Conservation Services Programme Annual Plan 2018/19

Conservation Services Programme
Department of Conservation
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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.

EM Sage

Hon. Eugenie Sage
Minister of Conservation

Lou Sanson
Director-General of Conservation

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1. Overview

1.1 Introduction

The Conservation Service 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 2018/19 ("Annual Plan") includes the conservation services to be delivered as the 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 2015[1] ("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 2015, 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.

1.2 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 2015) 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.

1.3 Guiding frameworks, research planning and prioritisation

The CSP Strategic Statement 2015, 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

[1] Available to download from http://www.doc.govt.nz/our-work/conservation-services-programme/csp-plans/csp-strategic-statement-2015/

Plan), the research planning and prioritisation processes used by CSP, and the way CSP is implemented by working with others.

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 Threat Management Plan (TMP) and the New Zealand sea lion 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 ("CSP fish plan)[2], and the DRAFT CSP Marine Mammal medium term research plan (CSP mammal plan)[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 (marine reptiles, and corals) will be developed.

A summary of the planning and prioritisation milestones, in accordance with the CSP Strategic Statement 2015, undertaken in developing the CSP Annual Plan 2018/19 are as follows:

1. CSP RAG meeting to review relevant research output and gap analysis (December 2017). This was held in conjunction with a planning process meeting for Ministry for Primary Industries (MPI) Aquatic Environment research.
2. Annual research summary report finalised, CSP medium term research plans updated and an initial list of research proposals for 2018/19 drafted and circulated to CSP RAG (February 2018). Feedback sought on initial research proposals.
3. CSP RAG meeting, with open invitation to all CSP stakeholders, to discuss and prioritise research proposals for 2018/19 (February 2018). Additional written feedback also sought from CSP RAG.
4. Draft Annual Plan developed based on this feedback and provided for formal consultation (April 2018).
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 MPI. 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 MPI.

1.4 Consultation

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

7 December 2018	Initial CSP RAG meeting – review and gap analysis.
21 February 2018	Updated medium term research plans, initial list of research proposals and CSP RAG prioritisation framework circulated to CSP RAG.
28 February 2018	Second CSP RAG meeting to discuss and prioritise initial research proposals.

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

19 March 2018	Additional feedback received from CSP RAG on research proposals and their prioritisation.
27 April 2018	Draft Conservation Services Programme Annual Plan 2018/19 released for public consultation
25 May 2018	Public consultation period closes
June 2018	Summary of public submissions and response to comments completed
June 2018	Director-General of Conservation conveys the Conservation Services Programme Annual Plan 2018/19, amended in accordance with public submissions, to the Minister of Conservation for agreement

1.5 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 (INT2018-01 Observing commercial fisheries in 2018/19) 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. We welcome stakeholder views on different ways to attribute administration costs across projects.

2. Interaction Projects

2.1 Observing commercial fisheries

Project code: INT2018-01

Start Date: 1 July 2018

Completion Date: 30 June 2019

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 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 contribute to assessments of the risks posed to protected species by commercial fishing and whether mitigation strategies employed by fishing fleets are effective at reducing protected species captures.

The CSP Observer Programme will continue to purchase baseline services for "offshore" fisheries from MPI Observer Services, given the scale of their operation, this allows observers to be placed strategically across New Zealand Fisheries. Inshore fisheries observer coverage will also be delivered by MPI 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 MPI Observer Services has been used. As such, for the purposes of planning, costings for observer coverage are based on those provided by the MPI Observer Services to provide a best estimate.

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/MPI) 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 seabirds[3] and sharks[4] 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 Foreign Owned Vessel coverage, trawl and setnet vessel coverage on the East coast of the North Island to address the Māui dolphin Threat Management Plan, monitoring of new technologies such as Precision Seafood Harvesting and coverage of snapper trawl in the Hauraki Gulf to address concerns around snapper stocks. Where coverage driven by Ministerial direction also provides a platform for delivery of the CSP Observer Programme, CSP will continue to purchase a relevant portion of that coverage.

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 at least on a daily basis the numbers, and the behaviour of, marine mammal and seabird species seen around the fishing vessel.
- Collecting information to better understand cryptic morality of protected species (e.g. following data collection protocols developed from CSP project INT2013-05).
- Monitoring vessel activities against any relevant operational plans such as protected species Management Plans (MPs) or Vessel Management Plans (VMPs).
- Carrying out other tasks (e.g. making observations on discard and offal discharge) as required.

[3] NPOA–Seabirds available at http://www.mpi.govt.nz/Default.aspx?TabId=126&id=1760
[4] NPOA–Sharks available at http://www.mpi.govt.nz/Default.aspx?TabId=126&id=2126

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.

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.

Application of observer coverage by fishery in 2018/19:

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 200 m depth), some small vessels, particularly bottom longline vessels under 36 m, 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/Ministry for Primary Industries Inshore Observer Programme 2017/18 plan (included as Section 2.1.1 of this plan). In general, coverage in these fisheries was aimed at reducing uncertainly around the risk to particular protected species which was identified in level 1 and level 2 risk assessments (Rowe 2010a, Richard & Abraham 2015, Abraham et al. 2017, Ford et.al. 2015), and assessing mitigation options for interactions identified, as well as delivering on Threat Management Plan objectives for Hector's and Māui dolphins, and the draft New Zealand sea lion Threat Management Plan. The NPOA–Seabirds 2013 highlights the importance of observer data in meeting the objectives of the plan, and the CSP Seabird Plan 2017 outlines fishery specific priorities to reduce uncertainty in current risk scores. The NPOA–Sharks 2013 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.

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 2018 – 30 June 2019, effort data from previous years was examined, in conjunction with MPI, to ensure that desired coverage levels are achievable with the days planned and that these coverage levels would 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). Following Ministerial decisions in 2012, there is a substantial increase in foreign owned vessel coverage. This has resulted in a proportionally greater volume of coverage going on to these vessels.

The most recent observer coverage and protected species statistics are summarised by Hjorvarsdottir & Isaacs (2018). 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 Hjorvarsdottir (2016). Summary information for 1 July 2014 to 30 June 2015 is reported by Hjorvarsdottir (2016). Summary information for 1 July 2015 to 30 June 2016 is reported by Hjorvarsdottir (2017). 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-MPI 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 2011/12[5]. This tiered process has endured into the planning for the 2018/19 year and decisions on the levels and placement of this observer coverage were undertaken jointly between DOC and MPI. 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.

For 2018/19 the cost of observer coverage is being jointly recovered by both DOC and MPI 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. 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.

Due to ongoing industry concerns of over recovery for unachieved inshore observer coverage, MPI 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. Additional to this, the cost of an inshore observer day was capped at $950 to better reflect the actual cost of those days.

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/Documents/conservation/marine-and-coastal/marine-conservation-services/approved-mcs-annual-plan-2011-12.pdf

Inshore Observer Projects 2018/19

The table below summarises the proposed observer projects for 2018/19

Inshore Fisheries							
Fishery	Stocks	Total Days	2018/19 levied	MPI %	MPI days	CSP %	CSP days
WCNI setnet	Crown funded	150	-	-	-	-	-
WCNI inshore trawl	JDO1, SCH1, TRE7, SNA8, KAH8, TAR1, GUR1	560	280	50%	140	50%	140
SNA1 trawl	SNA1	150	75	50%	37.5	50%	37.5
Bottom longline - North east NI (SNA)	SNA1	130	65	50%	32.5	50%	32.5
Bottom longline - BNS target (FMA1)	BNS1, HPB1	110	55	50%	27.5	50%	27.5
Set net -east coast SI	SCH3, SPO3, ELE3, MOK3, SPD3	200	100	50%	50	50%	50
Set net - south coast SI	SCH5, SPO3, ELE5, SPD5, BUT5	120	60	50%	30	50%	30

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 2018
Completion Date	31 March 2019
Targeted Statistical Area	022, 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 Otago.
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 population needs to be estimated as the East Coast has the highest levels of setnet activity. Observer coverage is targeted in a statistical area where there are high levels of setnet fishing occurring. In 20014/15 with enhanced levels of coverage in this area 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.

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 been identified by several processes including risk assessment as being at risk from setnet fisheries from Otago south. Due to the decrease in their mainland population their susceptibility to fishing increases.

Proposed Coverage

- Statistical area 022, 024, 026.
- The planning optimisation process identified 65% coverage required to gain sufficient data.
- 200 observer days are required.

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:

- Biological sampling of fish to help inform stock assessments.
- 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.
- 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.
- Observer coverage on East Coast South Island trawl vessels is also proposed (refer to Seabird mitigation project section), primarily to investigate the capture rate of at-risk seabirds. Secondary information on incidental capture rates of protected species will also be collected.
- An ongoing autopsy programme for Hector's and Māui dolphins aims to identify sub-species, cause of death, body condition, 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.

South Coast South Island

Overall project objectives/information needs

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

Start Date	1 October 2018
Completion Date	31 March 2019
Targeted Statistical Areas	025, 027, 029, 030

Project Objectives

1. Gather information to estimate the number of captures and the capture rate of Hector's dolphins hoiho and white pointer sharks.
2. Gather information to identify the nature and extent of interactions with white pointer shark hoiho, Fiordland crested penguins, Fiordland bottlenose dolphins and by setnet fisheries on the South Coast of the South Island.
3. Additionally, spatial distribution data will be obtained for seabirds and marine mammals.

Information Needs

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

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.

The National Plan of Action – Sharks (NPOA–Sharks) sets goals and objective for better understanding and ultimately reducing the incidence of protected shark species. Historically, captures of white pointer sharks have been reported by both fishers and observers around Stewart Island and Fiordland. Identifying the factors which lead to captures will assist in the development of effective mitigation. Additionally, a number of 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.

Proposed Coverage

- Statistical areas 025, 027, 029, 030, 031
- The planning optimisation process identified 60% coverage required to gain sufficient data.
- 120 observer days are required.

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:

- Biological sampling of fish to help inform stock assessments.
- Information on the nature and extent of setnet interactions with seabirds, in particular hoiho.
- Sea lion interaction.
- White pointer shark interactions.
- 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 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, 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.

West Coast North Island

Overall project objectives/information needs

1. Estimate the capture rate of Māui dolphins in **setnet fisheries** on the West Coast of the North Island.

Start Date	1 July 2018
Completion Date	30 June 2019
Targeted Statistical Areas	040-046

Project Objectives

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

Information Needs

An overall capture rate for Māui dolphins needs to be estimated. Observer coverage is targeted to reflect the Ministerial decisions made in response to the Review of the Māui dolphin Threat Management Plan (TMP).

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 will be proposed.

Previous observer coverage in the area has identified interactions with other protected species including common dolphins, fur seals and white pointer sharks. 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 040-046
- 100% coverage of setnet effort with in restricted 2nm-7nm zone (Ministerial directive).
- 150 observer days are required.

Secondary information to be collected

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

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, 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.

INSHORE TRAWL

West Coast North Island

Overall project objectives/information needs

1. Estimate the capture rate of Māui dolphins in **trawl fisheries** on the West Coast of the North Island.

Start Date	1 July 2018
Completion Date	30 June 2019
Targeted Statistical Areas	041-046

Project Objectives

1. Gather information to estimate the number of captures and the capture rate of Māui dolphins in 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

An overall capture rate for Māui dolphins needs to be estimated. Observer coverage will be targeted to reflect Ministerial direction made in response to the review of the Māui dolphin TMP. 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
- 90% effort required (Ministerial directive).
- 560 observer days are required.

Secondary information to be collected

- Biological sampling of fish will help inform stock assessments.
- Information on total commercial catch.
- Observations on the nature of warp interactions will inform improvements to estimates of cryptic mortality which feed in to the level 2 risk assessment.
- Observer counts to provide spatial distribution data for seabirds and marine mammals.

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, 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 2018
Completion Date	30 June 2019
Targeted Statistical Areas	003-009

Background Information

The Ministry for Primary Industries (MPI) proposes to continue a monitoring programme in the SNA 1 trawl fishery to achieve improved information gathering and verification of reported catch within the commercial SNA1 fishery. Black petrel is identified by the L2 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 Level-2 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.

Project Objectives/ Information needs

1. Support the development of standards for implementation of the ongoing monitoring programme in SNA 1.
2. 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
3. Collection information on the nature of interactions with protected species, in particular black petrels and flesh-footed shearwaters which will assist in informing mitigation strategies.
4. Joint industry government initiatives to undertake electronic monitoring are underway in this fishery. In order to gain a robust assessment of the efficacy of these monitoring systems paired observer coverage will be undertaken providing a baseline against which video detection of captures can be measured.

Proposed Coverage

- North East North Island 003-009
- 150 observer days required.

Secondary information to be collected

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

Precision Seafood Harvesting (PSH) monitoring

Start Date	1 July 2018
Completion Date	30 June 2019
Targeted Statistical Areas	As Necessary

Background Information

As part of special permit conditions in place for the trialling of Precision Seafood Harvesting technology observer coverage requirements are in place. These vessels will be operating over a variety of seasons and Statistical Areas. Previous coverage has highlighted 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. Contribute to the development of innovative fish harvesting and handling systems in line with the proposed EITT programme objectives.
2. Collect information to reduce uncertainty associated with the estimated capture rate of protected species including cetaceans, protected sharks, and at-risk seabird species (primarily black petrels and flesh-footed shearwaters)
3. Collection information on the nature of interactions with protected species, in particular black petrels and flesh-footed shearwaters, which will assist in informing mitigation strategies.

Proposed Coverage

- As per permit requirements
- 120 observer days required.

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 2018
Completion Date	31 June 2019
Targeted Statistical Areas	003-009

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 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

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, MPI 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 the development of mitigation options.

Risk to black petrels derives primarily from inshore bottom long-line fisheries, spread approximately equally between the three defined fishery groups (i.e. small bottom longline targeting bluenose; small bottom longline targeting snapper; and small bottom longline targeting other inshore species). A second at-risk species from inshore bottom longline fisheries, 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.

Joint industry government initiatives to undertake electronic monitoring are underway in this fishery. In order to gain a robust assessment of the efficacy of these monitoring systems paired observer coverage will be undertaken providing a baseline against which video detection of captures can be measured.

A related research project is currently 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. *It will be important that new observer coverage is spread across the range of spatial and temporal variables where captures are thought to occur* (i.e. in all months and all statistical areas) and if possible across the full range of fleet or behavioural variables examined (i.e. on different types of vessels). 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 003, 004, 005, 006, 007, 008 and 009.
- The planning optimisation process identified 30% 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).
- 110 observer days required.

Secondary information to be collected

- Information on BNS and HAP 1 catch.

North-East North Island – Snapper target

Start Date	1 October 2018
Completion Date	31 June 2019
Targeted Statistical Areas	003-009

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

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, MPI 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.

Risk to black petrels derives primarily from inshore bottom long-line fisheries, spread approximately equally between the three defined fishery groups (i.e. small bottom longline targeting bluenose; small bottom longline targeting snapper; and small bottom longline targeting other inshore species). A second at-risk species from inshore bottom longline fisheries, 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.

Joint industry government initiatives to undertake electronic monitoring are underway in this fishery. In order to gain a robust assessment of the efficacy of these monitoring systems paired observer coverage will be undertaken providing a baseline against which video detection of captures can be measured.

A related research project is currently 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. *It will be important that new observer coverage is spread across the range of spatial and temporal variables where captures are thought to occur* (i.e. in all months and all statistical areas) and if possible across the full range of fleet or behavioural variables examined (i.e. on different types of vessels). 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 003, 004, 005, 006, 007, 008 and 009
- Summer coverage is required (black petrels and flesh-footed shearwaters are absent in winter).
- 130 observer days required.

Secondary information to be collected

- Information on SNA 1 catch.

2.1.2 "Offshore" Fisheries

As for previous years, planning of observer days was conducted jointly with MPI 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 2018/19 are summarised in the table below. 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.

Summary of 2018/19 observer days planned in better known fisheries

Fishery	Stocks	Total Days	MPI %	MPI 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	220	90%	198	10%	22
Sub-Antarctic Deepwater	ORH3B, OEO1, OEO6	60	90%	54	10%	6
West Coast NI Deepwater	ORH7A	60	90%	54	10%	6
Pelagic trawl fisheries:						
West Coast North Island	JMA7, EMA7, BAR7	650	85%	553	15%	98
Middle Depth trawl fisheries:						
West Coast South Island	HOK1, HAK7, LIN7, SWA1	1000	85%	850	15%	150
Chatham Rise Middle Depth	HOK1, HAK1, HAK4, LIN3, LIN4, SWA3, SWA4, JMA3, BAR1, BAR4, RBT3	850	85%	723	15%	128
Subantarctic Middle Depth	HOK1, SWA4, WWA5B, BAR5, JMA3, LIN6	800	85%	680.0	15%	120.0
Southern blue whiting	SBW6B, SBW6I, SBW6R	430	80%	344	20%	86
Squid	SQU1T, SQU6T	1300	80%	1040	20%	260
Hoki Cook Strait	HOK1	120	85%	102	15%	18
WCSI Hoki-Inside the line	HOK1	80	85%	68	15%	12
Scampi	SCI1, SCI2, SCI3, SCI4A, SCI6A	400	80%	320	20%	80
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	266	85%	226.1	15%	39.9
Domestic SLL - west coast BIG/SWO	BIG1, SWO1	107	85%	91.0	15%	16.1
Domestic tuna longline - east coast STN	STN1	164	85%	139.4	15%	24.6
Domestic tuna longline - west coast STN	STN1	128	85%	109	15%	19
Purse Seine fisheries:						
Purse seine - SKJ (non super seiner)	SKJ	140	85%	119	15%	21
Purse seine - SKJ (super seiner)	SKJ	30	85%	25.5	15%	4.5

Further background to fisheries groupings and the allocation of observer days is provided below.

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 2018 and May and June 2019.

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 this 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 2018/19 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 2018/19 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 include offal and discard management, the use of bird scaring devices and trawling known tracks to avoid catching deep sea invertebrates. CSP will fund only 10% of observer days in this fishery due to the relatively low work load relating to protected species interactions.

SURFACE LONGLINE FISHERIES

Domestic surface longline

Monitoring priorities for 2018/19 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 including tori line development (see CSP Project MIT2015-02). 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 2018/19 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.

PURSE SEINE FISHERIES

Skipjack tuna

Observer coverage has historically taken place in this fishery, though not for the purposes of protected species monitoring. Two ray species (*Manta birostris* and *Mobula japanica*) have historically been reported as bycatch in this fishery and therefore for the 2018/19 year CSP will be funding coverage in this fishery to assess the nature and extent of protected fish captures in this fishery as well as undertaking specific work to assess the survival probability of live released animals. Observer coverage is planned for AKE and AKW in both the domestic purse seine and super seine fisheries.

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 2016-02: Identification of seabirds captured in NZ fisheries).
4. Data will be available for other DOC and MPI 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 (INT2016-02) was consulted on in 2016/17 and is included here for completeness.

2.2 Identification of seabirds captured in New Zealand fisheries

Project Code: INT 2016-02

Start Date: 1 July 2016

Completion Date: 30 June 2019

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 examination of photographs, the taxon and, where possible, sex, age-class and provenance of seabirds captured in New Zealand fisheries (for live captures or dead specimens discarded at sea).

Rationale

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

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

Information gained through this project will link to Ministry for Primary Industries databases, seabird bycatch estimates, and will inform ongoing risk assessment, research and modelling of the effects of fisheries bycatch on seabird populations. Further, the mode of capture and

associated information will enable robust analyses to be made of the factors contributing to seabird capture events and inform the development of appropriate mitigation strategies.

Research approach

Specific objectives 1-3

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;
- Moult 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.

Specific objective 4

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 Ministry for Primary Industries databases and/or other relevant databases.

Indicative Research Cost: $80,000 per annum

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

Fish stocks: BAR1, 7, BCO4, BIG1, BNS1, 2, 3, 7, BUT5, 7, BWS1, ELE3, 5, 7, EMA1, 3, 7, FLA1, 2, 3, 7, GMU1, GSH1, 3, 4, 7, 8, 9, GSP1, 7, GUR1, 2, 3, 7, 8, HAK1, 4, 7, HOK1, HPB1, 2, 3, 4, 7, 8, JDO1, 2, 3, 7, JMA1, 3, 7, KIN1, 7, 8, LEA1, 2, 3, LIN1, 2, 3, 4, 5, 6, 7, MAK1, MOK1, 3, 5, MOO1, ORH1, 2A, 2B, 3A, 3B, OEO1, 3A, 4, 6, PAR1, 9, POR1, POS1, RBM1, RSN1, 2, RIB1, 2, RCO1, 3, 7, RSK1, 3, 7, 8, SBW6A, 6R, 6I, 6B, SCH1, 2, 3, 4, 5, 7, SCI1, 2, 4A, 6A, 6B, SKI1, 3, 7, SNA1, 2, 3, 7, 8, SPD1, 3, 4, 5, 7, 8, SPE1, 3, 4, 7, SPO1, 3, 7, 8, SQU1T, 6T, SSK1, 3, 7, 8, STA1, 3, 4, 5, 7, STN1, SWA1, 3, 4, SWO1, TAR1, 2, 3, 4, 5, 7, 8, TOR1, TRE1, 2, 7, TRU3, 4, WAR1, 2, 3, 7, 8, WWA2, 3, 4, 5B, 7, YEM1, 8, 9

NOTE: This multi-year project (INT2017-02) was consulted on in 2017/18 and is included here for completeness.

2.3 Supporting the utility of electronic monitoring to identify protected species interacting with commercial fisheries

Project Code: INT 2017-02

Start Date: 1 July 2017

Completion Date: 30 June 2019

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

Project Objective

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

Specific Objectives

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

Rationale

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

Research approach

During the first year, the project will undertake an international review of training and instructional materials used in relation to the detection and description of fishing interactions with Threatened Endangered and Protected Species (TEPS).

This will inform the second year's methodologies which will work in parallel with a more developed IEMRS process to develop and produce training and resource materials directed at footage reviewers. The material will aim to enable footage reviewers to accurately identify and characterise the natural and contributing factors of protected species interactions, undertake more accurate speciation of cryptic taxa, and make more accurate assessments of the fate or injury status of animals interacting with fishing activities. Information gained through this project will link to MPI 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.

Outputs

1. A literature review of international training documentation for electronic monitoring programmes relating to TEPS
2. Training and instructional materials enabling footage reviewers to identify and characterise the natural and contributing factors of protected species interactions

Note: A two-year term is proposed.

Indicative Research Cost: $20,000 per annum

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

Fish stocks: BAR1, 7, BCO4, BIG1, BNS1, 2, 3, 7, BUT5, 7, BWS1, ELE3, 5, 7, EMA1, 3, 7, FLA1, 2, 3, 7, GMU1, GSH1, 3, 4, 7, 8, 9, GSP1, 7, GUR1, 2, 3, 7, 8, HAK1, 4, 7, HOK1, HPB1, 2, 3, 4, 7, 8, JDO1, 2, 3, 7, JMA1, 3, 7, KIN1, 7, 8, LEA1, 2, 3, LIN1, 2, 3, 4, 5, 6, 7, MAK1, MOK1, 3, 5, MOO1, ORH1, 2A, 2B, 3A, 3B, OEO1, 3A, 4, 6, PAR1, 9, POR1, POS1, RBM1, RSN1, 2, RIB1, 2, RCO1, 3, 7, RSK1, 3, 7, 8, SBW6A, 6R, 6I, 6B, SCH1, 2, 3, 4, 5, 7, SCI1, 2, 4A, 6A, 6B, SKI1, 3, 7, SNA1, 2, 3, 7, 8, SPD1, 3, 4, 5, 7, 8, SPE1, 3, 4, 7, SPO1, 3, 7, 8, SQU1T, 6T, SSK1, 3, 7, 8, STA1, 3, 4, 5, 7, STN1, SWA1, 3, 4, SWO1, TAR1, 2, 3, 4, 5, 7, 8, TOR1, TRE1, 2, 7, TRU3, 4, WAR1, 2, 3, 7, 8, WWA2, 3, 4, 5B, 7, YEM1, 8, 9

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

2.4 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 Ministry for Primary Industry databases and will inform ongoing bycatch estimation, risk assessment, research, and modelling of the effects of fisheries bycatch on marine mammals, turtles, and protected fish populations. This is a new project and is designed to complement the existing seabird identification project. Observers routinely collect samples of genetic material from these taxa, and these can be used to resolve uncertain identification determinations from photographs.

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 and web-based platform which allows for the pairing of imagery to meta data, 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 Ministry for Primary Industries 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: BAR1, 7, BCO4, BIG1, BNS1, 2, 3, 7, BUT5, 7, BWS1, ELE3, 5, 7, EMA1, 3, 7, FLA1, 2, 3, 7, GMU1, GSH1, 3, 4, 7, 8, 9, GSP1, 7, GUR1, 2, 3, 7, 8, HAK1, 4, 7, HOK1, HPB1, 2, 3, 4, 7, 8, JDO1, 2, 3, 7, JMA1, 3, 7, KIN1, 7, 8, LEA1, 2, 3, LIN1, 2, 3, 4, 5, 6, 7, MAK1, MOK1, 3, 5, MOO1, ORH1, 2A, 2B, 3A, 3B, OEO1, 3A, 4, 6, PAR1, 9, POR1, POS1, RBM1, RSN1, 2, RIB1, 2, RCO1, 3, 7, RSK1, 3, 7, 8, SBW6A, 6R, 6I, 6B, SCH1, 2, 3, 4, 5, 7, SCI1, 2, 4A, 6A, 6B, SKI1, 3, 7, SNA1, 2, 3, 7, 8, SPD1, 3, 4, 5, 7, 8, SPE1, 3, 4, 7, SPO1, 3, 7, 8, SQU1T, 6T, SSK 1, 3, 7, 8, STA1, 3, 4, 5, 7, STN1, SWA1, 3, 4, SWO1, TAR1, 2, 3, 4, 5, 7, 8, TOR1, TRE1, 2, 7, TRU3, 4, WAR1, 2, 3, 7, 8, WWA2, 3, 4, 5B, 7, YEM1, 8, 9

2.5 Trialling innovative Electronic Monitoring (EM) systems for small vessels

Project Code: INT 2018-02

Start Date: 1 July 2018

Completion Date: 30 June 2020

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

Project Objectives

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

Rationale

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

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

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

Research approach

This project will aim to trial self-contained EM systems in order to test and solutions suitable for the most logistically challenging vessels of the inshore sector, targeting vessels that. It is envisaged that as a case study the at sea trials will be carried out as a case study on vessels based around Otago/Southland, covering the main breeding areas of hoiho (yellow-eyed penguins).

The trial will test if the systems are operationally fit for purpose, in that they are robust and reliable across a range of environmental and operational conditions, as well as that the systems are capable of collecting image and other data suitable for the detection of protected species

bycatch. For the second component, paired trialling using human observer coverage will be required, therefore project logistics will be aligned with observer coverage planning.

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 Ministry for Primary Industries databases and/or other relevant databases.

Note: A two-year term is proposed.

Indicative Research Cost: $50,000 per annum

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

Fish stocks: BNS1, BUT5, ELE3, 5, GUR1, HPB1, JDO1, KAH8, MOK3, SCH1, 3, 5, SNA1, 8, SPD3, 5, SPO3, TAR1, TRE7

2.6 Development of observer photograph protocols and curation

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 MPI 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 MPI 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, in a way that would reduce the complexity of collating necessary image information. Cameras equipped with GPS that are capable of recording and embedding coordinates in the image file metadata as soon as the photograph is taken could provide a solution to this problem. The use of these cameras could make the image processing largely automated to both simplify the work, and potentially make 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 Ministry for Primary Industries 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: BAR1, 7, BCO4, BIG1, BNS1, 2, 3, 7, BUT5, 7, BWS1, ELE3, 5, 7, EMA1, 3, 7, FLA1, 2, 3, 7, GMU1, GSH1, 3, GSH4, 7, 8, 9, GSP1, 7, GUR1, 2, 3, 7, 8, HAK1, 4, 7, HOK1, HPB1, 2, 3, 4, 7, 8, JDO1, 2, 3, 7, JMA1, 3, 7, KIN1, 7, 8, LEA1, 2, 3, LIN1, 2, 3, 4, 5, 6, 7, MAK1, MOK1, 3, 5, MOO1, ORH1, 2A, 2B, 3A, 3B, OEO1, 3A, 4, 6, PAR1, 9, POR1, POS1, RBM1, RSN1, 2, RIB1, 2, RCO1, 3, 7, RSK1, 3, 7, 8, SBW6A, 6R, 6I, 6B, SCH1, 2, 3, 4, 5, 7, SCI1, 2, 4A, 6A, 6B, SKI1, 3, 7, SNA1, 2, 3, 7, 8, SPD1, 3, 4, 5, 7, 8, SPE1, 3, 4, 7, SPO1, 3, 7, 8 , SQU1T, 6T, SSK1, 3, 7, 8, STA1, 3, 4, 5, 7, STN1, SWA1, 3, 4, SWO1, TAR1, 2, 3, 4, 5, 7, 8, TOR1, TRE1, 2, 7, TRU3, 4, WAR1, 2, WAR3, 7, 8, WWA2, 3, 4, 5B, 7, YEM1, 8, 9

2.7 Improving the collection of data and samples from bycaught basking sharks

Project Code: INT 2018-04

Start Date: 1 July 2018

Completion Date: 30 June 2019

Guiding Objectives: CSP Objectives C, E; CSP Protected Fish Plan; National Plan of Action – Sharks.

Project Objectives

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

Rationale

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

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

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

Research approach

Nearly all basking sharks observed during the last three decades (1986-2016) were taken by trawl, and most captures were from around South Island. A predominantly southern distribution of the species in New Zealand waters appears real as basking sharks have rarely been sighted in northern North Island waters (Francis & Duffy 2002).

Analysis of capture has indicated that certain sectors of the trawl fleet are more likely to encounter backing sharks, for example over the period 2011-2016, basking sharks were caught in hoki and barracoota target fisheries in East Coast (EC), and in hake and hoki fisheries in West Coast (WC). In Soutland-Auckland (SA) region, more than half of the 44 sharks were caught in arrow squid target trawl, with the remainder coming from hoki, silver warehou, hake and ling

fisheries. A single vessel was responsible for 23/44 captures in the SA region. The SA region was responsible for 83% of the basking shark captures reported from three key regions with specific target fisheries in 2011-2016. More than half of the SA captures came from the arrow squid target trawl fishery which concentrated on the southern edge of Stewart-Snares Shelf, shallower than 250 m.

Therefore, effort will be prioritised against those vessels most likely to encounter basking sharks.

Outputs

1. A summary of results and tools developed will be reported, reviewed by the CSP Technical Working Group, and published on an annual basis.
2. Provision of training, data collection instructions and, where necessary, equipment to key commercial fishing vessels.
3. Provision of all data collected in electronic format, suitable for updating Ministry for Primary Industries databases and/or other relevant databases.

Note: A two-year term is proposed.

Indicative Research Cost: $20,000 per annum

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

Fish stocks: CDL6, HAK1, 4, 7, HOK1, JMA7, LIN5, 6, OEO 6, ORH 1, 2A, 2B, 3B, RCO3, SBW6I, 6B, SCI6A, 6B, SKI2, SKJ1, SPD3, 5, SQU1T, 6T, SWA3, 4, WWA5B

2.8 Updated analysis of spine-tailed devil ray post release survival

Project Code: INT 2018-05

Start Date: 1 July 2018

Completion Date: 30 June 2019

Guiding Objectives: CSP Objectives A and B; National Plan of Action – Sharks

Project Objective:

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

Rationale

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

Analysis of this further information will significantly refine post release mortality estimates and the factors which drive it.

Research approach

This project will involve a desktop study and reanalysis of fishing, bycatch and sPAT tag data to reassess the factors driving bycatch and post release mortality for *Mobula japanica* in purse seine fisheries using the additional four years of at-sea tagging data.

Findings will be used to provide recommendation on best practice guidance on how to avoid capture of *Mobula japanica* as well as best practice guidance for handling.

Outputs

1. Report detailing the identified factors driving bycatch and post release mortality for *Mobula japanica* in purse seine fisheries, as well as recommendations for best practice guidance.
2. A summary of results will be reported, reviewed by the CSP Technical Working Group, and made available on the CSP report webpage.
3. Provision of all data collected in electronic format.

Indicative Research Cost: $15,000

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

Fish stocks: SKJ1

3. Population Projects

NOTE: This multi-year project (POP2017-04) was consulted on in 2017/18 and is included here for completeness. Additional Crown-funded research is proposed ***for 2018/19****, to be delivered alongside this project, and summarised following the project description.*

3.1 Seabird population research: Auckland Islands 2017-20

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 National Plan of Action – Seabirds[6] 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).

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

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.

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 resight 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 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. Jensz, 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.

Indicative Research Cost: $90,000

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
2	White-capped albatross	$30,000	BAR5, 7 BIG1, HOK1, SCI6A, SQU1T, 6T, STN1, SWA4

Additional Crown-funded research for 2018/19

Objective 3: to collect information on the foraging range and life history parameters of white-chinned petrel.

Rationale: This research aligns with the CSP seabird plan, and the opportunity for cost effective delivery alongside this existing project was identified by the CSP Research Advisory Group.

Research approach: Building on earlier research by Otago University, supported by CSP (Rexer-Huber 2017), this research will aim to recover GLS tracking devices currently deployed on birds from the Adams Island study colony, and collect resight data from marked birds at the colony.

Outputs: a report describing research undertaken; data collected

Indicative Research Cost: $15,000

Reference

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

NOTE: This multi-year project (POP2017-06) was consulted on in 2017/18 and is included here for completeness.

3.2 Indirect effects on seabirds in north-east North Island region

Project code: POP2017-06

Start Date: 1 July 2017

Completion Date: 30 June 2019

Guiding Objectives: CSP Objective D.

Project Objective: The overall objective of this two-year project will address priority recommendations from project INT2016-04 to better understand the indirect effect of commercial fishing on seabirds in north-east North Island through changes in food availability through fish work-ups. This consist of the following specific objectives:

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

Rationale

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

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

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

Research approach

The research will require data collection from both at-sea sampling and colony visits. Over the next two years, the research will be divided into four objectives.

Objective 1 – Identify the range of potential seabird prey species within fish work-ups

Initially, methods to sample prey species will be developed. These might include the use of fine mesh nets to collect samples of fish, krill, fish eggs and plankton from the surface layer of the sea (0-1 m in depth and the sub-surface 1-5 m in depth). These are the zones typically available to surface seizing and shallow diving seabirds. The sampling protocol will be to collect prey samples from different species of fish work-ups (identifying the species of fish making up the majority of the shoal) and running the nets through these shoals at two depths listed above. These sampling locations will be GPS mapped. After the fish shoal has dispersed, the same net sampling protocol will be repeated through the same water zone at the same depths to see what prey species naturally occur in the water surface layers compared to when shoaling fish are present. Prey species will later be sorted later into broad biological categories and mass of each type determined. Where possible potential prey items will be identified down to family, genera, or species.

Objective 2 – Identify food fed to chicks of key surface feeding seabirds.

This objective will be assessed by collecting any chance regurgitations or stomach flush diet samples from chicks of red-billed gull, white-fronted tern, Australasian gannet, fairy prion, Buller's shearwater and fluttering shearwater breeding on northern offshore islands. Trail cameras might also be used to identify prey items fed to chicks where adults carry the food in their bill. Diet samples will be sorted into broad categories and the mass of each type determined, and where possible, identified down to family, genera, or species.

Objective 3 – Compare prey availability in fish work-ups with the diet of the target seabird species.

From the information gathered in objectives 1 and 2, research under this objective will compare the availability of food in fish work-ups with the diet of target seabird species to determine the importance of each prey type in the diet of local breeding seabirds. Establish if there is a spatial difference in food availability (water depth) that might be related to known foraging behaviour of each seabird species and whether the seabird diet items naturally occur in the sea surface layer or are more likely to be captured during fish work-ups.

Objective 4 – Collect baseline population data on surface nesting seabirds on a sample of northern offshore islands to monitor long-term changes in populations.

This objective will require collection of quantitative data on the size of the breeding populations of the following seabird species; red-billed gull, white-fronted tern, and Australasian gannet. At least five major colonies in the region will be photographed from aerial surveys and the population size (breeding pairs) determined from counts of nesting birds seen in the photographs. This information will serve as a baseline to monitor any long-term change in population numbers if the diet studies show a high dependency on prey species sourced from fish work-ups.

Outputs

1. Data collected, in an electronic format.
2. A technical report (or reports) detailing the methods used, a summary of data collected, analysis of seabird diet and its relationship to food availability in fish work-ups and

recommendations for further research to more fully understand the mechanisms through which fishing indirectly influences food availability.

3. A technical report (or reports) detailing the methods used, a summary of data collected, analysis of in seabird population assessments for the target seabird species, and recommendations for future monitoring to adequate assess trends over time.
4. Presentation of annual reports to the CSP Technical Working Group.

Indicative Research Cost: $40,000 per annum (dependent on scope of proposed project)

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

Fish stocks: EMA1, GMU1, JMA1, KAH1, PIL1, SNA1, STN1, SWO1, TRE1

NOTE: This multi-year project (POP2017-07) was consulted on in 2017/18 and is included here for completeness.

3.3 The age and growth of New Zealand protected corals at high risk

Project Code: POP 2017-07

Start Date: 1 July 2017

Completion Date: 30 June 2018

Guiding Objectives: CSP Objective E.

Project Objective

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

Rationale

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

Research approach

This project will determine the age and growth characteristics of key high risk New Zealand cold-water coral species. As there is no single method known that can be used to measure the age or growth rate of all coral types, the first year will focus on methodology development which will be built on the use of existing coral specimens collected by fisheries observers. Expertise will be sought from domestic and international experts. The development of methodology will consider matters including:

- Research species
- Sample sizes needed
- Spatial distribution of samples
- Analytical methods

Methodologies will be taxa dependant but could include radiocarbon dating, radiometric (lead 210) dating and zone counts. During the second year, the research plan will be implemented on high priority specimens.

Outputs

1. A technical report describing the development of the proposed methodology

References

Clark, M., Tracey, D., Anderson, O., and Parker, S. 2014. Pilot ecological risk assessment for protected corals. Report prepared by the National Institute of Water and Atmospheric Research for the New Zealand Department of Conservation, Wellington. 32p. http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-conservation-services/reports/pilot-ecological-risk-assessment-for-protected-corals-final-report.pdf

Note: A two-year term is proposed

Indicative Research Cost: $25,000 per annum

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

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

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

Project Code: POP 2018-01

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)

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

3.5 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 studies hoiho colonies.
2. To collect dietary and condition data at poorly studies 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 briefing 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 fines 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)

Fish stocks: BAR1, BCO3, 5, BNS3, BUT5, ELE3, 5, FLA3, GUR3, MOK3, 5, PAD3,5, SCA3, 5, STA3, 5, TAR3, 5, WAR3

3.6 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 resighting of marked animals.

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

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 resightings, 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 fromhttp://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 (*Phocarctos hookeri*) breeding on the Auckland Islands. Report or 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 4-year term is proposed to align with the term of the TMP

Indicative Research Cost: $100,000

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

Fish Stocks: SQU6T, SCI6A

3.7 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 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.

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

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

Richard, Y., Abraham, E.R. 2013. Risk of commercial fisheries to New Zealand seabird populations. New Zealand Aquatic Environment and Biodiversity Report No. 109. Ministry for Primary Industries, Wellington.

Waugh, S.M., Jamieson, S.E., Stahl, J.C., Filippi, D.P., Taylor, G.A., and Booth, A. 2014. Final Report on Project POP2011-02 Flesh-footed Shearwaters-population study and foraging areas. Report prepared by the Museum of New Zealand, Te Papa Tongarewa for the New Zealand Department ofConservation, Wellington, 68 p.

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 3-year term has been 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

3.8 Westland petrel population estimate

Project code: POP2018-05

Start Date: 1 July 2018

Completion Date: 30 June 2019

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

Project Objectives

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

Rationale

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

Research Approach

Westland petrels breed in 28 colonies restricted to a series of coastal ridgelines near to Punakaiki on the West Coast of the South Island (Wood & Otley 2013). Field methods to estimate the total population size will consist of transect burrow counts with an assessment of occupancy. The methods will be tailored according to best practice identified by Parker & Rexer-Huber (2015) and should maximise comparability to previous estimates (Wood & Otley 2013; Waugh et al 2015), to provide indications of population trend. The research will be planned to maximise any cost synergies with research and management activities undertaken by DOC at the colony sites, and the opportunity to collect data on key demographic rates from marked individuals encountered will be considered.

Outputs

1. A technical report (or reports) detailing methods used and results found, including an updated population estimate of Westland petrels.
2. Data obtained, suitable for use in analyses such as fisheries risk assessment.

References

Waugh, S. M., C. Barbraud, L. Adams, A. N. D. Freeman, K.-J. Wilson, G. Wood, T. J. Landers, and G. B. Baker. 2015. Modeling the demography and population dynamics of a subtropical seabird, and the influence of environmental factors. The Condor: Ornithological Applications 117:147–164.

Wood, G. C., and H. M. Otley. 2013. An assessment of the breeding range, colony sizes and population of the Westland Petrel (*Procellaria westlandica*). New Zealand Journal of Zoology 40:186–195.

Indicative Research Cost: $20,000

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

Fish Stocks: BAR5, GUR7, HOK1W, LIN5, SQU1T, STN1, SWO1.

3.9 Protected coral connectivity in New Zealand

Project code: POP2018-06

Start Date: 1 July 2018

Completion Date: 30 June 2019

Guiding Objectives: CSP Objective E

Project Objectives

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

Rationale

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

Research Approach

This study would review connectivity information on deep sea corals in New Zealand, based on existing genetics studies in the region. Following the information review, a genetic study investigating previously identified at risk coral species would be undertaken on a species of the protected black coral group, where genetic connectivity data in New Zealand is particularly limited. The analyses will be focused on archived specimens for which existing molecular markers are available. Analyses will assess connectivity at various temporal and spatial scales and, if possible, will address on contemporary vs. historical connectivity.

Outputs

1. A technical report summarising a) coral genetic connectivity studies carried out to date in the New Zealand region, and b) methods applied and results obtained from a genetic connectivity assessment of a 'high-risk' coral species.
2. Data obtained, suitable for use in further analyses such as fisheries risk assessment.

Indicative Research Cost: $40,000

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: Two multi-year population projects; POP2017-02 Indirect effects of fishing on New Zealand sea lions and POP2017-03 Salvin's albatross: Bounty Islands population project were consulted on in 2017/18. Due to logistical issues in delivery of year one of each these projects they have been deferred by a year. Therefore, as delivery of 2017/18 outputs will now occur in 2018/19, CSP will not cost recovery for year two outputs until 2019/20

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

Due to the updating of relevant management plans such as NPOA seabirds and NPOA sharks, project MIT2017-01 Protected Species Liaison Project will be put up for review after the finalisation of these documents.

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 the Ministry for Primary Industries.

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 3-year term is proposed for this project

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 (MIT2017-02) was consulted on in 2017/18 and is included here for completeness

4.2 Characterization and development of offal management for small vessels

Project Code: MIT 2017-02

Start Date: 1 July 2017

Completion Date: 30 June 2019

Guiding Objectives: CSP Objectives A and B; CSP seabird plan 2017; National Plan of Action – Seabirds.

Project Objective

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

Rationale

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

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

Research approach

This project aims to compile and utilise existing information on both offal management practices on trawl vessels <28m and assess the practicalities of refinements to these. Initially a review of offal management practices both domestically and internationally will be undertaken. Data sources will include observer data and diaries, commercial fishing data, international literature published and grey literature and select fisher interviews.

Where data is adequate, a quantitative assessment of offal management practices against bycatch events will be undertaken. Where data is not adequate qualitative assessments will be made. Results of the analysis will be used to refine and improve current best practice for smaller vessel offal management. Outputs will be used to implement best practice advice for a range of smaller vessels via the various liaison programmes operating throughout the fleet.

Outputs

1. Report detailing the domestic and international review of offal management practices on smaller vessels and the influence on bycatch events.
2. Recommendations of best practice offal management for smaller vessels suitable to be implemented by relevant liaison programmes.

Indicative Research Cost: $30,000 per annum

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

Fish stocks: BAR1, 5, 7, ELE3, 5, 7, FLA3, 7, GSH3, 5, 7, GUR2, 3, 7, LIN2, 3, 5, 7, RCO3, 7, SCH3, SNA1, 2, SPO3, 7, STA3, 5, 7, TAR3, 5, 7

4.3 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 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 athttp://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: BAR1, 7, BCO4, BIG1, BNS1, 2, 3, 7, BUT5, 7, BWS1, CRA4, 5, 7, ELE3, 5, 7, EMA1, 3, 7, FLA1, 2, 3, 7, GMU1, GSH1, 3, 4, 7, 8, 9, GSP1, 7, GUR1, 2, 3, 7, 8, HAK1, 4, 7, HOK1, HPB1, 2, 3, 4, 7, 8, JDO1, 2, 3, 7, JMA1, 3, 7, KIN1, 7, 8, LEA1, 2, 3, LIN1, 2, 3, 4, 5, 6, 7, MAK1, MOK1, 3, 5, MOO1, ORH1, 2A, 2B, 3A, 3B, OEO1, 3A, 4, 6, PAR1, 9, POR1, POS1, RBM1, RSN1, 2, RIB1, 2, RCO1, 3, 7, RSK1, 3, 7, 8, SBW6A, 6R, 6I, 6B, SCH1, 2, 3, 4, 5, 7, SCI1, 2, 4A, 6A, 6B, SKI1, 3, 7, SNA1, 2, 3, 7, 8, SPD1, 3, 4, 5, 7, 8, SPE1, 3, 4, 7, SPO1, 3, 7, 8, SQU1T, 6T, SSK1, 3, 7, 8, STA1, 3, 4,, 5, 7, STN1, SWA1, 3, 4, SWO1, TAR 1, 2, 3, 4, 5, 7, 8, TOR1, TRE1, 2, 7, TRU3, 4, WAR1, 2, 3, 7, 8, WWA 2, 3, 4, 5B, 7, YEM1, 8, 9

4.4 Haul mitigation for small longline vessels

Project code: MIT2018-02

Start Date: 1 July 2018

Completion Date: 30 June 2019

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

Project Objectives

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

Rationale

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

Research Approach

The project will build upon the recommendations of MIT2015-02 (Goad 2018), and will consider a range of candidate haul mitigation devices. These will then be shortlisted as necessary using initial criteria of safety, simplicity and cost effectiveness.

One or more identified methods will then be tested at sea over a range of operating conditions with observations undertaken by a combination of dedicated researcher and video monitoring. Devices will be assessed for ability to spatially separate birds from hauling hooks across a range of environmental and operational conditions. Durability, and ease of use will also be assessed, seeking crew feedback to ensure a long-term willingness to operate such devices.

Outputs

1. Report detailing the development and experimental trialling of haul mitigation devices.
2. An assessment of device efficacy and recommendations on potential improvements and future opportunities for development

References

Goad, D., 2018 Small longline vessel hauling mitigation development. Available at http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-conservation-services/reports/hauling-mitigation-report-11Feb2018.pdf

Indicative Research Cost: $75,000

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

Fish Stocks: BIG1, BNS1, HPB1, SNA1, STN1, SWO1, LIN2, LIN7

4.5 Setting mitigation for small longline vessels

Project code: MIT2018-03

Start Date: 1 July 2018

Completion Date: 30 June 2019

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

Project Objectives

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

Rationale

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

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

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

Research Approach

Quantitative testing will be undertaken of one or more key mitigation devices designed to set baited hooks at depth. Device efficacy will be assessed using non-lethal metrics, to describe the deterrence of seabirds from high risk areas around the vessel. Performance will be assessed in a range of weather conditions and varying fishing operations. Appropriate testing metrics will be developed for subsequent at-sea testing, which may be in conjunction with observer deployment, liaison officer placement or utilization of specialist researchers.

Outputs

1. Report detailing the development and experimental trialling of setting mitigation devices.
2. Recommendations on potential applications, improvements and future opportunities for development.

Indicative Research Cost: $75,000

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

Fish Stocks: BIG1, BNS1, HPB1, LIN2, 7, SNA1, STN1, SWO1

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

Project code: MIT2018-04

Start Date: 1 July 2018

Completion Date: 30 June 2019

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

Rationale

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

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

Research Approach

This project will use existing tools and synthesize existing information sources to undertake a desktop review, followed by expert panel workshop to present a range of options for spatial and temporal management of setnet fishing against explicitly stated management and recovery objectives for hoiho. Options will be presented over a range of temporal and spatial scales and resolutions utilizing both quantitative and expert based logics.

The report will explicitly consider any current limitations and data gaps and provide recommendations on potential methods to address these.

Outputs

1. Report detailing the development of a series of case studies for objective based spatial temporal management options.
2. Recommendations on further tools and processes which may streamline or increase transparency and utility of spatial / temporal management.

Indicative Research Cost: $80,000
Cost Recovery: F(CR) Item 4 (100% Industry)

Fish Stocks: BAR1, BCO3, 5, BNS3, BUT5, ELE3, 5, FLA3, GUR3, MOK3, 5, PAD3, 5, SCA3, SCA5, STA3, 5, TAR3, 5, WAR3

Appendix 1: Cost Allocation Tables

A: CSP 2018/19 Projects

Code	Project	Research	Admin	Total	CR Item	Industry %	Industry	Crown
Interaction Projects								
INT2016-02	Identification of seabirds captured in New Zealand fisheries	$80,000	$9,413	$89,413	4	100	$89,413	$0
INT2017-02	Supporting the utility of electronic monitoring to identify protected species interacting with commercial fisheries	$20,000	$2,353	$22,353	4	100	$22,353	$0
INT2017-03	Identification of marine mammals, turtles and protected fish captured in New Zealand fisheries	$15,000	$1,765	$16,765	4	100	$16,765	$0
INT2018-01	Observing commercial fisheries	$849,646	$99,976	$949,622	8	100	$949,622	$0
INT2018-02	Trialling innovative Electronic Monitoring (EM) systems for small vessels	$50,000	$5,883	$55,883	4	100	$55,883	$0
INT2018-03	Development of Observer photograph protocols and curation	$30,000	$3,530	$33,530	4	100	$33,530	$0
INT2018-04	Improving the collection of data and samples from bycaught basking sharks	$20,000	$2,353	$22,353	4	100	$22,353	$0
INT2018-05	Updated analysis of spine-tailed devil ray post release survival	$15,000	$1,765	$16,765	4	100	$16,765	$0

Continued overleaf

CSP 2018/19 Projects (Continued)

Code	Project	Research	Admin	Total	CR Item	Industry %	Industry	Crown
Population Projects								
POP2017-04	Auckland Islands seabird research	$90,000	$10,590	$100,590	3	50	$50,295	$50,295
	Objective 3 White-chinned petrel (Crown contribution)	$15,000	$1,765	$16,765	-	0	$0	$16,765
POP2017-06	Indirect effects on seabirds in north-east North Island region	$40,000	$4,707	$44,707	3	50	$22,353	$22,353
POP2017-07	The age and growth of New Zealand protected corals at high risk	$25,000	$2,942	$27,942	3	50	$13,971	$13,971
POP2018-01	Improving distribution maps of protected cold water corals	$30,000	$3,530	$33,530	3	50	$16,765	$16,765
POP2018-02	Hoiho population and tracking project	$60,000	$7,060	$67,060	3	50	$33,530	$33,530
POP2018-03	New Zealand sea lion Auckland Island pup count	$100,000	$11,767	$111,767	2	90	$100,590	$11,177
POP2018-04	Flesh-footed shearwater population project	$100,000	$11,767	$111,767	3	50	$55,883	$55,883
POP2018-05	Westland petrel population estimate	$20,000	$2,353	$22,353	3	50	$11,177	$11,177
POP2018-06	Cold-water coral connectivity in New Zealand	$40,000	$4,707	$44,707	3	50	$22,353	$22,353
Mitigation Projects								
MIT2017-01	Protected species liaison project	$140,000	$16,473	$156,473	4	100	$156,473	$0
MIT2017-02	Characterization and development of offal management for small vessels	$30,000	$3,530	$33,530	4	100	$33,530	$0
MIT2018-01	Protected species engagement project	$40,000	$4,707	$44,707	4	100	$44,707	$0
MIT2018-02	Haul mitigation for small longline vessels	$75,000	$8,825	$83,825	4	100	$83,825	$0
MIT2018-03	Setting mitigation for small longline vessels	$75,000	$8,825	$83,825	4	100	$83,825	$0
MIT2018-04	Options for temporal and spatial management	$80,000	$9,413	$89,413	4	100	$89,413	$0
TOTAL		**$2,039,646**	**$240,000**	**$2,279,646**			**$2,025,377**	**$254,269**

B: CSP Observer Allocation

Fishery	Stocks	Total Days	2018/19 levied	MPI %	MPI 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	220	220	90%	198	10%	22	$450	$9,900
Sub-Antarctic Deepwater	ORH3B, OEO1, OEO6	60	60	90%	54	10%	6	$450	$2,700
West Coast NI Deepwater	ORH7A	60	60	90%	54	10%	6	$450	$2,700
Pelagic trawl fisheries:									
West Coast North Island	JMA7, EMA7, BAR7	650	650	85%	553	15%	98	$450	$43,875
Middle Depth trawl fisheries:									
West Coast South Island	HOK1, HAK7, LIN7, SWA1	1000	1000	85%	850	15%	150	$450	$67,500
Chatham Rise Middle Depth	HOK1, HAK1, HAK4, LIN3, LIN4, SWA3, SWA4, JMA3, BAR1, BAR4, RBT3	850	850	85%	723	15%	128	$450	$57,375
Subantarctic Middle Depth	HOK1, SWA4, WWA5B, BAR5, JMA3, LIN6	800	800	85%	680.0	15%	120.0	$450	$54,000
Southern blue whiting	SBW6B, SBW6I, SBW6R	430	430	80%	344	20%	86	$450	$38,700
Squid	SQU1T, SQU6T	1300	1300	80%	1040	20%	260	$450	$117,000
Hoki Cook Strait	HOK1	120	120	85%	102	15%	18	$450	$8,100
WCSI Hoki-Inside the line	HOK1	80	80	85%	68	15%	12	$450	$5,400
Scampi	SCI1, SCI2, SCI3, SCI4A, SCI6A	400	400	80%	320	20%	80	$450	$36,000
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	266	266	85%	226.1	15%	39.9	$585	$23,342
Domestic SLL - west coast BIG/SWO	BIG1, SWO1	107	107	85%	91.0	15%	16.1	$585	$9,389
Domestic tuna longline - east coast STN	STN1	164	164	85%	139.4	15%	24.6	$585	$14,391
Domestic tuna longline - west coast STN	STN1	128	128	85%	109	15%	19	$585	$11,232

Continued overleaf

B: CSP Observer Allocation (Continued)

Fishery	Stocks	Total Days	2018/19 levied	MPI %	MPI days	CSP %	CSP days	Cost Per day	CSP Research Cost
Purse Seine fisheries:									
Purse seine - SKJ (non super seiner)	SKJ	140	140	85%	119	15%	21	$585	$12,285
Purse seine - SKJ (super seiner)	SKJ	30	30	85%	25.5	15%	4.5	$585	$2,633
Inshore Fisheries									
WCNI setnet	Crown funded	150	-	-	-	-	-	-	-
WCNI inshore trawl	JDO1, SCH1, TRE7, SNA8, KAH8, TAR1, GUR1	560	280	50%	140	50%	140	$950	$133,000
SNA1 trawl	SNA1	150	75	50%	37.5	50%	37.5	$950	$35,625
Bottom longline - North east NI (SNA)	SNA1	130	65	50%	32.5	50%	32.5	$950	$30,875
Bottom longline - BNS target (FMA1)	BNS1, HPB1	110	55	50%	28	50%	28	$950	$26,125
Set net -east coast SI	SCH3, SPO3, ELE3, MOK3, SPD3	200	100	50%	50.0	50%	50.0	$950	$47,500
Set net - south coast SI	SCH5, SPO3, ELE5, SPD5, BUT5	120	60	50%	30	50%	30	$950	$28,500
Total									$849,646

ECSI = East Coast South Island WCSI = West Coast South Island ECNI = East Coast North Island WCNI = West Coast North Island