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Section Detail Report

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Overview

This report provides information on interactions[1] between seabirds and commercial fishing activities in New Zealand's Exclusive Economic Zone (EEZ) and Territorial Sea.

Nearly all seabirds found in New Zealand are protected by law. It is not illegal to capture or kill a seabird accidentally or incidentally in the course of commercial fishing activities however any such event must be reported to the Ministry for Primary Industries as required. Interactions between seabirds and commercial fishing activities occur widely around New Zealand.

The Ministry for Primary Industries (the Ministry, which encompasses Fisheries New Zealand) and the Department of Conservation (DOC) are the regulatory agencies responsible for managing interactions between seabirds and commercial fishing activities.

New Zealand's management of interactions between seabirds and commercial fishing activities is broadly based on the status of seabird populations and risks to those populations. Risk assessments highlight priorities for consideration of commercial fishing risks to seabird populations and management action. A multi-faceted operational environment (including government agencies, industry and non-government organisations) supports the implementation of seabird management measures.

Requirements for management of seabird populations and risks to those populations are specified through statute, i.e. Acts of Parliament, and associated regulations, notices and circulars. Assessment of compliance with mandatory measures for mitigating seabird bycatch is informed by on-vessel deployment of government fisheries observers, vessel boardings, and aerial surveillance. Enforcement is undertaken by Ministry for Primary Industries fisheries officers. The Ministry also progresses prosecutions in relation to non-compliance.

Policy guidance for managing risks to seabird populations due to commercial fishing activities is provided by New Zealand's National Plans of Action for Seabirds. The National Plan of Action currently being implemented was published in 2013. This Plan has a five-year term and a review is underway. Consultation on a new version to cover the next 5-year term is planned for 2019. Species-specific management actions are identified in threatened species recovery plans and action plans.

Non-binding initiatives aimed at addressing seabird interactions with fishing activities include vessel-based management plans and liaison activities, capacity-building amongst vessel operators and crew, research and monitoring, and operational conformance measures.

New Zealand is party to a number of legally-binding international agreements as well as voluntary arrangements that relate to interactions between seabirds and fishing activities. These include regional fisheries management organisations, conventions focusing on biodiversity, and seabird-specific instruments.

Key statistics

- 96 seabird taxa (species and subspecies) breed in New Zealand. These include albatross, petrels, shearwaters, penguins, shags, and many others.
- Seabird interactions have been documented with commercial fishing activities including surface and bottom longline, trawl, setnet, troll, and potting.

[1] For the purposes of this report, interactions are defined as seabirds coming into contact with fishing gear. Interactions may result in captures, injuries and fatalities.

- Where seabird interactions with commercial fishing activities are documented, the four species populations assessed as most likely to be at risk from these activities are black petrel (*Procellaria parkinsoni*), Salvin's albatross (*Thalassarche salvini*), flesh-footed shearwater (*Puffinus carneipes*), and Westland petrel (*Procellaria westlandica*).

- Across all New Zealand commercial fisheries for which information is available, annual potential seabird fatalities are estimated at 14 400 (95% confidence interval: 11 900 – 17 500). Estimated total (live and dead) seabird captures in fisheries using the trawl and longline methods overall have decreased since the early 2000s. Trends by species and within fisheries vary.

Scope

This report focuses on risks to seabird populations due to interactions between seabirds and commercial fishing activities in New Zealand's Exclusive Economic Zone (EEZ) and Territorial Sea. Interactions are defined for the purposes of this report as seabirds coming into contact with fishing gear. Interactions may lead to seabird captures, injuries and mortalities.

The report is not a quantitative analysis, but instead focuses on the management approach associated with these interactions. Quantitative analyses of seabird interactions are available in supporting reference materials. Both regulatory and non-regulatory measures and management activities are discussed within the report.

Explicitly out of scope are the following;

- Interactions that occur in non-commercial fisheries[2]
- Interactions that occur in other jurisdictions
- Indirect interactions, for example, where commercial fishing activities may have impacts on seabird foraging habitats
- Threats unrelated to commercial fishing
- Other human-induced impacts on seabirds
- An evaluation of seabird population status, and,
- Broader frameworks for marine conservation >> remit of *Marine Conservation Section Detail Report*.

The New Zealand approach

Introduction

New Zealand is often referred to as the seabird capital of the world. 96 breeding seabird taxa occur there. For some species groups (e.g. albatross, petrels, penguins, shags), the diversity found in New Zealand is greater than anywhere else in the world[3,4]. Overall, New Zealand also has more endemic seabirds than any other country[5].

The status of New Zealand seabirds is defined using the New Zealand Threat Classification System[6] (NZTCS) and the IUCN Red List[7]. The NZTCS is administered by the Department of Conservation. The NZTCS is based on an expert panel evaluation of the status of taxa, that considers population size and trend, number of subpopulations, and area of occupancy on a purely

[2] Note however that these are addressed by the same government agencies, and many of the same legislative and policy instruments, as seabird interactions with commercial fishing.
[3] http://www.doc.govt.nz/our-work/seabird-prioritisation-framework/
[4] Gill et al. (2010)
[5] Croxall et al. (2012)
[6] Robertson et al. (2017)

national basis[6]. Classification categories are listed in Appendix 1. The IUCN Red List classifies species using conceptually similar criteria applied at a global scale[7]. Classification categories are listed in Appendix 2.

Under the NZTCS, approximately one third of seabird taxa in New Zealand are classified as threatened, and approximately half are considered at risk[6]. Globally, New Zealand has the highest number of seabird species of conservation concern[5,7].

Changes to population status of seabirds over time are reflected in changes to threat classification. For example, under the NZTCS, the status of Hutton's shearwater (*Puffinus huttoni*) changed from Declining to Nationally Vulnerable between 2012 and 2016 assessments[6]. Examples of changes in threat status on the IUCN Red List include Chatham albatross (*Thalassarche eremita*), which moved from Critically Endangered in 2009 to being assessed as Vulnerable from 2010 onwards.

Characteristics of seabird interactions with commercial fishing activity

The nature and extent of interactions between seabirds and some New Zealand commercial fisheries has been documented by government fisheries observers since the 1990s[8,9,10]. In general, the nature and extent of these interactions is better understood for high-volume large-scale fisheries compared to smaller-scale inshore fisheries, due to more extensive at-sea observation and reporting from large-scale fisheries over time.

The nature of interactions between seabirds and commercial fishing activities depends on the type of fishing gear used.

- In trawl fisheries, seabirds might strike trawl warps (the cables connecting the trawl net to the fishing vessel) and paravanes, or be captured inside trawl nets or in net meshes[10,11].
- In setnet (gillnet) fisheries, entanglement in net meshes can occur[12].
- In longline fisheries, seabirds can become entangled in lines, hooked through a wing or other body part, or caught by an ingested hook that cannot be dislodged[9].
- In pot fisheries, captures of shags have been reported[13].
- Less often, seabirds are caught on other gear elements used in fishing operations. For example, mitigation devices such as bird bafflers, tori lines and warp scarers are all documented to cause occasional mortalities[14], especially when device designs are not optimised (e.g. tori line streamers or bird baffler droppers dragging in the water can entangle seabirds).

Seabirds may also collide with vessels. These interactions are not considered to be incidental captures in fisheries by management agencies, because they do not result from interactions with elements of fishing gear *per se*[15]. However, these interactions are reported by government fisheries observers.

For fisheries in which observers have been deployed, the proportion of annual potential seabird fatalities[16] estimated amongst fishing methods are[17]:

[7] IUCN (2018)
[8] e.g. Baird (2001)
[9] Abraham and Thompson (2011a)
[10] Abraham and Thompson (2015a)
[11] Bull (2007)
[12] Abraham and Thompson (2015b)
[13] Bell (2012)
[14] Ministry for Primary Industries, unpublished data.
[15] https://psc.dragonfly.co.nz/;

- Trawl – 74.8%
- Bottom longline – 16.8%
- Surface longline – 7.6%
- Setnet – 0.7%

The estimated total numbers of captures in fisheries using the trawl and longline methods have decreased since the early 2000s. Trends vary within fisheries and by species[15].

The four species populations assessed as most at risk of being incidentally caught in New Zealand fisheries at levels in excess of their sustainability limits are[17]:

- black petrel (*Procellaria parkinsoni*)
- Salvin's albatross (*Thalassarche salvini*)
- flesh-footed shearwater (*Puffinus carneipes*)
- Westland petrel (*Procellaria westlandica*)

These species are classified by the NZTCS and IUCN Red List as follows.

Seabird	New Zealand Threat Classification System[6]	IUCN Red List[7]
Black petrel	Nationally Vulnerable	Vulnerable
Salvin's albatross	Nationally Critical	Vulnerable
Flesh-footed shearwater	Nationally Vulnerable	Near threatened
Westland petrel	Naturally Uncommon	Endangered

Legislative framework

Legislative instruments relevant to seabird interactions with commercial fishing activities include Acts of Parliament (Wildlife Act 1953, Fisheries Act 1996) and associated regulations.

The Department of Conservation (DOC) and the Ministry for Primary Industries (the Ministry) are the two central government agencies with responsibilities for managing seabird interactions with commercial fisheries. Within the Ministry, Fisheries New Zealand is the branch responsible for fisheries management (including seabird interactions with fisheries). Compliance and enforcement are conducted at the whole-of-Ministry level.

DOC administers the Wildlife Act 1953. Almost all seabirds are protected under this Act. However, it is not illegal to capture or kill a protected seabird accidentally or incidentally when commercial fishing, provided that event is reported as required. Commercial fishing permit holders are legally required to report seabird captures. Failure to report such captures is an offence.

[16] Annual potential fatalities = the estimated number of seabird captures per year, assuming all captures are fatal, and incorporating scalars for unobserved and unobservable (cryptic) mortality.
[17] Richard et al. 2017, where sustainability limits are defined as the level of human-induced mortality that a taxon can sustain while meeting a specified population recovery or stabilisation outcome.

The Wildlife Act 1953 also provides for the development of population management plans, which are intended to limit the fisheries-related mortality of protected species. To date, a population management plan has not been completed for any seabird.

The Ministry for Primary Industries administers the Fisheries Act 1996, which provides for the utilisation of fisheries resources whilst ensuring sustainability. Seabirds are encompassed by the "ensuring sustainability" provision of the Fisheries Act 1996, which is defined as avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment.

Under the Fisheries Act 1996, fisheries regulations, notices and circulars can all be used to specify Government's requirements relevant to the management of seabird interactions with commercial fishing activity. Current provisions include:

- Reporting requirements that apply when seabirds are caught in commercial fishing operations[18],
- Prohibition of net-sonde monitor cables[19],
- Requirement to use one of three specified seabird bycatch reduction devices on trawlers ≥ 28 m in overall length (streamer lines, bird bafflers, or warp scarers)[20],
- Requirement to use streamer lines on bottom longline vessels ≥ 7 m in length, night-set, and line-weight in specified combinations, and manage fish waste discharge[21], and,
- Requirement to use streamer lines, night-setting and line-weighting in specified combinations on surface longline vessels[22].

Under the Fisheries Act 1996, the Minister of Fisheries is also responsible for taking all reasonable steps to ensure that protected species mortality limits specified in population management plans are not exceeded.

Conservation Services are defined in the Fisheries Act 1996. The role of DOC includes the delivery of Conservation Services. These services are outputs produced in relation to the adverse effects of commercial fishing on protected species[23].

Conservation Services and Fisheries Services are specified annually by DOC and the Ministry, respectively, and include a substantial amount of work related to seabird interactions with commercial fishing. These services may comprise studies of populations, risk assessments, development and testing of bycatch mitigation measures, outreach activities relating to seabird bycatch reduction, and placement of observers on commercial fishing vessels.[24]

Policy context

Seabird interactions with commercial fishing activities fall under various government policies that cover conservation, biodiversity, and seabird-specific scopes.

The Conservation General Policy 2007[25] covers six New Zealand statutes relevant to conservation management, including the Wildlife Act 1953[26]. It specifies that marine protected species (including seabirds) should be managed for long-term viability and recovery throughout their natural range.

[18] Fisheries (Reporting) Regulations 2017
[19] Fisheries (Commercial Fishing) Regulations 2001
[20] New Zealand Government (2010a)
[21] New Zealand Government (2018a)
[22] New Zealand Government (2018b)
[23] CSP (2015)
[24] CSP (2018)
[25] DOC (2007)
[26] The other statutes covered by this Policy are the Conservation Act 1987, Marine Reserves Act 1971, Reserves Act 1977, Wild Animal Control Act 1977, and the Marine Mammals Protection Act 1978.

The New Zealand Biodiversity Strategy 2000[27] and Action Plan 2016[28] comprise New Zealand's response to its obligations under the Convention on Biological Diversity 1992. National Target 5 from the Action Plan is relevant to addressing seabird interactions with commercial fishing activities, i.e., "*Biodiversity is integrated into New Zealand's fisheries management system*".

The key action under this Target is that:

> *"By 2020, New Zealand will have moved towards an ecosystem approach to fisheries management that includes enhanced recording of bycatch from the sea and improved understanding of the rates of change in marine biodiversity."*

The New Zealand Biodiversity Strategy is currently under review. The Minister of Conservation is leading the development of the new strategy. The new strategy is scheduled to be finalized in late 2019.

The National Plan of Action – Seabirds[29] (NPOA) provides key policy guidance for managing seabird interactions with commercial fishing. This Plan articulates a series of objectives and a broad suite of activities intended to manage seabird interactions with commercial, customary and recreational fisheries, and New Zealand's fishing vessels active on the high seas.

The NPOA is built around a long-term objective that is supported by subsidiary objectives. The long-term objective of the NPOA is[29]:

> *"New Zealand seabirds thrive without pressure from fishing related mortalities, New Zealand fishers avoid or mitigate against seabird captures and New Zealand fisheries are globally recognised as seabird friendly."*

The five-year NPOA biological risk objective most relevant to the scope of this report is that species categorised as at very high or high risk from fishing move to a lower category of risk within the term of the Plan.

The NPOA is currently under review by DOC and MPI, with input from the multi-stakeholder Seabird Advisory Group. As part of this review, a new implementation framework is being developed for New Zealand commercial fisheries. Public consultation on the NPOA – Seabirds that will cover the next 5-year period is planned for 2019. The NPOA – Seabirds (2013) remains in place until a new version is completed.

The NPOA is New Zealand's response to the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries[30]. New Zealand's first NPOA – Seabirds was developed in 2003.

In addition, threatened species recovery plans and management action plans provide policy and operational guidance underpinning management of some seabird species. These plans are broad in scope and consider threats including, but not limited to, fisheries interactions. Specific plans are discussed later in this report, including a recovery plan for hoiho (yellow-eyed penguin) and action plans for black petrel, flesh-footed shearwater and Gibson's and Antipodean albatross.

Complying with the New Zealand approach

Risk-based approach

[27] DOC (2000)
[28] DOC (2016)
[29] MPI (2013)
[30] FAO (1999)

Government agencies and others managing seabird interactions with commercial fisheries often prioritise management interventions using a risk-based approach. In this context, the "risk" of interest is the risk that commercial fishing is having significant negative effects on seabird populations.

A series of risk assessments has been conducted since 2010, by Government and contracted research providers. Broadly, the intent of risk assessment work over time has been to inform prioritization of actions to manage interactions between seabirds and commercial fisheries (i.e. focus work where it is most needed to avoid negative population-level impacts). Risk assessments have included qualitative through semi- to fully quantitative approaches[31,32,33,34]. The findings of risk assessments are considered in the specification of conservation and fisheries services that support fisheries observer coverage, research projects and outreach.

Most recently, risks to seabird populations that fisheries interactions present within New Zealand waters have been considered by Richard and Abraham[35,36,37]. These assessments rely heavily on seabird life history information, seabird distributions defined for the assessments, and fisheries observer data on seabird captures. Where no observer data exists for a fishery, Richard and Abraham do not consider that fishery in the risk assessment. Assessments cover 72 seabird taxa[37].

The relative level of risk that seabird captures present to the seabird populations considered has changed with iterations of the Richard and Abraham risk assessments. However, the black petrel has consistently been identified as the species most likely to be at risk of sustaining negative population impacts due to commercial fisheries interactions in New Zealand waters. In the most recent assessment, black petrel, Salvin's albatross, flesh-footed shearwater, and Westland petrel are assessed as the four species most likely to experience higher human-induced mortality than their populations can sustain (Figure 1)[37].

[31] Baird and Gilbert (2010)
[32] Francis and Bell (2010)
[33] Francis (2012)
[34] Rowe (2013)
[35] Richard et al. (2011)
[36] Richard and Abraham (2013)
[37] Richard et al. (2017)

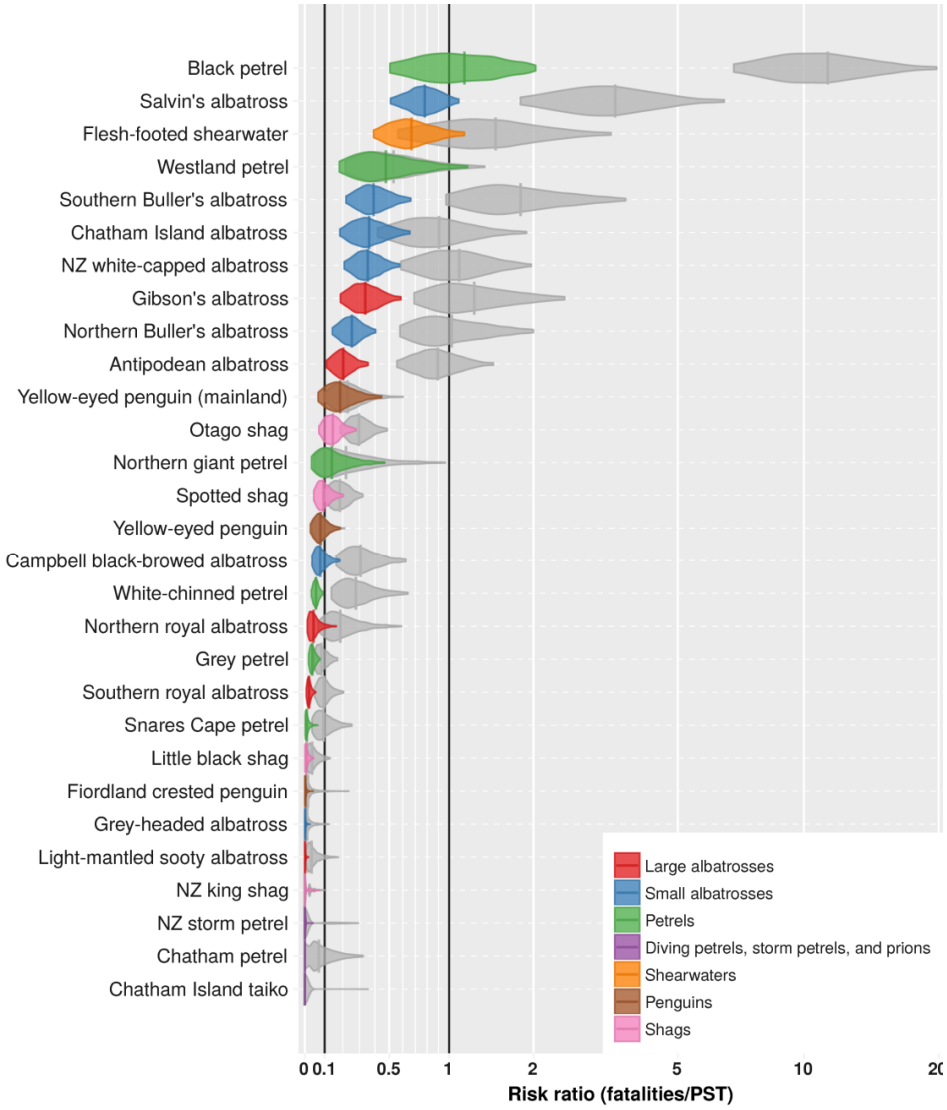

Figure 1. Standard species-level output of the New Zealand Seabird Risk Assessment. Species risk is shown on the *x* axis. The vertical line at R=1 corresponds to the level of all human-induced mortality that the species can sustain while still meeting a specified population recovery or stabilisation outcome. The grey shapes indicate the risk ratios from Richard and Abraham (2015), and show the changes in risk ratios derived by sequential versions of the assessment. Seabirds with a risk ratio of almost zero are not included here. The risk ratio of yellow-eyed penguin refers to the mainland population only. (Source: MPI (2017), reproduced with permission from the Ministry for Primary Industries).

Single-species population models have also been developed for some New Zealand seabirds to assess population trend, and the risk that interactions with fisheries may present (e.g. black petrel[32] and Westland petrel[38], and southern Buller's (*Thalassarche bulleri bulleri*)[39], Antipodean (*Diomedea antipodensis antipodensis*)[40], Gibson's (*Diomedea antipodensis gibsoni*)[41], white-capped (*Thalassarche steadi*)[33] albatross). Drawing conclusions from this single-species modelling work about the impacts of fisheries on seabird populations has often proven difficult and the most definitive conclusion to date is for Buller's albatross. For that species, researchers consider that over the past 60 years, the risk to population viability

[38] Waugh et al. (2015)
[39] Fu and Sagar (2016)
[40] Edwards et al. (2017)
[41] Francis et al. (2015)

resulting from fisheries has been small[39]. In the case of Antipodean albatross, fishing-induced mortalities in the New Zealand EEZ were deemed to have negligible impact on the population. It was not possible to explore how misidentification of bycaught birds, and bycatch outside New Zealand waters, affect this conclusion[40]. Modelling work can also highlight where knowledge gaps result in particular constraints on understanding population status and trends, thereby informing research priorities.

Regardless of their findings with respect to the impacts of fishing on seabirds, population modelling and single-species risk assessments provide insights into what data are required to better understand risks and impacts. Therefore, they are useful tools for guiding prioritisation of research investments and management actions.

Species-specific plans

Threatened species recovery plans and management action plans have been developed and implemented for some species.

Threatened species recovery plans

DOC has produced a threatened species recovery plan for hoiho (yellow-eyed penguin) to guide management from 2000 – 2025[42]. Actions identified to deliver on the hoiho recovery plan objective of quantifying and reducing fishing-related mortalities include research to better quantify fishing impacts on hoiho, advocacy and outreach to increase awareness of fishing impacts, and delivery of higher levels of observer coverage in commercial fisheries with which hoiho interact[42]. Since this plan's term commenced, government fisheries observers have been deployed on setnet vessels where hoiho occur. Observer coverage levels of up to 3.4% of setnet effort in some areas have been achieved[43]. Observers have documented hoiho captures. This has allowed consideration of the risk of setnet fishing to hoiho[37].

Species-specific Action Plans

Other species-focused plans for seabird management that consider fisheries interactions support the NPOA – Seabirds[299]. Linking to the NPOA's five-year biological risk objective requiring that species categorised as at very high or high risk from fishing move to a lower category of risk, the black petrel and flesh-footed shearwater action plan identifies three key actions to address commercial fishing impacts[44]. These are:

- Developing and/or improving safe, practical and effective mitigation techniques
- Motivating fishers to start or continue to use these mitigation techniques
- Gathering adequate data to measure risk from commercial fishing over time

Each of these actions is underpinned by specific activities (see below) intended to contribute to reducing the risk that fishing presents to these two species.

Some actions identified in the black petrel and flesh-footed shearwater action plan have been implemented, for example[44]:

- improving knowledge of these species' foraging behaviour around fishing vessels,
- designing and testing tori lines for use on small longline vessels,
- conducting training workshops for fishers to increase awareness of seabird bycatch risks and how to avoid them,
- deploying liaison officers where very high and high risk seabird species interact with commercial fishing activities, and,
- trialling voluntary electronic (camera) monitoring on bottom longline vessels operating in areas where black petrels and flesh-footed shearwaters occur.

[42] McKinlay (2001)
[43] Abraham and Thompson (2015b)
[44] MPI and DOC (2015)

The Ministry and DOC have also prepared a species-specific action plan for Gibson's and Antipodean albatross[45]. This plan takes a sector-based approach to addressing fishing risks to these species. Sectors are:

- Non-commercial fisheries
- Commercial surface longline fisheries, comprising:
    - Large vessels using the surface longline method
    - Small vessels using longlining to target tuna species
    - Small vessels using longlining to target swordfish (*Xiphias gladius*)
- International fisheries.

Actions fall into three categories for each component of the commercial longline sector:

- identify best practice mitigation techniques
- implement best practice mitigation, and,
- improve the quantity and quality of data available to assess risk that commercial longline fisheries present to Gibson's and Antipodean albatross.

For large-vessel surface longline fisheries, key actions are to:

- identify best practice mitigation measures that can be applied during longline hauling
- address operational and implementation issues with existing bycatch reduction measures (e.g. safety concerns around line-weighting)
- contribute to the development of international best practice standards for mitigation measures, through New Zealand's involvement in the Agreement on the Conservation of Albatrosses and Petrels (see below)
- assess the utility of hookpods as a measure for reducing seabird bycatch in longline fisheries, and,
- collect information that will improve the quality of risk assessments conducted.

Note that since the 2016/17 fishing year, no large vessels using the surface longline method have operated in New Zealand waters.

For small-vessel surface longline fisheries, key actions include the following:

- research best practice mitigation measures that can be applied during longline hauling*
- contribute to the development of international best practice standards for mitigation measures applicable to smaller vessels, through New Zealand's involvement in the Agreement on the Conservation of Albatrosses and Petrels*
- support the development and testing of new mitigation technologies*
- continue research optimising tori line designs and usage on smaller vessel surface longliners*
- identify and address operational and implementation issues with existing bycatch reduction measures*
- conduct education and outreach to increase awareness of the need to use seabird bycatch mitigation measures and how to use these measures*
- increase compliance with mandatory seabird bycatch reduction measures, and follow up on incidences of non-compliance
- consider spatially-based triggers for the application of mitigation requirements in areas where risks of seabird interactions are highest
- develop seabird management plans for vessel-based management of seabird capture risks*
- collect information that will improve the quality of risk assessments conducted*, and,

[45] MPI and DOC (2016)

- develop proxy targets where capture rate targets cannot be used to assess progress with managing seabird capture risks (e.g. where observer coverage is insufficient to allow monitoring of capture rates over time).

Actions identified in the Gibson's and Antipodean action plan that have been, and/or continue to be implemented are identified by * above[45].

Research and monitoring

Research and monitoring relating to seabird interactions with commercial fishing activities is conducted on an ongoing basis. Current initiatives supported by the Ministry/Fisheries New Zealand and DOC that focus on seabird interactions with commercial fisheries include the following[24,46]:

- Delivery of observer services to monitor seabird captures and deployment of mitigation devices
- Investigation of electronic monitoring for identifying protected species (including seabirds) caught in New Zealand commercial fisheries
- Trialling electronic monitoring systems designed for small vessels
- Refinement of the Richard and Abraham seabird risk assessment
- A fully quantitative assessment of the fisheries risk to Antipodean albatross (*Diomedea antipodensis antipodensis*)
- Population status of Chatham Island albatross (*Thalassarche eremita*), Gibson's albatross, white-capped albatross, black petrel, Westland petrel, and flesh-footed shearwater
- Population information and foraging distribution of yellow-eyed penguins (*Megadyptes antipodes*)
- Investigations of cryptic (unobserved or unobservable) mortality of seabirds in commercial fisheries

Current initiatives

Beyond current monitoring approaches focused on fisheries observer deployment, the Ministry is implementing Digital Monitoring (DM) across New Zealand commercial fishing vessels. (DM was previously known as the Integrated Electronic Monitoring and Reporting System (IEMRS)).

DM comprises vessel positioning data and near-real time catch and effort reporting. The roll-out of these requirements is underway, with implementation across the fleet scheduled for completion by the end of 2019. Electronic logbooks will be used by fishers to meet statutory reporting requirements, including when seabirds are caught in the course of fishing operations.

The requirement for electronic monitoring (EM) using on-vessel cameras is under ongoing consideration by Government. Exemptions to the existing regulations for EM are now in place. (These regulations were promulgated in 2017). The primary goal of rolling out EM under IEMRS was verification of fisher self-reports. The current Minister of Fisheries has indicated that re-consultation would occur in future if EM was to be progressed[47].

Stakeholder engagement

Stakeholder engagement is a core component of the government's approach to managing seabird interactions with commercial fishing activities. The government's Seabird Advisory Group, which includes DOC, the Ministry, industry, and recreational fisheries and environmental non-government organisation (NGO) representation, provides advice relating to the management of New Zealand seabirds in the context of fisheries interactions, both inside and outside New Zealand waters. The Seabird Advisory Group supports Government's implementation of the National Plan of Action – Seabirds[29].

DOC and the Ministry, respectively, convene the Conservation Services Programme Technical Working Group and the Aquatic Environment Working Group (AEWG). These groups include stakeholders such as fishing industry representatives,

[46] MPI (2017)
[47] https://www.beehive.govt.nz/release/next-steps-digital-monitoring-fisheries

science providers, NGOs, and independent experts. The groups review and evaluate seabird-related research and management work, and make recommendations on future work, including that comprising Conservation and Fisheries Services. For example, the AEWG has reviewed iterations of the Richard and Abraham risk assessment work described in the previous section[35,36,37]. Groups are not consensus-based, but their advice is considered by Government in the development and roll-out of its work programmes.

There are also species-specific working groups. The Black Petrel Working Group comprises fishers and other fishing industry participants, iwi, representatives of environmental NGOs, and central and regional government. This group helps deliver on actions addressing the Black Petrel and Flesh-footed Shearwater Action Plan[44]. The Antipodean Albatross Working Group was established in 2017. Its goal is to investigate the declining population trajectory of this albatross, and determine what actions are necessary to address it[48].

Seabird management work outside commercial fisheries

Seabird breeding activity on land in New Zealand creates opportunities for management activities. Land-based work at breeding sites may include:

- research to understand population status and trajectories
- predator control to increase breeding success of seabirds
- attachment of monitoring devices to birds to determine at-sea movements, and,
- creation of new colonies of seabirds (e.g., for Chatham Island albatross and Chatham petrel (*Pterodroma axillaris*)[49], and Hutton's shearwater[50]).

Some land-based activities are relevant to an understanding of the risks of seabird interactions with commercial fishing, such as determining at-sea movements. Land-based work can also directly affect the risk that fishing-related mortalities may present to seabird populations. (That is, in general, larger seabird populations are less likely to be at risk from fishing-related mortalities). Some of this work is conducted and/or supported by Government. However, non-government work also supports delivery on government management priorities for seabirds.

Non-regulatory initiatives

Within the New Zealand commercial fishing industry, a number of initiatives contribute to the implementation of non-regulatory measures to manage seabird-fisheries interactions. Initially focused amongst larger vessels undertaking deepwater fishing activities, in recent years, initiatives to address seabird interactions with inshore fisheries have increased significantly.

Vessel-based risk management plans and liaison activities

Risk management plans or codes of practice focusing on seabird – fisheries interactions have been developed on a voluntary basis across some sectors of the commercial fishing fleet. These are;

- Operational Procedures
- Seabird Management Plans
- Vessel Management Plans
- Risk Management Plans

In the early 2000s, a code of practice was developed for vessels using the autoline method to target ling (*Genypterus blacodes*)[51]. This code included information on measures to reduce the risk of seabird bycatch, requirements for reporting to

[48] Fisheries New Zealand (2018)
[49] www.taiko.org.nz/
[50] www.huttonsshearwater.org.nz/category/trust-projects/

Government and industry, and background information on seabird bycatch amongst vessels using the bottom longline method to target ling. The code was intended to be used alongside a training manual that provided more information relevant to seabird bycatch[52]. This code was revised in 2013 and the scope broadened to provide an interim code of practice for other bottom longline fisheries[53].

Bottom longline vessels targeting ling in Fisheries Management Areas 2 – 7 fish under Operational Procedures implemented and administered by the Deepwater Group Ltd (DWG). These procedures are agreed between owners of fishing quota, owners of Annual Catch Entitlement[54], and in conjunction with the Ministry[55]. The objectives of the operational procedures include:

- to mitigate the risk of seabird captures and resulting mortalities
- to ensure vessels have robust and documented procedures that meet mandatory and DWG requirements for seabird bycatch mitigation
- to ensure that mandatory measures for bycatch reduction are understood and followed
- to actively involve vessel crews in seabird mitigation measures.

Procedures include the documentation of vessel owner and operator, crew and DWG responsibilities relating to seabird bycatch risks and management of those risks. Procedures also cover background information on seabirds caught in bottom longline fishing activities targeting ling, risk factors for seabird captures, mandatory and non-regulatory seabird bycatch reduction measures, seabird handling and reporting.

Supporting the implementation of these Operational Procedures, the DWG Environmental Liaison Officer visits every vessel using the bottom longline method in FMAs 2 – 7 that lands two or more metric tonnes of ling per year. The liaison officer distributes instructions for tori line construction, as well as providing construction materials to smaller-scale operators[56].

On inshore bottom longline vessels operating in northern New Zealand (specifically vessels targeting snapper (*Pagrus auratus*) and bluenose (*Hyperoglyphe antarctica*) in FMA 1), liaison officers have been developing voluntary Seabird Management Plans with vessel operators since 2014[57]. These plans are intended to document daily operational practices employed to manage the risk of seabird captures. For example, plans document routine line-weighting regimes, tori lines usage, and measures vessel operators implement during periods of increased seabird bycatch risk (e.g. if they observe seabirds gathering around their vessel, or targeting longline baits). Plans are intended to capture actual fishing practices, not an ideal operational state that is never achieved[57]. Therefore, they are useful to highlight areas in which liaison activities can be focused to improve practices to reduce the risk of seabird interactions.

Working with operators of surface longline fishing vessels, liaison officers have developed voluntary seabird risk management plans in 2016/17. These risk management plans were preceded by exploratory work to document vessel operating practices[57]. In 2017/18, work developing plans continued (and the scope of these was expanded to all protected species, including seabirds). As well as these plans, liaison officers provide surface longline vessel operators with guidance on approaches to reduce seabird interactions with their operation, event triggers and reporting requirements, and materials to build tori lines[58].

[51] Ling Autoline Working Group (2004)
[52] Lydon (2013)
[53] Deepwater Group Ltd (2013)
[54] Holders of Annual Catch Entitlement have a legal right to take a certain weight of a fishstock during a fishing year. A fishstock is a species of fish occurring in a Quota Management Area.
[55] Deepwater Group Ltd (2016), https://deepwatergroup.org/newsresources/op-manual/
[56] Cleal, J. Personal communication. 3 April 2017.
[57] Pierre (2016)
[58] Pierre (2017)

Liaison work focusing on the management of seabird interactions is also underway amongst coastal trawlers (vessels < 28 m overall length). Protected Species Risk Management Plans (including seabirds) were prepared for 11 vessels operating around Otago in 2017/18. In 2018/19, work has been extended to coastal trawlers operating in other areas. This work builds on initiatives undertaken in 2014/15, that were focused around the South Island.

In 2018/19, set net vessels are included in liaison officers' work for the first time. Work with these vessels is planned to grow in coming years[24].

Liaison work conducted in the surface longline, FMA 1 bottom longline, coastal trawl (excluding vessels targeting hoki under the Deepwater Group Ltd), and set net fisheries is currently executed as a conservation service, commissioned by DOC[24], who implement the programme in collaboration with MPI and Fisheries Inshore New Zealand. Trawl vessels targeting hoki (under the Deepwater Group Ltd) are involved in a liaison programme that links to the Marine Stewardship Council certification of the fishery in which these vessels participate.

Operational Procedures (OPs) and Vessel Management Plans (VMPs) are in place on New Zealand trawl vessels ≥ 28 m in overall length as a non-regulatory measure that is required by DWG. These non-regulatory plans have been in place for a number of years, and are focused on reducing seabird capture risks (as well as captures of other protected species)[59,60]. Implementation of plans at sea is supported by onshore workshops conducted with vessel operators, skippers and crew by the DWG Environmental Liaison Officer. At-sea conformance with OPs and VMPs is documented by government fisheries observers and reported back to DWG by the Ministry. Aggregated information on conformance is made publicly available by the Ministry, such as in annual reporting.

The OPs and VMPs include:

- contextual information on seabird species of particular interest and types of interactions these birds have with fishing activities
- areas and periods of higher bycatch risk
- vessel operator, skipper and crew responsibilities in relation to implementing VMPs
- specific actions to mitigate risk
- mandatory requirements for the deployment of seabird bycatch mitigation devices, and,
- reporting requirements (mandatory, and non-regulatory reporting to DWG).

Government fisheries observers audit the implementation of voluntary risk management plans across the vessels included in liaison work. Liaison officers then follow up with vessel operators, to resolve any issues identified.

Capacity-building amongst vessel operators and crew

As well as the more structured programmes described above, industry, government, and non-government groups all undertake activities intended to reduce the extent of seabird interactions with fisheries, and to increase fisher awareness of these interactions and how to manage them.

Industry participants may be involved in these work programmes in a number of ways:

- At sea: Fishing vessel skippers and crew may be involved in vessel-based development and testing of seabird bycatch reduction measures such as bird bafflers[61], underwater gear setting devices[62] and tori lines[63]. This work

[59] Deepwater Group Ltd (2009)
[60] Deepwater Group Ltd (2015)
[61] Cleal and Pierre (2016)
[62] Baker et al. (2016)
[63] Pierre and Goad (2016)

involves mitigation practitioners working on-vessel to test devices, with the assistance of skippers and crew in administering tests and devising solutions to problems encountered. Alternatively, devices may be deployed with skippers and crew tasked with monitoring device performance, conducting repairs or modifications to address issues arising while at sea, and communicating their findings to mitigation practitioners on returning to port.

- On land: Activities include visits to seabird breeding sites to build knowledge and understanding of seabirds. In 2013 fishers visited the black petrel breeding colony on Great Barrier Island[64], and fishers have also visited the Westland petrel breeding colony on the west coast of the South Island. Workshops with fishers, vessel owners, and other industry participants have also been conducted in recent years, including Seabird Smart workshops convened by Southern Seabird Solutions with the support of industry and government[65]. These workshops are focused on how to reduce the risk of seabird captures during fishing activities.

Monitoring

Voluntary camera monitoring of seabird captures is underway on a trial basis in FMA 1. Black petrel captures are a focus of this monitoring project, which has been facilitated by the Black Petrel Working Group. This project is not part of DM.

Conformance and verification measures

The party responsible for implementing requirements for reducing seabird bycatch risk varies by regulation. For example, fishing permit holders are responsible for meeting legal requirements for reporting specific information on seabirds captured or killed in the course of commercial fishing activities[18]. Commercial longline fishers are responsible for using tori lines when setting longlines, setting longlines at night and meeting line-weighting requirements[21,22].

Where legal requirements apply to specific stakeholder group(s), the Ministry may assist by sending personal correspondence to relevant individuals to notify them directly of new requirements.

External measures

Fisheries regulations relating to seabird interactions, such as the use of required bycatch mitigation measures, are monitored by the Ministry in a number of ways. The most common is using government fisheries observers, who are placed on vessels to collect information on many components of fishing operations. Observer duties include documenting the use of mandatory seabird bycatch mitigation devices, recording seabird captures, taking samples of seabirds landed dead on fishing vessels, and returning samples to shore to confirm identification[24,66]. Observers are focused on information collection, not enforcement. Information they collect is then returned to government agencies onshore for follow-up. Government has some ability to audit fisher self-reports against observer reports where observers are placed on fishing vessels.

A compliance role is executed by the Ministry's Fisheries Officers, who conduct port visits to fishing vessels and may board vessels at sea. Fisheries Officers also collect information that may lead to prosecutions for fisheries offences.

Aerial surveillance is used to gather information on compliance with required measures to reduce seabird interactions with commercial fishing operations. Similar to information collected by observers, surveillance information is returned to the Ministry for onshore processing and any follow-up deemed appropriate. For example, in 2005, aerial surveillance identified

[64] https://blog.doc.govt.nz/2013/06/11/black-petrels-meet-fishermen/
[65] http://www.southernseabirds.org/about-us/projects/seabird-smart-training-workshops/
[66] Bell and Mischler (2015)

that trawl vessels operating in the southern New Zealand squid fishery were not using mitigation devices to the extent appropriate given the applicable codes of practice[67]. Vessels were recalled to port as a result.

Where non-compliance with legal requirements is detected, offences and penalties apply. These are articulated in the Wildlife Act 1953 and the Fisheries Act 1996 and associated fisheries regulations. Penalties include fines, vessel forfeiture and imprisonment, depending on the nature and gravity of the offence. Penalties are defined in both Acts and regulations, including Part 5 of the Wildlife Act 1953, Part 13 of the Fisheries Act 1996 and associated regulations.

Within industry, vessel operators reporting against seabird capture triggers may provide some indication of compliance with regulated measures and conformance with non-regulatory measures. Where triggers are reported, liaison officers can work with operators (in some cases, in near-real time) to identify and resolve issues that may have exacerbated capture risks. Triggers are documented in voluntary risk management plans, OPs, and VMPs.

Government fisheries observers also document conformance with vessel-specific management plans implemented to reduce seabird bycatch risk. Information flow back to industry enables follow-up where non-conformance is documented.

Other measures

For fisheries under the Marine Stewardship Council (MSC) certification system, the sustainability of protected species captures, and associated management measures, are key parts of fishery assessment and annual audit[68]. Detailed information supporting fisheries assessments is provided in Public Certification Reports, made available on the MSC website and also accessible on the species profile page of OpenSeas.

Comparability to international best practice

The Agreement on the Conservation of Albatrosses and Petrels (ACAP) identifies and reviews global best practice measures for seabird bycatch reduction[69,70,71]. New Zealand is a party to this Agreement. New Zealand also contributes to the definition of best practice measures through conducting empirical research on bycatch reduction approaches[72,73]. Best practice as defined by ACAP is relevant to management actions that aim to minimise interactions between commercial fishing and New Zealand's albatrosses and petrels.

Regulated measures in place on trawl vessels in New Zealand that are best practice, as defined by ACAP are[71]:

- the prohibition of net sonde cables on all trawlers[19]
- tori lines, as one of three options for mandatory use of a specified device on vessels ≥ 28 m in overall length, to reduce the risk of seabird strikes on trawl warps[20].

Non-regulatory measures in place on trawl vessels ≥ 28 m in overall length that are best practice, as defined by ACAP are[71]:

- managing the discharge of fish processing waste
- minimising the time nets are on the surface
- removing fish and fish scraps from nets between net deployments[60].

[67] http://www.scoop.co.nz/stories/PO0505/S00074.htm
[68] www.msc.org
[69] ACAP (2017a)
[70] ACAP (2017b)
[71] ACAP (2017c)
[72] Pierre et al. (2012)
[73] Goad and Debski (2017)

Regulated measures for bottom longline fishing vessels in New Zealand that are best practice, as defined by ACAP are[69]:

- line-weighting
- tori lines (on vessels ≥ 7 m in length)
- night-setting
- no discharge of fish processing waste during setting
- discharge of fish processing waste during hauling only on the opposite side of the vessel to where hauling occurs[21].

Non-regulated best practice measures for the bottom longline fishing method in place on an unknown number of vessels include:

- haul mitigation devices[74].

For surface longline vessels, ACAP's best practice recommendation is for simultaneous use of tori lines, weighting of longline branch lines (snoods) and night-setting[70]. The New Zealand regulatory approach includes those measures but does not currently require the three to be deployed simultaneously[22].

Overarching measures

New Zealand's approach to managing seabird interactions with commercial fisheries is guided by or linked to a number of international agreements, conventions, plans and guidelines. Some of these originate in fisheries-specific contexts whilst others are more broadly related to the conservation of biodiversity or seabirds. In broad terms, the relevance of these instruments to seabird interactions with fishing activity is that a commitment exists to ensure that:

- the use of fisheries resources is sustainable, and,
- the conservation status of seabirds is not compromised by commercial fishing activities.

In many cases, seabird interactions with fisheries are encompassed in considerations of the effects of fishing on associated, dependent or ecologically-related species.

Binding agreements that relate to the sustainable use of fisheries resources include the following. (*Conventions marked with asterisks explicitly specify the use of seabird bycatch reduction measures that apply to New Zealand fishing vessels, as part of a broader suite of fisheries management measures that signatories are responsible for implementing.*)

- Convention on the Conservation of Antarctic Marine Living Resources 1980[75]*
  This convention applies to living marine resources found south of the Antarctic convergence. The Commission that implements the convention adopts decisions that apply to harvesting these resources, including specific conservation measures to reduce the impacts of fishing activities on seabirds (i.e. area closures, tori line usage, and management of fish waste discharge).

- United Nations Convention on the Law of the Sea (UNCLOS) 1982[76]
  In relation to seabird interactions with fisheries, this convention requires New Zealand to consider the effects of fishing such that seabird populations are maintained or restored above "*levels at which their reproduction may become seriously threatened*"[77].

- Convention on Biological Diversity 1992[78]

[74] Pierre (2018)
[75] https://www.ccamlr.org/
[76] http://www.un.org/depts/los/convention_agreements/texts/unclos/UNCLOS-TOC.htm
[77] http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf
[78] https://www.cbd.int/

This convention addresses the conservation and sustainable use of biological diversity. New Zealand's delivery of its obligations under this convention is articulated as the New Zealand Biodiversity Strategy 2000[27] and Action Plan 2016[28] (see above).

- Convention for the Conservation of Southern Bluefin Tuna 1994[79]*
  This convention focuses on the management of southern bluefin tuna (*Thunnus maccoyii*). It issues binding and non-binding conservation measures, including measures relevant to seabirds.

- United Nations Fish Stocks Agreement 1995[80]
  This agreement implements provisions of UNCLOS, requiring the adoption of conservation and management measures that ensure seabirds, as associated and dependent species and species belonging to the same ecosystem as harvested fish stocks, are maintained for long-term viability.

- Western and Central Pacific Fisheries Convention 2004[81]*
  This Convention is underpinned by UNCLOS. Its objective is to ensure the long-term conservation and sustainable use of highly migratory fish stocks in the western and central Pacific Ocean. Parties to this convention implement binding conservation and management measures, and develop non-binding recommendations, for seabird interactions with convention area fisheries. The Convention Area includes the New Zealand Exclusive Economic Zone and areas outside New Zealand's national jurisdiction.

- Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean 2009[82]*
  Parties to this binding Convention focus on conservation and sustainable use of fisheries in the South Pacific. This includes the development and implementation of conservation measures intended to protect and maintain the ecosystems in which fisheries resources occur. Conservation measures relating to seabirds include requirements for the use of bycatch reduction measures.

Binding agreements that apply to specific seabirds, and promote an improvement in seabird conservation status are:

- The Convention on the Conservation of Migratory Species of Wild Animals (CMS) 1979[83]
  Appendix II of this Convention lists approximately 20 procellariiform[84] seabird species that occur in New Zealand. Their listing recognises these species' unfavourable conservation status, and the need for international cooperation to deliver management to improve that status. The Convention encourages range states for listed species to develop agreements for management of listed species or species groups.

- Agreement on the Conservation of Albatrosses and Petrels 2004[85]
  This agreement arises from CMS. Its objective is to achieve and maintain a favourable conservation status for 31 listed species of albatrosses and petrels, 22 of which occur in New Zealand. The Agreement focuses on international coordination of activities to mitigate threats to listed species. The Agreement text considers seabird interactions with fisheries specifically, obligating member parties to take appropriate actions to reduce or eliminate fisheries bycatch. This Agreement is the recognised authority on best practice mitigation measures for reducing seabird captures in fisheries.

[79] https://www.ccsbt.org/
[80] In full: United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks
[81] https://www.wcpfc.int/
[82] http://www.sprfmo.int/
[83] http://www.cms.int/
[84] This group of seabirds includes albatrosses, petrels, shearwaters, storm petrels and diving petrels.
[85] http://acap.aq/

Non-binding instruments that relate to the management of seabird interactions with commercial fishing activity include:

- United Nations Food and Agriculture Organization Code of Conduct for Responsible Fisheries (CCRF) 1995[86]
  This Code provides a principled approach to fisheries management and promotes the protection of marine biodiversity and endangered species.

- International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA) 1999[87]
  This action plan highlights seabird mortalities in longline fisheries, and sets out activities that are intended to reduce this mortality. New Zealand's approach to implementing the IPOA has involved its own NPOA considering fisheries more broadly than just commercial longline activities, as discussed in more detail earlier in this report.

- United Nations Food and Agriculture Organization Technical Guidelines for Responsible Fisheries: Best practices to reduce incidental catch of seabirds in capture fisheries 2009[88]
  These guidelines were developed to facilitate the implementation of the CCRF and the IPOA. They are addressed at decision-makers and policy-makers managing seabird interactions with fishing activity. They are also intended to provide guidance and advice for management of seabird interactions by regional fisheries management organisations.

[86] http://www.fao.org/docrep/005/v9878e/v9878e00.htm
[87] http://www.fao.org/docrep/006/X3170E/x3170e02.htm
[88] http://www.fao.org/3/a21f9e2a-22cf-5223-9d5b-328a99f1e748/i1145e00.pdf

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Appendix 1. Conservation status categories of the New Zealand Threat Classification[6]

Where taxa are taxonomically determinate, categories and subcategories are:

- Extinct
- Data Deficient
- Threatened
    - Nationally Critical
    - Nationally Endangered
    - Nationally Vulnerable
- At Risk
    - Declining
    - Recovering
    - Relict
    - Naturally Uncommon
- Non-resident Native
    - Migrant
    - Vagrant
    - Coloniser
- Not Threatened
- Introduced and Naturalised

Where taxa are taxonomically indeterminate, categories and subcategories are:

- Data Deficient
- Threatened
    - Nationally Critical
    - Nationally Endangered
    - Nationally Vulnerable
- At Risk
    - Naturally Uncommon

Appendix 2. IUCN Red List Categories[7]

- Extinct
- Extinct in the wild
- Critically endangered
- Endangered
- Vulnerable
- Near threatened
- Least concern
- Data Deficient
- Not evaluated

Report Details

Section	Associated species – Seabirds
Report author(s)	Johanna Pierre, JPEC Ltd (Director)
Date of draft report	7 December 2018
Lead Agency Review	Graeme Taylor, Igor Debski, Department of Conservation
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Relevant legislation, regulation and statues	Wildlife Act 1953 Fisheries Act 1996 Fisheries (Commercial Fishing) Regulations 2001 Fisheries (Reporting) Regulations 2001 Seabird Scaring Devices Circular 2010 (no. F517) Fisheries (Seabird Sustainability Measures - bottom longlines) notice 2010 (no. F541) Fisheries (Seabird Mitigation Measures - surface longlines) Circular 2014 (no. 213)
Relevant regulatory agencies	Fisheries New Zealand www.mpi.govt.nz Department of Conservations www.doc.govt.nz