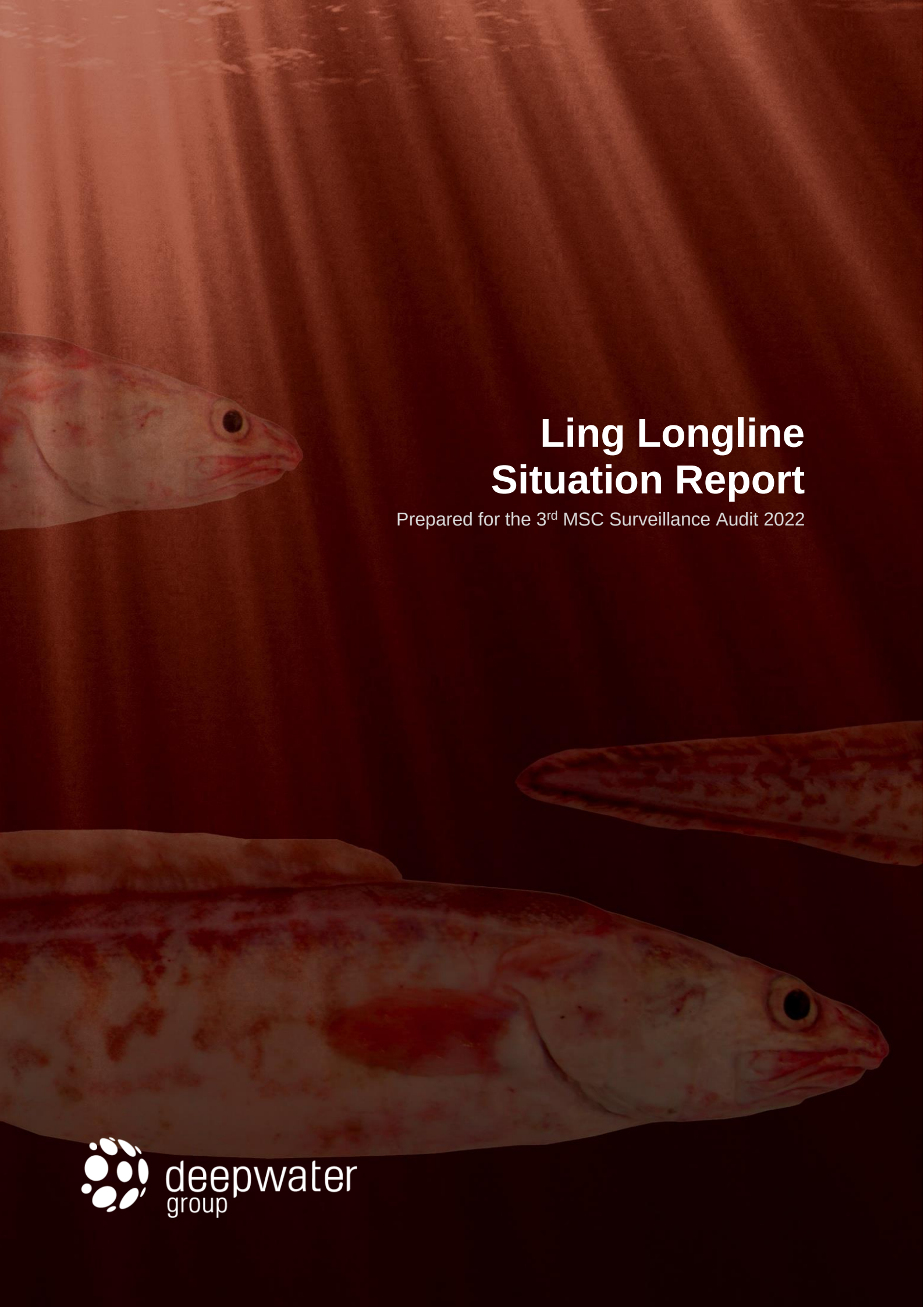

Ling Longline Situation Report

Prepared for the 3rd MSC Surveillance Audit 2022

deepwater group

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New Zealand Ling Longline Fishery

Purpose of this report

This report provides an update on five ling longline Units of Certification (UoC) (LIN 3, 4, 5, 6 & 7), and builds on the information previously provided for the second surveillance audit in 2021

It is Deepwater Group Limited's (DWG) submission that these five fisheries continue to conform with the MSC Fisheries Standard (FCR V1.3) as evidenced in the following updated information and references.

Overview of fishery MSC certification

Ling longline certification details

Certification date	Initial Certification: September 2014 Recertification: September 2018 (synchronised with Hoki)
Stock areas	UoC 6: LIN 3 UoC 7: LIN 4 UoC 8: LIN 5 UoC 9: LIN 6 UoC 10: LIN 7
Species	*Genypterus blacodes*
Method/gear	Longline

P1 Overview of stock status information

Stock status, TACC & catches

UoC 6 – LIN 3

Update on stock status (FNZ, 2022; Mormede et al., in prep. a, b, c), (updating Holmes, 2019)	For Chatham Rise (LIN 3 & 4), B_{2022} was estimated to be about 56% B_0; Very Likely (> 90%) to be above the management target of 40% B_0 (base case run).
TACC 2021-22 TACC 2020-21 TACC 2019-20 TACC 2018-19 TACC 2017-18	2,060 t 2,060 t 2,060 t 2,060 t 2,060 t
UoA share of TACC and total LIN catch	100% of TACC and 30% of total LIN catch (based on average estimated longline catch over the last two years)

UoC share of TACC and total LIN catch	93% of TACC and 29% of total LIN catch (based on average estimated longline catch over the last two years)
LIN 3 catch 2020-21	1,489 t (Total reported catch) 489 t (Estimated catch trawl) 406 t (Estimated catch bottom longline) 594 t (Estimated catch other methods)[1]
LIN 3 catch 2019-20	1,684 t (Total reported catch) 912 t (Estimated catch trawl) 554 t (Estimated catch bottom longline) 218 t (Estimated catch other methods)

Note: "Estimated catch trawl" is derived from at-sea estimates per fishing event and is typically different from "reported catch", which is derived from weighed landings as reported against the TACC and balanced with ACE.

Figure 1: Total Allowable Commercial Catches and reported catches for LIN 3 (all gear types).

UoC 7 – LIN 4

Update on stock status (FNZ, 2022; Mormede et al., in prep. a, b, c), (updating Holmes, 2019)	For the Chatham Rise stock (LIN 3 & 4), B_{2022} was estimated to be about 56% B_0; Very Likely (> 90%) to be above the management target (base case run).

[1] 'Other' methods include potting, setnet, dahn line, Danish seine and fish traps.

TACC 2021-22 TACC 2020-21 TACC 2019-20 TACC 2018-19 TACC 2017-18	4,200 t 4,200 t 4,200 t 4,200 t 4,200 t
UoA share of TACC and total LIN catch UoC share of TACC and total LIN catch	100% of TACC and 64% of total LIN catch (based on average estimated longline catch over the last two years) 94% of TACC and 62% of total LIN catch (based on average estimated longline catch over the last two years)
LIN 4 catch 2020-21 LIN 4 catch 2019-20 	2,103 t (Total reported catch) 656 t (Estimated catch for all target trawl) 1,447 t (Estimated catch for bottom longline) 0 t (Estimated catch other methods). 1,778 t (Total reported catch) 571 t (Estimated catch for all target trawl) 1,048 t (Estimated catch for bottom longline) 159 t (Estimated catch other methods).

Figure 2: Total Allowable Commercial Catches and reported catches for LIN 4 (all gear types)

Note: The LIN 4 trawl catch is largely a bycatch in the much larger eastern hoki trawl fishery and LIN 4 trawl catch trends are therefore subject to forces other than ling abundance.

UoC 8 – LIN 5

Update on stock status (Mormede et al., 2021, 2021a)	LIN 5&6 (Sub-Antarctic excl. Bounty Plateau): B_{2021} was estimated to be between 71% B_0; Virtually Certain (>99%) to be at or above the target (40% B_0).
TACC 2021-22	5,208 t
TACC 2020-21	4,735 t
TACC 2019-20	4,735 t
TACC 2018-19	4,735 t
TACC 2017-18	3,955 t
UoA share of TACC and total LIN catch	100% of TACC and 10% of total LIN catch (based on average estimated longline catch over the last two years)
UoC share of TACC and total LIN catch	95% of TACC and 8% of total LIN catch (based on average estimated longline catch over the last two years)
LIN 5 catch 2020-21	4,950 t (Total reported catch)
	4,380 t (Estimated catch trawl)
	567 t (Estimated catch bottom longline)
	3 t (Estimated catch other methods)
LIN 5 catch 2019-20	4,662 t (Total reported catch)
	4,264 t (Estimated catch for all target trawl)
	387 t (Estimated catch for bottom longline)
	11 t (Estimated catch for other methods)

The revised stock assessment in 2021 resulted in advice to the Minister proposing a TACC increase for LIN 5 (FNZ, 2021). The Minister subsequently approved an increase from 4,735 t to 5,208 t for the 2021-22 fishing year (FNZ, 2021a), (Figure 3).

Figure 3: Total Allowable Commercial Catches and reported catches for LIN 5 (all gear types)

Webber et al. (2021) applied a new, generalised age-structured stock assessment model (Stan-ASD), in the most recent stock assessment of LIN 5 and LIN 6 and argue that it offers an improved tool for coding and implementing new concepts and for testing different aspects of age-structured stock assessment models.

UoC 9 – LIN 6

Update on stock status LIN 5 & 6 (Mormede et al., 2021, 2021a) LIN 6B (Horn, 2007)	For the Sub-Antarctic stock (LIN 5 & 6, excluding the Bounty Plateau, LIN 6B), B_{2021} was estimated to be between 71% B_0; Virtually Certain (> 99%) to be above the management target. For the Bounty Plateau stock, fished only by longline (LIN 6B part of LIN 6), B_{2006} was estimated to be 61% B_0; Very Likely (> 90%) to be at or above the management target of 40% B_0.
TACC 2021-22 TACC 2020-21 TACC 2019-20 TACC 2018-19 TACC 2017-18	8,505 t 8,505 t 8,505 t 8,505 t 8,505 t
UoA share of TACC and total LIN catch UoC share of TACC and total LIN catch	100% of TACC and 39% of total LIN catch (based on average estimated longline catch over the last two years) 94% of TACC and 37% of total LIN catch (based on average estimated longline catch over the last two years)
LIN 6 catch 2020-21	3,916 t (Total reported catch) 2,567 t (Estimated catch trawl)

LIN 6 catch 2019-20	1,349 t (Estimated catch bottom longline)[2] 0 t (Estimated catch other methods) 3,967 t (Total reported catch) 2,234 t (Estimated catch trawl) 1,733 t (Estimated catch bottom longline) 0 t (Estimated catch other methods. 209 t (Estimated catch LIN 6B bottom longline)

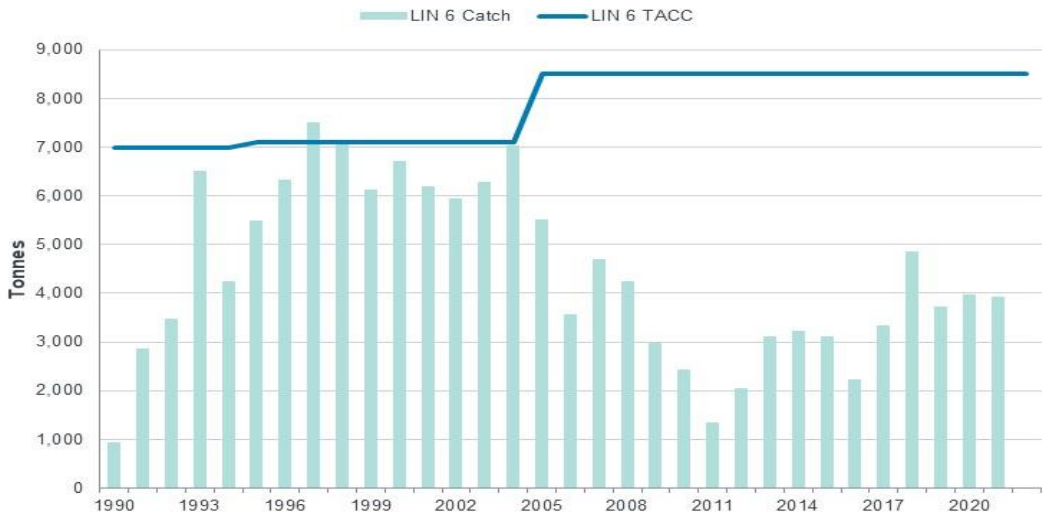

Figure 4: Total Allowable Commercial Catches and reported catches for LIN 6 (all gear types)

Note: The LIN 6 trawl catch is largely a bycatch in the much larger western (Sub-Antarctic) hoki trawl fishery and overall, LIN 6 catch trends are therefore subject to forces other than ling abundance.

UoC 10 – LIN 7

Update on stock status (Kienzle, 2021)	Three alternative model runs were presented, with B_{2020} estimated to be about 47% B_0, Likely (>60%) to be at or above the management target.
TACC 2021-22	3,387 t
TACC 2020-21	3,387 t
TACC 2019-20	3,387 t
TACC 2018-19	3,080 t
TACC 2017-18	3,080 t

[2] Including LIN 6B catch

UoA share of TACC and total LIN catch	100% of TACC and 47% of total LIN catch (based on average estimated longline catch over the last two years)
UoC share of TACC and total LIN catch	73% of TACC and 38% of total LIN catch (based on average estimated longline catch over the last two years)
LIN 7 catch 2020-21	3,308 t (Total reported catch) 1,414 t (Estimated catch trawl) 1,780 t (Estimated catch bottom longline) 114 t (Estimated catch other methods)
LIN 7 catch 2019-20	3,215 t (Total reported catch) 1,877 t (Estimated catch trawl) 1,313 t (Estimated catch bottom longline) 25 t (Estimated catch other methods)

Figure 5: Total Allowable Commercial Catches and reported catches for LIN 7 (all gear types)

Time series of relative biomass estimates for ling are available from biennial trawl surveys conducted on the Chatham Rise (LIN 4 & LIN 4) and in the sub-Antarctic (LIN 5 & LIN 6) (Stevens et al., 2021, 2020).

Catch-at-age information and dataset summaries for use in ling stock assessments are prepared on a regular basis (e.g., Saunders et al., 2022).

Key P1 references

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Mormede, S; Dunn, A; Webber, D N (in prep b) Stock assessment of ling (*Genypterus blacodes*) on the Chatham Rise (LIN 3&4) for the 2021–22 fishing year. Draft New Zealand Fisheries Assessment Report.

Mormede, S; Dunn, A; Webber, D N (in prep c) Spatial-temporal standardisation of commercial longline and trawl survey catches of ling (*Genypterus blacodes*) on the Chatham Rise (LIN 3&4). Draft New Zealand Fisheries Assessment Report.

Saunders, R.J.; Ballara, S.; Hart, A. & Sutton, C.P. (2022). Catch-at-age for hake (*Merluccius australis*) and ling (*Genypterus blacodes*) for the 2019–20 fishing year and from a research trawl survey in 2020, and a summary of the available data sets from the New Zealand EEZ. New Zealand Fisheries Assessment Report 2022/09. 95 p. https://fs.fish.govt.nz/Doc/25134/FAR-2022-09-Hake-And-Ling-Catch-At-Age-2019-2020-4269.pdf.ashx

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P2 Overview of environmental information

Observer coverage

MPI's scientific observer programme (SOP) collects data from fisheries, including ETP incidental capture information. This ETP component, under New Zealand law, is administered and funded by the Department of Conservation (DOC) through levies recovered from relevant fisheries quota owners. All observer deployment is managed by the SOP.

The objective of the SOP is to collect data from fisheries for the following purposes:

- As an input to monitor key fisheries against harvest strategies
- As an input to monitor biomass trends for target and bycatch species
- To enable reliable estimations and the nature of ETP species interactions and captures
- To enable timely responses to sustainability and environmental impact issues
- To provide a high level of confidence in fishers' at sea compliance with regulatory and non-regulatory measures.

The level of observer coverage for the different fisheries/sectors is tailored to suit the data and information requirements, including for stock assessment, compliance monitoring and ETP species captures. FNZ considers that 30% coverage is sufficient for most fisheries/sectors but implements high (80-100%) coverage for fisheries where there may be what are deemed by management to be high-risk ETP species (e.g., squid and southern blue whiting trawl fisheries where operations overlap with sea lions).

With a limited pool of observers, achievement of target observer coverage rates in all sectors may be affected by priorities around particular fisheries. For example, during 2018-19,

Ministerial directives requiring high levels of observer coverage in a number of inshore fisheries for monitoring of dolphin interactions (e.g., West Coast North Island), resulted in reprioritisation of observer deployments. This led to challenges in achieving coverage targets in some domestic deepwater fisheries.

For the ling longline fleet, the coverage achieved in 2019-20 was 320 days, slightly below the target of 400 observer days (FNZ, 2021). Observer coverage in this fleet over the recent 5-year period has ranged between 9% and 23% of hooks deployed, with an average of 15% coverage. Observer coverage in 2020-21 was severely restricted due to the Covid-19 epidemic, with < 1% of hooks observed (Table 1).

Table 1: Observer coverage in the ling longline fisheries (LIN 3, 4, 5, 6 & 7) as a percentage of hooks observed, 2015-16 to 2020-21.

	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Observer Coverage	9%	15%	23%	11%	17%	0.24%

Under the Annual Operational Plan for Deepwater Fisheries 2021-22, planned observer coverage for larger (i.e., > 34 m) ling longliners is 25-30%, while for longliners < 34 m the planned coverage is 10-15% of fishing days (FNZ 2021).

The trend in numbers of hooks deployed and observed in ling longline fisheries has been fairly consistent over the last 17 years. There was a slight slump from 2013 to 2015 followed by an increase back to long-term average levels from 2016 (Figure 6), (FNZ, 2021a).

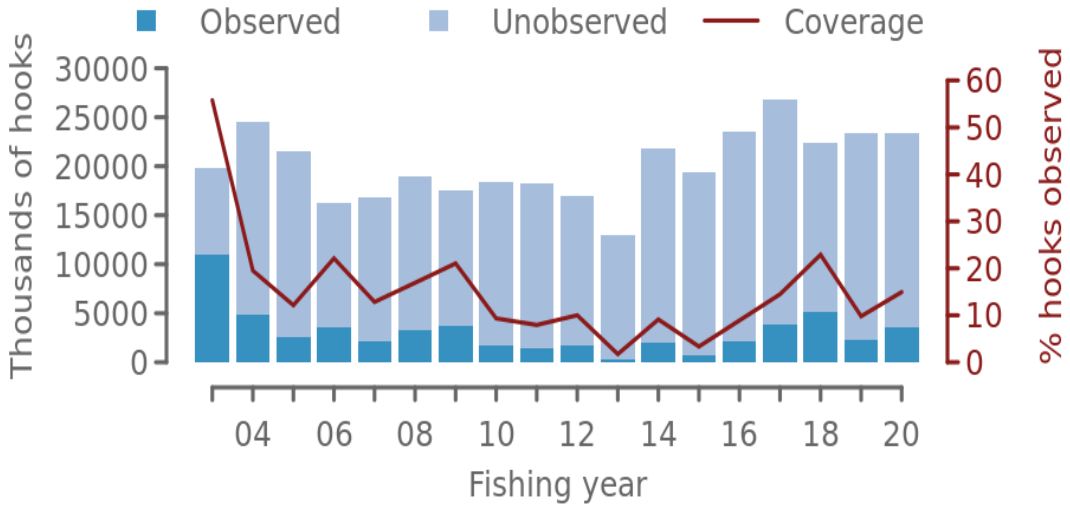

Figure 6: Numbers of hooks deployed and observed deployed in all ling longline fisheries, 2002-03 to 2019-20.

Retained & bycatch species

Ling accounts for around 66% of the total reported catch from ling-targeted longliners. The main non-target species, in decreasing order by weight, are QMS species spiny dogfish, ribaldo, rough skate, smooth skate, sea perch, pale ghost shark and red cod, followed by non-QMS species black cod and shovelnose dogfish (Finucci & Anderson, 2020). Eight of the top ten bycatch species are managed within the QMS and catches are therefore well monitored and with direct controls to limit their overall catch. The main discard species are spiny dogfish, black cod, conger eel and deep water dogfish.

While spiny dogfish is a QMS species, it has been listed as a Schedule 6 species under the Fisheries Act 1996 and can be legally returned to the sea (dead or alive) provided the catch is reported and balanced against ACE.

The trend in total bycatch has been relatively constant over the period 2002-03 to 2018-19, while for discards there has been a slight decrease (Finucci & Anderson, 2020).

ETP species

Information on incidental captures of ETP species, reported by vessels and by MPI observers, is summarised in the Aquatic Environment and Biodiversity Annual Review reports (e.g., FNZ 2022), and on the Protected Species Capture webpage (FNZ, 2021b). The database provides open access to multi-year records of ETP species captures by fishery sector and fishing method, based on MPI observer data, and is updated annually through FNZ's Science Working Group process.

In addition to MPI's scientific observer programme, a range of management measures, including some industry-led, non-regulatory initiatives, are employed to monitor environmental interactions in deep water fisheries and to reduce the risk of any adverse effects on protected species populations. Measures relating to the monitoring and risk management of ETP species are described in DWG's Operational Procedures and 10 Commandments for ling longline fisheries (DWG, 2021).

Seabirds

Seabirds are subject to incidental capture by ling longline vessels during line setting and hauling when birds target baited hooks. The Ling Longline Operational Procedures prescribe a range of mitigation measures to be followed to mitigate seabird capture (e.g., use of tori lines, night-setting, line weighting, thawing of bait prior to deployment, dimmed deck lighting during setting, offal discharge restrictions). Measures relating to the capture-mitigation and monitoring of seabirds are described in DWG's Ling Longline Operational Procedures (DWG, 2021).

Between 2013-14 and 2019-20, there were between 16 and 91 observed, and between 515 and 1002 estimated, incidental seabird captures per annum in ling longline fisheries. No strong trend in seabird captures is evident over this period. Seabird captures in 2019-20 were higher than average at 91 observed captures, while 2020-21 saw a return to the average rate with 31 captures (Table 2), (FNZ, 2021b).

Table 2: Observed and estimated incidental seabird captures and capture rates in all ling longline fisheries, 2013-14 to 2019-20.

Fishing Year	% Observed Hooks	Observed Captures	Estimated Captures (Median)	Estimated Captures 95% CI	Observed Capture Rate/1000 Hooks
2013-14	9%	31	917	(548-1511)	0.016
2014-15	3%	16	698	(404-1169)	0.025
2015-16	9%	89	823	(519-1309)	0.042
2016-17	14%	35	793	(451-1374)	0.009

2017-18	23%	23	515	(312-821)	0.004
2018-19	10%	23	726	413-1291	0.010
2019-20	15%	91	1002	662-1507	0.026

During 2020-21 the percentage of hooks observed was 6% and a total of 31 seabirds were observed captured by ling longliners. Details on the species involved are not currently available (G. Lydon FNZ, pers. comm.).

In 2019-20, 66% of seabirds observed captured by ling longliners were white-chinned petrels, 11% were sooty shearwater and another 10% comprised other petrels and shearwater species. Albatrosses made up 11% of the seabirds captured, with white-capped being the one most commonly caught (FNZ, 2021b).

White-chinned petrel, the species captured most often is categorised as 'Not Threatened' by DOC (Richard et al., 2020), and has a 'Low' risk classification (Table 3).

The risk classifications from the Spatially Explicit Fisheries Risk Assessment Framework (SEFRA), (Richard et al., 2020), for the main species incidentally captured in the ling longline fishery are provided below (Table 3). The Annual Potential Fatalities (APFs) for these species, for all New Zealand fisheries, are well below the estimated Population Sustainability Thresholds (PSTs), (Richard et al., 2020).

Table 3: Threat and risk classifications, for all New Zealand fisheries combined, as applicable to the most prevalent incidental seabird captures by the ling longline fishery, noting the APFs are for all NZ commercial fisheries combined.

Species	SEFRA Risk Classification (all fisheries combined)	SEFRA Mean APF	SEFRA Mean PST
White-chinned petrel	Low	1,360	25,600
Salvin's albatross	High	2,780	3,600
Grey petrel	Low	203	5,530
Westland petrel	High	180	350
White-capped albatross	High	3,830	10,900
Southern Buller's albatross	High	528	1,370
Southern Royal albatross	Low	19	848
Chatham albatross	High	155	425

The two species incidentally caught by ling longliners that are at highest risk are Salvin's albatross and Westland petrel, which have total risk ratios near or above 50% of the PST threshold of 1 (Richard et al., 2017).

Censuses undertaken of Salvin's albatross at their breeding colonies on Bounty Islands show that the number of breeding pairs increased between 2010 and 2013 and that their numbers have steadily increased from around 43,000 in 2010 to around 60,000 in 2018 (Table 4), (Baker & Jensz, 2019).

Table 4: Censuses of Salvin's albatross at Bounty Islands

Census Year	Breeding Pairs	Raw Counts	95% CI
2010	31,786	42,826	42,212-43,240
2013	39,995	53,893	53,429-54,357
2018	Not estimated	60,419	59,927-60,911

Estimated incidental captures of Salvin's albatross in ling longline fisheries over the 7-year period from 2013-14 to 2019-20 have ranged between 33 and 90, with an average of 58 birds per annum (Fig. 7), (FNZ, 2021b).

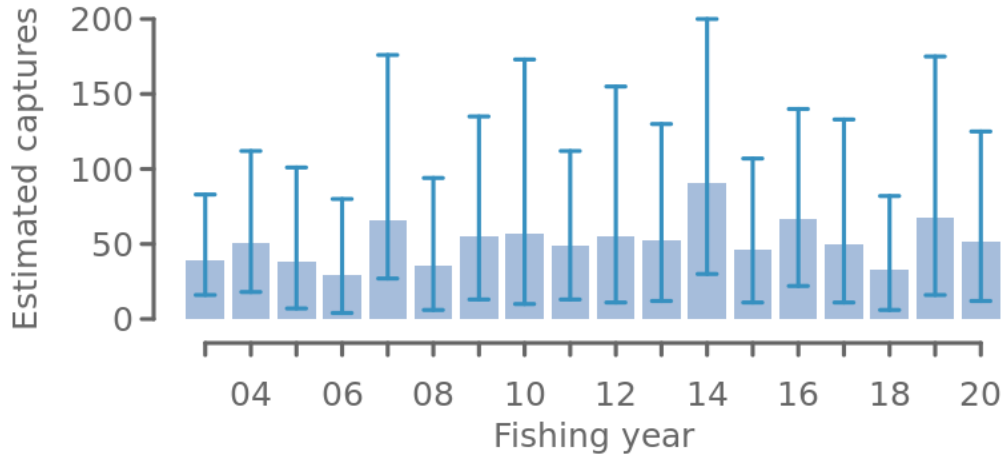

Figure 7: Estimated incidental captures of Salvin's albatross by ling longline fisheries 2002-03 to 2019-20.

The Westland petrel population is considered to be stable at around 4,000 breeding pairs (Waugh & Bartle, 2013). Based on demographic studies at the largest colony, the population is estimated to be stable or slightly increasing (Waugh et al. 2015).

While modelled estimates of Westland petrel captures are not currently available, the low number of observed incidental captures per annum by ling longline fisheries, totalling 16 birds over the 7-year period 2013-14 to 2019-20 (Figure 8), (FNZ, 2021b).

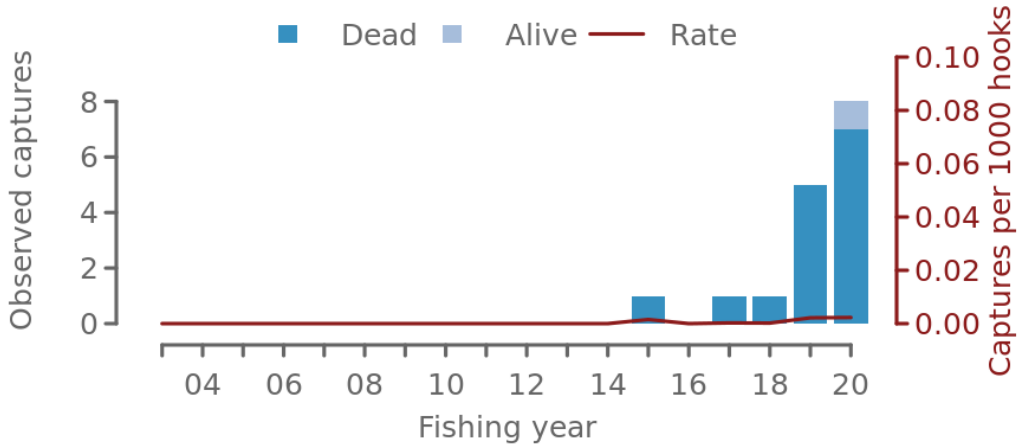

Figure 8: Observed incidental captures of Westland petrel by ling longline fisheries 2002-03 to 2019-20.

These low numbers of annual captures, in combination with the moderate level of observer coverage (Table 1), suggest they do not pose a high risk to the Westland petrel population. Their median Annual Potential Fatality (APF) rate of 180 for all trawl and longline fisheries combined is well below their estimated Population Sustainability Threshold (PST) of 350 (Richard et al., 2017).

FNZ and DOC have multiple seabird population monitoring, risk assessment and mitigation projects planned and/or underway, including for white-chinned petrel, Salvin's albatross, southern Buller's albatross, Gibson's albatross, white-capped albatross, northern giant petrel and flesh-footed shearwater (FNZ, 2020b).

Seabird Mitigation Measures

The Fisheries (Seabird Mitigation Measures - Bottom Longlines) Circular (No. 2) 2021 was implemented on 1 October 2021. The primary changes of the Circular involved:

- Setting streamer line requirements based on baiting method and vessel length to more accurately account for fishing effort.
- Introduce an outcome-focused approach to ensure that all vessels setting bottom longlines weight their line so that hooks sink to a depth of 5 metres within the aerial extent of the streamer line.
- Requirement for all BLL vessels active in FMA 6 to use an integrated weighted line (IWL) of 50g per metre.
- Allow bottom longline vessels to discard all live fish and dead fish greater than 30cm on the same side of the vessel as the hauling station if a hauling mitigation device is deployed.

Deepwater Group has responded to the regulatory changes by updating the Ling 2-7 Bottom Longline Operational Procedures (OP), the document which all DWG operators adhere to when targeting ling by bottom longline in these areas. The OP reflects what was changed in the regulations and guides operators on how to meet them. The most significant regulator change was the area-specific line weighting, requiring vessels in FMA 6 to use IWL at all times when bottom longlining. IWL with a lead core of 50g per metre is considered best practice by the Agreement on the Conservation of Albatrosses and Petrels (ACAP).

DWG Liaison Programme for ETP Species Risk Management

During 2020-21, DWG's Environmental Liaison Officer (ELO) visited 21 ling longline vessels (4 autoline & 17 hand-baiting), comprising 95% of the active fleet[3]. The Covid-19 pandemic restricted vessel visits to an extent. The purpose of these vessel visits is to:

- Organise and deliver environmental training resources to senior crew and associated managers.
- Monitor vessel operator's adherence to the agreed environmental risk Operational Procedures (OPs)
- Maintain fleet database of vessels, operators, target species, ports, skippers etc.
- Undertake port call and vessel visits to a minimum of 90% of the fleet
- Analyse all FNZ audits of Vessel Management Plans (VMPs) and OPs, contacting operators with feedback for each and every audit
- Provide expert advice on vessel-specific options for fish waste management and warp mitigation systems and ensure this is documented
- Maintain strong liaison with government – particularly with FNZ, DOC and DOC's Inshore Liaison Officer Programme
- Review VMPs, ensuring each vessel has an effective vessel-specific seabird risk management programme.
- Provide full induction into DWG programmes to new skippers and/or vessel operators who have moved to new fisheries or have started on new vessels.
- Produce an end-of-year summary report to DWG, FNZ and DOC.

The ELO additionally visits any vessel that has reported trigger-point captures in order to assess the possible reasons for the captures, whether they could have been prevented, and to educate the skipper on how to reduce the risk of such events re-occurring. The ELO is on-call 24/7 for any communications or requests for support, including for trigger capture events (Cleal, 2020, 2021).

Issues identified by the ELO specific to ling longliners include (Cleal, 2021):

- New bottom longline Mitigation Regulations have been implemented, requiring specific sink rates and revised tori line performance, which may be difficult for vessels to meet. Vessel-specific Risk Management Plans are being implemented to cover the new Regulations
- Many vessels use contract skippers who change vessels regularly, making it difficult to get uptake of information
- Many vessels have been sold, requiring education of new owners not familiar with mitigation requirements and methods
- Reporting of trigger events and seabird captures by some vessels is incomplete, and MPI compliance has started communicating with companies that appear to be lagging (MPI, 2020, 2021).

[3] Excluding smaller vessels landing less than 2 t of ling annually, of which there are approximately 10 - 15 boats (note most of these vessels are under other DOC CSP risk programme plans e.g., surface longline).

In summary, the existing seabird mitigation strategies applied by DWG and FNZ for ling longline fisheries, in combination with FNZ's seabird risk assessment and management approach, serve to ensure that the UoCs do not hinder or threaten the recovery of any seabird populations.

Other ETP Species

There have been no reported captures of protected fur seals, sea lions, whales, dolphins, sharks or turtles by ling longline vessels over the last 17 years (FNZ 2021b).

Benthic interactions

Bottom longline fishing has minimal interactions with the benthic habitat.

New Zealand's strategy to guard against adverse impacts on the benthic environment includes multiple area closures in the EEZ. A total of 17 Benthic Protection Areas (BPAs), representatively distributed around the EEZ, and 17 'seamount' closures, collectively close 30% of the EEZ to bottom fishing (Helson et al., 2010). The area closures protect:

- 28 percent of underwater topographic features (including seamounts)
- 52 percent of seamounts over 1000 metres in height
- 88 percent of known active hydrothermal vents.

Aquatic environment and biodiversity research initiatives related to the benthic effects of fishing are detailed in the Annual Operational Plan for Deepwater Fisheries (FNZ, 2021a), and relate mainly to examining the effects of bottom trawl fishing.

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P3 Overview of management information

Legal & customary framework

New Zealand's fisheries management is centred on the Quota Management System (QMS), a system introduced in 1986 based on Individual Transferrable Quota (quota), Total Allowable Catch (TAC) limits and Total Allowable Commercial Catch (TACC) limits.

Quota provides a property right to access commercial fisheries and has been allocated to Māori as part of the Treaty of Waitangi Settlements that acknowledge the Treaty guaranteed Māori *"full exclusive and undisturbed possession of their…fisheries."*

Quota is a tradable property right that entitles the owner to a share of the TACC. At the commencement of each fishing year, quota gives rise to Annual Catch Entitlements (ACE) which are tradable, expressed in weight, and entitle the holder to land catch against them. The QMS enables sustainable utilisation of fisheries resources through the direct control of harvest levels based on the best available science. The QMS is administered by MPI through the Fisheries Act 1996.

New Zealand has implemented one of the most extensive quota-based fisheries management systems in the world, with over 100 species or species-complexes of fish, shellfish and seaweed now being managed within this framework. Almost all commercially targeted fish species within New Zealand's waters are now managed within the QMS.

At an operational level, these fisheries are managed in accordance with the National Fisheries Plan for Deepwater Fisheries (FNZ, 2019). There are species-specific chapters for hake, hoki and ling within this plan (MPI, 2010a; MPI, 2011; MPI, 2013a).

The National Deepwater Plan consists of three parts:

- Fisheries management framework and objectives:
  - Part 1A - strategic direction for deep water fisheries
  - Part 1B - fishery-specific chapters and management objectives at the fishery level
- Annual Operational Plan (AOP) – detailing the management actions for delivery during the financial year
- Annual Review Report – reporting on progress towards meeting the five-year plan and on the annual performance of the deep water fisheries against the AOP.

The deepwater fisheries management system undergoes periodic reviews to ensure it is able to deliver on its objectives and to identify opportunities to maximise its effectiveness. The most recent review was conducted in 2018 (IQANZ, 2018).

Collaboration

In 2006, DWG and FNZ (then MPI), entered into a formal partnership to enable collaboration in the management of New Zealand's deep water fisheries. This partnership was updated in 2008 and 2010 (MPI, 2010), and has directly facilitated improved management of the hake/hoki/ling trawl fisheries through:

- A close working relationship under a shared and agreed vision, objectives and collaborative work plans
- Real-time, open communication between DWG and FNZ on information relevant to management measures, particularly from the FNZ Observer Programme and commercial catching operations.

FNZ and DOC actively consult with interested parties to inform management decisions through their open scientific working groups and public consultation processes.

Compliance & enforcement

FNZ maintains a comprehensive compliance programme, which includes both encouraging compliance through support and creating effective deterrents. This strategy is underpinned by the VADE model, which focuses on all elements of the compliance spectrum as follows:

1. Voluntary compliance – outcomes are achieved through education, engagement and communicating expectations and obligations
2. Assisted compliance – reinforces obligations and provides confidence that these are being achieved through monitoring, inspection, responsive actions and feedback loops
3. Directed compliance – directs behavioural change and may include official sanctions and warnings
4. Enforced compliance – uses the full extent of the law and recognises that some individuals may deliberately choose to break the law and require formal investigation and prosecution.

Since 1994, all vessels over 28 m have been required by law to be part of the Vessel Monitoring System (VMS) which, through satellite telemetry, enables FNZ to monitor all hake/hoki/ling/southern blue whiting vessel locations at all times. Paper-based catch reporting was also required by all fishing vessels operating in NZ's EEZ. These systems have now been replaced by near real time Geospatial Position Reporting and daily Electronic Catch Reporting. FNZ still combines this functionality with at-sea and aerial surveillance, supported by the New Zealand Defence Force. This independently provides surveillance of activities of deep-water vessels through inspection and visual capability to ensure these vessels are fully monitored and verified to ensure compliance with both regulations and with industry-agreed Operational Procedures.

All commercial catches from QMS stocks must be reported and balanced against ACE at the end of the month. It is illegal to discard or not report catches of QMS species. Catches may only be landed at designated ports and sold to Licensed Fish Receivers (LFRs). Reporting requirements for hake/hoki/ling trawl vessels include logging the location, depth, main species caught for each tow, and total landed catch for each trip.

MPI Fishery Officers carried out a total of 122 in-port and at-sea inspections for the period 1 January 2019 to 31 December 2021. These inspections relate to both inshore and deep-water vessels that were engaged in the HOK, HAK, LIN and SBW trawl fisheries and the LIN longline fishery. Inspections during 2020 and 2021 were lower than usual due to restricted access to vessels during the Covid epidemic (Table 5), (G. Lydon FNZ, pers. comm.).

Table 5: Compliance inspections of deepwater fishing vessels by MPI Fishery Officers, 1 January 2019 to 31 December 2021

		Number of inspections		
Year	**Inspection type**	**HAK/HOK/LIN trawl**	**LIN longline**	**SBW trawl**
2019	In port (inshore vessels)	25	15	
	In port (deep-water vessels)	9	2	3
	At sea	6	6	0
	Total	**40**	**23**	**3**
2020	In port (inshore vessels)	10	9	
	In port (deep-water vessels)	9	1	1
	At sea	2	1	0
	Total	**21**	**11**	**1**
2021	In port (inshore vessels)	5	13	0
	In port (deep-water vessels	4	0	0
	At sea	3	2	0
	Total	**12**	**15**	**0**
	Grand total	**73**	**49**	**4**

Areas monitored during in-port inspection included one or more of the following:

- Carton weights
- Adherence to state for HGT and DRE product (for HOK, HAK and LIN)
- ER reporting and landing documentation
- Verification of landing
- Compliance checks of mitigation devices for NFPS (e.g., SLEDS and tori lines)
- Inspection of PRB equipment
- Fish to meal.

Some minor non-compliance was detected during in-port inspections in relation to ER reporting including the non-reporting of discards and LIN tail cuts greater than 60mm for dressed product. Other compliance issues such as no fishing permit or certificate of

registration onboard the vessel was detected and followed up by Fisheries Officers at the time with the skipper and later with the permit holder if required.

MPI Fishery Officers conducted three at-sea RNZN patrols in 2019. These patrols covered vessels operating on the East Coast of the North Island/Upper East Coast of the South Island and the West Coast South Island Hoki fishery. During these operations, a total of 88 vessels were boarded and inspected, observed by RNZN helicopter and/or hailed if boarding was not possible. Of the 88 vessels, twelve had been operating in the HOK, HAK, or LIN fisheries. The Fishery Officers were briefed to examine possible compliance risks in these fisheries including one or more of the checks listed above.

Due to the COVID-19 pandemic, all NZ borders and entry ports were closed to non-residents from March 2020. This resulted in fewer in-port and at-sea inspections of fishing vessels throughout 2020 due to the tight restrictions on people movement and inspection criteria. In November 2020 one at-sea RNZN patrol was conducted in the Northland area. During the patrol one LIN longline vessel was boarded and two trawlers with by-catch of LIN. No compliance issues were identified during these inspections.

FNZ audits commercial vessel catch-effort and landing reports, reconciles these against multiple sources including VMS records, data collected by onboard FNZ observers, and catch landing records from LFRs to ensure that all catches are reported correctly. Areas of compliance risk and/or concern are communicated to deepwater operators annually by MPI Compliance (MPI, 2019, 2020). In addition, MPI's Management and Compliance teams meet with DWG personnel and vessel operators annually to discuss and evaluate any issues of concern (DWG, 2019; 2020). Any identified risks are communicated to the fleet along with proposed remedial action to be undertaken.

Commercial fishermen face prosecution and risk severe penalties, which include automatic forfeiture of vessel and quota upon conviction of breaches of the fisheries regulations (unless the court rules otherwise). Financial penalties are also imposed in the form of deemed values to discourage fishermen from over-catching their ACE holdings.

The extensive Regulations governing these fisheries are complemented by additional industry-agreed non-regulatory measures, known as DWG's Operational Procedures (DWG, 2021). The Minister for Fisheries relies on the effectiveness of both regulatory and non-regulatory measures to ensure the sustainable management of these fisheries.

To facilitate implementation and monitoring of performance of DWG's Operational Procedures, DWG has an Environmental Liaison Officer (ELO) whose role is to train vessel operators and skippers on ETP species mitigation methods, use of mitigation equipment, safe handling and release of incidental captures and prompt reporting of trigger-level captures to DWG and FNZ. The ELO is on-call 24/7 to respond to any ETP species capture issues and maintains an active liaison with both vessel operators and FNZ towards ensuring effective implementation of the Operational Procedures and the National Plans of Action for Seabirds (FNZ, 2020) and Sharks (MPI, 2013b).

Fisheries plans

The National Fisheries Plan for Deepwater Fisheries (FNZ, 2019) is a statutory document approved by the Minister of Fisheries. This Plan provides an enabling framework outlining agreed management objectives, timelines, performance criteria and review processes. There is a fisheries-specific chapter for the ling fishery within this Plan (MPI, 2011).

The actual management measures and delivery outcomes in the Plan are specified in FNZ's Annual Operational Plan (AOP), (FNZ, 2021), which is reviewed and updated annually. In

addition, Annual Review Reports assess performance against the AOP and are publicly available (FNZ, 2021a).

Research plans

Research needs for deep water fisheries are driven by the objectives of the National Fisheries Plan for Deepwater Fisheries and delivered through the Medium-Term Research Plan for deep water fisheries (MTRP), (FNZ, 2020a). The MTRP provides a five-year schedule of science and monitoring projects (e.g., biomass surveys and stock assessments), required to support the sustainable management of deepwater fisheries.

All research projects are reviewed by FNZ's Science Working Groups and assessed against FNZ's Research and Science Information Standard for New Zealand Fisheries (MFish, 2011) and the Harvest Strategy Standard (MPI, 2008).

FNZ's Annual Operational Plan for Deepwater Fisheries 2021/22 (Tables 8-11 and 16) provide FNZ and DOC research projects to be undertaken during 2021-22 that relate to deep water species (FNZ, 2021). FNZ's NPOA Seabirds 2020 – Implementation Plan outlines the seabird risk assessment, monitoring and mitigation projects to be undertaken from 2020 to 2024 (FNZ, 2020b).

A comprehensive review of progress achieved against aquatic environment-related research projects and environmental objectives is undertaken by FNZ annually (FNZ, 2022).

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