

CSP/Bycatch project longlist 2023/24

INT, POP or MIT	Title	Summary	Duration (Years)
INT 1	Sub-antarctic albatross diet: composition of natural prey versus fisheries bait/waste	<p>CSP Objective B: Objective B: "The nature of direct adverse effects of commercial fishing on protected species is described." Albatross diets consist predominantly of fish, squid, crustaceans and carrion taken from the uppermost surface waters of the open oceans. Commercial fishing operations unintentionally provide food for albatross in the form of offal, discards and baited hooks, which sometimes results in incidental mortality of seabirds. Little is understood about the composition of natural prey versus fisheries bait/waste in albatross diet because of a range of difficulties, including 1) the challenges of accessing and handling wild albatrosses for sampling gut contents, 2) inherent biases in relying on data recovered from birds caught from fishing vessels, and 3) difficulties in identifying prey species from digested stomach samples. The importance of reducing the attractiveness of fishing vessels to seabirds (e.g. fish waste) is internationally recognised but there is a concerning lack of knowledge around the level of albatross dependence on waste/bait from vessels as a food source, at both colony and individual levels. DOC has successfully conducted molecular seabird dietary studies with the University of Auckland who have recently optimised DNA extraction methods and developed PCR protocols (including seabird sex ID) using albatross faecal samples collected at colonies. This optimisation overcomes many of the difficulties for beginning to determine the significance of fisheries waste/bait to the diet of albatross species. This study is the first dietary study of its kind using DNA metabarcoding techniques for New Zealand albatross species and is an exciting new area of conservation biology as it allows the definitive detection of the presence of individual species in the scat/gut samples, even when there are insufficient physical remains to make a reliable identification. Initial results from this seminal work will be reported in January 2023, with the aim to submit the work for publication to a relevant journal by the end of March/early April. Samples initially analysed were from scat (collected opportunistically from sub-Antarctic seabird colonies over 2019-2022), and subsequently the opportunity arose to include stomach content samples from the DOC protected species bycatch necropsy programme, providing a much-needed comparison to aid in the conservation of these threatened species. Species investigated to date include Antipodean, southern Buller's and white-capped albatross, but will be expanded as samples permit. Building on proof of concept, this current laboratory-based project aims to use these newly developed DNA techniques to understand the relationship between fisheries bait/waste and natural prey, to a species level (predator and prey), using additional samples collected over the 2022/23 sub-Antarctic field season, and through the DOC necropsy programme. Interpretation of the results will also consider any findings on bait depredation by seabirds at a species and fishery level through CSP project MIT2022-04, due for completion in 2023. The current project is more broadly envisaged as a 10-year longitudinal study to investigate albatross feeding ecology in an effort to support mitigation efforts to decrease seabird bycatch and their corresponding feeding on fisheries waste/bait. It also has the potential to be applied to other seabird groups. However, given this is a new area of research for CSP, we are initially suggesting running this as a 1-year programme so that results can be analysed and reported back to a CSP TWG whereby giving the opportunity to refine project aims with stakeholders before committing to a longer-term project (e.g., including albatross foraging distribution from tracking data and overlaying with fisheries effort).</p>	1
INT 2	Impact of fisheries extractions on pelagic foraging seabird populations in the wider Hauraki Gulf area	<p>Seabird populations are declining in the Hauraki gulf (e.g. red-billed gulls and white-fronted terns) and it is believed that there is a link between fishing pressures (in particular the purse seine fishery) and these population declines (FNZ 2022 project ZZBD2020-08 by NIWA: The role of low- and mid-trophic level fish in the Hauraki Gulf ecosystem). Therefore, we need to better understand food-web dynamics and the nature and extent of fisheries extractions in relation to changing seabird populations in north-east New Zealand. This project builds on the recent pilot study funded by DOC and is envisaged as a 3-year project to seek partnerships, and seed fund relevant projects which cover: (1) monitoring of key populations (gulls, terns, gannets, fluttering shearwaters, prions, Buller's shearwaters), (2) diets of birds at key colonies and (3) at-sea assessment of food availability in shoals, including inter-annual variation, and will consider findings released in ZZBD2020-08.</p>	3
INT 3	Impact of fishing on the ecosystem services provided by deep-sea corals in the New Zealand region	<p>This project aims to determine the relationship between the abundance/biomass of protected corals and the ecosystem services they provide, and compare the provision of these services in unfished, fished and closed areas. Coral ecosystem services have never been estimated in New Zealand waters. To do this, the project will examine varied data sources including trawling distribution data, abundance-based species distribution model outputs, and existing video and still imagery data to determine various ecosystem services measures relating to supporting, provisioning and regulation services (e.g., habitat provision for diverse associated invertebrates, habitat and nursery grounds for commercially exploited fish, and carbon cycling and storage). The project will focus on seamount complexes and other areas on the Chatham Rise to establish the relationship between the abundance of stony corals and the the abundance and diversity of associated invertebrates and fish, information which can then be used to establish coral density thresholds at which high biodiversity is supported, and to determine whether stony corals are a potential nursery ground for juvenile fish. A second component of the project will determine carbon storage provisions of coral habitat. Finally, examining areas subject to differing fishing pressures could enable better understanding of the impacts of commercial trawling on ecosystem services provided by corals, and mapping this information EEZ-wide could feed into consideration of mitigation approaches. Outputs would be determined with research providers but most likely GIS layers for spatial mgmt tools would be developed. This project fits Theme 4 of the coral MTRP (coral recovery and resilience - ecosystem services).</p>	2
INT 4	Understanding the extent and usage of coral rubble reporting codes by fisheries observers	<p>The coral rubble reporting codes CBB (coral rubble alive or dead) and CBD (coral rubble dead) account for over half of reported coral bycatch greenweight. However, ascertaining life status from live corals and images is very difficult. This project will examine observer images and quantify the likely proportion of genuine rubble -including how much of 'live or dead' fits each category, if more specific codes could have been used, if images are taken and match reports, and mapping areas/taxa/fisheries for which this code is the most often used.</p>	1

INT 5	Understanding coral bycatch - assessing large catches	This project would look at historical coral bycatch records, survey subject matter experts, examine COD vs. trip diaries, and examine imagery, to see if large catches (500kg - >1tonne/event or trip) are possible or likely, as we often see such high reports in the bycatch records (it's difficult to disentangle what's feasible but unlikely with what's potentially erroneous). Comparisons would be made between maximum research survey coral catches by taxa, and maximum observed and corroborated catches by taxa on commercial vessels. The findings could be used to establish data grooming protocols and thresholds by taxa/morphological groups, and potentially modelling could be applied to correct suspect historical reporting and to map areas/fisheries where high bycatch is possible/likely - e.g. by overlapping results with trawl footprint data and hotspots abundance data in heavily fished and rarely fished areas. These outputs could inform mgmt efforts, and would build a more confident picture of coral bycatch across the EEZ. Fits Theme 1 (species composition and distribution) of coral MTRP	1
INT 6	Species identification of camera-detected protected species captures in New Zealand fisheries	The accurate determination of the taxon of protected species captured in New Zealand fisheries is vital for examining the potential threat to population viability posed by incidental fisheries captures. With the roll-out of cameras on inshore commercial vessels, experts will be needed to assess and records of protected species interactions, and identify species to the lowest possible taxonomic level. 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 protected species. This project acts as a pilot to assess incoming cameras information as well as project the anticipated scale of work once cameras are fully deployed. Work from this project will identify any barriers to smooth operations and inform how cameras-detected species ID is managed in the future. The project will also recommend any other areas for possible future analysis or investigation.	1
INT 7	Relationship between surface foraging seabirds in the Hauraki Gulf and fish school workups.	Building on zooplankton, fish and seabird data collected during three field seasons (2017-2021; POP2017-06 & POP2019-02,) data will be pooled into a single large robust dataset for statistical analysis and will incorporate oceanographic variables. This will address the unbalanced nature of previous single data sets (e.g., varying methodology between years) and builds on recommendations outlined in the previous final reports.	1
INT 8	Mapping the spatial and bathymetric ranges and diversity of stylasterid corals in Fiordland.	Building upon INT2022-05: Determining the resilience of Fiordland corals to fishing impacts, this project will focus on using SCUBA and ROV surveys for detailed mapping of stylasterid corals in protected, fished, and unfished areas of Fiordland - with a more comprehensive assessment than INT2022-05 (which is primarily black-coral focused). The project would use image analysis, mapping - and biological samples for potential genetics and diversity assessment. Stylasterid ecology is poorly understood in Fiordland, most work has been done in sub-antarctic from research trawls. The project will provide oversight of the overlap of these corals with fishing activity and fits under the Theme 1 biodiversity and Distribution/Abundance data gaps in the MTRP. Outputs from this, and INT2022-05, could form the basis of an ongoing monitoring programme -theme 3 in the MTRP (and Theme 6 - shallow water corals). Upcoming field trips in INT2022-05 will give prelim insight into extent of stylasterid distribution at sub-SCUBA depths.	1
MIT 1	Understanding the relationship between fish hook size and bait type with seabird captures	Seabirds are caught on fishing hooks either by swallowing baited hooks, or by being hooked in the body by a bare hook. Research shows that the risk of seabird bycatch is reduced with the use of circle hooks instead of 'J' hooks, however little is known about the effect of hook size and bait type on bycatch rates for various seabird species. By comparison, research shows that the risk of turtle bycatch is also reduced with the use of circle hooks, as well as large hooks and fish bait instead of squid bait. This project is a pilot study aimed at using data collected through the CSP necropsy programme (and other sources) to investigate the effect of hook size and bait type on seabird bycatch rates across different target fisheries. Results will enable us to provide consistent messaging on mitigation recommendations for reducing the risk of both seabird and turtle bycatch.	1
MIT 2	Identifying protected species in trawl fisheries using AI species recognition software and net camera technology	Decreased bycatch of marine mammals in commercial fisheries continues to be an area where mitigation measures need further development. The wider aim of the project is to investigate the potential for mitigation to include release of mammals immediately after entering a trawl net (before haul) by using cameras and AI technology to identify a protected species net incursion and then alert vessel skippers. This will require a staged approach and the scope of the current 1-year project is to initially attach cameras to a trawl net to gather opportunistic footage of dolphins and seals around trawl nets in the Cook Straight hoki fishery. The images will then be used to train an AI model for protected species recognition. This project may be refined based on findings from PMM2020-08 NOVEL TECHNOLOGIES TO MITIGATE THE RISK OF DOLPHIN CAPTURE IN INSHORE TRAWL FISHERIES.	1
MIT 3	Underwater line setting devices for bottom longline vessels	Subject to progress made through CSP project MIT2021-01, and building on work undertaken by DOC project BCBC2020-11b, this project will aim to continue operational refinement of the one or both devices currently in development. Further, the project would support the longer-term use of the device(s) under commercial fishing operations through technical assistance and data collection to adequately assess the effectiveness as a seabird bycatch mitigation device. These devices represent a novel new approach to mitigating seabird bycatch in longline fisheries.	2
MIT 4	Gear configurations to improve sink rates in bottom longline fisheries	Subject to progress made through CSP project MIT2021-01, and building on work undertaken by DOC project BCBC2021-03 in snapper longline, this project will aim to develop specific advice on gear configurations to improve sink rates for a wider range of target bottom longline fisheries. The project will involve at-sea experimental work to test a range of gear and operational variables that influence sink rate and provide readily accessible advice to fishers. Improving sink rates to ensure bird scaring lines provide adequate aerial protection to baited hooks is a key element of seabird bycatch mitigation strategies in bottom longline fisheries.	1
MIT 5	Synthetic trawl warps to mitigate seabird warp strikes	Bright coloured Dyneema warps are used by some inshore trawlers in place of traditional steel cables. The characteristics of such material may influence the likelihood of warp strikes, for example by making the warps more visible to seabirds. To maximise cost saving synergies this project will be implemented alongside the at-sea testing component of MIT2022-07 (postponed to 2023/24) to assess bird behaviour around synthetic vs steel cable warps to determine whether such material is likely to reduce warp strike rates.	1
MIT 6	Enabling uptake of best practice seabird bycatch mitigation in the surface longline fishery	Monitoring on the uptake and implementation of best practice seabird bycatch mitigation, as described in the Mitigation Standards under the NPOA-Seabirds 2020, has highlighted limited progress in the surface longline fleet. This is especially apparent in a lack of alignment to the recommended 3/3 mitigation (tori line, night-setting and line weighting to ACAP standards) or use of hook-shielding devices on 100% of hooks. This project is will build on existing CSP Liaison Programme capacity and will provide further gear and support that goes beyond the current scope and scale of the Liaison Programme project. Operators will be identified by need, as advised by industry feedback to Liaison Officers and through the assessment of Protected Species Risk Management Plans against Mitigation Standards. Support could include the coordination, provision and assistance in the use of hook-shielding devices and novel line weighting options. It could also include further testing and refinement of tori lines and hauling mitigation. This project will produce recommendations that indicate whether the Liaison Programme project should increase in scope and scale to further accommodate and sustain increased mitigation support in the surface longline fleet.	1

MIT 7	Novel seabird bycatch mitigation for floated demersal longline fisheries	There are significant challenges for some floated demersal longline fisheries in achieving desired sink rates of gear to meet regulatory requirements and best practice seabird bycatch mitigation standards. In particular, the slow setting speeds typical in bluenose target fisheries limit the extent of aerial protection that tori lines can provide. This project will test the effectiveness and practicality of one or more novel bycatch methods in this fishery. The project will consider testing any relevant novel options identified during current social science research underway in the fishery, as well as the potential use of Hookpods, and the use of underwater line setting devices developed for other bottom longline target fisheries. The chosen device(s) will be tested for the mitigation effectiveness, practicality and any effect on fish catch. This project will be further refined through input from industry.	1
MIT 8	Understanding and mitigating seabird and turtle bycatch during the pelagic longline soak period	Seabird bycatch mitigation development in pelagic longline fisheries has focussed primarily on the risk during setting and more recently on the haul period. However, it is known that pelagic longlines can also be brought up to the surface during the soak, e.g. by hooked sharks, where exposed baited hooks can pose bycatch risk to seabirds. The extent of this risk is currently unknown as it is difficult to determine the point at which birds are caught during a fishing operation. Similarly, there is little information on the depth and time for which turtles are caught during the fishing period. This project will build on initial work undertaken by DOC using existing TDR data to characterise the depth profile of hooks during the entire fishing period to further refine the findings, collect more at-sea data, assess against bycatch records and review any international research. The project will consider the effectiveness of existing practices (i.e. line weighting) on mitigating the availability of hooks during the soak and will recommend any other mitigation options for possible future testing.	1
POP 1	Auckland Islands New Zealand sea lions	To undertake a pup count on Enderby Island (Sandy Bay), Dundas Island and Figure of 8. To undertake tag resightings and daily counts of animals on the beach including live and dead pups to provide survivorship and interaction data for the demographic model.	3
POP 10	Campbell Island seabird research	This project will focus on southern royal albatross, with additional consideration of northern giant petrel, white-chinned petrel, grey-headed albatross and Campbell Island albatross. It will collect data to assess population size, change in population size over time and key demographic parameters. The project will utilise cost-saving synergies with external penguin research and other CSP subantarctic research projects to collect updated population information and provide a platform for potential tracking studies (subject to other projects)	2
POP 12	Habitat use, diving behaviour and diet of hoiho in the Subantarctic	Fisheries activities such as bottom trawling can modify benthic communities and can have direct (e.g., bycatch, benthic disturbance) and indirect effects (e.g., competition for prey) on seabirds. Therefore, fisheries activities can affect the diet of seabirds with implications for breeding success. The marine habitat utilisation of the Nationally Endangered hoiho / yellow-eyed penguin (a predominantly benthic forager) has been studied in detail for the northern (New Zealand mainland and Rakiura) population (POP2018-02, POP2020-5). Yet little is known about their habitat use, diving behaviour and diet in the Subantarctic, particularly from colonies other than Enderby Island and outside the guard phase of the breeding cycle when foraging ranges are restricted by central-place foraging (Muller et al. 2020). Here, we propose to collect data on the foraging distribution, diving behaviour and diet of hoiho in the Subantarctic using a combination of GPS-dive loggers / satellite tags and bird-borne foraging cameras for data deficient breeding, non-breeding periods as well as different life history stages (adults, juveniles) and at sites other than Enderby Island. The results of this project will quantify the overlap of hoiho foraging distribution with trawling activities as well as overlap of hoiho diet with fisheries target species (indirect competition), which is critical for fisheries management. These data will enable to estimate the direct and indirect impacts of trawling on hoiho foraging.	1
POP 13	Habitat use, diving behaviour and diet of hoiho at a major colony on Rakiura / Stewart Island	Fisheries activities can pose direct and indirect threats to seabirds. Direct effects include incidental captures in fishing nets and benthic disturbance, whereas indirect effects include resource competition when fisheries and seabirds target the same prey, potentially affecting seabird breeding success. The wider Neck area on Rakiura harbours ~20% of the current breeding population of the Nationally Endangered hoiho / yellow-eyed penguin on Rakiura making this an important breeding colony. Breeding areas on the Neck are concentrated at two main sites: Little Glory Bay, which lies on the Paterson Inlet side of the Neck and Steep Head, which lies on the seaward side. Based on previous tracking studies of hoiho in Paterson Inlet (POP2018-02, POP2020-05) it is assumed that hoiho breeding at Little Glory Bay will forage in Paterson Inlet, whereas hoiho breeding at Steep Head are more likely to feed out at sea. Importantly, hoiho at Steep head face a higher risk from incidental capture in setnets compared to hoiho breeding at Little Glory Bay, Paterson Inlet and other sites (e.g., voluntary exclusion zones) where no set netting activity takes place. Furthermore, hoiho breeding at Steep Head have shown reduced breeding success in recent years compared to birds from Little Glory Bay, possibly due to less favourable foraging conditions. Here we propose to study the foraging distributions (tracking) and diet of hoiho (bird-borne cameras / molecular diet analysis) breeding at both sites during different breeding stages (guard, post-guard and pre-moult) to quantify the overlap of hoiho with local fishing activities (spatial overlap) or target species (dietary overlap) and whether this can explain differences in breeding success between the two sites.	1
POP 14	Aerial survey of leatherback turtles off Northeast North Island	The Western Pacific leatherback turtle population is critically endangered due to a variety of reasons including bycatch in commercial fisheries. High levels of bycatch in surface longline fisheries off the northeast North Island are likely to be unsustainable and contributing to the decline of this population. Fishery independent data is required on the species distribution and size in New Zealand waters to determine overlap with commercial fisheries and the size-age structure of animals affected. Aerial surveys have provided effective for determining the distribution and monitoring abundance of this species in other global hotspots (e.g. NW Atlantic, California Current System). This project will lay the basis for a future project to capture and satellite tag leatherbacks at sea in order to investigate diving behaviour, long distance movements and aggregation sites/critical habitat in NZ waters (collaboration with Australian and US leatherback researchers).	1
POP 15	Grey Petrel Campbell Island survey	This research aims to provide an updated population estimate for Grey Petrels on Campbell Island. The last population estimate of this at-risk species from Campbell dates back to 2015. Due to the breeding phenology of Grey Petrels, this project cannot be conducted in synergy with POP 10. Instead, this project aims to utilise cost-saving synergies with winter research projects on Southern Right Whales (for a survey later in their breeding period) or POP2022-10 (for a survey earlier in their breeding period).	1
POP 16	White-capped albatross population estimate	Building on existing research from POP2022-08 (I) to conduct full population census of white-capped albatross.	1

POP 17	Inshore seabird colony mapping, populations, behaviour	Compile data for red billed gulls, black back gulls, Foveaux shag, Otago shag, spotted shag, gannet, and white fronted tern distributions, population and colony locations so that Fisheries New Zealand can fund a distribution modelling project in 24/25 to progress towards the robust inclusion of these seabirds in future risk assessments.	1
POP 18	Fur seal population estimate	Characterisation of fur seal distributions to inform improved estimates of the spatial overlap of fur seal with fishing. Breeding colonies occur as far north as the Coromandel peninsula and as far south as the subantarctic islands. With populations increasing and new colonies being established on the New Zealand mainland it is important to estimate their current distribution to get ahead of any increasing risk that fisheries are placing on these populations.	1
POP 19	Comprehensive aerial survey for SI Hector's population estimates NCSI	Spatial models are critical for the application of the spatially explicit fisheries risk assessment (SEFRA). A review of recent modelling using environmental covariates to inform local-scale Hector's dolphin in key-areas around the South Island (Roberts 2022) identified a need for further dedicated survey data. This was especially important for the north coast of the South Island (NSCI), and the south coast of the South Island (SCSI) where the spatial model used for the Hector's and Māui Threat Management Plan (TMP) fit poorly to the aerial survey undertaken by MacKenzie and Clement (2019).	1
POP 2	Spotted shag: south island population review	Spotted shag populations have declined considerably and the species is nationally vulnerable. Bycatch in set-nets is not uncommon. This project delivers on priority monitoring and data gaps as per the CSP seabird plan. The project aims to: (1) census the Canterbury and top of the south island population size and trend and (2) track and describe the foraging distribution, and overlap with fishing effort, for key colonies. This work would apply methods developed for king shags, and spotted shags in northern North Island.	2
POP 3	Otago and Foveaux shag: foraging distribution and fisheries overlap	This project delivers on priority monitoring and data gaps as per the CSP seabird plan. The project aims to describe the foraging distribution, and overlap with fishing effort, for key colonies. This work would apply tracking and analysis methods developed for king shags and spotted shags in northern North Island and build on current findings from CSP 2021-07 Otago and Foveaux shag census.	3
POP 4	Snares: Southern Buller's population study	This species is likely to receive the highest risk ranking. This project will include ongoing annual mark-resight studies of birds at the Snares study site, continued breeding success monitoring at the Snares (and potentially Solander), an updated population estimate at Snares (one estimate during the next three year term), an updated population assessment at Solander, satellite tracking to determine fine scale fisheries overlap at both Snares and Solander and dive-depth assessment.	3
POP 5	Seabird breeding biology: Foveaux/Otago shag and southern Buller's albatross	Using data gathered from recently acquired trail camera images collected at various seabird colonies, including Southern Buller's, Foveaux and Otago shag, investigations will be made of the breeding cycle and population dynamics from nest-building to fledging, as well as temporal changes in colony attendance both during and outside of the breeding season. This work is a continuation of previous CSP population studies under various projects including POP2019-04 and POP2021-07.	1
POP 7	Snares Buller's albatross: modelling of return and recruitment rates	Southern Buller's albatross <i>Thalassarche bulleri bulleri</i> remains a prominent component of commercial fisheries bycatch in New Zealand. A comprehensive modelling of the well-studied population at The Snares, incorporating three types of data (a 60-year plus set of mark-recapture observations, censuses of the breeding population, and estimates of fishing effort and bycatch) was last undertaken using data up until 2007, and concluded that the fisheries risk to the viability of the population was small (Francis & Sagar 2012). However, since 2007, estimates of adult survival have shown a declining trend and it is now timely to re-run the modelling of this population, using an appropriate modelling framework (e.g. NIWA's SeaBird) and incorporating 'new' data from 2008 onwards. This would be beneficial for future iterations of the spatially explicit fisheries risk assessment, which, in its most recent iteration incorporated annual survival values from 0.93 to 0.98 which may have over-estimated current adult survival values.	1
POP 8	Salvin's albatross population study at Bounty Islands	This project will utilise cost-saving synergies with external penguin research to continue to monitor and track this high-risk species. Specifically, in the first year, a trip late in the season will service existing remote cameras aimed at understanding the exceedingly low breeding success and satellite track juveniles. In the second year, a trip earlier in the season will aim to provide an updated population size estimate using drone surveys, further service remote cameras and extend current mark-resight efforts.	2
POP 9	Westland petrel population estimate	Building on existing research, undertake appropriate surveys to estimate the total population size.	1
POP2021-04	Flesh-footed shearwater population monitoring	Due to unforeseen operational costs full delivery of this project will require an increase in budget to \$70k per year.	
POP2022-01	Black petrel population monitoring	Due to unforeseen operational costs full delivery of this project will require an increase in budget to \$100k per year. If budget is increased the objective of at-sea monitoring can be expanded to include collecting data to inform the estimate of total population size.	