

## CSP Initial research proposals 2018/19

CSP RAG 28 February 2018

### **Purpose**

These initial project proposals have been developed to deliver outputs to address research gaps identified by the Conservation Services Programme (CSP) Research Advisory Group (RAG). These gaps have been identified through the development of medium term research plans, or at previous meetings of the RAG. It is intended that these initial proposals, and any other proposals identified by the RAG, will be prioritised at the CSP RAG meeting of 28 February 2018. The prioritised proposals will be used to develop the CSP Annual Plan 2018/19

These initial research proposals should be considered in light of the following key documents:

- [CSP Strategic Statement 2015](#)
- [CSP Seabird medium term research plan 2017](#)
- [CSP Protected fish medium term research plan 2016](#)
- [Draft Marine Mammal medium term research plan 2017](#)
- [CSP Annual Plan 2017/18](#)

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## Interaction Projects

### Ongoing projects

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

This multi-year project was consulted on in 2015/16 and was due for completion in June 2018. Due to unforeseeable circumstances, the project was delayed by a year and is now due for completion in June 2019. It is proposed to form part of the CSP Annual Plan 2018/19.

Full details are provided in the CSP Annual Plan 2015/16.

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

This multi-year project was consulted on in 2016/17 and is due for completion in June 2019. It is proposed to form part of the CSP Annual Plan 2018/19.

Full details are provided in the CSP Annual Plan 2016/17

#### INT2017-03 Identification of marine mammals, turtles and protected fish captured in New Zealand fisheries

This multi-year project was consulted on in 2017/18 and is due for completion in June 2020. It is proposed to form part of the CSP Annual Plan 2018/19.

Full details are provided in the CSP Annual Plan 2017/18

#### INT2017-02 Supporting the utility of electronic monitoring to identify protected species interacting with commercial fisheries

This multi-year project was consulted on in 2017/18 and is due for completion in June 2019. It is proposed to form part of the CSP Annual Plan 2018/19.

Full details are provided in the CSP Annual Plan 2017/18

### Proposed projects

#### INT-1 Observing commercial fisheries

**Term:** 1 year.

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

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

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

The CSP Observer Programme will continue to purchase baseline services for “offshore” fisheries from MPI Observer Services, given the scale of their operation, which allows observers to be placed strategically across New Zealand Fisheries. Inshore fisheries observer coverage will also be delivered by MPI Observer Services, per a joint planning process.

Planning of observer coverage is undertaken jointly by MPI and DOC as part of a separate process and will be consulted on as part of the consultation on the CSP Annual Plan 2018/19.

### **INT-2 Improving the collection of data and samples from bycaught Basking Sharks**

**Term:** 1 year.

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

**Project Objective:** To increase the acquisition of biological data from bycaught animals to support further research on the New Zealand stocks structure and biological information of basking sharks. Based on the recommendations derived from POP2016-03.

#### **Specific Objectives:**

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

Basking sharks are caught incidentally in New Zealand trawl and set net fisheries. They were protected in December 2010, and the last review of bycatch was undertaken in 2017. Basking sharks are hard to find and hard to study. Consequently, information on their populations and biology is difficult to obtain and is dependent on a slow, incremental accumulation of knowledge about them. The limited availability of specimens, the low chance of encountering one on any particular vessel, and the difficulty of working on a large animal during a commercial fishing operation, all hinder the collection of biological data. Before the protection of basking sharks in December 2010, most reported captures came from observers. However, after the protection and the introduction of the NFPS form at the same time, reports of captures by commercial fishers have provided a more comprehensive data source than observer reports. Increasing the priority of observer research activities for basking sharks would offer some hope of success on increasing our knowledge. In addition, supplementing fishers with the right tools and encouraging them to sample any bycaught basking sharks when an observer is not on board could provide an important resource.

This project will build on the recommendations of POP2016-03.

**Indicative cost:** \$20,000

### **INT-3 Development of observer photograph protocols and curation**

**Term:** 2 year.

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

**Project Objective:** To improve the quality and usability of protected species interaction photographs taken by observer.

#### **Specific Objectives:**

1. To review observer protocols for photographing bycaught protected species.
2. To review the photograph metadata collected and recorded.
3. To develop an improved database for observer photographs.

Digital photo images and associated metadata collected by observers provide an invaluable resource for the identification of protected species that are bycaught in, or otherwise interact with, commercial fisheries. Although a general photography protocol exists, the quality of these photographs is often variable, and researchers using these data for identification of animals have recommended

improvements to the current processes. Updated protocols and guidelines that are more detailed will improve the successful utilisation of this form of observer data.

Image data is currently captured in the photo log. This data helps identify potential interactions between the protected species and fishing gear, and identify factors that may have contributed to the interaction. Some image metadata is also provided via a handwritten autopsy label, which the observers should include on the photographs, requiring a manual process for collating this data. Updating the methods for recording image metadata and standardizing the use of GPS referenced cameras could make the image processing largely automated to both simplify the work, and potentially make the process more robust by adding business rules for metadata validation.

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

**Indicative cost:** \$30,000 per annum

#### **INT-4 Characterisation of marine mammal interactions**

**Term:** 1 year.

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

**Project Objective:**

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

Marine mammals are bycaught throughout New Zealand fisheries. The methods of interactions vary between fisheries and the species involved.

The draft marine mammal risk assessment included 35 species of marine mammals that are determined to inhabit New Zealand waters. Six of these species are classified under the New Zealand Threat Classification System as Migrant, nine as Not Threatened, three as Nationally Endangered and five as Nationally Critical, with the remaining 12 species classified as Data Deficient as not enough information exists to properly determine their threat status.

Not all marine mammals have been reported interacting with commercial fisheries in New Zealand; most beaked whales and large whales (with the exception of the Humpback whale) have a relatively low incidence of being bycaught. Due to the relative paucity of data for marine mammals in New Zealand, particularly relating to their population structure and the nature of interactions with commercial fishing, one of the proposed research priorities is the development of method and species-specific mitigation options for each protected marine mammal species known to interact with commercial fisheries.

This project will aim to characterise the nature of marine mammal captures in New Zealand fisheries. In addition, the project will identify and assess the current mitigation techniques for marine mammal captures, both domestically and internationally, and make recommendations as to their applicability in New Zealand fisheries. While this work has been conducted for specific fisheries, including project MIT2012-03, there's a need for holistic analyses of the overall nature of interactions.

**Indicative cost:** \$25,000

### **INT-5 Trialling innovative Electronic Monitoring (EM) systems for small vessels**

**Term:** 2 years.

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

**Project Objective:**

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

The Ministry for Primary Industries (MPI) is rolling out new digital systems for tracking, monitoring and reporting of commercial fishing.

Electronic monitoring (EM) is being trialled or is operating in many fisheries around the world. Traditional EM systems can be challenging to fit to small vessels given power, space and set-up requirements.

Inshore fishing within the New Zealand EEZ is an immensely diverse activity, with large amounts of variation in individual practice and effort. Individual vessels can range in size from just two metres in length to over thirty metres. Equally, activity can range from 20 days per year to over 300 for each vessel. One of the challenges with observing the inshore fisheries is the difficulty of placing observers on small vessels in remote ports. Additionally, many of the fishers only operate part time, either seasonally or sporadically.

Overly simplified characterisation of the inshore sector is problematic, and may lead to false conclusion about the fishery. Therefore, it is critical to gather information on the inshore fishing sector from as broad and representative coverage as possible. Due to the historical low levels of observer coverage, and the challenging nature of this fishing sector, using electronic monitoring technology to monitor the fisheries may be a feasible, if the technology is a viable tool for monitoring the incidental catch of protected species. The EM system has been trialled in the snapper fishery in quota management area one (SNA 1), with the aim of examining the feasibility of EM technology as a viable monitoring tool for estimating the amount of snapper returned to the sea and validating the estimates on the vessel catch effort data. This trial was carried out on vessels over seven meters in overall length.

This project will aim to place EM systems on board setnet vessels from the inshore sector that are under seven meters in overall length. The trial will be focussed on vessels based around Otago/Southland, covering the main breeding areas of yellow-eyed penguins.

**Indicative cost:** \$50,000 per annum

### **INT-6 Updated analysis of Spine-tailed devil ray post release survival**

**Term:** 1 year.

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

**Project Objective:**

1. To provide updated estimates of post release survival of *Mobula japonica* bycatch in purse seine fisheries

2. To identify operational, biological and environmental factors which effect the likely hood of post-release mortality
3. To provide recommendations on the most effective methods to reduce post release mortality.

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

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

**Indicative cost:** \$15,000

### **INT-7 Estimating cryptic mortality rates of warp strikes**

**Term:** 1 year.

**Guiding Objectives:** CSP Objective A, B and C; National Plan of Action – Seabirds.

**Project Objectives:**

1. To estimate the cryptic mortality of seabirds by warp strike by retaining seabird corpses until hauling.

Currently, seabird bycatch estimates are based on the number of carcasses that are subsequently hauled aboard. Whilst multipliers have been developed to account for cryptic mortality in seabird bycatch risk assessment, the proportion of birds that are killed following warp strikes are not recovered during hauling is poorly known. Research into the nature of cryptic mortality is vital to better understand the relationship between heavy contacts of seabirds with trawl warps and mortality.

This project will aim to trial the use of warp attachment device to investigate whether it would increase the probability that seabirds killed on trawl warps will be retained until hauling. The device, 'corpse catcher', has previously been trialled successfully on vessels in the waters of Falkland Islands.

**Indicative cost:** \$50,000-100,000



## Population Projects

### Ongoing Projects

#### **POP2017-03 Salvin's albatross: Bounty Islands population project**

This multi-project was consulted on in 2017/18 and was due for completion in June 2019. Due to unforeseeable circumstances, the work for 2017/18 was deferred to 2018/19, moving the completion date to June 2020. It is proposed to form part of the CSP Annual Plan 2017/18.

Full details are provided in the CSP Annual Plan 2017/18.

#### **POP2017-04 Auckland Islands seabird research**

This multi-year project was consulted on in 2017/18 and is due for completion in June 2020. It is proposed to form part of the CSP Annual Plan 2018/19.

Full details are provided in the CSP Annual Plan 2017/18.

#### **POP2017-06 Indirect effects on seabirds in north-east North Island region**

This multi-year project was consulted on in 2017/18 and is due for completion in June 2019. It is proposed to form part of the CSP Annual Plan 2018/19.

Full details are provided in the CSP Annual Plan 2017/18.

#### **POP2017-02 Indirect effects of fishing on New Zealand sea lions**

This multi-year project was consulted on in 2017/18 and was due for completion in June 2019. Due to unforeseeable circumstances, the work for 2017/18 has been deferred to 2018/19, moving the completion date to June 2020. It is proposed to form a part of the CSP Annual Plan 2018/19.

Full details are provided in the CSP Annual Plan 2017/18.

#### **POP2017-07 The age and growth of New Zealand protected corals at high risk**

This multi-year project was consulted on in 2017/18 and was due for completion in June 2019. It is proposed to form a part of the CSP Annual Plan 2018/19.

Full details are provided in the CSP Annual Plan 2017/18.

### Proposed Projects

#### **POP-1 Campbell Island seabird research**

**Term:** 1 year.

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

**Project Objective:**

1. To estimate the population size of Campbell Island and grey-headed albatrosses.
2. To estimate the population size of Northern giant petrels at Campbell Island.

The Conservation Services Programme Seabird medium term research plan 2017 (CSP seabird plan 2017) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives. This proposal delivers priority research components of the CSP seabird plan 2017 involving field work at Campbell Island. The proposal has been developed to maximise cost and logistical efficiencies between components. If research on New Zealand sea lions is undertaken at Campbell Island in 2018/19 further cost and logistical efficiencies will be possible.

Supporting rationale for all the components is summarised in the CSP seabird plan 2017. It is envisaged that a variety of methods will be used, including photo-point counts (consistent with previous surveys of Campbell Island albatross) and ground-based counts, and possibly drone photo counts. Methods will be developed and tailored to each species and site.

**Indicative cost:** \$60,000 – \$100,000

### **POP-2 Antipodes Island seabirds research**

**Term:** 1 year.

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

**Project Objective:**

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

The Conservation Services Programme Seabird medium term research plan 2017 (CSP seabird plan 2017) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives. This proposal delivers priority research components of the CSP seabird plan 2017 involving field work at Antipodes Island. The proposal has been developed to maximise cost and logistical efficiencies between components. Research on Antipodean albatross is planned in 2018/19 outside of CSP, and will provide further cost and logistical efficiencies if progressed. Supporting rationale for all the components is summarised in the CSP seabird plan 2017. Methods will be developed and tailored to each species and site, and maximise comparability to previous estimates where they exist.

**Indicative cost:** \$60,000 – \$100,000

### **POP-3 Westland petrel population estimate**

**Term:** 1 year.

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

**Project Objective:** To estimate the population size of Westland petrel

The Conservation Services Programme Seabird medium term research plan 2017 (CSP seabird plan 2017) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives. This proposal delivers priority research components of the CSP seabird plan 2017 related to Westland petrel. Supporting rationale for all the components is summarised in the CSP seabird plan 2017. Methods will be developed to maximise comparability to previous estimates, and cost synergies with other research or management activities will be investigated.

**Indicative cost:** \$20,000 – \$40,000

#### **POP-4 Spotted shag population review**

**Term:** 2 year.

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

**Project Objective:**

1. To review the taxonomic status of spotted shags
2. To review population data on spotted shags and make recommendations for any future field work required to improve the certainty of current population estimates

The Conservation Services Programme Seabird medium term research plan 2017 (CSP seabird plan 2017) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives. This proposal delivers priority research components of the CSP seabird plan 2017 involving spotted shags. Supporting rationale for all the components is summarised in the CSP seabird plan 2017. It is intended that the taxonomic review will be progressed as a collaborative project with a University or other research institute, and may involve genetic analyses. Objective 2 will be a desk based exercise, drawing on all available data, and may inform a future field-based project.

**Indicative cost:** 20,000 per annum

#### **POP-5 Southern Buller's albatross: Snares/Tini Heke population project**

**Term:** 3 year.

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

**Project Objective:** To estimate key demographic parameters of Southern Buller's albatross at the Snares.

An established study site for Southern Buller's albatross, with substantial historic mark-resight effort, exists at the Snares (Sagar 2014), one of the most accessible subantarctic island groups. This project will continue standard mark-recapture monitoring to further improve estimates of key demographic parameters, particularly adult survival which was noted as declining in the most recent data assessment by Sagar et al (2017).

**Indicative cost:** \$60,000 per annum.

#### **POP-6 New Zealand Sea Lion: Auckland Islands Pup count**

**Term:** 4 year.

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

**Project Objectives:**

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

At a minimum annual pup counts are required for current fisheries management purposes in order to monitor against a trigger level related to potential population declines. These pup counts can be conducted over a shorter field season than a full resighting programme and therefore reduce the

quantum of cost. However, simple pup counts will not collect the range of data required to inform changes in demographic parameters which may be driving population trends.

**Indicative cost:** \$100,000 per annum

### **POP-7 New Zealand fur seal: Cook Strait habitat use assessment**

**Term:** 2 year.

**Guiding Objectives:** CSP Objective E.

**Project Objectives:**

1. To characterise and map fur seal breeding and haul out sites in the bottom of the North Island and top of the South Island.
2. To characterise fur seal habitat usage in the Cook Strait region.
3. To determine which fur seal colonies overlap with the Cook Strait hoki fishery.

New Zealand fur seals are bycaught throughout New Zealand fisheries. Fisheries such as West coast and Cook Strait hoki, and southern blue whiting are known to have high observed bycatch rates. While, over time, bycatch rates appear to have decreased in the West Coast hoki fishery; in the Cook Strait there has been more limited observer coverage and relatively high observed bycatch rates of fur seals for some years. There remains a high degree of uncertainty about the impact of this fishery on the New Zealand fur seal population, including which colonies are most at risk. The colonies most likely to be impacted are at the top of the South Island, and bottom of the North Island; little is known about the health of fur seal colonies in these regions. It is proposed to reduce uncertainty around the affected population in a staged manner.

This project will aim to characterise the New Zealand fur seal interactions observed in the hoki fishery in the Cook Strait region and identify key fur seal colonies. This will be done by analysing all bycatch records of fur seals from the area, and pull out records of tagged animals. The tagged animals will be matched to the New Zealand fur seal database to identify key colonies. Included in this project will be the updating of the New Zealand fur seal tagging database, which will include an update of the database interface and the upload of tagging data from recent years.

**Indicative cost:** \$35,000

### **POP-8 Cold-water coral connectivity in New Zealand**

**Term:** 1 year.

**Guiding Objectives:** CSP Objective E.

**Project Objectives:**

1. Review existing data on coral connectivity relevant to New Zealand corals.
2. Undertake a genetic study of a key deep-sea coral species highlighted by the pilot ecological risk assessment (ERA) as high risk to support the identification of vulnerable areas.

The recolonisation potential of protected cold-water coral species is largely unknown and remains a key information gap to inform an ERA for protected corals in New Zealand. This study would review connectivity information on cold water corals in New Zealand, based on existing genetics work and knowledge from overseas on reproductive potential, that would help identify key at risk species of which a mode of recolonisation is not yet known. Following this information review, a genetic study

investigating previously identified at risk coral species would be undertaken. It is suggested that the initial study will focus on black corals, where little information is available on connectivity in New Zealand. Outputs of this work will directly inform acute assessment of the risk of commercial fishing on protected coral species and subsequently and appropriate management measures.

**Indicative cost:** \$50,000

### **POP-9 Improving distribution maps of protected cold-water corals in New Zealand**

**Term:** 2 year.

**Guiding Objectives:** CSP Objectives B & C

**Project Objective:**

1. To improve distribution maps of protected cold-water corals in New Zealand

A number of protected coral taxa are known to be bycaught in commercial fisheries in New Zealand. In order to increase our understanding of the risk this poses to protected coral populations, and ensure commercial fishing impacts on protected corals are minimised, it is important to quantify the spatial extent of these impacts. This project will be focused on updating current distribution maps for protected coral species and identify areas where corals are at highest risk of interactions with fishing gear.

**Indicative cost:** \$30,000

### **POP-10 Leopard seal: New Zealand distribution and occurrence assessment**

This proposal was submitted by Dr. Krista Hupman, NIWA.

**Term:** 2 year.

**Guiding Objectives:** CSP Objective E

**Project Objectives:**

1. To characterize and map leopard seal distribution and occurrence in New Zealand waters
2. To determine which areas of leopard seal occurrence overlaps with New Zealand fisheries

Risk assessments are increasingly being used to identify and evaluate potential impacts of fishing-related mortalities, while also accounting for uncertainty. In New Zealand (NZ) waters, a spatial risk assessment framework has been developed to assess the impact of fisheries bycatch on marine mammal populations. This framework estimates the risk of annual potential fatalities (APF) on the sustainability of different populations (referred to as population sustainability threshold; PST). The risk assessment also outlines species which are data deficient, and highlights important gaps in knowledge that require additional research to be conducted.

The only NZ pinniped not included in this assessment is the leopard seal (*Hydrurga leptonyx*). Between the fishing years 1995-96 and 2004-15, there were three observed captures in NZ's exclusive economic zone (southern blue whiting trawl n=1; unknown trawls n=2). As such, exclusion of leopard seals from risk assessments leaves a high degree of uncertainty about the impact of NZ fisheries on their populations within NZ waters, including which areas of their occurrence are most at risk. To illustrate; the population size of leopard seals is currently unknown but is anecdotally considered to be extremely small (fewer than 100 at any given time), and three observed captures have occurred. This suggests that the risks to leopard seals may be at a much higher level than currently indicated.

Additionally, no formal framework is provided to consider the effects of the “data deficient” status of this species. Leopard seals may have been overlooked due to the lack of published studies on the occurrence, distribution or breeding population size in NZ. As such the species is classified as a rare vagrant to New Zealand waters.

However, the recent establishment of the New Zealand Leopard Seal Database (NZLSD) by LeopardSeals.org has shown that leopard seals are a regular member of New Zealand’s marine fauna. They occur year-round, show long-term residency (up to five years), and have been documented giving birth within NZ waters (Hupman et al. in prep.; Hupman and Visser in prep.). LeopardSeals.org has collated over 1,750 sightings, there has been no assessment of their distribution or occurrence within NZ. Consequently, there has been no examination of where fisheries have significant overlap with leopard seal populations. Furthermore, while a photo-identification catalogue of individuals within NZ has been established, it has not been examined to determine the minimum number of breeding age females which occur in NZ waters. This is despite evidence of their potential vulnerability to fisheries bycatch (as is evidenced by the number of bycaught pinnipeds in NZ) and other non-fisheries related threats. To assess the risk of commercial fisheries to leopard seals in NZ, this project will use the NZLSD to better understand the distribution and occurrence of leopard seals in NZ waters.

This project proposes to reduce uncertainty around the potentially affected population in a staged manner. Year one will involve a characterization and mapping exercise, using data from the NZLSD to examine the distribution and occurrence of leopard seals in NZ waters in relation to fisheries. Based on this characterization, in the second year, key areas will be selected for a satellite tagging study to determine the foraging range of leopard seals and combined with fine scale fisheries data to describe the extent of spatial and temporal overlap between leopard seals and New Zealand fisheries.

**Indicative cost:** \$50,000-100,000 per annum

### **POP-11 Flesh-footed shearwater: Population Monitoring**

**Term:** 3 year.

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

**Project Objective:**

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

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

from POP2015-02, which was implemented to address priority population estimate gaps and better estimate key demographic rates.

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

Previous research under project POP2015-02 did not include the breeding site at Motumahanga Island in Taranaki. Recent captures in the bottom longline fishery in this area has highlighted concern for this population, where the only population estimates date from the late 1980s and 1990s.

Tracking of flesh-footed shearwaters in 2017-18 has shown that these birds can exhibit broad variability in foraging behaviour with birds tracked in 2018 travelling much further offshore than those tracked in 2017. A project to track birds from both a Hauraki Gulf colony (Lady Alice Island) and Bay of Plenty colony (Ohinau Island) in the same breeding season will determine whether birds from these populations mix at sea during incubation and early chick rearing periods. Also, this will help improve our understanding of fisheries risk by assessing the relative rates of inshore (<50km offshore) versus pelagic (>50km offshore) foraging trips.

**Indicative cost:** \$100,000 per annum

### **POP-12 Hoiho population and tracking project**

**Term:** 2 year.

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

**Project Objectives:**

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

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

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

**Indicative cost:** \$60,000 per annum

### **POP-13 The relative abundance and distribution of data-deficient Odontocete species in the Cook Strait region from passive acoustic data**

This proposal was submitted by Dr Giacomo Giorli, NIWA. The proposal was submitted as four separate projects: 1) Hector dolphin, 2) Beaked whales, 3) “blackfishes” (i.e. long-finned pilot whales, short-finned pilot whales, killer whales, and false killer whales) and 4) sperm whales. For the scope of CSP, the projects have been combined into one proposal, and the estimated price combined. However, the scope and objectives of the project can be discussed during the CSP RAG. In addition, the sperm whale project, was not included as the species is not known to be impacted by fisheries.

**Term:** 1 year.

**Guiding Objectives:** CSP Objective E; Hector’s and Māui dolphin Threat Management Plan.

**Project Objectives:**

1. To estimate the seasonal/spatial occurrence and relative abundance of selected odontocetes, including species that were identified as data deficient by MPI’s multi-species spatial marine mammal risk assessment.
2. To investigate the foraging behaviour and foraging strategies of odontocete species. This will provide information on the feeding habitats.

Knowing the feeding behaviour will help in developing strategies to minimize by-catch of species that approach the fishing vessel to exploit the fish trapped by nets. It can also help in regulating time of fishing activities according to the foraging behaviour of the marine mammals in an area.

Passive acoustic monitoring (PAM) of underwater ecosystems is an effective and relatively cheap means for the monitoring of the underwater soundscapes. Since odontocetes use echolocation signals to hunt prey, PAM detections can be used to describe the relative abundance of odontocete species, their seasonal distribution and aspects of their foraging behaviour (Au et al., 2014; Giorli, Neuheimer, Copeland, & Au, 2016; Küsel et al., 2011; Marques et al., 2013).

Between June 2016 and August 2017, NIWA collected one year of continuous passive acoustic data in the Cook Strait region at each of seven locations (Figure 1). One recording station (situated in Queen Charlotte sound, stn1 in Figure 1) was operative between July and December 2016. These locations were chosen to study the occurrence of marine mammals and anthropogenic noise around the Cook Strait region. Cook strait is a key area for fishing and aquaculture. In additional, a growing interest in mineral extraction in this region has raised questions about the effect of noise generated by human activities on cetaceans living in this region.

It is proposed to use this unique dataset to study the distribution, relative abundance and foraging behaviour of odontocete species that are either at risk of mortality due to bycatch in fishing operations, or data deficient in term of distributions and relative abundance, precluding the robust risk assessment of human threats, which typically vary in space and time.

**Indicative cost:** \$155,000



## Mitigation Projects

### Ongoing projects

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

This multi-year project was consulted on in 2016/17 and was due for completion in June 2018. Due to unforeseeable circumstances, the work for 2017/18 was deferred to 2018/19, moving the completion date to June 2019. It is proposed to form part of the CSP Annual Plan 2017/18.

Full details are provided in the CSP Annual Plan 2016/17

#### **MIT2017-01 Protected species liaison project (SLL and BLL)**

This multi-year project was consulted on in 2017/18 and is due for completion in June 2020 It is proposed to form part of the CSP Annual Plan 2018/19

Full details are provided in the CSP Annual Plan 2017/18

#### **MIT2017-02 Characterisation and development of offal management for small vessels**

This multi-year project was consulted on in 2017/18 and is due for completion in June 2019 It is proposed to form part of the CSP Annual Plan 2018/19

Full details are provided in the CSP Annual Plan 2017/18

The second year of this project builds on the outputs of the first, and will focus on the trialling of recommended offal management options.

#### **MIT2017-03 Characterisation and mitigation of protected species interactions in the inshore trawl fisheries**

This multi-year project was consulted on in 2017/18 and is due for completion in June 2019 It is proposed to form part of the CSP Annual Plan 2018/19

Full details are provided in the CSP Annual Plan 2017/18

The second year of this project builds on the outputs of the first year and will focus on the trialling of recommended mitigation methods for protected species captures in the inshore trawl fisheries.

### Proposed projects

#### **MIT-1 Haul mitigation for small longline vessels**

**Term:** 1 year.

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

**Project Objectives:**

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

Research is currently underway as part of CSP project MIT2015-02 to describe the nature and extent of haul captures in small vessel longline fisheries and develop a device to mitigate such bycatch. This project will address priority recommendations from these projects, as presented to the CSP TWG on 28 February 2018.

**Indicative cost:** \$50,000-\$100,000

**MIT-2 Options for Temporal and Spatial management of key fisheries to reduce risk of interactions with protected species**

**Term:** 1 Year

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

**Project Objectives**

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

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

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

**Indicative cost:** \$80,000

**MIT-3 Protected species bycatch media**

**Term:** 2 year.

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

**Project Objectives:**

1. To produce a newsletter to communicate protected species-related information to commercial fishermen;
2. To produce media suitable for incorporation into third party publications in order to maximize audience exposure.
3. To provide identification tools targeted at commercial fishermen to improve their understanding of protected species interacting with their fishing operations.
4. To develop and produce pictorial guides for fishers on handling protected species after capture in fishing operations
5. To produce short videos on key mitigation measures to demonstrate the techniques required to deploy the gear.

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 results of research projects, however, appropriate communication of this generally involved interpretation of research outputs to cater to specific audiences. Project MIT2016-01 produced education resources targeted at commercial fishers across a variety of media using data from existing

sources. This project will build on MIT2016-01, as incorporating additional recommendations on producing pictorial guides on protected species handling and short videos demonstrating deployment of key mitigation gear.

**Indicative cost:** \$40,000 per annum

#### **MIT-4 Development of modified fishing gear to reduce the effects of inshore trawling**

**Term:** 2 year.

**Guiding Objectives:** CSP Objective A and E

**Project Objectives:**

1. To trial the use of modified gear for flatfish trawling

Trawl fisheries are receiving increasing attention for the potential to affect seafloor habitats. These modifications have been suggested to negatively affect benthic foragers that depend on an intact benthic ecosystem, such as the yellow-eyed penguin. The most common mitigation method for these effects have been closures of sensitive areas to trawling. However, in recent years studies that test modified fishing gear to reduce the effects of trawling on seafloor communities have been emerging. Rose et al. (2010) trialled modifications for the trawl systems used in Alaska's flatfish fisheries, with the aim of maintaining catch rates but reducing seafloor contact of the gear, with promising results. The aim of this project is to conduct a similar trial, to Rose et al. (2010) in order to reduce the benthic impacts of inshore trawling in yellow-eyed penguin foraging habitats.

**Indicative cost:** \$100,000 per annum

#### **MIT-5 Review of mitigation techniques to reduce benthic impacts of trawling**

**Term:** 1 year.

**Guiding Objectives:** CSP Objective A and E

**Project Objectives:**

1. To develop practical modification for the trawl system used in the inshore trawl fleet

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

This project aim is to review literature on mitigation techniques used to reduce benthic impacts of trawling in various bottom trawl fisheries and make recommendations that are relevant to the New Zealand trawl fisheries.

**Indicative cost:** \$30,000