# Conservation Services Programme Annual Research Summary 2016-17



Freydis Hjorvarsdottir
Conservation Services Programme
Department of Conservation
December 2017

# Table of Contents

1. Introduction ..... 4

1.1 Purpose ..... 4

1.2 Background ..... 4

1.3. CSP Vision and Objectives ..... 4

1.4 Development of the Annual Plan ..... 5

1.5 Consultation process ..... 5

1.6 Explanation of reporting structure ..... 6

2. Interaction Projects ..... 7

2.1 INT2016-01 Observing commercial fisheries ..... 7

2.2 INT2015-02 Identification of marine mammals, turtles and protected fish captured in New Zealand fisheries ..... 9

2.3 INT2015-03 Identification and storage of cold-water coral bycatch specimens ..... 10

2.4 INT2016-02 Identification of seabirds captured in New Zealand fisheries ..... 11

2.5 INT2016-03 Post release survival of white pointer sharks in New Zealand ..... 13

2.6 INT2016-04 Indirect effects of commercial fishing on Buller's shearwater and red-billed gulls 15

3. Population Projects ..... 17

3.1 POP2015-02 Flesh-footed shearwater: Various locations populations project ..... 17

3.2 POP2016-01 Seabird population research: Chatham Islands 2016-17 ..... 19

3.3 POP2016-02 Seabird population research: Auckland Islands 2016-17 ..... 23

3.4 POP2016-03 Updated basking shark bycatch review ..... 29

3.5 POP2016-09 Support to cetacean habitat suitability modelling ..... 31

3.6 POP2016-05 Yellow-eyed penguin foraging and indirect effects ..... 32

3.7 POP2016-06 Salvin's albatross Bounty Islands: methodology development ..... 34

3.8 POP2016-06 New Zealand Sea Lion: Auckland Islands pup count ..... 36

4. Mitigation Projects ..... 38

4.1 MIT2015-01 Seabird bycatch reduction (small vessel longline fisheries)..... 38

4.2 MIT2015-02 Small vessel seabird mitigation project..... 40

4.3 MIT2016-01 Protected species bycatch media..... 43

4.4 MIT2016-02 Entanglement of cetaceans in pot/trap lines and setnets and a review of potential mitigation methods..... 46

# 1. Introduction

## 1.1 Purpose

This report outlines the research carried out through the Conservation Services Programme Annual Plan 2016/17, and provides updates on multi-year projects started in previous years.

## 1.2 Background

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

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

## 1.3. CSP Vision and Objectives

The Conservation Services Programme (CSP) vision is that:

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

The suite of research and other conservation services delivered as part of the CSP falls into three categories:

1. Understanding the nature and extent of adverse effects on protected species from commercial fishing activities in New Zealand fisheries waters.
2. Developing effective solutions to mitigate adverse effects of commercial fishing on protected species in New Zealand fisheries waters.
3. Developing population management plans, where appropriate.

Detailed outcome-based objectives for CSP are provided in the Conservation Services Programme Strategic Statement 2015[1].

[1] Available to download from http://www.doc.govt.nz/csp-strategic-statement-2015

## 1.4 Development of the Annual Plan

The Conservation Services Programme Annual Plan 2016/17[2] described the conservation services to be delivered as the Conservation Services Programme (CSP), and subject to cost recovery from the commercial fishing industry. As such, this Annual Plan formed the basis for levying the commercial fishing industry under the Fisheries Act 1996. For further background information on CSP, including extracts of relevant legislation, refer to the Conservation Services Programme Strategic Statement. In the development of this Annual Plan a series of discussions were held with Ministry for Primary Industries (MPI) staff to harmonize the CSP and MPI research programmes for 2016/17 and to ensure there was no duplication. A formal consultation process was also used as described below.

## 1.5 Consultation process

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

The collaborative processes used to develop the 2016/17 Annual Plan are as follows:

Inshore observer coverage is based on a continuation of delivering objectives identified by a process conducted in preparation for the CSP Annual Plan 2016/17. This process was developed jointly by the CSP team at the DOC and the Inshore Fisheries team at MPI.

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

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

| | |
|---|---|
| 2 December 2015 | Initial CSP RAG meeting – review and gap analysis. |
| 12 February 2016 | Updated medium term research plans, initial list of research proposals and draft CSP RAG prioritisation framework circulated to CSP RAG. |
| 20 February 2016 | Feedback on prioritisation framework and additional research proposals from CSP RAG |
| 25 February 2016 | Second CSP RAG meeting to discuss and prioritise initial research proposals. Note: there was disagreement between RAG members on implementation of the prioritisation framework, but feedback on relative priority between proposals was recorded. |
| 28 April 2016 | Additional feedback received from CSP RAG on research proposals and their prioritisation. |
| 30 March 2016 | Draft Conservation Services Programme Annual Plan 2016/17 released for public consultation |
| 27 April 2016 | Public consultation period closes |
| 11 June 2016 | Summary of public submissions and response to comments completed |
| June 2016 | Director-General of Conservation conveys the Conservation Services Programme Annual Plan 2016/17, amended in accordance with public submissions, to the Minister of Conservation for agreement |

[2] Available to download from http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-conservation-services/plans/csp-annual-plan-2016-17.pdf

## 1.6 Explanation of reporting structure

This report first describes the objectives and rationale for each project, then provides an update on project status and a summary of the key results and recommendations from the projects. A project logistics summary statement is included detailing the service provider, the project budget (excluding administration costs), identification of the relevant provisions within the Fisheries (Cost Recovery) Rules 2001 that determine cost allocation and review milestones. Finally, a citation and weblink are provided to enable ease of access to the final research reports.

Conservation Services Programme activities in 2016/17 were divided into three main areas:

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

# 2. Interaction Projects

## 2.1 INT2016-01 Observing commercial fisheries

### Overall objective

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

### Specific objectives

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

### Rationale

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

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

### Project status

Write-up in progress.

## Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $1,192,418.  Services were provided by the Ministry for Primary Industries Observer Services.

## 2.2 INT2015-02 Identification of marine mammals, turtles and protected fish captured in New Zealand fisheries

### Overall objective

To determine which marine mammal, turtle and protected fish species are captured in fisheries and their mode of capture.

### Specific objectives

1. To determine, primarily through examination of photographs, the taxon and, where possible, sex, age-class and provenance of marine mammals, turtles and protected fish captured in New Zealand fisheries (for live captures and dead specimens discarded at sea)

### Rationale

The accurate determination of the taxon of marine mammals, turtles and protected fish captured in New Zealand fisheries is vital for examining the potential threat to population viability posed by incidental fisheries captures. Observers on commercial vessels are not always able to identify marine mammals, turtles and protected fish at sea with high precision, and the assessment of the age-class may require expert knowledge. Information gained through this project will link to Ministry for Primary Industry databases and will inform ongoing bycatch estimation, risk assessment, research and modelling of the effects of fisheries bycatch on marine mammals, turtles and protected fish populations.

This is a new project and is designed to complement the existing seabird identification project. Observers routinely collect samples of genetic material from these taxa, and these can be used to resolve uncertain identification determinations from photographs.

### Project status

Awaiting data for completion.

### Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $15,000 per annum. Services were provided by Anton van Helden, Marine Mammal Consultant.

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

### Overall objective

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

### Specific objectives

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

### Rationale

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

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

### Project status

This is a three-year term project. Reporting for the 2016/17 year is now complete.

### Project logistics summary statement

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

### Review milestones:

- Methodology report tabled on the CSP webpage on 16 November 2016
- Draft Final Annual Report tabled on the CSP webpage on 22 November 2017

## 2.4 INT2016-02 Identification of seabirds captured in New Zealand fisheries

### Overall objective

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

### Specific objectives

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

### 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 some fleets, a new protocol has been developed to determine which specimens are returned for full necropsy. This protocol aims to strike a balance between returning birds for full necropsy (for rarer species and in less observed fisheries) and photographing birds for determination of taxon (for commonly caught species in well observed fisheries).

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

Information gained through this project will link to Ministry for Primary Industries databases, seabird bycatch estimates, and will inform ongoing risk assessment, research and modelling of the effects of fisheries bycatch on seabird populations. Further, the mode of capture and associated information will enable robust analyses to be made of the factors contributing to seabird capture events and inform the development of appropriate mitigation strategies.

### Project status

Ongoing. Waiting on data for completion of 16/17 reporting.

## Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $80,000 per annum. Services were provided by WMIL.

## Review milestones:

- Methodology report tabled on the CSP webpage on 16 November 2016
- Draft Final Annual Report tabled on the CSP webpage on 22 November 2017

## 2.5 INT2016-03 Post release survival of white pointer sharks in New Zealand

### Project Objective

1. To better characterise bycatch events of white sharks caught in commercial setnets.
2. To identify the operational and biological factors that affect post-release mortality of white sharks.
3. To identify methods of improving post release survival.

### Rationale

White pointer sharks have been observed caught throughout the New Zealand EEZ and in a wide range of fisheries (Frances & Lyon 2012). As with other shark species there is a general paucity of information on the life history characteristics of white pointer sharks. However, indications are that they are generally slow growing and late maturing (Francis & Lyon 2012), making them susceptible to fishing impacts at a population level. While those animals caught in deeper water offshore trawls are generally identified as dead, those caught in coastal setnet fisheries, particularly on the South Coast South Island and West Coast North Island are often reported as being released alive, though with various injuries. In order to adequately assess fishery impact and develop mitigation solutions to maximise the likelihood of survival it is important to understand the post release survival of these animals. Studies on other elasmobranchs, bycaught in New Zealand fisheries have identified low survival rates of animals which were assessed as alive and in good condition at time of release (Francis 2014). Identifying factors which affect post release survival allows mitigation practices to be developed to reduce fisheries impacts.

### Project status

Completed

### Summary of the methods and key findings

Ministry for Primary Industries' databases of fish catch and effort were searched and white shark records analysed. Observer data provided limited insight into bycatch of white sharks, because only nine sharks have been observed since 2008. Instead, we analysed data on 53 white sharks reported by fishers on Non-Fish and Protected Species (NFPS) forms since 2008, including 36 caught in set nets. Some captures may not have been reported, so the conclusions drawn may reflect reporting biases and not be valid. Three small regions (Great Exhibition Bay (GEB), Taranaki (TAR) and Foveaux Strait (FOV)) accounted for 89% of the 36 white sharks reported caught by set net vessels, but only 20% of the length of net set. Between 2007 and 2016, fishing effort declined in GEB and TAR but rose in FOV. White shark bycatch may have been affected by these changes in fishing effort, but trends in the spatial distribution of fishing effort, and changes in the importance of target fisheries, could also have influenced the impact of fishing on white sharks over the last decade.

The main target set net fisheries responsible for catching white sharks were different in all three regions: trevally in GEB, warehou in TAR and school shark/rig/spiny dogfish in FOV. The seasonality of the fisheries was not an important factor in GEB and TAR, although all FOV sharks were caught in summer-autumn. Two vessels reported 58% of the white sharks caught in the three regions. One of them (in FOV) set twice as much net as the next most important vessel. However, the other vessel (in GEB) was only the second-most important vessel in terms of amount of net set in that region, indicating that factors other than effort are important. Comparisons were made of set net gear parameters among regions, target species, vessels and shark- or non-shark sets. Higher nets tended

to catch more sharks in all regions, but sharks were caught across a range of mesh sizes, net lengths and set durations. Spatial factors were important in GEB and FOV, indicating that fishing location may be an important factor driving white shark bycatch.

## Recommendations

- Bycatch could be reduced by identifying important hotspots of abundance and reducing or ceasing set net fishing in those areas at appropriate times of year. Restrictions on set netting in the Foveaux Strait–Stewart Island region during summer–autumn would greatly reduce white shark bycatch, as would closure to set netting of some other key white shark habitats.
- Reduction of set net height in key fisheries could reduce bycatch.
- 69% of sharks reported on NFPS forms were judged by fishers to be alive and in good condition, 3% were alive but injured, and 28% were dead. A post-release mortality experiment would be necessary to determine the true mortality rate of white sharks released alive from set nets. Such a study would have to run for 3–5 years to estimate PRM.

## Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $20,000. Services were provided by NIWA.

## Review milestones:

- Draft final report presented at the CSP TWG meeting on 16 March 2017
- Final report made available on the CSP webpage in June 2017

## Citation

Francis, M. 2017. Bycatch of white sharks in commercial set nets. Report prepared by NIWA for the New Zealand Department of Conservation, Wellington. 27p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/post-release-survival-of-white-pointer-sharks-in-new-zealand-setnet-fisheries/

## 2.6 INT2016-04 Indirect effects of commercial fishing on Buller's shearwater and red-billed gulls

### Project Objective

1. To identify potential indirect effects of commercial fishing on red-billed gulls and Buller's shearwater

### Rationale

Commercial fishing, including purse seine capture methods, may be driving changes in fish populations in the Hauraki Gulf area leading to reduced availability of suitable prey for Buller's shearwater and red-billed gulls in surface waters. As poor divers, Buller's shearwater specialise in foraging in association with fish work-ups. This may be contributing to reduced breeding success of this species, which breeds only at the Poor Knights Islands. Recent tracking studies have shown that Buller's shearwaters now travel to the eastern South Island to gather food and incubation shift lengths have increased markedly since the 1970's (from 4 days per shift to 14 days). Red-billed gull colonies in the Hauraki Gulf have declined substantially from the 1960s. For example, less than 100 pairs nested on Mokohinau Island group in 2015 whereas this colony had >20,000 birds in the early 1960's. Red-billed gulls on the outer island colonies depend on krill and small fish brought to the sea surface by large schools of fish. This project will assess available information on seabird interactions with fish shoals and analyse the fish stock capture data from purse seine fleets in Hauraki Gulf and Bay of Plenty since the 1960s. This will be used to describe mechanisms for potential indirect effects of commercial fishing, and provide recommendations to better understand the mechanisms identified.

### Project status

Complete

### Recommendations

- Establish a national seabird monitoring programme.
- Development of seabird population models.
- Integrate seabird monitoring with other marine ecosystem programmes (including fisheries).
- Maintain a database of seabird colonies.
- Investigate prey types of priority procellariform species.
- Determine what the contribution feeding in associations with fish schools is for the diet of priority procellariform species at critical stages of breeding.
- Data collection within seabird colonies for Buller's and fluttering shearwaters, and initiate a contemporary survey and breeding study for fairy prion over five years.
- Baseline population estimates for priority procellariform species and key breeding sites.
- Ensemble modelling using at-sea and aerial survey data of observed seabird/fish school events to predict likely fish school occurrence with priority procellariform species in north-eastern North Island.
- Initiate a GPS and PTT tracking programme of priority procellariform species at different stages of breeding.
- Island surveys for burrowing seabirds throughout northern North Island offshore islands working to a priority list.
- Investigate cetacean and procellariform associations – importance for diet of black petrel.

## Project logistics summary statement

This project was 100% crown funded. The planned cost for the project was $15,000.

## Review milestones:

- Draft final reports and discussion material was presented on at the CSP TWG meeting on 16 March 2017.
- Final reports made available on the CSP webpage in June 2017.

## Citation

Frost, P. 2017. Population status and trends of selected seabirds in northern New Zealand. Report prepared for the Department of Conservation, Wellington. 37p.

Gaskin, C. 2017. Procellariiformes associating with shoaling fish schools - northern New Zealand. Report prepared by northern NZ seabird trust for the Department of Conservation, Wellington. 52p

## Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/indirect-effects-of-commercial-fishing-on-bullers-shearwater-and-red-billed-gulls/

# 3. Population Projects

## 3.1 POP2015-02 Flesh-footed shearwater: Various locations populations project

### Overall objectives

1. To estimate the population size of flesh-footed shearwater at Middle Island (Mercury Islands).
2. To estimate key demographic parameters of flesh-footed shearwater at Lady Alice Island/Mauimua and Ohinau Islands.
3. To describe the at-sea distribution of flesh-footed shearwater breeding at Northland breeding sites.

### Rationale

The Conservation Services Programme Seabird medium term research plan 2015 (CSP seabird plan 2015) 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. It was developed as part of the work of the CSP Research Advisory Group. Key components of research described in the CSP seabird plan 2015 for delivery in 2015/16 were identified and prioritised by the CSP RAG. This proposal covers prioritised components involving field work on flesh-footed shearwater, classified as at very high risk from commercial fisheries. Supporting rationale for all the components is summarised in the CSP seabird plan 2015.

### Project status

Ongoing. This is a multi-year project, the annual report for 15/16 (demographic component) is now complete.

### Summary of the methods and key findings

The trends and population dynamics of flesh-footed shearwaters (*Puffinus carneipes*) in New Zealand are not well understood. The threat classification was changed from "Not Threatened" to "Nationally Vulnerable" between 2008 and 2012 which falls within the criteria of predicted decline of 50-70%.

A clearer understanding of the population dynamics of this species is necessary to pinpoint the key problem areas. This project focused on one study site, Ohinau Island, Mercury Islands group, Coromandel, and expanded on previous work done on flesh-footed shearwaters started in 2012.

A two-week trip was carried out during late chick rearing, with the aim of bandings as many chicks and adults as possible, both caught in burrows and on the surface at night. A total of 357 birds were banded, of which 90 were adults and 267 were chicks.

In addition, 186 study burrows were marked with access to the nest chamber, and 32 burrows were included as control burrows which would only be checked with a burrow-scope. These 218 burrows provide an excellent starting point for the next two seasons where the focus will be on monitoring reproductive success and continuing to increase the marked population and recapturing of banded birds.

## Recommendations

- It is recommended that next season's field team is prepared to dig additional hatches and find additional burrows to keep the sample size large.

## Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. This is a three-year project and the planned cost for the project was $80,000 per annum. Services were provided by Wildlife Management International Ltd.

## Review milestones:

- Project update presentation at the CSP TWG meeting on 10 June 2016
- Final report for 2015/16 component published on the CSP webpage on 26 June 2016
- Project update presentation at the CSP TWG meeting on 27 July 2017

## Citation

Mischler, C.P. 2016. Conservation Services Programme, Flesh-footed Shearwater Project 4653, Demographic Component, April-May 2016 Report. Unpublished technical report to the Department of Conservation. Report prepared by Wildlife Management International Ltd for the New Zealand Department of Conservation, Wellington. 11p.

## Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/flesh-footed-shearwater-demographic-component-2015-16/

## 3.2 POP2016-01 Seabird population research: Chatham Islands 2016-17

### Overall objectives

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

### Rationale

The Conservation Services Programme Seabird medium term research plan 2016 (CSP seabird plan 2016) 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. It was developed as part of the work of the CSP Research Advisory Group. Key components of research described in the CSP seabird plan 2016 for delivery in 2016/17 were identified and prioritised by the CSP RAG. This proposal covers prioritised components involving field work at the Chatham 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 2016.

### Seabird population research, Chatham Islands 2016/17 (ground component)

### Project status

Field work and analysis complete – Waiting on final report

### Summary (Forty-Fours)

A field team of three (Dave Bell, Dave Boyle and Hamish Tuanui-Chisholm) camped on the island from Dec 5th until Dec 9th, 2016.

A full census of Northern Buller's Mollymawks on the island counted 17,682 nests sites. This total is higher than previous counts (2007-09 average 14,699 nests) and is likely to be a result of improved methodology rather than an increase in numbers.

A full census of Northern Royal Albatross on the island counted 1,400 birds incubating eggs. This is significantly lower than that recorded using aerial photography in 2006-2009: average of 2,209 breeding pairs (range 1,879-2,692 pairs). As Northern Royal Albatross are a biannual breeder, without knowing the productivity from last season, it is difficult to determine if this represents a true decline. However, it seems most likely that Northern Royal Albatross on Motuhara are declining.

### Recommendations (Forty-Fours)

- Biologically there is unlikely to be any issues in regard to undertaking a demographic study on this species.
- If a project was to be initiated on Northern Buller's Mollymawk, at the same time a project on Northern Royal Albatross should also be carried out as these population appears to be in serious decline.

### Summary (The Pyramid)

Te Tara Koi Koia (The Pyramid), the sole breeding site of the Chatham Island Mollymawk *Thalassarche eremita*, is privately owned by the Daymond Whanau and we are very grateful for their permission to camp on the island to undertake research on Chatham Island Mollymawk.

A field team of two (Dave Bell and Dave Boyle) camped on the island from Nov 9th until Nov 14th. A full census of the island counted 5296 nests sites of Chatham Island Mollymawk. This result is very similar to previous counts, with the average from 1999-2016 being 5,294 nest sites (range 5,194-5,407, n=11).

However, the long-term trend suggests that the population could be in gradual decline. Most nests contained breeding birds, with 63.1% of nests containing eggs, 10.8% a chick and 22.6% had already failed; only 3.5% of nests were classified as empty. Chick hatching had only just started during this field trip. A review of nest occupancy recorded during field trips since 1997 clarifies the breeding timetable of Chatham Island Mollymawk.

A total of 310 band recoveries we made of Chatham Island Mollymawk, this included 3 dead adults, 196 adults incubating eggs, 47 adults guarding a chick, 29 adults on a failed nest, 14 adults on an empty nest, and 21 adults caught away from nests where breeding status could not be determined. A total of 65 study nests on the Camp Flat and Slopes had birds breeding in them, containing either an egg or chick. A further 9 marked nests were occupied by birds, but were empty.

### Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $85,450. Services were provided by Wildlife Management International Limited.

### Review milestones:

- Draft results presented at the CSP TWG meeting on 16 March 2017
- Draft Final reports made available for comments on the CSP meeting page on 17 July 2017

### Citation

Bell, M.D.; Bell, D.J.; Boyle, D.P.; Tuanui-Chisholm, H. 2017. Motuhara Seabird research: December 2016. Report prepared by Wildlife Management International Limited for the New Zealand Department of Conservation, Wellington. 14p.

Bell, M.D.; Bell, D.J. & Boyle, D.P. 2017. Chatham Islands Mollymawk research on Te Tara Koi Koia: November 2016. Draft Report prepared by Wildlife Management International Limited for the New Zealand Department of Conservation, Wellington. 24p.

### Webpage

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/seabird-population-census-on-the-forty-fours-2016/

http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-conservation-services/reports/csp-pop2016-01-chatham-mollymawk-pyramid-report2016.pdf (Draft report)

## Seabird population research, Chatham Islands 2016/17 (aerial component)

### Project status

Complete.

### Summary of the methods and key findings

In November and December 2016, we used aerial photography and satellite imagery to determine the population size of Northern royal albatross breeding and Northern Buller's albatross on the Forty-Fours and The Sisters, Chatham Islands, and to compare the estimates derived from these techniques with ground counts. In addition, we also used the opportunity to test the feasibility of using aerial photography to estimate population size of Northern giant petrels, which also breed on the two island groups.

The estimated annual count of royal albatross derived from aerial survey after adjustment to account for the presence of loafing birds in the colony was of 4,772 annual breeding pairs after correction using aerial close-up photos, and 4,406 annual breeding pairs after correction using ground counts.

The count derived from satellite imagery for The Sisters and The Forty-Fours was 2,578 and 2,533 Apparently Occupied Sites, respectively, which was 21% lower than the raw aerial count for The Sisters (3,269 birds) and 38% higher than the raw aerial count for the Forty-Fours (1,830 birds). The ground count for the Forty-Fours was 1,404 annual breeding pairs.

The estimated annual count of Buller's albatross derived from aerial survey after adjustment to account for the presence of loafing birds in the colony was 17,969 annual breeding pairs after correction using aerial close-up photos, and 16,138 annual breeding pairs after correction using ground counts (correction factor 0.121). Most birds (85.3%) were breeding on The Forty-Fours.

The ground count for the Forty-Fours was 16,492 annual breeding pairs, which included an estimate of 3,445 nesting attempts that had failed. Adjusted aerial counts for The Forty-Fours were 7.1% and 16.5% lower than the ground count, although a direct comparison is difficult due to the 14-day difference between the ground and aerial counts, and the inclusion of failed nests in the ground counts, which would not have been detectable from the air.

There were no counts derived from satellite imagery for Buller's albatross as the resolution of the imagery is unsuitable for counting this species.

Aerial counting of northern giant petrels was not effective at either The Sisters or The Forty-Fours. Birds were not clearly visible in most images and detecting birds was difficult. An aerial count of 370 chicks at The Forty-Fours, was 30% of the 1,235 giant petrel chicks counted on the ground.

The use of WorldView-3 satellite imagery to count albatross populations is a new phenomenon which has potential application to the other greater albatross species. The mixed results obtained in this study indicate there may be more to be learnt to refine the technique. At this stage use of either aerial photographic surveys or on-ground counts remain the preferred methods for estimating population size and monitoring in the Chatham Islands.

## Recommendations

- At this stage use of conventional ground or aerial counting techniques are likely to be more cost effective, and remain the preferred methods for estimating population size and monitoring in the Chatham Islands.

## Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $34,000. Services were provided by Latitude 42.

### Review milestones:

- Draft results presented at the CSP TWG meeting on 24 May 2017
- Final report made available on the CSP webpage in August 2017

### Citation

Baker, G.B., Jensz, K., Bell, M., Fretwell, P.T. & Phillips, R.A. 2017. Seabird Population Research, Chatham Islands 2016/17 aerial photographic survey. Report prepared by Latitude 42 for the Department of Conservation, Wellington, New Zealand. 20p.

### Webpage

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/seabird-population-research-chatham-islands-2016-17-aerial-survey/

## 3.3 POP2016-02 Seabird population research: Auckland Islands 2016-17

### Overall objectives

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

### Rationale

The Conservation Services Programme Seabird medium term research plan 2016 (CSP seabird plan 2016) 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. It was developed as part of the work of the CSP Research Advisory Group. Key components of research described in the CSP seabird plan 2016 for delivery in 2016/17 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 2016.

## Gibson's wandering albatross

### Project objectives

1. To estimate the population size of Gibson's albatross population.
2. To collect data to estimate the adult survival and other demographic parameters at Adams Island.

### Project status

Complete.

### Summary of the methods and key findings

Estimates of population size, survivorship, productivity and recruitment were made from a mark-recapture study undertaken in a 61 ha intensively monitored study area.
The size and trend of the Gibson's albatross population was estimated by counts of active nests in 3 representative parts of their main breeding grounds on Adams Island which have been re-counted repeatedly since 1998.

The numbers of birds nesting in 2017 was a little lower than the previous year, probably because of relatively high numbers of pairs breeding and high breeding success in 2016, likely due to a strong El Niño.

There were estimated to be 4,423 pairs of Gibson's albatross breeding in 2017, about half the number of pairs breeding in 2004 (i.e. 8,728) before the population crashed.
Proportion breeding and nesting success in Gibson's wandering albatrosses appears related to the large-scale patterns of climate variability, the southern oscillation and the Pacific decadal oscillation.

Survivorship and productivity of Gibson's wandering albatross is improving and the rate of decline of the population has slowed, though the population is still decreasing or is at best stable. However,

counts of the number of nesting birds continue to gradually increase because a higher proportion of the birds are choosing to nest.

Even if ocean conditions are favourable in the next few years, as they were in early 2016 due to the strong El Nino, a rapid increase in the size of the breeding population of Gibson's wandering albatross is unlikely as productivity has been low for almost a decade, so there are few young birds available to join the breeding population.
While the conservation status of Gibson's wandering albatross is so poor, monitoring its population structure and trend on Adams Island remains an important conservation priority.

### Recommendations

- Population size and trend and adult survival should continue to be estimated at regular intervals until the population substantially increases. A detailed modelling exercise such as the one carried out by Francis et al in 2012 would give a better indication of the trajectory of the whole population and should be undertaken within the next five years.
- Recent estimates of the size of the population are sufficiently accurate that a whole-island census is probably unnecessary.

### Project logistics summary statement

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

### Review milestones:

- Results were presented on at the CSP TWG meeting on 24 May 2017
- Final report made available on the CSP webpage in June 2017

### Citation

Walker K, Elliott, G, Rexer-Huber K, Parker G. 2017. Gibson's wandering albatross population study and census 2016/17. Report prepared for the Department of Conservation, Wellington.

### Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/gibsons-wandering-albatross-at-adams-island-population-study-and-census-2016-17/

## White-capped albatross

### Project status

Complete

### Project objectives

1. Undertaking mark recapture work at the study colony established on Disappointment Island to collect data suitable for estimating key demographic parameters such as adult survival.
2. Conduct an aerial photographic census of white-capped albatross at the Auckland Islands.
3. Archive all photographic data obtained for white-capped albatross in accordance with the protocols described by Baker et al (2015).

## Summary of the methods and key findings (ground component)

We established a marked population of breeding adult white-capped albatross at their largest colony on Disappointment Island, Auckland Islands with the long-term aim to estimate key white-capped albatross demographic parameters, including adult survival. The work reported in 2017 comprises the set-up phase over three annual visits 2015 - 2017 of a study area established in a dense white-capped albatross colony close to Castaways Bay. To support the interpretation of aerial photographs, an additional objective was to conduct ground-truthing counts to estimate the proportion of breeding white-capped albatrosses from those that are apparently incubating (birds sitting on nests that do not actually have an egg).

A total of 393 breeding white-capped albatrosses have been banded in three annual visits to Disappointment Island 2015 – 2017. White-capped albatross resighting rates of birds banded in previous years were 21% in 2016 and 24% in 2017. Ground-truthing counts of incubating versus apparently incubating birds revealed that overall the proportion of incubating birds averaged 64% from 21 transects.

Two years of recaptures do not provide sufficient recapture histories for individuals to allow survival estimates. However, our two short visits in 2016 and 2017 recorded encouraging resighting rates, given the short duration of visits that did not allow sufficient time for breeding pairs to changeover mates, and the primary focus of the work on banding and ground-truthing (not resighting).

Ground-truthing data show that counts of the breeding population of white-capped albatrosses on Disappointment Island using aerial photography cannot provide an accurate or consistent estimate without calibration by ground-truthing data of the number of birds apparently incubating. As the proportion of incubators versus apparent incubators may vary around the island, we question whether sufficient ground truthing data can be collected to enable accurate estimates of the entire breeding population based on interpretation of aerial photography.

## Summary of the field work methods (aerial component)

Field work for previous years (2006-2015) has been previously described in Baker et al (2015) and Baker and Jensz (2016). From 2006 to 2010 flights were conducted in December to coincide with the early incubation period of the breeding cycle. At this time, it was anticipated that birds would have just completed egg laying (M. Double unpublished; P. Sagar unpublished), and hence most birds that attempted to breed would still be attending active nests. The dates of our previous visits to the Auckland Islands were 16 December 2006, 13 December 2007, 14 December 2008, 3 December 2009 and 15 December 2010. For logistical reasons the counts since 2011 were undertaken in January (11 January 2012, 14 January 2013, 20 January 2014 and 13 January 2016. The 2016 counts were undertaken on 18 January (Disappointment Island, Adams Island) and 19 January 2017 (SW Cape, Auckland Island), and all colonies were photographed at least twice. The timing of January counts is not ideal with respect to the breeding cycle of white-capped albatross, as although hatching would not have commenced, some nests could be expected to have failed and those breeding birds may have abandoned their breeding sites.

Photography was timed to occur between 1100 to 1600 NZDT. Although there is little information on the behaviour of breeding white-capped albatrosses, information from the closely-related shy albatross *Thalassarche cauta* indicates that during the early incubation period the ratio of incubating to loafing birds is high as most loafers are at sea during the middle of the day (B. Baker unpublished).

The survey photographs of Disappointment Island were taken at an altitude of about 400 metres, well above the minimum limit of 300 m recommended by DOC. Most photographs were taken with the zoom lens set at a focal length of 100 mm. The close-ups were taken using the Canon lens' maximum extension of 400 mm. The entire set of photographs were subsequently replicated to ensure that four complete back-up sets existed both on portable hard drives and in at least three different locations. A full set of photographs was provided to Department of Conservation officer Ms Katie Clemens-Seely.

## Recommendations (ground component)

A further five-day visit to Disappointment Island would allow the banded population to be increased to more than 600 birds. Simulation modelling by Roberts et al. (2015) found estimates from 600 individuals provided acceptably precise survival estimates with 5 years of resighting effort.
We recommend that visits to Disappointment Island plan for at least five days on the island.
We also recommend that trips take place during the brood guard stage to (1) minimise or eliminate the risk of causing breeding failures, and (2) coincide with the time when parents change-over nest attendance most frequently.

## Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $50,000. Services were provided by Parker Conservation, NIWA & Latitude 42.

## Review milestones:

- Results were presented on at the CSP TWG meeting on 24 May 2017
- Final report made available on the CSP webpage in June 2017

## Citation

Parker, G.C., Sagar, P., Thompson, D. & Rexer-Huber, K. 2016. White-capped albatross – adult survival & other demographic parameters, Auckland Islands 2017. Report prepared by Parker Conservation for the Department of Conservation, Wellington. 14p.

Baker, G.B. & Jensz, K. 2017. White-capped albatross aerial photographic survey, January 2017. Report prepared by Latitude 42 for the Department of Conservation, New Zealand. 5p.

## Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/whitee28090capped-albatross--adult-survival-and-other-demographic-parameters-auckland-islands-2017/

http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-conservation-services/reports/auckland-island-white-capped-albatross-aerial-2017.pdf

# White-chinned petrel

## Project objectives

1. To extend the collection of resight data from study colonies established to estimate key demographic parameters.
2. Retrieval of additional tracking devices to collect further spatial foraging data which can be used to describe the spatial overlap with commercial fishing effort.

## Project status

Field work component is complete. Reporting will be finalized next year.

### Summary of the methods and key findings

Robust population size estimates for white-chinned petrels were obtained for the Auckland Island and Campbell Island groups. Eleven islands including Adams Island were included. Burrow numbers were sampled widely to capture spatial variability (33–241 randomised sampling sites per island). Estimated burrow numbers were corrected with detection rates and occupancy rates to estimate numbers of breeding birds. The Auckland Island group has an estimated 186,000 (95% CI: 136,000–237,000) white-chinned petrel breeding pairs, and the breeding population of the Campbell group is estimated ~ 22,000 (15,000–29,000) pairs. The New Zealand region supports almost a third of white-chinned petrels globally, substantially more than suspected. Importantly, the estimates establish repeatable population baselines.

Tracking data from all major island populations except Campbell Island were analysed together, giving the first metapopulation-scale picture of the at-sea distribution of adult white-chinned petrels. The movements of 150 adult petrels (9–33 petrels per island group, including 33 from Adams Island) were tracked for an average of 369 days with light-level geolocation GLS loggers. Quantitative density estimates for white-chinned petrels show key global density hotspots (off South America, New Zealand, and southern Africa). Island population-specific distributions highlight areas used only by adults from a given island population. Island-specific distributions also show spatial segregation between island populations varying across the year to an extent unusual for seabirds.

Using comprehensive sampling from every island population, high-resolution genomic data (60,709 genotyping-by-sequencing loci) was compared with data from widely-used mitochondrial genes (entire cytochrome b gene and the highly variable 1st domain of control region). Genomic data revealed genetic structure in white-chinned petrels at very fine scale (among islands) and at broad oceanic scales (between Atlantic and Indian Ocean regions) that was not detected in analyses of single genes. Three ocean-basin scale evolutionarily significant units, ESUs, were identified. There is promise that some island populations are sufficiently unique to link mortality in a specific fishery to a given island.

### Recommendations

- Survey data from Antipodes need analysing fully. Numbers on Campbell are coarse; local burrow occupancy data and surveys of Jacquemart are needed. For population trend data at New Zealand islands, Auckland and Campbell estimates should be repeated (5-10 years). The Antipodes population needs re-survey in next 1-2 years.

- Tracking is needed at Campbell (only island with unknown range). Bycatch petrels in areas used by only one population should be linked to island of origin. Petrel density data should be overlaid with fishing effort.
- Resightings at Adams study colony should continue for demographic parameter estimates
- The potential to genetically assign bycatch white-chinned petrels to island needs testing and development, targeting bycatch petrels from areas where populations overlap.

## Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $20,000. Services were provided by Kalinka Rexer-Huber, University of Otago.

## 3.4 POP2016-03 Updated basking shark bycatch review

### Project Objectives

1. To update the 2012 review of basking shark bycatch with information from the most recent fishing years.
2. To reassess the efficacy of management measures.
3. To update the review of relevant research on basking shark population parameters.
4. To explore potential future work to better understand basking shark populations and biology around New Zealand.

### Rationale

Since the review of Francis & Sutton (2012; output of CSP POP2011-04) a series of bycatch events and industry management interventions have occurred. The National Plan of Action-Sharks has also been developed which has specific objectives related to increasing understanding and improving management of shark populations. Advances have also been made in the understanding of basking shark biology. It is therefore timely to update the review of Francis & Sutton (2012), to ensure the most recent available information is readily available to inform management of fisheries bycatch of this species.

### Project status

Completed

### Summary of the methods and key findings

A literature search was carried out for new publications on basking sharks since 2012. Ministry for Primary Industries' databases of fish catch and effort were searched and basking shark records analysed. Raw catch per unit effort (CPUE) indices were calculated for each of three core fishery regions using observed captures. A shorter series of CPUE indices was also calculated using reported commercial data.

There is weak genetic structuring of basking sharks at the scale of ocean basins and large-scale movement. This is confirmed by new tagging studies that found movements of 3000–4600 km in the Atlantic and Pacific oceans. Basking sharks frequently inhabit ocean depths greater than 600 m. The aggregations of basking sharks in shallow coastal waters represent only part of their complex behavioural and habitat requirements. Japanese drift net surveys east of New Zealand during the late 1980s found sharks less than 3 m long inhabit epipelagic waters in the open ocean. The recent discovery of a 6.9 m mature female indicates that some mature at a smaller size than previously thought.

Observed raw CPUE has been at or near zero in East Coast (EC) and West Coast (WC) fisheries since the mid 2000s, while CPUE in Southland–Auckland Islands region (SA) fluctuated around low levels. It is not known whether the low numbers of captures in recent decades are a result of different operational methods used by the fleet, a change in regional availability of sharks, or a decline in basking shark abundance. SA region was responsible for 83% of the basking shark captures in 2011–2016. More than half of the SA captures came from the arrow squid target trawl fishery. Catch rates were greatest in 200–400 m of water, at the deeper end of the squid fishery depth range, and in the silver warehou fishery. Sharks were caught at moderate rates down to depths as great as 800 m One fishing vessel was responsible for 52% of captures in SA. This is probably explained by a combination

of high fishing effort, and the larger headline height and greater depth worked than other vessels. Headline height was an important factor affecting basking shark catch rates.

No specific management measures are in place for basking sharks. However, an active mitigation programme has been operated by Deepwater Group to reduce shark captures since October 2013. It is not yet clear whether the mitigation measures have had any effect on basking shark captures, and given the low and variable catch rates of sharks, any effect will be difficult to detect. A move towards headline heights of less than 4 m, and a reduction of fishing in the favoured depth range of sharks, would probably reduce basking shark captures.

## Recommendations

- Collection of tissue samples (e.g. fin clips) for feeding into international studies of basking shark genetics.
- Collection of white muscle samples, and sampling of stomach contents, to determine the trophic level occupied by basking sharks, and what they feed on, in subsurface habitats.
- Shark length should be measured or estimated, and sex determined, for all sharks caught in commercial fisheries.
- Vessels should retain any small juveniles caught for scientific study.
- Attempts should be made to deploy popup satellite tags on free-swimming basking sharks. This will rely on the ability to find animals at the surface in an accessible location

## Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $15,000. Services were provided by NIWA.

## Review milestones:

- Draft final report made available for commenting on the CSP meeting webpage on 19 April 2017.
- Final report made available on the CSP webpage in June 2017.

## Citation

Francis, M. 2017. Review of commercial fishery interactions and population information for New Zealand basking shark. Report prepared by NIWA for the New Zealand Department of Conservation, Wellington. 44p.

## Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/updated-basking-shark-bycatch-review-2016-17/

## 3.5 POP2016-09 Support to cetacean habitat suitability modelling

### Specific objectives

1. To prepare spatial distribution information for cetacean species held by DOC to inform planned habitat suitability modelling and ultimately fisheries risk assessment.

### Rationale

There are 47 cetacean species known to occur in New Zealand waters, three of which are listed as Nationally Critical, and another three as Nationally Endangered (Baker et al. 2010) under the New Zealand threat classification system. All cetaceans in New Zealand's territorial seas and Exclusive Economic Zone (EEZ) are protected under national law by the Marine Mammal Protection Act (1978), which mandates that all physical or habitat disturbances to the animals must be avoided or mitigated. However, the knowledge about distribution and habitat use patterns of cetaceans in New Zealand waters is limited, especially for those that inhabit offshore waters. This lack of information limits the attempts by government, conservation and industry stakeholders to consider risks and minimize impacts on cetaceans. Compiling existing cetacean sightings datasets and modelling cetacean habitat use will provide improved understanding of the environmental drivers of cetacean habitat use and generate reliable predictions of species habitat suitability patterns. This project will assist the development of habitat modelling through the preparation and compilation of DOC data sources and lay the ground work for future CSP projects to develop a web-based portal, which will enable quick and dynamic access to the best available information of the habitat suitability of various cetacean species in New Zealand. The results from this project will feed in to the longer term Marine Mammal Risk Assessment in New Zealand waters, and to CSPs five-year marine mammal medium term research plan (Goetz, personal comm).

### Project status

On Hold

### Project logistics summary statement

This project was 100% crown funded. The planned cost for the project was $15,000.

## 3.6 POP2016-05 Yellow-eyed penguin foraging and indirect effects

### Project Objectives

This research project was scoped to collect key information required to understand the impact of commercial fishing on the Auckland Islands New Zealand sea lion population, in line with CSP Objective E

### Specific objectives

1. To describe the at-sea foraging distribution of adult and juvenile yellow-eyed penguins breeding in Otago and Southland.
2. To collate and synthesise existing information relevant to the indirect effect of commercial fishing induced benthic habitat modification on the mainland population of yellow-eyed penguins.
3. To identify mechanisms through which commercial fishing induced benthic habitat modification may affect the mainland population of yellow-eyed penguins, and provide recommendations for future research to better understand these indirect effects.

### Rationale

Ellenberg and Mattern (2012; output of CSP project POP2011-08) provided research recommendations to understand the impact of fishing induced benthic habitat modification on yellow-eyed penguins in the Otago and Foveaux Strait regions. The recommendations include data collection on yellow-eyed penguins using GPS devices, and sea floor surveys.

This project aims to build on a proposed research programme at Otago University to investigate the diet, dispersal and foraging strategies of yellow-eyed penguins. Such information will form a key component of further investigation of mechanisms of potential indirect effects of commercial fishing on this species. This project will also assess available information to describe mechanisms for potential indirect effects of commercial fishing, and provide recommendations to better understand mechanisms identified. A thorough collation and synthesis of existing information will ensure cost effectiveness and synergies with other research programmes are maximised in progressing our understanding in this area.

### Project status

Ongoing

### Summary of the methods and key findings

For adults, birds of known breeding status and identity were targeted for GPS/TDR deployment at pre-moult (once chicks had fledged) and winter (post-moult). AxyTrek-3D GPS-TDR (c. 59g 43 x 75 x 20mm, TechnoSmArt Europe) were attached to the central lower back using Tesa tape, which was then coated with Pattex glue to prevent peeling. The devices were set to collect 1 GPS fix per minute and 1 pressure fix per second. Retrieval was opportunistic, as we had anecdotal evidence that yellow-eyed penguins can stay at sea for more than 10 days.

At pre-moult 12 devices were deployed, with 9/10 retrieved supplying meaningful data, and two were lost. In total 31 foraging trips were recorded at pre-moult for Otago Peninsula and Catlins birds. Maximum distance from origin ranged from 10.8km to 69.4km, and trips between 1 and 5 days were recorded. Maximum dive depths were between 22.7m and 156.2m.

Over the winter, 25 devices were deployed, with 21/24 supplying meaningful data, but 3 failed mid-trip due to a fault with the pressure sensor. 1 device was lost. In total 52 complete foraging trips were recorded for yellow-eyed penguins nesting in North Otago, on Otago Peninsula and in the Catlins. Maximum distance from origin ranged from 3.7km to 143.4km, and trips between 1 and 12 days were recorded. Maximum dive depths were between 18.0m and 119.7m.

Fledglings were of known age and parentage, and were over 5.5kg at 90 days. 5x KiwiSat 202 172C satellite tags (c. 32g, Sirtrack) and 4x Petrek 3G GSM-GPS were deployed on fledglings when they reached c. 100 days. The devices were secured to the central lower back using Tesa tape, and the tape on the sattelite tags was glued down to prevent peeling. 2/5 satellite tags and 2/4 Petrek tags did not transmit any data, and the reasons for failure are unclear. The 2 Petrek tags transmitted for c. 8-12 hours before failing. The Petrek devices indicated that both chicks dispersed to the northeast of their natal areas. 3 KiwiSat tags transmitted for 32-44 days, with an initial dispersal of c. 34-50km/day following the same heading for 4-7 days. Once the tracked birds reached the Canterbury Bight, two birds remained in this area for the remaining 5 weeks, with the third bird moving towards North Otago coast in its final week of transmissions. Mean distance from land was between 9.7km and 11.3km, with the maximum distance being 31.1km. 2/3 birds appeared to make landfall once, one near St. Andrews and the other at Pleasant River Mouth. The probable foraging area (50% minimum convex polygon) was c. 420km2, being placed off the east coast between Timaru and Rangitata Mouth.

## Recommendations

- Recruitment of yellow-eyed penguins has declined from c. 26% (Richdale 1957) to 12.3% (Stein et al. 2017). More than c. 60% of juvenile yellow-eyed penguins that are seen post-fledge do not survive to adulthood, and further foraging research into pre-moult juvenile foraging would be beneficial, as pre- moult appears to be the second-highest point of mortality in the juvenile year.
- Yellow-eyed penguins breeding in the Catlins travelled long distances at pre-moult and in winter, but relatively little is known about their movements during the guard and post-guard stages of chick rearing. Baseline data are needed for this subpopulation, which have declined sharply over the last five years.

## Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $25,000. Services were provided by Mel Young, University of Otago.

## Review milestones:

- Progress presented at the CSP TWG on 27 July 2017

## Weblink

http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-conservation-services/meetings/pop2016-15-yellow-eyed-penguin-presentation.pdf

## 3.7 POP2016-06 Salvin's albatross Bounty Islands: methodology development

### Overall objective

To Develop a methodology to estimate the population size of Salvin's albatross at the Bounty Islands, and collect of at-sea distributional information.

### Rationale

Recent population estimates of Salvin's albatross at the Bounty Islands (part of CSP project POP2012-06) using ground and aerial methods have found contrasting evidence in regards population trend (Amey & Sagar 2013; Baker et al 2014). The at-sea foraging distribution of this population is described from only a small sample size of individuals due to device failure in a recent study (Thompson et al 2014; part of POP2012-06).

This project will develop a methodology for a project to estimate an updated population estimate of Salvin's albatross at the Bounty Islands, a comparison of the updated estimate to previous estimates to determine population trend, and collect a representative sample of at-sea foraging distributional information. Completing all these components in one project will maximise cost-effectiveness at this remote site.

It is envisaged that the research plan developed will be proposed for delivery as part of CSP in 2017/18.

### Project status

Complete.

### Recommendations

- Two-year project.
- Satellite mapping of island to allow area of occupancy to be quantified.
- Aerial photographic survey in year 1 (and ideally repeated in year 2) to estimate total number of breeding pairs and area of occupancy.
- Aerial survey conducted in late September.
- Ground visit in both years, coinciding with aerial survey to allow ground truthing.
- Focus on GLS deployment in year 1, with trial PPT/GPS transmitting device deployment.
- Focus on GLS retrieval and additional PPT/GPS transmitting devices deployment in year 2.
- Identify any potential constraints limiting breeding success.
- Band and resight birds with potential to establish a study site area on Proclamation Island (easiest access and most existing data).

### Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $10,000.

### Review milestones:

- Final report published on the CSP website in March 2017

### Citation

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

### Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/salvins-albatross-bounty-islands-methodology-development-2016-17/

## 3.8 POP2016-06 New Zealand Sea Lion: Auckland Islands pup count

### Specific objectives

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

### Rationale

New Zealand sea lions are classified as Nationally Critical (Baker et al. 2010), and are incidentally killed each year in southern commercial trawl fishing operations targeting species including squid, scampi and southern blue whiting. The foraging areas of New Zealand sea lions at the Auckland Islands have been shown to overlap with commercial trawl fishing activity, particularly SQU6T and SCI6A. Approximately 7o% 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).

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

### Project status

Complete.

### Summary of the methods and key findings

New Zealand sea lion monitoring was undertaken between 10 January and 21 January 2017 at Enderby Island, Dundas Island and Figure of Eight Island in the Auckland Islands group. A full description of methods is available in Childerhouse (2016), which is available from DOC and the author upon request. The research followed almost exactly the same methods as undertaken previously by DOC with a few differences outlined in the methodology part of the report. Overall, the project was a success and all objectives were completed.

Pup production was estimated for New Zealand sea lion colonies at Sandy Bay (n=349), Dundas Island (n=1,549), Figure of Eight Island (n=67) and South-East Point (n=0); with total pup production for the Auckland Islands in 2016/17 estimated as 1965.

The estimate for 2016/17 is 14% higher than for 2015/16 and is 31% higher than the lowest ever estimate for pup production in 2008/09.

Seven hundred and seventy-five pups were marked at the Auckland Islands including: Sandy Bay – 328 flipper tagged and microchipped; Dundas Island – 400 flipper tagged only; and Figure of Eight Island – 47 flipper tagged only

There was only a small amount of resighting effort conducted as part of this project as there was no time allocated to it. Additional limited resighting effort is being undertaken by DOC personnel remaining on Enderby Island

## Project logistics summary statement

This project was 90% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $100,000. Services were provided by Blue Planet Marine.

## Review milestones:

- Methodology presented at the CSP TWG meeting on 25 October 2016
- Final results presented at the CSP TWG meeting on 1 March 2017
- Final report published on the CSP website in May 2017

## Citation

Childerhouse, S., Burns, T., French, R., Michael, S. & Muller, C. 2017. FINAL Report for CSP Project New Zealand sea lion monitoring at the Auckland Islands 2016/17. Report prepared by Blue Planet Marine for the New Zealand Department of Conservation, Wellington. 24p.

## Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/new-zealand-sea-lion-monitoring-at-the-auckland-islands-2016-17/

# 4. Mitigation Projects

## 4.1 MIT2015-01 Seabird bycatch reduction (small vessel longline fisheries)

### Specific objectives

1. To provide one or more liaison officers to the inshore bottom longline and small vessel surface longline fishing fleets, with a focus on northern North Island, to assist those fleets reduce their seabird bycatch.
2. To coordinate the seabird liaison officer roles with wider efforts targeted at seabird bycatch reduction in relevant fisheries to achieve the greatest possible reduction in bycatch.

### Rationale

To effectively reduce the risk of interactions with seabirds 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 reduce that risk at a species level it is necessary for there to be consistency of application of mitigation across all fleets interacting with the species. Seabird liaison officers have formed a vital interface between skippers, government and researchers. Other projects and processes are also underway, which aim to reduce seabird bycatch, including the work of collaborative groups involving industry, Government and eNGOs, and process driven by the Ministry for Primary Industries. Coordinating liaison officers with these other processes to maximise reduction results is important.

Liaison officers were trialled in the snapper longline fleet around the Hauraki Gulf in 2013/14 and its initial positive results led to an expanded project being jointly resourced between DOC and MPI in 2014/15. This project expanded to a wider area and over a broader range of seasons, in particular to a larger portion of the Snapper longline fleet whilst also moving into the bluenose/hapuku fleet to develop vessel specific Seabird Management Plans (SMPs) along with liaison with the domestic surface longline fleet. Based the outcomes of two years of this work the ongoing need for the liaison role has been demonstrated to allow review, refinement and expansion of SMPs or equivalent on inshore vessels interacting with seabird species.

### Project status

Complete.

### Summary of the methods and key findings

The liaison role has been in place with the snapper fleet in Fisheries Management Area 1 (East Cape to North Cape) since 2010, and with the bluenose fleet since 2011. To date between one and three liaison officers have engaged with fishers each season. Management and reporting has occurred through various combinations of the Department of Conservation, the Ministry for Primary Industries, and a separately contracted coordinator.

The role works alongside other initiatives such as Southern Seabird Solutions Trust seabird smart training workshops, the National Plan of Action for Seabirds, and more specific action plans such as the black petrel and flesh-footed shearwater action plan. The liaison program has concentrated on improving mitigation and engaging with fishers. Vessel specific documents were introduced in 2014 and these provide details of the approach to reducing seabird interactions on each vessel. More recently, the focus has been on reviewing and auditing these seabird management plans to check whether they are representative of fishing practices and reducing interactions.

Liaison officers have worked with skippers and deckhands, often at sea, to refine and improve mitigation. The whole fishing operation including gear setup, setting speed, offal and returned bait management has been considered with respect to its influence on seabird interactions.

In practice, the liaison role has involved a large amount of listening to experienced skippers who have developed mitigation over many years. The role has provided a conduit to share this knowledge between skippers. Conversations with fishers also provide an opportunity to keep them up to date with mitigation developments and best practice advice, as well as pass on concerns to fisheries managers about other fishery related matters.

### Recommendations

- Start the liaison role earlier in the season, prior to birds arriving and observer trips starting.
- Observe the fleet systematically, either randomly or targeted with a transparent rationale. Avoid covering the same vessels repeatedly.
- Have a structured communication of methods to fishers.
- Include effort fishing west of North Cape, and South of East Cape.

### Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $150,000 per annum for two years. Services were provided by JPEC Ltd.

### Review milestones:

- Draft final report presented at the CSP TWG meeting 22 September 2016
- Final report published on the CSP webpage in September 2016

### Citation

Pierre, J.P. 2016. Conservation Services Programme Project MIT2015-01: Seabird bycatch reduction (small vessel longline fisheries): Liaison Coordinator Final Report. Report prepared by JPEC Ltd. for the New Zealand Department of Conservation, Wellington. 56p.

### Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/seabird-bycatch-reduction-small-vessel-longline-fisheries/

http://www.doc.govt.nz/our-work/conservation-services-programme/bycatch-bylines-newsletter/

## 4.2 MIT2015-02 Small vessel seabird mitigation project

### Specific objectives

1. To test the efficacy of mitigation strategies or devices identified by the work of the seabird liaison officers operating in the small vessel bottom longline fleets.
2. To support efficacy testing of the improved tori line designs produced as an output of project MIT2014-02.

### 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 2015) despite current mitigation requirements and use. Implementation of proven mitigation strategies is known to be variable both within and between these fleets. Seabird Liaison officers have been deployed in the northern inshore bottom longline fleets for the past two years, also moving into the surface longline fleet during 2014/15, and further work is proposed in project MIT2015-01. In order 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. Recent work has included testing of new weighting options, setting practices and novel devices such as the hook pod (including CSP projects MIT 2011-03, MIT 2012-01 and MIT2013-02). Research is underway to develop improved tori line designs (CSP project MIT2014-02).

### Summary of the methods and key findings – Tori line designs for small longline vessels

Tori lines are one of the most thoroughly tested seabird bycatch reduction measures available, and have been proven effective in reducing seabird bycatch in both trawl and longline fisheries. However, most of the work to date has been carried out on vessels over 20 m in length.

This report describes further work producing tori line designs suitable for use under normal commercial fishing conditions in the New Zealand pelagic longline fleet, comprising small vessels 12-25m in length. The project also sought to address any concerns raised by fishers. In particular, designs were developed that addressed safety concerns, minimised tangling, and allowed deployment at night and in poor weather conditions.

Achieving a 75m aerial extent with a combination of long tube streamers and short tape streamers is feasible as a minimum standard, which corresponds favourably to internationally recognised best practice advice for larger pelagic vessels. Design considerations are focussed on the aerial section, the drag section and the tori poles and their attachment. Advice is provided on how to optimise each of these elements for deployment on small vessels.

In developing specifications or guidance for tori lines to be used on small vessels we recognise the need to incorporate a degree of flexibility to allow designs to be optimised to each individual vessel. For example, allowing considerable flexibility in the design of the drag section of the tori line is recommended as the method of generating drag is not important.

## Summary of the methods and key findings – Testing of Hookpod-minis in the NZ pelagic longline fishery

Following initial Hookpod trials in 2013, a new model of Hookpod, the Hookpod-mini, was developed to suit the fishing operations of the New Zealand surface longline fishery. We tested the operational and mitigation effectiveness of the Hookpod-mini relative to current fishing practices in the fleet, through depth opening trials, experimental and long-term trials during commercial fishing and collection of sink rate data.

Hookpod-mini opening depth tests and sink rates of weighted snoods indicated that Hookpod-minis provided protection to seabirds from hooks to a depth greater than that achieved through the combined use of tori lines and line weighting. Hookpod-minis had an advantage of being more consistent in achieving protection from hooks to a given depth compared to line weighting (sink rate profiles were highly variable) and tori lines (correct deployment was dependent on conditions such as wind). Hookpod-minis were used for half the hooks set for total of 20 experimental sets on two vessels. The control gear comprised the vessels' normal setup of either unweighted snoods or snoods with 60 g sliding weights at 1 m from the hook, plus tori lines. Catch comparisons indicated no significant difference in target fish or shark bycatch between Hookpod-minis and the vessels' control gear. A long-term skipper-collected dataset covered 10 months fishing with Hookpod-minis and the vessel's control gear (unweighted gear with tori line and night setting). Hookpod-mini loss and failure rates were well below the target 1 % per set and seabird bycatch rates were considerably lower on the Hookpod-mini snoods.

Our findings suggest that Hookpod-minis are an operationally feasible and effective seabird bycatch mitigation measure in the New Zealand surface longline fishery.

### Project status

Additional elements of this project were postponed to 2017/18.

### Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $100,000 in 2016/17. Services were provided by Vita Maris.

### Review milestones:

- Draft final report for Tori line design presented at the CSP TWG meeting on 8 June 2017.
- Draft final report for Hookpod-minis presented at the CSP TWG meeting on 3 August 2017.
- Final report for Hookpod-minis published on the CSP webpage in August 2017.
- Final report for the Tori line design published on the CSP webpage in September 2017.

### Citation

Goad, D. 2017. Tori line designs for small longline vessels. Report prepared by Vita Maris for the Department of Conservation, Wellington. 21p.

Goad, D. & Sullivan, B. (2017). Testing the Hookpod-mini in the New Zealand pelagic longline fishery. Report prepared for the Department of Conservation, Wellington.

## Weblink

Design of Tori lines for small longline vessels:
http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/tori-line-designs-for-small-longline-vessels/

Testing of Hookpod-minis in the NZ pelagic longline fishery:

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/testing-hookpod-mini-in-the-new-zealand-pelagic-longline-fishery/

## 4.3 MIT2016-01 Protected species bycatch media

### Project Objectives

1. To produce a newsletter to communicate protected species-related information to commercial fishermen;
2. To produce media suitable for incorporation into third party publications in order to maximise audience exposure.
3. To develop and produce identification tools targeted at commercial fishermen to improve their understanding of protected species interacting with their fishing operations

### 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 MIT 2016-01 will build on this by not only producing a quarterly newsletter, to be distributed in both hard copy and electronic, but also a range of media articles which can be directly incorporated into other relevant publications such as industry magazines and port newsletters. This expansion of scope will allow increase in target audience exposure and uptake.

Previously the Department has produced identification guides for seabirds and sharks (e.g. CSP 2007, 2010). Having up-to-date identification tools will improve the ability of fishermen to accurately understand which species are interacting with their fishing operations, so that they can ensure adequate measures are being taken to avoid or minimise bycatch. The guides also provide distribution and behavioural information which help inform mitigation strategies. These tools will also help improve the quality of data reported on captured protected species, thus contributing to a better understanding of the nature and extent of interactions. Such data contributes to risk assessments used in fisheries management, and enables the development of appropriate mitigation options where required. This project will allow the production (e.g. printing costs) of education resources across a variety of media using data from existing sources such as observer records, tracking studies and the protected species identification projects (e.g. INT2016-02 and INT2015-02). Resources will be targeted at commercial fishers, preferably in a region and fishery specific manner to provide information on species of concern which will assist in development and refinement of effective mitigation strategies.

### Project status

Ongoing. Draft Annual Final Report for the 16/17 year is complete.

### Summary of the methods and key findings

To address the first objective of this project, four newsletters have been prepared and circulated during the first year of the two-year project term. Articles covered new, emerging, and best practice

bycatch mitigation measures, research underway on mitigation, policy developments, current events, and other protected species information relevant to commercial fishing. Newsletters have included key references, to facilitate access to information additional to that presented.

The newsletter circulation included commercial fishers and others involved in the fishing industry, such as those holding fishing quota and annual catch entitlement, Seafood New Zealand's Sector Representative Entities and Commercial Stakeholder Organisations, seafood company representatives, Ministry for Primary Industries regional office staff, the New Zealand Federation of Commercial Fishermen, and practitioners working on fisheries bycatch issues. Throughout this reporting period, the newsletter was distributed in html form via email, via Twitter and Facebook links, as an A4 2-page pdf file distributed electronically, and a hard copy newsletter mailed to recipients who did not have an electronic point of contact or specifically requested a hard copy.

Overall, the newsletter reaches approximately 1,575 recipients directly. The html newsletter was opened by an average of 39.4% of recipients during the year, almost identical to the previous year of the project. Twitter was the fastest growing channel for distribution, with around 200 views (range: 123 – 233) per issue. The overwhelming majority of readers were located in New Zealand (87% or more for each issue), with international readers based in Australia, the USA, Canada, Japan, Greece, and Thailand.

To address the third objective of the project, two seabird identification guides previously produced by the Department of Conservation (the Fisher's Guide to New Zealand Seabirds and the Fisher's Guide to New Zealand Coastal Seabirds) were updated. These were reprinted in hard copy and as web-quality pdfs.

Next steps for the project include:

- Continuing the quarterly production and circulation of the Bycatch Bylines newsletter,
- Addressing the second objective of the project, by producing media for inclusion in third-party publications such as Seafood magazine, and,
- Developing and printing a new guide to protected fish and reptile species.

## Recommendations

Beyond the current project term, there are additional opportunities to improve resources available for fishers working to reduce the risks that commercial fishing presents to protected species.

Recommendations for future work include:

- Continuing the production and circulation of the newsletter at a quarterly frequency,
- Producing a pictorial guide for fishers on handling protected species after capture in fishing operations,
- Continuing the production of fact sheets on key bycatch mitigation measures (e.g. line-weighting), and

- Developing a series of short (e.g. five minute) videos on the use of key bycatch mitigation measures, such as tori lines, line-weighting and fish waste retention, that show how these measures can be applied safely and effectively on vessels.

## Project logistics summary statement

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

## Citation

Pierre, J.P. 2017. Conservation Services Programme Project MIT2016-01: Protected Species bycatch media. Report prepared by JPEC Ltd for the New Zealand Department of Conservation. 8p.

## 4.4 MIT2016-02 Entanglement of cetaceans in pot/trap lines and setnets and a review of potential mitigation methods

### Project Objectives

1. To characterise the nature and extent of entanglement of whale species in pot/trap lines and setnets in New Zealand and make recommendations on whether or not the current levels of risk warrant development or implementation of improved mitigation.
2. To identify and assess the current mitigation techniques for cetacean capture in the pot/trap lines and setnets both domestically and internationally and make recommendations as to their applicability in the New Zealand market.

### Rationale

Cetaceans (primarily humpbacks, though also southern right whales and orca) can become entangled fish pot/trap lines or setnets (including down-lines). Within New Zealand this has most commonly been documented in Kaikoura, during winter, where the humpback whale northern migration comes close to shore and overlaps with the rock lobster fishing activity. In recent years there have also been increasing reports on the North Island, including Orca. The occasional Southern right whale has also been reported as entangled. DOC has a response team which will attempt a release a cetacean if conditions allow.

The number of reported incidents annually is low in New Zealand in comparison with some other countries; however, in recent years there has been a notable increase in occurrence outside of Kaikoura, and including other species. The frequency of humpback whale entanglements will also be related to the status of the humpback whale population as the risk of entanglement will increase with increasing numbers of cetaceans passing through the inshore waters of the East Coast of the South Island. DOC coordinates an annual survey of the humpback whale migration each winter, and the most recent season (2015) observed the highest count of whales coming through the Cook Strait (137) since the survey commenced in 2004.

It is timely to assess the level of risk posed to cetaceans from commercial pot/trap and setnet fishing activity, and determine whether or not the current level of risk warrants development or implementation of improved mitigation measures.

### Project status

Complete

### Summary of the methods and key findings

Between 1984 and 2017, there were 44 reported large whale entanglements in NZ waters, of which 39 were attributable to pot/trap and set net fisheries. 64% of large whale entanglements involved rock lobster and 'likely' rock lobster gear, 21% of entanglements involved set net gear and 15% of entanglements involved either rope from an unknown gear type, or the gear involved in the entanglement was unknown.

The outcome of entanglement events was variable. 29% of all documented entanglements were fully disentangled, with 10.5% partially disentangled. 10.5% of whales shed gear on their own (without intervention). Conversely, 18% of entanglements were linked to the death of the individual, either directly or indirectly, and the fate of 32% of entangled whales remained unknown.

The risk of entanglement to NZ populations of humpback and southern right whales is likely to be low. Risk to killer whales in NZ waters is likely higher, as is the risk to an individual animal once entangled. The individual animals at greatest risk of entanglement are humpback whales on their northern migration along the east coast of the South Island. This timing and location coincides with a high level of commercial rock lobster fishery effort. The recovery of whale populations is likely to lead to more frequent interactions with fisheries and heighten the need for adequate mitigation methods.

There are three main categories of mitigation employed to address the entanglement of large whales: acoustic deterrents; gear modifications; and management modifications. Despite global efforts to mitigate the entanglement of large whales, few gear modifications have proven successful in reducing documented entanglement numbers. Acoustic deterrents have shown mixed results with large cetaceans, with most studies indicating no response by large whales.

Given the high economic value of the NZ commercial pot/trap and set net fisheries involved, as well as the current low documented incidence of entanglements, seasonal or temporal closures are not a viable mitigation tool. Seasonal, mandatory gear modifications focused on reducing the amount of slack rope in the water column is a more measured approach to reduce risk.

An advocacy campaign that targets fishers around the Kaikoura region and along the south-east coast of the South Island during the months of May-August may be effective. Disentanglement efforts will continue to be a vital.

## Recommendations

Cost effective and practical ways to reduce risk until effective mitigation measures are developed:

- Minimising slack rope likely reduces the risk of entanglement and is an appropriate interim mitigation method until other methods are further developed and groundtruthed.
- Conducting observations of the use of NZRLC's 'OceanSnap' application and if/how this consequently results in fishers moving/removing gear in instances when whales are sighted.
- Developing or purchasing entanglement buoys similar to those used in Western Australia may help relocate entangled animals when weather, logistics or availability hamper the disentanglement effort.
- Conducting public education campaigns about the New Zealand disentanglement network to decrease likelihood of people taking matters into their own hands. Similarly, increased funding or training for DOC's phone operators to reassure callers their call has been attended to and that DOC is responding.
- Training of additional personnel (within and outside of DOC) as part of the New Zealand disentanglement network. Ideally such personnel will have existing sufficient vessel and

whale experience so that they understand both the marine environment and animal behaviour.

Recommendations in order to increase New Zealand's knowledge and ability to understand and appropriately mitigate the entanglement of large whale species in pot/trap lines and set nets:

- Conduct an audit of all internal DOC entanglement-related records and collate the results.
- Enhance data reporting protocols for entanglement events. DOC should develop and instigate a clear, consistent classification system whereby gear type is specifically listed.
- Conducting scar-based studies would help quantify the extent of the entanglement problem for whales migrating past New Zealand.
- Determining sex via DNA analysis may be useful in order to help inform impact on particular demographics, or particular risk, as well as add to the data informing population dynamics of other genetic collections.
- Monitor (or assist with), the global development of fisheries gear modification focused on lowering the rate of whale interactions with fisheries.

### Review milestones:

- Methodology presented at the CSP TWG meeting on 25 October 2016.
- Draft final report presented at the CSP TWG meeting on 24 May 2017.
- Final report published on the CSP webpage in September 2017.

### Citation

Laverick S, Douglas L, Childerhouse S, and Burns D (2017). Entanglement of cetaceans in pot/trap lines and set nets and a review of potential mitigation methods. Report by Blue Planet Marine for the Department of Conservation, Wellington. 75p.

### Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/entanglement-of-cetaceans-in-pot-trap-lines-and-set-nets-and-a-review-of-potential-mitigation-methods/