National Plan of Action - Seabirds 2020

Supporting document

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1. Introduction

This document provides background to New Zealand's National Plan of Action-Seabirds 2020: Reducing the incidental catch of seabirds in fisheries (NPOA-Seabirds 2020). It supports the NPOA-Seabirds 2020 by providing more information about New Zealand's seabird populations; how seabirds interact with fisheries; what risks seabirds face from fisheries; and how these risks can be mitigated. This document also provides more details about the NPOA-Seabirds 2020 implementation approach and measurement of progress against the goals and objectives of the NPOA-Seabirds 2020.

2. History

The responsibility to deal with threats to seabirds from fishing stems from the United Nations Convention on the Law of the Sea 1982 (UNCLOS). UNCLOS requires coastal states, like New Zealand, to ensure their Exclusive Economic Zone (EEZ) conservation and management measures take into consideration the effects on species, such as seabirds, that are, *'associated with or dependent on harvested species so as to maintain or restore their populations above levels at which their reproduction may be seriously threatened*'.[1]

UNCLOS Article 119(1)(b) places a similar obligation on all states fishing on the high seas.[2] These obligations were repeated and developed in the United Nation's Fish Stocks Agreement[3] and the Food and Agriculture Organization of the United Nation (FAO)'s Code of Conduct for Responsible Fisheries[4], both of which were produced in 1995. Therefore, the obligation to consider effects on species, such as seabirds, could now be considered binding on all countries as part of customary international law.

As a result of increased awareness about the incidental capture of seabirds, especially in longline fisheries, in 1998, the FAO organised an expert consultation on the subject. This resulted in publishing the International Plan of Action for reducing incidental catch of seabirds in longline fisheries (IPOA-Seabirds) in 1999.[5]

The IPOA-Seabirds guides countries when preparing their own national plans of action to reduce the incidental catch of seabirds in longline fisheries, and deciding what technical measures to include. These plans are known as, 'NPOA-Seabirds'.

New Zealand's first NPOA-Seabirds was published in 2004.[6] The NPOA-Seabirds 2004 included all New Zealand fisheries, and:

- described what was known about seabird interactions with New Zealand fisheries;
- explained the voluntary and mandatory measures that New Zealand would use to reduce the incidental catch of seabirds in those fisheries;
- listed the research that was underway to understand the nature and extent of incidental catch, and how to mitigate it; and

[1] United Nations Convention on the Law of the Sea 1982 (UNCLOS):Article 61(4).

[2] UNCLOS 1982: Article 119(1)(b)

[3] Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks 1995 (UN Fish Stocks Agreement) 2001

[4] FAO Code of Conduct for Responsible Fisheries 1995

[5] International Plan of Action for reducing incidental catch of seabirds in longline fisheries (IPOA Seabirds) 1999

[6] https://fs.fish.govt.nz/Doc/21870/NPOAseabirds%5B1%5D.pdf.ashx

- outlined how New Zealand would oversee, monitor and review the effectiveness of the voluntary and mandatory measures and the overall implementation of the NPOA-Seabirds 2004.

In 2007, the FAO acknowledged the need to broaden the range of fishing gear covered by the IPOA-Seabirds, and the need to strengthen the IPOA-Seabirds' implementation by developing best-practice technical guidelines. These guidelines were developed at an expert consultation in 2008.[7]

The best practice technical guidelines highlighted that, despite international efforts to reduce the incidental mortality of seabirds in longline fisheries, the populations of many seabird species were declining. The declining populations were partly attributed to: the low number of countries that had developed an NPOA-Seabirds; the limited implementation of NPOA-Seabirds; the varying quality of the NPOA-Seabirds; and the limited action being taken by some regional fisheries management organisations (RFMOs). Developing and implementing a more robust and widespread suite of NPOA-Seabirds, which covered all relevant types of fishing gear, was necessary and urgent.

New Zealand responded by revising its NPOA-Seabirds 2004 in 2012, to produce the NPOA-Seabirds 2013. This revision acknowledged that, although the incidental capture of seabirds had been reduced in some New Zealand fisheries, much more work was needed in other fisheries, and improvements were needed in all fisheries. The NPOA-Seabirds 2013 also acknowledged the need to assess, and help reduce the incidence of, incidental mortality of New Zealand seabirds in waters outside New Zealand's jurisdiction.

The NPOA-Seabirds 2020 replaces the NPOA-Seabirds 2013. It uses lessons learnt from implementing the NPOA-Seabirds 2013, which are described in the *Review of the National Plan of Action Seabirds 2013*.[8]

3. State of New Zealand Seabird Populations

New Zealand seabirds have diverse taxonomy, biology, ecology and behaviour. Approximately 145 seabird taxa use New Zealand waters. This includes about 95 taxa that breed in New Zealand—over one third of these are endemic, meaning they only breed in New Zealand.

More albatross, petrel, shag and penguin species breed in New Zealand than anywhere else in the world. Other seabirds visit New Zealand waters to feed, however do not breed here.

The diversity of seabirds in New Zealand partly stems from the country's unique natural history, and its geographic spread from the sub-tropical Kermadec archipelago in the north to the sub-Antarctic islands in the south. Before humans arrived in New Zealand, the absence of mammalian predators on land made it a particularly safe place for seabirds to breed. New Zealand continues to be an important foraging and breeding ground for seabirds because of its extensive coastline; numerous inshore and offshore islands (many of which are predator free); and surrounding seas and oceans.

Despite New Zealand being such an important area for seabirds, they face many threats. These include predators (introduced land-based mammals and other birds), disease, fire, weeds, loss of nesting habitat, competition for nest sites, coastal development, human disturbance, commercial and cultural harvesting, volcanic eruptions, pollution, plastic and marine debris, oil spills and

[7] Food and Agriculture Organization of the United Nations. *Report of the expert consultation on best practice technical guidelines for IPOA/NPOA-Seabirds.* FAO Fisheries and Aquaculture Report No. 880, FIIT/R880 (En). Bergen, Norway. 2–5 September 2008.

[8] https://www.fisheries.govt.nz/protection-and-response/sustainable-fisheries/managing-our-impact-on-marine-life/seabirds/

exploration, heavy metals or chemical contaminants, global sea and air temperature changes, marine biotoxins and interactions with fisheries.[9]

The International Union for the Conservation of Nature (IUCN) maintains a global list of threat status for a range of species, including seabirds. The seabird species at highest risk of capture by New Zealand's fisheries have IUCN threat statuses ranging from endangered (such as Gibson's albatross) to near-threatened (such as Southern Buller's albatross).

New Zealand also defines threat status for its seabird species under the New Zealand Threat Classification Scheme. New Zealand classifies a number of taxa at a finer resolution than the IUCN (for example, separating Gibson's and Antipodean albatross), and ranks the threat status of New Zealand-breeding populations only (for example, flesh-footed shearwater, which also breeds in Australia).

Table 1 lists the species of New Zealand's seabirds most at risk from fishing, and their IUCN and New Zealand threat status.

[9] Taylor, G. A. (2000). *Action plan for seabird conservation in New Zealand. Part A, threatened seabirds*. Threatened Species Occasional Publication No. 16. Department of Conservation, Wellington. Retrieved from at https://www.doc.govt.nz/globalassets/documents/science-and-technical/tsop16.pdf

Table 1: Seabird taxa at risk from commercial fishing in New Zealand, and IUCN and New Zealand threat status

Common name	Scientific name	Risk[10]	IUCN threat status[11]	NZ threat status[12]
Black petrel	*Procellaria parkinsoni*	VH	Vulnerable	T Vulnerable
Salvin's albatross	*Thalassarche salvini*	H	Vulnerable	T Critical
Westland petrel	*Procellaria westlandica*	H	Endangered	AR Uncommon
Flesh-footed shearwater	*Puffinus carneipes*	H	Near threatened	T Vulnerable
Southern Buller's albatross	*Thalassarche bulleri bulleri*	H	Near threatened*	AR Uncommon
Gibson's albatross	*Diomedea antipodensis gibsoni*	H	Endangered*	T Critical
New Zealand white-capped albatross	*Thalassarche steadi*	M	Near threatened	AR Declining
Chatham Island albatross	*Thalassarche eremite*	M	Vulnerable	AR Uncommon
Northern Buller's albatross	*Thalassarche bulleri platei*	M	Near threatened*	AR Uncommon
Yellow-eyed penguin (mainland)	*Megadyptes antipodes*	M	Endangered	T Endangered*
Antipodean albatross	*Diomedea antipodensis antipodensis*	M	Endangered*	T Critical
Northern giant petrel	*Macronectes halli*	M	Least concern	AR Recovering
Otago shag	*Leucocarbo chalconotus,*	M	Vulnerable*	AR Recovering
Spotted shag	*Stictocarbo punctatus*	L	Least concern	NT
Yellow-eyed penguin	*Megadyptes antipodes*	L	Endangered	T Endangered
White-chinned petrel	*Procellaria aequinoctialis*	L	Vulnerable	NT
Campbell black-browed albatross	*Thalassarche impavida*	L	Vulnerable*	T Vulnerable
Northern royal albatross	*Diomedea sanfordi*	L	Endangered	AR Uncommon

[10] From Richard, Y.; Abraham, E.; Berkenbusch, K. (2019) Assessment of the risk of commercial fisheries to New Zealand seabirds, 2006-07 to 2016-17. (*In press).* VH ('Very High' risk), H ('High' risk), M ('Medium' risk), ('Low' risk).
[11] IUCN. (2019). *The IUCN red list of threatened species*. Version 2019-1. Retrieved from www.iucnredlist.org
[12] The NZ threat statuses are T (threatened); AR (at risk); and NT (not threatened).[12] Retrieved from https://www.doc.govt.nz/globalassets/documents/science-and-technical/nztcs19entire.pdf

4. Interactions between Seabirds and New Zealand Fisheries

Understanding how seabirds interact with New Zealand fisheries helps explain New Zealand's rationale for the NPOA-Seabirds 2020.

4.1 Types of Seabirds at Risk of Incidental Capture

Different species of seabirds have different biological characteristics (such as diving ability, agility, size, sense of smell, eyesight and diet) and foraging traits (such as foraging range; and aggression, boldness or shyness they display towards fishing activity). These differences affect the threats they face from fishing operations, and how susceptible they are to interactions with, and capture by, fishing.

The nature and extent of seabird interactions with fishing operations differs spatially, temporally, seasonally and daily. There are further variations between sectors and fisheries, and between fleets and vessels within fisheries. Some fishing methods are particularly threatening to some types or species of seabirds. For example, penguins are particularly vulnerable to set net operations.

During the 2017/18 fishing year, the seabird species most frequently observed captured in New Zealand commercial fisheries were, in descending order, white-chinned petrels, white-capped albatross, Buller's albatross, sooty shearwaters, Salvin's albatross, and flesh-footed shearwaters.[13] The observed seabird capture rates of seabirds in trawl, longline and set net fisheries are provided in Appendix 5 of the *Review of the National Plan of Action Seabirds 2013*.[14]

4.2 Current Information Sources

Four main sources of information are used to identify and assess the nature, extent and potential consequences of seabird mortality in fisheries within New Zealand's jurisdiction, or fishing by New Zealand vessels on the high seas:

1. Fisheries New Zealand's observer-reported data. This provides data on seabird captures, species identification, use of mitigation measures and general fishing practices, photographs of seabirds caught on fishing vessels, and specimens (seabirds killed by fishing operations) for onshore analysis.
2. Commercial fisher-reported data. This provides data on the spatial and temporal distribution of fishing effort, and on seabird captures, but less resolution on seabird species.
3. Research outputs on seabird biology, demography, ecology, and at-sea distribution.
4. Data collected by, or reported to, RFMOs.

Information from these sources is used to report on, and monitor, seabird captures in New Zealand fisheries, seabird population statuses, and to assess the risk fisheries pose to seabirds. [15] [16] These reports, along with domestic and international assessments of seabird population status (Table 1), are the basis for assessing the nature and extent of seabird captures in New Zealand fisheries. Such

[13] Observer coverage is not representative of total fishing effort. Therefore, the seabird species that are most frequently observed being captured may not be a true reflection of the seabird species most frequently caught across all New Zealand fisheries.

[14] https://www.fisheries.govt.nz/protection-and-response/sustainable-fisheries/managing-our-impact-on-marine-life/seabirds/

[15] The *Aquatic Environment and Biodiversity Annual Review 2018* is available at https://www.fisheries.govt.nz/dmsdocument/34854-aquatic-environment-and-biodiversity-annual-review-aebar-2018-a-summary-of-environmental-interactions-between-the-seafood-sector-and-the-aquatic-environment

[16] The Ministry for Primary Industries' database of protected species capture information is maintained at https://psc.dragonfly.co.nz

information provides comprehensive, annual data by fishery and species, and will be used to assess implementation and performance during the term of the NPOA-Seabirds 2020.

Other sources of information include: anecdotal information about interactions between seabirds and New Zealand's recreational and customary non-commercial sectors; and information from various sources about seabird interactions in waters under the jurisdiction of other coastal states.

Digital monitoring is expected to substantively change how fisheries are monitored in New Zealand. It involves geospatial position reporting and electronic reporting on all commercial fishing vessels in New Zealand. Cameras on vessels may also supplement on-board observer activities. Digital monitoring is expected to greatly improve the information on seabird capture events across a broad range of fisheries.

4.3 Risk Assessment Method

The New Zealand seabird risk assessment is the main way that Fisheries New Zealand evaluates the impact of commercial fisheries on New Zealand seabirds. The risk assessment uses the spatially explicit fisheries risk assessment (SEFRA) method.[17] For each seabird population, the seabird risk assessment combines an impact assessment of deaths from all commercial fisheries with a biological assessment of the associated effect on the population, as a function of population size and demographic parameters influencing population productivity. Using Bayesian models, uncertainty arising from imprecise model inputs and imperfect model fits is estimated empirically and reflected explicitly in model outputs.

For each species–fishery combination, the SEFRA method combines maps of seabird distributions with maps of spatially-resolved fishing effort data and observed seabird captures recorded by fisheries observers. The rate at which seabirds encounter fishing effort is a product of the spatial overlap of the seabird and fishing effort distribution layers. The probability of death per encounter is estimated from observed captures, and modified to include deaths that may be un-observable (known as 'cryptic mortality').

The New Zealand seabird risk assessment is a multi-species model that assesses risk from fisheries to all seabird populations and from all commercial fishing methods simultaneously, to estimate cumulative effects at the population level. Subsequently, model estimates can be queried or disaggregated at any spatial and temporal scale, so that decision makers can focus on particular species, fisheries or locations of interest, and can track changes over time. Outputs of the risk assessment can be used to: prioritise the deployment of fisheries observers (where catchability is uncertain); identify what additional research is needed (where risk is uncertain because the inputs into the model are imprecise); and inform the design of risk reduction measures (where risk is judged to be too high).

The SEFRA method evaluates performance against policy objectives by expressing estimated fisheries-related deaths as a proportion of a predefined 'Population Sustainability Threshold' (PST). PST is the maximum number of annual deaths under which the impacted population size can be expected to recover to and/or stabilise at a particular fraction of the un-impacted population. In other words, risk is calculated by comparing estimated deaths with the PST. The risk score is expressed as a Bayesian distribution including uncertainty. Therefore, PSTs can also be defined with reference to the level of confidence with which the population outcome will be achieved, e.g. "With

[17] The SEFRA method is described in chapter 3 of the *Aquatic environment and biodiversity annual review 2018.*

X% certainty, a population for which Risk = 1 will recover to and/or stabilise at or above Y% of the un-impacted level".

The choice of population outcome implicit in the PST is a policy decision, which may vary between species. To date, the multi-species seabird risk assessment has used a simple logistic population-growth model with a default setting for all species.[18] The policy decision may be reviewed to reflect different conservation priorities for different seabird species.

Regardless of the choice of population outcome in the PST (the denominator in the risk equation), risk scores are additive as a function of the number of deaths (the numerator). This means that species-level risk scores can be disaggregated by fishery or geographic area, at any spatial scale. The following sections summarise the contributions each fishery group makes to species-level risk for the most at-risk seabird species.

This document uses the 2019 Seabird Risk Assessment[19], and bases the risk categories on those used in the NPOA-Seabirds 2013 as per Table 1, where a species is in a category if the risk ratio meets either the median or credible interval threshold.

Risk Category	Median	Credible Interval
Very High	1	>2
High	0.3	>1
Medium	0.1	>0.3
Low	-	>0.1

4.4 Commercial Longline Fisheries

Seabirds are captured in longline fisheries when they get hooked through their beaks or throats (or other parts of their bodies) when they try to eat hooked bait. They can also get tangled in fishing line when they forage on hooked bait, fish or discharged fish waste.

Seabirds are captured primarily during the setting or hauling of longlines, when the hooks are at a depth at which baits are accessible to seabirds. When seabirds are caught during setting, they typically die as they are dragged underwater and drown. Seabirds that are caught during hauling are often released alive, although the post-release survival rates are not well known.

Therefore, slow longline sink rates during setting, and the discharge of fish waste during setting and hauling, are operational factors that may increase the risk of seabird captures.

The risk of seabirds being captured during setting can be reduced by using tori (streamer) lines, which deter seabirds from foraging on baited hooks. Another risk-reduction method is using line or hook weighting regimes that rapidly sink baited hooks to below the reach of diving seabirds.

The risk of seabirds being captured during hauling can be reduced by managing the discharge of fish waste, deploying deterrent devices (such as a brickle curtain), and operational practices that minimise the time hauled hooks stay at, or near, the surface of the water.

[18] The default is that Risk = 1 corresponds to a median population-stabilisation outcome of 75% of the un-impacted population level.

[19] Richard, Y.; Abraham, E.; Berkenbusch, K. (2019) Assessment of the risk of commercial fisheries to New Zealand seabirds, 2006-07 to 2016-17. (*In press)*

There are two categories of longline fishing. Surface (pelagic) longlining uses gear suspended from the sea surface using floats; bottom (demersal) longlining uses gear sunk to the seabed using weights.

4.4.1 Surface longline fisheries

Surface longline gear is used to target species like tuna and swordfish in the upper 100–200 metres of the water column. During the 2017/18 fishing year, around 35 vessels used surface longline fishing methods in New Zealand.[20] Such vessels are between 14 and 22 metres long. Fish waste from at-sea processing is discharged at sea.

Between 800 and 1,200 hooks, typically baited with squid, are usually deployed per fishing event (or 'set'). During the 2017/18 fishing year, 2.3 million hooks were reported set.

Surface longline gear consists of long (up to 20 metres) transparent nylon snoods (branch lines) suspended from a monofilament backbone. However, the way gear is configured (such as the snood length and spacing) depends on the target species and fisher's preference.

Until 2015/16, Japanese charter vessels used surface longlining methods in New Zealand. They were large vessels (more than 43 metres long), which deployed up to 4,000 hooks per set, and they configured their gear differently to the domestic fleet (for example, they used longer snoods). The Japanese charter fleet was comprehensively observed and had relatively low seabird capture rates. This fleet has not fished in New Zealand since vessel registration requirements changed in 2016, so it is not discussed further in this document. Any reference to seabird capture rates or observer coverage before 2015/16 refers to the domestic fleet only.

The spatial distribution of surface longline fishing effort varies during the year. However, there are three primary fisheries that are relatively discrete in their timing and location:

1. a swordfish and bigeye tuna target fishery in northern waters, which operates throughout the year, however mainly in the austral summer (and accounts for around 40% of total surface longline effort);[21]
2. a southern bluefin tuna target fishery off the west coast of the South Island, which operates between April and July (and accounts for around 20% of total surface longline effort)
3. a second bluefin tuna target fishery off the east coast of the North Island, which operates between May and September (and accounts for around 35% of total surface longline effort).

Gear configuration and operations vary between target species. When swordfish are being targeted, hooks are typically set closer to the sea surface, and there is a larger distance between snoods than when southern bluefin tuna are targeted. Vessel operators may also choose to set at a faster speed when they target swordfish—so that hooks stay closer to the surface—or set during the day to maximise the catch.

Surface longline fishing gear may also present a risk to seabirds when the gear is fishing (termed the 'soak'). Environmental factors (such as upwelling), or large fish (like tuna or sharks) can bring the gear towards the surface so that it becomes accessible to seabirds.

The surface longline fishery for southern bluefin tuna on the west coast of the South Island and the east coast of the North Island has the highest observer coverage; while the swordfish and bigeye tuna fisheries have lower observer coverage. During the 2017/18 fishing year: 19% of hooks

[20] Most vessels that fish using the method of surface longlining also fish using other methods for part of the year.
[21] The percentage of total effort is based on the number of hooks set between the 2015/16 and 2017/18 fishing years.

targeting southern bluefin tuna off the west coast of the South Island were observed; 11% of hooks targeting southern bluefin tuna off the east coast of the North Island were observed; and 8% of hooks targeting swordfish and bigeye tuna were observed.

Various albatross and petrel species, many of which are classified as being at 'Very High' or 'High' risk from fishing (by the latest iteration of the Seabird Risk Assessment), have been observed interacting with surface longline gear. The capture of large albatross species (*Diomeda spp*) in surface longline fisheries is a particular concern. The 2019 seabird risk assessment estimated that surface longline fisheries contributed 93% of the risk score (the percentage of annual potential fatalities[22]) for Gibson's albatross and 86% of the risk score for Antipodean albatross.

Black petrel, Southern Buller's albatross, Westland petrel and white-capped albatross are other 'Very High' or 'High' risk species that have been observed caught in surface longline fisheries. The 2019 seabird risk assessment estimated that surface longline fisheries contributed 18% of the risk score for black petrel, 19% of the risk score for Southern Buller's albatross, 31% of the risk score for Westland petrel and 7% of the risk score for white-capped albatross. Black petrels are caught only in the summer swordfish or bigeye tuna target fisheries,[23] while most white-capped albatross, Southern Buller's albatross and Westland petrel are caught in the west coast of the South Island southern bluefin tuna fishery. Few seabirds are caught in the southern bluefin tuna fishery on the east coast of the North Island.

4.4.2 Bottom longline fisheries

During the 2017/18 fishing year, approximately 100 vessels fished using the method of bottom longlining in New Zealand. The species of seabirds that are most frequently observed interacting with bottom longline vessels vary by fishery.

The 2019 seabird risk assessment estimated that bottom longline fisheries contributed 13% of the risk to Salvin's albatross, 63% of risk to Chatham Island albatross, 51% of the risk to northern giant petrel, 32% of the risk to black petrel, 53% of the risk to flesh-footed shearwater, and 18% of the risk to Westland petrel.

The set up and operations of the bottom longline fleet are diverse, but the fleet can broadly be split into two types based on the method used to bait hooks.

4.4.2.1 Hand-baiting Vessels

Most bottom longline vessels bait hooks by hand. Hand-baiting vessels are typically between 6 and 25 metres long and deploy up to 6,000 hooks per set. During the 2017/18 fishing year, hand-baiting bottom longline vessels recorded setting approximately 20 million hooks.

Hand-baiting vessels target a wide variety of species and are active around New Zealand's entire coastline—from shallow inshore waters to some offshore areas over 600 metres deep. These vessels most frequently target snapper (snapper targeting makes up 49% of the total effort primarily from Northland to the Bay of Plenty),[24] ling (ling targeting makes up 23% of the total effort and is targeted around the South Island and eastern North Island), and bluenose or hapuka (bluenose or hapuka targeting makes up 12% of the total effort and is predominantly conducted in northern waters).

[22] An estimate of the number of birds killed in fisheries each year.

[23] Black petrels are not present in New Zealand waters during the winter, so they don't face the risk of capture in the southern bluefin tuna fishery on the east coast of the North Island.

[24] The percentage of total effort is based on number of hooks set between the 2015/16 and 2017/18 fishing years.

These vessels discharge fish waste (e.g. offal and used bait) at sea. However, the quantity of fish waste discarded varies considerably depending on target species; snapper is landed whole, which results in very little fish waste whereas ling is generally processed at sea, which results in an increased quantity of fish waste.

All hook-bearing lines deployed from hand-baiting vessels are externally weighted. However, the way gear is set up varies between target species and vessel operators. For example, when targeting bluenose, operators typically add more floats to the line.

Hand-baiting vessels targeting snapper, bluenose or hapuka off northern New Zealand are known to capture black petrels and flesh-footed shearwaters. The 2019 seabird risk assessment estimated that small vessel bottom longline fisheries contributed 32% of the risk score for black petrels and 53% of the risk score for flesh-footed shearwaters.[25]

Specific analysis of observer data indicates that black petrel and flesh-footed shearwater captures on hand-baiting bottom longline vessels are more likely to occur during the haul than other seabirds in other bottom longine fisheries.[26]

Observer coverage of the hand-baiting bottom longline fleet is typically lower than that for autoline, with between 2% and 5% of hooks set observed annually. Coverage is directed towards the South Island ling and North Island snapper, bluenose or hapuka fisheries.

4.4.2.2 Autoline Vessels

Vessels that use automatic baiting machines (autoline vessels) are typically larger than hand-baiting vessels, and deploy more hooks (up to 30,000) per set. During the 2017/18 fishing year, autoline vessels recorded setting approximately 20 million hooks within New Zealand's EEZ.

Large (more than 34 m long) autoline vessels predominantly target ling in offshore waters (chiefly the Chatham Rise), or toothfish species in very deep water outside the EEZ. Smaller (less than 34 m long) autoline vessels target a wider range of species (ling, school shark, hapuka and bluenose) in coastal and offshore waters.

As of March 2019, eight autoline vessels (four large and four small) were active in New Zealand or registered to New Zealand companies. The four large vessels use an integrated weight line with a lead core of 50 grams per metre. Small autoliners weight lines externally. Three of the large autoliners operate fish-meal processing plants, turning most of their fish waste into meal. The other vessels discharge fish waste at sea.

Observer coverage of the autoline bottom longline fleet varies between fisheries and vessels. The large autoline fleet that targets toothfish species outside the EEZ has 100% observer coverage, with very low observed seabird capture rates. The large autoline fleet that targets ling within the EEZ has been moderately well observed (approximately 15% of hooks set were observed between the 2006/07 and 2017/18 fishing years). However, the small autoline fleet has not been as well observed (fewer than 5% of hooks set are observed each year).

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[25] The risk assessment does not differentiate between hand-baiting and autoline vessels. It does, however, distinguish between the small vessel (less than 34 m) and large vessel (greater than 34 m) bottom longline fleets. The delineation is intended as a proxy for hand-baiting and autoline vessels but the smaller autoline vessels are included within the small vessel bottom longline fleet. Numbers provided are based on small ling BLL, snapper, hapuka, minor species, and bluenose target BLL.

[26] Since the start of the 2008/09 fishing year 44% of the black petrel and 34% of the flesh-footed shearwaters that were observed captured on hand-baiting bottom longline vessels were released alive. As they were released alive, it is assumed they were caught during the haul, not during the set. By comparison, 8% of white-chinned petrels observed caught on large autoline vessels during this time were released alive, indicating that most captures occurred during the set.

Seabird capture rates by large (more than 34 m long) autoline vessels are typically low (between 0.01 and 0.02 seabirds per 1,000 hooks). White-chinned petrel is the most frequently caught species, although the 2019 seabird risk assessment estimates a 'Low' risk to the population from fishing.

The large vessel ling bottom longline fishery is estimated to pose a negligible risk to all New Zealand seabird species.

4.5 Commercial Trawl Fisheries

Trawling involves using cables called warps to tow a net (or nets) at depth behind a vessel.

When seabirds collide with trawl warps, they can be injured or die, especially larger species like albatross. If seabird wings are injured, the seabird may be unable to forage, which can lead to death. Some seabirds drown when the trawl warps force them underwater. Grease, or similar substances, applied to warps can get transferred onto seabirds, damage their feathers and exacerbate the risk of capture. Seabirds that are injured or killed in interactions with warps are not always retained and counted as an observed capture. This mortality is known as 'cryptic mortality' and remains a key area of uncertainty in relation to understanding mortality from seabirds resulting from trawl fishing.

There is an increased risk of collisions between seabirds and trawl warps if the discharge of fish waste attracts seabirds towards risk areas where the trawl warps enter the water. Managing fish waste[27] and deploying warp mitigation devices that scare or deter birds from risk areas (such as bird bafflers or tori lines) can reduce the risk of seabirds colliding with trawl warps.

Seabirds can also be caught by trawling if they get tangled in trawl nets. This can happen when the net is on, or close to, the sea surface typically during deployment of the gear (shooting) or hauling. Smaller seabirds (such as petrels or shearwaters) can get trapped inside the net when they dive into its mouth, while other species (such as albatrosses) may get tangled in the net mesh when they try to seize fish from the net. The risk of seabirds getting caught in the net is reduced if fish are removed from the net before shooting (the term for fish stuck in nets is 'stickers') and the time the net spends at, or near, the surface is minimised.

Between the 2013/14 and 2017/18 fishing years, approximately 88% of observed captures on deepwater trawl vessels were classed as 'net captures'. Of those, 40% of the seabirds were released alive, although post-release survival rates are unknown. The number of seabirds observed to be caught in the net greatly exceeds those observed to be caught by warps.[28] However, before drawing firm conclusions about which capture type poses a greater risk to seabirds, cryptic mortality and the comparative risks of trawl and net captures on less well-observed trawl fleets must be considered.

4.5.1 Types of Trawl Vessels

Three trawl fleets are active within New Zealand: large trawl vessels (more than 28 m long), small trawl vessels (less than 28 m long) and scampi trawl vessels.

As of March 2019, there were 37 vessels in the large trawl fleet. These vessels mostly target middle-depth species (such as hoki or squid) or deepwater species (mainly orange roughy or oreo) in offshore waters. Some vessels may also target inshore species (such as snapper or trevally, particularly around the North Island). The large trawl fleet conducts approximately 25,000 fishing

[27] Fish waste can be managed by processing it into fish meal, mincing it, discharging it in batches or restricting its discharge.

[28] Between the 2013/14 and 2017/18 fishing years 88% of observed captures on deepwater trawl vessels were classed as 'net captures'; 8% were classed as 'warp captures'; and 4% were classed as 'other' (this includes birds that were caught on the paravane or were tangled in a mitigation device).

events (tows) each year. Many large trawlers undertake some on board processing; therefore, they generate more fish waste than other vessels. This fish waste is either turned into fishmeal, minced and discharged, or discharged in batches. Eighteen vessels in the large vessel trawl fleet have on-board meal plants, which reduces the quantity of fish waste to be discharged.

As of March 2019 there were approximately 140 vessels in the small vessel trawl fleet. These vessels operate in coastal waters around the entire coastline, typically targeting inshore species. The small trawl fleet conducts between 50,000 and 60,000 tows each year. They may also seasonally target middle-depth species such as hoki. Small trawlers keep fish whole (green), although they may process bycatch species (such as ling or school shark) at sea.

As of March 2019, the scampi trawl fleet comprises 10 vessels that almost exclusively target scampi.[29] These vessels are between 20 and 32 m long and use specific scampi gear (lightweight, multi-rig nets). The scampi fleet typically conducts 4,500 to 5,000 tows per year.

Although most scampi are retained whole, scampi fishing incurs high rates of fish and invertebrate bycatch, which results in relatively high rates of fish waste being discharged. The discharge of fish waste attracts seabirds to the vessel, increasing the risk of seabird captures. Multi-rig nets also stay on the water's surface longer during hauling, which can increase the risk of seabirds getting caught in the net.

4.5.2 Observer Coverage

The rates of observer coverage vary between the three trawl fleets. The large trawl fleet has been consistently well observed: more than 40% of all tows by large trawlers were observed between the 2013/14 and 2017/18 fishing years. Specific target fisheries (such as southern squid, jack mackerel and southern blue whiting) have noticeably higher levels of observer coverage (up to 100% of tows).

The rate of observer coverage of the small trawl fleet is much lower (approximately 5% of tows between 2013/14 and 2017/18). It has increased in recent years, but remains highly skewed towards northern waters and seasonal hoki fisheries.

The rates of observer coverage of the scampi trawl fleet are also relatively low: coverage rates varied between 3% of tows in 2015/16 and 12% in 2017/18.

4.5.3 Risk to Seabirds

The trawl fleet is active throughout New Zealand's EEZ, and a wide variety of seabird species are known to interact with, and be captured by, commercial trawl vessels. Seabird interactions with the trawl fleet are best characterised for large vessel fisheries, as they are the ones most commonly observed. Seabird capture rates by the large trawl fleet are highest in the southern squid and Chatham Rise or sub-Antarctic middle-depth fisheries. Seabird capture rates are lowest in the deepwater and jack mackerel fisheries.

Of the species classed as being at a 'Very High' or 'High' risk from fishing, large trawlers (excluding those targeting scampi) are estimated to contribute 34% of the risk score for Salvin's albatross; 62%

[29] Some vessels may also target other deepwater species or inshore species, or switch to different fishing methods.

of the risk score for southern Buller's albatross; 18% of the risk score for Westland petrel; and 35% of the risk score for white-capped albatross.[30]

Less is known about seabird interactions with the small trawl fleet, because the fleet is not well observed and observer coverage is biased towards areas or fisheries where lower rates of seabird captures would be expected.[31] Observed capture rates are unlikely to be representative of the total number of seabirds captured, as seabird captures are thought to be more frequent in certain areas or seasons when there is often less observer coverage. The estimated number of seabirds caught by small trawlers is highly uncertain.

For species classed as being at a 'Very High' or 'High' risk from fishing, the estimated contribution from small trawlers to the overall risk is shown in the table below.

Species	Proportion of risk estimated from inshore trawl
Black petrel	46%
Salvin's albatross	39%
Flesh-footed shearwaters	31%
Westland petrel	29%
Southern Buller's albatross Gibson's albatross	<10%

Although observer coverage of the scampi trawl fishery is relatively low, the current estimates of seabird interactions in this fishery are thought to be reasonably accurate. This is because the scampi fishery is limited to five small areas (more than 99% of scampi target tows are conducted in these areas) and the observer coverage is relatively representative of the whole fishery.

Seabird species known to interact with the scampi trawl fleet include Salvin's albatross and white-capped albatross (primarily on the Chatham Rise and in the sub-Antarctic); flesh-footed shearwaters (in the Bay of Plenty); and white-chinned petrel (in the sub-Antarctic). The 2019 seabird risk assessment estimated that the scampi trawl fleet contributes 12% of the risk score for Salvin's albatross, 6% of the risk score for flesh-footed shearwater and 3% of the risk score for white-capped albatross.

4.6 Commercial Set Net Fisheries

Set nets (also known as gill nets) are a threat to diving seabirds (such as penguins, shags and petrels) due to the risk of them getting tangled, and drowning, in the nets while they forage for food. Depending on the seabird species, and how the nets are fished, seabirds can get captured when the net is deployed (set or hauled) or when soaking (while the gear is being used for fishing). Nets set close to breeding colonies and within key foraging areas are considered to pose the greatest risk to seabirds, particularly penguins.

A broad range of fish species are targeted using set nets. The areas fished, net configuration, and operational practices used vary according to the fish species being targeted. Flatfish and mullet are

[30] Contributions to risk based on hoki, middle depth, squid, scampi, deepwater, ling, hake, southern blue whiting, and jack mackerel trawl APF estimates. This includes some effort by small trawl vessels.

[31] Small (less than 28 m long) trawlers in areas and fisheries with relatively high levels of observer coverage include the inshore trawl fishery off the west coast of the North Island and seasonal (winter) hoki fisheries in the Cook Strait or on the west coast of the South Island.

targeted by relatively small (less than 13 m long) vessels within enclosed waters, such as estuaries. This activity is thought to present a low risk to seabirds.

A second set net fleet operates in coastal waters. It primarily targets sharks, although warehou, ling or tarakihi are also targeted. These vessels are larger (up to 22 m long) and use longer nets,[32] with some vessels using multiple nets per fishing event. The coastal set net fleet operates around most of the coast of New Zealand (noting that a number of exclusions zones are in place for marine mammals).

A third set net fleet targets butterfish using multiple, short (20 m) nets. These nets are typically set very close to the shore and can present a very high risk to seabirds if they are used near seabird colonies. During the 2017/18 fishing year, approximately 30 vessels targeted butterfish this way, mainly in Cook Strait and around the south coast of the South Island.

The rates of observer coverage of set net fisheries are mixed. The coverage in some areas (such as around New Plymouth) has been high (100%) for some years, moderate (up to 30% of nets set) in some areas (such as the south and east coasts of the South Island), and low to nil in other areas or sectors (such as in Cook Strait or enclosed waters like estuaries). Overall, observer coverage in set net fisheries has averaged around 3.5% of nets set over the 2013/14 to 2017/18 fishing years.

In recent years, yellow-eyed penguins, Fiordland crested penguins, little blue penguins, Stewart Island shags, flesh-footed shearwaters and cape petrels have been observed caught in set nets. However, it is difficult to infer the number and rate of seabird captures in set net fisheries around New Zealand, because observer data is limited and not representative.

4.7 Other Commercial Fisheries

Observer data, fisher reports and research indicate that seabirds occasionally die in other commercial fisheries, including trolling, potting, and purse seining. Diving seabirds, like shags, can get trapped in fish or lobster pots while they forage for food,[33] while others, like gannets, can get hooked or tangled up in the line after diving on trolling lures. Internationally, seabirds are known to get caught in purse seine fisheries; however, between 2004/05 and 2017/18 only eight seabirds were observed caught during purse seine operations in New Zealand, and six of these were released alive. During this time, approximately 10% of purse seine fishing events were observed.[34]

[32] Regulations provide for most fishers to use up to 3,000 metres of nets.

[33] Shags captured in pot fisheries have historically been reported from the Chatham Islands; however, changes to pot designs are thought to have reduced the risk of capture. Wildlife Management International Limited. (2012). *Shag interactions with commercial rock lobster pot and trap fishing methods in the Chatham* Islands. WMIL: Marlborough, New Zealand. Retrieved from https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/int-2011-02-shag-pot-interaction-final-report.pdf

[34] Suazo, C. G., Oliveira, N., Debski, I., Mangel, J, C., Alfaro Shigueto, J., Azocar, J., García-Alberto, G., & Velarde, E. (2017). *Seabird bycatch in purse seine fisheries: Status of knowledge and mitigation measures*. Agreement on the Conservation of Albatrosses and Petrels. Eighth Meeting of the Seabird Bycatch Working Group. Wellington, New Zealand. 4–6 September 2017. Retrieved from https://www.acap.aq/en/working-groups/seabird-bycatch-working-group/seabird-bycatch-wg-meeting-8/sbwg8-information-papers/2917-sbwg8-inf-26-seabird-bycatch-in-purse-seine-fisheries-status-of-knowledge-and-mitigation-measures-summary-only/file

4.8 Non-commercial Fisheries

Recreational fisheries are an important component of New Zealand's nearshore fisheries, with just under 20% of New Zealanders fishing recreationally every year.[35] The recreational take of some species in inshore finfish fisheries is estimated to be similar to the commercial harvest. However, the number of hooks and nets used in recreational fishing (the fishing 'effort') is unknown.

Set net and hook-and-line fisheries present the greatest recreational fishing risk to seabirds. In set net fisheries, diving seabirds can get tangled up and drown in the net while foraging for food. The greatest risk to seabirds from set net fisheries is when the nets are used in coastal waters near seabird colonies. Seabirds are captured in hook-and line-fisheries by getting tangled up in, or hooked by, fishing gear. Seabirds are at the greatest risk of capture when light tackle or drifting fishing gear is used in coastal waters with high numbers of gulls or petrels present. Hook-and-line fishers operating on vessels encounter more seabird species than those fishing from land.

Research in southern New Zealand shows that various shag and penguin species are captured in non-commercial set nets.[36] However, it is difficult to infer the nature and extent of seabird deaths in these fisheries because of limited data on captures elsewhere in the country, or on the total recreational set net fishing effort.

A New Zealand study published in 2010 quantified the number of seabirds caught by non-commercial fishers by surveying fishers returning from fishing trips and observer coverage of charter vessels carrying recreational fishers.[37] The surveys were mainly done in the Hauraki Gulf, which has the most intense recreational fishing in New Zealand. The types of seabirds most commonly observed and reported caught were petrels (including shearwaters) and gulls. The study estimated that up to 40,000 seabirds may be caught by recreational fishers each year. However, 77% of seabirds reported caught by recreational fishers were released alive (although the post-release survival rates are unknown).

Two recent Fisheries New Zealand surveys of the New Zealand public on recreational fishing activity and catch asked questions about incidental seabird captures. The results of the 2017/18 Recreational Panel survey were recently released.[38] The survey asked fishers about seabirds disrupting their fishing activity, and what types of seabirds were involved in any disruption. Around 25% of respondents reported that seabirds had disrupted their fishing, primarily through chasing and grabbing baits. It should be noted that this was a separate category to seabirds being hooked or tangled. The most common types of seabirds reported were gulls and shags.

4.9 Fisheries outside New Zealand's EEZ

The threats from fishing to seabirds that breed in New Zealand are not limited to the operations of New Zealand vessels in waters under New Zealand jurisdiction. Seabirds are also threatened by the operations of New Zealand and foreign-flagged vessels on the high seas, or by the operations of commercial, recreational or artisanal fishers in waters under the jurisdiction of other states.

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[35] Sport and Recreational New Zealand (SPARC). (2008). *Sport, recreation, and physical participation among New Zealand adults: key results of the 2007/08 Active NZ Survey*. SPARC: Wellington.

[36] Abraham, E. R., Berkenbusch, K. N., & Richard, Y. (2010). *The capture of seabirds and marine mammals in New Zealand non-commercial fisheries*. New Zealand Aquatic Environment and Biodiversity Report No. 64. Retrieved from https://fs.fish.govt.nz/Doc/22393/AEBR_64.pdf.ashx

[37] Ibid

[38] National Research Bureau Ltd (2019). Exit Survey from 2017/18 National Panel Survey. (In press)

New Zealand has extended its seabird risk assessment methodology to RFMO-reported surface longline fishing effort outside the New Zealand EEZ.[39] This study found that black petrel and Antipodean albatross were the New Zealand species at greatest risk from surface longline fishing outside the New Zealand EEZ. This work will be updated regularly as new or improved data become available. The risks that other commercial fishing methods pose to seabirds that breed in New Zealand but venture outside the New Zealand EEZ haven't been quantified.

4.10 Impact of Incidental Capture on Seabird Species

Several population characteristics of albatrosses and petrels make them susceptible to long-term population decline as a result of anthropogenic mortalities. Albatrosses and petrels typically become sexually mature late (between 3 and 15 years old) and produce a maximum of one chick per year. If a breeding individual dies, the egg or chick almost always fails or dies, and the remaining partner may wait several years before nesting with a new partner. Some other species of seabirds, such as some shags and penguins, breed more prolifically and are therefore more resilient.

4.11 Other Threats to Seabirds

In addition to incidental death from fisheries, many species of seabirds face other threats to their survival. These threats include predators (mainly mammals), ocean plastic, degraded nesting habitats caused by introduced animals, reduced food supply, catastrophic events (such as storms or earthquakes), disease and climate change.

Other risks to seabirds—which partly arise from fishing but are shared across all vessel activities at sea and with offshore platforms—are colliding with vessels' or platforms' superstructures (this may cause death) or landing on vessels or platforms and being unable to leave without assistance (this is called 'deck landings' or 'deck strike'). The risks of collisions or deck landings are thought to be exacerbated by bright, artificial lights in low visibility (such as navigation lights in fog). Although collisions and deck landings are reported by vessel operators and observers, these causes of death are not included in the seabird risk assessment.

The NPOA-Seabirds 2020 focuses on threats to New Zealand seabirds from fishing activities and operations. However, to determine which actions to prioritise, the cumulative effects of non-fishing impacts on a species must also be considered. When a species is known to be significantly adversely affected by activities other than fishing, reducing the threat from fishing may be an important factor in reducing the species' overall risk of population decline.

5. Bycatch Mitigation in Commercial Fisheries

The New Zealand commercial fishing fleet has diverse operational practices. Likewise, when seabirds interact with fishing operations, different species display different behaviours. Therefore, applying rigid 'one-size-fits-all' seabird bycatch mitigation strategies may produce suboptimal results. Tailoring strategies to specific operational situations is critical to reducing the risk of seabird capture.

[39] Abraham, E., Roux, M-J., Richard, Y., & Walker, N. (2017). *Assessment of the risk of southern hemisphere surface longline fisheries to ACAP species.* Western and Central Pacific Fisheries Commission, Scientific Committee, Thirteenth Regular Session. Rarotonga, Cook Islands. 9–17 August 2017. Retrieved from https://www.wcpfc.int/node/29579

5.1 Legislative requirements

In the mid-2000s, the then Ministry of Fisheries considered imposing wide-ranging mandatory legislative options on some fleets to mitigate the risk they posed to seabirds. The legislative option subsequently approved by the Minister of Fisheries in 2009 involved amending regulations to empower the Chief Executive to issue circulars specifying general criteria for seabird mitigation measures that could be applied to classes of vessels or specific vessels.[40]

The policy intent behind the regulations was that vessel-specific measures would only be applied if adherence to mitigation measures, whether required by legislation or non-regulatory, was unsatisfactory. The incentive was for fishers to voluntarily comply with all relevant measures to avoid having vessel-specific measures, with associated conditions, applied.

To date, three method-specific circulars have been issued. The option to issue vessel-specific circulars remains and would be considered in the event of a clear lack of adherence to mitigation measures.

5.1.1 Trawl

The Seabird Scaring Devices Circular 2010 applies to trawlers greater than or equal to 28 metres in overall length.[41] The circular requires this class of vessel to deploy one of three types of seabird scaring device: paired streamer lines (also referred to as tori lines); bird bafflers; or warp deflectors.

The circular contains specifications for each type of seabird scaring device.

5.1.2 Surface longline

The Fisheries (Seabird Mitigation Measures – Surface Longlines) Circular 2018 applies to any commercial fisher when setting surface longlines.[42] The circular requires fishers to use a streamer line, and *either* set at night, *and/or* use a prescribed line weighting regime. The circular contains streamer line specifications that vary depending on the length of the vessel.

5.1.3 Bottom longline

The Fisheries (Seabird Mitigation Measures – Bottom Longlines) Circular 2018 applies to commercial fishers using the bottom longline method on vessels greater than or equal to 7 metres in overall length.[43] It requires the use of a streamer line while setting, and night setting unless a defined line weighting regime is followed. The circular contains streamer line specifications that vary depending on the length of the vessel.

5.2 Collaborative Approaches to Implementing Bycatch Mitigation

Liaison officers have been involved in helping to promote communication and awareness of best practice operations within fishing fleets since the early 2000s. The role of liaison officers is to assist fishers with protected species bycatch avoidance and mitigation measures. This includes providing advice, training and education materials, and advising on updated research. The programmes also create a conduit between government and fishers, which helps fishers and aids delivery on government management objectives for protected species.

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[40] Regulation 58A of the Commercial Fishing regulations

[41] The circular is available at https://www.fisheries.govt.nz/dmsdocument/20321-seabird-scaring-devices-circular-2010-no-f517

[42] The circular is available at http://legislation.govt.nz/regulation/public/2018/0213/latest/LMS95828.html?src=qs

[43] This circular is available at https://www.fisheries.govt.nz/dmsdocument/20324-fisheries-seabird-sustainability-measuresbottom-longlines-circular-2010-no-f541

Currently, two liaison programmes are in operation. One is run by the Deepwater Group Ltd with support from Fisheries New Zealand, the other by the Department of Conservation.

5.2.1 Deepwater Group liaison programme

Deepwater Group Ltd[44] has operated a protected species bycatch mitigation programme for the deepwater fisheries sector since the mid-2000s. The programme's initial focus was on seabirds but subsequently extended to all protected species.

The Deepwater Group's programme utilises two Nelson-based staff and covers the following fleets:

- >28m trawlers
- Scampi trawlers
- Ling bottom longliners that target ling in quota management areas LIN 2 – LIN 7[45]
- Coastal hoki trawlers

Although the deepwater fleet is relatively small,[46] and its fishing activities are relatively homogeneous compared with the inshore sector, deepwater fishing takes place throughout the year and in areas of differing seabird activity. Over the life of the programme, the bycatch management and mitigation process has evolved to include: management plans that are specific to each vessel;[47] outreach services; and an auditing and review process supported by Fisheries New Zealand.[48]

5.2.2 DOC liaison programme – Inshore and Highly Migratory Species focused

Compared with the deepwater sector, the inshore sector has more fishing methods (trawl, Danish and purse seine, longline and set net), more vessels (over 400, compared with less than 50 deepwater vessels), and poses more risks to protected species. However, the principles of engaging at the fleet level and the vessel level are similar to the deepwater fleet.

In 2014, the Department of Conservation (DOC) began a multi-year Protected Species Liaison Project with some small bottom longline vessels operating in northern New Zealand.[49] The project uses similar processes to the Deepwater Group's programme with contracted liaison officer helping operators develop a protected species risk management plan (PSRMP)[50] for their vessels. PSRMPs are based on Operational Procedures and Mitigation Standards (refer to section 5.3.2), and they set out actions the skipper and crew will take to reduce the risk posed to seabirds by the vessel operations.

As of 2018/19, the DOC programme has four part-time liaison officers and a coordinator. The liaison officers are based in the regions and each officer covers inshore vessels/methods in the following regions:

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[44] Deepwater Group Ltd represents most deepwater species quota holders.

[45] Information on quota management system and quota management areas can be found here.

[46] As of April 2019 there were 47 vessels in the core deepwater fleet (all bottom longline vessels more than 34 metres long; all trawl vessels more than 28 metres long that regularly target deepwater species; and all vessels that target scampi).

[47] Vessel-specific vessel management plans are not yet in place for the ling bottom longline fleet.

[48] Deepwater Group Operational Procedures are available at https://deepwatergroup.org/newsresources/op-manual/

[49] The report of a review of the Protected Species Liaison Coordination project is available at: https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/reports/mit2017-01-ps-liaison-coordination-draft-final.pdf.pdf

[50] PSRMPs can take a number of forms and can be referred to as simply Risk Management Plans (RMP) or in the deepwater, they are commonly known as Vessel Management Plans (VMPs).

- Coromandel and Northland:
  - trawl, bottom longline, surface longline, and set net methods.
- Bay of Plenty and Auckland:
  - trawl, bottom longline, surface longline, and set net methods.
- West Coast region of the South Island (up to Mokau on the West Coast of the North Island), and the east coast from Timaru (north as far as Mahia):
  - trawl, bottom longline, surface longline, and set net methods.
- Canterbury, Otago and Southland:
  - trawl and set net methods.

The DOC programme is partly cost-recovered from quota holders as part of the Conservation Services Programme component of fisheries cost recovery levies, and partly Crown-funded.

Around 150 vessels now have an initial PSRMP, so a large proportion of the liaison work is concentrated on reviewing, auditing, and updating plans, responding to on the water issues, and working with skippers and vessel owners to avoid seabird bycatch. The number of PSRMPs (or analogous vessel-specific documents) in place across both the deepwater and inshore sectors, and information on the level of adherence to such plans, is provided in section 6.

Fisheries Inshore New Zealand (FINZ)[51] has recognised the success of these fishery-based programmes. FINZ has committed to supporting DOC in developing and implementing programmes for inshore fleets that pose a risk to seabirds and other protected species. Through the NPOA-Seabirds 2020, seabird risk management processes for all fisheries will be aligned. This work will use lessons learnt to implement a consistent, transparent and effective seabird bycatch mitigation programme.

5.3 Implementing the NPOA-Seabirds 2020 Bycatch Mitigation Process

To address the risks faced by seabirds, the process under the NPOA-Seabirds 2020 will combine regulatory and other agreed (but non-mandatory) bycatch mitigation measures, and apply them on a vessel-specific basis. This approach focuses on education, partnering to find innovative solutions to reduce risk to seabirds, and ensuring that all fishers know how and are taking all practicable steps to avoid seabird bycatch. The intention is to increase the fishing industry's 'buy-in', maximise uptake of the measures, and allow individual and innovative approaches to be used.

Under the NPOA-Seabirds 2020, bycatch mitigation will focus on trawl, longline and set net fisheries. PSRMPs may be developed for the Danish seine fleet but not for other fishing methods.

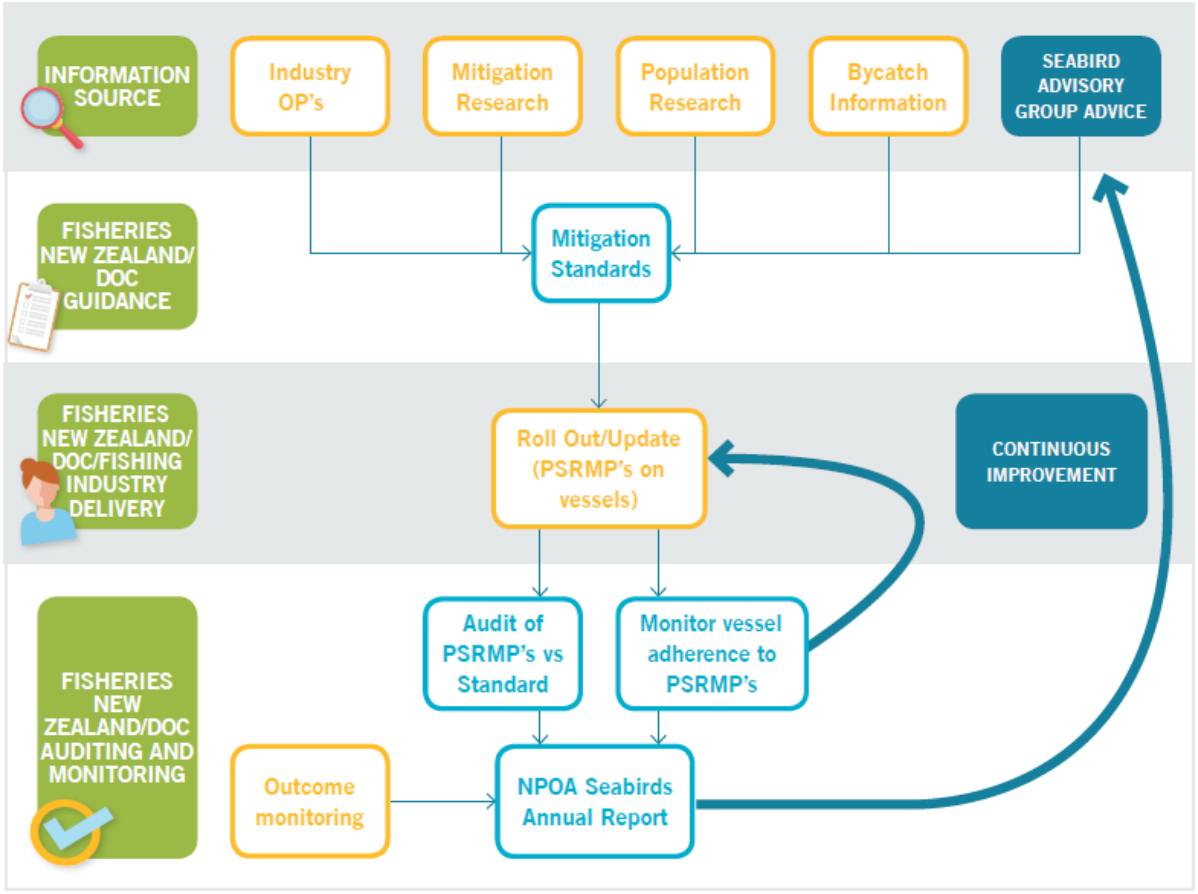
Each PSRMP will set out the primary mitigation measures and contingency plans that will be used on a vessel. Each plan will be reviewed regularly to account for changes in a vessel's operations, or to incorporate advances in seabird risk mitigation measures.

PSRMPs will be developed with guidance from liaison officers, alongside fleet-wide Operational Procedures and government Mitigation Standards.

The NPOA-Seabirds 2020's seabird bycatch mitigation process is displayed in Figure 1, and described in more detail in the following sections.

[51] Fisheries Inshore New Zealand (https://www.inshore.co.nz/) represents inshore and highly migratory species quota and annual catch entitlement holders.

Figure 1: NPOA-Seabirds 2020 bycatch mitigation process



5.3.1 Information Sources

5.3.1.1 Research and Bycatch Information

Research on possible mitigation options, biological information on population status and trends, outputs from updated risk assessments, and information on bycatch events and circumstances will contribute to updates of the Mitigation Standards as appropriate. This may include new mitigation practices, or a renewed focus on a particular area or species where information suggests that risk may be higher than previously estimated.

5.3.1.2 Industry Operational Procedures (Industry OPs)

The fishing industry develops Operational Procedures, which are documents that describe bycatch mitigation for specific fleets. These are developed in consultation with Fisheries New Zealand and DOC.[52]

The Operational Procedures state mandatory mitigation measures and other strategies that the fleet has agreed to take (for example, sharing information about 'hotspots' and captures). The Operational Procedures also describe mandatory and non-mandatory (trigger point) reporting requirements; the process to audit vessel adherence to PSRMPs and Operational Procedures; and the process to review vessel PSRMPs.

[52] FINZ plans to upload the inshore fisheries sector's operational procedures onto its website in the near future. Operational procedures for deepwater fisheries are available on their website at https://deepwatergroup.org/newsresources/op-manual/

5.3.1.3 10 Golden Rules

Forming part of industry Operational Procedures is the '10 Golden Rules', which explains to crew members that they must 'Look…Think...Act'" in terms of protected species mitigation. The rules are posted in a prominent position, such as the wheelhouse, as a constant reminder of what to consider during fishing operations.

5.3.2 Fisheries New Zealand/Department of Conservation guidance

5.3.2.1 Mitigation Standards

The diversity of vessel size, on-board equipment, and operational practices means that bycatch mitigation practices may differ across vessels. To ensure consistency in the bycatch mitigation practices used, and to help vessel crews develop their PSRMPs, Fisheries New Zealand and DOC have agreed Mitigation Standards in consultation with the Seabird Advisory Group.

Mitigation Standards are written for a fishing method and vessel size combination, and are grouped by the desired outcomes of bycatch mitigation practices. For example, the desired outcomes for trawl vessels more than 28 m long are:

1. The discharge of fish waste from the vessel is managed so as not to attract seabirds to risk areas
2. The risk to seabirds from trawl warps is minimised
3. Seabird attraction towards, and access to, trawl nets is minimised. If seabirds do access nets, the risk of harmful interactions is minimised
4. The risk of deck landings or impacts against the vessel is minimised.

Each document details the Mitigation Standards necessary to achieve each desired outcome, and the equipment or operational practices that are needed to meet each Standard. For example, there are two Mitigation Standards needed to achieve desired outcome 1 for trawl vessels more than 28 m long:

> Mitigation standard 1.1: Fish waste is not discharged from the vessel during shooting or hauling.
>
> Mitigation standard 1.2: Any fish waste discharged whilst the net is being towed must be either minced or batch discharged.

The Mitigation Standards take into account global and domestic research on effective mitigation strategies. They will be regularly reviewed and updated to accommodate new research findings and feedback from at-sea monitoring. This will ensure continuous improvement of the mitigation of seabird captures.

Mitigation Standards have been developed for:

- >28m trawlers
- <28m trawlers
- Scampi trawlers
- Autoline bottom longliners
- Hand-baiting bottom longliners
- Surface longliners
- Set netters[53]

[53] The set net mitigation standard will be reviewed during the first year of operation of the amended NPOA.

5.3.3 Delivery

5.3.3.1 Roll Out, Update, and Implementation of Protected Species Risk Management Plans

Liaison officers will help vessel operators develop and review a PSRMP (or analogous risk management plan) for each vessel in the relevant fleet. [54] The PSRMP will use vessel operator knowledge and expertise of vessel operations, the best available information on seabird behaviour, risk mitigation research findings, and the Mitigation Standards.

PSRMPs will be prepared from a template, so they are consistent and can be audited against the Mitigation Standards.

For fisheries that already have PSRMPs, or equivalent documents, in place across the entire fleet (this applies to the more than 28 m long trawl, scampi trawl and surface longline fisheries), the focus will be on monitoring at-sea adherence with plans, and reviewing the content of the plans. The proposed plan to implement PSRMPs across the remaining fleets is summarised in Table 2.

[54] Further information on DOC's activities is available in the *Conservation Services Programme Annual Plan 2018/19* available at: https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/plans/csp-annual-plan-2018-19.pdf 2017/18

Table 2: Implementation plan for DOC's protected species liaison project

Areas[55]	***Vessels operational 2016 - 2018***[56]	***Financial year***		
		2018/19	***2019/20***	***2020/21***
		Number of plans in place[57]	**- Liaison officer expansion: additional LO for north and central areas (focus on set net) and possible additional LO for southern areas (dependent on outcome of Hector / Maui TMP)** **-Review all existing plans for consistency with Mitigation Standards**	**- Review all existing plans for consistency with Mitigation Standards** **- Audit and review**
North East (FMA1)				
Set net	*37*	*2*	- Minimum of ~20 new set net, trawl and part time bottom longline vessels into programme.	- Remaining set net, trawl and Danish seine vessels to be brought into the programme.
Trawl	*21*	*16*		
Bottom longline	*43*	*37*		
Danish seine	*12 (entire North Island)*	*2*		
North West (FMA9)				
Set net	*50*	*0*	- Minimum of ~20 new harbour set net vessels brought into the programme (dependant on Hector / Maui TMP outcome).	- Remaining set net vessels brought into the programme
Central East (FMA2)				
Set net	*13*	*0*	- Minimum of ~15 new set net, trawl and part time bottom longline vessels into programme.	- Remaining trawl and set net vessels to be brought into the programme
Trawl	*25*	*10*		
Bottom longline	*10*	*9*		
Central West (FMA8)				
Set net	*16*	*0*	- Dependant on Hector / Maui TMP outcome	- All remaining trawl, set net and bottom longline vessels brought into the programme
Trawl	*4*	*0*		
Bottom longline	*3*	*0*		

[55] The areas referred to broadly correspond to Fishery Management Areas (FMAs)
[56] Indicative numbers only
[57] As above

Areas[55]	*Vessels operational 2016 - 2018*[56]	*Financial year*		
		2018/19	*2019/20*	*2020/21*
		Number of plans in place[57]	**- Liaison officer expansion: additional LO for north and central areas (focus on set net) and possible additional LO for southern areas (dependent on outcome of Hector / Maui TMP)** **-Review all existing plans for consistency with Mitigation Standards**	**- Review all existing plans for consistency with Mitigation Standards** **- Audit and review**
South East (FMA3)				
Set net	*24*	*7*	- Remaining trawl and harbour set net vessels brought into the programme. - Contact made with harbour set net vessels.	- Danish seine, and any remaining vessels, brought into the programme
Trawl	51	47		
Bottom longline	0	0		
Danish seine	5 (entire South Island)			
South West (FMA7)				
Set net	1	0	- Remaining trawl, set net and bottom longline vessels brought into the programme	
Trawl	19	9		
Bottom longline	5	0		
Southern South Island (FMA5)				
Set net	6	2	- Remaining trawl, set net and bottom longline vessels brought into the programme	
Trawl	9	7		
Bottom longline	1	0		

5.3.4 Auditing of PSRMPs

Fisheries New Zealand and DOC will regularly compare PSRMPs to the Mitigation Standards to ensure that vessel operators are using practices that best mitigate the risk to seabirds. The results of these comparisons will be reported at least annually and be used to inform updates or revisions of the Mitigation Standards.

The results of reviews will be reported in the publicly available NPOA-Seabirds Annual Report along with data on seabird captures and capture rates. The information, alongside any new research and/or risk assessment outputs, will be considered by Fisheries New Zealand and DOC in consultation with the Seabird Advisory Group and an assessment made on any updates required to the Mitigation Standards, or Operational Procedures, or whether to amend priorities for management and liaison activities.

5.3.5 Monitoring and feedback

At-sea monitoring is an essential component of the success of liaison programmes. At present, most deepwater fisheries have relatively high observer coverage, which creates the feedback loop that helps to drive change across the fleet. Achieving high levels of observer coverage in inshore and highly migratory species fisheries is inherently difficult due to a number of constraints. In these fisheries, alternative monitoring methods are currently being explored. This includes ongoing camera trials in the snapper bottom longline fishery, which aims to help us better understand the risks of black petrel interactions with this fleet.

Fisheries New Zealand expects that over the next few years, monitoring capabilities will be enhanced significantly. Already, electronic reporting has resulted in the more timely delivery of information to Fisheries New Zealand from vessels. The provision of more timely information allows Fisheries New Zealand to monitor seabird bycatch and mitigation use in real time, thereby improving the ability of Fisheries New Zealand to respond to seabird capture events. For example, Fisheries New Zealand can inform liaison officers of significant capture events on unobserved vessels and prioritise observer coverage in the short term onto those vessels reporting high seabird capture rates and/or operating in higher risk areas (so as to assess at-sea adherence to the PSRMP).

By the end of the five year term of this NPOA, the information available on fisher adherence to mitigation measures and seabird captures will enable Fisheries New Zealand to review and, if necessary, strengthen the legislative requirements. It will also allow for consideration of different ways of measuring seabird bycatch.

5.3.5.1 Trip-based feedback loop

Whenever a Fisheries New Zealand observer undertakes a trip on a vessel with a PSRMP or Operational Procedures on board, one of the observer's key tasks is to audit adherence to either the PSRMP or the relevant OP. Fleet-specific audit forms have been developed for this purpose.

Observers may also be debriefed by Fisheries New Zealand staff after a trip. Debriefs can include discussing the audit form and any points of interest during the observers' time on board the vessel.

The aim of the audit process is to monitor adherence to the vessel's PSRMP and fleet Operational Procedures, and also to provide feedback to liaison officers and vessel operators and crew. Vessels may only be in port for a few days a year and crews may change during the port call. Therefore, feedback that may result in an action, such as buying new materials or making physical changes to parts of a vessel or operations, needs to be provided in a timely manner.

In order to close the feedback loop, liaison officers are provided details of the audit and debrief so that they can follow up with the manager or crew of the vessel. Annual summaries of audits will be published in the NPOA-Seabirds Annual Report.

If a vessel is repeatedly observed to be not adhering to its PSRMP, Fisheries New Zealand would consider specifying vessel-specific mitigation measures under Regulation 58A of the Commercial Fishing Regulations.

The generic examples below illustrate how the trip-based feedback loop operates.

Example 1

An observer audit indicates that components of a tori line need replacing. The liaison officer will inform the vessel operator and offer assistance in sourcing materials prior to the next trip.

Example 2

An observer audit notes that crew were not clearing stickers from the trawl net as diligently as they could have been. This feedback will be provided to the vessel operator so they remind crew on the next trip to address this issue, or develop new processes and procedures to ensure the crew are fully implementing the PSRMP.

5.3.5.2 Triggers (real-time management of events)

Each PSRMP or OP sets out "trigger points". Trigger points are a real-time capture reporting threshold system. If a trigger is reached, the skipper is expected to notify the relevant liaison officer within 24 hours.[58] If a Fisheries New Zealand observer is on a vessel, the same process applies; reaching a trigger means the observer must also notify the Fisheries New Zealand Observer Programme shore staff as soon as possible.

Additional details about the event can then be requested and Fisheries New Zealand and DOC will work together to determine what response, if any, is required. Liaison officers will also follow up and work with vessel operators to identify what they can do to mitigate the risk of further captures.

Seabird triggers are broadly similar across all PSRMPs or OPs:

Deepwater fleet	**Inshore fleet**
For any 24 hour period: • *Three or more large dead seabirds (e.g. albatrosses or mollymawks)* • *Five or more dead seabirds (any size)*	*For any 24 hour period:* • *One black petrel, flesh footed shearwater, yellow eyed penguin or greater albatross (royal, Gibson, wandering)* • *Three or more large dead seabirds (e.g. mollymawks, giant petrels or gannets)* • *Five or more small seabirds (e.g. petrels or shearwaters)*
For any 7-day period: • *10 or more captures of any seabird (dead or alive)*	*For any 7-day period:* • *10 or more captures of any seabird (dead or alive)*
For any 7-day period: • *10 or more captures of any seabird (dead or alive)*	*For any 7-day period:* • *10 or more captures of any seabird (dead or alive)*

[58] Deepwater vessel crews are also expected to notify their vessel manager.

Reporting triggers enables liaison officers to advise whether additional mitigation measures should be taken, and to consider whether other vessel operators need to be advised if it is a fleet-wide issue. Advising other vessel operators does not happen routinely but may take the form of a reminder if a capture event occurs as a result of a fisher not adhering to a PSRMP or OP.

Trigger reporting also enables Fisheries New Zealand and DOC to investigate the causes of triggers in order to advise on future mitigation actions. If the cause of a trigger being reached was likely due to a potential breach of legislative requirements, Ministry for Primary Industries compliance staff would also be informed.

The generic examples below illustrate potential scenarios and outcomes of triggers being reached.

Example 1

A 24 hour seabird trigger was reached on a factory trawler. This was communicated to the vessel's shore staff and the relevant liaison officer. The liaison officer spoke to the vessel manager who, in turn, contacted the vessel skipper. The discussion with the skipper indicated that the seabird captures were likely due to silver warehou heads being continuously discarded by the crew rather than going to the meal plant or being batch discarded. The discarding attracted more birds and resulted in some being captured on the warps. The outcome was that all parties agreed that fish heads would be stored and only discarded between tows.

Example 2

A trawler reported a large, one-off capture event. The liaison officer spoke to the vessel manager who, in turn, contacted the vessel skipper. The discussion with the skipper indicated that the captures were the result of a gear failure; in this instance winch failure during hauling when the trawl net was at the surface led to seabirds being captured in the net. The liaison officer reminded the vessel manager to try and minimise the length of time the net spent at the surface and to try and undertake repairs with the gear on board.

The nature of fishing means that gear failures do occasionally occur, which can lead to seabirds being captured and triggers being reached. Some large one-off capture events have resulted from instances of gear failure.

Example 3

A seabird trigger was reached on a surface longline vessel. Discussions between the skipper and the liaison officer indicated that the seabirds had been taking during setting. The liaison officer advised the skipper to add additional weight to the line to achieve a faster sink rate. The crew subsequently routinely increased the line weighting regime.

Annual summaries of triggers and follow up actions taken will be published in the NPOA-Seabirds Annual Report.

6. Performance Measurement

The NPOA-Seabirds 2020 has four goals and eleven objectives for the next five years, and there are 33 performance measures to track performance against the objectives. Progress towards the objectives will be reported annually in the NPOA-Seabirds Annual Report.

This section lists the performance measures for each objective, and describes the current status related to those measures, with baseline information as required wherever possible. Where gaps in

reporting on performance measures are identified, relevant actions to address those will be added to the Implementation Plan.

Goal 1: Avoiding Bycatch

Table 3: Performance Measures and Current Status for Objective 1

Objective 1	**All New Zealand commercial fishers are using practices that best avoid the risk of seabird bycatch enabled by appropriate regulations**
Performance measure 1 (input)	**Proportion of fishing fleet with vessel-specific risk management plans for bycatch mitigation (target: 100%)**
Inshore fisheries	As of September 2019, approximately 65% of inshore trawl vessels less than 28 m long; less than 1% of set net vessels; and 62% of bottom longline vessels had PSRMPs.
Deepwater fisheries	In September 2019, all deepwater trawl vessels[59] had PSRMPs. No ling bottom longline vessels have PSRMPs, but Operational Procedures have been developed and are in place for the 32 vessels that regularly target ling in LIN 2– LIN 7.
Highly migratory species	All vessels operating in the surface longline fishery have PSRMPs.
Performance measure 2 (input)	**Proportion of vessel-specific risk management plans that reflect the bycatch Mitigation Standards for the relevant fishery (target: 100%)**
Inshore fisheries	Mitigation standards have not been agreed, so a baseline number has not been set.
Deepwater fisheries	Mitigation standards have not been agreed, so a baseline number has not been set.
Highly migratory species	Mitigation standards have not been agreed, so a baseline number has not been set.
Performance measure 3 (input)	**Rate of adherence to vessel-specific risk management plans (based on available monitoring data) (target: 100% by 2025)**
Inshore fisheries	In the 2017/18 fishing year Fisheries New Zealand observers audited 13 trips on 10 bottom longline vessels in FMA 1. The audits highlighted that changes are needed to the PSRMPs and the audits themselves, to enable consistent results and ensure fishery operations and reporting are represented.

[59] This number includes all trawl vessels longer than 28 metres and all trawl vessels used to target scampi (47 vessels).

Deepwater fisheries	In the 2017/18 fishing year Fisheries New Zealand observers audited at-sea practices on 35 large trawl vessels, and 7 scampi trawl vessels on a total of 150 trips. 89% of the audits showed no follow-up action was necessary because the vessels were adhering to their plans. In the second half of the 2017/18 fishing year observers audited five bottom longline vessels that target ling against the bottom longline Operational Procedures. These vessels collectively deployed 75% of all hooks that targeted ling that year. Two audits showed follow-up actions were needed.
Highly migratory species	Since the 2017/18 fishing year, observers have used audit forms to monitor the rate of adherence against PSRMPs.[60]
Performance measure 5 (output)	**Number of fisheries that have enough information to set reduction targets (target: increasing)**
	Using the approach to setting capture rate reduction targets agreed by the Seabird Advisory Group in 2015, two fisheries (squid trawl and middle-depth trawl) have enough information to set numerical capture rate reduction targets.
Performance measure 6 (output)	**Rates of seabird capture relative to agreed reduction targets (where enough information is available) (decreasing)**
Squid trawl	The reduction target agreed in the NPOA-Seabirds 2013 was 12.0 birds per 100 tows. Between 2014/15 and 2016/17 the capture rate was 15.5 birds per 100 tows.
Middle-depth trawl	The reduction target agreed in the NPOA-Seabirds 2013 was 2.3 birds per 100 tows. Between 2014/15 and 2016/17 the capture rate was 2.8 birds per 100 tows.
Performance measure 7 (output)	**Proportion of fisheries that have proxy targets set because they don't have enough information to set reduction targets (target: increasing)**
Inshore fisheries	Proxy targets have not been set for inshore fisheries.
Deepwater fisheries	All six fisheries with insufficient information to set reduction targets have proxy targets set in the Fisheries New Zealand Deepwater Annual Operational Plan.
Highly migratory species	The surface longline fishery has proxy measures, defined in the Fisheries New Zealand Annual Operational Plan for Highly Migratory Species.
Performance measure 8 (output)	**Frequency of auditing against proxy targets (target: increasing)**

[60] The audit outcomes and vessel risk-reduction measures have been summarised in DOC's Conservation Services Programme reports, which are available on the DOC website: www.doc.govt.nz/our-work/conservation-services-programme/csp-reports

Inshore fisheries	N/A
Deepwater fisheries	Proxy targets are reported against annually in the Fisheries New Zealand Annual Review Report for Deepwater Fisheries.
Highly migratory species	Proxy targets are reported against annually in the Fisheries New Zealand Annual Review Report for Highly Migratory Species Fisheries.

Table 4: Performance Measures and Current Status for Objective 2

Objective 2	**Practices that effectively avoid risk of seabird bycatch are supported and promoted to recreational and customary non-commercial fishers**
Performance measure 9	**Outreach is directed to recreational and customary non-commercial fisheries organisations and measured by:** **1. the number of social media hits for seabird-related outreach campaigns (target: increasing)** **2. the amount of seabird-awareness material and mitigation guidance that is distributed (target: increasing)**
	1. Information about the number of social media hits in 2018 was unavailable. 2. In January 2018, an article on seabirds was published in fishing magazines and advertising space was used for seabird awareness communication.
Performance measure 10	**The number of organisations involved in messaging and geographical areas covered (target: increasing)**
	This information is not available for 2018
Performance measure 11	**Information that is available on seabird captures and the use of bycatch mitigation measures in non-commercial fisheries (target: increasing)**
	Surveys of recreational groups and non-commercial fishers and inspections by fishery officers will be primary sources of information to report on this performance measure.

Goal 2: Healthy Seabird Populations

Table 5: Performance Measures and Current Status for Objective 3

Objective 3	**Research, monitoring, and management actions are prioritised for seabird populations of particular concern, and their risk ratios reduce**[61]
Performance measure 12	**Research and/or management actions are undertaken specifically for species or populations of particular concern (target: increasing as a proportion of the population of concern)**
	There are currently species-specific approaches in place for black petrel, yellow-eyed penguin (hoiho), and Antipodean albatross.
Performance measure 13	**Level of uncertainty in risk assessment outputs (target: decreasing)**
	Refer to the '95% c.i.' column under Risk Ratios in the Seabird Risk Assessment The width of the 95% credible intervals (95% c.i.) should be getting narrower. Additional information on uncertainty in the risk assessment is available in the published Seabird Risk Assessment[62].
Performance measure 14	**Risk ratios for seabird populations of particular concern (target: decreasing)**
	The risk ratios for current species of particular concern are: • Black petrel: 1.23 (95% confidence interval 0.55–2.11) • Salvin's albatross: 0.65 (95% confidence interval 0.42 – 0.94) • Westland petrel: 0.54 (95% confidence interval 0.26 – 1.12) • Flesh-footed shearwater: 0.49 (95% confidence interval 0.30 – 0.80) • Southern Buller's albatross: 0.37 (95% confidence interval 0.21 – 0.60) • Gibson's albatross: 0.31 (95% confidence interval 0.17 – 0.54) • Antipodean albatross: 0.17 (95% confidence interval is 0.09–0.30) • Yellow-eyed penguin (mainland population only) (hoiho): 0.17 (95% confidence interval 0.0–0.3)

[61] 'Particular concern' means species considered to be at High or 'Very High' risk in the risk assessment, or those identified through some other process, and taking into account threat status.
[62] Richard, Y.; Abraham, E.; Berkenbusch, K. (2019). Assessment of the risk of commercial fisheries to New Zealand seabird, 2006-07 to 2016-17. *In press.*

Figure 2: Population Sustainability Threshold (PST), total annual potential fatalities (APF, equivalent to FRD) in trawl, longline, and set net fisheries, risk ratio with f = 1 (RR = APF/PST), and the probability that APF>PST for seabird taxa in the current risk assessment. Taxa are ordered in decreasing order of the median risk ratio.[63]

	PST		APF		Risk ratio		P(APF > PST)
	Mean	95% c.i.	Mean	95% c.i.	Median	95% c.i.	
Black petrel	447	225–831	513	325–803	1.23	0.55–2.11	0.70
Salvin's albatross	3 460	2 630–4 730	2 250	1 640–3 060	0.65	0.42–0.94	0.01
Westland petrel	351	233–532	194	103–361	0.54	0.26–1.12	0.05
Flesh-footed shearwater	1 450	1 010–2 050	710	496–1 020	0.49	0.30–0.80	0.00
Southern Buller's albatross	1 360	896–2 160	486	358–664	0.37	0.21–0.60	0.00
Gibson's albatross	497	327–743	151	95–221	0.31	0.17–0.54	0.00
NZ white-capped albatross	10 800	7 680–15 700	3 160	2 290–4 330	0.29	0.18–0.46	0.00
Chatham Island albatross	428	292–632	123	69–196	0.28	0.14–0.53	0.00
Northern Buller's albatross	1 640	1 070–2 630	414	321–524	0.26	0.15–0.41	0.00
Yellow-eyed penguin (mainland)	120	79–180	21	8–41	0.17	0.06–0.38	0.00
Antipodean albatross	369	258–517	63	37–97	0.17	0.09–0.30	0.00
Northern giant petrel	337	159–792	51	16–113	0.15	0.04–0.47	0.00
Otago shag	283	184–418	37	20–58	0.13	0.06–0.25	0.00
Spotted shag	3 730	1 790–7 080	304	198–439	0.09	0.04–0.19	0.00
Yellow-eyed penguin	285	189–424	21	8–41	0.07	0.03–0.16	0.00
White-chinned petrel	25 800	16 100–41 300	1 680	1 390–2 010	0.07	0.04–0.11	0.00
Campbell black-browed albatross	2 000	993–3 570	117	65–223	0.06	0.03–0.15	0.00
Northern royal albatross	723	345–1 360	36	14–81	0.05	0.02–0.15	0.00
Foveaux shag	208	132–317	7	2–14	0.03	0.01–0.08	0.00
Grey petrel	5 460	3 190–9 130	139	86–217	0.03	0.01–0.05	0.00
Southern royal albatross	854	600–1 190	22	9–42	0.02	0.01–0.05	0.00
Snares Cape petrel	1 570	605–3 670	24	5–68	0.01	0.00–0.06	0.00
Fluttering shearwater	35 900	15 300–73 700	393	197–665	0.01	0.00–0.03	0.00
Northern little penguin	1 500	905–2 310	13	4–26	0.01	0.00–0.02	0.00
White-flippered little penguin	467	270–742	4	0–9	0.01	0.00–0.02	0.00
Little black shag	338	155–644	3	0–9	0.01	0.00–0.03	0.00
Pied shag	1 120	707–1 680	8	0–25	0.01	0.00–0.02	0.00
Grey-headed albatross	695	335–1 270	5	0–21	0.01	0.00–0.04	0.00
Fiordland crested penguin	626	283–1 180	4	0–15	0.00	0.00–0.03	0.00
Southern little penguin	1 500	910–2 380	7	1–15	0.00	0.00–0.01	0.00
Common diving petrel	137 000	46 900–309 000	383	63–1 430	0.00	0.00–0.01	0.00
Grey-faced petrel	30 000	19 200–50 200	62	27–117	0.00	0.00–0.00	0.00
Sooty shearwater	622 000	296 000–1 180 000	1 210	681–2 220	0.00	0.00–0.01	0.00
Light-mantled sooty albatross	873	668–1 140	2	0–13	0.00	0.00–0.01	0.00
Hutton's shearwater	14 900	9 160–23 300	17	3–68	0.00	0.00–0.00	0.00
Chatham Island little penguin	1 500	926–2 390	1	0–8	0.00	0.00–0.01	0.00
Buller's shearwater	56 200	34 300–102 000	17	6–35	0.00	0.00–0.00	0.00
Little shearwater	21 600	13 800–32 900	6	1–12	0.00	0.00–0.00	0.00
White-headed petrel	34 400	16 300–67 600	9	2–19	0.00	0.00–0.00	0.00
NZ white-faced storm petrel	331 000	139 000–683 000	85	17–239	0.00	0.00–0.00	0.00
Australasian gannet	9 400	4 120–18 500	3	0–12	0.00	0.00–0.00	0.00
Southern black-backed gull	333 000	138 000–689 000	54	18–117	0.00	0.00–0.00	0.00
Fairy prion	326 000	209 000–493 000	89	10–462	0.00	0.00–0.00	0.00
Snares crested penguin	6 860	4 800–9 660	1	0–5	0.00	0.00–0.00	0.00
Broad-billed prion	68 400	45 400–104 000	9	1–29	0.00	0.00–0.00	0.00
Black-bellied storm petrel	15 400	8 650–25 900	2	0–9	0.00	0.00–0.00	0.00
Cook's petrel	48 900	27 400–87 100	7	0–36	0.00	0.00–0.00	0.00
Antarctic prion	154 000	77 000–284 000	10	2–26	0.00	0.00–0.00	0.00
Mottled petrel	47 200	30 400–77 100	4	0–21	0.00	0.00–0.00	0.00
Auckland Island shag	485	198–988	0	0–1	0.00	0.00–0.00	0.00
Bounty Island shag	26	15–43	0	0–0	0.00	0.00–0.00	0.00
Subantarctic skua	67	44–103	0	0–0	0.00	0.00–0.00	0.00
Caspian tern	172	95–294	0	0–0	0.00	0.00–0.00	0.00
Chatham Island shag	76	47–116	0	0–3	0.00	0.00–0.05	0.00
Campbell Island shag	476	222–906	0	0–0	0.00	0.00–0.00	0.00
Eastern rockhopper penguin	11 100	6 800–17 300	1	0–3	0.00	0.00–0.00	0.00
Erect-crested penguin	17 800	12 600–24 700	1	0–4	0.00	0.00–0.00	0.00
White-bellied storm petrel	228	106–441	0	0–0	0.00	0.00–0.00	0.00
White tern	26	15–43	0	0–0	0.00	0.00–0.00	0.00
South Georgian diving petrel	10	5–18	0	0–1	0.00	0.00–0.07	0.00
NZ king shag	39	24–60	0	0–2	0.00	0.00–0.06	0.00
Kerm. storm petrel	12	4–26	0	0–0	0.00	0.00–0.00	0.00
Masked booby	53	28–94	0	0–0	0.00	0.00–0.00	0.00
NZ storm petrel	53	6–207	0	0–1	0.00	0.00–0.02	0.00
Pitt Island shag	103	63–161	0	0–2	0.00	0.00–0.02	0.00
Chatham petrel	42	23–76	0	0–0	0.00	0.00–0.00	0.00
Chatham Island taiko	2	1–4	0	0–0	0.00	0.00–0.00	0.00
Pycroft's petrel	412	247–718	0	0–1	0.00	0.00–0.00	0.00
Soft-plumaged petrel	497	136–1 290	0	0–0	0.00	0.00–0.00	0.00
Wedge-tailed shearwater	6 020	3 040–10 600	0	0–0	0.00	0.00–0.00	0.00
Kerm. petrel	779	500–1 300	0	0–1	0.00	0.00–0.00	0.00
White-naped petrel	7 080	3 340–14 200	0	0–0	0.00	0.00–0.00	0.00

[63] From Richard et al 2019. *Assessment of the risk to commercial fisheries to New Zealand seabirds, 2006-07 to 2016-17. In press.* The risk to yellow-eyed penguin was assessed for the entire New Zealand population, but also for the mainland population only, based on the assumption that all estimated fatalities were of the mainland population, and the number of annual breeding pairs was between 600 and 800. Taxa names are coloured according to their risk category.

Table 6: Performance Measures and Current Status for Objective 4

Objective 4	**The estimated number of fishing-related deaths[64] of all seabird populations is less than the average number between 2014/15 and 2016/17[65]**
Performance measure 15	**Estimated fishing-related deaths, from the seabird risk assessment, relative to the average number of fishing-related deaths between 2014/15 and 2016/17 (target: decreasing)**
	Figure 2 shows the current estimate of Annual Potential Fatalities (equivalent to Fishing-Related Deaths) for seabird populations using data up to 2016/17.[66]

Goal 3: Research and Information

Table 7: Performance Measures and Current Status for Objective 5

Objective 5	**Research is undertaken to improve bycatch mitigation across sectors, especially those without effective mitigation (Note: mitigation may include spatial and temporal closures)**
Performance measure 16	**Number of mitigation practices assessed**
	This will be reported on annually, using outputs from DOC and Fisheries New Zealand research, and other organisations' projects.
Performance measure 17	**Number of mitigation practices improved, where applicable**
	This will be reported on annually, using outputs from DOC and Fisheries New Zealand research, and other organisations' projects.
Performance measure 18	**Number of fisheries without available or known effective mitigation (target: decreasing)**
	Mitigation practices have not been assessed for set net, some coastal trawl fisheries and some bottom longline fisheries.

[64] Fishing-related deaths (FRD) are an estimate of the number of seabird deaths caused by fishing. FRD includes cryptic mortalities and unobserved fishing effort.
[65] It may not be possible to measure a reduction for species that have low estimated numbers of fishing-related deaths.
[66] Richard et al 2019. *Assessment of the risk to commercial fisheries to New Zealand seabirds, 2006-07 to 2016-17. In press.*

Table 8: Performance Measures and Current Status for Objective 6

Objective 6	**Monitoring programmes for New Zealand commercial fisheries are designed and implemented to provide statistically robust information to assess progress towards the NPOA-Seabirds 2020's objectives**
Performance measure 19	**Monitoring objectives and needs are documented and updated annually, informed by the risk assessment**
	This will be reported annually.
Performance measure 20	**Monitoring coverage across all fisheries (target: increasing)**
	Table 9 shows the percentage of fishing events observed in the main fisheries during 2017/18.
Performance measure 21	**Uncertainty in risk assessment arising from limited monitoring data (target: decreasing)**
	Refer to the 2019 Seabird Risk Assessment.
Performance measure 22	**The Fisheries New Zealand monitoring plan, and the plan's rationale, is published annually**
	The monitoring plan will be discussed with the Seabird Advisory Group annually. The monitoring plan and implementation plan will be uploaded on the Fisheries New Zealand website at the start of each financial year.

Table 9: Percentage of fishing events observed in the main fisheries during 2017/18 fishing year

	Fishing events	Percentage of events observed
Trawl fishery (tows)		
Hoki trawl	13,789	34.6
Hake trawl	258	58.1
Ling	1,164	29.8
Squid	2,827	89.0
Southern blue whiting	455	100.0
Jack mackerel	1,690	87.3
Scampi	4,325	12.1
Middle-depth[67]	6,266	25.4
Deepwater[68]	3,745	24.1
Flatfish	12,408	0.4
Other inshore[69]	27,252	7.8
All trawl	74,179	20.1
Bottom longline (BLL) fishery (hooks)		
Ling BLL vessels >28 m long	15,542,822	31.2
Ling BLL vessels <28m long	6,846,275	4.0
Snapper BLL	10,417,687	3.1
Bluenose BLL	1,100,285	3.2
Hapuka BLL	2,840,504	3.0
Other BLL	3,155,239	9.6
All bottom longline	39,902,312	14.7
Surface longline (SLL) fishery (hooks)		
Southern bluefin SLL	1,297,341	16.6
Other SLL	991,460	8.1
All surface longline	2,288,801	12.9
Other fisheries		
Set net (metres of net)	14,904,443	5.7
Purse seine (sets)	734	9.9

[67] Includes alfonsino, barracouta, silver warehou and white warehou target tows.

[68] Includes orange roughy and oreo target tows.

[69] Includes tows targeting gurnard, snapper, tarakihi, trevally and other species.

Table 10: Performance Measures and Current Status for Objective 7

Objective 7	**Observation and monitoring methods are researched, developed and implemented across all sectors**
Performance measure 23	**New observation and monitoring methods (including e-monitoring) are incorporated into monitoring programmes and reporting**
	This will be reported annually.
Performance measure 24	**Data collection protocols (such as observer forms) are updated as necessary**
	This will be reported annually.

Table 11: Performance Measures and Current Status for Objective 8

Objective 8	**A research programme provides information to reduce uncertainty in estimates of risk to seabirds from fishing**
Performance measure 25	**Uncertainty in risk assessment due to limited biological data (target: decreasing)**
	This will be reported whenever the risk assessment is updated.

Goal 4: International Engagement

Table 12: Performance Measures and Current Status for Objective 9

Objective 9	**The risk to New Zealand seabird species from fisheries outside the New Zealand EEZ is assessed and communicated to international organisations, governments and other stakeholders**
Performance measure 27	**A seabird fisheries risk assessment is completed and updated to incorporate data for New Zealand seabirds caught outside the New Zealand EEZ**
	The draft Southern Hemisphere Risk Assessment incorporating surface longline effort, was presented to the CCSBT Ecologically Related Species Working Group in May 2019.
Performance measure 28	**New Zealand's information on compliance with seabird measures is shared with relevant flag states, CCAMLR, and Regional Fisheries Management Organisations**
	New Zealand undertakes High Seas patrols in the Pacific and has shared the results of High Seas inspections with relevant flag states and relevant RFMOs.
Performance measure 29	**New Zealand actively engages with governments and fishing industries whose vessels create the greatest risk to New Zealand seabirds**
	In November 2018, New Zealand signed a cooperative arrangement with Chile focused on enabling collaboration between New Zealand and Chile on seabird issues.
Performance measure 30	**New Zealand actively facilitates data sharing (relevant to New Zealand seabirds and fishing) between relevant international organisations, governments and stakeholders**
	Data sharing activities will be reported on annually.

Table 13: Performance Measures and Current Status for Objective 10

Objective 10	**New Zealand advocates for the development, adoption, improvement, and uptake of seabird conservation measures**[70]
Performance measure 31	**Where possible, meeting reports from CCAMLR and Regional Fisheries Management Organisations show that seabird matters, including new conservation measures, have been considered**
	Successfully reached agreement on changes to seabird conservation measures at CCSBT and WCPFC in 2018. Outcomes of future RFMO discussions will be reported annually.
Performance measure 32	**Where possible, resolutions from relevant fora consider the risk to seabirds from fishing**
	This will be reported on annually.

[70] The term 'conservation measures' is intentionally broad, so that a wide range of options to avoid, remedy or mitigation adverse effects of fishing on seabird populations can be considered.

Table 14: Performance Measures and Current Status for Objective 11

Objective 11	**New Zealand actively works bilaterally, multi-laterally, and with international organisations to build capacity to reduce the risk to New Zealand seabirds**
Performance measure 33	**Active and effective programmes are in place, or completed, that build the capacity of governments and other stakeholders whose fisheries create risks to New Zealand seabirds**
	MFAT funds work delivered by MPI aimed at enhancing fisheries management capacity in the Pacific, which includes the management of bycatch. Seabird related activities undertaken by this programme will be reported annually.

7. Appendix One: Seabird Advisory Group Terms of Reference

PURPOSE

The purpose of the group is to monitor and assist the implementation of the NPOA-Seabirds 2020 and to contribute to the review that, in accordance with its provisions, is scheduled to commence after its fourth year of operation.

MEMBERSHIP

The membership of the group will be open to all interested organisations. It is expected that members will be persons who have knowledge and experience in relation to the fishery-seabird interactions issues that need to be addressed to ensure the NPOA-Seabirds 2020 is implemented. It should include members from environmental groups, the fishing industry, the recreational and customary non-commercial sectors, the Department of Conservation, Fisheries New Zealand, and Ministry of Foreign Affairs and Trade.

No formal upper limit for the membership of the group should be prescribed, but, in order to ensure it is able to function effectively and efficiently, the numbers attending meetings should not exceed twelve. If necessary, consultations should be held before the first meeting, and subsequently at the request of any interested stakeholder, to arrange appropriate shared membership or rotational membership. Organisations wishing to participate in the work of the group should ensure their nominated participant will be able to contribute to the work of the group on a continuous basis. Consideration should be given as appropriate to the co-option, for particular meetings, of experts who are not normally members of the group.

Members are expected to contribute in a professional capacity and are not expected necessarily to represent the views of their sector.

ROLE

The group is an advisory body, not a decision-making body. It will monitor progress against the objectives of the NPOA-Seabirds 2020 and provide advice and assistance to Fisheries New Zealand, the Department of Conservation, and the Ministry of Foreign Affairs and Trade in relation to the implementation of the NPOA-Seabirds 2020.

To fulfil its role the group will, as appropriate:

- review at sea monitoring data, scientific reports, industry self-reporting data and other sources of information to assess progress in achieving seabird related objectives annual and five-year plans;
- review updates to and revisions of the risk assessment to assess progress in reducing the level of risk to seabirds from fisheries or other sources as appropriate;
- appraise Regional Fisheries Management Organisation reports and other international or domestic reports to assess progress in addressing threats to New Zealand seabirds in other fisheries outside New Zealand;
- consider reports, factsheets or other information on the development of new mitigation practices or technology and their suitability for New Zealand fisheries; and,
- evaluate the effectiveness of training, education, and outreach in New Zealand fisheries in achieving behaviour change in commercial and non-commercial fisheries.

MODUS OPERANDI

In consultation with Fisheries New Zealand and the Department of Conservation, the group will elect a Chair who may be an independent person from outside the group.

The group will meet at least annually and sufficiently frequently to carry out its role effectively. In particular the timing and frequency of its meetings must ensure it is able to contribute effectively to the annual review and revision of the seabird interaction components of fisheries plans.

The group will be provided in a timely manner with all information relevant for its role. In particular, Fisheries New Zealand will provide it with the fisheries planning documents and associated implementation guidelines, review documents reporting on the achievements against annual and five-year plans, science documents describing the most recent risk assessments, developments in mitigation and reports on the capture of seabirds in fishery. The Department of Conservation will provide the group with any relevant information or recommendations developed by the Agreement on the Conservation of Albatrosses and Petrels.

Where possible advice from the group, including recommendations, will be arrived at by consensus. Where the group is unable to provide its advice by consensus, it will set out in any report the different views of its members.

Meetings of the group will be co-ordinated and serviced by Fisheries New Zealand and Department of Conservation.