

**Conservation Services Programme
Annual Research Summary
2015-16**

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1. Introduction

1.1 Purpose

This report outlines the research carried out through the Conservation Services Programme Annual Plan 2015/16, 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 2015¹.

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 2015/16² 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 2015/16 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 2015/16 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 2015/16. 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:

3 December 2014	Initial CSP RAG meeting – review and gap analysis.
28 January 2015	Updated medium term research plans, initial list of research proposals and draft CSP RAG prioritisation framework circulated to CSP RAG.
12 February 2015	Feedback on prioritisation framework and additional research proposals from CSP RAG
18 February 2015	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.
4 March 2015	Additional feedback received from CSP RAG on research proposals and their prioritisation.
20 March 2015	Draft Conservation Services Programme Annual Plan 2015/16 released for public consultation
17 April 2015	Public consultation period closes

² Available to download from <http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-conservation-services/plans/csp-annual-plan-2015-16.pdf>

May 2015	Summary of public submissions and response to comments completed
June 2015	Director-General of Conservation conveys the Conservation Services Programme Annual Plan 2015/16, amended in accordance with public submissions, to the Minister of Conservation for agreement

1.6 Explanation of reporting structure

This report first describes the objectives and rationale for each project, then provides an update on project status and a summary of the key results and recommendations from the projects. A project logistics summary statement is included detailing the service provider, the project budget (excluding 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 2015/16 were divided into three main areas:

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

2. Interaction Projects

2.1 INT2015-01 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

In progress.

Summary of the methods and key findings

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

Observer coverage is, where possible, planned jointly with the Ministry for Primary Industries to ensure that coverage objectives are aligned. For the purposes of planning observer coverage, fisheries are divided into two broad categories: firstly, those fisheries that are poorly known and generally characterised by small vessel, owner operated fleets operating in the inshore, the second; better understood deepwater fisheries which have been subject to long-term monitoring.

While the majority of the 'poorly understood' fisheries operate in the inshore area (i.e. to around 200 m depth), some small vessels, particularly bottom longline vessels under 36 m, will operate in deeper waters such as the Chatham Rise. Details of the approach used to set days in these fisheries are described in the Joint Department of Conservation/Ministry of Fisheries Inshore Observer Programme 2011/12 plan. In general, coverage in these fisheries was aimed at reducing uncertainty around the risk to particular protected species identified in both the level 1 and level 2 risk assessments and assessing mitigation options for interactions identified.

For better observed fisheries, long-term datasets exist which allow for ongoing monitoring to detect whether changes are occurring in the nature and extent of captures. In these offshore fisheries where higher levels of coverage are already undertaken CSP purchases a portion of existing observer time to allow data collection to be spread strategically over the fishing fleet.

The observer coverage presented in this report extends work conducted in previous years.

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

2.2 INT2013-02 Identification of seabirds captured in New Zealand fisheries

Overall objective

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

Specific objectives

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

Rationale

Large numbers of seabirds frequent New Zealand commercial fishing waters. Birds with significant differences in conservation status can appear morphologically similar. The accurate determination of the taxon of seabirds captured in New Zealand fisheries is vital for examining the potential threat to population viability posed by incidental fisheries captures. Observers on commercial vessels are not always able to identify seabirds at sea with high precision and the assessment of the age-class, sex and provenance of captured individuals requires 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 carcasses and performing necropsy. In order to maximise cost efficiencies, and in recognition of increased observer coverage levels in the offshore Foreign Charter Vessel fleet, a new protocol has been developed to determine which specimens are returned for full necropsy. This protocol aims to strike a balance between returning birds for full necropsy (for rarer species and in less observed fisheries) and photographing birds for determination of taxon (for commonly caught species in well observed fisheries).

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

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

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

Project status

This is a multi-year project that is due for completion in December 2016. The reporting for 2013-14 and 2014-15 has been completed.

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 Wildlife Management International Ltd.

Review milestones:

- Final report due 15 December 2016

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2.3 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

Ongoing.

Recommendations

To improve photo-identifications in the future, wherever possible, all interactions should be photographed and recorded with haul/sample information included in the image. Further training should be given to observers to ensure that all key demographic features such as head, flippers, body shape etc. are included, with scale where possible. Photograph numbers should be recorded on the observer non-fish bycatch form. Photographs (and extracts from the observer log books) should be provided regularly throughout the fishing year for photo-identification.

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.

2.4 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

Ongoing. This is a three-year term project.

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.

2.5 INT2015-04 Black petrel and flesh-footed shearwater foraging behaviour around fishing vessels

Overall objective

To determine the diving capabilities and behaviour of black petrels and flesh-footed shearwaters around fishing vessel

Specific objectives

1. To determine, through specific experimental trials, the diving capabilities and behaviour of black petrels and flesh-footed shearwaters in response to available baits.
2. To document the environmental and operational factors which effect this behaviour.
3. To provide recommendations on methods for reducing bycatch risk based on seabird diving behaviour.

Rationale

In order to achieve effective seabird mitigation solutions for longline fisheries it is important to understand the availability of baited hooks to seabirds. Black petrels are capable of diving to considerable depths (Bell 2014,). This project will investigate the diving behaviour of black petrels, the seabird most at risk from commercial fisheries, and flesh-footed shearwaters, in response to bait in circumstances recreating small vessel bottom longline fishing activity, the fishery posing most risk (Richard et. al. 2013). This information need has been identified in the Black Petrel and Flesh-footed Shearwater Action Plan, as part of the implementation of the National Plan of Actions-Seabirds.

Project status

Ongoing. This is a two-year term project, progress report for 2015/16 has been completed.

Summary of the methods and key findings

Petrels and shearwaters are known to have an extra-ordinary ability to dive while seeking food - shearwaters for example are capable of diving to the astonishing depth of over 65 metres. This project aims to document the diving and feeding behaviour of petrels and shearwaters in response to fishing baits to inform future development of methods of reducing seabird by-catch. As fishing baits are attractive, there is a significant risk of fatal interactions between seabirds and commercial and recreational fishing activities. Black petrel *Procellaria parkinsoni* and flesh-footed shearwater *Ardenna carneipes* have been identified as being at high risk from commercial fisheries in New Zealand waters, particularly longline fisheries that target snapper and bluenose, in addition to interactions with recreational fishers. This threat is most pronounced during the breeding season as these species migrate out of New Zealand waters during winter. The initial two-day trial documented in this report was designed to test a camera rig and underwater diver as methods of recording the diving behaviour of seabirds.

The trial was conducted on two days (31 March and 4 April 2016) in the area between Hauturu and Cape Rodney/Tawharanui using equipment custom-made for this project. An underwater camera rig consisting of an adjustable array of seven GoPro+ cameras was deployed from the stern of an 11m boat. The cameras were angled with overlapping camera sets to provide a wide field of view of both near-surface and underwater activity. This rig was supplemented by video and still photography using a fixed deck camera, a diver and underwater camera, and at one location a snorkeler with a GoPro. Baits of cut pilchard and squid were dropped within two metres of the camera rig. Conditions on both trial days were not ideal with relatively poor visibility, moderate swell and strong winds at times. In

addition, the timing of the trial at the end of the breeding season for both black petrel and flesh-footed shearwater meant that relatively few birds were present and there was little competition for baits.

During 4.7 hours of filming over the course of the two days we witnessed the interaction of nine seabird species with baits or with other seabirds attracted to bait: fluttering shearwater, flesh-footed shearwater, black petrel, Buller's shearwaters, black-backed gull, red-billed gull, Cook's petrel, Australasian gannet and Arctic skua. A total of 415 individual dives were recorded during the survey period.

Several feeding behaviours were observed. These included flying dives, surface sighting and seizing, duck dives, short dives and prolonged foraging dives. Birds were seen to investigate baits while underwater and, on a number of occasions, reject them. The birds were also highly manoeuvrable underwater and capable of changing direction with ease.

During this successful initial trial investigating the diving behaviour of at-risk petrels and shearwaters, we made novel discoveries regarding the interactions of these species underwater and their diving capabilities, including: 1) Bait preferences differ between species; 2) Seabird species have different diving inclinations; and 3) Heterospecific interactions around a prey source.

The present study shows that the use of a multi-frame camera apparatus and diver with camera is effective in better understanding the behaviour of petrels and shearwater in interactions with bait and fishing lines. This method can be applied to more in-depth and scientifically controlled studies related to bait preferences, diving and visual acuity, and interactions between seabird species and fishing apparatus. This information is critical in mitigating fisheries by-catch and provides important data for better understanding the at-sea biology of seabirds.

Recommendations

To conduct a further series of trials using camera rigs operated from recreational boats and commercial long-liners.

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 Northern New Zealand Seabird Trust.

Review milestones:

- Project update presented at the CSP TWG meeting on 10 June 2016
- Progress report published on the CSP website on 20 October 2016

Citation

Gaskin, C.P., Ross, J.R., Robinson, R. & Friesen, M.R. 2016. Diving & foraging behaviour of petrels & shearwaters - initial trials. Report prepared by Northern New Zealand Seabird Trust for the New Zealand Department of Conservation, Wellington. 25p.

Weblink

<http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/diving-and-foraging-behaviour-of-petrels-and-shearwaters-initial-trials/>

3. Population Projects

3.1 POP2015-01 Black petrel: Aotea/Great Barrier Island & Hauturu/Little Barrier Island population project

Overall objectives

To estimate the population size and key demographic parameters of black petrel at Great Barrier Island, Little Barrier Island and Moehau.

Specific objectives

1. To estimate the population trend, fecundity and age-class survival of black petrels on Great Barrier Island/Aotea.
2. To estimate the populations size, trend, fecundity and age-class survival of black petrel at Little Barrier Island.
3. To identify the presence of black petrels (or other seabirds) on the Moehau range, Coromandel, using automated acoustic recorders.

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 – Seabirds6 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 black petrel, classified as at very high risk from commercial fisheries. Supporting rationale for all the components is summarised in the CSP seabird plan 2015. Key areas of uncertainty for black petrels are around the population size on Aotea/Great Barrier Island outside of the main colony (see Bell et al. 2011; 2013) and on Hauturu/Little Barrier Island. Other locations such as Coromandel have been indicated as potentially containing breeding sites. CSP Project POP2014-02 initiated research to better estimate the total population size by targeting survey effort at areas outside the main breeding colony on Great Barrier Island, and at Little Barrier Island. Trials of a mixed method approach using acoustic monitoring and ground searching are being conducted during 2015/16.

Project status

Complete.

Summary of the methods and key findings

This project was conducted in three parts:

1) Great Barrier Island/Aotea

This report is part of the ongoing study of the black petrel, *Procellaria parkinsoni*, on Great Barrier Island/Aotea that was begun in the 1995/96 breeding season. During the 2015/16 breeding season, 433 numbered burrows within the 35-ha study area near Mount Hobson/Hirakimata were checked and intensively monitored. Of these 419 are used as study burrows and 286 were used by breeding pairs, 75 by non-breeding adults and the remaining 59 burrows were non-occupied. By 10 May 2016,

191 chicks were still present in the study burrows, corresponding to a breeding success of 66.8%. Nine census grids were monitored within the study area and accounted for 164 of the inspected burrows and 154 of the study burrows, with 103 burrows being used for breeding. There were 108 chicks from earlier breeding seasons were recaptured within the Mount Hobson/Hirakimata colony area this season (a total of 254 'returned chicks' have been caught since the 1999/2000 season). Over 1550 hours of recordings were collected by automated acoustic recording units showing black petrels began calling between 2100 and 2252 hours and that activity was highest near the summit (Mt Hobson/Hirakimata). Mean clacking rate varied between 1.1 to 12.7 clacks per minute. Analysis of the stratified census grid and mean transect data estimated that there were 1947 to 2197 birds present in the 35-ha area around Mount Hobson/Hirakimata. Unfortunately the tracking and diving behaviour work could not be completed due to technical failure of both the GPS and TDR devices.

2) Little Barrier Island/Hauturu-o-Toi

This report covers the population monitoring of black petrels, *Procellaria parkinsoni*, on Hauturu-o-Toi/Little Barrier Island in the 2015/16 breeding season. On Hauturu-o-Toi/Little Barrier Island, 149 study burrows were monitored, of which 92 were original study burrows established in 1997 by Mike Imber. Only 56% were being used by breeding pairs, but those pairs had 85.2% breeding success with 69 chicks fledging this season. Twenty automated acoustic devices were placed out across Hauturu-o-Toi/Little Barrier Island in December 2015 and were retrieved in March 2016. Black petrel calls were recorded at five locations: Thumb Ladder (LC7), Summit (LC11), Track 7 junction (LC15), Track 8 highpoint (LC16) and Track 8 halfway to Mt Kiriraukawa (LC17). Thirty-six transects were completed with a total of 49 breeding, 18 non-breeding and 50 unoccupied burrows found (n = 117 burrows). Surveys with a seabird-detector dog covered 52.5 km (approximately 73 ha) finding 121 breeding burrows. Analysis of the acoustic recorder units and surveys estimated that there were approximately 620 breeding pairs of black petrels present on Hauturu-o-Toi/Little Barrier Island.

3) Moehau range, Coromandel

An important factor for addressing the estimation of the total black petrel (*Procellaria parkinsoni*) population is to identify any additional breeding sites away from Great Barrier Island/Aotea and Hauturu-o-Toi/Little Barrier Island. The Moehau Range, Coromandel was identified as one possible area for black petrel as shown by historical presence. Nocturnal seabirds are ideal candidates for acoustic monitoring because they are highly vocal at their colonies, particularly during the breeding season. Black petrels call on the ground when trying to attract mates to their burrows between October and February, with peak activity between November and January. Seventeen automated acoustic recording units were deployed on the Moehau range between 30 November 2015 and 31 January 2016. No black petrel calls were recorded, but Cook's petrel (*Pterodroma cookii*) flight calls were recorded.

Recommendations

- 1.1. Continue monitoring of the black petrel population using the study burrows up to the 2024/25 season.
- 1.2. TDR & GPS devices deployed on 30 adults to obtain foraging information in NZ waters.
- 1.3. GLS devices deployed on 30 adults to obtain information on migration to South America.
- 1.4. Satellite devices deployed on juveniles to obtain information on migration to South America.
- 1.5. Random transects and ground surveys throughout the 35-ha study area around Mount Hobson for adult and juvenile recaptures (to improve survival and immigration estimates) and to compare with earlier transect surveys to determine population trends.
- 1.6. Cat trapping continues, on and around Hirakimata prior to the breeding season.
- 1.7. Future analysis of the resighting data is completed.

- 2.1. Continue monitoring of the black petrel population using the study burrows up to the 2019/20 season.
- 2.2. Deploy acoustic recording devices in areas that haven't been covered during previous surveys to obtain information on the range and density of birds on the island.
- 2.3. Complete further random transects and seabird detector dog surveys to recapture adults and juveniles (to improve survival and immigration estimates) and to provide a population estimate.
- 2.4. Establish the exact limits of the Hauturu-o-Toi/Little Barrier Island black petrel colony or habitat and the area calculated by a ground truth survey.

- 3.1. Deploy acoustic recording devices in areas that haven't been covered during the previous survey to obtain further information on the presence of seabirds on the Moehau range.
- 3.2. Deploy acoustic devices over a range of times throughout the survey period in case birds are calling later than at the known colonies.
- 3.3. Repeat the acoustic monitoring survey on the Moehau Range every 5-10 years to determine changes in the area following on-going predator control and whether seabirds are trying to colonise the area.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was \$100,000. In addition, The Ministry for Primary Industries supported the project by contributing \$80,000. Services were provided by Wildlife Management International Ltd.

Review milestones:

- Preliminary results presented at the CSP TWG meeting 10 June 2016
- Draft final reports presented at the CSP TWG meeting 22 September 2016
- Final reports published on the CSP webpage on 18 October 2016

Citation

- 1) Bell, E.A.; Mischler, C.P.; MacArthur, N.; Sim, J.L.; Scofield, R.P. 2016. Population parameters of black petrels (*Procellaria parkinsoni*) on Great Barrier Island/Aotea, 2015/16. Report to the Conservation Services Programme, Department of Conservation. Wellington, New Zealand
- 2) Bell, E.A.; Mischler, C.P.; MacArthur, N.; Sim, J.L. 2016. Black petrel (Black petrel (*Procellaria parkinsoni*)) population study on Hauturu-o-Toi/Little Barrier Island, 2015/16. Report to the Conservation Services Programme, Department of Conservation. Wellington, New Zealand.
- 3) Bell, E.A.; Stewart, P. 2016. Black petrels (*Procellaria parkinsoni*) population study on Moehau Range, Coromandel, 2015/16. Report to the Conservation Services Programme, Department of Conservation. Wellington, New Zealand.

Weblink

<http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/black-petrel-population-study-great-barrier-island-little-barrier-island-and-moehau-range/>

3.2 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 – Seabirds7 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 term 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 Annual report published on the CSP webpage on 26 June 2016

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/>

3.3 POP2015-03 Seabird population research: Auckland Islands 2015-16

Overall objective

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

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 – Seabirds³ 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 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 2015.

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

Gibson's albatross

Specific objectives

1. To estimate the population size of Gibson's albatross at the Auckland Islands.
2. To continue the mark-recapture study on Adams Islands, Auckland Islands, to collect information on adult survival and other key demographic parameters.

Project status

Complete.

Summary of the methods and key findings

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 that have been re-counted repeatedly since 1998. In addition a larger area (Astrolabe Basin) was also counted, and these counts compared with counts undertaken in 1997 and 2000.

Estimates of population size, survivorship, productivity and recruitment are made from a mark-recapture study undertaken in a 61 ha intensively monitored study area.

The numbers of birds nesting in 2016 was the highest it has been since the 2005 population crash, probably partly because breeding success in 2015 was low.

The number of birds nesting in the wider Astrolabe area was about 8% higher than that estimated using the proportionate change in the annually counted blocks since the last whole-island census. This total probably does not reflect a real increase in numbers but rather the use of more accurate count techniques, and the application of correction factors to daily census totals for late egg laying and early nest failure. There were estimated to be 5,817 pairs of Gibson's albatross breeding in 2016 compared to 5,527 pairs in the very low 2000 breeding season and 7,857 pairs in 1997.

The survivorship and productivity of Gibson's wandering albatross has improved since the population crash in 2005, but still have not risen to the levels they were before the crash. The mark-recapture estimates of the size of the breeding population indicate that the rate of decline of the population has slowed though it is still decreasing. In contrast counts of the number of nesting birds have gradually increased since the 2005 crash. The apparent contradiction between the nest counts and the mark-recapture estimates of population size arise from the changing demography of Gibson's wandering albatross. Immediately after the 2005 crash a high proportion of the population did not breed. Since then the proportion of birds breeding each year has increased, so that even though the total population of breeding birds declined, the number nesting increased because a higher proportion of the birds chose to nest.

The population of Gibson's wandering albatross is still declining though at slower rate than previously. We estimate that there were about 5,817 pairs of Gibson's albatross breeding in 2016.

Monitoring the population structure as well as trends of Gibson's albatrosses remains an important conservation priority as the population is still declining, and simple counts of nesting birds does not accurately reflect the conservation status of the species.

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 \$80,000. Services were provided by Albatross Research.

Review milestones:

- Project update and proposed scope published to the CSP meeting webpage on 25 August 2015
- Draft final report presented at the CSP TWG meeting on 10 June 2016
- Final report published at the CSP webpage on 18 August 2016

Citations

Elliott, G., Walker, K., Parker, G., Rexer-Huber, K. 2016. Gibson's wandering albatross census and population study 2015/16. Report prepared for the New Zealand Department of Conservation, Wellington. 19p.

Weblink

<http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/gibsons-wandering-albatross-survey-auckland-islands-2015-16/>

White-capped albatross

Specific objectives

1. To estimate the population size of white-capped albatross at the Auckland Islands

Although not costed into this proposal, two secondary objectives are listed:

2. To conduct ground trothing of the aerial survey methodology used in Objective 1
3. To collect resight data from a study colony established on Disappointment Island to contribute to the estimation of key demographic parameters.

These secondary objectives are target information identified in the CSP seabird plan 2015 that were not costed in this proposal, for reasons of prioritisation, but were possible extensions.

Project status

The aerial component of this project is complete. Ground component will be reported on in 2016/17.

Summary of the methods and key findings

White-capped albatrosses are endemic to New Zealand, breeding on Disappointment Island, Adams Island and Auckland Island in the Auckland Island group, and Bollons Island in the Anitpodes Island Group. The population status of white-capped albatrosses breeding on the Auckland Islands was poorly known until 2006 when annual population census was commences using aerial photography. These population censuses have now been conducted over nine years, permitting population size to be estimated and population trends determined.

In January 2016 aerial photographs were obtained for all three colonies (Disappointment Island, South-West Cape and Adams Island).At each colony we conducted two circuits to provide images suitable for counting the breeding birds on the island, which were taken using a photo-extension of 70 mm. Additional photographs using maximum photo-extension (200 mm or 300mm) were also taken at Disappointment Island, the largest of the colonies, to assist in determining the proportion of empty nests and non-breeding birds in the colonies. The photos taken are a complete series of overlapping images that cover the entire area of the sites where albatrosses were nesting; approximately 2,200 digital photographs were taken during the survey flight.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was \$30,000. Services were provided by Latitude 42 & NIWA.

Review milestones:

- Project update for aerial survey and ground component presented at the CSP TWG on the 10 June 2016.
- Final report published to the CSP webpage on 17 November 2016.

Citation

Baker, G.B. & Jensz, K. 2016. White-capped albatross aerial photographic survey 2013. Report prepared by Latitude 42 for the New Zealand Department of Conservation. 3p.

Weblink

<http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/white-capped-albatross-aerial-survey-auckland-islands/>

DRAFT

White-chinned petrel

Specific objectives

1. To estimate the population size of white-chinned petrel at the Adams Islands, Auckland Islands.

Project status

Complete.

Summary of the methods and key findings

The White-chinned Petrel *Procellaria aequinoctialis* is one of the most frequently observed seabird species captured in fisheries bycatch, yet some populations remain virtually unstudied. In the New Zealand region, the priority programmes to fill key information gaps included surveying, tracking and collecting demographic data from White-chinned Petrels in the Auckland Islands. Survey of the Campbell Island population and clarification of taxonomic uncertainty in the New Zealand region were secondary aims. This information paper provides a progress update and reports some preliminary findings. An estimated 186,000 (95% CI: 131,000–248,000) White-chinned Petrel pairs breed in the Auckland Islands, and the Campbell Island group supports around 22,000 (15,000–29,000) breeding pairs. A tracking programme in the Auckland Islands has retrieved 38 geolocators from White-chinned Petrels to date. Our work on phylogenetic affinities of White-chinned Petrels supported the idea of an NZ regional population, with all three breeding islands grouping together. A study was initiated to collect demographic data from White-chinned Petrels at Adams Island, Auckland Islands. Two years of data have since been collected.

At Adams Island, burrow density and occupancy data were collected in December 2015. The difficult cliff-shelf terrain used by White-chinned Petrels on Adams Island limited sapling to density sampling plots. A stratified random design produced 10 strata with 327 sampling plots in total. Observer effects and detection probability were also tested. Burrow density was calculated from plots. Mean burrow occupancy was 0.64 ± 0.04 . We estimated 32,900 (11,700–52,600) breeding pairs on Adams Island at early incubation.

Recommendations

Resight data have been collected annually at the Auckland Islands since 2013 and monitoring should continue for the project to yield useful demographic 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 \$25,000. Services were provided by Otago University.

Review milestones:

- Project update presentation at the CSP TWG meeting on 10 June 2016
- Report published to the CSP webpage on 20 October 2016

Citation

Rexer-Huber, K. Parker, G. & Thompson D. 2016. New Zealand White-chinned Petrel population research update. Third meeting of the Population and Conservation Status Working Group, La Serena, Chile. 8p

Weblink

<http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/white-chinned-petrel-population-research-progress-report/>

DRAFT

Northern giant petrel

Specific objectives

1. To estimate and map total breeding pairs on all small off-lying islands in the Auckland Islands group known or suspected to have breeding birds.

Project status

Complete.

Summary of the methods and key findings

On each island the number of pre-fledging chicks present and their spatial distribution was recorded. To achieve this, two workers conducted parallel strip-transects spaced at approximately 30 m intervals to exhaustively survey the available Northern giant petrel nesting habitat. The exceptions were Enderby and Dundas where a single person conducted exhaustive searches of all available habitat. All vegetation classes were treated as available habitat, with the exception of the interior of southern rata dominated forest interiors. Hand-held GPS units with topographical mapping software were used to record all line transect surveys and the locations of all chicks detected.

Nests that showed clear signs of having failed in the current breeding season were also counted. Caution was used to avoid counting old nests and 'play' nests constructed by non-breeding birds. In an attempt to correct for nesting failure during the egg and early chick stage, the total number of Northern giant petrels breeding was calculated by applying the average, lowest and highest records of breeding success from the past ten years on Macquarie Island to the number of nests we found. Macquarie Island, 350 nautical miles southwest of the Auckland Islands, is the nearest Northern giant petrel colony where these data have been collected.

Surveys counted 216 Northern giant petrel chicks on eight of the 15 islands visited in December 2015 and January 2016. Enderby Island had the largest breeding population, with 96 chicks counted. This represents a large increase in the population on Enderby Island compared to the only historic comprehensive count, in 1988, when just two Northern giant petrel chicks were counted. The second and third largest populations were on Disappointment (38, 18%) and Dundas Islands. Fourteen failed nests were recorded, eleven of which were on Enderby. No breeding Northern giant petrels were reported from Rose and Friday Islands, where the species has previously been recorded breeding. Chicks were counted at two locations previously not reported to support breeding Northern giant petrels, at French's Island and Crozier Point on the main Auckland Island.

Applying crude correction factors based on breeding success at the nearest Northern giant petrel colony where these data have been collected, Macquarie Island, we estimate the breeding population in the Auckland Islands 2015-2016 to be approximately 340 (range 310-390) breeding pairs. Our quantitative estimate is higher than the four historical, non-quantitative records of breeding pairs. The population has been documented as 50 breeding pairs three times (Taylor 2000; Taylor 1988; Bell 1975) and once as 200 breeding pairs (CJ Robertson in Hunter 1986).

Recommendations

- We recommend future monitoring of the Auckland Island Northern giant petrel breeding population. Ideally island-wide surveys would be repeated every three to five years. Enderby Island would be the ideal location for regular, annual counts of breeding birds. Disturbance

from tourism may negatively impact upon breeding Northern giant petrels on Enderby Island, and should be monitored given that the island supports such a large proportion of the Auckland Island breeding population.

- Because there are no trend data for Northern giant petrels anywhere in the NZ region, we strongly advise that the Antipodes and Campbell Islands populations are re-counted in the near future and the results related to previous counts (Wiltshire and Scofield 2000; Wiltshire and Hamilton 2000)

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 Parker Conservation.

Review milestones:

- Draft final report presented at the CSP TWG meeting on 10 June 2016
- Final report published to the CSP webpage on 22 July 2016

Citation

Parker, G.C., Muller, C.G., Rexer-Huber, K. 2016. Northern giant petrel *Macronectes halli* breeding population survey, Auckland Islands, December 2015 – February 2016. Report prepared by Parker Conservation for the New Zealand Department of Conservation, Wellington. 16p.

Weblink

<http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/northern-giant-petrel-survey-auckland-islands-2015-16/>

3.4 POP2015-04 Northern Buller's albatross: review taxonomy

Specific objectives

1. To reassess the taxonomic status of breeding populations of northern Buller's albatross.
2. To identify genetic markers to allow routine genetic assessment of bycaught Buller's albatross to determine their population of origin.

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 – Seabirds9 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 is one of the prioritised components. Supporting rationale for all the components is summarised in the CSP seabird plan 2015.

Currently two subspecies of Buller's albatross, northern and southern, are generally recognised, though uncertainty remains around the taxonomic relationships across the Buller's albatross clade. An isolated breeding population occurs at the Three Kings, and the taxonomic status of this population is of current research interest (M. Rayner pers. comm.). Northern and southern Buller's albatross is currently categorised as at high and very high risk.

Project status

Complete.

Summary of the methods and key findings

To resolve the degree of differentiation between two subspecies of Buller's Albatross, Northern (*Thalassarche bulleri platei*) and Southern (*Thalassarche bulleri bulleri*), a total of 73 blood samples were obtained from chicks and nesting adults between 1996 and 2007. Twenty-six samples are representative of *Thalassarche bulleri platei* (22 = Motuhara, 4 = Rangitahi) and an additional 47 samples are representative of *Thalassarche bulleri bulleri* (24 = North East Island, 23 = Solander Island). Liver samples from a further 97 individuals were harvested during routine necropsy of bycatch between July 1999 and June 2016. Analysis of a 221 bp fragment of the mitochondrial DNA control region Domain II revealed high levels of diversity similar to those previously reported for Domain I of the control region in other seabirds (add reference). Regional differentiation was difficult to assess due to the high variation within Northern Buller's Albatross (percent pairwise differences ranged from 0 – 6.4%). However, pairwise comparisons among colonies demonstrated high levels of differentiation between colonies from different regions (pairwise Φ_{ST} = 0.586 - 0.703, $p < 0.00001$). Regional population structure was further examined without a priori assignment in BAPSv6.0 (Bayesian Analysis of Population Structure). BAPS identified three haplogroups; Haplogroups I & II were only found in the Northern Buller's Albatross, and Haplogroup III was found only in Southern Buller's Albatross. All but two individuals from samples of known provenance were able to be assigned to the population of origin with maximum probability ($P = 1.00$). These two

individuals from Motuhara shared the genetic characteristics of all 3 haplogroups, but were most strongly associated with Haplogroup III. This suggests that there may be additional haplogroups not represented within the current sample set and increased colony sampling may resolve this uncertainty.

Despite the presence of this one ambiguous haplotype, all 97 samples collected from bycatch were able to be assigned to their population of origin with maximum probability. A total of 19 bycatch individuals were representative of Northern Buller's Albatross (Haplogroup I: n = 8, Haplogroup II: n = 11), while the remaining 78 bycatch samples were assigned to Southern Buller's Albatross (Haplogroup III). This method did not permit assignment back to distinct colonies or sites. This may be because there is genetic homogeneity between colonies within regions. Our findings were similar to previous work on the Southern Buller's Albatross which reported finding no differentiation among two southern colonies. However, these new findings support the conclusion that Northern and Southern Buller's are genetically differentiated populations, and show that assignment to source is possible using short CRII sequences as a tool.

Recommendations

The mtDNA assay appears to be able to determine whether a Buller's Albatross is from the Northern or Southern group. However, the level of certainty for this mtDNA-based identification approach does need to be tested further. It can be gradually phased in as a potential stand-alone method for assigning individuals to their population of origin as the level of certainty improves. It is recommended that more samples of known Northern and Southern Buller's albatross are collected and DNA-typed to increase the sample sizes and help improve the statistical power of the method. Increasing the number of samples of known provenance should enable the ambiguity of the haplotype shared by 2 *Thalassarche bulleri platei* individuals sampled from Motuhara to be resolved. This will also enable a better assessment of the diversity within the observed haplogroups and precisely define all of the haplogroups.

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 Victoria University of Wellington.

Review milestones:

- Preliminary results presented at the CSP TWG meeting on 10 June 2016

3.5 POP2015-05 New Zealand Sea Lion: Auckland Islands population project

Overall objective

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 estimate New Zealand sea lion pup production at Enderby, Figure of 8 and Dundas Islands.
2. To mark New Zealand sea lion pups at Enderby and Dundas Islands following established techniques.
3. To conduct a five-week period of resighting previously marked animals at Enderby Island.
4. To update the New Zealand sea lion database.
5. To collect data on pup weight, to contribute towards time series data on population dynamics.

Rationale

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

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 research project is scoped to collect key information required to understand 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.

Project status

Complete.

Summary of the methods and key findings

Pup production was estimated for NZSL colonies at Sandy Bay (n=321), Dundas Island (n=1,347), Figure of Eight Island (n=59) and South East Point (n=0); with total pup production for the Auckland Islands in 2015/16 estimated as 1,727. The estimate for 2015/16 is 10% higher than for 2014/15 and is 15% higher than the lowest ever estimate for pup production in 2008/09. The steep decline in total pup

production seen from 1997/98 until 2008/2009 appears to have levelled off although total pup production is still significantly lower than the peak in 1997/98. Since the lowest ever record of total pup production at the Auckland Islands in 2008/09, pup production has seen annual increases in five of the last seven years and overall production appears to have stabilised at around 1600-1700 pups per annum since 2008/09. While the stabilisation of total pup production is a positive step, it is important to note that pup production in 2015/16 still represents a 43% decline since the peak in 1997/98.

Estimates of pup mortality to the date of the pup production estimate in mid-January are broadly comparable to previous 'non-epidemic' years. However, these figures do not represent full season surveys and are not directly comparable to data collected prior to 2012/13, and so should be viewed as a minimum. Pup mortality estimates to the date of pup count are: Sandy Bay 4% (to 15 January 2016), Dundas Island 9% (to 18 January 2016) and Figure of Eight Island 10% (to 9 January 2016) and overall for all sites 8%.

Seven hundred and fifty-seven pups were marked at the Auckland Islands including: Sandy Bay – 198 flipper tagged and microchipped, and 110 microchipped only (Note that this was a new protocol implemented in 2014/15 with only approximately 50% rather than 100% of pups being tagged at Sandy Bay); Dundas Island – 400 flipper tagged only; and Figure of Eight Island – 49 flipper tagged only.

Of the 34 dead pups recovered at Sandy Bay, 33 were in sufficient state for necropsy. Preliminary provisional diagnosis for cause of death includes 61% bacterial infection (suspected with *Klebsiella pneumoniae*), 12% open diagnosis (decomposed, scavenged or no significant findings), 21% starvation, 3% trauma and 3% intestinal perforation. It is important to note that these diagnoses are provisional and will be refined and/or confirmed once full histopathology analysis has been completed at Massey University pending funding;

Between 11 November 2015 and 20 February 2016, there were a total of 6,667 resights of marked NZSLs of which 6,411 were suitable for use (i.e. contained sufficient information allowing positive identification).

Recommendations

- Future teams allocate more time and training to microchipping to reduce this loss rate
- Restart microchipping and tagging of all pups at Sandy Bay, at least until microchip retention rates can be minimised
- Investigation of an additional electronic tagging/tracking method to identify individuals at a distance
- Increased monitoring effort and a review of existing pup ramps at Dundas Island.
- Review of tagging and microchipping methods to consider new methods & approaches
- Surveys of other Islands to search of sea lions breeding away from the main colonies
- Consideration of increase in the active management of pup mortality
- Collection of body condition information on adult females

Project logistics summary statement

This project was 90% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was \$250,000. Services were provided by Blue Planet Marine NZ.

Review milestones:

- Final results presented at the CSP TWG meeting on 18 May 2016
- Final report published on the CSP webpage on 7 June 2016

Citation

Childerhouse S, Miller C, Burns T, French R, Kay E (2016) Final Report for CSP Project New Zealand sea lion ground component 2015/16. Report prepared by Blue Planet Marine for the New Zealand Department of Conservation, Wellington. 52p.

Weblink

<http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/new-zealand-sea-lion-ground-component-2015-16/>

DRAFT

3.6 POP2015-06 Marine reptiles – review of interactions and populations

Overall objective

To review existing information to describe the nature and extent of interactions and population information on risks from commercial fishing on marine reptiles in New Zealand's EEZ.

Specific objectives

1. To review existing information to describe the nature and extent of interactions between commercial fishing and marine reptiles.
2. To review existing information to describe population information relevant to assessing risk from commercial fishing to marine reptiles.
3. To review existing information on possible mitigation options relevant to New Zealand fisheries to minimize marine reptile bycatch.
4. To identify information gaps in the understanding of the nature and extent of interactions between commercial fishing and marine reptiles, population information and mitigation options, and provide recommendations for further research to address any gaps identified.

Rationale

All marine reptiles are fully protected in the New Zealand EEZ, with five species of sea turtles recorded as well as sea snakes and kraits. Observer coverage has reported low but regular bycatch of sea turtles in surface longline and inshore trawl fisheries with green turtles being the most commonly caught. There have also been records of leatherback and hawksbill turtle captures. While observed bycatch incidence has been low, this is likely influenced by low observer coverage in these fisheries. The life history parameters of marine reptiles make them susceptible to adverse effects from fisheries bycatch. Understanding the nature and extent of these interactions is important to develop appropriate management, including mitigation.

Project status

Completed.

Summary of the methods and key findings

Five species of marine turtles and four species of sea snakes and kraits have been recorded in New Zealand waters. These species are susceptible to adverse effects from commercial fisheries to varying degrees. This research investigated commercial bycatch data to describe the nature and extent of marine reptile interactions in New Zealand's Exclusive Economic Zone from 2008 to 2015.

Existing population information was reviewed to assess potential risks to fisheries, to identify information gaps, and ultimately make recommendations to mitigate impacts. In total, 120 marine turtle bycatch records were reported while no bycatch of sea snakes or kraits were documented.

Leatherback turtles (*Dermochelys coriacea*) were most frequently captured comprising 75% (n = 90) of all records. In contrast, green turtles (*Chelonia mydas*), hawksbill turtles (*Eretmochelys imbricata*), and loggerhead turtles (*Caretta caretta*) were captured in relatively low numbers, comprising 10% (n = 12), 5% (n = 6) and 2% (n = 2), respectively. The large majority of all bycatch events occurred in fisheries management areas off northeastern New Zealand (74%) and during summer (51%, n = 61) and autumn (38%, n = 45). Surface longline (SLL) activities targeting swordfish and tunas posed the greatest risk to marine turtles, recording the highest number of bycatch overall (91%, n = 109). In

particular, leatherback turtles were most frequently captured in this fishery, accounting for 73% (n = 88) of total bycatch.

The potentially significant threat of SLL activities to marine turtles is reflected by the annual bycatch rate (for all species combined) which, in some years, exceeded the Western and Central Pacific Fisheries Commission recommended minimal marine turtle interaction rate of 0.019 turtles per 1000 hooks. In addition, very low observer coverage was allocated to fisheries and management areas where marine turtle bycatch was most likely to occur. Overall, very little local population information is available for marine reptile species in New Zealand.

Ultimately, given the potential impacts to marine turtles and information gaps identified, several recommendations are made in order to mitigate bycatch risk in New Zealand.

Recommendations

This research has identified five key recommendations to address the impact of commercial fisheries on marine reptiles in New Zealand waters. These are:

1. Adopt the Western and Central Pacific Fisheries Commission's (WCPFC) resolution RES2005-04 and conservation and management measure CMM2008-03. Thus, it is recommended to implement a minimal marine turtle interaction rate of 0.019 turtles per 1000 hooks or less, for shallow-set longline fisheries that target swordfish.
2. Adopt the United Nations Food and Agriculture Organisation (FAO) Guidelines to Reduce Sea Turtle Mortality.
3. Review the allocation of observer coverage to more appropriately monitor high risk areas and time periods.
4. Improve data quality and reporting.
5. Improve population information and research.

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 Karearea Consultants.

Review milestones:

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

Citation

Godoy, D. 2016. Marine reptiles - review of interactions and populations, Final report. Report prepared by Karearea Consultants for the New Zealand Department of Conservation. 53p.

Weblink

<http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/marine-reptiles-review-of-interactions-and-populations/>

3.7 POP2015-07 Supporting genetic analysis of protected fish species

Specific objectives

1. To establish a repository for genetic samples of protected fish species.
2. To conduct a stock take of complete, current and planned genetic analyses internationally, in relation to New Zealand's nine protected fish species.
3. To provide recommendations on the most appropriate methods of furthering genetic analyses in order to inform management of New Zealand's protected fish species in relation to fisheries bycatch.

Rationale

Reviews of the nine fish species protected under the Wildlife Act 1953 have highlighted a general paucity of data on the genetic structuring of stocks (Francis & Lyon 2012; 2014). This lack of information on population structure makes meaningful quantification of the extent of risk to these species problematic. Internationally there are a number of universities and research institutes undertaking genetic analyses on these species, with work being at various stages of planning or completion. Undertaking a stock take of these projects and pooling of samples with those collected from bycaught animals in New Zealand will allow a more strategic approach to planning and support of research to understand the genetic structuring of these protected fish species, allowing for robust assessment of risk from commercial fishing to these taxa over time in accordance with the National Plan of Action-Sharks.

Project status

Complete.

Summary of the methods and key findings

Nine fish species are currently protected in New Zealand fisheries waters (white shark, basking shark, whale shark, oceanic whitetip shark, deepwater nurse shark, spinetail devilray, giant manta ray, spotted black grouper and giant grouper). All nine species have low productivity, which in combination with fisheries threats make them vulnerable to over-exploitation. The wide distributions of most species, and the broad expanses of ocean between New Zealand and other population centres of all nine species, raise the possibility that some or all of them may have multiple, isolated, geographic populations. Understanding population structure is important for managing the New Zealand populations of these nine species. Even though the species are protected within the New Zealand EEZ, they may be subjected to fishing and environmental impacts elsewhere if they form part of more extensive geographic populations. The present study carries out a detailed investigation of the genetics of the nine species in order to (a) establish a repository for genetic samples of protected fish species, (b) conduct a stock take of complete, current and planned genetic analyses internationally, and (c) provide recommendations on the most appropriate methods of furthering genetic analyses in order to inform management of New Zealand's protected fish species in relation to fisheries bycatch.

NIWA has been collecting tissue samples from white shark since 1991, from basking shark since 1997, and from spinetail devilray since 2013. Many of these tissue samples have been contributed to international studies on the population genetics of these species. We aggregated all of NIWA's tissue samples to form the nucleus of a new library of protected species tissue samples, and a database of worldwide tissue samples of New Zealand's protected fish species was compiled. The database

contains good sample sizes of white shark (N=102) and basking shark (N=56) but small or no samples of the remaining seven species. Few of the tissues are held in the NIWA repository, with most being held elsewhere.

Genetic studies on the nine protected species found during a literature review and correspondence with geneticists worldwide are summarised and reviewed. Worldwide population genetics studies have been completed for white shark, basking shark, whale shark and spintail devilray, although no studies on whale shark have included New Zealand material. The remaining species have been studied in only part of their range (spotted black grouper; no New Zealand material included) or not at all (oceanic whitetip shark, deepwater nurse shark, giant manta ray, giant grouper).

Recommendations

Most of the species covered in this review have global distributions but samples sizes of many studies were limited. A key priority is to continue to gather samples to complement samples collected from other locations. To increase the levels of genetic resolution, future studies should aim to build comprehensive reference genomes and single-nucleotide polymorphism databases, by using genotyping-by-sequencing or brute force population-scale genome sequencing. These approaches better resolve weak patterns of genetic variation and detect local-adaptive differences among populations. Specific recommendations are made for further study of white shark, basking shark, deepwater nurse shark and spotted black grouper.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was \$30,000. Services were provided by NIWA.

Review milestones:

- Draft final report presented at the CSP TWG meeting on 16 June 2016
- Final report published on the CSP webpage 25 August 2016

Citation

Francis M. & Ritchie, P. 2016. Genetic studies of New Zealand's protected fish species 2015/16. Report prepared by NIWA and Victoria University of Wellington for the New Zealand Department of Conservation, Wellington. 33p.

Weblink

<http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/supporting-genetic-analysis-of-protected-fish-species/>

4. Mitigation Projects

4.1 MIT2014-01 Protected species bycatch newsletter

Overall objective

To produce a newsletter to communicate protected species-related information to trawl and longline fishermen.

Rationale

Reducing the impacts of commercial fishing on protected species relies on individual fishermen actively applying best practice mitigation methods to their fishing activity. Applying and developing mitigation methods in specific circumstances requires an understanding of the protected species that may be impacted, and the nature with which they interact with fishing activity. A range of relevant information exists, often the result of research projects, and the newsletter will serve as a vehicle for communication to fishermen, fishing companies, and other interested parties. An evaluation of previous examples of this work by Pierre (2012) indicates that this format shows promise in reaching a broad sector of the fishing community and wider stake holders, and provides recommendations for further development.

Project status

Complete.

Summary of the Methods and Key Findings

The objective of Conservation Services Programme project MIT2014-01 was to produce a bimonthly newsletter to communicate protected species-related information to commercial fishermen. This project's two-year term has now concluded, with 12 issues of the newsletter produced.

Articles covered best practice mitigation methods, new and emerging mitigation measures, work underway to develop bycatch reduction approaches, current events of relevance to commercial fishers, and other protected species information relevant to commercial fishing. Key references were also provided in each issue, to facilitate reader access to additional information on topics of particular interest.

The target audience for the newsletter comprised commercial fishers and others involved in the fishing industry. Recipients included holders of fishing quota and annual catch entitlement, seafood company representatives, Seafood New Zealand's Sector Representative Entities and Commercial Stakeholder Organisations, Ministry for Primary Industries regional office staff, the New Zealand Federation of Commercial Fishermen, and individuals working in the fishing industry or on fisheries bycatch issues. In addition, fisheries observers and seabird liaison staff distributed copies to fishers in person, when newsletter items had particular relevance to their activities or the fisheries in which they were deployed.

Throughout this project term, the newsletter was circulated directly to around 1,700 recipients. It was distributed in five forms: as an html newsletter delivered 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 indicated a preference for this medium or who did not have an electronic point of contact. Throughout the project term, the html newsletter was viewed electronically by 33 – 43.3% of the emailed recipients (mean = 39%). The html newsletter included an 'unsubscribe' option as well as providing for

recipients to update their contact details. Since December 2014, 47 recipients have unsubscribed. Ten 'subscribe' requests were received and 9 recipients have updated their contact details online. The majority of readers (83 - 94%) were New Zealand-based, with international readers accessing the newsletter from Australia, USA, Japan, Germany, Canada, the Czech Republic and Thailand. In addition, the newsletter's Twitter circulation attracted 57 'opens' on average for each edition (range = 22 - 103). The newsletter's circulation list was constructed using information from Ministry for Primary Industries databases, fisheries stakeholder circulation lists, government agency staff lists, and personal contacts amongst government and industry.

To broaden the audience for key messages regarding protected species interactions with commercial fisheries, the newsletter format could in future be supplemented with the publication of topical articles in industry media and presentations at industry meetings and conferences. This would also provide the opportunity to tailor key messages to particular interest groups (e.g., commercial fishers active in a particular region).

Recommendations

The newsletter's circulation list was constructed using information from Ministry for Primary Industries databases, fisheries stakeholder circulation lists, government agency staff lists, and personal contacts amongst government and industry. To broaden the audience for key messages regarding protected species interactions with commercial fisheries, the newsletter format could be supplemented with the publication of topical articles in industry media and presentations at industry meetings and conferences. This would also provide the opportunity to tailor key messages to particular interest groups (e.g., commercial fishers active in a particular region or dealing with particular protected species issues).

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 Johanna Pierre Environmental Consulting Ltd.

Review milestones:

- 2014/15 annual review presented at the CSP TWG meeting on 17 of June 2015
- Final report presented at the CSP TWG meeting on 16 June 2016
- Final report published on the CSP webpage on 20 July 2016

Citation

Pierre, P. 2016. Protected species bycatch newsletter: Final Report. Report prepared by Johanna Pierre Environmental Consulting Ltd. for the New Zealand Department of Conservation, Wellington. 7p.

Weblink

<http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/protected-species-bycatch-newsletter-final-report/>

Newsletters available at:

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

4.2 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

With activities based from ports around the country and their focus being on the business of catching fish, fishers may find it difficult to stay abreast of developments in the field of bycatch mitigation, as well as changes in government policies and management approaches that overarch the fisheries they are active in. Liaison officers provide a mechanism to address this. In 2013/14, liaison officers were deployed in the snapper (*Pagrus auratus*) bottom longline fleet in Fishery Management Area 1. The success of that programme led to its continuation in 2014/15. This project (MIT2015-01) builds on previous liaison officer work with another two-year term.

Its objectives are:

1. To provide one or more liaison officers to the inshore bottom longline and small vessel surface longline fishing fleets, with a focus on the northern North Island, to assist those fleets in reducing 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 reduction in bycatch possible.

The liaison team for 2015/16 comprised two liaison officers and a coordinator. The programme was established with documentation outlining roles and responsibilities, modes of interaction with government and stakeholders, and prioritised lists of vessels for engagement. Vessels included in the programme were surface and bottom longliners active in Fisheries Management Area 1 and targeting snapper (*Pagrus auratus*) (38 vessels) and bluenose (*Hyperoglyphe antarctica*) (17 vessels), and surface longline vessels operating off the east coast of the North Island and the west coast of the South Island (38 vessels). The activities of liaison officers were supported with information collection by government fisheries observers, who documented details of mitigation strategies in use on vessels.

In bottom longline fisheries, Seabird Management Plans were the vehicle for documenting strategies employed day to day on vessels to reduce seabird capture risk. These plans were introduced in 2014/15, and reviewed in 2015/16. In surface longline fisheries, Operational Plans had a similar function, and were developed in 2015/16 for the first time. The range of measures described in these plans varied significantly amongst vessels, illustrating opportunities to continue to encourage the implementation of improved bycatch mitigation strategies in future.

Amongst bottom longline vessels included in the liaison programme in 2015/16, liaison officers had up to four contacts with bluenose vessels and up to 12 contacts with snapper vessels. Up to six contacts were made by the liaison officer with surface longline vessel operators. Engagement with industry, government, research providers, environmental groups and other stakeholders has been valuable for the liaison programme in 2015/16. In particular, licensed fish receivers have made extremely important contributions to the programme and this is encouraged for future years.

Recommendations

In addition to fostering the involvement of licensed fish receivers in the liaison programme, recommendations for future years include providing a more closely located liaison resource for the west coast of the South Island, having seabird liaison officers and fisheries observers go to sea only in their respective capacities to ensure role clarity, prioritising a small group of higher risk vessels for dedicated liaison activities in 2016/17 such that their mitigation strategies demonstrably improve, and providing regular online updates for stakeholders interested in the activities of liaison team.

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/>

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4.3 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).

Project status

Implementation planned for 2016/17.

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 in 2015/16.