



Conservation Services Programme Annual Plan 2019/20

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Conservation Services Programme
Department of Conservation
PO Box 10 420
Wellington
www.doc.govt.nz/csp



Department of
Conservation
Te Papa Atawhai

New Zealand Government

Statement on Conservation Services

Conservation services are defined in section 2 of the Fisheries Act 1996 as follows:

“Conservation services means outputs produced in relation to the adverse effects of commercial fishing on protected species, as agreed between the Minister responsible for the administration of the Conservation Act 1987 and the Director-General of the Department of Conservation, including—

- (a) Research relating to those effects on protected species;*
- (b) Research on measures to mitigate the adverse effects of commercial fishing on protected species;*
- (c) The development of population management plans under the Wildlife Act 1953 and the Marine Mammals Protection Act 1978.”*

We agree that the outputs described in the following pages, to be delivered in 2018/19, are “conservation services” in accordance with this definition. Cost recovery principles have been applied in accordance with section 262 of the Fisheries Act 1996.



Hon. Eugenie Sage
Minister of Conservation



Lou Sanson
Director-General of Conservation

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1. Overview

Introduction

The Conservation Services Programme (“CSP”) has operated, under the administration of DOC, since 1996 with the ultimate aim of avoiding, remedying, or mitigating the adverse effects of commercial fisheries on protected species. The Conservation Services Programme Annual Plan 2019/20 (“Annual Plan”) includes the conservation services to be delivered as the Conservation Services Programme (“CSP”), and subject to cost recovery from the commercial fishing industry. As such, this Annual Plan forms the basis for levying the commercial fishing industry under the Fisheries Act 1996. For a summary of the legal basis of levied work described in this Annual Plan, refer to the Conservation Services Programme Strategic Statement 2018¹ (“Strategic Statement”).

The CSP vision is that “*commercial fishing is undertaken in a manner that does not compromise the protection and recovery of protected species in New Zealand fisheries waters*”. In order to meet this vision, the following CSP Objectives, as described in the CSP Strategic Statement 2018, have been identified:

- Objective A: Proven mitigation strategies are in place to avoid or minimise the adverse effects of commercial fishing on protected species across the range of fisheries with known interactions.
- Objective B: The nature of direct adverse effects of commercial fishing on protected species is described.
- Objective C: The extent of known direct adverse effects of commercial fishing on protected species is adequately understood.
- Objective D: The nature and extent of indirect adverse effects of commercial fishing are identified and described for protected species that are at particular risk to such effects.
- Objective E: Adequate information on population level and susceptibility to fisheries effects exists for protected species populations identified as at medium or higher risk from fisheries.

Format

The format used to specify the conservation services in this Annual Plan includes an outline of the objectives and rationale for each project, and the outputs that are anticipated to be produced. Guiding objectives, both CSP Objectives (described in the CSP Strategic Statement 2018) and relevant management plans, are identified for each project. The project specifications also indicate cost recovery information, i.e. indicative project costs (excluding administration costs), relevant provisions within the Fisheries (Cost Recovery) Rules 2001 that determine cost allocation, and relevant fish stocks. Costs are summarised in Appendix 1. All financial amounts appearing in this document are exclusive of GST.

Guiding frameworks, research planning and prioritisation

The CSP Strategic Statement 2018, outlines the objectives of CSP and describes the process through which each annual plan of services will be developed and delivered. It provides detail on the wider management context (for example, how CSP delivers on whole of government plans such as the National Plans of Action for seabirds and sharks and relevant Threat Management Plans), the research planning and prioritisation processes used by CSP, and the way CSP is implemented by working with others.

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

The Conservation Services Programme planning considers and works in parallel with other relevant planning and management processes such as the Hector's and Māui dolphin and the New Zealand sea lion Threat Management Plans (TMP). The iterative and inclusive planning process ensures that gaps are identified, and research synergies are maximised.

The CSP Research Advisory Group (CSP RAG), was established in December 2013 following finalisation of the CSP Strategic Statement and provided guidance for the development of this Annual Plan. Three medium term research plans have also been developed as part of the work of the CSP RAG; the CSP seabird population medium term research plan 2017 ("CSP seabird plan 2017")², the CSP protected fish medium term research plan 2018 ("CSP fish plan 2018")², and the CSP Marine Mammal medium term research plan 2018 ("CSP mammal plan 2018")². These plans have been used to inform relevant sections of this Annual Plan. In time, medium term research plans for the remaining protected species groups (corals and marine reptiles) will also be developed.

The CSP Annual Plan attempts to undertake projects across the entire range of protected species impacted by commercial fishing activities but does not always manage to incorporate projects on each of these groups every year. For 2019/20 there are not any proposed protected fish projects, however, work is currently underway on two projects from 2018/19 (INT2018-04 Improving the collection of data and samples from bycaught basking sharks and INT2018-05 Updated analysis of spine-tailed devil ray post release survival) that were delayed due to logistical reasons and are due for completion during 2019/20.

A summary of the planning and prioritisation milestones, in accordance with the CSP Strategic Statement 2018, undertaken in developing the CSP Annual Plan 2019/20 are as follows:

1. CSP RAG meeting to review relevant research output and gap analysis (December 2018). This was held in conjunction with a planning process meeting for Fisheries New Zealand (FNZ) Aquatic Environment research.
2. Annual research summary report finalised, CSP medium term research plans updated and an initial list of research proposals for 2019/20 drafted and circulated to CSP RAG (March 2019). Feedback sought on initial research proposals.
3. CSP RAG meeting, with open invitation to all CSP stakeholders, to discuss and prioritise research proposals for 2019/20 (March 2019). Additional written feedback also sought from CSP RAG.
4. Draft Annual Plan developed based on this feedback and provided for formal consultation (April 2019).
5. Analysis of submissions and development of final Annual Plan.

Inshore observer coverage was planned using a process developed jointly by CSP and the Inshore Fisheries team at FNZ. The programme progresses delivery of objectives identified by a process conducted in preparation for the CSP Annual Plan 2011/12. Deepwater and Highly Migratory Species (HMS) observer coverage was developed jointly by the CSP and the Deepwater Fisheries and HMS team respectively at FNZ.

Consultation

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

- | | |
|------------------|---|
| 14 December 2018 | Initial CSP RAG meeting – review and gap analysis. |
| 4 March 2019 | Updated medium term research plans, initial list of research proposals and CSP RAG prioritisation framework circulated to |

² Available to download from <http://www.doc.govt.nz/csp-rag>

CSP RAG.

8 March 2019	Second CSP RAG meeting to discuss and prioritise initial research proposals.
24 March 2019	Additional feedback received from CSP RAG on research proposals and their prioritisation.
3 May 2019	Draft Conservation Services Programme Annual Plan 2019/20 released for public consultation.
2 June 2019	Public consultation period closes.
10 June 2019	Summary of public submissions and response to comments completed.
20 June 2019	Director-General of Conservation conveys the Conservation Services Programme Annual Plan 2019/20, amended in accordance with public submissions, to the Minister of Conservation for agreement.

Administrative costs

Administration costs have always been a contentious matter relating to the delivery of conservation services. Administration requirements of each project differ, as does the time required to address these. Currently, administration charges are distributed in a pro-rated fashion across projects, in accordance with the cost of the project. This approach is broadly appropriate, for example, the costliest project (INT2019-01 Observing commercial fisheries in 2019/20) incurs the majority of administration expenses. For that project, administration includes observer training programmes and training materials, data management, briefing and debriefing, liaison at sea and with other agencies when necessary, and reporting. For other projects, the administration burden may be significantly less. Administration also includes charges for the use of Departmental facilities and services.

DOC is continually striving to maximise efficiencies, and the administration costs for delivering conservation services dropped by \$15,000 between 2008/09 and 2009/10, and subsequently dropped again by \$13,000 for 2011/12 and has been maintained at this level. For 2019/20 the administration costs total 10% of the programme costs, we welcome stakeholder views on different ways to attribute administration costs across projects.

2. Interaction Projects

2.1 Observing commercial fisheries

Project code: INT2019-01

Start Date: 1 July 2019

Completion Date: 30 June 2020

Guiding Objectives: CSP Objectives A, B, C; National Plan of Action – Seabirds, National Plan of Action – Sharks; New Zealand sea lion Threat Management Plan and Hector’s and Māui dolphin Threat Management Plan.

Project 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

Management approach

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

The CSP Observer Programme will continue to purchase baseline services for “offshore” fisheries from FNZ Observer Services, given the scale of their operation, this allows observers to be placed strategically across New Zealand Fisheries. Inshore fisheries observer coverage will also be delivered by FNZ Observer Services, according to a joint planning process (described in Section 2.1.1). Where data collection involves using techniques beyond observation and recording, providers with specific expertise and/or equipment will be considered. For the purposes of providing costings, the rate provided by FNZ Observer Services has been used. As such, for the purposes of planning, costings for observer coverage are based on those provided by the FNZ Observer Services to provide a best estimate.

Research Approach

To date, the bulk of publicly available information on at-sea interactions between fishing vessels and protected species in New Zealand waters, has been collected by government (DOC/ FNZ) observers.

The allocation of observer coverage across fisheries will be made in relation to:

- Historic mortality of protected species.
- Fishing effort.
- Past observer coverage.
- The status of particular threatened protected species.
- Current level of information.
- Risk assessment work which has been undertaken (e.g. Rowe 2010a, Richard & Abraham. 2013, Abraham et al. 2017).
- Requirements under the National Plans of Action (NPOAs) for seabirds³ and sharks⁴ and any relevant Threat Management Plans (TMPs).
- Information needs identified for newly introduced protected species.

Coverage levels are driven by a number of factors including data needs for protected species and fisheries management, compliance, international obligations and ministerial directives. These ministerial directives include squid 6T coverage for sealion captures, both trawl and setnet vessel coverage on the West coast of the North Island to address some of the Māui Dolphin issues raised in the Māui and Hector dolphin Threat Management Plan, and coverage of snapper trawl in the Hauraki Gulf to look at concerns around snapper stocks and undersized snapper. Here coverage is driven by ministerial direction and also provides a platform for delivery of the CSP Observer Programme, CSP will continue to purchase a relevant portion of that coverage for protected species.

The duties of an observer in respect to the CSP Observer Programme can be summarised as:

- Monitoring and recording the interactions of protected species with fishing operations.
- Reporting on the efforts made to mitigate the adverse effects of commercial fishing on protected species.
- Recording, photographing, and tagging all protected species bycatch.
- Recovering and returning the bodies or samples of dead protected species for identification and autopsy.
- Recording observational data on numbers, and the behaviour of, marine mammal and seabird species seen around the fishing vessel.
- Collecting information to better understand cryptic mortality of protected species.
- Monitoring vessel activities against any relevant operational plans such as protected species Risk Management Plans (PSRMPs) or Vessel Management Plans (VMPs).
- Carrying out other tasks (e.g. making observations on discard and offal discharge) as required.

In addition to the duties discussed above, CSP will occasionally use observers to collect data for specific mitigation or information acquisition projects. Examples of past projects include fish waste trials, observations of warp interactions on inshore trawl vessels and blue-dyed bait trials.

³ NPOA–Seabirds 2013 available at <https://www.mpi.govt.nz/dmsdocument/3962/loggedIn>

⁴ NPOA–Sharks 2013 available at <https://www.mpi.govt.nz/dmsdocument/1138/loggedIn>

Information collected includes:

- Environmental conditions (e.g. sea state).
- Fishing methods (including a description of gear employed) and operations.
- Processing waste management practices.
- Abundance and behaviour of protected species in vicinity of vessel.
- Mitigation practices adopted.
- Knowledge and approach of crew.
- Interactions between protected species and fishing gear.

It is important to note that observer programmes typically have high spatial and temporal variation, as well as multiple priorities for information collection, which can make the data challenging to interpret and extrapolate to estimate actual bycatch rates by fishery, location, or other desired variables. Data accuracy and relevance can be affected by inter-observer variability, weather conditions and access to vessels, while precision is affected by the observer sampling design. Data quality may also be biased by the opportunistic allocation of observers to vessels, as it is not always possible to place observers on vessels randomly or representatively. Nevertheless, the use of fisheries observers is currently considered to be the most reliable and flexible means of acquiring data on protected species interactions.

Planning of observer coverage by fishery in 2019/20:

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 (see 2.1.1). The majority of these vessels operate in the inshore area (i.e. to around 200m depth). Some small vessels, particularly bottom longline vessels under 36m, will operate in deeper waters such as the Chatham Rise (and are observed as part of deepwater longline coverage). Details of the approach used to set days in these fisheries are described in the Joint Department of Conservation/Fisheries New Zealand Inshore Observer Programme 2019/20 plan (included as Section 2.1.1 of this plan). In general, coverage in these fisheries is aimed at reducing uncertainty around the risk to particular protected species which are identified in level 1 and level 2 risk assessments (Rowe 2010a, Richard & Abraham 2015, Abraham et al. 2017, Ford et al. 2015) as well as assessing mitigation options for identified interactions and delivering on the relevant Threat Management Plan objectives for Hector’s and Māui dolphins and New Zealand sea lions. The NPOA-Seabirds 2013 and drafted 2019 plan both highlight the importance of observer data in meeting the objectives of the plans including monitoring and auditing functions of risk management plans. The NPOA-Sharks 2013 also gives guidance on data collection priorities to inform protection and management of sharks, in the first instance dealing with improved data for the development of a quantitative risk assessment similar to that produced for seabirds. In addition, the sharks, seabirds and mammals medium term research plans are taken into consideration and outline fishery specific priorities to reduce uncertainty in current risk scores.

The second group of fisheries can be considered ‘better known’ and have generally had some level of ongoing observer coverage over the last ten years or more (see 2.1.2). Most of these fisheries are characterised by large vessels operating further offshore and are termed ‘offshore’ fisheries. Observers working in these fisheries generally have multiple priorities including stock assessment, compliance, and protected species interactions. DOC contributes to a portion of observer time in these fisheries and, as such, days are planned differently to the poorly known fisheries. In order to set observer days for the period 1 July 2019 – 30 June 2020, effort data from previous years was examined, in conjunction with FNZ, to ensure that desired coverage levels are

achievable with the days planned and that these coverage levels would ideally meet the data requirements of both agencies. All time periods are based on 1 July – 30 June in line with the period that observer coverage runs (i.e. not the fishing year).

The most recent observer coverage and protected species statistics are summarised by Weaver (2019). Protected species interaction data for the period 1 July 2004 to 30 June 2011 were reported by Rowe (2009, 2010b) and Ramm (2010, 2012, 2013). Summary information for the period 1 July 2011 to 30 June 2013 is reported by Clemens-Seely et al. (2014a, b). Summary information for 1 July 2013 to 30 June 2014 is reported by Clemens-Seely and Hjørvarsdóttir (2016). Summary information for the period 1 July 2014 to 30 June 2016 is reported by Hjørvarsdóttir (2016, 2017). Summary information for 1 July 2016 to 30 June 2017 is reported by Hjørvarsdóttir and Isaacs (2018). Download links are provided in the References section.

Fisheries Management Areas are referred to by three letter codes as follows:

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	Kermadecs

2.1.1 “Inshore” Fisheries: Joint DOC-FNZ Inshore Observer Programme

Introduction

During the planning round for the 2011/12 observer programme a tiered approach was developed to prioritising areas of observer coverage. This planning process was described in detail in the Marine Conservation Services Programme Annual Plan 2011/12⁵. This tiered process has endured into the planning for the 2019/20 year. Final decisions on the levels and placement of this observer coverage were undertaken by FNZ with consideration to capacity of the Observer Services Unit. These decisions were informed by risk assessments (levels 1, 2 and 3 where applicable), the National Plans of Action for Seabirds and Sharks, relevant Threat Management Plan priorities, and previous observer data and fish-stock related data collection. While the tiered approach and risk assessments highlight the observer effort required to reduce uncertainty in these fisheries, often these levels of coverage required cannot be reached due to the nature of the inshore fleet as described above.

Due to ongoing industry concerns of over recovery for unachieved inshore observer coverage, FNZ committed to reviewing the cost recovery method for these fisheries. The outcome of this review was to only levy 50% of planned inshore observer days, with the balance of achieved days being recovered in the following year. For the 2019/20 year this has been increased to 80% due to FNZ and DOC adopting more realistic planning and implementing changes in the capacity to provide observer coverage. The cost of an inshore observer day has been capped at \$950 to reflect the actual cost of those days.

For 2019/20 the cost of observer coverage is being jointly recovered by both DOC and FNZ similar to the way in which offshore observer coverage is cost recovered. Broadly, for coverage driven by protected species interactions each cost will be recovered evenly by each agency (Table 1). For coverage driven by fisheries needs but also collecting protected species information the observer’s time will be prorated to reflect the time spent on each set of tasks, generally 85% Fisheries, 15% Conservation Services.

As the Inshore Observer Programme is jointly planned and delivered, to ensure equity the CSP will also follow this cost recovery model.

The goals of the Inshore Observer Programme are to:

- *inform management of impacts from fishing on protected species by identifying and quantifying interactions between inshore fisheries and protected species, and assessing the effectiveness of mitigation measures, where appropriate;*
- *minimise adverse effects of fishing on the aquatic environment, including on biological diversity; and*
- *inform management of fish stocks by gathering biological and other information on board fishing vessels.*

⁵ Available for download from <https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/approved-mcs-annual-plan-2011-12.pdf>

Table 1. Inshore Observer Projects 2019/20. The table below summarises the proposed observer projects for 2019/20.

Method	Area	Statistical Area	Percent age of effort	Season	Total number of days	2019/20 levied	FNZ %	FNZ days	CSP %	CSP days	Objective
Setnet	East Coast South Island Otago	020, 024, 026	30%	Oct-Mar	125	100	50%	50	50%	31.25	Capture rate & interactions of South Island Hector's dolphins & hoiho
	South Coast South Island	025, 027, 029, 030	50%	Oct-Mar	175	140	50%	70	50%	43.75	Capture rate & interactions of hoiho, white pointer shark & other protected species
	West Coast North Island (including BLL SNA8)	040, 041, 042, 045, 046	100%	All year	175	-	-	175	50%	43.75	Information on distribution & possible captures of Māui dolphins
Small inshore trawl	West Coast North Island	041-046	100%	All year	650	520	50%	260	50%	162.5	Information on distribution & possible captures of Māui dolphins
	East / South Coast South Island	018, 020, 022, 024-027, 029, 030	5%	All year	250	200	50%	100	50%	62.5	Rate of seabird captures, audit and assess mitigation techniques, & gather information to inform cryptic mortality estimates
	North-east North Island (Snapper target)	002-010	20%	All year	105	84	50%	42	50%	26.25	Monitor capture rate of black petrels & flesh-footed shearwaters, collect information on interactions & effectiveness of mitigation
Precision Seafood Harvesting Trawl	North-east North Island (Snapper target)	As necessary	30%	All year	105	84	100%	84	-	-	EITT gear trials
Bottom Longline	North-east North Island (Bluenose target)	002-010	10%	Oct-Apr	35	28	50%	14	50%	8.75	Monitor capture rate of black petrels & flesh-footed shearwaters, collect information on interactions & effectiveness of mitigation
	North-east North Island (Snapper target)	002-010	10%	Oct-Apr	385	308	50%	154	50%	96.25	Monitor capture rate of black petrels & flesh-footed shearwaters, collect information on interactions & effectiveness of mitigation
Total					2005						

SETNET

East Coast South Island / Otago

Overall project objectives/information needs

1. Estimate the capture rate of Hector's dolphins and hoiho South Island populations in **setnet** fisheries.

Start Date	1 October 2019
Completion Date	31 March 2020
Targeted Statistical Area	020, 024, 026

Project Objectives

1. Gather information to estimate the number of captures and the capture rate of Hector's dolphins and hoiho in setnet fisheries on the East Coast of the South Island.
2. Gather information to identify the nature and extent of interactions with hoiho, NZ fur seals and shags by setnet fisheries on the East Coast of the South Island.

Information Needs

An overall capture rate for the East Coast of the South Island Hector's dolphin population needs to be estimated as the East Coast has some of the highest levels of coastal setnet effort in the country. Observer coverage is targeted in statistical areas where there are high levels of setnet fishing occurring within the Hector's dolphin habitat. Ongoing delivery issues in relation to safety requirements around crewing levels and ability to safely carry observers has continued to impact upon coverage rates so more data is needed to ensure a robust estimate of captures and capture rates and to inform risk assessments.

Robust estimation of total Hector's dolphin captures requires that the fishing behaviour observed is representative of normal situations (i.e. if we can assume that observer placement is not changing behaviour). To minimise any potential bias, relatively high coverage as a percentage of effort by area/month is proposed, across the entire fleet operating in these statistical areas.

Hoiho have also been identified by several processes, including risk assessments, as being at risk from setnet fisheries from Banks Peninsula south. Due to the decrease in their mainland population their susceptibility to fishing increases.

Proposed Coverage

- Statistical area 020, 024, 026.
- The planning optimisation process identified 30% coverage required to gain sufficient data.
- 125 observer days are planned.

Secondary information to be collected

To make the best use of Observers' time, secondary information can sometimes be collected, which will then inform other priorities. Secondary information collected will include:

- Audit of Protected Species Risk Management Plans and adherence to operational procedures
- Information on the nature and extent of setnet interactions with other seabirds, marine mammals, and protected fish.
- Observer counts to provide spatial distribution data for seabirds and marine mammals.
- Biological sampling of fish to help inform stock assessments.
- Total catch verification in line with providing better information about the specific target fisheries.

Related Research

- An East Coast South Island aerial survey has obtained robust estimates of Hector's dolphin abundance and distribution, which when combined with up to date reliable capture observations will allow estimation of the risk posed by setnet fisheries in this area.
- An ongoing autopsy programme for Hector's and Māui dolphins aims to identify sub-species, cause of death, body condition, and the extent of parasitism for any beach-cast or captured dolphins. This allows better understanding of the health and condition of the various Hector's and Māui dolphins.
- Ongoing hoiho population monitoring and adult and juvenile tracking studies will assist in the estimation of risk of interaction and identification of foraging habitat.

South Coast South Island

Overall project objectives/information needs

Estimate the capture rate and interactions of hoiho, white pointer sharks and Hector's dolphin populations in setnet fisheries.

Start Date	1 October 2019
Completion Date	31 March 2020
Targeted Statistical Areas	025, 027, 029, 030

Project Objectives

1. Gather information to estimate the number of captures and the capture rate of hoiho, and white pointer sharks.
2. Gather information to identify the nature and extent of interactions between setnet fisheries and white pointer sharks, hoiho, Fiordland crested penguins, Foveaux shag, dolphins and sea lions on the South Coast of the South Island.
3. Gather spatial distribution data for seabirds and marine mammals.

Information Needs

Observer coverage is targeted in statistical areas where there are high levels of setnet fishing occurring to allow estimation of the capture rate for the South Coast populations. More data is needed in this area to ensure a robust estimate of captures and capture rate of hoiho and white pointer sharks.

Hoiho have been identified by several processes, including risk assessments, as being at risk from setnet fisheries on the South Coast South Island. Due to the decrease in their mainland population from to a variety of factors, their susceptibility to fishing increases. Current recommendations within the draft Hoiho Threat Management Plan include increased observer coverage in order to obtain further temporal and special data on the nature and extent of setnet interactions with hoiho.

The National Plan of Action – Sharks 2013 (NPOA-Sharks 2013) sets goals and objectives for better understanding and ultimately reducing the incidence of capture of protected shark species. The factors which lead to captures will assist in the development of effective mitigation. Additionally, a number of captured white pointer sharks are alive (though with injuries) at time of release, therefore, further information on the factors which contribute to safe and successful release of animals is important to developing adequate guidelines for fishers.

Robust estimation of total captures requires that the fishing behaviour observed is representative of normal situations (i.e. if we can assume that observer placement is not changing behaviour). To minimise any potential bias, relatively high coverage as a percentage of effort by area/month is proposed.

Proposed Coverage

- Statistical areas 025, 027, 029, 030.
- The planning optimisation process identified 50% coverage required to gain sufficient data.
- 175 observer days are planned.

Secondary information to be collected

To make the best use of Observers' time, secondary information can sometimes be collected, which will then inform other priorities. Secondary information collected will include:

- Audit of Protected Species Risk Management Plans and adherence to operational procedures

- Information on the nature and extent of setnet interactions with other seabirds, marine mammals, and protected fish.
- Observer counts to provide spatial distribution data for seabirds and marine mammals.
- Biological sampling of fish to help inform stock assessments.
- Total catch verification in line with providing better information about the specific target fisheries.

Related Research

- Ongoing hoiho population monitoring and adult and juvenile tracking studies will assist in the estimation of risk of interaction.
- Hoiho review including the range and distribution, population levels and trends.
- An East Coast South Island aerial survey has obtained estimates of Hector's dolphin abundance and distribution, which when combined with up to date reliable capture observations will allow estimation of the risk posed by setnet fisheries in this area.
- Post release survival of white pointer sharks in set net fisheries.
- An ongoing autopsy programme for Hector's and Māui dolphins aims to identify sub-species, cause of death, body condition, and the extent of parasitism for any beach-cast or captured dolphins. This allows better understanding of the health and condition of the various Hector's and Māui dolphins.

West Coast North Island

Overall project objectives/information needs

1. Gather information on distribution and monitor for captures of Māui dolphins in setnet fisheries on the West Coast of the North Island.

Start Date	1 July 2019
Completion Date	30 June 2020
Targeted Statistical Areas	040, 041, 042, 045, 046

Project Objectives

1. Gather information on any Māui dolphin captures that may occur within the setnet fisheries on the West Coast of the North Island.
2. Observational survey to gather spatial distribution data for Māui dolphins.
3. Gather information on the nature and extent of interactions with other protected species in the area.

Information Needs

Observer coverage is targeted to reflect the ministerial decisions made for coverage of set nets operating within the restricted 2-7nm zone. This coverage is currently being assessed within the Māui dolphin Threat Management Plan (TMP) review.

Setnet effort in this fishery has significantly decreased in the last two years. Robust estimation of total Māui dolphin captures requires that the fishing behaviour observed is representative of normal situations (i.e. if we can assume that observer placement is not changing behaviour). To minimise any potential bias, relatively high coverage as a percentage of effort by area/month is proposed.

Previous observer coverage in the area has identified interactions with other protected species including seabirds such as white capped albatross, dolphins and fur seals. Improved information on the nature and extent of these interactions is important in the development of effective management and mitigation strategies.

Proposed Coverage

- Statistical areas 040, 041, 042, 045, 046.
- 100% coverage of setnet effort with in restricted 2-7nm zone (ministerial directive).
- 175 observer days are planned.

Secondary information to be collected

- Observer observations to provide spatial distribution data for seabirds and marine mammals.
- Audit of Protected Species Risk Management Plans and adherence to operational procedures
- Information on the nature and extent of setnet interactions with other seabirds, marine mammals, and protected fish.
- Total catch verification in line with providing better information about the specific target fisheries.

Related Research

- Ongoing aerial and boat-based surveys of the West Coast North Island supported by biopsy sampling where possible.
- An ongoing autopsy programme for Hector's and Māui dolphins aims to identify sub-species, cause of death, body condition, and the extent of parasitism for any beach-cast or captured dolphins. This allows better understanding of the health and condition of the various Hector's and Māui dolphins.
- Hector's and Māui Dolphin Threat Management Plan.

INSHORE TRAWL

East / South Coast South Island

Overall project objectives/information needs

To assess the rate of seabird captures in inshore trawl fisheries on the East and South coast of the South Island, audit and assess mitigation techniques and gather information to inform cryptic mortality estimates due to warp strikes.

Start Date	1 July 2019
Completion Date	30 June 2020
Targeted Statistical Areas	018, 020, 022, 024, 025, 026, 027, 029, 030

Project Objectives

1. Estimate the capture rate of seabirds in inshore trawl fisheries on the East and South coasts of the South Island.
2. Gather data on warp strikes to improve estimations of cryptic mortality.
3. Audit of protected Species Risk Management Plans in order to characterise and assess mitigation use in trawl fisheries on the East / South Coast of the South Island.

Information needs

Information on total mortality is important to inform robust fisheries management decision making in relation to fishery related deaths. The level 2 seabird risk assessment identifies inshore trawl as posing a risk to several albatross species and there is significant uncertainty surrounding the level of cryptic and total mortality especially inshore trawl fisheries.

Previous observer coverage in statistical areas 020, 022, 024, 025, 026 identified captures of Salvin's and white-capped albatross on trawl warps in particular, further data on the nature and extent of these interactions is necessary to understand cryptic mortality and to accurately estimate the capture rate of seabirds within this fishery.

Information on mitigation use to avoid warp strikes is also important in order to reduce captures and cryptic mortality. Data collected by Fisheries Observers can be used to inform PRSMP's and skippers on the efficiency and effectiveness of mitigation techniques used.

The National Plan of Action – Seabirds, which is currently under review, sets goals and objective for better understanding and ultimately reducing the incidence of seabird bycatch, observational and audit data is necessary in this fishery to achieve the objectives in the NPOA.

Proposed Coverage

- East Coast South Island 018, 020, 022, 024, 025, 026, 027, 029, 030.
- 5% effort required, targeted at vessels with seabird mitigation plans.
- 250 observer days are planned.

Secondary information to be collected

- Collection information on the nature and extent of interactions with other protected species including Hector's Dolphins.
- Observer observations to provide spatial distribution data for seabirds and marine mammals.

Related Research

- Ongoing hoiho population monitoring and adult and juvenile tracking studies will assist in the estimation of risk of interaction.

- An East Coast South Island aerial survey has obtained estimates of Hector's dolphin abundance and distribution, which when combined with up to date reliable capture observations will allow estimation of the risk posed by trawl fisheries in this area. The Spatially Explicit Risk Assessment has provided estimates on high risk areas to Hector's dolphins.
- Characterisation and mitigation of protected species interactions in inshore trawl fisheries which highlights in the need for additional data on the extent of interactions and cryptic mortality in the ECSI trawl fishery.

West Coast North Island

Overall project objectives/information needs

1. Gather information on distribution and monitor for captures of Māui dolphins in trawl fisheries on the West Coast of the North Island.

Start Date	1 July 2019
Completion Date	30 June 2020
Targeted Statistical Areas	041-046

Project Objectives

1. Gather information on any Māui dolphin captures that may occur within the trawl fisheries on the West Coast of the North Island.
2. Observational survey to gather spatial distribution data for Māui dolphins.
3. Gather information on the nature and extent of interactions with other protected species in the area.

Information Needs

Observer coverage is targeted to reflect the ministerial decisions made for coverage of trawl vessels operating within restricted zone on the west coast North Island. This coverage is currently being assessed within the Māui dolphin Threat Management Plan (TMP) review.

Robust estimation of total Māui dolphin captures requires that the fishing behaviour observed is representative of normal situations (i.e. if we can assume that observer placement is not changing behaviour). To minimise any potential bias, relatively high coverage as a percentage of effort by area/month will be proposed.

Proposed Coverage

- Statistical areas 041-046.
- 100% effort required (ministerial directive).
- 650 observer days are planned.

Secondary information to be collected

- Observer observations to provide spatial distribution data for seabirds and marine mammals.
- Audit of Protected Species Risk Management Plans and adherence to operational procedures
- Information on the nature and extent of setnet interactions with other seabirds, marine mammals, and protected fish.
- Total catch verification in line with providing better information about the specific target fisheries.

Related Research

- Ongoing aerial and boat-based surveys of the West Coast North Island supported by biopsy sampling where possible.
- An ongoing autopsy programme for Hector's and Māui dolphins aims to identify sub-species, cause of death, body condition, and the extent of parasitism for any beach-cast or captured dolphins. This allows better understanding of the health and condition of the various Hector's and Māui dolphins.

North-East North Island – Snapper target

Start Date	1 July 2019
Completion Date	30 June 2020
Targeted Statistical Areas	002-010

Overall project objectives/information needs

Monitor the capture rate of black petrels and flesh-footed shearwaters and collect information on interactions and effectiveness of mitigation. Monitor SNX (undersized snapper) discards and offal management.

Project Objectives

1. Collection information on the nature of interactions with protected species, particularly black petrels and flesh-footed shearwaters, which will assist in informing mitigation strategies.
2. SNX discards and catch verification for fisheries management.
3. Audit of Protected Species Risk Management Plans and adherence to operational procedures and discard management.

Information needs

The black petrel is identified by the seabird level 2 risk assessment as the single most at-risk seabird species from commercial fisheries interactions; flesh-footed shearwaters are also in the very high-risk category. The risk assessment has highlighted snapper trawl as posing a risk to black petrels and flesh-footed shearwaters. In order to gain accurate information on the nature and extent of interactions, ongoing coverage is necessary.

Camera trials are no longer underway or included in the programme, review of footage is continuing. There has historically been a ministerial requirement to cover 100% of this fishery for SNX discards and management, this is currently under review.

Proposed Coverage

- North East North Island 002-010.
- 20% effort required.
- 105 observer days are planned.

Secondary information to be collected

- Information on the nature and extent of inshore trawl interactions with seabirds, mammals, turtles and protected fish species.

Precision Seafood Harvesting (PSH) monitoring

Start Date	1 July 2019
Completion Date	30 June 2020
Targeted Statistical Areas	As Necessary

Background Information

Vessels trialling innovative trawl technology operate over a variety of seasons and Statistical Areas. Historically, previous coverage with trawl technology such as the use of Precision Seafood Harvesting nets has highlighted a risk of captures of common and bottle-nosed dolphins, white pointer sharks, and at-risk seabirds including black petrels. As such, information will continue to be collected on the nature and extent of interactions and where applicable what mitigation methods are in place.

Project Objectives/Information needs

1. Undersized snapper discards and catch verification for fisheries management.
2. Collection information on the nature of interactions with protected species, particularly black petrels and flesh-footed shearwaters, which will assist in informing mitigation strategies.
3. Audit of Protected Species Risk Management Plans and adherence to operational procedures and discard management.

Proposed Coverage

- Statistical areas as necessary.
- 30% effort required.
- 105 observer days are planned.

Secondary information to be collected

Observer counts to provide spatial distribution data for seabirds, marine mammals, and turtles.

NOTE: this coverage is not cost recovered as part of the Conservation Services Programme but is included here for completeness.

BOTTOM LONGLINE

North-East North Island - Bluenose target

Start Date	1 October 2019
Completion Date	31 June 2020
Targeted Statistical Areas	002-010

Monitor the capture rate of black petrel and flesh-footed shearwaters, and collect information on interactions and effectiveness of mitigation in bottom longline fisheries.

Project Objectives

1. Collect information to reduce uncertainty associated with the estimated capture rate of at-risk seabird species (primarily black petrels and flesh-footed shearwaters) in inshore bottom longline fisheries targeting bluenose.
2. Collect information to improve current estimates of cryptic mortality/live-release survival in inshore bottom-longline fisheries.
3. Collect information to evaluate the efficacy of inshore bottom longline mitigation efforts.

Information Needs

The black petrel is identified by the L2 risk assessment as the single most at-risk seabird species from commercial fisheries interactions. Current capture estimates are unrealistically high (mean risk ratio = 19.4) and improved observer coverage is likely to result in a more realistic estimate. In the meantime, however, FNZ and DOC are confident that current impacts are unsustainable, and management action is needed. The primary objective of observer coverage focused on black petrels is to better understand what factors most strongly determine variable capture rates, to support development of mitigation options in bottom longline fisheries (snapper, bluenose and

A second at-risk species from inshore bottom longline fisheries is the flesh-footed shearwater (mean risk ratio = 1.32). Risk to this species arises primarily from bottom longline vessels targeting snapper. Due to low historical observer coverage in all inshore bottom longline fishery groups, these risk estimates are subject to considerable uncertainty. Capture rates recorded by fishery observers can be expected to substantially improve these estimates.

If coverage is unrepresentative (i.e. because vessels of a particular class resist accepting observers, or the presence of an observer biases fisher behaviour), capture rate estimation arising from the new model will be poorly informed, and associated risk estimates are likely to remain uncertain (or possibly biased).

Current estimates of cryptic mortality in inshore bottom longline fisheries rely on observations elsewhere and do not include consideration of post-release survivability for live-captured birds. Fishery-specific observations can be expected to yield substantial improvements. Observer coverage tasked to collect data to characterise interactions and to evaluate the likely fate of birds released alive is a high priority.

Proposed Coverage

- Statistical areas 002, 003, 004, 005, 006, 007, 008, 009, and 010.
- The planning optimisation process identified 10% coverage required, spread to the extent practical across the range of vessels and in space and time, to gain sufficient data.
- Summer coverage is required (black petrels and flesh-footed shearwaters are absent in winter).
- 35 observer days are planned.

Secondary information to be collected

- Information on the nature and extent of inshore trawl interactions with seabirds, mammals, turtles and protected fish species.
- Audit of Protected Species Risk Management Plans and adherence to operational procedures.
- Information on BNS and HAP 1 catch assessments.

Related Research

- Joint industry government initiatives around electronic monitoring.
- Research planned to model black petrel (and flesh-footed shearwater) capture rates as a function of multiple variables potentially affecting interactions with fisheries, including analysis of higher resolution spatial and temporal distributions (of both birds and vessels), and fleet variables such as vessel experience and mitigation.

North-East North Island – Snapper target

Start Date	1 October 2019
Completion Date	31 June 2020
Targeted Statistical Areas	002-010

Project Objectives

1. Collect information to reduce uncertainty associated with the estimated capture rate of at-risk seabird species (primarily black petrels and flesh-footed shearwaters) in inshore bottom longline fisheries targeting snapper.
2. Collect information to improve current estimates of cryptic mortality/ live-release survival in inshore bottom-longline fisheries.
3. Collect information to assess the efficacy of electronic monitoring trial being undertaken in the area.
4. Collect information to evaluate the efficacy of inshore bottom longline mitigation efforts.

Information Needs

The black petrel is identified by the L2 risk assessment as the single most at-risk seabird species from commercial fisheries interactions. Current capture estimates are unrealistically high (mean risk ratio = 19.4) and improved observer coverage is likely to result in a more realistic estimate. In the meantime, however, FNZ and DOC are confident that current impacts are unsustainable, and management action is needed. The primary objective of observer coverage focused on black petrels is to better understand what factors most strongly determine variable capture rates, to support development of mitigation options in bottom longline fisheries (snapper, bluenose and mixed inshore species).

A second at-risk species from inshore bottom longline fisheries is the flesh-footed shearwater (mean risk ratio = 1.32). Risk to this species arises primarily from bottom longline vessels targeting snapper. Due to low historical observer coverage in all inshore bottom longline fishery groups, these risk estimates are subject to considerable uncertainty. Capture rates recorded by fishery observers can be expected to substantially improve these estimates.

If new coverage is unrepresentative (i.e. because vessels of a particular class resist accepting observers, or the presence of an observer biases fisher behaviour), capture rate estimation arising from the new model will be poorly informed, and associated risk estimates are likely to remain uncertain (or possibly biased).

Current estimates of cryptic mortality in inshore bottom longline fisheries rely on observations elsewhere and do not include consideration of post-release survivability for live-captured birds. Fishery-specific observations can be expected to yield substantial improvements. Observer coverage tasked to collect data to characterise interactions and to evaluate the likely fate of birds released alive is a high priority.

Proposed Coverage

- Statistical areas 002, 003, 004, 005, 006, 007, 008, 009, and 010.
- The planning optimisation process identified 10% coverage required, spread to the extent practical across the range of vessels and in space and time, to gain sufficient data.
- Summer coverage is required (black petrels and flesh-footed shearwaters are absent in winter).
- 385 observer days are planned.

Secondary information to be collected

- Information on the nature and extent of inshore trawl interactions with seabirds, mammals, turtles and protected fish species.
- Audit of Protected Species Risk Management Plans and adherence to operational procedures.
- Information on BNS and HAP 1 catch assessments.

Related Research

- Joint industry government initiatives around electronic monitoring.
- Research planned to model black petrel (and flesh-footed shearwater) capture rates as a function of multiple variables potentially affecting interactions with fisheries, including analysis of higher resolution spatial and temporal distributions (of both birds and vessels), and fleet variables such as vessel experience and mitigation.

2.1.2 “Offshore” Fisheries

As for previous years, planning of observer days was conducted jointly with FNZ to identify an overall amount of observer coverage which will meet both agencies goals. Costs were then apportioned to each agency on the basis of how much of the observers’ work in each fishery will be focused on Conservation Services. Typically, the CSP component is 15% of the total days, which reflects the time that observers are likely to spend on protected species tasks. For specific fisheries, such as scampi, Southern blue whiting and squid trawl, this apportioning is increased to 20% to reflect an increased focus on protected species data collection due to specifically identified risks.

These fisheries have generally received higher levels of observer coverage compared to the fisheries discussed in 2.1.1, with coverage levels being dictated by a number of objectives from fisheries management requirements, protected species research and benthic interaction monitoring. Domestic surface longline and scampi fisheries have relatively lower levels of coverage below 10% in recent years. For middle depth trawl fisheries, in order to better reflect the fact that vessels will target multiple species over a single trip, they have been divided on an area basis to both assist in addressing information needs and observer planning.

Planned days for 2019/20 are summarised in the table below (Table 2). These fisheries are monitored to track changes in protected species interactions and mitigation efficacy over time. Data is collected to allow estimation of capture levels and to better understand the nature of protected species interactions in order to develop mitigation solutions.

Table 2. Summary of 2019/20 observer days planned in better known fisheries

Fishery	Stocks	Total Days	FNZ %	FNZ days	CSP %	CSP days
Deepwater trawl fisheries:						
North Island Deepwater	ORH1, ORH2A, ORH2B, ORH3A, BYX2, CDL2, RBY2	100	90%	90	10%	10
Chatham Rise Deepwater	ORH3B, OEO3A, OEO4, BYX3	300	90%	270	10%	30
Sub-Antarctic Deepwater	ORH3B, OEO1, OEO6	120	90%	108	10%	12
West Coast NI Deepwater	ORH7A	100	90%	90	10%	10
Pelagic trawl fisheries:						
West Coast North Island	JMA7, EMA7, BAR7	250	85%	212.5	15%	37.5
Middle Depth trawl fisheries:						
West Coast South Island	HOK1, HAK7, LIN7, SWA1	650	85%	552.5	15%	97.5
Chatham Rise Middle Depth	HOK1, HAK1, HAK4, LIN3, LIN4, SWA3, SWA4, JMA3, BAR1, BAR4, RBT3	650	85%	552.5	15%	97.5
Subantarctic Middle Depth	HOK1, SWA4, WWA5B, BAR5, JMA3, LIN6	500	85%	425	15%	75
Southern blue whiting	SBW6B, SBW6I, SBW6R	400	80%	320	20%	80
Squid	SQU1T, SQU6T	1250	80%	1000	20%	250
Hoki Cook Strait	HOK1	150	85%	127.5	15%	22.5
WCSI Hoki-Inside the line	HOK1	150	85%	127.5	15%	22.5
Scampi	SCI1, SCI2, SCI3, SCI4A, SCI6A	450	80%	360	20%	90
Deepwater bottom longline fisheries:						
Ling Bottom Longline	LIN2, LIN3, LIN4, LIN5, LIN6, LIN 7	400	85%	340	15%	60
Surface longline fisheries:						
Domestic SLL - east coast BIG/SWO	BIG1, SWO1	150	85%	127.5	15%	22.5
Domestic SLL - west coast BIG/SWO	BIG1, SWO1	55	85%	46.8	15%	8.3
Domestic tuna longline - east coast STN	STN1	160	85%	136	15%	24
Domestic tuna longline - west coast STN	STN1	160	85%	136	15%	24
Albacore Troll						
Albacore Troll	FNZ MSC certification	70	100%	-	-	-

Further background to fisheries groupings and the allocation of observer days is provided in the following pages.

PELAGIC AND MIDDLE DEPTH TRAWL FISHERIES

Finfish

Pelagic and middle depth trawl fisheries primarily target hoki, hake, ling, warehou, jack mackerel and southern blue whiting. A large proportion of observer coverage in these fisheries will be targeted at Foreign Owned Vessels, and vessels may often target multiple species in the same trip. The rationale provided here is divided on a geographic and fishery basis to best identify CSP information needs:

West Coast South Island

Coverage will largely be targeted at the 'Hoki season' from July to September. Observers record information on which mitigation techniques are employed in this fishery. Mitigation techniques employed include offal and discard management, and the use of bird scaring devices (legally required for larger vessels). This fleet has had observed interactions with a wide range of seabirds and, historically, has had high levels of fur seal interactions. The fleet can be broadly divided by size, with larger vessels (both domestic and foreign owned vessels) operating outside of the 25nm offshore management area and the smaller fleet operating within 25nm of the coast. Due to the differences in fleet dynamic and bycatch profiles between the smaller and larger vessel fleets coverage levels have been specified separately for each.

Cook Strait

This fishery operates distinctly from other hoki fisheries, in that vessel size is limited to less than 46m. A large number of vessels shift to this fishery from other areas with a short but intense period of fishing taking place. Trips are generally overnight with catch rates of hoki being high. This fishery has also been the site of some of the highest numbers of fur seal captures therefore observer coverage in this fishery has been increased. Observers record information on which mitigation techniques are employed in this fishery. Mitigation techniques employed include offal and discard management, and the use of bird scaring devices (legally required for larger vessels). The fishery typically spans over observer years therefore coverage in the Cook Strait will be targeted at July and August 2019 and May and June 2020.

Chatham Rise

The Chatham Rise middle depth trawl fishery operates in a spatially distinct area to the other middle depth trawl fisheries, and so encounters a different assemblage of protected species. This fishery is operated exclusively by larger vessels. Observers record information on which mitigation techniques are employed in this fishery. Mitigation techniques employed include offal and discard management, and the use of bird scaring devices (legally required for larger vessels). Observer coverage for the period October to May will be spread across SEC and SOE. This coverage will be achieved under a combination of 'Foreign Owned Vessel' and 'Domestic Middle Depth trawl' lines identified in the preceding table.

Subantarctic

The subantarctic middle depth trawl fishery is largely dominated by tows targeting southern blue whiting around the Bounty Islands and Campbell Island where significant captures of both New Zealand sea lions and fur seals have taken place. Observer time will be focussed on monitoring and recording behaviour of and interactions with fur seals and sea lions. Data is also collected on seabird interactions and behaviour due to the location of this fishery and its close vicinity to many seabird breeding islands. The landing of protected coral will also be recorded, and sub-samples will be taken for identification.

Observers are tasked with recording information on which mitigation techniques are employed on vessels to better understand interactions between fishing gear and captures of protected species. Mitigation techniques employed in this fishery include offal and discard management and the use of bird scaring devices.

Due to increased interactions with New Zealand sea lions around Campbell Island, CSP will fund 20% of the observer days in the southern blue whiting portion of the subantarctic fishery, reflecting an increasing focus of observers' time being on protected species observation, particularly marine mammal abundance and behaviour. Overall it is intended that all vessels operating in the southern blue whiting fishery will be observed.

West Coast North Island

This fishery group is dominated by the jack mackerel trawl fishery. Observer time will be focussed on recording protected species interactions and the behaviour of cetaceans, pinnipeds, and seabirds around the vessel. Observers will also record information on which mitigation and avoidance techniques are employed in this fishery. Vessels can employ several techniques aimed at reducing the likelihood of interacting with dolphins, including not fishing during hours of the day when dolphin interactions are more likely, not shooting nets when dolphins are sighted and avoiding a shallow headline depth. During the 2019/20 observer year coverage is planned to target the period October to December and April to June to coincide with key jack mackerel fishing periods.

Scampi

The priority for observers in southern areas will be to monitor interactions with seabirds and New Zealand sea lions. Priority for observations in northern waters will be monitoring of interactions with very high-risk seabirds such as black petrels and flesh-footed shearwaters. In southern waters monitoring of interactions with sea lions and albatross is prioritised. The landing of protected coral will also be recorded, and sub-samples will be taken for identification if required. Data is also collected on seabird interactions and behaviour around vessels. Observers record information on which mitigation techniques are employed in this fishery, including offal and discard retention, the use of bird scaring devices and net restrictors, as well as specific gear configurations used. CSP will fund 20% of observer days in this fishery due to the significant protected species focus of the coverage.

Squid6T

Areas of CSP interest in this fishery include offal and discard management and captures of sea lions and seabirds in trawl nets. Observer placement in 2019/20 will be focussed to monitor interactions from January to May. The CSP Observer Programme will form 20% of days planned for the squid 6T fishery to monitor interactions with protected species and measures to reduce those interactions.

DEEP WATER BOTTOM TRAWL FISHERIES

Orange Roughy and Oreo

Observer time will be focussed on assessing the extent of protected coral landed on vessels as well as monitoring and recording interactions with, and behaviours of, seabirds. Sub-samples of corals will be taken for identification when required. Mitigation techniques employed in this fishery may include offal and discard management, and the use of bird scaring devices. CSP will fund only 10% of observer days in this fishery due to the relatively low workload relating to protected species interactions.

SURFACE LONGLINE FISHERIES

Domestic surface longline

Monitoring priorities for 2019/20 will include collecting information on protected species interactions, mitigation techniques and offal/discard management practices employed in the fishery. Coverage targets in this fishery are laid out in the NPOA-Seabirds 2013. Coverage may also be utilised in relation to CSP mitigation projects relating to seabird bycatch mitigation and the auditing of the protected species risk management plans. Observer coverage will be in AKE, CEE, CHA, and KER to monitor interactions with seabirds and turtles. Coverage will be throughout the year.

BOTTOM LONGLINE FISHERIES

Deep-sea ling

Observer time will be focussed on monitoring and recording interactions with seabirds including captures and behaviour around the vessel. Observers record information on which mitigation techniques are employed in this fishery, including the use of tori lines and line weighting regimes. Observer coverage in 2019/20 will be focussed on smaller bottom longline vessels operating on the Chatham Rise to monitor seabird interactions during September, October, May, and June, though some coverage will be spread over all areas.

CSP OBSERVER PROGRAMME OUTPUTS

1. A descriptive report summarising observer data relating to protected species collected in offshore fisheries and inshore fisheries will be provided to stakeholders as part of the Annual Research Summary (ARS) Reports.
2. Specific information can be requested from CSP at any time and will be delivered within a reasonable timeframe (usually within 10 working days).
3. All seabirds are returned and/or photographed, where possible, for identification and autopsy (see project INT 2019-02: Identification of seabirds captured in NZ fisheries).

4. Data will be available for other DOC and FNZ projects including mitigation development/testing, bycatch estimation, risk management and other modelling projects.

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Indicative Research Cost: See Appendix 1 for details

Cost Recovery: F(CR) Item 8 (100% Industry). This project is observer coverage.

Fish Stocks: See Appendix 1 for details

NOTE: This multi-year project (INT2017-03) was consulted on in 2017/18 and is included here for completeness.

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

Project Code: INT 2017-03

Start Date: 1 July 2017

Completion Date: 30 June 2020

Guiding Objectives: CSP Objectives B, C; National Plan of Action – Sharks; New Zealand sea lion Threat Management Plan.

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 observed captured in New Zealand fisheries (for live captures and dead specimens discarded at sea).

Rationale

The accurate determination of the taxon of marine mammals, turtles and protected fish captured in New Zealand fisheries is vital for examining the potential threat to population viability posed by incidental fisheries captures. Observers on commercial vessels are not always able to identify marine mammals, turtles, and protected fish at sea with high precision, and the assessment of the age-class may require expert knowledge. Information gained through this project will link to 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 is a new project and is designed to complement the existing seabird identification project. Observers routinely collect samples of genetic material from these taxa, and these can be used to resolve uncertain identification determinations from photographs.

Research approach

Where government observers recorded an incidental capture of a marine mammal, turtle, or protected fish generally no specimen is retained. Instead photographic records and a genetic sample are taken. Live interactions are photographed where possible. All photographs obtained, by specimen, will be delivered to a suitable expert for that taxonomic group in electronic format on a quarterly basis. Details on the date, time, location, and fishery of capture will also be provided. Photographs will be examined to determine the following:

- Identification, to the lowest taxonomic level possible;
- Sex (where possible);
- Age (where possible); and
- Provenance (origin) (where possible).

These data will be reported by taxon and fishery stratum (fishing method, fishery area and target species). When a specimen is identified, the identification features used shall be fully described.

Genetic samples of all bycaught marine mammals, turtles and protected fish are routinely collected by observers and where photographic analysis cannot adequately determine taxa, genetic analysis may be undertaken.

Funding will contribute to both expert identification and development of a web-based platform which allows for the pairing of imagery to metadata, which will then be made available to relevant experts.

Outputs

1. A summary of results will be reported, reviewed by the CSP Technical Working Group, and published on an annual basis.
2. Information requested by CSP will be provided within a reasonable timeframe (usually 10 working days).
3. Provision of all data collected in electronic format, suitable for updating Fisheries New Zealand databases and/or other relevant databases.

Note: A three-year term is proposed

Indicative Research Cost: \$15,000 per annum

Cost Recovery: F(CR) Item 4 (100% Industry)

Fish stocks: BAR_{1, 7}, BCO₄, BIG₁, BNS_{1, 2, 3, 7}, BUT_{5, 7}, BWS₁, ELE_{3, 5, 7}, EMA_{1, 3, 7}, FLA_{1, 2, 3, 7}, GMU₁, GSH_{1, 3, 4, 7, 8, 9}, GSP_{1, 7}, GUR_{1, 2, 3, 7, 8}, HAK_{1, 4, 7}, HOK₁, HPB_{1, 2, 3, 4, 7, 8}, JDO_{1, 2, 3, 7}, JMA_{1, 3, 7}, KIN_{1, 7, 8}, LEA_{1, 2, 3}, LIN_{1, 2, 3, 4, 5, 6, 7}, MAK₁, MOK_{1, 3, 5}, MOO₁, ORH_{1, 2A, 2B, 3A, 3B}, OEO_{1, 3A, 4, 6}, PAR_{1, 9}, POR₁, POS₁, RBM₁, RSN_{1, 2}, RIB_{1, 2}, RCO_{1, 3, 7}, RSK_{1, 3, 7, 8}, SBW_{6A, 6R, 6I, 6B}, SCH_{1, 2, 3, 4, 5, 7}, SCI_{1, 2, 4A, 6A, 6B}, SKI_{1, 3, 7}, SNA_{1, 2, 3, 7, 8}, SPD_{1, 3, 4, 5, 7, 8}, SPE_{1, 3, 4, 7}, SPO_{1, 3, 7, 8}, SQU_{1T, 6T}, SSK_{1, 3, 7, 8}, STA_{1, 3, 4, 5, 7}, STN₁, SWA_{1, 3, 4}, SWO₁, TAR_{1, 2, 3, 4, 5, 7, 8}, TOR₁, TRE_{1, 2, 7}, TRU_{3, 4}, WAR_{1, 2, 3, 7, 8}, WWA_{2, 3, 4, 5B, 7}, YEM_{1, 8, 9}.

NOTE: This multi-year project (INT2018-03) was consulted on in 2018/19 and is included here for completeness.

2.3 Improvement in observer photograph protocols and photograph curation⁶

Project Code: INT 2018-03

Start Date: 1 July 2018

Completion Date: 30 June 2020

Guiding Objectives: CSP Objectives A, B, C; National Plan of Action – Seabirds; National Plan of Action – Sharks; New Zealand sea lion and Hector’s and Māui dolphin Threat Management Plans.

Project Objectives:

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

Rationale

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

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

Research approach

Image metadata is currently captured on a handwritten autopsy label, which the observers should include on the photographs. Other observer recorded trip data and forms are either stored in the COD database or in Fisheries New Zealand systems. Due to the metadata being provided via a handwritten label on the photos, collation of metadata requires a manual process. In some cases, no autopsy label is provided on the photograph, requiring extensive efforts to trace the trip, image date, and time details back to information stored in the COD database, the FNZ photographic logs, and or the ‘Benthic Materials’ form to obtain the required metadata for georeferencing.

Given the required image metadata is provided via a handwritten label that the observer includes in the photograph, collating these data will be a manual process unless metadata recording methods are updated. This project will aim to update the at-sea instructions on photographing specimens, including applying a new observer protocols for recording image metadata. Cameras equipped with GPS that are capable of recording and embedding coordinates in the image file metadata as the photograph is taken could provide a solution to this problem. The use of these

⁶ This project description remains the same as what was previously consulted on in the CSP Annual Plan 2017/18, though minor grammatical errors have been corrected in this version.

cameras could make the image processing largely automated, both simplifying the work, and potentially making the process more robust by adding business rules for metadata validation.

Curating the photographs and associated metadata in a database accessible to researchers using the photographs for species identification or other processes will provide better efficiencies for those projects.

Outputs

1. A summary of results will be reported, reviewed by the CSP Technical Working Group, and published on an annual basis.
2. A report describing updated at-sea instructions for photographing specimen and recommendations on implementation.
3. Scoping of an observer image database and a report describing potential development and usability.
4. Provision of all data collected in electronic format, suitable for updating Fisheries New Zealand databases and/or other relevant databases.

Note: A two-year term is proposed

Indicative Research Cost: \$30,000 per annum

Cost Recovery: F(CR) Item 4 (100% Industry)

Fish stocks: BAR_{1, 7}, BCO₄, BIG₁, BNS_{1, 2, 3, 7}, BUT_{5, 7}, BWS₁, ELE_{3, 5, 7}, EMA_{1, 3, 7}, FLA_{1, 2, 3, 7}, GMU₁, GSH_{1, 3}, GSH_{4, 7, 8, 9}, GSP_{1, 7}, GUR_{1, 2, 3, 7, 8}, HAK_{1, 4, 7}, HOK₁, HPB_{1, 2, 3, 4, 7, 8}, JDO_{1, 2, 3, 7}, JMA_{1, 3, 7}, KIN_{1, 7, 8}, LEA_{1, 2, 3}, LIN_{1, 2, 3, 4, 5, 6, 7}, MAK₁, MOK_{1, 3, 5}, MOO₁, ORH_{1, 2A, 2B, 3A, 3B}, OEO_{1, 3A, 4, 6}, PAR_{1, 9}, POR₁, POS₁, RBM₁, RSN_{1, 2}, RIB_{1, 2}, RCO_{1, 3, 7}, RSK_{1, 3, 7, 8}, SBW_{6A, 6R, 6I, 6B}, SCH_{1, 2, 3, 4, 5, 7}, SCI_{1, 2, 4A, 6A, 6B}, SKI_{1, 3, 7}, SNA_{1, 2, 3, 7, 8}, SPD_{1, 3, 4, 5, 7, 8}, SPE_{1, 3, 4, 7}, SPO_{1, 3, 7, 8}, SQU_{1T, 6T}, SSK_{1, 3, 7, 8}, STA_{1, 3, 4, 5, 7}, STN₁, SWA_{1, 3, 4}, SWO₁, TAR_{1, 2, 3, 4, 5, 7, 8}, TOR₁, TRE_{1, 2, 7}, TRU_{3, 4}, WAR_{1, 2}, WAR_{3, 7, 8}, WWA_{2, 3, 4, 5B, 7}, YEM_{1, 8, 9}.

2.4 Identification of seabirds captured in New Zealand fisheries

Project Code: INT 2019-02

Start Date: 1 July 2019

Completion Date: 30 June 2022

Guiding Objectives: CSP Objectives B, C; National Plan of Action – Seabirds.

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

Research approach

Specific objectives 1-4

Dead birds returned by government observers will be delivered, suitably packaged and labelled, to the contractor. Observers make note of the circumstances of capture and provide a tentative identification. Seabirds returned will be examined to determine the following:

- Species identification and classification;
- Sex;
- Molt and brood patch development as a partial indicator of breeding status;
- Age;
- Provenance (origin) (where possible);
- Subcutaneous fat score as an index of body condition;
- Stomach and gizzard contents; and
- General body condition including any signs of injury and cause of death (where possible).

The data will be reported on by species and fishery stratum (fishing method, fishery area and target species). The methodologies used in examining the specimens and categorising them into different groups shall be fully described. Differences in research protocols compared to previous necropsy research on New Zealand seabirds returned from fisheries shall be fully detailed and the implications of any differences discussed.

Feather samples will be collected from bycaught seabirds and analysed to allow genetic determination of identification of specimens of difficult to identify species groups (e.g. wandering albatrosses).

Specific objective 5

Where government observers recorded an incidental bird capture and no specimen is retained (either live captures or discarded dead birds), all photographs obtained, by specimen, will be delivered to the contractor in electronic format. Details of the date, time, location and fishery of capture will also be provided. Photographs will be examined to determine the following:

- Identification and classification, to the lowest taxonomic level possible;
- Sex (where possible);
- Age (where possible); and
- Provenance (origin) (where possible).

These data will be reported by taxon and fishery stratum (fishing method, fishery area and target species). When a specimen is identified and separated from similar species, the identification features used shall be fully described.

Outputs

1. A summary of results will be reported, for circulation to stakeholders, on a quarterly basis.
2. Information requested by CSP will be provided within a reasonable timeframe (usually 10 working days).
3. Annual report(s) of confirmed identification, sex, age, provenance and all other data collected, of all specimens examined. To the extent possible, the final report will also identify potential interactions between seabirds and fishing gear and identify factors that may have contributed to seabird mortality. Data will be reported by fishery stratum (fishing method, fishery area and where possible target species).
4. Presentation of six monthly and annual reports to the CSP Technical Working Group.
5. Provision of all data collected in electronic format, suitable for updating Fisheries New Zealand databases and/or other relevant databases.

Note: A three-year term is proposed

Indicative Research Cost: \$100,000 per annum

Cost Recovery: F(CR) Item 4 (100% Industry)

Fish stocks: BAR_{1, 7}, BIG₁, BNS_{1, 2, 3, 7}, BUT_{5, 7}, BWS₁, ELE_{3, 5, 7}, EMA_{1, 3, 7}, FLA_{1, 2, 3, 7}, GMU₁, GSH_{1, 3, 4, 7, 8, 9}, GSP_{1, 7}, GUR_{1, 2, 3, 7, 8}, HAK_{1, 4, 7}, HOK₁, HPB_{1, 2, 3, 4, 7, 8}, JDO_{1, 2, 3, 7}, JMA_{1, 3, 7}, KIN_{1, 7, 8}, LEA_{1, 2, 3}, LIN_{1, 2, 3, 4, 5, 6, 7}, MAK₁, MOK_{1, 3, 5}, MOO₁, ORH_{1, 2A, 2B, 3A, 3B}, OEO_{1, 3A, 4, 6}, PAR_{1, 9}, POR₁, POS₁, RBM₁, RSN_{1, 2}, RIB_{1, 2}, RCO_{1, 3, 7}, RSK_{1, 3, 7, 8}, SBW_{6A, 6R, 6I, 6B}, SCH_{1, 2, 3, 4, 5, 7}, SCI_{1, 2, 4A, 6A, 6B}, SKI_{1, 3, 7}, SNA_{1, 2, 3, 7, 8}, SPD_{1, 3, 4, 5, 7, 8}, SPE_{1, 3, 4, 7}, SPO_{1, 3, 7, 8}, SQU_{1T, 6T}, SSK_{1, 3, 7, 8}, STA_{1, 3, 4, 5, 7}, STN₁, SWA_{1, 3, 4}, SWO₁, TAR_{1, 2, 3, 4, 5, 7, 8}, TOR₁, TRE_{1, 2, 7}, TRU_{3, 4}, WAR_{1, 2, 3, 7, 8}, WWA_{2, 3, 4, 5B, 7}, YEM_{1, 8, 9}.

2.5 Characterisation of marine mammal interactions

Project Code: INT 2019-03

Start Date: 1 July 2019

Completion Date: 30 June 2020

Guiding Objectives: CSP Objectives A, B; CSP Marine Mammal Plan; New Zealand sea lion and Hector's and Māui dolphin Threat Management Plans.

Project Objectives:

1. To characterise the nature and extent of marine mammal captures in New Zealand commercial fisheries.
2. To identify and assess the current mitigation techniques for reducing incidental marine mammal captures domestically and internationally and make recommendations as to their applicability and suitability in the New Zealand market.

Rationale

The Marine Mammal Risk Assessment⁷ included 35 species of marine mammals that inhabit New Zealand waters. Five of these species are classified under the New Zealand Threat Classification System⁸ as Not Threatened, two as At Risk, Naturally Uncommon, one as At Risk-Recovering, two as Nationally Vulnerable, one as Nationally Endangered and four as Nationally Critical, with the remaining species classified as Data Deficient as not enough information exists to properly determine their threat status.

Not all marine mammals have been observed interacting with commercial fisheries in New Zealand. Most beaked whales and large whales (except for Humpback whales) have a relatively low incidence of being bycaught. While prior work has been conducted for specific fisheries, (e.g. MIT2012-03), there is a need for holistic analyses of the overall nature of marine mammal interactions. This project will support the work being done through the International Whaling Commission's Bycatch Mitigation Initiative.

Research approach

This project seeks to analyse long-term bycatch data to identify changes in marine mammal interactions over time and if there is reasoning behind these. Analysis could also include, but is not limited to, identifying if any temporal/spatial/seasonal patterns are apparent and exploring these more comprehensively.

This project will also examine the development of method and species-specific mitigation options for each protected marine mammal species known to interact with commercial fisheries and will also investigate if anecdotal information exists in relation to ways to avoid or reduce marine mammal interactions.

Outputs

1. A technical report detailing the characterisation of marine mammal captures in New Zealand commercial fisheries, including methods used, and an assessment of current mitigation techniques used worldwide (and their applicability to the New Zealand market) for reducing marine mammal captures.
2. Data obtained, suitable for use in further analyses such as fisheries risk assessment.

Note: A one-year term is proposed

⁷ Available for download from <https://fs.fish.govt.nz/Page.aspx?pk=113&dk=24554>

⁸ Available for download from <https://www.doc.govt.nz/globalassets/documents/science-and-technical/nztcs29entire.pdf>

Indicative Research Cost: \$25,000

Cost Recovery: F(CR) Item 4 (100% Industry)

Fish stocks: BAR_{1, 5, 7}, BIG₁, BUT₅, CRA_{4, 5, 7}, ELE₃, HAK_{1, 7}, HOK_{1E}, HOK_{1W}, HPB₃, JDO₁, JMA₇, LIN_{1, 5, 6, 7}, ORH_{3B}, HPB₃, RBT₇, SBW_{6A, 6B}, SCH_{3, 5}, SCI_{6A}, SCI_{4A}, SPO₃, SNA_{1, 2}, SQU_{6T}, SQU_{1T}, STN₁, SWA_{3, 4}, TAR_{1, 8}, TRE₇, WAR_{3, 8}, WWA_{5B}.

2.6 Identification and storage of cold-water coral bycatch specimens

Project Code: INT 2019-04

Start Date: 1 July 2019

Completion Date: 30 June 2022

Guiding Objectives: CSP Objectives B, C, E.

Project Objectives:

1. Identify coral bycatch that cannot be identified by Government fisheries observers to the finest taxonomic level (assign codes to coral specimens to the species level wherever possible, when this is not possible; identify specimens to genus or family level).
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 is unable to be identified by government Fisheries Observers to the finest taxonomic level provides vital baseline information that can help to better inform research and marine protection such as predictive modelling, benthic risk assessments and management of benthic marine protected species.

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.

Research approach

A catalogue of Observer collected coral samples will be created and maintained. These samples will be verified taxonomically by domestic experts at regular intervals throughout the year. In addition to this (when possible), visiting international coral experts will refine the taxonomic identification even further. The updated taxonomic identification of the bycatch samples will then be shared with Fisheries New Zealand for them to update this information in the COD database.

Observer briefings, manuals, and training material will be revised based on outputs of this project in order to continue to improve the accuracy of at-sea identification.

Outputs

1. Records and imagery of previously unidentified cold-water coral bycatch obtained by government funded Fisheries Observers within the New Zealand EEZ.
2. Creation and maintenance of a catalogue of Observer collected coral samples.

3. Report(s) detailing confirmed identification, provenance, and all other data collected, for all specimens examined. Data will be reported by fishery stratum (fishing method, fishery area, and, where possible, target species).
4. Updated coral identification guides for use in training government Fisheries Observers.

Note: A three-year term is proposed

Indicative Research Cost: \$60,000 per annum

Cost Recovery: F(CR) Item 4B (100% Industry)

Fish stocks: BAR_{1, 5}, BYX_{1, 2}, HAK₁, HOK₁, JM_{3, 8}, LIN_{1, 5, 6}, ORH_{1, 2A, 2B, 3A, 3B}, OEO_{4 6}, SBW_{6A, 6R, 6I, 6B}, SCI_{4A}, SQU_{1T, 6T}, SWA_{3, 4}, WWA_{5B}.

2.7 Coral biodiversity in deepwater fisheries bycatch

Project Code: INT 2019-05

Start Date: 1 July 2019

Completion Date: 30 June 2020

Guiding Objectives: CSP Objectives B, E.

Project Objective:

To use DNA sequencing of Observer-sampled octocoral specimens to genetically quantify the species-level diversity contained within deepwater fisheries bycatch, to improve understanding of fishery impacts

Rationale

The diversity and relationship of protected octocoral species impacted by deepwater fisheries is not currently understood since morphological identification by observers and taxonomic experts often only places specimens within higher taxonomic rankings (e.g., to family- or genus-level), and relies on comparisons to existing species descriptions. This research would use genetic barcoding to establish how many distinct and potentially new/cryptic species are present among recent Observer collections deposited within the NIWA Invertebrate Collection (NIC), and their relationships to NIC reference material.

Under the DOC Coral Identification Project, coral tissue samples have been taken from Observer-collected bycatch specimens for genetic identification. The NIC holds at least 169 coral tissue samples, of which 74 are octacorals. Only 14 of these octacorals are assigned a species name.

Research approach

This project will use DNA sequence data to infer the identity of the 74 octocoral specimens and their relatedness to similar NIC reference specimens, plus related species for which sequence data is available. The samples were collected following specific protocols for genetic study and thus should be amenable to DNA sequencing of two barcode genes that are capable of distinguishing species (*mtMutS* and 28S rDNA). Including reference material, 100 samples will be sequenced in total.

Outputs

1. A summary detailing methods and results will be reported, reviewed by the CSP Technical Working Group, and made available on the CSP report webpage.
2. Provision of all data collected in electronic format.

Note: A one-year term is proposed

Indicative Research Cost: \$22,000

Cost Recovery: F(CR) Item 4B (100% Industry)

Fish stocks: BAR1, 5, BYX1, 2, HAK1, HOK 1, JM3, 8, LIN1, 5, 6, ORH1, 2A, 2B, 3A, 3B, OEO4 6, SBW 6A, 6R, 6I, 6B, SCI4A, SQU1T, 6T, SWA3, 4, WWA5B.

2.8 Post-release survival of seabirds

Project Code: INT 2019-06

Start Date: 1 July 2019

Completion Date: 30 June 2020

Guiding Objectives: CSP Objectives B, C, E.

Project Objectives:

1. To investigate options for assessing the post-release survival of seabirds that interact with commercial fisheries in New Zealand.
2. To identify operational, biological and environmental factors which may constrain the assessment of post-release survival of seabirds using tracking tags or other means.
3. To provide recommendations on the most effective methods to assess post-release survival of seabirds.

Rationale

Currently, the fate of seabirds post-interaction are unknown beyond life state at release. Live-release seabird interactions may result in injuries or stress, limiting the likelihood of long-term survival. To improve estimates of true mortality rate due to commercial fishing interactions there is a need to reduce uncertainty around the fate of seabirds post-release across species and interaction types.

Further research in this area could substantially refine post release mortality estimates and the factors which drive it.

Research approach

This project will consist of an initial literature review and a subsequent expert workshop to investigate the options, including tagging or tracking, available to undertake a more comprehensive research project to determine the fate of live-released seabirds. This study will assess similar research conducted, both nationally and internationally, to ascertain a fit-for-purpose method/s for measuring seabird survival post-release. Options need to be assessed based on set criteria such as longevity, visibility, cost-effectiveness and impact to the animal. This study will also provide recommendations on the methodology and effective time-period for the subsequent research project.

Output

1. Report detailing the identified options for assessing the post-release survival of seabirds and recommended method(s).

Note: A one-year term is proposed

Indicative Research Cost: \$10,000

Cost Recovery: F(CR) Item 4 (100% Industry)

Fish stocks: BAR_{1, 7}, BIG₁, BNS_{1, 2, 3, 7}, BUT_{5, 7}, BWS₁, ELE_{3, 5, 7}, EMA_{1, 3, 7}, FLA_{1, 2, 3, 7}, GMU₁, GSH_{1, 3, 4, 7, 8, 9}, GSP_{1, 7}, GUR_{1, 2, 3, 7, 8}, HAK_{1, 4, 7}, HOK₁, HPB_{1, 2, 3, 4, 7, 8}, JDO_{1, 2, 3, 7}, JMA_{1, 3, 7}, KIN_{1, 7, 8}, LEA_{1, 2, 3}, LIN_{1, 2, 3, 4, 5, 6, 7}, MAK₁, MOK_{1, 3, 5}, MOO₁, ORH_{1, 2A, 2B, 3A, 3B}, OEO_{1, 3A, 4, 6}, PAR_{1, 9}, POR₁, POS₁, RBM₁, RSN_{1, 2}, RIB_{1, 2}, RCO_{1, 3, 7}, RSK_{1, 3, 7, 8}, SBW_{6A, 6R, 6I, 6B}, SCH_{1, 2, 3, 4, 5, 7}, SCI_{1, 2, 4A, 6A, 6B}, SKI_{1, 3, 7}, SNA_{1, 2, 3, 7, 8}, SPD_{1, 3, 4, 5, 7, 8}, SPE_{1, 3, 4, 7}, SPO_{1, 3, 7, 8}, SQU_{1T, 6T}, SSK_{1, 3, 7, 8}, STA_{1, 3, 4, 5, 7}, STN₁, SWA_{1, 3, 4}, SWO₁, TAR_{1, 2, 3, 4, 5, 7, 8}, TOR₁, TRE_{1, 2, 7}, TRU_{3, 4}, WAR_{1, 2, 3, 7, 8}, WWA_{2, 3, 4, 5B, 7}, YEM_{1, 8, 9}.

3. Population Projects

NOTE: This multi-year project (POP2017-03) was consulted on in 2017/18 and is included here for completeness. The project had originally been planned for the period 2017-2019 but was postponed to 2018-2020 due to operational constraints.

3.1 Salvin's albatross: Bounty Islands population project

Project code: POP2017-03

Start Date: 1 July 2018

Completion Date: 30 June 2020

Guiding Objectives: CSP Objective E; CSP seabird plan 2017; National Plan of Action – Seabirds.

Project Objectives:

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

Rationale

The Conservation Services Programme Seabird medium term research plan 2017 (CSP seabird plan 2017) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and NPOA – Seabirds Objectives. It was developed at the request of the CSP Research Advisory Group. Key components of research described in the CSP seabird plan 2017 for delivery in 2017/18 were identified and prioritised by the CSP RAG. This proposal covers prioritised components involving field work for Salvin's albatross at the Bounty Islands. Recent population estimates of Salvin's albatross at the Bounty Islands (part of CSP project POP2012-06) using ground and aerial methods found contrasting evidence in regard to population trend. The at-sea foraging distribution of this population is described from only a small sample size of individuals due to device failure in a recent study (also part of POP2012-06).

Research approach

This project was designed following recommendations from a methodology workshop undertaken as part of project POP2016-06. This two-year project will deliver the following summary recommendations from the workshop:

- Satellite mapping of Bounty Islands to allow area of occupancy to be quantified (year one).
- Aerial photographic survey to estimate total number of breeding pairs and area of occupancy.
- Ground visit across both years, coinciding with aerial surveying to allow ground truthing.
- Focus on GLS deployments in year one, with trial of PPT/GPS transmitting device deployment.
- Focus on GLS retrieval in year two, and additional PPT/GPS transmitting device deployment.
- Identify any potential constraints limiting breeding success.

- Band and resight birds with potential to establish a study site area on Proclamation Island (easiest access and most existing data).

Outputs

1. A technical report (or reports) detailing methods used and results found, including an updated population estimate and the foraging distribution of Salvin's albatross from the Bounty Islands.
2. Data obtained, including spatial distribution data suitable for use in fisheries risk assessment.

Note: A three-year term is proposed

Indicative Research Cost: \$120,000 per annum

Cost Recovery: F(CR) Item 3 (50% Industry 50% Crown)

Fish stocks: BAR_{1,4}, BIG₁, GUR₃, HOK₁, JMA₃, LIN₃, OEO_{3A}, OEO₄, ORH_{3B}, SBW_{6B}, SCI_{3A}, SCI_{4A}, SWA_{3,4}

NOTE: This multi-year project (POP2017-04) was consulted on in 2017/18 and is included here for completeness.

3.2 Seabird population research: Auckland Islands 2017-20⁹

Project code: POP2017-04

Start Date: 1 July 2017

Completion Date: 30 June 2020

Guiding Objectives: CSP Objective E; CSP seabird plan 2017; National Plan of Action – Seabirds.

Project Objective:

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

Specific Objectives:

Objective	Species	Target biological information
1	Gibson’s albatross	A - Adult survival and other demographic parameters (Adams Island) B - Population size
2	White-capped albatross	A - Adult survival and other demographic parameters (Disappointment Island) B - Population size

Rationale

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

Species specific objectives and research approach

Gibson’s albatross – the first objective (Objective 1A) is to continue the mark-recapture study on Adams Island (Auckland Islands) to collect information on key demographic parameters. This will follow established methods (Walker & Elliot 1999, 2005).

The second objective is to estimate the total population size at the Auckland Islands (Objective 1B). The research approach will be based on exploratory work and recommendations from Elliott et al (2016) and Baker et al (in prep).

In prioritising resources for this project, priority will be given to work under Objective 1A over work under Objective 1B.

⁹ This project description remains the same as what was previously consulted on in the CSP Annual Plan 2017/18, though minor grammatical errors have been corrected in this version.

Outputs – a report describing research undertaken to estimate the population size for the Auckland Islands; a report describing the mark-recapture research completed; data collected.

Previous CSP population projects on Gibson’s albatross include POP2016-02, POP2015-03, POP2014-02, POP2013-03, POP2012-07, POP2004-02 and BRD2001-01.

Note: Gibson’s albatross has been identified as a potential indicator species by DOC (Monks et al. 2013), and data collected by this study may be used as part of DOC’s reporting on indicator species.

White-capped albatross – the key focus will be to collect re-sight data from a study colony established on Disappointment Island to contribute to the estimation of key demographic parameters (2A). Methods will follow those established during the establishment of the study colony (Parker et al, in prep).

A secondary objective is to estimate the population size by aerial photographic survey (Objective 2B), using established methods (Baker et al 2013).

In prioritising resources for this project, priority will be given to work under Objective 2A over work under Objective 2B.

Outputs – a report describing the research undertaken; a summary report describing the aerial survey; data collected.

Previous CSP population projects on white-capped albatross include POP2016-02, POP2015-03, POP2014-02, POP2013-02, POP2012-05 and POP2005-02.

References

- Baker, B. Jenz, K., Cunningham, R. 2013. White-capped albatross population estimate - 2011/12 and 2012/13. Research report for Department of Conservation, Wellington. Available for download from <http://www.doc.govt.nz/conservation/marine-and-coastal/conservation-services-programme/csp-reports/2012-13/white-capped-albatross-population-estimate-2013/>
- Baker, B. et al (in prep). Aerial survey for Gibson’s albatross on Adams Island, 2016. Report prepared for the New Zealand Department of Conservation, Wellington.
- Elliott, G., Walker, K., Parker, G., Rexer-Huber, K. 2016. Gibson's wandering albatross census and population study 2015/16. Report prepared for the New Zealand Department of Conservation, Wellington. 19p. Available for download from <http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/gibsons-wandering-albatross-survey-auckland-islands-2015-16/>
- Monks, J.M.; O'Donnell, C.F.J.; Wright, E.F. 2013: Selection of potential indicator species for measuring and reporting on trends in widespread native taxa in New Zealand. DOC Research and Development Series 338. Department of Conservation, Wellington. 18 p.
- Walker, K.; Elliott, G. 1999: Population changes and biology of the wandering albatross *Diomedea exulans gibsoni* at the Auckland Islands. Emu 99: 239-247.
- Walker, K.; Elliott, G. 2006: At-sea distribution of Gibson’s and Antipodean wandering albatrosses, and relationships with long-line fisheries. Notornis 53 (3): 265-290.

Note: A three-year term is proposed

Indicative Research Cost: \$90,000 per annum

Cost Recovery: F(CR) Item 3 (50% Industry 50% Crown)

Fish Stocks:

Objective/Species	Indicative Cost	Fish Stocks
1 Gibson’s albatross	\$60,000	ALB1, BIG1, STN1, SWO1

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2	White-capped albatross	\$30,000	BAR5, 7 BIG1, HOK1, SCI6A, SQU1T, 6T, STN1, SWA4
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NOTE: This multi-year project (POP2018-01) was consulted on in 2018/19 and is included here for completeness.

3.3 Improved habitat suitability modelling for protected corals in New Zealand waters

Project code: POP2018-01

Start Date: 1 July 2018

Completion Date: 30 June 2020

Guiding Objectives: CSP Objectives B, C.

Project Objective:

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

Rationale

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

Research approach

Additional information is available to inform distribution modelling of protected corals. This project will build on work carried out by Anderson et al. (2014) and will include updated datasets of observer presence records for protected corals, recent research and biodiversity trawl survey data for protected corals, revised and extensive regional environmental data layers, and the updated trawl footprint for the region. Catch effort data will be considered.

Outputs

1. Data on coral distribution in an electronic format suitable for use in risk assessment.
2. A technical report describing the methods used along with maps of the presence and predicted distribution of protected corals in relation to commercial fishing effort.
3. Recommendations for any future research required to further improve the estimation of risk to protected corals from commercial fishing.

References

Anderson, O., Tracey, D., Bostock, H., Williams, M., and Clark, M. 2014. Refined habitat suitability modelling for protected coral species in the New Zealand EEZ. Report prepared by the National Institute of Water and Atmospheric Research for the New Zealand Department of Conservation, Wellington. 46p. Available for download from: <http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2013-14/protected-coral-distribution-modelling-2014/>

Note: A two-year term is proposed

Indicative Research Cost: \$30,000 per annum

Cost Recovery: F(CR) Item 3 (50% Industry 50% Crown)

Fish stocks: HOK1, ORH1, 2A, 2B, 3A, 3B, OEO1, 3A, 4, 6, SBW6A, 6R, 6I, 6B, SQU1T, 6T.

NOTE: This multi-year project (POP2018-02) was consulted on in 2018/19 and is included here for completeness.

3.4 Hoiho population and tracking project

Project Code: POP 2018-02

Start Date: 1 July 2018

Completion Date: 30 June 2020

Guiding Objectives: CSP Objective E; CSP seabird plan 2017; National Plan of Action – Seabirds.

Project Objectives

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

Rationale

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

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

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

Research approach

Stage one of the work will be to expand existing compiled information, synthesising additional unpublished data by working in collaboration with relevant researchers.

Field work will be conducted at key poorly studied colonies in order to collect demographic and dietary data. Comparisons will be made between sites, both mainland and subantarctic, and where possible, it will be compared to historical data. GPS, dive logger and potentially camera equipment will be applied to a subset of birds to gain fine scale movement, dive and behavioural data across a range of sites. This will identify key spatial, diurnal and seasonal overlap with fisheries informing management options for both direct and indirect effects of fisheries.

Findings will be incorporated into wider hoiho management processes.

DOC funding will be used to further support this project by providing a number of GPS tags for deployment

Outputs

1. A technical report describing the development of the proposed methodology.
2. Provision of tracking data for DOC.
3. Recommendations for further population monitoring priorities at key sites.

References

- Ellenberg, U., Mattern, T. 2012. Yellow-eyed penguin – review of population information. Report to the Department of Conservation. Available at <http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-conservation-services/pop-2011-08-yellow-eyed-penguin-population-information-review.pdf>
- Webster, T. 2018. The Pathway ahead for hoiho | Te ara whakamua. A report on the impacts facing hoiho \ yellow-eyed penguins: literature review and recommendations. Yellow-eyed Penguin Trust, Dunedin, New Zealand.

Note: A two-year term is proposed

Indicative Research Cost: \$60,000 per annum (plus \$20,000 additional DOC contribution to tags)

Cost Recovery: F(CR) Item 3 (50% Industry 50% Crown)

Fish stocks: BAR₁, BCO_{3, 5}, BNS₃, BUT₅, ELE_{3, 5}, FLA₃, GUR₃, MOK_{3, 5}, PAD_{3,5}, SCA_{3, 5}, STA_{3, 5}, TAR_{3, 5}, WAR₃.

NOTE: This multi-year project (POP2018-03) was consulted on in 2018/19 and is included here for completeness.

3.5 New Zealand Sea Lion: Auckland Islands pup count

Project code: POP2018-03

Start Date: 1 July 2018

Completion Date: 30 June 2022

Guiding Objectives: CSP Objective E; New Zealand sea lion Threat Management Plan.

Project Objectives

1. To estimate New Zealand sea lion pup production at Enderby, Figure of 8 and Dundas Islands.
2. To update the New Zealand sea lion database.

Rationale

New Zealand sea lions are classified as Nationally Critical (Baker et al. 2010), and are incidentally killed each year in southern commercial trawl fishing operations targeting species including squid, scampi, and southern blue whiting. The foraging areas of New Zealand sea lions at the Auckland Islands have been shown to overlap with commercial trawl fishing activity, particularly SQU6T and SCI6A. Approximately 70% of New Zealand sea lions breed at the Auckland Islands, where population data have been collected since the mid-1990s, including estimates of pup production and re-sighting of marked animals.

Since 2001 there has been a considerable decline in pup production at the Auckland Islands. A literature review to identify potential indirect effects of commercial fishing on the Auckland Islands population as part of CSP project POP2010-01 (Bowen 2012) highlighted a number of key information gaps that currently prevent a full understanding of any such potential indirect effects, including time series data of population dynamics as collected in this project. CSP project POP2012-02 analysed population data collected during previous years in order to determine the key demographic factors driving the observed population decline of New Zealand sea lions at the Auckland Islands. It found that low pupping rates, a declining trend in cohort survival to age 2 and low adult survival may explain declining pup counts in one studied population (Roberts et al. 2014).

The New Zealand sea lion Threat Management Plan sets in place a holistic range of research, monitoring and management actions for New Zealand sea lions both at the Mainland / Stewart Island and the sub-Antarctic Islands. This research project, funded through CSP, forms a component of that wider suite of work and is scoped to collect pup count information required to manage the impact of commercial fishing on the Auckland Islands population, in line with CSP Objective E. It is envisaged that other research, and/or management actions, progressed as part of the TMP, will be delivered alongside the research programme proposed here to provide logistical synergies.

Research Approach

Pup production at Dundas and Enderby Island has historically been estimated using a range of methods including aerial (Baker et al. 2013) and ground-based mark-recapture methods (Chilvers 2012; Childerhouse et al. 2013). For the purposes of the CSP in 2017/18 it is proposed that a ground-based pup count only be conducted, over a shorter field season than previously undertaken. Depending on logistical constraints, pup production at Figure of 8 Island will be by direct count following established methods (Chilvers 2012; Childerhouse et al. 2013).

It is intended that other objectives such as re-sightings, disease monitoring, and pup survival estimations will be considered and potentially undertaken as part of the outputs of the New Zealand sea lion Threat Management Plan.

Outputs

1. Data collected, in an electronic format suitable for upload into the New Zealand sea lion database.
2. New Zealand sea lion database updated and made available to relevant investigators. Any changes to the structure of the database must be fully documented.
3. A technical report (or reports) detailing the methods used, a summary of data collected and estimates of New Zealand sea lion pup production at the Auckland Islands.

Note: Maximum cost efficiencies will be achieved through aligned delivery with subantarctic projects, particularly in relation to transport logistics. Previous CSP projects on New Zealand sea lion population data collection include: POP2017-05, POP2016-07, POP2015-05, POP2014-01, POP2013-01, POP2012-01, POP2012-02, POP2011-01, POP2010-01, POP2007-01, POP2006-01, POP2005-01, POP2004-01, MAM2002-1, MAM2001-1 and MAM2000-1. See also POP2012-02.

References

- Baker C.S., Chilvers B.L., Constantine R., DuFresne S., Mattlin R., van Helden A., Hitchmough R. 2010. Conservation status of New Zealand Marine Mammals (suborders Cetacea and Pinnipedia), 2009. *New Zealand Journal of Marine & Freshwater Research* 44:101-115.
- Baker, B., Jenz, K., Chilvers, L. 2013. Aerial survey of New Zealand sea lions – Auckland Islands 2011/12. Report prepared Department of Conservation. Available for download from: <http://www.doc.govt.nz/conservation/marine-and-coastal/conservation-services-programme/csp-reports/2012-13/new-zealand-sea-lion-aerial-survey-2013/>
- Bowen, W.D. 2012. A review of evidence for indirect effects of commercial fishing on New Zealand sea lions (*Phocarcos hookeri*) breeding on the Auckland Islands. Report of Department of Conservation, Wellington. 41 p. Available for download at <http://www.doc.govt.nz/conservation/marine-and-coastal/conservation-services-programme/csp-reports/2010-11/review-of-indirect-effects-of-fishing-on-new-zealand-sea-lions/>
- Childerhouse SJ, Amey J, Hamer D, McCrone A 2013. Final report for CSP Project 4426 New Zealand sea lion ground component 2012/13. Report to the Department of Conservation, Wellington, New Zealand. Version 1.2. 26 p. Available to download from <http://www.doc.govt.nz/conservation/marine-and-coastal/conservation-services-programme/csp-reports/2012-13/new-zealand-sea-lion-ground-survey-2013/>
- Chilvers, B.L. 2012. Research to assess the demographic parameters of New Zealand sea lions, Auckland Islands 2011/12. Final Research Report, November 2012. Department of Conservation, Wellington. Available for download <http://www.doc.govt.nz/conservation/marine-and-coastal/conservation-services-programme/csp-reports/2011-12/new-zealand-sea-lion-research-auckland-islands-2011-12/>
- Roberts, J., Fu, D., Doonan, I., & Francis, C. 2014. New Zealand sea lion: demographic assessment of the causes of decline at the Auckland Islands. Demographic model options: demographic assessment. Report prepared by NIWA for the Department of Conservation, Wellington. 142p.

Note: A four-year term is proposed

Indicative Research Cost: \$100,000 per annum

Cost Recovery: F(CR) Item 2 (90% Industry 10% Crown)

Fish Stocks: SQU6T, SCI6A.

NOTE: This multi-year project (POP2018-04) was consulted on in 2018/19 and is included here for completeness.

3.6 Flesh-footed shearwater: Population Monitoring

Project code: POP2018-04

Start Date: 1 July 2018

Completion Date: 30 June 2021

Guiding Objectives: CSP Objectives E; CSP seabird plan 2017; National Plan of Action – Seabirds.

Project Objectives

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

Rationale

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

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

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

Tracking of flesh-footed shearwaters in 2017-18 has shown that these birds can exhibit broad variability in foraging behaviour with birds tracked in 2018 travelling much further offshore than those tracked in 2017. A project to track birds from both a Hauraki Gulf colony (Lady Alice Island) and a Bay of Plenty colony (Ohinau Island) in the same breeding season will determine whether birds from these populations mix at sea during incubation and early chick rearing

periods. Also, this will help improve our understanding of fisheries risk by assessing the relative rates of inshore (<50km offshore) versus pelagic (>50km offshore) foraging trips.

Research Approach

A survey of Motumahanga Island colony (near New Plymouth) is proposed for January 2019 to meet Objective 1. Obtaining a robust quantitative estimate for this site for the first time since 1989 will help inform management about any potential impacts from local fisheries to this population.

Quantitative surveys of flesh-footed shearwater burrows on each island in the Chickens island group will be conducted between 2018 and 2021, where possible using methods consistent with Baker et al. 2010 and Waugh et al 2013. Lady Alice/Mauimua Island will be surveyed in Dec 2018-Jan 2019, Whatupuke Island in January 2020 and Coppermine Island in January 2021. Occupancy rates will be determined for each site in a standardised period of early-mid January (during the mid-incubation period).

Waugh et al. (2014) and Crowe et al. (2017) provided advice on population monitoring required to estimate adult survival, juvenile survival, fecundity, and age of first reproduction of flesh-footed shearwaters. Objective 3 of this project will build on these recommendations, conducting further demographic mark-recapture field work at the established study sites at Lady Alice/Mauimua and Ohinau Island, and increasing the sample size of marked adults and chicks at these colonies. The data collected over three breeding seasons (2018/19, 2019/2020 and 2020/21) will provide improved knowledge of key demographic parameters including adult and juvenile survival and recruitment of juveniles back at study colonies.

Detailed data on the at-sea distribution and foraging behaviour of flesh-footed shearwaters was reported from Ohinau Island during late incubation and early chick rearing (Jan-Feb 2014) by Waugh et al. (2014), and from early chick rearing on Lady Alice/Mauimua Island in Feb 2017 (Kirk et al. 2017). Objective 4 of this project would expand on this past work by simultaneous GPS tracking of a sample of 25 birds per site at Lady Alice/Mauimua and Ohinau Islands in the first half of incubation (early Dec 2018 to mid-January 2019) and during chick-rearing (mid-February to mid-March 2019). This will look at overlap in foraging locations between sites and interannual differences in foraging distribution and behaviour.

Objective 5 will repeat the observations made in Dec 2016 on Ohinau Island of egg-laying dates in flesh-footed shearwaters (Bell et al. 2017) to assess inter-island and inter-annual variation in egg-laying activity. Study nests will be monitored on both Lady Alice/Mauimua and Ohinau Islands from 1-22 Dec 2018 to quantify egg-laying dates.

Outputs

1. A technical report (or reports) detailing methods used and results found, including an updated population estimates for four islands, updated estimates of key demographic parameters (survival of marked birds and breeding pairs, occupancy rates, breeding success and the foraging distribution of Lady Alice and Ohinau breeding flesh-footed shearwaters.
2. Data obtained, including all banding records of adults and chicks, and spatial distribution data suitable for use in fisheries risk assessment.

References

Baker, B., Hedley, G., Cunningham, R. 2010. Data collection of demographic, distributional and trophic information on the flesh-footed shearwater to allow estimation of effects of fishing on population viability: 2009-10 field season. Research Report for Ministry of Fisheries project PRO2006/01. Ministry of Fisheries, Wellington. 62 p.

- Bell, M.; Burgin, D.; Crowe, P.; Kirk, H. 2017. Timing and duration of egg-laying in flesh-footed shearwater (*Puffinus carneipes*) in New Zealand. *Notornis*. 64: 171-174.
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- Waugh, S.M., Tennyson, A.J.D., Taylor, G.A. and Wilson, K-J. 2013. Population sizes of shearwaters (*Puffinus* spp.) breeding in New Zealand, with recommendations for monitoring. *Tuhinga* 24: 159-204.

Note: A three-year term is proposed

Indicative Research Cost: \$100,000 per annum

Cost Recovery: F(CR) Item 3 (50% Industry 50% Crown)

Fish Stocks: BIG1, BNS 1, SNA 1, GUR8.

3.7 Investigation of electronic device options to assess distribution, diving, and foraging behaviour of Hector's dolphins

Project code: POP2019-01

Start Date: 1 July 2019

Completion Date: 30 June 2020

Guiding Objectives: CSP Objective E.

Project Objectives

1. To determine currently available options that would be suitable for assessing the fine scale distribution, diving, and foraging behaviour of Hector's dolphins.
2. To identify operational, biological and environmental factors which may constrain the assessment.
3. To provide recommendations on the most effective method to assess behavioural aspects of Hector's dolphins.

Rationale

Substantial work has been undertaken to assess and address the risk of fisheries bycatch to Hector's and Māui dolphins through the Threat Management Plan¹⁰. However, fully understanding the risk is limited by gaps in our knowledge on the fine scale distribution and behaviour of the dolphins.

Satellite tagging has been proposed in the past as a tool to fill knowledge gaps. However, technology at the time required invasive techniques to deploy the tags on dolphins and was considered high risk for use on Hector's and Māui dolphins.

The last time the technology was considered was at the formation of the Māui dolphin Research Advisory Group in 2014. Technology has likely progressed since then. The purpose of this project is to assess the current state of the technology to see if it has advanced enough to answer questions about Hector's and Māui dolphin distribution and foraging behaviour while minimising the potential risk of the tag deployment to the dolphins.

Research Approach

This project will start off by investigating available tracking options that would allow for a more comprehensive research project to be undertaken on Hector's dolphins. This study will assess similar research conducted, both nationally and internationally, to ascertain a fit-for-purpose method(s) for measuring spatial use in small marine mammals. Options need to be assessed based on set criteria such as longevity, cost-effectiveness, and impact to the animal. This study will also provide recommendations on the effective time-period for the subsequent research project.

Outputs

1. Report detailing the identified options for assessing the distribution, diving, and foraging behaviour of Hector's dolphins.

¹⁰ Available to download at <https://www.doc.govt.nz/our-work/our-work-with-maui-dolphin/hectors-and-maui-dolphin-threat-management-plan/>

2. Recommendations on the most effective method to assess behavioural aspects of Hector's dolphins.

Note: A one-year term is proposed

Indicative Research Cost: \$20,000

Cost Recovery: F(CR) Item 3 (50% Industry 50% Crown)

Fish Stocks: ELE3, 7, SPO3, 7, 8, TAR3, GUR3, WAR3.

3.8 Fish shoal dynamics in North-eastern New Zealand

Project code: POP2019-02

Start Date: 1 July 2019

Completion Date: 30 June 2020

Guiding Objectives: CSP Objective D.

Project Objectives

1. Continue collecting zooplankton and fish samples from surface fish shoals to compare with the samples collected in 2017-19 to gain a better understanding of annual, seasonal, and spatial variation in samples, in relation to different species of shoaling fish.
2. Utilise the purse seine fishery spotter plane database to explore fish work up relationships with bathymetric and oceanographic features, temporal changes in fish stocks and contrasting environmental conditions.

Rationale

North-eastern North Island waters, from the Three Kings Islands to East Cape, are notable for large numbers of seabirds gathering and feeding in association with concentrations of zooplankton and fish, variously known as a 'fish shoals', 'work ups', 'boil ups', 'bust ups', or 'bait balls'. While the mega marine fauna feeding activity has been described to varying degrees, the zooplankton and fish responsible for these events and the dynamics which drives them is poorly understood in New Zealand. This project extends upon past projects (INT2016-04 and POP2017-06) which highlighted how little is known about fish shoaling activity. There is a need to understand the processes that determine different fish shoaling as many seabirds are dependent on surface shoaling fish that make prey species available as a food source, commercial fisheries also target these fish shoals. Further research into shoaling patterns over time is beneficial considering evident reductions in seabird populations (e.g. red-billed gulls and white-fronted terns).

The purse seine fishery spotter database (*aer_sight*) contains records of search effort and sightings of pelagic schooling species (mainly skipjack tuna, kahawai, blue mackerel, jack mackerel and trevally) dating from June 1960 to the present day. This long-term data set will enable thorough investigation into the temporal and spatial patterns of shoaling activity.

Research Approach

This project aims to assess the content of zooplankton in fish shoals utilising a combination of zooplankton nets and underwater video to identify key species involved in triggering fish shoaling. The presence of these organisms will then be related to observations of other marine fauna, numbers and feeding behaviours. These data will be examined in relation to inter-annual, seasonal and spatial parameters.

This project will update the *aer_sight* database with data since 2013 (recorded separately) and explore fish shoaling relationships with bathymetric (reefs, channels, shelf edges) and topographical (islands, island groups and headlands) features, oceanographic features (currents), temporal changes (annual, seasonal) and environmental conditions such as ENSO events.

Outputs

1. A technical report detailing the methods used and analysis of seasonal, inter-annual and spatial variation in zooplankton and other marine organisms present in fish shoals in north-eastern New Zealand and the fish stocks and seabird species targeting these resources.

2. A technical report detailing the methods used and analysis of the fish shoal spotter plane database to assess relationships between fish stocks and underwater features and how these aerial counts have varied over time.
3. Data collected in this project will be provided in electronic format.

Note: A one-year term is proposed

Indicative Research Cost: \$60,000

Cost Recovery: F(CR) Item 3 (50% Industry 50% Crown)

Fish Stocks: EMA1, GMU1, JMA1, KAH1, PIL1, SKJ1, SNA1, STN1, SWO1, TRE1.

3.9 Antipodes Island seabirds research

Project code: POP2019-03

Start Date: 1 July 2019

Completion Date: 30 June 2020

Guiding Objectives: CSP Objective E; CSP seabird plan 2017; National Plan of Action – Seabirds.

Project Objectives

1. To estimate the population size of Northern giant petrels.
2. To estimate the population size of White-chinned petrels.

Rationale

The Conservation Services Programme Seabird medium term research plan 2017 (CSP seabird plan 2017) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives. This proposal delivers priority research components of the CSP seabird plan 2017 involving field work at Antipodes Island. The proposal has been developed to maximise cost and logistical efficiencies between components. Research on Antipodean albatross is planned in 2019/20 outside of CSP and will provide further cost and logistical efficiencies if progressed. Supporting rationale for all the components is summarised in the CSP seabird plan 2017. Methods will be developed and tailored to each species and site and will maximise comparability to previous estimates where they exist.

Research Approach

The northern giant petrel population on Antipodes Island will be counted by ground-based surveys and an estimate made of the total breeding population using known productivity and nest failure rates from other breeding sites to correct for the one-off sample at Antipodes Island.

A survey of the white-chinned petrel population will be made by methods used in previous surveys of this species. These include burrow plots and distance sampling techniques to estimate burrow density and a sample of burrow nest contents to estimate occupancy rates (using burrowscopes). The previous white-chinned petrel survey on Antipodes Island used burrow plots to assess burrow density whereas the Disappointment Island survey used a distance sampling technique. Therefore, a comparison of these two techniques will be needed to compare with past results to ensure any total population changes observed are related to actual population changes rather than using different counting methods.

Outputs

1. A technical report providing methods used and results of the giant petrel and white-chinned petrel population assessments.
2. Data collected during the project to be made available in electronic format.

Note: A one-year term is proposed

Indicative Research Cost: \$40,000

Cost Recovery: F(CR) Item 3 (50% Industry 50% Crown)

Fish Stocks: BAR1, BAR5, BAR7, BIG1, HAK1, HAK7, HOK1, JMA3, JMA7, LIN, 3, LIN5, LIN6, LIN7, SBW6A, SBW6I, SBW6R, SCI1, SCI2, SCI3, SCI6A, STN1, SWA1, SWA3, SWA4, SQU1T, SQU6T, WWA5B.

3.10 Southern Buller's albatross: Snares/Tini Heke population project

Project code: POP2019-04

Start Date: 1 July 2019

Completion Date: 30 June 2022

Guiding Objectives: CSP Objective E; CSP seabird plan 2017; National Plan of Action – Seabirds.

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 2017 (CSP seabird plan 2017) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives. This proposal delivers priority research components of the CSP seabird plan 2017 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.

Research Approach

This project will continue the established mark-recapture monitoring methodology to further improve estimates of key demographic parameters, particularly adult survival which was noted as declining in the most recent data assessment by Sagar et al. (2017). Breeding success will also be quantified through the deployment of trail cameras. Several cameras will be placed on trees or stakes within colonies to include as many nests as practical in the field of view. Images will be recorded hourly during daylight hours. Similar cameras set up on Auckland Islands in 2018 obtained data on nesting productivity of white-capped albatross with up to 11 months of images stored on camera.

Outputs

1. A technical report providing methods used and results found, including an updated population estimate and updated estimates of key demographic parameters (survival of marked birds and breeding pairs, occupancy rates, and breeding success) of Southern Buller's albatross at the Snares.
2. Provision of all data collected (including all banding records of adults and chicks) in electronic format.

References

- Sagar, P. 2014. Population studies of Southern Buller's albatrosses on The Snares. Research report prepared by NIWA, for DOC, MPI, and DWG.
- Sagar, P., Thompson, D. & Scofield, P. 2017. Population Study of Southern Buller's Albatross on The Snares. Report prepared for the Deepwater Group Limited. 13p.

Note: A three-year term is proposed

Indicative Research Cost: \$40,000 per annum

Cost Recovery: F(CR) Item 3 (50% Industry 50% Crown)

Fish Stocks: BAR1, BAR4, BAR5, BIG1, HOK1, LIN5, LIN7, SCI3, SCI6A, SQU1T, SQU6T, STN1, SWA4, WWA5B.

3.11 New Zealand fur seal: Bounty Islands population assessment

Project code: POP2019-05

Start Date: 1 July 2019

Completion Date: 30 June 2020

Guiding Objectives: CSP Objective E.

Project Objectives

1. To determine the population trend of fur seals at the Bounty Islands, to the extent possible using existing data.
2. To recommend future data collection protocols to better estimate the population size and trend of fur seals at the Bounty Islands.
3. To investigate the feasibility of estimating the population trend of fur seals at the Bounty Island through aerial surveys conducted by UAV (unmanned aerial vehicle).

Rationale

New Zealand fur seals are captured in the southern blue whiting trawl fishery around the Bounty Islands at one of the highest rates of any trawl fishery (Abraham et al, 2017), however, information on their population level and trend at this site is poor. Data on fur seals has been collected during a number of surveys of other species at the Islands, notably Salvin's albatross. This data exists as on ground observations and aerial photographs and may be informative in assessing population trends.

Research Approach

Examine existing information on fur seal observations (i.e. aerial photos and ground counts) to determine their suitability for estimating the population trend of fur seals and make recommendations on future data collection that may allow a better assessment of fur seal population level and trend in the Bounty Islands area. These recommendations will seek to collect data in association with other potential future monitoring (such as for Salvin's albatross) to maximise cost efficiencies.

This project will also assess the feasibility of estimating the population trend of fur seals at the Bounty Islands through aerial surveys conducted by a UAV, including a thorough investigation into the potential of any adverse impacts on protected species. If weather and logistics allows, a drone will be used to collect photos of the fur seal distribution on the island. These photos will then be counted, and a population estimate will be determined. This method will then be evaluated to determine its suitability as a tool for estimate the population of fur seals at the Bounty Islands.

Outputs

1. A technical report (or reports) detailing the methods used and results found from existing information.
2. Report detailing the proposed methodology for aerial surveys including risk mitigation considerations.
3. Provision of all data collected in electronic format.

References

Abraham, E.R., Neubauer, P., Berkenbusch, K. and Richard, Y. 2017. Assessment of the risk to New Zealand marine mammals from commercial fisheries. New Zealand Aquatic Environment and Biodiversity

Report No 189. Available for download from <https://fs.fish.govt.nz/Doc/24554/AEBR-2017-189-Marine-mammal-risk-assessment.pdf.ashx>

Note: A one-year term is proposed

Indicative Research Cost: \$30,000

Cost Recovery: F(CR) Item 3 (50% Industry 50% Crown)

Fish Stocks: SBW6B.

3.12 Spotted shag population review

Project code: POP2019-06

Start Date: 1 July 2019

Completion Date: 30 June 2020

Guiding Objectives: CSP Objective E.

Project Objective

1. To review historic and recent population data on spotted shags breeding in northern New Zealand.
2. To make recommendations for any future field work required to improve the certainty of current population estimates.

Rationale

The Conservation Services Programme Seabird medium term research plan 2017 (CSP seabird plan 2017) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives. This proposal delivers priority research components of the CSP seabird plan 2017 involving spotted shags. Supporting rationale for all the components is summarised in the CSP seabird plan 2017.

The current taxonomy of many shag species in New Zealand is under review and it was identified that a taxonomic review of spotted shags was required, this is now being progressed externally to CSP. It is thought the northern spotted shag populations (now confined to the inner Hauraki Gulf) differ from the spotted shag populations breeding from Cook Strait south (Szabo 2017). The northern population of spotted shags has contracted in range to one or two breeding sites in recent years. Previously the birds bred across multiple sites including both east and west coast colonies in northern New Zealand.

Research Approach

This project will be an initial desk-based exercise focusing on the compilation of existing data to estimate population size and trend and may inform a future field-based project on the northern populations. The timing of spotted shag population declines and the changes in population numbers will be assessed by a review of the published and unpublished literature, field records from Birds New Zealand members and online databases such as eBird (www.ebird.org). The project will collate existing data and, where possible, investigate population trends over time, map changes in distribution and identify any potential factors that might have caused these changes (e.g. fishing impacts, colony disturbance, climate change and possible loss of breeding habitat etc). Depending on the extent of data found, further work to collate and/or analyse existing data may be recommended, as well as any future field research required to obtain better estimates of population size and trend.

Outputs

1. A technical report or reports will be produced summarising the review of existing data on population trends and changes in the northern spotted shag population.
2. Any data collected during the desktop review will be made available in electronic format.
3. Recommendations for any future desk-based and/or field work required to improve the certainty of current population estimates.

References

Szabo, M.J. 2013 [updated 2017]. Spotted shag. In Miskelly, C.M. (ed.) *New Zealand Birds Online*.
www.nzbirdsonline.org.nz

Note: A one-year term is proposed

Indicative Research Cost: \$10,000

Cost Recovery: F(CR) Item 3 (100% Crown)

4. Mitigation Projects

NOTE: This multi-year project (MIT2017-01) was consulted on in 2017/18 and is included here for completeness.

4.1 Protected Species Liaison Project

Project Code: MIT 2017-01

Start Date: 1 July 2017

Completion Date: 30 June 2020

Guiding Objectives: CSP Objective A; CSP seabird plan 2017; National Plan of Action – Seabirds, National Plan of Action – Sharks.

Project Objectives

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

Specific Objectives

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

Rationale

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

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

The process to date has involved development and documentation of vessel specific mitigation practices in Seabird Management Plans, implementation of these plans into vessel practice, review by government fisheries observers, and subsequent review and improvement where relevant. Currently there are a series of parallel and complimentary processes in place tasked with embedding operational procedures into inshore fishing activities. A coordination role as part of this project will be critical to aligning these approaches to ensure that maximum value will be gained.

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

Implementation approach

Over the three-year term of this project it is planned that efforts will move between areas and fishing fleets based on existing and emerging bycatch priorities. Fisheries will continue to move along the pathway which has been established in the bottom and surface longline which involves installation of Seabird Management Plans (SMPs), audit by government fisheries observers and subsequent review and improvement of SMPs where relevant. Key roles are defined as:

Liaison Officers:

Liaison Officers will have an adequate working understanding of protected species biology, taxonomy and behaviour assist in understanding the risk posed in each area and season. By employing Liaison Officers who have operational experience in fishing fleets along with an understanding of best practice mitigation and seabird characteristics it is possible to spread information over the fishing fleet in a collaborative and practical manner. These officers will also be equipped with fact sheets/ resources and mitigation materials to assist in the dissemination of this knowledge.

Officers will actively encourage development of vessel specific mitigation practices and where appropriate vessel management plans. Liaison Officers will operate closely with Observer Services to ensure mutual gains with part of the role including sea time on vessels to help understand individual vessels' operations and therefore tailor the most appropriate mitigation solutions. The officers will also operate as a conduit for communication between fishers and government by directing fishers concerns or questions to the right people.

Coordination:

A coordination role will actively liaise with government and coordinate the work of the Liaison Officers, ensuring that any relevant documentation, such as SMPs, are appropriately catalogued and available to relevant management parties. They will also ensure coordination with other projects and processes relevant to the target fisheries. The role will be tasked with identifying and prioritising actions that will makes the highest contribution to reducing seabird bycatch in the target fisheries.

Outputs

1. Database of progress, including SMPs installed, vessels visited, and mitigation materials issued.
2. Regular communication and meetings, as appropriate, with relevant agencies, industry bodies and other parties to coordinate bycatch reduction activities and report progress.
3. Monthly short form reports back to relevant advisory groups detailing progress and any developments which have come from the fleet.
4. Annual written report detailing interactions with fishers and steps take to enhance mitigation.

Note: A three-year term is proposed

Indicative Research Cost: \$140,000 per annum

Cost Recovery: F(CR) Item 4 (100% Industry)

Fish stocks:

Objective/Species	Indicative Cost	Fish Stocks
1 Surface Longline	\$35,000	ALB1, BIG1, STN1, SWO1
2 Bottom Longline	\$35,000	BIG1, BNS1, HPB1, SNA1
3 Inshore Trawl	\$35,000	BAR1, 7, FLA1, GUR1, JDO1, LIN1, 2, RCO3, SNA1, 2, TAR1, 2, 3, TRE1, 7
4 Setnet	\$35,000	SCH3, 5, SPO3, ELE3, 5, MOK3, SPD5

NOTE: This multi-year project (MIT2018-01) was consulted on in 2018/19 and is included here for completeness.

4.2 Protected species engagement project

Project code: MIT2018-01

Start Date: 1 July 2018

Completion Date: 30 June 2020

Guiding Objectives: CSP Objective A, B, and C; CSP Seabird Plan, CSP Protected Fish Plan; National Plan of Action – Seabirds, National Plan of Action – Sharks.

Project Objectives

1. To provide identification tools targeted at commercial fishermen to improve their understanding of protected species interacting with their fishing operations.
2. To develop and produce pictorial guides for fishers on handling protected species after capture in fishing operations.
3. To produce short videos on key mitigation measures to demonstrate the techniques required to deploy the gear.
4. To communicate protected species-related information, handling methods and mitigation measures to commercial fishermen.

Rationale

Reducing the impacts of commercial fishing on protected species relies on individual fishermen actively applying best practice mitigation methods to their fishing activity. Applying and developing mitigation methods in specific circumstances requires an understanding of the protected species that may be impacted, and the nature with which they interact with fishing activity. A range of relevant information exists, often the result of research projects, however, appropriate communication of this generally involves interpretation of research outputs to cater to specific audiences. Project MIT2014-01 used a hard copy and web-based newsletter to provide a medium for this communication (Pierre 2016). Project MIT2018-01 will pick up on several recommendations from MIT2016-01, but also explore other methods of communication to commercial fishermen such as through workshops, tailored for different fishing sectors in order to communicate the relevant information in an efficient way. The changes and expansion of the scope will allow increase in target audience exposure and uptake.

Research approach

Previously the Department has produced identification guides for seabirds and sharks (e.g. CSP 2007, 2010), project MIT2016-01 produced updated and additional education resources. This project will build on several recommendations from MIT2016-01. This includes producing pictorial guides on protected species handling and short videos demonstrating deployment of key mitigation gear, as well as providing identification tools to increase understanding of protected species that might interact with their fishing operations.

The resources will be communicated to commercial fishermen through port-based workshops or other suitably targeted mechanisms. This will allow a more interactive communication of the resources and allow fishermen to give feedback on the tool and guides produced. Workshops will be tailored in a region and fishery specific manner to provide information on species of concern which will assist in development and refinement of effective mitigation strategies. Delivery of this project will complement and support the Protected Species Liaison Project.

Outputs

1. Workshops on best practice mitigation methods, current relevant events, updates on novel methods or new mitigation trials and information on protected species and the nature of their interaction with commercial fishing.
2. Educational resources targeted at commercial fishermen across a range of media.
3. Pictorial guides for fishers on handling protected species.
4. Short videos on key mitigation measures.

Previous CSP projects include MIT2016-01, MIT 2014-01, MIT2012-05 and MIT2011-05.

References:

Conservation Services Programme, 2007: A fisher's guide to New Zealand seabirds available at <http://www.doc.govt.nz/our-work/conservation-services-programme/csp-identification-guides/a-fishers-guide-to-new-zealand-seabirds/>

Conservation Services Programme, 2010: A fisher's guide: New Zealand coastal seabirds. Available at: <http://www.doc.govt.nz/our-work/conservation-services-programme/csp-identification-guides/a-fishers-guide-new-zealand-coastal-seabirds/>

Pierre., J. 2016. MIT2014-01 Protected Species Bycatch Newsletter Report to the CSP TWG 21 January 2016. Available for download at: <http://www.doc.govt.nz/pagefiles/74833/bycatch-bylines-21-january-2016.pdf>

Note: A 2-year term is proposed for this project

Indicative Research Cost: \$40,000 per annum

Cost Recovery: F(CR) Item 4 (100% Industry)

Fish Stocks: BAR_{1, 7}, BCO₄, BIG₁, BNS_{1, 2, 3, 7}, BUT_{5, 7}, BWS₁, CRA_{4, 5, 7}, ELE_{3, 5, 7}, EMA_{1, 3, 7}, FLA_{1, 2, 3, 7}, GMU₁, GSH_{1, 3, 4, 7, 8, 9}, GSP_{1, 7}, GUR_{1, 2, 3, 7, 8}, HAK_{1, 4, 7}, HOK₁, HPB_{1, 2, 3, 4, 7, 8}, JDO_{1, 2, 3, 7}, JMA_{1, 3, 7}, KIN_{1, 7, 8}, LEA_{1, 2, 3}, LIN_{1, 2, 3, 4, 5, 6, 7}, MAK₁, MOK_{1, 3, 5}, MOO₁, ORH_{1, 2A, 2B, 3A, 3B}, OEO_{1, 3A, 4, 6}, PAR_{1, 9}, POR₁, POS₁, RBM₁, RSN_{1, 2}, RIB_{1, 2}, RCO_{1, 3, 7}, RSK_{1, 3, 7, 8}, SBW_{6A, 6R, 6I, 6B}, SCH_{1, 2, 3, 4, 5, 7}, SCI_{1, 2, 4A, 6A, 6B}, SKI_{1, 3, 7}, SNA_{1, 2, 3, 7, 8}, SPD_{1, 3, 4, 5, 7, 8}, SPE_{1, 3, 4, 7}, SPO_{1, 3, 7, 8}, SQU_{1T, 6T}, SSK_{1, 3, 7, 8}, STA_{1, 3, 4, 5, 7}, STN₁, SWA_{1, 3, 4}, SWO₁, TAR_{1, 2, 3, 4, 5, 7, 8}, TOR₁, TRE_{1, 2, 7}, TRU_{3, 4}, WAR_{1, 2, 3, 7, 8}, WWA_{2, 3, 4, 5B, 7}, YEM_{1, 8, 9}

4.3 Dolphin dissuasive device mitigation in inshore fisheries

Project Code: MIT 2019-01

Start Date: 1 July 2019

Completion Date: 30 June 2020

Guiding Objectives: CSP Objectives A, E; Hector's and Māui dolphin Threat Management Plan.

Project Objectives

1. To develop a methodology for the assessment of a dolphin dissuasive device in inshore fisheries.
2. To provide recommendations on further research.

Rationale

Dolphin Dissuasive Devices (DDD) are thought to limit interactions between dolphins and fishing nets by emitting high frequency ultrasound signals. Signals can be modulated (in length and width) to limit the potential of dolphins adapting to the signal. DDDs are currently used in the deepwater jack mackerel fishery (two units deployed either on bridles facing backwards over the net or placed on the headline getting coverage immediately in front of the trawl mouth). Currently there is anecdotal evidence that shows that these devices may be effective but little quantitative research to support this.

Research approach

This desk-based study would involve an international review of Dolphin Dissuasive Devices with a focus on research on species and fisheries relevant to New Zealand.

Outputs

1. Report detailing an international review of Dolphin Dissuasive Devices used in fisheries and the influence on bycatch events relative to New Zealand fisheries and species.
2. Proposed methodology for field trials and assessment of a dolphin deterrent device in an inshore setting.
3. Recommendations on location(s) and technology suited to the New Zealand inshore environment and dolphin species.

Note: A one-year term is proposed

Indicative Research Cost: \$20,000

Cost Recovery: F(CR) Item 4 (100% Industry)

Fish stocks: BAR1, BIG1, ELE3, HOK1E, HOK1W, JDO1, JMA7, LIN7, SCH3, SNA1, 3, SPO3, SQU1T, SQU6T, STN1, TAR1, TRE7.

4.4 Review of mitigation techniques to reduce benthic impacts of trawling

Project code: MIT2019-02

Start Date: 1 July 2019

Completion Date: 30 June 2020

Guiding Objectives: CSP Objective A, E.

Project Objective

To review modified trawl fishing gear applicable to the New Zealand inshore trawl fleet.

Rationale

Trawl induced habitat modifications have been suggested to negatively affect benthic foragers that depend on an intact benthic ecosystem, such as hoiho. Indirect effects are also possible via changes to the structure of the seafloor and the suspension of sediment. The most common mitigation method for these effects have been closures of sensitive areas to trawling. However, in recent years studies that test modified fishing gear to reduce the effects of trawling on seafloor communities have been emerging, with several showing promising results (e.g. Rose et al. 2010). Bottom trawling uses numerous types of gear designs, sizes, rigging and operational methods. Therefore, impact on the bottom habitat will differ among the various bottom trawl fisheries, and mitigation techniques will depend on the gear used.

Research approach

This desk-based study aims to review literature on mitigation techniques used to reduce benthic impacts of trawling in various bottom trawl fisheries and make recommendations that are relevant to New Zealand trawl fisheries. This study may lead on to a project focusing on trialling modified trawl gear in the inshore fleet.

Outputs

1. A technical report detailing methods used and results found, including recommendations on mitigation techniques used to reduce benthic impacts of trawling.
2. Provision of all data collected in electronic format.

References

Rose, C. S., Gauvin, J.R. & Hammond, C.F. (2010) Effective herding of flatfish by cables with minimal seafloor contact. *Fishery Bulletin*, 108(2), pp. 136-144.

Note: A one-year term is proposed

Indicative Research Cost: \$20,000

Cost Recovery: F(CR) Item 4 (100% Industry)

Fish Stocks: BAR1, 4, 5, 7, BYX1, 3, 7, CDL2, HAK1, 4, 7, HOK1E, HOK1W, JDO1, JMA3, 7, LIN1, 6, OEO1, 3A, 6, ORH1, 2A, 2B, 3B, 7A, 7B, RBT3, RBY1, 2, SBW6A, SCH1, SCI1, 2, 4A, SKI7, SNA1, 8, SPE4, SQU1T, 6T, SWA3, 4, TAR1, 2, TRE1, 7, WWA3, 5B.

4.5 Lighting adjustments to mitigate against deck strikes/vessel impacts

Project code: MIT2019-03

Start Date: 1 July 2019

Completion Date: 30 June 2021

Guiding Objectives: CSP Objective D.

Project Objective

To investigate if lighting adjustments (colour and strength) have the potential of reducing the occurrence of vessel impacts in commercial fishing.

Rationale

Artificial light at night (ALAN) has been identified as a threat to petrel and shearwater species. It is a threat at sea with highly illuminated vessels moving near seabird breeding islands. Light attraction disproportionately impacts fledglings, who haven't yet learned to avoid it. Lights on fishing vessels can cause bird-strike of species that aren't otherwise caught as bycatch, such as diving petrels and storm petrels. Birds can become injured when they strike the vessel, oiled by deck equipment, and die of exposure if not found and released. Vessel lighting at night is essential for safety on both recreational and working vessels. Identifying which colours and intensities of light have the least impact on seabirds will assist in maintaining safety standards while minimising the impacts of light spill on seabirds, reducing the likelihood of them crashing on fishing (and other) vessels.

Research Approach

This project would involve an analysis of observer data on fishing vessel impacts at night and a land-based island trial (looking at the effects on birds of differing light colour and strength) in the Hauraki Gulf (potential sites being Hauturu or Mohikinau Islands) recording seabird activity by thermal imaging software. Following the outcomes of the first year, a vessel-based trial will be conducted.

Outputs

1. Review of literature on lighting impacts on seabirds and assessment of observed fishing vessel impacts in relation to lighting.
2. Report detailing the proposed methodology of land/sea-based testing.
3. An assessment of device efficacy and recommendations on potential improvements and future opportunities for development.

Note: A two-year term is proposed

Indicative Research Cost: \$20,000 in first year, \$40,000 in second year

Cost Recovery: F(CR) Item 4 (100% Industry)

Fish Stocks: BAR_{1, 5}, BIG₁, BNS₁, HAK₁, HOK₁, JDO₁, JMA_{3, 7}, LIN_{2, 4, 6}, ORH_{1, 3}, RBY₁, SBW_{1, 6}, SCH₅, SCI_{1, 4A}, SNA₁, STN_{1, 8}, SQU_{6T}, SWA_{3, 4}, TAR_{1, 5}, TRE₁, WAR₃.

4.6 Optimum batching interval for discharge management on vessels in the scampi fishery

Project code: MIT2019-04

Start Date: 1 July 2019

Completion Date: 30 June 2020

Guiding Objectives: CSP Objective A; National Plan of Action – Seabirds.

Project Objective

To investigate offside batching intervals of discharge in reducing seabird interactions around fishing vessels.

Rationale

Batching intervals are currently utilised as a discharge management measure across commercial fisheries, yet limited data is collected on this practise e.g. no data on time between discharge outfalls. Following recommendations from MIT2017-02, this project aims to investigate varied batching intervals with the objective of determining if an ‘optimum’ batching discharge interval exists in reducing seabird activity around working fishing vessels and seabird interactions with fishing gear or the vessel. Batching may be beneficial in disrupting the flow of attractant for seabirds to fishing vessels; therefore, reducing abundance and potential capture during haul and the subsequent set of fishing gear. The key aspects of batching discharge involve: a holding period of fish waste, offal or returned baits (for a minimum of 30 minutes) and swift discharge (five minutes or less) as opposed to continuous discharge (Pierre et al. 2012; Kuepfur and Pompert 2017).

The scampi fishery is a bottom trawl fishery conducted by a small number of vessels <32 metres in length. Vessels typically conduct 2-3 long, slow speed tows per day. The fishery is characterised by a relatively high proportion of non-target bycatch (due to the small mesh size of trawl nets) which is currently discharged at sea. On-board fish waste management equipment differs across vessels, though may consist of holding/storage tanks for bycatch that can be periodically discharged via a chute, other vessels store fish bycatch in bins prior to discharge.

Research Approach

An analysis of past observer data on batching practices in the scampi fishery will provide an overview for developing the methodology for this study. The methodology will be oriented around the analysis of differing batching regimes and the impact it may have on seabird activity and observed seabird interactions/captures. The timing (in relation to set/haul), location (haulside, offside), type (offal, whole fish, baits) and efficacy of batching will be investigated across the scampi trawl fleet. Recommendations will be sought, for example, on what additional information might observers be required to collect on batching and seabird activity.

Outputs

1. A technical report detailing findings and recommendations on batching of discharge in the scampi fishery.
2. Provision of all data collected in electronic format.

References

Pierre JP, Abraham ER, Richard Y, et al (2012) Controlling trawler waste discharge to reduce seabird mortality. *Fish Res* 131-133:30-38.

Kuepfer A, Pompert J (2017) Discharge management as a seabird bycatch mitigation tool: Results from further batch-discharge trials in the Falkland Islands trawl fishery. SBWG8 Inf 16. Agreement on the Conservation of Albatrosses and Petrels, Hobart.

Note: A one-year term is proposed

Indicative Research Cost: \$20,000

Cost Recovery: F(CR) Item 4 (100% Industry)

Fish Stocks: SCI1, 2, 3, 4A, 5, 6A, 6B, 7, 8, 9, 10.

Appendix 1: Cost Allocation Tables

A: CSP 2019/20 Projects

Code	Project	Research	Admin	Total	CR Item	Industry %	Industry	Crown
Interaction Projects								
INT2017-03	Identification of marine mammals, turtles and protected fish captured in New Zealand fisheries	\$15,000	\$1,548	\$16,548	4	100	\$16,548	\$0
INT2018-03	Development of Observer photograph protocols and curation	\$30,000	\$3,095	\$33,095	4	100	\$33,095	\$0
INT2019-01	Observing commercial fisheries	\$1,104,094	\$113,917	\$1,218,011	8	100	\$1,218,011	\$0
INT2019-02	Identification of seabirds captured in New Zealand Fisheries	\$100,000	\$10,318	\$110,318	4	100	\$110,318	\$0
INT2019-03	Characterisation of marine mammal interactions	\$25,000	\$2,579	\$27,579	4	100	\$27,579	\$0
INT2019-04	Identification and storage of cold-water coral bycatch specimens	\$60,000	\$6,191	\$66,191	4B	100	\$66,191	\$0
INT2019-05	Coral biodiversity in deepwater fisheries bycatch	\$22,000	\$2,270	\$24,270	4B	100	\$24,270	\$0
INT2019-06	Post-release survival of seabirds	\$10,000	\$1,032	\$11,032	4	100	\$11,032	\$0

Continued overleaf

CSP 2019/20 Projects (Continued)

Code	Project	Research	Admin	Total	CR Item	Industry %	Industry	Crown
Population Projects								
POP2017-03	Salvin's albatross: Bounty Islands population project	\$120,000	\$12,381	\$132,381	3	50	\$66,191	\$66,191
POP2017-04	Seabird population research: Auckland Islands 2017-20	\$90,000	\$9,286	\$99,286	3	50	\$49,643	\$49,643
POP2018-01	Improved habitat suitability modelling for protected corals in New Zealand waters	\$30,000	\$3,095	\$33,095	3	50	\$16,548	\$16,548
POP2018-02	Hoiho population and tracking project	\$60,000	\$6,191	\$66,191	3	50	\$33,095	\$33,095
POP2018-03	New Zealand sea lion: Auckland Island pup count	\$100,000	\$10,318	\$110,318	2	90	\$99,286	\$11,032
POP2018-04	Flesh-footed shearwater population monitoring	\$100,000	\$10,318	\$110,318	3	50	\$55,159	\$55,159
POP2019-01	Investigation of electronic device options to assess distribution, diving and foraging behaviour of Hector's dolphins	\$20,000	\$2,064	\$22,064	3	50	\$11,032	\$11,032
POP2019-02	Fish shoal dynamics in North-eastern New Zealand	\$60,000	\$6,191	\$66,191	3	50	\$33,095	\$33,095
POP2019-03	Antipodes Island seabirds research	\$40,000	\$4,127	\$44,127	3	50	\$22,064	\$22,064
POP2019-04	Southern Buller's albatross: Snares/Tini Heke population project	\$40,000	\$4,127	\$44,127	3	50	\$22,064	\$22,064
POP2019-05	NZ fur seal: Bounty Islands population assessment	\$30,000	\$3,095	\$33,095	3	50	\$16,548	\$16,548
POP2019-06	Spotted shag population review	\$10,000	\$1,032	\$11,032	-	0	\$0	\$11,032
Mitigation Projects								
MIT2017-01	Protected species liaison project	\$140,000	\$14,445	\$154,445	4	100	\$154,445	\$0
MIT2018-01	Protected species engagement project	\$40,000	\$4,127	\$44,127	4	100	\$44,127	\$0
MIT2019-01	Dolphin Dissuasive Device Mitigation in inshore fisheries	\$20,000	\$2,064	\$22,064	4	100	\$22,064	\$0
MIT2019-02	Review of mitigation techniques to reduce benthic impacts of trawling	\$20,000	\$2,064	\$22,064	4	100	\$22,064	\$0
MIT2019-03	Lighting adjustments to mitigate against deck strikes/vessel impacts	\$20,000	\$2,064	\$22,064	4	100	\$22,064	\$0
MIT2019-04	Optimum batching interval for discharge management on vessels in the scampi fishery	\$20,000	\$2,064	\$22,064	4	100	\$22,064	\$0
TOTAL		\$2,326,094	\$240,000	\$2,566,094			\$2,218,593	\$347,501

B: CSP Observer Allocation

Fishery	Stocks	Total Days	2018/19 levied	FNZ %	FNZ days	CSP %	CSP days	Cost Per day	CSP Research Cost
Deepwater trawl fisheries:									
North Island Deepwater	ORH1, ORH2A, ORH2B, ORH3A, BYX2, CDL2, RBY2	100	100	90%	90	10%	10	\$450	\$4,500
Chatham Rise Deepwater	ORH3B, OEO3A, OEO4, BYX3	300	300	90%	270	10%	30	\$450	\$13,500
Sub-Antarctic Deepwater	ORH3B, OEO1, OEO6	120	120	90%	108	10%	12	\$450	\$5,400
West Coast NI Deepwater	ORH7A	100	100	90%	90	10%	10	\$450	\$4,500
Pelagic trawl fisheries:									
West Coast North Island	JMA7, EMA7, BAR7	250	250	85%	212.5	15%	37.5	\$450	\$16,875
Middle Depth trawl fisheries:									
West Coast South Island	HOK1, HAK7, LIN7, SWA1	650	650	85%	552.5	15%	97.5	\$450	\$43,875
Chatham Rise Middle Depth	HOK1, HAK1, HAK4, LIN3, LIN4, SWA3, SWA4, JMA3, BAR1, BAR4, RBT3	650	650	85%	552.5	15%	97.5	\$450	\$43,875
Subantarctic Middle Depth	HOK1, SWA4, WWA5B, BAR5, JMA3, LIN6	500	500	85%	425	15%	75	\$450	\$33,750
Southern blue whiting	SBW6B, SBW6I, SBW6R	400	400	80%	320	20%	80	\$450	\$36,000
Squid	SQU1T, SQU6T	1250	1250	80%	1000	20%	250	\$450	\$112,500
Hoki Cook Strait	HOK1	150	150	85%	127.5	15%	22.5	\$450	\$10,125
WCSI Hoki-Inside the line	HOK1	150	150	85%	127.5	15%	22.5	\$450	\$10,125
Scampi	SCI1, SCI2, SCI3, SCI4A, SCI6A	450	450	80%	360	20%	90	\$450	\$40,500
Deepwater bottom longline fisheries:									
Ling Bottom Longline	LIN2, LIN3, LIN4, LIN5, LIN6, LIN 7	400	400	85%	340	15%	60	\$450	\$27,000
Surface longline fisheries:									
Domestic SLL - east coast BIG/SWO	BIG1, SWO1	150	150	85%	127.5	15%	22.5	\$585	\$13,163
Domestic SLL - west coast BIG/SWO	BIG1, SWO1	55	55	85%	46.8	15%	8.3	\$585	\$4,826
Domestic tuna longline - east coast STN	STN1	160	160	85%	136	15%	24	\$585	\$14,040
Domestic tuna longline - west coast STN	STN1	160	160	85%	136	15%	24	\$585	\$14,040

Continued overleaf

B: CSP Observer Allocation (Continued)

Fishery	Stocks	Total Days	2018/19 levied	FNZ %	FNZ days	CSP %	CSP days	Cost Per day	CSP Research Cost
Troll fisheries:									
Albacore Troll	FNZ MSC certification	70	70	100%	-	-	-	-	-
Inshore Fisheries									
WCNI setnet & BLL SNA8	Crown funded	175	-	-	-	-	-	-	-
WCNI inshore trawl	JDO1, SCH1, TRE7, SNA8, KAH8, TAR1, GUR1	650	520	50%	260	50%	260	\$950	\$247,000
SNA1 trawl	SNA1	105	84	50%	42	50%	42	\$950	\$39,900
Bottom longline - North east NI (SNA)	SNA1	385	308	50%	154	50%	154	\$950	\$146,300
Set net - east coast SI	SCH3, SPO3, ELE3, MOK3, SPD3	125	100	50%	50	50%	50	\$950	\$47,500
Set net - south coast SI	SCH5, SPO3, ELE5, SPD5, BUT5	175	140	50%	70	50%	70	\$950	\$66,500
Bottom longline - BNS target (FMA1)	BNS1, HPB1	35	28	50%	14	50%	14	\$950	\$13,300
Bottom trawl - east coast SI	BAR1, RCO3, TAR3, FLA3, GUR3, SPD3, RSK3, SSK3	250	200	50%	100	50%	100	\$950	\$95,000
PSH Trawl	Direct charged	105	84	100%	-	-	-	-	-
Total									\$1,104,094

ECSE = East Coast South Island

WCSI = West Coast South Island

ECNI = East Coast North Island

WCNI = West Coast North Island