able to amend the specimen labels to match the benthic forms. The observer comments are extremely valuable where a match cannot be made with sample numbers or codes alone.

It is important that original digital image file names are retained and not over-written or completely changed from what is held on file by Fisheries New Zealand (FNZ). The removal of the original image file name means that the link between the original image and any further expert identification is lost.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $60,000 per annum over three years.

Review milestones

- Draft final report for 2021/22 made available on the CSP webpage in June 2023
- Final report for 2021/22 made available on the CSP webpage in July 2023

Citation

Mills, S., Connell, A., Macpherson, D., Tracey, D. 2023. Identification and storage of cold-water coral bycatch specimens. INT2019-04 final annual report prepared for Conservation Services Programme, Department of Conservation. NIWA Client Report 2023073WN. 51 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/int2019-04-identification-and-storage-of-cold-water-coral-bycatch-specimens-1-july-2021-30-june-2022-final-report.pdf

2.4 INT2020-02 Identification of marine mammals, turtles and protected fish captured in New Zealand fisheries

Project objective

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), and their mode of capture.

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 Fisheries New Zealand 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 project is designed to complement the existing seabird and coral identification projects. Observers routinely collect samples of genetic material from these taxa, these can be used to resolve uncertain identification determinations from photographs.

Project status

This is a multi-year project that is due for completion in December 2023. 2020/21 and 2021/22 reporting are complete.

Summary of the methods and key findings

Marine mammals

There were 115 marine mammal bycatch events reported by observers between 1 July 2021 to 30 June 2022. Of these events, 72 (63%) had either photos or videos that could be assessed to confirm taxa identification and other information. The remaining 43 (37%) events had no photos associated with them and were therefore not able to be assessed. Taxa identification by observers was confirmed as correct in almost all events where reasonable quality photos were available. The only exception to this was the expert identification of a WHT (dolphins and toothed whales [unidentified]), which was identified by the observer as WHU (whale unspecified).

Protected fishes and reptiles

There were 13 protected fish and reptile bycatch events reported by observers between 1 July 2021 to 30 June 2022. Of these events, 8 (62%) had either photos or videos that could be assessed to confirm taxa identification and other information. The remaining 5 (38%) events had either poor quality photos, or no photos at all associated with them, and were therefore not able to be assessed. Taxa identification by observers was confirmed as correct all events where reasonable quality photos were available**.**

Recommendations

- Observers did an excellent job identifying marine mammal species caught as bycatch; the only potential improvement would be to identify individuals to a higher phenotypic resolution

when good taxonomic resolution is not possible (e.g. a toothed whale vs a whale in general), and to provide photographic evidence of length measurement and genitals.

- Consider reviewing the accuracy of observer records is genetic testing of observer-collected tissue samples. The benefit of taking genetic samples is that they would verify all of the identification, sex and age data.
- It would be useful to review the observer protocols for the collection of photos to ensure they are up to date and provide the required information. Further photographic training and solutions to the limitations that exist aboard vessels should be sought (e.g. addressing lighting conditions, shiny surfaces / glare).
- Any notes and descriptions of sex identification methods should be reviewed and updated where necessary, especially for female sex determination.
- If a marked individual (i.e. flipper tags or other identifying marks) is caught, it is essential that details of the mark are recorded. The observer should take several high-quality photos of the mark, and if there is more than one mark (e.g. two tags or a tag and a brand) then they should take separate photos of both marks. The observer should attempt to read and confirm the mark and then record that on their data sheet. Ideally, provenance flipper tags are removed from the individual (and replaced with a capture tag) and returned ashore for confirmation.

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

- Marine mammals draft final report for 2021/22 made available on the CSP webpage in September 2023
- Marine mammals final report 2021/22 made available on the CSP webpage in September 2023

Citation

Johnston O, Pavanato, H. (2023). Identification of marine mammals captured in New Zealand fisheries 2021-22. INT2020-02 final report prepared by Cawthron Institute for the Department of Conservation. 25 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/int2020-02-identification-of-marine-mammals-captured-in-nz-fisheries-2021-22-final-report.pdf

2.5 INT2021-02 Characterisation of protected coral interactions

Project objectives

1. To improve our understanding of the current extent and variation of protected coral bycatch across multiple fisheries and fishing methods.
2. To improve our understanding of the risks of fishing to protected coral groups and how those risks vary temporally and spatially.
3. To inform focus areas / fisheries for mitigation efforts.
4. To inform development of a risk assessment.

Rationale

This project seeks to collate available protected coral bycatch records to update and improve our understanding of where various coral groups and taxa are caught, and which fisheries, fishing methods and areas pose the highest risk to corals.

Project status

Complete.

Summary of the methods and key findings

This study focused on analysing the spatio-temporal distribution of observed coral captures in New Zealand's commercial fisheries between the 2007–08 and 2019–20 fishing years. The majority (99%) of reported coral catch was attributed to bottom trawl fisheries. The study specifically examined trends in protected coral species groups, including black corals, gorgonians, lace corals, and stony corals.

The evaluation of coral bycatch data and presence-absence data suggests that stony corals are the most commonly reported group of corals in observed bycatch within and outside the Exclusive Economic Zone (EEZ), with lower occurrences in observed bycatch of the other coral groups. Further, stony corals are predominantly caught in bottom trawl fisheries that target orange roughy in the North-East Chatham Rise region. The analysis of stony coral catch weights did not reveal a clear pattern over the assessed period, although the first three years stood out with particularly high reported catch weights. However, caution is necessary when interpreting these findings due to inconsistent methods of determining catch weights.

Recommendations

The study suggests that for reporting purposes, the current grouping of protected coral species into stony corals, black corals, lace corals, and gorgonians is adequate to assess coral fisheries interactions broadly at a high taxonomic level. However, further differentiating of stony corals into stony cup corals and stony branching corals could be useful, as the latter have higher catch rates within bottom trawl fisheries. Further, disaggregating the stony coral group revealed that branching corals were typically caught within Fishery Management Areas (FMAs) 6 and 9, while cup-forming corals were typically caught within FMA 4.

The research also demonstrates the limitations of using catch weight as a proxy measure of the impact of fishing on coral habitats; large coral captures are often subjectively estimated, and the accuracy of reported catch weights is questionable. Therefore, catch weight is not considered a reliable indicator of fishery impact on coral communities. We suggest assessing the risk of commercial fishing on corals based on presence-absence data of coral captures.

Furthermore, while the analysis of presence-absence data can help identify risk areas of coral catch in commercial fisheries, it does not provide a comprehensive measure of the actual impact on coral communities. Factors such as habitat destruction, physical damage, and post-capture mortality should be considered. The study emphasizes the need for standardized protocols for determining coral catch weights and exploring alternative indicators that capture the broader ecological implications of fishing on coral habitats.

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 over one year.

Review milestones

- Draft final report made available on the CSP webpage in June 2023
- Presentation of findings to the CSP Technical Working Group on 8 June 2023
- Final report made available on the CSP webpage in September 2023

Citation

Meyer, S. 2023. Characterisation of protected coral interactions. INT2021-02 final report prepared by Proteus for Conservation Services Programme, Department of Conservation 173 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/int2021-02-characterisation-of-protected-coral-interactions-final-report.pdf

2.6 INT2021-03 Review of commercial fishing interactions with marine reptiles

Project objectives

1. Characterise commercial fishery interactions with marine reptiles, particularly sea turtles, within New Zealand fishery waters.
2. Report on total numbers of captures and fate of bycaught marine reptiles by species, fishery, and year.
3. Identify species most at risk from commercial fishing and fisheries with the highest observed or reported catches of marine reptiles.

Rationale

Five species of sea turtle and three species of sea snake are recorded from New Zealand waters. All are protected under the Wildlife Act 1953. All Pacific populations of sea turtles are considered threatened or endangered. Leatherback and green turtles are the marine reptiles most frequently reported as bycatch in commercial fisheries, reflecting the higher frequency and duration of their occurrence in New Zealand waters. Satellite tagging has shown that adult leatherback turtles migrate directly from breeding beaches in the tropical southwest Pacific to offshore areas of high planktonic productivity off northern New Zealand and may remain in or close to New Zealand waters for more than a year. In contrast, juvenile green turtles recruit to coastal habitats, harbours, and rocky reefs in Northland from the pelagic phase and potentially remain in New Zealand waters for up to five or six years before migrating to adult habitats in tropical regions. The last review of bycatch of marine reptiles was conducted in 2016 and covered the period 2008 to 2015. This report found that in some years turtle bycatch in surface longlines fisheries exceeded the minimal marine turtle interaction rate recommended by the Western and Central Pacific Fisheries Commission.

Project status

Complete.

Summary of the methods and key findings

Between 2007–08 and 2020–21, there were a total of 273 reported captures of turtles, an average of 19.5 per year, and one capture of a sea snake. Of these, 49 were recorded by Ministry observers. In commercial fishing returns, five species of turtles were reported, with leatherback being the most frequently captured (n = 217; 79.5%), following by green turtles (n = 25; 9.2%). In the observed records, 37 (76%) were leatherback turtles. Most captures, across all species, were made in the surface longline fisheries targeting bigeye tuna or swordfish in FMA 1 (northeast North Island), where such fishing effort was also greatest, largely between January and April. The single sea snake, a banded sea krait, was caught during bottom longline fishing targeting tarakihi. The turtle captures varied between 2–34 per year until 2020–21, when they increased to 58.

For the main turtle capture area and season, FMA 1 and January to April inclusive, between 2007–08 and 2020–21, most of the reported turtle captures (86.6%) were made by vessels which did not have an observer aboard. Of the 53 vessels in the selected fishery, 10 (18.9%) had reported turtle bycatch, and just five of the 10 reported 90.7% of the turtle captures, with one vessel alone reporting 38.7% of all captures. This vessel was only observed in 2020, when it accounted for 33.0% of the observed events, and 2021, when it accounted for 47.3% of the observed events. That observers were on this

vessel in 2021, and the times and places that it fished, may partially explain why the observer turtle capture total was so much higher in 2020–21.

Evaluation of the environmental variables and the captures of leatherback turtles suggested the primary influence on turtle capture was likely to be water temperature, followed by frontal zones, ocean currents, and water clarity, with primary productivity having relatively little influence. Leatherback turtle captures were predicted to be most likely when sea surface temperatures were between about 14–22°C, when subsurface temperature at 200m was relatively warm, in the first two-thirds of the calendar year, when the mixed layer depth was relatively shallow, when time varying eastward currents were either negative or relatively strong, at latitudes south of about 42°S (i.e., west coast South Island), and when vessels were targeting swordfish.

Recommendations

Overseas recommendations propose that an achievable turtle capture rate (all species combined) should be less than 0.019 turtles per 1000 hooks for surface longline fisheries. Averaged between 2008 and 2021, leatherback turtle capture rates alone were at least 0.019 turtles per 1000 hooks in FMA1 between January and April.

A previous iteration of this work provided recommendations to better monitor marine reptile captures in New Zealand and to date, little progress has been made on any of these. It is highly recommended that these proposals are adopted, including the implementation and monitoring of a minimal sea turtle interaction rate; guidelines to reduce sea turtle mortality; revision of observer coverage allocation; improved data quality and reporting; and improved population information and research.

Additional recommendations made here include the implementation of set capture limits (absolute captures) rather than catch rate limit, further collection of biological information, improved estimation of capture rates through communication with skippers, and further investigation of alternative data sources.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $33,000 over one year.

Review milestones

- Draft final report made available on the CSP webpage in June 2022
- Presentation of findings to the CSP Technical Working Group on 21 June 2022
- Final report made available on the CSP webpage in July 2022

Citation

Dunn, M.R.; Finucci, B.; Pinkerton, M.H.; Sutton, P. 2022. Review of commercial fishing interactions with marine reptiles. INT2021-03 final report by NIWA for Department of Conservation. 78 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/int2021-03-review-of-commercial-fishing-interactions-with-marine-reptiles-final-report.pdf

2.7 INT2021-04 Collection and curation of tissues samples from protected fishes and turtles

Project objectives

1. To provide co-ordinated storage and curation of tissue samples collected from protected marine fishes and sea turtles by researchers, fishery observers and fishers.
2. To ensure all relevant meta-data is associated with each sample, that samples are accessible to bona-fide researchers, appropriate cultural controls on the use of samples are in place, and that the use of samples and publications arising from their use are tracked.

Rationale

Biological sampling or retention of carcasses of protected species taken as incidental bycatch in commercial fisheries can be difficult particularly for large pelagic species such as basking sharks, great white sharks, devil rays and some turtles. In addition to operational constraints, health and safety considerations can make examination or necropsy of dead animals difficult or impossible. However, genetic and stable isotope analyses that use small tissue samples can provide valuable information on population structure, connectivity and size, and habitat preferences and feeding ecology, respectively.

Project status

This is a multi-year project due for completion in June 2024. 2021/22 reporting complete.

Summary of the methods and key findings

The Protected Species Tissue Archive (Fishes and Turtles) is currently held at Tāmaki Paenga Hira Auckland War Memorial Museum in collaboration with the Department of Conservation. This Tissue Archive is an expansion of project INT2018-04 (Improving the collection of data and samples from bycatch basking sharks; Francis 2019, Finucci et al. 2021), through archiving and providing access to samples from protected fishes and turtles. Ninety-five sample vials are currently held from 55 individuals. Samples from only one individual turtle were received through the MPI observer program, the remaining samples were received from Department of Conservation staff and NIWA. Forty new sampling kits were produced and a further 50 sampling kits previously held by the MPI observer program were improved and restocked. Development of Traditional Knowledge and Bicultural Notices is ongoing.

Only one sample was received in the current year from the fisheries observer program. This represents a missed opportunity to collect samples that would allow ongoing genetic monitoring of protected species populations.

Recommendations

- Expansion of the archive to include other protected species.
- Expansion of the storage of tissue collections from -20°C ethanol preserved to include -80°C storage of tissues (both fresh and ethanol preserved).
- Where possible deposit voucher specimens in museum collections to allow for samples in the tissue archive to be connected to a physical specimen that can be examined into the future.
- Examination of ways to facilitate the collection of tissue samples from protected species bycatch.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $22,000 per year over three years.

Review milestones

- Establishment report for 2021/22 made available on the CSP webpage in December 2022.

Citation

Bray, R. 2022. Establishment Report – collection and curation of tissue samples from protected fishes and turtles. INT2021-04 establishment report prepared by Auckland War Memorial Museum for Department of Conservation. 19 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/int2021-04-collection-and-curation-of-tissues-samples-from-protected-fishes-and-turtles-establishment-report.pdf

3. Population Projects

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

Project 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 Vulnerable (Baker et al. 2019) and are incidentally killed each year in 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 (Chilvers et al. 2005), and a Quantitative Risk Assessment of threats to the species found that the two most significant threats to the recovery of the species were *Klebsiella pneumoniae* mortality and commercial trawl-related mortality (Roberts & Doonan 2016).

Approximately 70% of New Zealand se3a lions breed at the Auckland Islands, where population data has been collected since the mid-1990s, including annual 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 (Campbell et al. 2006; Chilvers et al. 2007). CSP project POP2012-02 analysed population data to determine the key demographic factors driving the observed population decline of New Zealand sea lions at the Auckland Islands. This analysis 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 Auckland Islands population (Roberts et al. 2014). A literature review to identify potential indirect effects of commercial fishing on the Auckland Islands population as part of CSP project POP2010-01 highlighted several key information gaps that prevent a full understanding of any such effects, including time series data of population dynamics (Bowen 2012).

In response to the continued decline at the Auckland Islands, the Ministers of Conservation and Primary Industries published a Threat Management Plan (TMP) for New Zealand sea lions in 2017. POP2018-03 is designed to collect NZ sea lion pup count information required to manage the impact of commercial fishing on the Auckland Islands population. It is envisaged that other research and management actions, will be progressed as part of the TMP, and may be delivered alongside the CSP research programme to provide logistical synergies.

Project status

Complete.

Summary of the methods and key findings

Five days of fieldwork were completed on the Auckland Islands, from 6 to 10 January 2022, which allowed for mark-recapture estimates and direct counts of sea lion pups on Enderby, Dundas, and Figure of Eight Islands. However, the timing of the research was c. 10 days earlier than standardised counts due to vessel availability, and, therefore, not all pups had been born when counts occurred. Additional tasks, including incidental tag resightings and assessment of alternative materials for mark-recapture marking of pups were undertaken.

Total pup production for the Auckland Islands was estimated at 1686 ± 51.4 pups (mean ± 1SE), which includes an adjustment to account for the early date of the counts, and 43 pups found dead at the time of counts. This figure is approximately 1.9% higher than the sum of mean direct counts and mark-recapture estimates without adjustment (minimum estimate = 1617 ± 49.4 pups). Both the adjusted and minimum estimates were higher than the minimum target of 1575 pups set in the New Zealand sea lion Threat Management Plan (DOC and MPI 2017), and both are considered to be underestimates of this year's pup production, due to the lack of cumulative dead pup count data from Enderby and the use of direct count methods (rather than mark-recapture) on Dundas Island. Based on these estimates, Auckland Islands pup production has remained stable since 2009.

Due to logistical and funding limitations, the last three seasons have not delivered the quality data necessary to support a robust analysis of pup and female survival, including pup morphometrics, flipper tagging and transponder insertion, and structured daily resighting effort for tagged animals. While the five-year TMP objective to 'halt the decline' of the New Zealand sea lion has been achieved, without continued mark-resight surveys there will be significant data deficiency which will limit our ability to analyse demographic trends and effectiveness of interventions to grow the population.

Recommendations

It is imperative that a full season of subantarctic fieldwork be conducted in 2022/23 so that New Zealand sea lion population and demographic research, as well as research on interventions to improve survival of pups, can be implemented and assessed.

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 per annum over four years.

Review milestones

- Final results for 2021/22 presented at the CSP TWG meeting on 19 May 2022
- Final report for 2021/22 published on the CSP website in September 2022

Citation

Young MJ and Manno K (2022). Auckland Islands 2021/22 New Zealand sea lion field research report: Conservation Services Programme pup count. Department of Conservation, Dunedin. 35 pp.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/pre-2019-annual-plans/pop2018-03-nz-sealion-auckland-islands-pup-count-final-report.pdf

3.2 POP2019-04 Southern Buller's albatross: Snares Islands/Tini Heke population project

Project objective

To estimate key demographic parameters of Southern Buller's albatross at the Snares.

Rationale

The Conservation Services Programme Seabird medium term research plan (CSP seabird plan) 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 involving the estimation of key demographic parameters of Southern Buller's albatross at the Snares. An established study site for Southern Buller's albatross, with substantial historic mark-resight effort, exists at the Snares (Sagar 2014), one of the most accessible subantarctic island groups. Information involving demographic parameters have been collected at the three study sites annually since 1992.

Project status

This is a multi-year project that is due for completion in March 2023. 2020/21 and 2021/22 are complete.

Summary of the methods and key findings

Demographic studies at the three study colonies on North East Island have been undertaken annually from 1992 to 2022, with the exception of 2018 and 2021, and so this report incorporates some of these data in the current analysis. Estimates of the numbers of breeding pairs, made by recording the contents (chick, egg or egg fragments) of each nest mound, increased in two of the three colonies to over the numbers recorded during 2020 to be at all-time highs for the 30-year duration of the study. With the assumption that the combined total number of breeding pairs in the three study colonies was representative of North East Island as a whole, and notwithstanding the maximal counts in two of the study colonies recorded in 2022, then the breeding population probably peaked around 2005–2006 and has since undergone marked annual variations.

A total of 379 birds were recaptured that had been banded previously in the study colonies as breeding adults of unknown age. A further 137 breeding birds were banded in the study colonies – these are presumed to be first-time breeders – during the latest 2022 survey. Estimates of annual survival of birds banded as breeders continued to decline, with estimates close to 0.9, or lower, in recent years. During the period 1992–2004 all chicks that survived to near-fledging in the study colonies were banded and their survival to return to the study colonies in subsequent years has been monitored. In 2022, 139 of these birds were recaptured, with birds from cohorts banded from 1996 to 2004 being recaptured for the first time. This demonstrates the long-term monitoring required to obtain reliable estimates of survival of such known-age birds. Of these recaptured 139 known-age birds, 11 were found breeding for the first time, and so were recorded as being recruited to the breeding population. In addition, three birds that had been banded as near-fledging in the study colonies during September 2013 and September 2014 were also recaptured for the first time.

In 2020, 50 Global Location Sensing (GLS) tags were attached to the metal leg bands of breeding birds in the Mollymawk Bay study colony; of these, 31 were retrieved, and a further 7 recorded as being lost, during the 2022 field season.

Twelve trail cameras were deployed at breeding colonies during the 2022 fieldwork: 11 set to record one photograph every hour during daylight, and one set to record 30 seconds of moving images daily, until they are retrieved in April 2023.

Recommendations

- Continue acquiring recapture data for breeding birds at the three study colonies to confirm that adult survival is at levels that would, over the long-term, result in a declining population trajectory, and to reduce the uncertainty around recent estimates of adult survival resulting from no recapture data for two years when the population was not visited.
- A more comprehensive re-modelling approach could be applied to the entire data set to estimate parameters other than adult survival. A re-run of the modelling undertaken by Francis & Sagar (2012) would additionally be beneficial for future iterations of the spatially explicit fisheries risk assessment.

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 three years.

Review milestones

- Draft final report for 2021/22 made available on the CSP webpage in May 2022
- Final report for 2021/22 made available on the CSP webpage in June 2022

Citation

Thompson, D.; Sagar, P. 2022. Population studies of southern Buller's albatross on The Snares. Report for POP2019-04 for the Department of Conservation. Wellington, NIWA. 20 pp.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/201920-annual-plan/pop2019-04-southern-bullers-albatross-on-the-snares.pdf

3.3 POP2021-01 Black Petrel research

Project objectives

1. To monitor the key demographic parameters at the breeding colony of this threatened seabird to reduce uncertainty or bias in estimates of risk from commercial fishing.
2. Undertake at-sea capture of black petrels to determine proportions of banded birds and identify if current low juvenile survival rates are affected by any non-philopatric behaviour at the study colony.

Rationale

The CSP Seabird medium term research plan (CSP seabird plan) 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 project extends on demographic work funded by commercial fisheries levies and DOC/MPI since 1996. Black petrels are the species at highest risk from commercial fisheries in northern New Zealand. Continuing research on this species is necessary to gather current rates of adult mortality, breeding success, juvenile survival and recruitment until suitable mitigation methods significantly reduce the capture risk to this species.

Project status

Complete.

Summary of the methods and key findings

Land component

During the 2021/2022 breeding season 478 tākoketai/black petrel study burrows were intensively monitored within the Mt Hobson/Hirakimata study area on Aotea/Great Barrier Island.

There were 326 (68.2%) burrows occupied by breeding pairs, 92 (19.2%) occupied by non-breeding birds, and 60 (12.6%) were unoccupied. Overall, 239 chicks were produced from the study burrows representing a fledgling success rate of 73.3%.

Nine census grids were monitored within the study area and accounted for 196 of the inspected study burrows. Of these, 148 were occupied by breeding pairs (75.5%) and 102 chicks were produced representing a fledging success rate of 68.9%.

A total of 745 adults and 254 fledgling chicks were captured during the 2021/2022 field season with 107 adults banded this season (including 69 from study burrows). Of the 254 fledgling chicks banded during the 2021/2022 field season, 227 were banded in study burrows; 12 had already fledged prior to the banding visit in May 2022.

There have been a total of 386 returned chicks recaptured at the colony since they were banded prior to fledging. Of these, 124 returned chicks were identified during the 2021/2022 breeding season; 23 of which had been caught for the first time at the colony. The majority of returned chicks were from the 2013/2014 breeding season, followed by the 2010/2011 cohort). Not all cohorts were represented as no returned chicks from the 1995/1996 and 1996/1997 cohorts were recaptured this season. Understanding the factors affecting return rates of chicks within the 35-ha study site is vital. It is important to determine whether it is related to low juvenile survival and/or recruitment or if it is simply due to a lack of detection. Understanding juvenile survival and recruitment is necessary for accurate population estimates and risk assessment modelling. Therefore, it is recommended that effort to obtain this data is completed with urgency.

Preliminary monitoring of pig and other predator occurrence and impact on black petrels on Cooper's Castle was undertaken this season. Sixteen black petrel burrows were identified within the boundaries of this study area; three were breeding and one was being visited by non-breeding birds. All other burrows were empty. Trail cameras were placed along pig pathways, walking tracks and outside active black petrel burrows. Footage confirmed feral pig, rat, and feral cat presence. While no interactions with black petrels were caught on camera, there was one cat predation and one rat predation at the study colony this season. Introduced species still pose a threat to the black petrel population and it is imperative pest control measures continue.

At-sea captures

In January 2022 WMIL staff were only able to undertake a one-day catching trip out in the waters north-east of the Marotere (Chicken) Islands group, and north of the Mokohinau Islands group. Poor weather prevented a longer trip. A total of 17 black petrels were caught from the back of the boat using a hand cast net and were all un-banded birds. Additional species caught were 18 toanui/flesh-footed shearwater (Ardenna carneipes) (Threat Status - At Risk: Relict).

In March 2022 WMIL staff were able to undertake a longer three-day catching trip, targeting the same areas, but particularly north of the Mokohinau Islands group. A total of 130 black petrels were caught from the back of a boat using the same hand cast net method. This total included 5 already banded birds from WMIL study colonies on Aotea/Great Barrier Island and Te Hauturu-o-Toi/Little Barrier Island, as well as 3 banded birds from the at-sea capture work. Additional species caught and banded were 78 flesh-footed shearwater, two New Zealand storm petrel (Fregetta maoriana) (Threat Classification: Nationally Vulnerable) and one rako/Buller's shearwater (Ardenna bulleri) (Threat Classification: At Risk: Declining).

In November 2022 WMIL staff were able to undertake a two-day catching trip, targeting the same areas as previously. A total of 39 black petrels were caught using the hand cast net method. This total included 2 already banded birds from the WMIL study colony on Aotea/Great Barrier Island. Additionally, 30 flesh-footed shearwaters were also caught and banded, one of which was already banded, having been banded at a WMIL study colony on Lady Alice Island in 2017. Finally one ōi/grey-faced petrel (Pterodroma gouldi) (Threat Classification: Not Threatened) was also caught and banded.

Over all trips undertaken by WMIL (April 2021, January 2022, March 2022 and November 2022), a total of 383 seabirds were captured altogether (April 2021: n=67, January 2022: n=35, March 2022: n=211, November 2022: n=70). A total of 176 (January 2022: n=17, March 2022: n=122, November 2022: n=37) black petrels were newly banded over all 2022 trips. Including the April 2021 preliminary trial captures, a total of 241 black petrels have been caught over the cumulative 9 days (April 2021: n=55 over 3 days, January 2022: n=17 on 1 day, March 2022: n=130 over 3 days, November 2022: n=39 over 2 days). Of these, 8 were previously banded at a terrestrial colony, representing 3% of total captures. The average daily capture rate of tākoketai/black petrel for each trip is highly variable; 18 per day in April 2021, 17 per day in January 2022, 43 per day in March 2022, and 20 per day in November 2022, with the average daily capture rate of black petrels for all trips being 27. The highest average catches were in the first and last light periods of the day (7-9am and 5-7pm).

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $75,000 over one year.

Recommendations

- Trips need to be undertaken towards the start of the breeding season, i.e., mid-November through to early February, with several trips throughout the breeding season to allow WMIL staff to capture more birds.
- A large amount of bait should be taken to facilitate creating more feeding frenzies and theoretically more birds behind the back of the boat for capture.
- Future work should be clarified much further in advance to increase the success of this work particularly dealing with ever changing weather and swell conditions, COVID disruptions, moon phases, and aligning the WMIL team and the skipper's schedules.
- Undertake future work around the dimmest phases of the moon.
- Undertake work further north with either the same skipper (El Pescador Charters) or another suitable vessel (i.e., with a duckboard), to target other areas of this species range.
- Future work should budget for a team of three (minimum) to have flexible flying and accommodation costs, as well as the rising costs of diesel fuel for boat charters and covering the cost of higher bait use.

Review milestones

- Draft final report for 2021/22 made available on the CSP webpage in June 2022
- Findings for 2021/22 presented to the CSP TWG on 18 July 2022
- Final reports for 2021/22 made available on the CSP webpage in October and December 2022

Citation

Bell, E.A., Welch, M. & Lamb, S. 2022. Key demographic parameters and population trends of tākoketai/black petrels (Procellaria parkinsoni) on Aotea/Great Barrier Island: 2021/2022. POP2021-01 final report prepared by Wildlife Management International for the Department of Conservation, Wellington. 35 p.

Burgin, D. 2022. Summary report for at-sea capture work for tākoketai/black petrels 2022. POP2021-01 final report prepared by Wildlife Management International for the Department of Conservation, Wellington. 18p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/pop2021-01-black-petrel-research-final-report.pdf

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/pop2021-01-black-petrel-research-at-sea-final-report.pdf

3.4 POP2021-02 Identification of protected coral hotspots using species distribution modelling

Project objectives

1. To collate, curate and analyse cold water coral records from existing seabed towed camera transects in the New Zealand region.
2. To identify hotspots for selected protected coral species in the New Zealand EEZ using predictions from abundance-based species distribution models.
3. To better understand the historical effects of fishing on observed patterns of coral distribution and relative abundances.

Rationale

This project will focus on abundance data to identify high conservation value hotspots for protected corals across the New Zealand EEZ. This is a novel modelling approach that builds upon available regional-scale habitat suitability models to improve our knowledge of coral abundance and distribution (rather than previous presence-absence models), and our knowledge of how current and historical commercial fishing effort shapes those patterns. As the first component of the project includes collation and analysis of new seabed imagery data to inform the model, the project will also serve to audit data available for future image-based coral research. Model outputs can inform future models, risk assessments, and management strategies that consider ecological processes, coral biology, and the impact of fishing on ecosystem services provided by deep-sea corals.

Project status

This is a multi-year project that is due for completion in June 2023. 2021/22 is complete.

Summary of the methods and key findings

The first year of the project has focused on analysing and compiling faunal observation data from NIWA's Deep-Towed Image System (DTIS), that will feed into abundance-based Species Distribution Model (SDM) development in Year 2. The results will be presented to the CSP Technical Working Group in Autumn 2023.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $70,000 over year one and $40,000 over year two.

3.5 POP2021-03 Seabird population research: Chatham Islands

Project objectives

1. Collect and download data files from archival tags and trail cameras deployed in early 2021 on Motuhara Island.
2. Continue to band large sample of albatrosses and giant petrels, and GPS map nesting sites to help inform demographic parameters about these species.
3. Collect drone imagery of the colony to use for population counts.

Rationale

The CSP Seabird medium term research plan (CSP seabird plan) 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. In January 2021, an opportunity became available to carry out work on three species of albatross and petrels on Motuhara (Forty-fours), a privately owned seabird island off Chatham Islands. This work replaced other projects planned for the subantarctic islands and called off due to COVID-19 concerns. Toroa Consulting Ltd had negotiated access to Motuhara with the landowners and they approved a programme of work to attach satellite tags to albatross and giant petrels. In addition, 55 GLS tags (archival tags) were placed on a sample of breeding northern Buller's albatross. Toroa Consulting Ltd also banded a large sample of northern giant petrel chicks as well as some adults of the two species of albatrosses. Trail cameras were left in situ to collect data on breeding success of these three species in 2021. To capitalise on this programme of work a visit is required in 2022 to recover technical equipment and continue banding of adults and chicks to build a robust sample of marked birds for future demographic modelling**.**

Project status

Complete.

Summary of the methods and key findings

Field work took place in January and February 2022 after significant weather delays (original trip was planned for August and then December). All the trail cameras placed in 2021 were relocated and SD cards removed for downloading of images (1 image was taken every hour until the camera batteries ran out or the SD card filled up). Most cameras continued to work for about 9 months covering the breeding season of the northern royal albatross and northern Buller's albatross and captured the laying period for northern giant petrels in August. The cameras were refreshed with new batteries and left in situ for a second year of monitoring. The report details fledgling rates from the nests visible in the cameras and some analysis of non-breeder activity in the colony at the end of each day.

The 55 global location sensing tags (GLS or geolocaters) placed on the northern Buller's albatross in 2021 were searched for by the field team and 49 of these tags were recovered from breeding birds. A few tags had faults but most had a year of data available for later analysis of movements near New Zealand and on migration. All functioning tags were redeployed on the same birds for a second year of data collection.

During the field trip breeding birds were counted in marked study quadrats and the numbers compared with drone flights taken over the colony. Birds in study plots continued to be banded and a search was made for previously banded birds from earlier expeditions.

Recommendations

- Need to recover GLS tracking tags on northern Buller's albatross and download trail camera images in the 2022/23 summer.
- Analysis is needed of the GLS tags to determine movements and behaviour of northern Buller's albatross across the annual cycle.

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.

Review milestones

- Draft final report made available on the CSP webpage in July 2022
- Findings presented to the CSP TWG on 18 July 2022
- Final report made available on the CSP webpage in December 2022

Citation

Bell, M. 2022. Motuhara seabird research: field trip report January 2022. POP2021-03 final report prepared by Toroa Consulting Limited for the Conservation Services Programme, Department of Conservation. 12 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/pop2021-03-chatham-island-seabird-research-2022-final-report.pdf

3.6 POP2021-04 Flesh-footed shearwater population monitoring

Project objectives

1. To collect key demographic parameters of flesh-footed shearwater at Lady Alice Island/Mauimua and Ohinau Islands, especially juvenile survival and recruitment.

2. To estimate the current population size of flesh-footed shearwaters at Titi Island, Marlborough Sounds.

Rationale

The CSP Seabird medium term research plan (CSP seabird plan) 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 extends on the work initiated under POP2015-02 and continued under POP2018-04 to address priority population estimate gaps and better estimate key demographic rates of this at-risk species, including new information about juveniles. Previous reports recommended that recapture efforts of breeding adults and non-breeders need to be consistently large scale to provide a robust mark-recapture dataset. Titi Island, Marlborough Sounds, has not been monitored for shearwaters for almost a decade. A repeat survey of this sole Cook Strait breeding colony will inform recent population trends in this region.

Project status

This is a multi-year project due for completion in June 2024. 2021/22 reporting is complete.

Summary of the methods and key findings

Ohinau and Lady Alice Islands

During the 2021/22 season we monitored 261 and 302 study burrows on Ohinau and Lady Alice Islands respectively. The breeding success (burrows with an egg that produce a chick that is likely to survive to fledging) on Ohinau Island was 59%, similar to the 58% measured in the 2020/21 season. Breeding success on Lady Alice Island was 51%, which was also similar to the 48% measured in 2020/21 season. There were no detectable differences in breeding success between study and burrowscope (control) burrows, indicating no impact of handler disturbance. We were able to identify 73% of the birds in breeding study burrows on Ohinau Island and 93% in burrows on Lady Alice Island. An additional 349 and 165 flesh-footed shearwaters were banded on Ohinau and Lady Alice Island respectively.

Titi Island

Burrow transects were carried out on Titi Island to gather data for an updated population estimate for flesh-footed shearwaters known to breed on the island. It is estimated that there are a total of 528 (250 – 806, 95% CI) occupied flesh-footed shearwater burrows on Titi Island with an average burrow occupancy of 15% calculated across all colony areas. Through this transect work, it was also possible to calculate a population estimate for the tītī/sooty shearwaters (Ardenna grisea) (Threat Status - At Risk: Declining) breeding on the island. It is estimated that there are a total of 1,038 (544 - 1,533, 95% CI) occupied sooty shearwater burrows on Titi Island with an average burrow occupancy of 25%, calculated as an average across all colony areas.

The flesh-footed shearwater population estimate presented here for Titi Island is slightly higher than the previous estimate carried out by Baker et al. (2010) and Waugh et al. (2014). We conclude that our estimates are not necessarily reflective of a population increase, but more likely a result of more

in-depth and higher-quality sampling and analysis techniques giving a more accurate estimate of population sizes compared to the two previous estimates. We recommend another future population estimate be undertaken in 5 years, utilising the same methods to support long term population trend analyses on Titi Island.

Recommendations

- Population monitoring on Ohinau and Lady Alice Islands be continued with 200 breeding study burrows monitored annually over two surveys (Dec/Jan and Apr/May).
- The number of burrowscope burrows monitored annually continue to be 50 on each island.
- A survival analysis be undertaken to estimate adult survival on each island.
- There is continued, focussed effort to band and recapture as many flesh-footed shearwaters on the surface and in burrows on both islands.
- Simultaneous sample of 10 juvenile and 10 adult flesh-footed shearwaters be tracked using PTTs in April/May to determine migration routes, and any differences between adult and juvenile mortality during this period.
- This should involve undertaking plastic collection from the surface of colonies, necropsy of dead individuals found at colony sites, as well as the lavage technique, as used by Lavers et al. (2021).
- The following islands should be considered for surveys to update population estimates:
    - Green Island, Mercury Islands
    - Mauitaha, Hen and Chicken Islands
    - Wareware and Muriwhenua Islands, Hen and Chicken Islands

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 for three years.

Review milestones

- Draft final report for 2021/22 published on the CSP website June 2022
- Findings for 2021/22 presented to CSP TWG on 16 June 2022
- Final reports for 2021/22 published on the CSP website November 2022

Citation

Burgin, D., and Ray, S. (2022). Flesh-footed shearwater population monitoring and estimates: 2021/22 season. POP2021-04 final report prepared by Wildlife Management International Limited for the New Zealand Department of Conservation, Wellington. 24p.

Burgin, D. & Lamb, S. 2022. Toanui/flesh-footed shearwater (Ardenna carneipes) population estimate for Titi Island, Marlborough Sounds: January 2022. POP2021-04 final report prepared by Wildlife Management International Limited for Department of Conservation, Wellington. 23p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/pop2021-04-flesh-footed-shearwater-monitoring-ohinau-and-lady-alice-islands-2021-22-final-report.pdf

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/pop2021-04-flesh-footed-shearwater-monitoring-titi-island-2021-22-final-report.pdf.pdf

3.7 POP2021-05 Age estimation of white sharks

Project objectives

1. To estimate age and growth of New Zealand great white sharks (*Carcharodon carcharias*).
2. To associate age estimates with tissue samples of New Zealand great white sharks used for close-kin mark recapture population estimates.

Rationale

Age and growth data is essential to estimating population growth rates and can be used to estimate other important demographic parameters such as maximum age, natural mortality, and age at maturity. In addition, the 2018 assessment of the status of the Eastern Australian – New Zealand great white shark population used sex-specific parameters estimated from genetic identification of half-sibling pairs. The detection of these pairs requires knowledge of the year of sampling and age or estimated age (from length) at sampling. Although the samples used in this analysis were obtained from across the species' Australian range, none of New Zealand samples came from sharks of known age. At present there are no age-at-length data available for juvenile great white sharks from New Zealand and only a single estimate of age for an adult.

Project status

Complete.

Summary of the methods and key findings

Vertebral banding patterns and microCT imaging were used to estimate age and growth for New Zealand white sharks for the first time. Vertebrae were obtained from white sharks reported dead from sources including commercial and recreational fishing vessels, and beach cast specimens over a 30-year period (1991 to 2021). Most white shark samples were collected around the North Island and were sampled throughout the year. The final sample (n = 38) included 20 females (1.52 to 5.36 m total length, TL), 12 males (1.87 to 4.85 m TL), and six unsexed sharks (2.26 to 3.0 m TL).

Vertebrae were difficult to read, particularly when counting the narrow increments near the margin of the vertebrae from old sharks. There was strong agreement between readers for age estimates of young New Zealand white sharks, but large disagreement for older sharks. Growth was modelled for both readers separately. Nearly half of the individuals were young (1–2 years old) and only six sharks were estimated to be older than 10 years of age. One shark (1.53 m TL) had no fully formed growth bands or distinct birth band, and was likely captured shortly after birth. Maximum age estimates from the band counts for Reader 1 and Reader 2, respectively, were 30 and 45 years for males (4.85 m TL) and 19 and 44 years for females (5.36 m TL).

The preliminary work here suggests New Zealand white sharks are relatively fast growing initially, and possibly long-lived. The relationship between length and growth was found to be nearly linear for young New Zealand white sharks. White sharks are born at approximately 1.5 m TL during the summer months (January, February) and deposition of opaque banding likely occurs in the winter months (May to August). White sharks were estimated to double their birth length to 3 m TL within five years, equating to an annual growth rate of approximately 30 cm per year. This rate of growth is similar to estimates from previous studies from Australia, South Africa, and California. Growth appeared to slow at approximately 3 m in length, which may be indicative of changes in diet, movement or habitat, or a reallocation of energy from somatic growth to reproductive development (i.e., maturity). Age-at-maturity could not be assessed here because of the small sample size, particularly for large individuals. However, based on known length-at-maturity estimates, age- at-maturity may occur at 7–10 years for

males and 14+ to 22+ years for females. Additional samples of large sharks will be needed to comprehensively understand age and growth of white sharks that inhabit New Zealand waters.

Age estimates could not be validated and bomb radiocarbon dating is unlikely to provide any useful insight here because samples are unlikely to be old enough for this validation technique.

Recommendations

- Continued collection of biological sampling, particularly of larger sharks
- Investigate alterative non-lethal means of ageing
- Complete a New Zealand-Australia white shark growth study
- Assessment of vertebrae elemental composition Project logistics summary statement

Project logistics summary statement

This project was 100% crown funded. The planned cost for the project was $70,000 over one year.

Review milestones

- Draft final report published on the CSP website July 2022
- Findings presented to the CSP TWG on 18 July 2022
- Final report published on the CSP website August 2022

Citation

Finucci, B., Ó Maolagáin, C. 2022. Preliminary age estimation of New Zealand white shark (Carcharodon carcharias). POP2021-05 final report by NIWA for Department of Conservation. 50 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/pop2021-05-age-estimation-of-great-white-sharks-final-report.pdf

3.8 POP2021-06 Fur seal population estimate and bycatch analysis: Cook Strait

Project objectives

1. To identify New Zealand fur seal colonies and / or haul outs within the Cook Strait which could overlap with fisheries.
2. To increase the understanding of interactions between New Zealand fur seals and the commercial hoki fishery within this area.

Rationale

New Zealand fur seals (*Arctocephalus forsteri*) are the most frequently bycaught marine mammal in New Zealand due to spatial and temporal overlap between fur seal foraging areas and commercial fishing areas (Mattlin 1987, Rowe 2009). Despite an estimated increasing population trend overall (Baker et al. 2019), high mortality rates in the Cook Strait area may be at an unsustainable level for local colonies. The hoki trawl fishery targets this area annually from late-June to mid-September, peaking effort in July and August. A range of mitigation methods have been trialled (such as a seal exclusion device) though further research and trials are needed. To better inform mitigation options going forward it's important to know the following: which colonies, sex and age class are the most impacted, and in what season, and is the bycatch likely to have a detrimental impact on the colonies in question? The focus areas of this project target answering these questions with the end goal of making recommendations of the most appropriate mitigation options.

Project status

In progress, year one delayed due to animal ethics approval and iwi consultation on some of the methodologies.

Project logistics summary statement

This project was 100% crown funded. The planned cost for the project was $60,000 over year one and $40,000 over year two.

3.9 POP2021-07 Otago and Foveaux shag census

Project objective

To provide an updated breeding population census and assess the population trend of Otago and Foveaux shag to adequately inform risk assessment and species management.

Rationale

Endemic to Southern New Zealand coastal waters and harbours, Foveaux shag (*Leucocarbo stewarti*) and Otago shag (*Leucocarbo chalconotus*) populations are respectively 'Nationally Vulnerable' and 'At Risk - recovering'. Formerly recognised singularly as Stewart Island shag, in 2016 Foveaux and Otago shags were classified as two genetically distinct species (Rawlence et al., 2016). The last population estimates are based on data from 1981 and early 1990's respectively and urgently need updating to inform evidence-based species conservation management and risk assessment. In 2021, preliminary studies were undertaken (BCBC2020-24) to identify current colony locations and develop a methodology for conducting a population survey. The current project will build on findings from BCBC2020-24 and complete three consecutive breeding population censuses to provide a robust comparison to the previous population estimates. Both species are known to be susceptible to incidental set-net fishery pressures and breeding colony disturbance. It is also noted that, whilst not relevant to CSP levied projects, there are also emerging threats to population stability arising from areas such as indirect fisheries pressures from the expansion of aquaculture in the Foveaux Strait region and plans to increase open seas aquaculture on the East and South Coasts of the South Island in areas these shag species are known to inhabit.

Project status

This is a multi-year project due for completion in June 2023, and comprises two parts: Otago shag (Part A) and Foveaux shag (Part B). Part A is complete, Part B is in progress.

Summary of the methods and key findings

Comprehensive surveys were conducted in targeted visits of current breeding sites. Aerial photographs for Otago shag counts were taken using a drone where appropriate (six colonies) or vantage-point DSLR photographs where a drone could not be flown (one colony). Building on animal response trials in previous work, these drone overflights during the breeding season first determined the drone flight height appropriate at each site to cause minimal disturbance. Survey flights were all taken within a week of each other, at the start of the breeding season in September 2021. Photographs were stitched and counted, recording the number of apparently nesting Otago shags. To correct counts of apparently nesting shags (apparently on nest, or AON), we collected ground-truthing data assessing nest contents at one colony (Pukekura), finding that 0.74 of apparently nesting Otago shags were actually breeding at the start of September. The size of the breeding population is then calculated as the raw count of apparently nesting pairs multiplied by the nest-contents correction. Since surveys took place at the very start of the breeding season, we expect to have missed some birds yet to lay, so figures should be understood as minimum breeding population estimates. The breeding colonies ranged in from the small southern colony at Kinakina Isl (estimated 32–33 breeding pairs) to the very large colony at Sumpter Wharf comprising some 504 breeding pairs (best estimate; range 496–511). The Otago shag population estimate—at least 1,275–1,332 breeding pairs at the start of the 2021 breeding season—is roughly similar to the last whole-population count in 2007. Despite different methods used, we believe this comparison is reasonable because independent counts of five

colonies in 2021, using the vantage-point methods of earlier work, gave comparable numbers to our estimates from aerial photographs. However, for re-assessment of population trends to be robust the population size estimate should first be repeated, considering the 15-year interval since the last regular colony counts and the unknown population dynamics in that interval.

Recommendations

- Repeat the population estimate to allow robust re-assessment of the current trend status in the Otago shag breeding population size.
- Otago shag population size estimate to be repeated at regular intervals over time to monitor the population's trend.
- Improve the accuracy of estimates and reduce potential biases and reliance on assumptions by considering photographic timing, occupancy and detection rates.

Project logistics summary statement

This project was 100% crown funded. The planned cost for the project was $60,000 over two years ($20,000 year 1 and $40,000 year 2)

Review milestones

- Draft final report for Otago shag published on the CSP website May 2022
- Final report for Otago shag published on the CSP website August 2022

Citation

Parker, G.C.; Rexer-Huber, K. 2022. Otago shag population census. Report for POP2021-07 for the Department of Conservation. Dunedin, Parker Conservation.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/pop2021-07-otago-shag-breeding-population-size-2021.pdf

3.10 POP2021-08 Assessment of causes of low burrow occupancy rates in Westland petrels

Project objective

To provide an updated breeding population census and assess the population trend to adequately inform risk assessment and species management.

Rationale

The CSP Seabird medium term research plan (CSP seabird plan) 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. Westland petrels only breed on the West Coast of the South Island at Punakaiki. The species is bycaught on commercial longlines and is rated as a medium-high risk species from commercial fishing activity. Uncertainty around current levels of burrow use and occupancy rates by breeding birds has affected population estimates for this species. These rates vary between different studies but are typically half those observed in other closely related species. The status of the birds maintaining burrow sites but not apparently breeding in them is still unclear. A large pool of non-breeding birds, especially of one sex, may have implications for the risk assessment modelling for this species in terms of total population size estimates. The movements of birds outside the breeding season and especially younger age classes are still a significant gap in our knowledge of this species.

Project status

In progress, this is a multi-year project that is due for completion in June 2023.

Project logistics summary statement

This project was 100% crown funded. The planned cost for the project was $60,000 for year one and $40,00 for year two.

4. Mitigation Projects

4.1 MIT2020-01 Hook-shielding use in the surface longline fishery

Project objectives

1. Facilitate ongoing use of hook-shielding devices in the surface longline fishery.
2. Assess the operational and bycatch reduction effectiveness of hook-shielding devices used in the surface longline fishery.

Rationale

Surface longline fisheries in New Zealand pose a bycatch risk to a range of seabird species, and implementation of highly effective mitigation has continued to be challenging (for example developing effective yet practical tori line designs for small vessels, and safety concerns regarding some line weighting options). Hook-shielding devices represent a new, stand-alone, mitigation option for hook setting in pelagic longlines, and is recognised globally as a best practice mitigation option. These devices physically protect the barb of the hook until it has sunk below the reach of seabirds. As a stand-alone method, it overcomes the difficulties encountered in deploying effective traditional mitigation options such as tori lines and line weighting. This project forms part of a Government supported roll-out of Hookpods, currently the only proven and available hook-shielding device, to the domestic surface longline fleet to address the bycatch risk posed during hook setting.

Project status

Shipping and technical issues delayed delivery of new Hookpods, support for implementation rephased into 2022/23.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $110,000 over year one and $30,000 in year two.

4.2 MIT2021-01 Protected species liaison project

Project objective

To coordinate Liaison Officer effort and target protected species bycatch reduction by encouraging vessel operators to meet best-practice bycatch mitigation.

Rationale

To effectively reduce the risk of interactions with protected species, it is important for vessels to be using best practice mitigation and take all necessary steps, both regulatory and nonregulatory measures, to avoid interactions. To measure success of mitigation and identify areas where further development is needed across each fleet, there needs to be consistency in the mitigation measures used while still allowing for innovation. Through the NPOA-Seabirds, a suite of best practice mitigation standards for each method have been developed; these mitigation standards will underpin the work that the Liaison Officers do and will be rolled out as part of the Liaison Programme through the Protected Species Risk Management Plans (PSRMPs). The purpose of the PSRMPs is to outline the vessels' current practices and work towards achieving all the best practice mitigation standards, and Liaison Officers will record where vessels are not able to achieve all standards and why. These notes will be shared with MPI for evaluation, where they will either reassess the mitigation standards or investigate how to better assist vessel operators to achieve the set standards. Auditing of PSRMPs by Fisheries Observers will then describe the steps the vessel is taking to meet the mitigation measures outlined in their plan and highlight areas for improvement.

Project status

This is a multi-year project that is due for completion in June 2024. 2021/22 reporting is complete.

Summary of the methods and key findings

In the 2021-22 fishing year (1 October 2021 - 30 September 2022), the liaison programme reviewed and updated 190 PSRMPs and established 26 new PSRMPs for inshore and Highly Migratory Species (HMS) vessels. A total of 60 PSRMP audits were completed by Observer services. These comprised of 3 surface longline audits, 8 bottom longline audits, 38 trawl audits and 11 set net audits.

The Liaison Programme received 61 triggers from 28 different vessels. Of the 61 trigger events, 39 were for seabirds. These were largely comprised of white-chinned petrels and flesh-footed shearwaters caught in the SLL and BLL fleets.

Within the coming years the capacity of the programme is expected to grow to provide full outreach to all relevant inshore and HMS fisheries. By the end of the 2021-22 fishing year there were 218 active vessels included in the Liaison Programme, and five Liaison Officers spread throughout the regions. With upwards of 376 vessels active in our prioritised inshore and HMS fleets, more capacity is needed in order to bring the remaining inshore vessels into the Liaison Programme. In addition to this, as cameras roll out there will be an anticipated increase to workload. The Liaison Programme will need to find a balance between Liaison Officer capacity and adequate levels of response.

Recommendations

The efficacy of the Liaison Programme depends on the connection of fishers with Liaison Officers, the monitoring of bycatch mitigation practices at sea, and the real-time communication of information influencing bycatch risk.

The ongoing difficulties in placing observers due to watchkeeping, will continue to limit Liaison Programme activity. The cameras rollout provides a good opportunity for receiving further information on protected species interactions and mitigation practices. Ongoing work with Fisheries New Zealand will be critical moving forward. This year, improvements have been made to allow for real-time data and response, but the intended platform responsible for keeping project activities organised and informing targeted engagement is still in development. The completion of this database (shared between FNZ and DOC) will be fundamental to the efficacy of Liaison Programme operations.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $250,000 per year over three years.

Review milestones

- Draft final report for 2021/22 published on the CSP website April 2023
- Final report for 2021/22 published on the CSP website May 2023

Citation

Plencner, T. 2023. CSP Liaison Programme Annual Report 2021-22. Final Report for MIT2021-01, Department of Conservation. 44 p.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/mit2021-01-protected-species-liaison-project-annual-report-2021-22.pdf

4.3 MIT2021-02 Cetacean interactions with pot fisheries

Project objectives

1. Update the previous analysis of cetacean entanglements.
2. Hold a workshop with fishers to explore mitigation options that could be implemented in New Zealand pot fisheries.

Rationale

Conservation and animal welfare concerns exist around the entanglement of large whales in pot/trap and set net fishery lines worldwide. As whale populations continue to recover, the frequency of interactions with fisheries is likely to increase. In New Zealand, the most entangled species are humpback whales (Megaptera novaeangliae) and orca (Orcinus orca). Previous analysis under project MIT2016-02 highlighted that reported entanglements appear to be spatially and temporally distinct, with humpback whales interacting with crayfish pot lines in the Kaikoura region primarily during the month of June (where the species northern migration and the peak of potting activity in CRA5 coincide). DOC implemented disentanglement training in the early 2000's and has personnel trained throughout the country to free whales that are reported as entangled safely. To compliment this approach, it is important to address the issue at the source by looking into options to reduce the chance of whales interacting with fishing gear in the first instance.

Given the widespread occurrence of whale entanglements, there has been a range of innovation and trials to attempt to mitigate this issue internationally. Despite lobster fisheries differing in practice across the world (soak times, setting depths etc) there may be mechanisms or practices that are proving effective elsewhere that should be considered within the New Zealand setting. The rock lobster fishery in New Zealand does not currently enforce any whale entanglement mitigation practices, however the industry body has published recommendations for fishers as a component of their Whalesafe Identification Guide (NZRLIC 2016) and are currently updating the industry Whalesafe Manual.

Project status

Complete.

Summary of the methods and key findings

In this project we update previous work on cetacean entanglements in New Zealand waters. We consider spatial and temporal trends in pot fishing effort, and entanglement information held by the Department of Conservation. We also review recent entanglement mitigation information and consider mitigation and management methods investigated in other jurisdictions. Further, we convened a workshop of expert stakeholders to share information, better understand entanglement risks and issues in the New Zealand rock lobster fishery, and proactively consider how to manage the entanglement issue with industry involvement. In New Zealand waters, pot fishing occurs in all Fisheries Management Areas except FMA 10 (Kermadec). Fishing effort reported has declined significantly from 1990 to 2021, with this decline driven by a reduction in pot fishing effort targeting rock lobster (*Jasus edwardsii*). Pot fishing targeting other species represents <10% of effort on average. Other species targeted with this method include packhorse lobster (*Jasus verreauxi*), ling (*Genypterus blacodes*), blue cod (*Parapercis colias*), paddle crab (*Ovalipes catharus*), and hagfish (*Eptatretus cirrhatus*). Pot fishing occurs around the main islands of New Zealand, and the Chatham Islands, with effort varying monthly among target species. Pot soak

times vary within and between target species. Since 1980, entanglements in pot fishing gear have been detected along the north-east coast of the North Island, Cook Strait and Marlborough, east coast of the South Island, and Fiordland and Stewart Island. Most recorded entanglements over time have involved humpback whales (Megaptera novaeangliae; 62%), followed by orca (Orcinus orca; 16%). Most entanglements have been reported in June, with almost all of these involving humpback whales. Orca entanglements have occurred in the spring and summer months. Entanglement events involving other cetacean species comprise 22% of those reported and have occurred occasionally through the year. Ecological factors relevant to entanglements are generally not well understood. However, the migration of humpback whales along the New Zealand coast continues to be a higher risk period based on entanglement reports. The fishing gear type most recently described in entanglement reports is 'cray' (rock lobster). Recent literature showed a breadth of work on entanglement mitigation and management. Approaches included gear-associated measures (gear modifications, acoustic deterrents and ropeless fishing), spatial and temporal closures, and investigations of whale ecology to understand and account for distribution and entanglement risks.

Recommendations

- Increase consistent reporting of entanglement events and pot soak times to DOC
- Grow relationship between fishers and disentanglement teams
- Increase knowledge of cetacean spatial and temporal distribution
- Update electronic reporting codes to include all cetacean taxa
- Characterise NZ pot fishing gear for future assessment
- Foster adoption of mitigation measures already in use by some fishers
- Investigate galvanic timed releases in entanglement hotspots

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 over one year.

Review milestones

- Draft final report published on the CSP website in July 2022
- Final report published on the CSP website in August 2022

Citation

Pierre, J. P., How, J. R., Dunn, A. 2022. Whale entanglements with New Zealand pot fisheries: characterisation and opportunities for management. MIT2021-02 final report prepared by JPEC for Department of Conservation, Wellington. 79 pp.

Weblink

https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/202122-annual-plan/mit2021-02-cetacean-interactions-with-pot-fisheries-final-report-redacted.pdf

4.4 MIT2021-03 Methods for increasing sink rates for bottom longline

Project objectives

1. To identify options for increasing the sink rate of hooks in small bottom longline fisheries.
2. To test the performance and efficacy of methods to increase the sink rate of hooks in small bottom longlines.

Rationale

Inshore bottom longline fisheries pose seabird bycatch risk to some of the seabird species at highest risk from commercial fisheries, such as black petrel and flesh-footed shearwater. The mitigation standard introduced by the NPOA-Seabirds 2020 contains expectations around achieving sink depths of hooks by the end of the aerial extent of the tori line (10m deep at high-risk times and 5m deep at other times). Achieving some of the standard sink rates has been challenging in some segments of the fleet.

Project status

Scoping workshop held in November 2021, with at-sea trials postponed to 2022-23.

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.