

# CSP Initial research proposals 2020/21

## CSP RAG 6 March 2020

### **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 6 March 2020. The prioritised proposals will be used to develop the CSP Annual Plan 2020/21.

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

- [CSP Strategic Statement 2018](#)
- [CSP Seabird medium term research plan 2019](#)
- [CSP Protected fish medium term research plan 2019](#)
- [CSP Marine mammal medium term research plan 2018](#)
- [CSP Annual Plan 2019/20](#)

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# Interaction Projects

## Ongoing projects

### **INT2019-02 Identification of seabirds captured in New Zealand Fisheries**

This multi-year project was consulted on in 2019/20 and is due for completion in June 2022. It is proposed to form part of the CSP Annual Plan 2020/21.

Full details are provided in the CSP Annual Plan 2019/20.

### **INT2019-04 Identification and storage of cold-water coral bycatch specimens**

This multi-year project was consulted on in 2019/20 and is due for completion in June 2022. It is proposed to form part of the CSP Annual Plan 2020/21.

Full details are provided in the CSP Annual Plan 2019/20.

## Proposed projects

### **INT-1 Observing commercial fisheries**

**Term:** 1 year

**Guiding Objectives:** CSP Objectives A, B and 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 Fisheries New Zealand I 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 Fisheries New Zealand Observer Services, per a joint planning process.

Planning of observer coverage is undertaken jointly by Fisheries New Zealand and DOC as part of a separate process and will be consulted on as part of the consultation on the CSP Annual Plan 2020/21.

**Indicative cost:** \$TBD in consultation with FNZ

### **INT-2 Identification of marine mammals, turtles and protected fish captured in New Zealand fisheries**

**Term:** 3 years

**Guiding Objective:** CSP Objectives B and C; National Plan of Action- Sharks; New Zealand sea lion and Hector’s and Māui dolphin Threat Management Plans

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

The accurate determination of the taxon of marine mammals, turtles and protected fish captured in New Zealand fisheries is vital for examining the potential threat to population viability posed by incidental fisheries

captures. Observers on commercial vessels are not always able to identify marine mammals, turtles, and protected fish at sea with high precision, and the assessment of the age-class may require expert knowledge. Information gained through this project will link to Fisheries New Zealand databases and will inform ongoing bycatch estimation, risk assessment, research, and modelling of the effects of fisheries bycatch on marine mammals, turtles, and protected fish populations. This is a new project and is designed to complement the existing seabird identification project. Observers routinely collect samples of genetic material from these taxa, and these can be used to resolve uncertain identification determinations from photographs.

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

### **INT-3 Protected coral identification and awareness**

**Term:** 1 year

**Guiding Objectives:** CSP Objectives B and C, CSP Coral Medium-Term Research Plan

**Project Objectives:** Update the coral identification guide for observers and fishers to accurately identify bycaught protected coral species while at sea

The current CSP coral identification guide was last updated in 2014 and requires improvements for quick and accurate identification of bycaught protected coral species. Accurately identifying corals 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 identification guide will contain more information and imagery of species that are difficult to differentiate/ are commonly misidentified. The guide will also include information to increase the awareness of deepwater corals in New Zealand such as the estimated age of previously returned bycaught specimens, habitat importance etc.

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

### **INT-4 Hoiho dietary study**

*This proposal was submitted by Yolanda van Heezik, University of Otago.*

**Term:** 2 years

**Guiding Objectives:** CSP Objectives B and C, CSP Seabird Medium Term Research Plan; National Plan of Action- Seabirds.

**Project Objectives:** To determine the diet of hoiho (*Megadyptes antipodes*) in both southern (subantarctic) and northern (mainland) populations using DNA metabarcoding of faeces.

Hoiho are declining rapidly in their northern range (including Banks Peninsula, Otago, Southland, Rakiura, Whenua Hou and Tītī Islands), and in their southern range (Auckland Islands, Campbell Island) there is scant information about their numbers, diet or foraging ecology. The decline in hoiho numbers in their northern range appears to be associated with a change in the availability and suitability of key prey items, and starvation-related mortality events have increased in frequency. DNA metabarcoding of hoiho faeces allows for highly accurate species- or genus-level identification of prey, and with minimal disturbance to focal birds. In combination with foraging ecology studies, DNA metabarcoding can highlight spatiotemporal dietary patterns, thus indicating how hoiho might interact with commercial fishing both directly and indirectly.

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

## **INT-5 Investigation of New Zealand fur seal (NZFS) bycatch in the Cook Strait Hoki fishery and mitigation options**

*This proposal was submitted by Simon Childerhouse, Cawthron Institute*

**Term:** 3 years

**Guiding Objectives:** CSP Objective C; CSP Marine Mammal Medium Term Research Plan

**Project Objective:** To investigate and characterise NZFS bycatch in the Cook Strait Hoki fishery with the view to identifying potential options for mitigation.

According to the Protected Species Bycatch Database, in the Cook Strait Trawl fishery over the 16 year period 2002/03-2017/18, the data includes: (i) a mean capture rate of 11.2 (max = 29.2, min = 0.8) seals per 100 tows; (ii) mean annual observed captures of 17.4 (total observed = 279, max = 32, min = 1) seals; (iii) observer coverage was very low at only 4.0% (max = 8.5%, min = 1.3%). This means that an approximate estimate of 6,941 seals were captured in this fishery alone over the 16 years and given that 83% of the reported captures are mortalities, then the number of deaths is in the order of 5,761 seals or approximately 360 seals per year. This is significant proportion (~30%) of all NZFS caught in all trawl fisheries NZ over that period. This level of bycatch could be unsustainable for local populations of fur seals if all the bycatch is coming from a single or small number of colonies. It is recommended that consideration is given to investigating potential impacts on local fur seal populations. Such a research programme should include (A) identification and monitoring of breeding and non-breeding fur seal sites around the Cook Strait area in the vicinity of the fishery, (B) investigation of whether it is possible to establish which locations bycaught seals may be coming from (e.g. genetics – which would require samples collected from bycaught individuals), (C) undertaking satellite tracking of foraging seals from local Cook Strait colonies as it is well documented that pinnipeds vary their foraging strategies depending on their location and available prey; (D) using the data from (C) to establish spatial overlap between seals and the fishery to explore mitigation options using the SEFRA approach; (E) development of estimates of the total bycatch of fur seals in this fishery; and (F) identify potential mitigation approaches to manage and reduce this mortality. While there is some evidence of a small decline in bycatch rates, the present rate could still be unsustainable and must be reduced. In addition, it would be highly desirable to increase observer coverage in this fishery to better understand and characterise the bycatch.

A1. Identification of all NZFS breeding and non-breeding colonies within the Cook Strait Region that may be susceptible to bycatch in the Hoki fishery (e.g. within the foraging range of NZFS)

A2. Development of baseline colony counts for all these colonies and comparison with historical data for colonies where it is available

B1. Genetic analysis of pup samples from each colony to investigate any inter-colony differences

B2. If B1 identifies differences, then genetic analysis of samples from bycatch specimens to try and identify colony of origin

C1. Satellite tracking of NZFS from a range of potential colonies from which bycatch may be occurring to identify potential source population for bycaught individuals. Ideally multi-season and different age and sex classes (consistent with makeup of bycaught individuals)

D1. Use SEFRA or similar approaches to identify spatial overlap and relative risk of capture over time and space

E1. Use existing data to estimate total annual bycatch rates for the fishery

F1. Use these data to explore options for practical mitigation

**Indicative cost:** \$350,000 per annum

## **INT-6 Assess seabird post-release survival from bycatch in commercial fisheries**

**Term:** 1 year

**Guiding Objectives:** CSP Objectives B and C

**Project Objective:** Identify post-release survival rates in seabirds

Currently, the fate of seabirds after bycatch interaction are unknown beyond live state at release. Live-release seabird interactions may result in injuries or stress, limiting the likelihood of long-term survival. To identify true mortality rates associated with commercial fishing bycatch there is a need to reduce uncertainty around the fate of seabirds post-release across species and interaction types.

This baseline study will utilise recommendations from INT2019-06 (due for completion Jul20) identifying an appropriate methodology to assess cryptic mortality in seabirds based on operational, biological and environmental factors. Research will include the tracking and monitoring of live seabird bycatch tagged and released by appropriately trained personnel. Methodology for this project will consider effective sample size (>30), species (e.g. one model species or multiple), fisheries (e.g. inshore FMA1 long line), tag types/costs, logistics of observer trained vs other trained personal for tagging, animal ethics, and seabird health assessment prior to tagging. A key consideration in measuring post-release survival is ensuring a method which collects adequate data to get a statistically robust result.

This proposal will address the knowledge gap in seabird post-release survival by:

1. Tagging/tracking of bycatch seabirds in inshore fisheries to investigate post-release mortality rates

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

## **INT-7 Post-release survival of protected sharks and rays**

**Term:** 3 years

**Guiding Objectives:** CSP Objectives A, B and C, CSP Protected Fish Medium Term Research Plan, National Plan of Action- Sharks.

**Project Objectives:** To determine post-release survival rates of white sharks, basking sharks and spine-tailed devil rays released by commercial fishers and monitor the success of the purse seine code of practice for handling and release of protected rays.

This project seeks to develop robust estimates of post-release survival of protected sharks and rays taken in a variety of fisheries using pop-off archival satellite tags. Conventional pop-off archival tags rather than 'survival tags' would be used to investigate survival rates and post-release behaviour of protected sharks taken in snapper longline, set net and trawl fisheries, and spine-tailed devil rays released from skipjack tuna purse seine vessels. All fishery observers in these fisheries and interested commercial fishers would be trained in the deployment of the tags. All fish assessed as alive at the time of release would be tagged and their condition and expected change of survival rated against a standard scale. Tagging effort would be focussed on spine-tailed devil rays initially. Currently all protected fishes released by commercial fishers are treated as dead for assessment purposes.

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

# Population Projects

## Ongoing Projects

### **POP2018-03 New Zealand sea lion: Auckland Islands pup count**

This multi-year project was consulted on in 2018/19 and is due for completion in June 2022. It is proposed to form part of the CSP Annual Plan 2020/21.

Full details are provided in the CSP Annual Plan 2018/19.

### **POP2018-04 Flesh-footed shearwater: Population Monitoring**

This multi-year project was consulted on in 2018/19 and is due for completion in June 2022. It is proposed to form part of the CSP Annual Plan 2020/21.

Full details are provided in the CSP Annual Plan 2018/19.

### **POP2019-03 Antipodes Island seabird research**

This one-year project was consulted on in 2019/20 and due to delays will be undertaken in 2020/21.

### **POP2019-04 Southern Buller's albatross: Snares/Tini Heke population project**

This multi-year project was consulted on in 2019/20 and is due for completion in June 2022. It is proposed to form part of the CSP Annual Plan 2020/21.

Full details are provided in the CSP Annual Plan 2019/20.

### **BCBC Antipodean albatross population study: Antipodes Island**

DOC Crown funding is committed to undertake population monitoring research annually at Antipodes Island. This research platform is being used to expand research to include tracking studies to investigate fisheries overlap and provides the opportunity for further collaboration in the investigation of other ecological aspects (e.g. diet), as well as opportunities to progress Mātauranga Māori.

## Proposed Projects

### **POP-1 Protected coral reproduction study**

*This proposal was submitted by Di Tracey, NIWA in 2019/20.*

**Term:** 2 years

**Guiding Objective:** CSP Objective E, CSP Coral Medium-Term Research Plan

**Project Objective:** To determine the reproductive strategies of key protected corals in the New Zealand region.

In order to support a long-term plan to manage and conserve populations of protected corals in the New Zealand region, an understanding of reproductive strategies for a range of key coral taxa is required.

The ecological risk assessment for protected corals (Clark et al. 2014), considered various sources of information and data available for the age, growth, reproduction, colonisation, and dispersal of corals. This information was used to rank the “productivity” of a coral species or group, which reflects its ability to recover from trawling impacts. However, such information was scarce, and unlike their shallower counterparts, the reproductive strategies employed by deep-sea corals are generally poorly documented.

A lack of such information for corals of the region was also highlighted in the report from the recent CSP Protected Coral Workshop held in October 2017 and are also highlighted in the ‘State of Knowledge of Corals Report’ (Tracey & Hjørvarsdottir, in prep).

This proposal will address the knowledge gap of coral reproductive strategies for key coral taxa for the region by:

1. Summarising the literature on deep-sea coral reproduction studies published after the review by Consalvey et al. (2010) and the State of Knowledge Report (Tracey & Hjørvarsdottir in prep).



2. Selecting which of the key protected coral groups will be a focus of the study.
3. Designing an at-sea observer sampling protocol for obtaining and maintaining live polyps of key coral taxa for laboratory studies
4. Examining preserved coral specimens held in the NIWA Invertebrate Collection to assess what amount of reproductive information can be obtained from stored samples to supplement the at-sea collection programme.
5. Carrying out histological analyses of coral polyp samples to analyse mesenteries dissected from gonad tissue to ascertain mode, fecundity and periodicity of spawning. Eggs state may be the most appropriate information to be described.
6. Preparing a report on reproductive strategies for the corals examined.

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

### **POP-2 Identify basking shark feeding strategies**

**Term:** 2 years

**Guiding Objectives:** CSP Objectives B and E, CSP Protected Fish Medium Term Research Plan

**Project Objective:** Characterise environmental and oceanographic factors that influence basking shark feeding regimes

Warming seas drive changes in migration patterns, linked closely to changes in food chain productivity. Basking sharks are a deep-sea species that feed on plankton throughout the entirety of the water column, including the sea-surface. Little is known about the relationship between changing oceanographic and environmental conditions which result in increased productivity of primary producers targeted by basking sharks (e.g. phytoplankton blooms), and areas in which trawl fisheries operate. In recent years, there has been an increase in the number of bycatch events between basking sharks and mid to deep-water trawl fisheries (predominantly squid). To mitigate against the incidental capture of basking sharks, we need to understand the oceanographic and environmental factors that influence basking shark predator-prey relationships – what are they feeding on and where? In particular, feeding regimes in relation to various depths in the water column that may increase the likelihood of interactions with trawl fisheries. This knowledge is essential to predicting how changing environmental and oceanographic conditions contribute to bycatch and will guide management decisions which contribute to the resilience of basking sharks.

What little is known of basking shark feeding behaviour and diet in New Zealand waters was found from investigation of stomach contents by Francis & Duffy (2002), and these only pertain to sharks in inshore waters (in one case a large coastal lagoon). To address the shortfall in knowledge on prey species, where possible, the project would also involve sampling of gut contents from mortalities caught in commercial fisheries.

This proposal will address the knowledge gap in basking shark feeding strategies by:

1. Investigating the temporal and spatial distribution from bycatch/sighting data and modelling the relationship with changes in oceanographic/habitat/environmental variables.
2. Identifying depths at which basking sharks are being caught in commercial trawl nets (e.g. acoustic investigation in squid fishery)
3. Investigating stomach contents of deceased bycatch

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

### **POP-3 Ecology of provisioning for seabirds in north-eastern New Zealand**

*This proposal was submitted by Chris Gaskin, NNZST*

**Term:** 2 years

**Guiding Objectives:** CSP Objective D; CSP Seabird Medium Term Research Plan

**Project Objective:** Collect zooplankton, fish and seabird regurgitation samples, together with other environmental variables in places where seabirds are found feeding. That is, not only in association with surface fish shoals, also in areas where no fish shoals are evident at the surface, to gain a better understanding of annual, seasonal, and spatial variation of the broader ecosystem.

North-eastern North Island waters, from the Three Kings Islands to East Cape, are notable for large numbers of seabirds gathering and feeding in association with concentrations of zooplankton and fish, variously known as a 'fish shoals', 'work ups', 'boil ups', 'bust ups', or 'bait balls'. Surface shoaling fish make prey species easily available as a food source. This project extends POP2017-06 and POP2019-02 where the focus has been on these fish shoal and schooling events and the dynamics which drives them. However, these previous studies have also highlighted the need to broaden the study as a complex pattern of foraging and diet preferences for several seabird species is emerging. This project will combine further investigation of fish school associations with investigating seabirds feeding away from fish shoals to determine what resources are available to seabirds (e.g. krill swarms, larval fish), also feeding on discards from feeding cetaceans (e.g. bottle-nose and common dolphins, and pilot and false killer whales) to better understand the occurrence of these associations and seabirds' dependence on them.

The project will utilise a range of methods, continuing the zooplankton and fish collecting; adding catching birds at sea using net gun technology to obtain regurgitations (technology originally developed for tracking NZ storm petrels); record species interactions through the highly successful underwater and topside photography; and to augment that with drone videography to identify the dynamics that trigger all aspects of seabird feeding in East Northland and Hauraki Gulf waters. Seabird regurgitation samples would be banked for future DNA analyses of for secondary prey to complement any visual assessment of contents. Blood samples would be collected for stable isotope analysis. These data will be examined in relation to inter-annual, seasonal and spatial parameters. A series of monthly, two-day surveys will be conducted October to March, taking in the inner Hauraki Gulf, outer Hauraki Gulf and extending to East Northland waters up to the Poor Knights Islands if required.

**Indicative cost:** \$70,000 per annum

### **POP-4 Investigating foraging plasticity for north-eastern New Zealand seabirds**

*This proposal was submitted by Chris Gaskin, NNZST*

**Term:** 2 years

**Guiding Objectives:** CSP Objective D; CSP Seabird Medium Term Research Plan

**Project Objective:** Determine the foraging overlap of four key seabirds that feed in association with commercially targeted fish species.

This project builds on earlier contracts investigating seabird species dependence on feeding in association with fish schools, species targeted by the purse seine fishery. Anecdotal evidence suggests a major decline in the abundance and occurrence of these fish schools. We currently do not know what impact this is having on seabirds. We suspect that some but not all seabird species that associate strongly with schooling fish may have the ability to switch prey. We want to be able track birds to see whether the focal area of fishery overlaps with seabird foraging hotspots, to analyse the diet of the seabirds and to assess their breeding success.

Australasian gannets from two study colonies in the Hauraki Gulf appear to exhibit spatial separation in terms of foraging distributions, based on some preliminary tracking reinforced by diet studies. Recent aerial surveys show there has been a marked increase of the population of the outer Gulf colony (Mahuki) with what appears

to be a corresponding loss to inner Gulf populations (Horuhoru Rock and Motukawao Islands). Potentially, this reflects a changing distribution of certain foraging resources between the inner and outer Gulf, species important for gannets and, also targeted by fisheries. Tracking, diet studies through regurgitations, and monitoring of breeding success are proposed to further investigate any changes.

Buller's shearwaters breed only on the Poor Knights Islands and is a species that does not appear to compete directly with fisheries. While commonly seen within Hauraki Gulf and Northland waters, including feeding in close association with tightly packed trevally and kahawai, and the more mobile mackerel and tuna schools, they also make long provisioning trips beyond local waters. This foraging distribution, together with results of recent stable isotope studies showing feeding across three different trophic levels with krill, fish and squid identified in regurgitations, suggests a degree of plasticity during each stage of breeding.

Both fairy prions and fluttering shearwaters commonly forage around significant bathymetric and hydrodynamic features within continental shelf waters and in association with shoaling fish, with regurgitations showing close correlation to the prey the fish are also feeding on (i.e. krill). However, fairy prions are confined to breeding only on the Poor Knights Islands, whereas by contrast, fluttering shearwaters breed across multiple sites, with the Hen & Chickens Islands the East Northland/Hauraki Gulf stronghold.

There is a need to better understand the foraging distribution and behaviours and diet of all four species during breeding and assess how any variability affects breeding success. Foraging plasticity may also buffer any potential impacts of climate change on changing prey distributions. However, without 'baseline' data this cannot be tested. To test the hypotheses suggested above, a comprehensive tracking, sampling and monitoring programme is required. Seabird foraging distributions will be overlaid with prey distributions targeted by many commercial fisheries, with data drawn from catch and vessel reporting.

**Indicative cost:** \$70,000 per annum

### **POP-5 Utilisation of the marine habitat of Yellow-eyed penguins from Stewart Island/Rakiura**

*This proposal was submitted by Thomas Mattern, Eudyptes Consulting*

**Term:** 1 year

**Guiding Objectives:** CSP Objectives D and E; CSP Seabird Medium Term Research Plan

**Project Objective:** Determining overlap of foraging ranges with and assessing effects of inshore fisheries and aquaculture on an endangered species in a region that may serve as mainland stronghold.

This project is an extension/continuation of the CSP project "Hoiho Population and tracking: POP2018-02" which mapped the habitat utilisation of Yellow-eyed penguin/hoiho around the NZ mainland (North Otago to Southland).

Yellow-eyed penguin at-sea movements will be recorded using GPS dive loggers at key locations on Stewart Island/Rakiura during the breeding season (October-February) and – if feasible – during the pre-moult period (February-March). Moreover, camera loggers will be deployed to get a snapshot of the prey types the penguins target. Sites to be covered will range from the Anglem coast (Rollers & Golden Beach) via the Patterson Inlet (Bravo Group) to Port Pegasus in the South.

Recorded GPS and dive data will be spatially analysed to map foraging hot spots and to determine core marine pathways used by the penguins to access their breeding colonies. This is particularly relevant on the open coast where this information can be used to inform set netting operations and minimize the risk of incidental bycatch.

The project will generate detailed distribution maps of penguins at sea, that help to identify sensitive regions where set netting activities may have the greatest impact on the species. It will furthermore establish baseline information about the ecology of Yellow-eyed penguins/hoiho on Stewart Island/Rakiura that is vital for the development of conservation strategies and actions in a region that may prove vital for the species in the not so distant future.

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

### **POP-6 Movements and habitat use by spine-tailed devil ray (*Mobula japonica*)**

**Term:** 3 years

**Guiding Objectives:** CSP Objective E, CSP Protected Fish Medium Term Research Plan, National Plan of Action- Sharks.

**Project Objectives:** To obtain robust information on the movements and habitat use by spine-tailed devil rays, and model fisheries overlap.

Diver encounters with spine-tailed devil rays while tagging oceanic manta rays off northeast North Island indicate that it is possible to tag free-swimming individuals of this species with pop-off archival satellite tags (Wildlife Computers mini-PAT). This method has been successfully used to tag and track manta rays and would provide the first fishery independent data on habitat use for New Zealand waters. All previous tagging of devil rays in New Zealand has been on rays released from skipjack tuna purse seines, and most data on their distribution is from reported catch in this fishery. This project would provide the scientific/experimental control required by studies of post-release survival and movement by this species. Analysis of the behaviour (e.g. dive timing, frequency, depth and duration; displacement direction and distance) of rays tagged while free-swimming can be compared to that of rays tagged and released from fishing vessels and objective measures of recovery developed.

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

### **POP-7 Seabird population research: Chatham Islands**

**Term:** 1 year

**Guiding Objectives:** CSP Objective E; CSP Seabird Medium Term Research Plan, National Plan of Action- Seabirds

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

Both the Chatham Island shag and Pitt Island shags are currently listed as Nationally Critical under the New Zealand Threat Classification System. The last threat assessment was made in June 2016. The 3-year CSP funded research on these species concluded in 2016 and the results were reported in 2017, too late to influence the threat classification assessment. The results from three years of surveys (2014-16) indicated a stable population trend and the numbers observed in 2016 were in fact similar to those recorded in 1997. The recent count series was substantially higher than the census results from 2003 and 2011. A key factor was the timing of the counts and use of aerial surveys repeated a month apart to look at variability in timing of nesting between different colonies. In hindsight it is felt that deficiencies in the 2003 and 2011 count methods contributed to the lower counts.

The conclusion from the 2017 report was that the two species are more likely to be stable in numbers than in serious decline. The next threat classification assessment is due in June 2021. Therefore, the timing is right to do a final survey of both shag species in the spring of 2020 to see if the census results support the conclusions from 2014-16. If the 2020 assessment comes up with a similar set of counts, it is highly likely that the threat status will change from Threatened -Nationally Critical to At Risk - Naturally Uncommon. This would demonstrate that the small number of birds drowned in pot fisheries annually is not enough to cause population level impacts.

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

## **POP-8 White-capped albatross research and monitoring – Disappointment Island (2020-23)**

**Term:** 3 years

**Guiding Objectives:** CSP Objective E; CSP Seabird Medium Term Research Plan, National Plan of Action- Seabirds

**Project Objectives:** Continue the collection of long-term demographic and at-sea tracking data to assess population trends and to understand the impacts of fisheries on white-capped albatross.

The largest population of white-capped albatross occurs on Disappointment Island in Auckland Island group. Population trend data for this site has been gathered through use of aerial photography in 2006 to 2017. Since 2015 ground-based monitoring of a marked study colony on Disappointment Island has started to obtain data to allow for improved survival estimates for this species. Tracking of adults has also been undertaken using GLS tags since 2018. The population study has primarily been an add on to the current work programme occurring with Gibson’s wandering albatross. This has hampered the project in terms of only minimal days are spent on white-capped albatross data collection. This new programme of work aims to improve the quantity and quality of data by the following steps:

1. Carry out surveys of the Disappointment Island study colony at the start of the incubation period (Nov/Dec) and compare nesting activity in the main study area using both ground and aerial surveys (drone flights). Repeat this survey in late Jan/Feb (hatching) to compare number of active nests with those observed in Nov/Dec. This will help interpret past aerial photography data sets where images were taken both in December and late January.
2. Put out trail cameras to monitor breeding activity and timing of nest failures. This data will help determine whether birds occupying nests are successful breeders, failed breeders or non-breeders to help with understanding status of birds observed in past aerial images.
3. Collect band recovery data from study colony birds and continue to mark a sample of breeding birds to build up robust datasets for adult survival analysis.
4. Deploy and collect GLS tags from a sample of birds to look at extent of movements of birds in relation to annual variability in foraging conditions.
5. Apply a sample of GPS tags to track finer scale interactions between white-capped albatrosses and fishing vessels.

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

## **POP-9 Gibson’s albatross – Auckland Islands seabird research**

*This proposal was submitted by Parker Conservation*

**Term:** 3 years

**Guiding Objectives:** CSP Objective E; CSP Seabird Medium Term Research Plan, National Plan of Action- Seabirds

**Project Objectives:**

- 1) To estimate adult survival and other key demographic parameters of Gibson’s albatross
- 2) To estimate the population size of Gibson’s albatross

This proposal delivers key components of the CSP seabird plan 2019 involving field work on Gibson’s albatross. Gibson’s albatross is a New Zealand endemic with NZ Threat status Threatened-Critical (Robertson 2017).

A long-term study site for Gibson’s albatross at the Auckland Islands enables trends in population size and demographic parameters to be assessed (Francis et al. 2012; Elliott et al. 2018). The primary focus of this research is to estimate key demographic parameters via continued mark-recapture monitoring. This will follow established methods (Walker & Elliott 1999) to estimate survival, productivity and recruitment, and estimate the

size and trend of the population. This suite of data allows more precise assessment of population trends than from simple nest counts. Drone-based aerial survey methods will be trialled for use to conduct wider population counts beyond the study plots.

**Indicative cost:** \$300,000

### **POP-10 Assessment of causes of low burrow occupancy rates in Westland petrels**

**Term:** 2 years

**Guiding Objectives:** CSP Objective E; CSP Seabird Medium Term Research Plan, National Plan of Action-Seabirds

**Project Objectives:** Examine burrow occupancy rates in Westland petrels and monitor nests to determine factors around why so many apparently suitable nests are bred in by this species.

Westland petrels only breed on the West Coast of the South Island at Punakaiki. The species is caught on commercial long lines and is rated as a medium-high risk species from commercial fisheries. There have been extensive long-term demographic studies of this species going back to 1970s by scientists from Te Papa and DOC. Recently this has included tracking of birds using both GPS and GLS tags. A study published by Waugh et al. (2003) found that just 21% of burrows were occupied by breeding birds. The authors considered two hypotheses for this very low occupancy rate (compared to other seabirds). Either the population was in decline or there was a high number of non-breeding birds maintaining apparently active burrows. Either way the apparent low occupancy rates can have a large effect on total population estimates based around burrow counts. For example, the uncertainty is demonstrated in the survey undertaken by Wood and Otley (2012) who found 12,843 active burrows in 28 different colonies. Their occupancy assessments were based on marked study burrows where the occupancy rate was 40% yet a random sample in the same colony carried out along a transect only had an occupancy rate of 23%. This resulted in a large variation in the total estimated breeding population (range 2954 to 5137 pairs). More recent studies by Waugh et al. have indicated that burrow occupancy rates are still an area of high uncertainty in this species. Understanding the factors around the accuracy of these occupancy estimates is therefore crucial for understanding the species status and trends.

The status of the birds maintaining burrow sites but not apparently breeding in them is still unclear. Are they early failed breeders, former breeders skipping a season, prospecting non-breeders or some other animal species keeping disused burrows looking active? A large pool of non-breeding birds, especially of one sex may have implications for the risk assessment modelling for this species in terms of total population size estimates. If each vacant burrow is used by a single bird versus single birds maintaining multiple networks of vacant burrows, will influence estimates on the overall size of the species population.

This study is designed to understand the dynamics around this situation by closely monitoring a sample of burrows and looking at frequency of visits by individuals to a cluster of marked nests within a well-defined area. Technology options include trail cameras, PIT tags, alphanumeric tags to ID birds in trail cameras and burrowscopes to assess breeding versus non-breeding sites. Birds captured will be individually marked and sexed using DNA techniques to determine if skewed sex ratios occur in the population. Trail camera footage or PIT tag recorders will be assessed to examine bird behaviour associated with the nest clusters (looking for evidence of multiple burrow occupancy). The study will determine if the low occupancy rate found in 2001 and in subsequent seasons has changed over time and varies between different sub-colonies.

The study would be best conducted over two years with field monitoring from March 2021 (pre-lay) to August 2021 (early chick rearing) and again in March-Aug 2022 with reports due in June 2022 and June 2023.

**Indicative cost:** 80,000 per annum

## **POP-11 Connectivity and demographics of Hector's dolphin in the top of the South Island**

*This proposal was submitted by Simon Childerhouse, Cawthron Institute*

**Term:** 3 years

**Guiding Objective:** CSP Objective E

**Project Objective:** Undertake a research programme focused on smaller, regional populations of Hector's dolphins around the top of the south. Specifically:

- Quantifying individual movement rates and genetic flow among dolphins in the TOTS to develop an improved understanding of the rates and mechanisms of connectivity (e.g. individual and genetic interchange) between the east and west coast South Island populations;
- Estimating demographic rates including survival, age and reproduction within these smaller regional populations;
- Monitoring population trends within these regional populations;
- Acoustic monitoring at key sites to assess distribution and frequency of use; and
- Investigation of diet and health (e.g. disease prevalence, pollutant loads).

The Draft TMP has identified a range of research priorities related to small, regional populations of Hector's dolphins. We define these regional populations as the groups of Hector's dolphins that live between the three main population groups around the South Island (i.e. West Coast, Banks Peninsula, Southland). These research priorities include (i) developing an improved understanding of the rates and mechanisms of connectivity (e.g. individual and genetic interchange) between the three distinct South Island populations, (ii) understanding demographics within these smaller regional populations which may have significantly different rates to other studied areas, and (iii) monitoring population trends within these regional populations. There has been little research in these regional areas (as the focus has been on the larger populations) but they are likely to play a key role in maintaining connectivity and gene flow between the large populations and, given their low numbers may be more vulnerable to impacts which could lead to local depletion and/or extinction. The Top of the South (TOTS) has been selected as the study area for its key role in maintain links between the two largest sub-populations on the east and west coast of the South Island and also in investigating possible links with the Māui dolphin population. We define the TOTS as the broad area between Kaikōura on the east coast and Karamea on the west coast. The programme would be developed in close collaboration with TOTS iwi groups.

**Indicative cost:** 250,000 per annum

## **POP-12 Age estimation of white sharks (*Carcharodon carcharias*) from New Zealand waters**

**Term:** 1 year

**Guiding Objectives:** CSP Objective E, CSP Protected Fish Medium Term Research Plan.

**Project Objectives:** To provide robust age estimates for use in population assessments of New Zealand white sharks.

Few published age estimates for New Zealand white are available. Robust age and growth, and age at maturity data are required for any population assessment and are used to estimate parameters such as maximum age, natural mortality, age at 50% maturity and population growth rate. The 2018 assessment of the status of the Eastern Australian - New Zealand white shark population conducted by CSIRO also used sex-specific parameters estimated from genetic identification of half-sibling pairs. The detection of kin pairs requires knowledge of the year of sampling and age or estimated age (from length) at sampling. While the samples used in this analysis were obtained across the species' Australian - New Zealand range none of the sharks in the New Zealand sample were directly aged and there are no age-at-length data available for juvenile white sharks from New Zealand. This project will consolidate and archive white shark vertebral samples collected by New Zealand researchers and fishery observers and provide the first age and growth estimates for the species in New Zealand

waters. In addition, ages of sharks used in the 2018 population estimate will be identified and the data provided to CSIRO for use in future population assessments.

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

**POP-13 Investigation of alternative aging methodologies for protected sharks**

*Removed from consideration due to proposal requiring further development as project relies on emerging technique(s).*

**Term:** 2 years

**Guiding Objectives:** ~~CSP Objective E, National Plan of Action - Sharks.~~

**Project Objectives:** ~~To determine if alternative aging methods, such as epi-genetic aging, can be used to estimate the age of protected species such as basking sharks.~~

~~Review of biological information available for basking sharks has identified the absence of reliable age estimates for the species as a major gap in knowledge of the species. The exceptionally large size of sub adults and adults makes collection of vertebral samples from dead basking sharks aboard fishing vessel impractical in most cases, and this is compounded by uncertainty regarding the reliability of age estimates for this species from vertebrae. This project would use species such as blue, mako and porbeagle, for which good conventional age and growth studies are available as models to investigate the applicability of emerging techniques for aging sharks, and if possible attempt to apply them to basking sharks using samples collected by observers.~~

**Indicative Cost:** ~~\$100,000~~

**POP-14 Basking shark habitat use and distribution**

**Term:** 3 years

**Guiding Objectives:** CSP Objectives B and C; CSP Protected Fish Medium Term Research Plan

**Project Objective:** Determine basking shark habitat use and distribution patterns

Basking sharks are a protected species, under the Wildlife Act 1953. Little is known of changing distribution patterns and since the late 1990s populations of seasonally prominent large schools (on the sea-surface) have disappeared from New Zealand coastal waters. It is not known if this was related to commercial fishing activity or changes in basking shark distribution patterns, however, commercial fishing bycatch also decreased around that same time. It is possible that changes to fishing practices were a contributing factor, but this would not account for the disappearance of surface aggregations from coastal hotspots. In recent years bycatch has begun to increase in trawl fisheries in the Southern Ocean near the Stewart/Snares shelf and the continental shelf to the east of the Auckland Islands.

In February 2020 the New Zealand Defence Force has been requested to conduct annual aerial surveys to monitor areas in the Southern Ocean where bycatch has occurred in an effort to identify large surface aggregations. Basking sharks are a deep-sea species and solitary filter-feeders but are also known to aggregate in large numbers at the sea-surface and have been successfully surveyed from the air in the North Atlantic Ocean. In addition to known populations in areas of the Southern Ocean, support from the New Zealand fishing industry is also needed to report sightings in other inshore and offshore areas. This will help identify areas to focus research effort for tagging studies to determine distribution patterns. It is essential we identify basking shark temporal-spatial distribution patterns, habitat use, and population connectivity, to better understand changing population dynamics and resulting risks associated with commercial fishing and bycatch.

This proposal will address the knowledge gap in basking shark distribution patterns by:

1. Location, biopsy, and satellite tagging/tracking of free-ranging basking sharks and tagging/tracking of bycatch to investigate post-release mortality rates



2. Modelling the relationship between environmental data and bycatch/sighting data over the past 30 years to identify potential impacts resulting in changes to basking shark distribution.

**Indicative cost:** \$120,000 total

#### **POP-15 Light-mantled sooty albatross population monitoring – Adams Islands**

**Term:** 3 years

**Guiding Objectives:** BCBC objectives, National Plan of Action-Seabirds; ACAP data gap

**Project Objectives:** Develop a methodology to estimate the population size of light-mantled sooty albatross at Adams Island and allow future monitoring of population trend.

The Auckland Islands are thought to hold the largest global population of light-mantled sooty albatross, but almost nothing is known of the current population size or trend. Building on limited part-site counts of breeding pairs on Adams Island, this project will seek to establish a robust survey methodology to monitor the population. It is envisaged a mix of drone-based and ground-based methods would be used. Dependent on year 1 trials of drone-based methods, a population estimate may also be achievable. The ground-based element will focus on ground truthing drone-based survey and will allow the deployment of tracking devices on adult birds to assess their at-sea foraging range, to identify any fisheries overlap.

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

#### **POP-16 Salvin's albatross population monitoring methodology assessment –Bounty Islands (2020/21)**

**Term:** 1 year

**Guiding Objectives:** CSP Objective E, National Plan of Action- Seabirds

**Project Objectives:** Assess the suitability of drone-based aerial survey and trail cameras for monitoring Salvin's albatross and report baseline results from 2019/20.

CSP project POP2017-03, Salvin's albatross: Bounty Islands population study, completed field work in 2019/20. In addition to the project objectives described in the CSP Annual Plan 2019/20, opportunistic research was conducted to survey part of the Island group using a drone, and trail cameras were deployed for a one year period to collect data on breeding phenology and breeding success. This project will analyse the data collected to make recommendations on the suitability of these tools in future population monitoring, and report the baseline results found.

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

#### **POP-17 Grey petrel population estimate – Antipodes Island**

**Term:** 2 years

**Guiding Objectives:** CSP Objective E, National Plan of Action- Seabirds

**Project Objectives:** To provide an updated population estimate and assess the population trend in relation to previous surveys at the island.

Previous research was conducted under contract to MPI in 2011. Year 1 of this project will develop a detailed survey methodology based on assessment of research in 2011, to ensure maximum comparability for trend assessment, and achieving a precise population estimate. Initial ground research may also be included in Year 1 if synergies with other research projects can be used. The full census will be conducted in year 2, utilising cost-saving synergies with other research at the island to the greatest extent possible.

**Indicative Cost:** Year 1: \$20,000 Year 2: 80,000 (to be reviewed in Year 1)

# Mitigation Projects

## Ongoing projects

### **MIT2019-03 Lighting adjustments to mitigate against deck strikes/vessel impacts**

This multi-year project was consulted on in 2019/20 and is due for completion in June 2021. It is proposed to form part of the CSP Annual Plan 2020/21.

Full details are provided in the CSP Annual Plan 2019/20.

### **MIT-1 Protected Species Liaison Program**

Start Date: 1 July 2020

Completion Date: 30 June 2023

Guiding Objectives: CSP Objective A; CSP Seabird Medium Term Research Plan; National Plan of Action - Seabirds, National Plan of Action - Sharks.

#### Project Objectives

- Ensure all commercial fishers are using practices that best avoid the risk of seabird bycatch
- Meet the goals set out in the Seabirds - National Plan of Action
- Improve understanding of interactions in relation to mitigation use and identify knowledge gaps

#### Specific Objectives

Grow Liaison capacity across inshore fleets around the country including methods; trawl, set net, bottom longline and surface longline.

#### Project Description

In order to effectively reduce the risk of interactions with protected species, it is important for vessels to be using best practice mitigation and take all necessary steps both regulatory and non-regulatory measures to avoid interactions. To measure success of mitigation and identify areas where further development is needed across each fleet, there needs to be consistency in the mitigation measures used while still allowing for innovation. Through the Seabirds - NPOA a suite of best practice mitigation measures for each method have been developed, these Mitigation Measures will underpin the work that the Liaison Officer do and will be rolled out as part of the Liaison program through the Protected Species Risk Management Plans(PSRMP's)

The purpose of the PSRMP's will change within this next phase using best practice mitigation measures that the vessel should be working towards rather than outlining the vessels current practices. Auditing of these plans by MPI Fisheries Observers will then describe the steps that the vessel is taking to meet the mitigation measures outlined in the plan and highlight where there is still work to be done.

Within the next three years the capacity of the program is expected to grow substantially in size. The role of the liaison officers will largely remain the same, supporting and educating fishers in best practice mitigation and providing a vital interface between skippers, government, and researchers. The growth over the next three years will consist of additional Liaison officers to expand into more fisheries and areas, increased contact with high risk vessels and fleets, development and delivery of a training program for crew on protected species and mitigation and the hiring of a full time liaison coordinator to ensure the operational oversight of the program.

Measuring success of the program and constraints in reporting capability have been identified as improvements needed in the rollout of this next phase of the project. This will be addressed through database development and standardisation of processes. There will also be increased engagement with quota holders to support the uptake of the plans and mitigation measures.

#### Project Deliverables/outcomes

- Database including PSRMP's installed and updated, vessels visited, trigger responses, mitigation materials and training provided.
- Creation of a working group to work through challenges within the program and report progress
- Development of management responses to triggers
- Training plans for fishers
- Quarterly reports back to relevant advisory groups detailing progress and any developments which have come from the fleet.
- Annual written reporting will be provided as part of the Seabirds – Annual Research Report

Indicative cost: Year one: \$350,000; Year two: \$450,000; Year three: \$450,000

### **MIT-2 Multi-taxa bycatch reduction technology: set-net illumination**

**Term:** 2 years

**Guiding Objectives:** CSP Objective A; CSP Seabird Medium Term Research Plan; National Plan of Action – Seabirds.

**Project Objective:** To assess the ability of net illumination by LEDs to reduce the bycatch of protected species in set-net fisheries in New Zealand without negatively impacting on target catch rates.

Multi-taxa bycatch reduction technologies (BRTs) utilise sensory cues for non-target species to avoid interacting with fishing gear. Recent studies internationally have shown promising reductions in bycatch of seabirds, small cetaceans and turtles with the deployment of light emitting diodes (LEDs) upon the float line of surface drift nets and bottom set nets (Bielli et al. 2019; Mangel et al. 2018; Ortiz et al. 2016). Visual cues are one of a range of sensory cues these animals use to locate prey thus a mitigation measure such as this has the potential benefit of working across taxa. LEDs are a low- cost tool that have not been shown to have a negative impact on target catch rates which could allow for a high uptake of the mitigation measure on New Zealand vessels. Furthermore, time would be saved in dealing with non-target entanglements and damage to fishing gear. This project would involve assessing the reduction of bycatch rates and target catch rates with LED- fitted nets and control nets on sub-set of commercial fishing vessels.

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

**References:**

Bielli, A., Alfaro-Shigueto, J., Doherty, P.D., Godley, B.J., Ortiz, C., Pasara, A., Wang, J.H., Mangel, J.C. 2019. An illuminating idea to reduce bycatch in the Peruvian small-scale gillnet fishery, *Biological Conservation*, 108277.

Mangel, J.C., Wang, J., Alfaro-Shigueto, J., Pingo, S., Jimenez, A., Carvalho, F., Swimmer, Y., Godley, B.J., 2018. Illuminating gillnets to save seabirds and the potential for multi-taxa bycatch mitigation. *Royal Society of Open Science*, 5, 180-254.

Ortiz, N., Mangel, J.C., Wang, J., Alfaro-Shigueto, J., Pingo, S., Jimenez, A., Suarez, T., Swimmer, Y., Carvalho, F., Godley, B.J., 2016. Reducing green turtle bycatch in small-scale fisheries using illuminated gillnets: the cost of saving a sea turtle. *Marine Ecology Progress Series*, 545, 251-259.

### **MIT-3 Rope modifications to reduce whale entanglements in pot fisheries**

**Term:** 1 year

**Guiding Objectives:** CSP Objectives A and B; CSP Marine Mammal Medium Term Research Plan

**Project Objective:** Investigate rope modifications that could be implemented in New Zealand pot fisheries to reduce whale entanglements

Whales are occasionally entangled in crayfish pot lines in New Zealand waters and DOC has crew trained throughout the country to disentangle the animals safely. In tandem with this, it is also important to address the issue at the source by looking into options to reduce the chance of whales interacting with fishing gear, such as making it more visible, adjusting the rope strength etc. This project will review international studies to determine modifications that could be trialled in a New Zealand setting. It will also review entanglement data

(rope characteristics, location of entanglement on animal, estimated spatial position of entanglement etc.) to determine what potential rope modifications may enable the widest benefit based on the occurrences to date.

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

#### **MIT-4 Effectiveness of night setting as a mitigation measure**

**Term:** 1 Year

**Guiding Objectives:** CSP Objective A; CSP Seabird Medium Term Research Plan; National Plan of Action – Seabirds.

**Project Objectives –**

- Characterise bird abundance and diving behaviour during night setting

Seabirds usually detect food at close range by sight and while many species are known to forage during the daytime, some species such as black petrels are known to actively forage at night and are therefore at-risk during night setting. While night setting is recognised as an effective mitigation tool to reduce bycatch in longline fisheries, there are limitations to the effectiveness of this measure for example around full moon phases/bright nights and temporal proximity to nautical dawn and nautical dusk.

This project will involve an initial assessment of TDR data collected on black petrel and flesh footed shearwater foraging and diving behaviour looking at time and moon phase of dives, the analysis of this data will then inform the data collection protocols used for data collection using night vision goggles during night setting on surface and bottom longline vessels.

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

**References:**

Bell, E.A. 2016. Diving behaviour of black petrels (*Procellaria parkinsoni*) in New Zealand waters and its relevance to fisheries interaction. *Notornis* 63 (2): 57-65

#### **MIT-5 Demersal Longline Mitigation**

**Term:** 1 Year

**Guiding Objectives:** CSP Objective A; CSP Seabird Medium Term Research Plan; National Plan of Action – Seabirds.

Project Objective – Development of a line setter for demersal long liners

This project will build on the development of an underwater line setter for small demersal long liners.

Mitigation standards in the draft Seabirds NPOA outline the need to achieve a 10m sink rate as fast as possible and before the end of the tori line during daytime setting. To help fishers achieve these sink rates, two devices have been trialled during 2019/20 aimed at setting gear at depth. Over the last year the development of the designs has been an iterative process, assessing performance and addressing operational and technical issues and constraints as they arise. This year of the project will aim to progress with one of the designs and will look at deployment on a range of vessels across the fleet.

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

#### **MIT-6 Adaptive Management tool use to improve sink rates**

**Term:** 1 Year

**Guiding Objectives:** CSP Objective A; CSP Seabird Medium Term Research Plan; National Plan of Action – Seabirds.

**Project Objectives:** Assess the use of the adaptive management tool

This project will build on the creation of an adaptive management tool in MIT2018-03 to inform fishers of line by line sink rates with an initial focus on promoting the uptake and use of the tool for data collection. Analysis of the data will then look at whether giving fishers information on sink rates and line set depths via the ER system, results in fishers taking steps to improve sink rates when necessary. This will include detailed comparisons of data provided by the wet tags and will be analysed at both a vessel level and by fishery/method.

**Indicative cost:** \$70,000

### **MIT-7 Improving engagement of fishers with seabird advocacy**

**Term:** 3 Years

**Guiding Objectives:** CSP Objective A; CSP Seabird Medium Term Research Plan; National Plan of Action – Seabirds.

**Project Objectives:** Increase engagement of fishers with protected species conservation

Quantitative data has shown that engagement of fishers through advocacy work, increases awareness of the plight faced by seabird species and creates a sense of responsibility and psychological ownership.

Over the last three years, Southern Seabird Solutions Trust, through the Black Petrel Working Group in conjunction with Wildlife Management International have supported an initiative to engage fishers with Black Petrel conservation through educational field trips to Great Barrier Island. While there has been substantial support for this work from industry, the uptake of this opportunity could be increased across both the bottom longline and surface longline fleets.

This project will be aimed at building on the current work, expanding awareness and supporting fishers who have not had the opportunity to take part in this advocacy training to get involved.

**Indicative cost** \$10,000

### **MIT-8 Mitigation gaps analysis towards reducing protected species bycatch**

**Term:** 1 year

**Guiding Objectives:** CSP Objective A

**Project Objectives:**

1. To provide an assessment of what level of bycatch reduction current mitigation tools that are in use can reasonably be expected to achieve for seabirds, corals and marine mammals.
2. To identify the most significant gaps in mitigation technology/practice that will need to be filled in order to achieve reduced protected species bycatch.

To achieve reduced protected species bycatch it is vital to understand what current mitigation techniques can deliver for seabird, coral and marine mammal bycatch reduction and to identify the most significant gaps that need to be filled. This will help identify priorities for innovation and help in the development of innovation roadmaps.

Based on available information on the use of bycatch mitigation techniques across different fishing methods and levels of bycatch (of seabirds, marine mammals and corals) across different fishing methods, the project will aim to assess the level of bycatch reduction these existing mitigation techniques can deliver.

Based on this assessment, the gap analysis would develop a matrix looking at fishing methods and the bycatch reduction priorities (seabirds, marine mammals and corals) and identify the largest gaps between what current

mitigation techniques can deliver. The assessment and the gap analysis would then be peer reviewed by key stakeholders.

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

### **MIT-9 Hook-shielding use in the surface longline fishery**

**Term:** 2 years

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

**Project Objectives:**

1. Facilitate ongoing use of hook-shielding devices in the surface longline fishery
2. Assess the operational and bycatch reduction effectiveness of hook-shielding devices used in the surface longline fishery

DOC and Fisheries New Zealand have funded the provision of hook-shielding devices to surface longline operators to achieve best practice bycatch reduction. Operators receiving hook-shielding devices will provide data on their operational use, and observations will also be made by fishery liaison officers, observers and compliance officers. Replacement devices will be provided as part of this project to operators providing the required data on device loss or failure project. This project will also collate and report on operational data provided by fishers, liaison officers, observers and compliance officers, and make a comparative assessment of bycatch and target fish capture rates between vessels using hook-shielding devices and those using other mitigation options. This analysis will be two-stage, initial data to November 2020 will be reported to inform project planning for 2021/22, and a more comprehensive analysis will be undertaken in late 2021 after a full year of operation.

**Indicative cost:** Year 1: \$110,000 Year 2: \$150,000 (subject to review in early 2021)

### **MIT-10 Investigating potential impacts and opportunities of transitioning setnet fisheries in hoiho habitat**

**Term:** 1 year

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

**Project Objectives:**

1. Conduct an economic viability analysis of setnet fisheries within hoiho habitat
2. Examine pros and cons for different available methods /options
3. Identify the most viable alternatives and mechanisms for putting them into practice

Entanglement in set nets is a known high mortality risk for hoiho where their range overlaps with setnets. Here, we propose an investigation into the range of options and opportunities available to fishers that currently set nets within hoiho habitat. An economic viability analysis (or cost-benefit analysis) would examine the direct and indirect benefits and consequences of set netting in different locations for different setnet fisheries *versus* alternatives (e.g. no fishing or other viable fishing methods). Expert panel workshops would bring together fishers, conservationists, researchers and industry to i) investigate pros and cons of set netting versus alternatives, and ii) identify the most suitable alternative option(s) and discuss appropriate pathways for implementation.

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