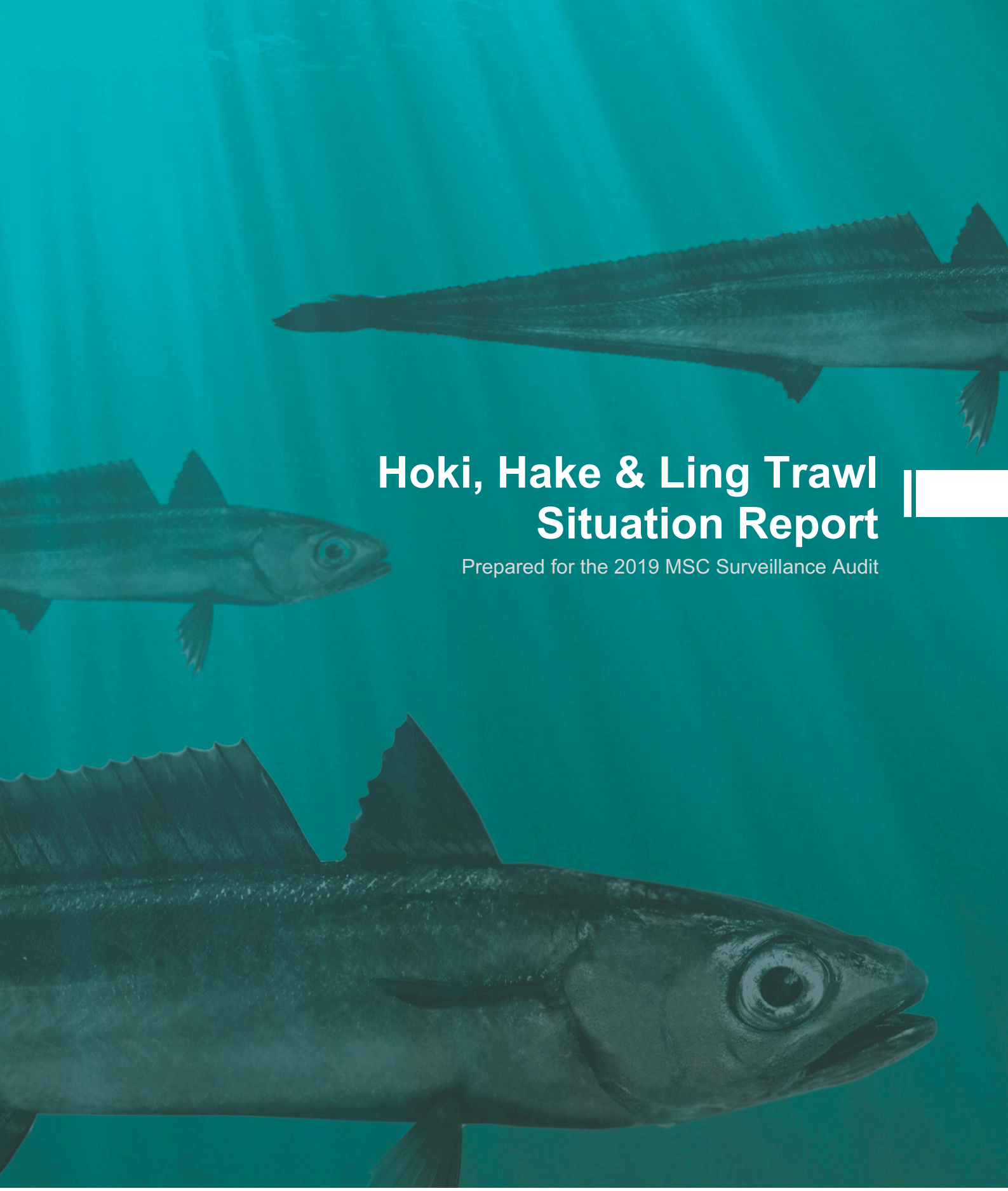

Hoki, Hake & Ling Trawl Situation Report

Prepared for the 2019 MSC Surveillance Audit

deepwater group

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Situation Report for the 2019 MSC Surveillance Audit

New Zealand Hoki, Hake & Ling Trawl Fisheries

Purpose of this report

This report is one of three prepared for the New Zealand 2019 combined MSC surveillance audits for hake, hoki, ling and southern blue whiting. It provides an update on 10 Units of Certification (UoC), for hake (HAK 1, 4 & 7), hoki (HOK 1 East & West) and ling (LIN 3, 4, 5, 6 & 7) trawl fisheries, and builds on the information previously provided for the 2017 reassessment. This combined UoC is described as the hoki mixed-species trawl fishery.

It is Deepwater Group Limited's (DWG) submission that these 10 fisheries continue to conform with the MSC Fisheries Standard (FCR V1.3) as evidenced in the following updated information and references.

All cited references are available here: https://deepwatergroup.org/certification/hoki-hake-and-ling-trawl-fishery-surveillance-audit-2019/

Overview of fishery status and information

Hoki trawl certification details

Certification date	Initial Certification: March 2001 First Recertification: October 2007 Second Recertification: September 2012 Third Recertification: September 2018
Stock areas	UoC 1: HOK 1 (East) UoC 2: HOK 1 (West)
Species	*Macruronus novaezealandiae*
Method/gear	Trawl

Hake trawl certification details

Certification date	Initial Certification: September 2014 Recertification: September 2018 (synchronised with Hoki)
Stock areas	UoC 3: HAK 1 (Sub-Antarctic) UoC 4: HAK 4 (Chatham Rise) UoC 5: HAK 7 (West Coast South Island)
Species	*Merluccius australis*
Method/gear	Trawl

Ling trawl 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	Trawl

Stock status, TACC & catches

UoC 1 & UoC 2 – HOK 1 East & HOK 1 West

Update on stock status (McKenzie, 2019)	HOK 1 East: B_{2019} was estimated to be 66% B_0 or 64% B_0; Virtually Certain (> 99%) to be at or above the lower end of the target range of 35-50% B_0 and Likely (> 60%) to be at or above the upper end of the target range. HOK 1 western stock: B_{2019} was estimated to be 56% B_0 or 29% B_0; About as Likely as Not (40-60%) to be at or above the lower end of the target range of 35-50% B_0.
TACC 2019-20 TACC 2018-19 TACC 2017-18 TACC 2016-17	115,000 t (agreed catch limit split East 60,000 t; West 55,000 t) 150,000 t (agreed catch limit split East 60,000 t; West 90,000 t) 150,000 t (agreed catch limit split East 60,000 t; West 90,000 t) 150,000 t (agreed catch limit split East 60,000 t; West 90,000 t)
UoA share of TACC UoC share of TACC	93% 100%
HOK 1 catch 2017-18 HOK 1 catch 2016-17	135,397 t (HOK 1 East 59,668 t, HOK 1 West 73,736 t) 141,567 t (HOK 1 East 55,616 t, HOK 1 West 64,077 t)[1]

[1] The sum of the HOK 1 East & West sub-area catches from FishServe amounts to slightly less than the total hoki catch because operators who balance with HOK ACE less than 275 t are not required to report by sub-area.

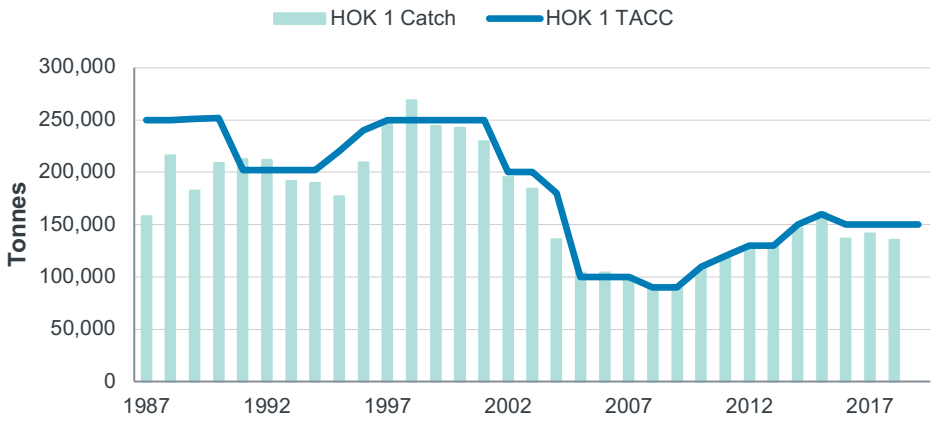


Figure 1: Total Allowable Commercial Catches and reported catches for HOK 1 (East & West combined).

The 2019 assessment for the western stock was uncertain and did not result in a single base case, showing a range of possible biomass estimates depending on the assumptions used to inform inputs to the model. A model run which used the same model as the 2018 assessment but with additional trawl survey and age data, indicated the stock could be at 56% B_0. However, a model run that focused on the western stock, and which gave more weight to fishery-independent biomass indices, indicated the western stock could be at 29% B_0 (Fig. 2), (FNZ, 2019).

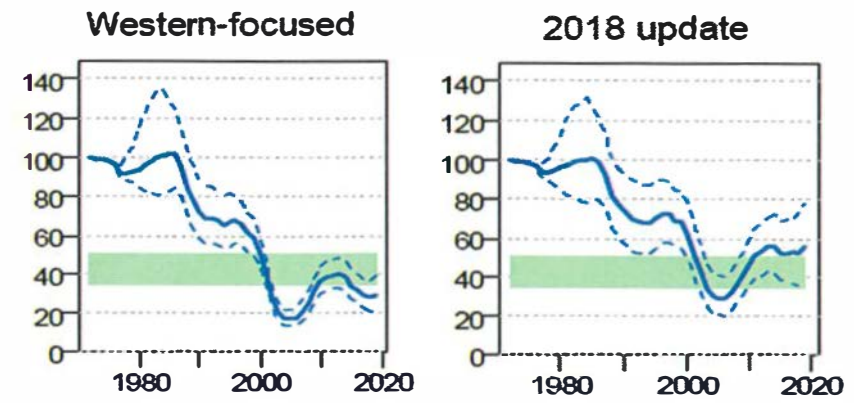


Fig. 2: Model outputs for the western hoki stock produced by the 2019 HOK 1 stock assessment. Solid and dashed blue lines show the median and 95% credible biomass intervals; the green band represents the management target range of 35-50% B_0.

As the harvest strategy for hoki is to manage the stock within a range of 35-50% B_0, the management response for the HOK 1 fishery has been to reduce the TACC from 150,000 t to 115,000 t and for the western stock catch limit to be reduced from 90,000 t to 55,000 t from 1 October 2019. This is expected to rebuild the western stock to the target level within five years (FNZ, 2019a).

UoC 3 – HAK 1

Update on stock status (Dunn, 2019)	HAK 1 (sub-Antarctic): B_{2018} was estimated at 49% B_0; Likely (> 60%) to be at or above the target of 40% B_0.
TACC 2017-18 TACC 2016-17 TACC 2015-16	3,701 t 3,701 t 3,701 t
UoA share of TACC UoC share of TACC	100% 94%
HAK 1 catch 2017-18 HAK 1 catch 2016-17	1,350 t 1,175 t

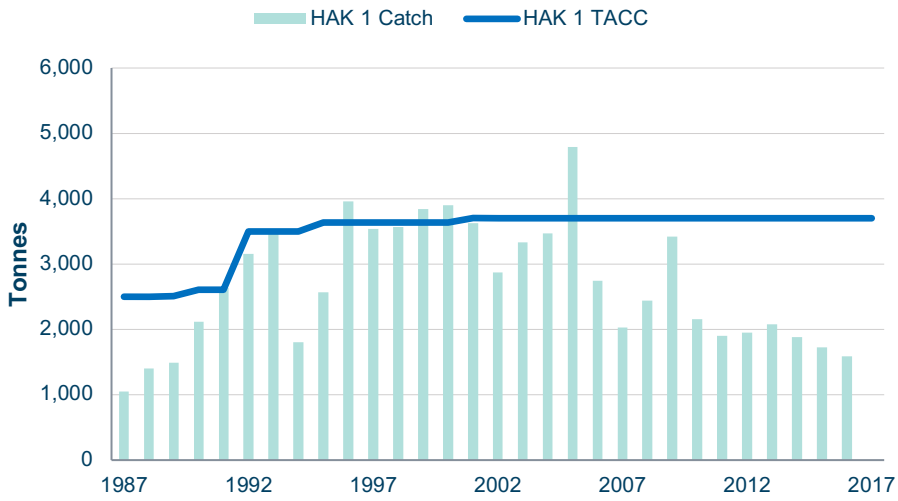


Figure 3 :Total Allowable Commercial Catches and reported catches for HAK 1.[2]

UoC 4 – HAK 4

Update on stock status (2017)	For the Chatham Rise stock (HAK 4 plus HAK 1 north of the Otago Peninsula), B_{2016} was estimated to be about 48% B_0; Likely (> 60%) to be at or above the target of 40% B_0.
TACC 2017-18 TACC 2016-17 TACC 2015-16	1,800 t 1,800 t 1,800 t

[2] This hake trawl fishery is largely a bycatch fishery in the much larger western hoki trawl fishery. Hake catch trends are therefore subject to forces other than hake abundance.

UoA share of TACC UoC share of TACC	100% 94%
HAK 4 catch 2017-18 HAK 4 catch 2016-17	267 t 268 t

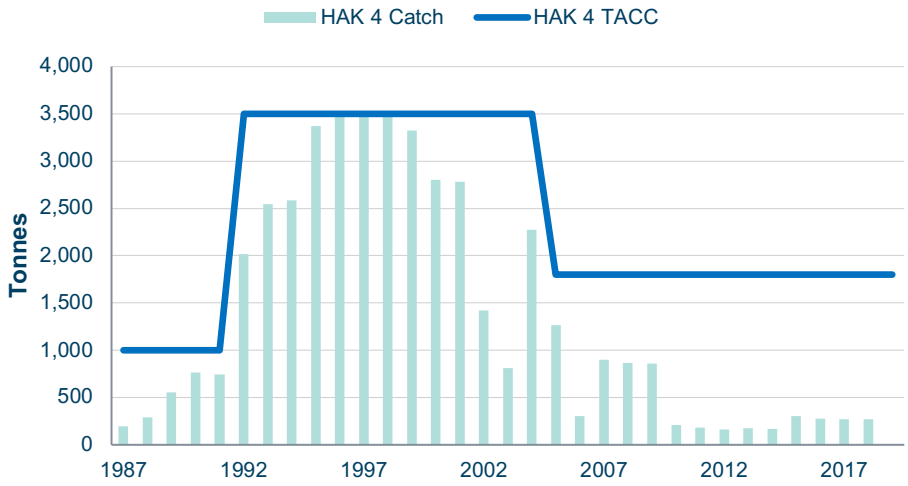


Figure 4: Total Allowable Commercial Catches and reported catches for HAK 4.[3]

UoC 5 – HAK 7

Update on stock status (McGregor et al., 2019)	B_{2019} for the West Coast South Island stock was estimated to be at 17% B_0; Exceptionally Unlikely (< 1%) to be at or above the target of 40% B_0.
TACC 2019-20 TACC 2018-19 TACC 2017-18 TACC 2016-17	2,272 t 5,064 t 5,064 t 7,700 t
UoA share of TACC UoC share of TACC	100% 94%
HAK 7 catch 2017-18 HAK 7 catch 2016-17	3,086 t 4,071 t

[3] This hake trawl fishery is largely a bycatch fishery in the much larger eastern hoki trawl fishery. Hake catch trends are therefore subject to forces other than hake abundance.

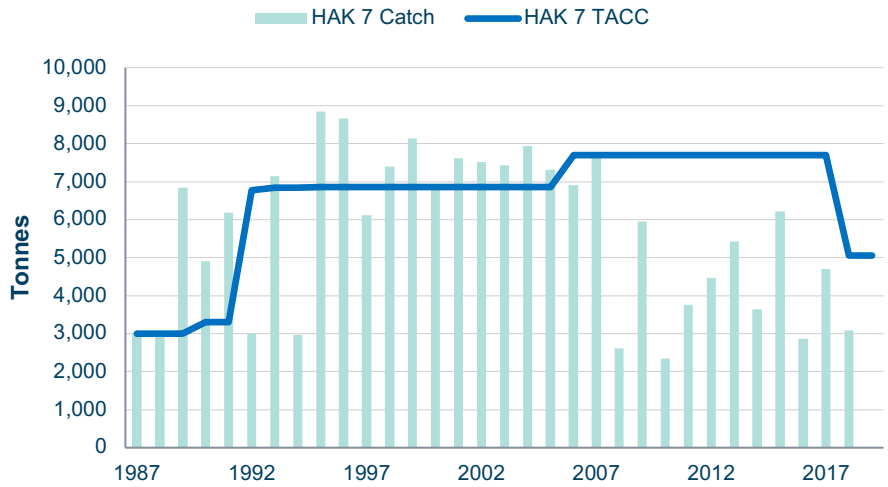


Figure 5: Total Allowable Commercial Catches and reported catches for HAK 7.

The 2019 base case stock assessment model estimated spawning stock biomass steadily declined to a low point in 2018–19 owing to higher levels of exploitation and below-average recruitment from 2000–01 to 2014–15. Biomass projections five years into the future under two recruitment scenarios showed that under the current level of catch of ~3,000 t annually, the biomass would increase under the average recruitment series (1974-2015), or would remain below 20% B_0 under the recent, below average, recruitment series (2006-2015), (Fig. 6), (FNZ, 2019).

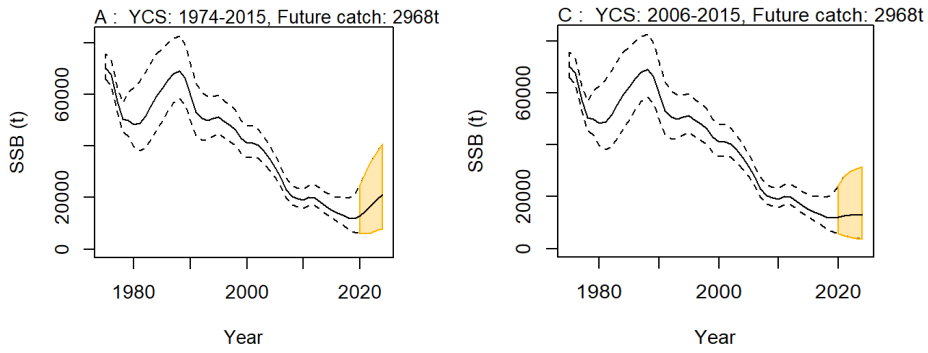


Figure 6: Spawning stock biomass trajectories for the base case model at the current catch level assuming average recruitment (left) and recent below-average recruitment (right).

Under the New Zealand Harvest Strategy Standard, a formal, time-constrained rebuilding plan is required to be developed for stocks assessed to be below the soft limit of 20% B_0 in order to rebuild the stock to at least the target level of biomass (40% B_0) in no longer than twice the timeframe it would take in the absence of fishing (MPI 2008). The management response for the HAK 7 fishery has been to reduce the TACC from 5,064 t to 2,272 t from 1 October 2019. This will serve to reduce the annual catch by ~700 t and is expected to rebuild the stock to the target level in a minimum of seven years (FNZ, 2019b). The HAK 7 stock is monitored using trawl surveys (O'Driscoll & Ballara, 2018) and stock assessments, (McGregor et al., 2019; FNZ, 2019), which are carried out every third year as scheduled by FNZ's Medium Term Research Plan for Deepwater Fisheries (MPI, 2017).

UoC 6 – LIN 3

Update on stock status (Holmes, 2019)	For Chatham Rise (LIN 3 & 4), B_{2019} was estimated to be about 57% B_0; Very Likely (> 90%) to be above the management target of 40% B_0 (base case run).
TACC 2017-18 TACC 2016-17 TACC 2015-16	2,060 t 2,060 t 2,060 t
UoA share of TACC and total LIN catch UoC share of TACC and total LIN catch	100% of TACC and 33% of total LIN catch (based on average estimated trawl catch over the last two years) 93% of TACC and 31% of total LIN catch (based on average estimated trawl catch over the last two years)
LIN 3 catch 2017-18 LIN 3 catch 2016-17 	2,171 t (Total reported catch) 621 t (Estimated catch trawl)[4] 676 t (Estimated catch bottom longline)[8] 764 t (Estimated catch other methods)[8] 1,808 t (Total reported catch) 708 t (Estimated catch trawl)[8] 672 t (Estimated catch bottom longline)[8] 290 t (Estimated catch other methods)[8]

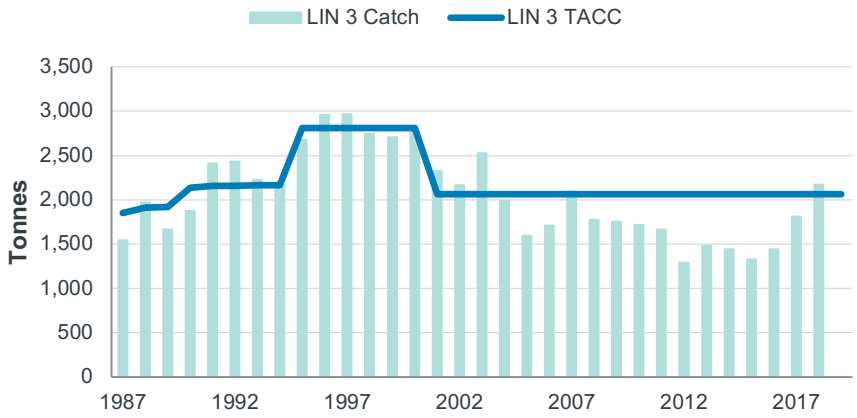


Figure 7: TACCs and reported catches for LIN 3 (all gear types).

UoC 7 – LIN 4

[4] There are typically differences between estimated and reported catches. “Estimated catch” is an at-sea estimate of the top 5-8 species per fishing event, whereas “reported catch” is the landings as reported against the TACC and balanced with ACE.

Update on stock status (Holmes, 2019)	For the Chatham Rise stock (LIN 3 & 4), B_{2019} was estimated to be about 57% B_0; Very Likely (> 90%) to be above the management target (base case run).
TACC 2017-18 TACC 2016-17 TACC 2015-16	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 26% of total LIN catch (based on average estimated trawl catch over the last two years) 94% of TACC and 25% of total LIN catch (based on average estimated trawl catch over the last two years)
LIN 4 catch 2017-18 LIN 4 catch 2016-17 	2,636 t (Total reported catch) 698 t (Estimated catch for all target trawl) 1,603 t (Estimated catch for bottom longline) 73 t (Estimated catch other methods). 2,565 t (Total reported catch) 666 t (Estimated catch for all target trawl) 1,542 t (Estimated catch for bottom longline) 2 t (Estimated catch other methods).

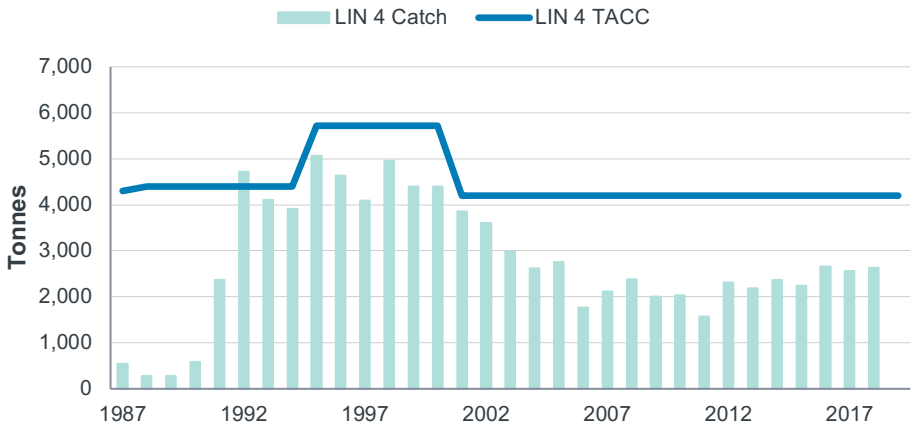


Figure 8: Total Allowable Commercial Catches and reported catches for LIN 4 (all gear types).[5]

UoC 8 – LIN 5

[5] This ling trawl fishery is largely a bycatch fishery in the much larger eastern hoki trawl fishery. LIN 4 catch trends are therefore subject to forces other than ling abundance.

Update on stock status (Masi, 2019)	LIN 5&6 (Sub-Antarctic excl. Bounty Plateau): B_{2018} was estimated to be between 75% and 101% B_0; Virtually Certain (>99%) to be at or above the target (40% B_0).
TACC 2017-18 TACC 2016-17 TACC 2015-16	3,955 t 3,955 t 3,955 t
UoA share of TACC and total LIN catch UoC share of TACC and total LIN catch	100% of TACC and 84% of total LIN catch (based on average estimated trawl catch over the last two years) 95% of TACC and 80% of total LIN catch (based on average estimated trawl catch over the last two years)
LIN 5 catch 2017-18 LIN 5 catch 2016-17	4,034 t (Total reported catch) 3,421 t (Estimated catch for all target trawl) 502 t (Estimated catch for bottom longline) 21 t (Estimated catch for other methods) 4,051 t (Total reported catch) 3,391 t (Estimated catch trawl) 575 t (Estimated catch bottom longline) 2 t (Estimated catch other methods)

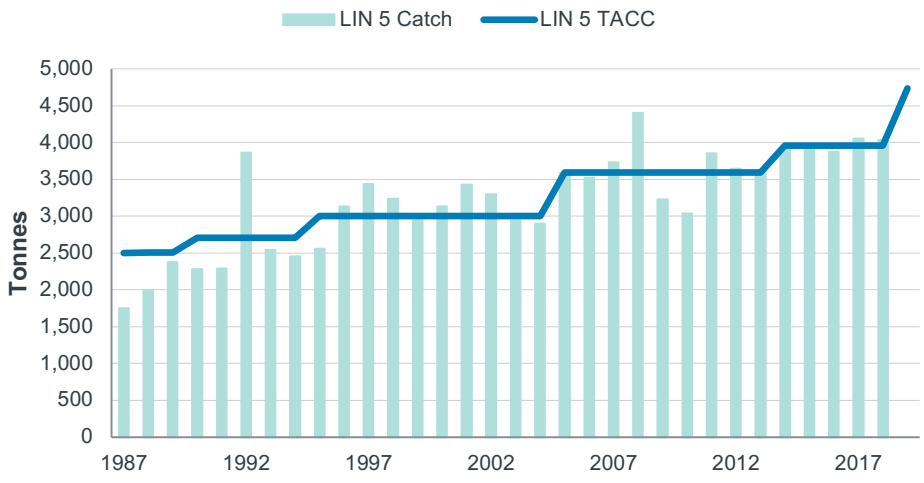
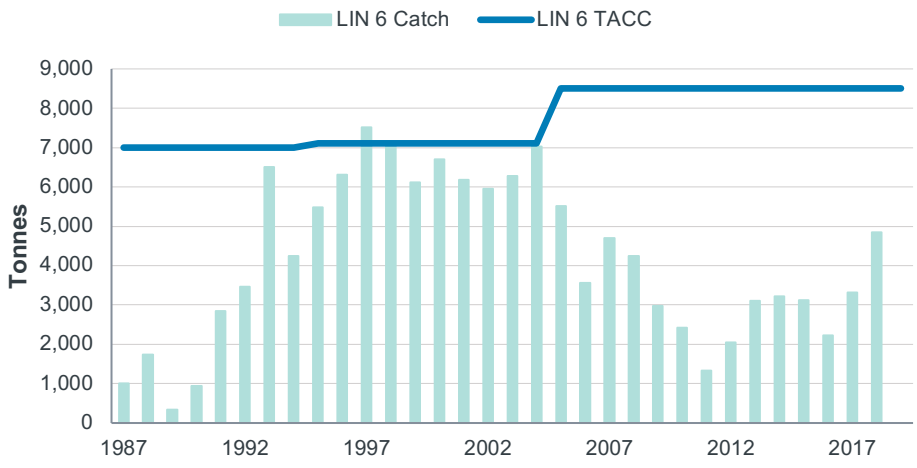


Figure 9: Total Allowable Commercial Catches and reported catches for LIN 5 (all gear types).

UoC 9 – LIN 6

Update on stock status LIN 5 & 6 (Masi, 2019) LIN 6B (Horn, 2007)	For the Sub-Antarctic stock (LIN 5 & 6, excluding the Bounty Plateau, LIN 6B), B_{2018} was estimated to be between 75% and 101% B_0; Virtually Certain (> 99%) to be above the management target. For the Bounty Plateau stock (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 2017-18 TACC 2016-17 TACC 2015-16	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 61% of total LIN catch (based on average estimated trawl catch over the last two years) 61% of TACC and 57% of total LIN catch (based on average estimated trawl catch over the last two years)
LIN 6 catch 2017-18 LIN 6 catch 2016-17	4,845 t (Total reported catch) 3,656 t (Estimated catch trawl) 545 t (Estimated catch bottom longline) 2 t (Estimated catch other methods. 228 t (Estimated catch LIN 6B bottom longline)[6] 3,323 t (Total reported catch) 1,315 t (Estimated catch trawl) 351 t (Estimated catch bottom longline) 0 t (Estimated catch other methods) 932 t (Estimated catch for LIN 6B bottom longline)

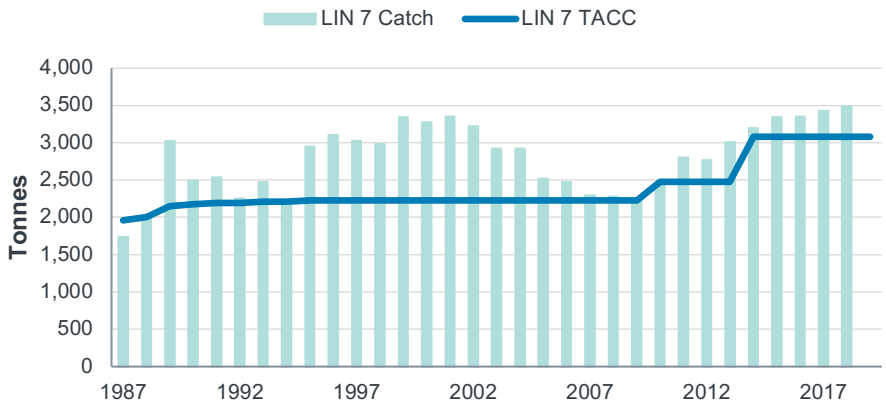


[6] LIN 6B catches are included in the reported and estimated totals for LIN 6, but have also been separated out here for ease of assessing the LIN 6B fishery.

Figure 10: Total Allowable Commercial Catches and reported catches for LIN 6 (all gear types).[7]

UoC 10 – LIN 7

Update on stock status (Dunn & Ballara, 2019)	Three alternative model runs were presented, with B_{2017} estimated to be 79%, 66% and 54% B_0, Very Likely (>90%) to be at or above the management target for all model runs.
TACC 2017-18 TACC 2016-17 TACC 2015-16	3,080 t 3,080 t 3,080 t
UoA share of TACC and total LIN catch UoC share of TACC and total LIN catch	100% of TACC and 52% of total LIN catch (based on average estimated trawl catch over the last two years) 73% of TACC and 38% of total LIN catch (based on average estimated trawl catch over the last two years)
LIN 7 catch 2017-18 LIN 7 catch 2016-17 	3,487 t (Total reported catch) 1,732 t (Estimated catch trawl) 822 t (Estimated catch bottom longline) 117 t (Estimated catch other methods) 3,428 t (Total reported catch) 1,891 t (Estimated catch trawl) 757 t (Estimated catch bottom longline) 26 t (Estimated catch other methods)



[7] This ling trawl fishery is largely a bycatch fishery in the much larger western hoki trawl fishery. LIN 6 catch trends are therefore subject to forces other than ling abundance.

Figure 11: Total Allowable Commercial Catches and reported catches for LIN 7 (all gear types).

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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 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[8]).

Table 1: Observer coverage in the hoki mixed-species trawl fisheries. Coverage given as the percentage of tows observed.

	2013-14	2014-15	2015-16	2016-17	2017-18
HOK, HAK, LIN	31%	29%	28%	26%	37%
All HOK, HAK, LIN, SWA & WWA	28%	30%	26%	28%	38%

FNZ's observer coverage plans for deepwater fisheries in 2018-19 and 2019-20 are provided in their Annual Operational Plans (FNZ, 2018, 2019g).

Retained & bycatch species

Hoki, hake and ling have accounted for, on average, 91% of the total estimated catch weight recorded by observers in these target fisheries. The remainder of the observed catch has principally comprised two other QMS species, silver warehou (1.4% of the total catch) and spiny dogfish (0.9%), and two non-QMS species/groups javelin fish (1.4% of the total catch) and rattails (1.1%). Invertebrate species make up only a very small fraction of the overall catch, with squid (arrow and warty), comprising 0.1% of the total catch, being the main species group caught.

[8] Note: The levels of interactions with NZ sea lions is very low. However, as sea lions are considered 'high risk' from a political perspective, high observer coverage is essential to ensure good capture-rate estimations are available.

Eight of the top ten bycatch species by weight are managed within the QMS and therefore catches are well monitored and direct controls exist to limit their overall catch.

The two most abundant bycatch species are the non-QMS species/groups, javelin fish and rattail species, which have respectively averaged 3,200 t and 2,400 t per annum over the most recent 5-year period (2012-13 to 2016-17), followed by QMS species spiny dogfish (790 t), silver warehou (657 t), pale ghost shark (529 t) and ribaldo (336 t). The main species discarded have been javelin fish, rattails, spiny dogfish, giant stargazer and shovelnose dogfish (Finucci et al., 2019).

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.

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 2019d), and on the MPI website which is maintained under contract by Dragonfly Ltd (Dragonfly, 2019). The latter 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 of ETP species are described in DWG's Operational Procedures (DWG, 2019, 2019a, 2019b, 2019c) and Vessel Management Plans (DWG, 2019d).

Seabirds

The numbers of observed incidental seabird captures are used to model the estimated number of annual captures based on the total number of trawl tows undertaken. Note that the estimated number of captures does not discriminate between birds killed and birds released alive. The proportion of birds released alive has increased in recent years as the main type of interaction has shifted from warp strikes (all fatal) to net captures (varying degrees of mortality annually but rarely less than 30% released alive. It is acknowledged that some birds released alive may not survive injuries sustained and, for modelling purposes, the SEFRA assumes 50% of released alive birds will not survive. Many of the net captures involve birds foraging on top of the net when it's on the surface on hauling and getting their feet tangled in the meshes. Practical solutions are being sought to resolve these net captures.

Table 2: Summary of observed incidental seabird captures in the hoki/hake/ling trawl fishery in 2017-18.

Fishery	Estimated Captures	Observed Captures	Released Alive	Dead	Capture Rate per 100 Tows	Observer Coverage
Hoki Trawl	334	169	82	87	3	35%

Hake Trawl	2	1	1	0	<1	60%
Ling Trawl	51	21	7	14	4	30%
Totals	**387**	**192**	**91**	**101**		

The observed seabird captures in 2017-18, and the estimated seabird captures for the years 2002-03 to 2017-18 are provided below for the hoki (Figs. 11-13) and ling (Figs. 14&15) fisheries. Only two seabirds were observed caught by the hake trawl fisheries in 2017-18.

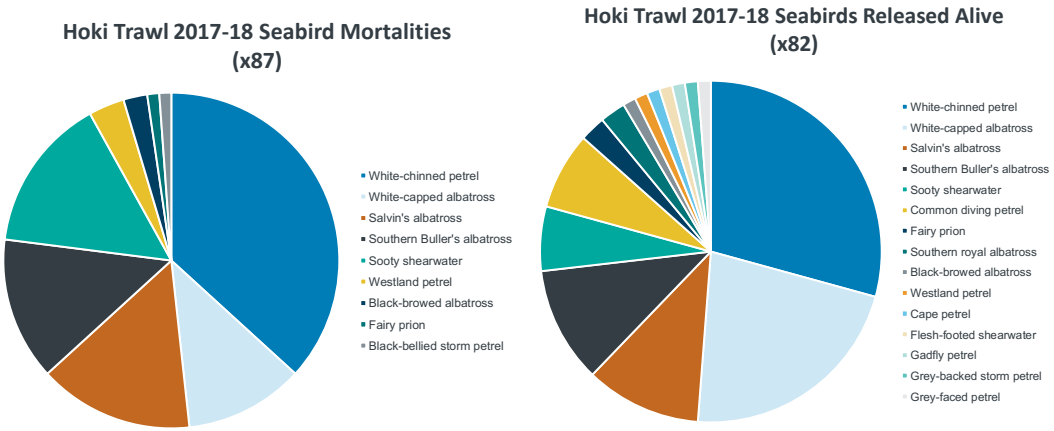

Figure 11: Hoki trawl fishery observed incidental seabird captures in 2017-18, mortalities (left) and released alive (right).

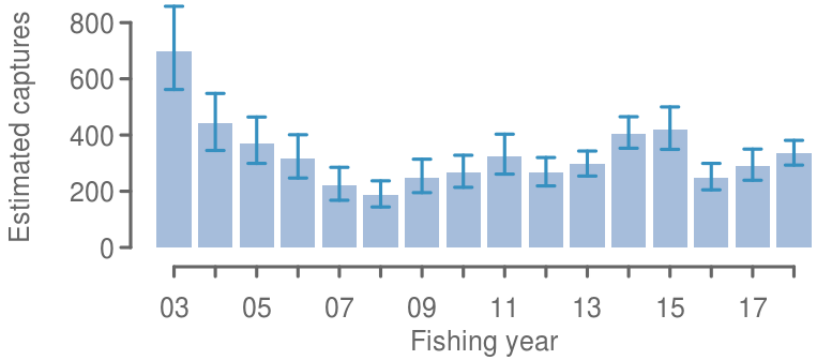

Figure 12: Hoki trawl fishery estimated total incidental seabird captures (dead and live-released) 2002-03 to 2017-18.

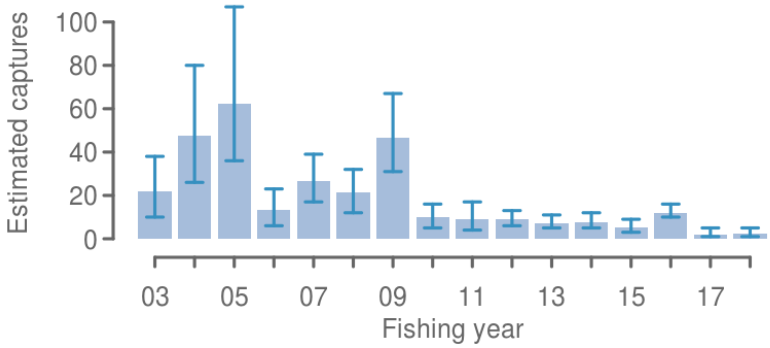

Figure 13: Hake trawl fishery estimated incidental seabird captures 2002-03 to 2017-18.

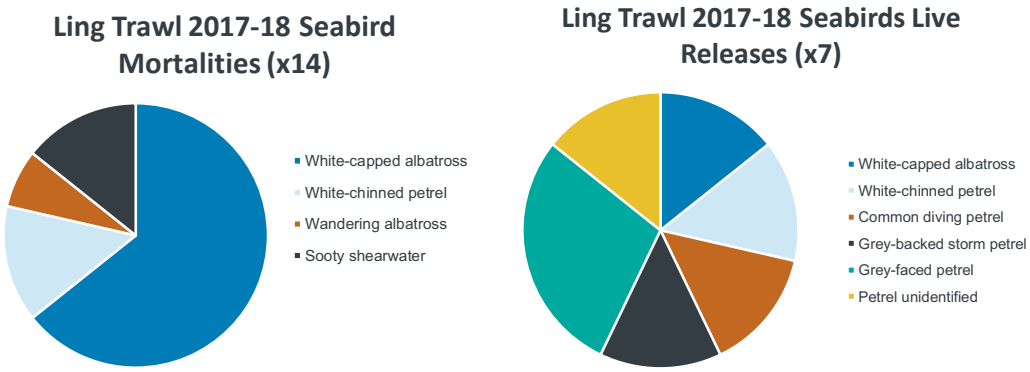

Figure 14: Ling trawl fishery observed incidental seabird captures in 2017-18, mortalities (left) and released alive (right).

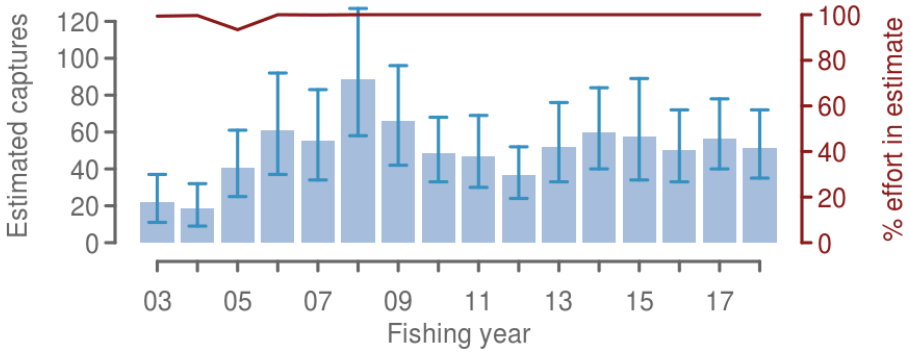

Figure 15: Ling trawl fishery estimated incidental seabird captures 2002-03 to 2017-18.

DOC's conservation status classification (Robertson et al., 2013), for the main species incidentally captured in the hoki trawl fisheries, and the risk categories emanating from the Spatially Explicit Fisheries Risk Assessment Framework (SEFRA), (Richard et al., 2017), are as follows:

Table 2: Threat and risk classifications for the most prevalent incidental seabird captures in the hoki/hake/ling trawl fisheries.

Species	DoC Threat Classification	SEFRA Risk Classification (all fisheries combined)	Risk Ratio
White-chinned petrel	At Risk	Low	0.05 (0.03-0.09)
White-capped albatross	At Risk	High	0.35 (0.21-0.58)
Salvin's albatross	Nationally Critical	High	0.78 (0.51-1.09)
Southern Buller's albatross	Naturally Uncommon	High	0.39 (0.22-0.66)
Sooty shearwater	At Risk	Low	0.00 (0.00-0.01)
Westland petrel	Naturally Uncommon	High	0.48 (0.18-1.19)

The updated risk assessment for New Zealand seabirds (Richard et al., 2017) noted a decline in interactions consistent with the declining effort in all trawl fisheries over the study period. Only one species, black petrel (1.15), had a median risk ratio higher than 1 (or upper 95% confidence limit higher than 2), taking into account fishing related mortality across all trawl and longline fisheries. Species with a median risk ratio <1 are not expected to hinder the achievement of population management targets. There have been zero estimated captures of black petrel in the hoki/hake/ling trawl fisheries between 2002-03 and 2017-18. Of the other species, only Salvin's albatross and Westland petrel have total risk ratios near or above 50% of the PST threshold of 1.

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 raw numbers have steadily increased from around 43,000 in 2010 to around 60,000 in 2018 (Table 3), (Baker & Jensz, 2019). A further study is being undertaken at the Bounty Islands this year (in progress October 2019).

Table 3: 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 middle-depth and deep water trawl fisheries over the 5-year period from 2013-14 to 2017-18 have ranged between 82 and 128, with an average of 103 birds per annum (Fig. 16). The rate of capture in HOK trawl fisheries (HAK and LIN trawl have negligible captures) has reduced by 45% since a peak in 2014-15. (Dragonfly, 2019).

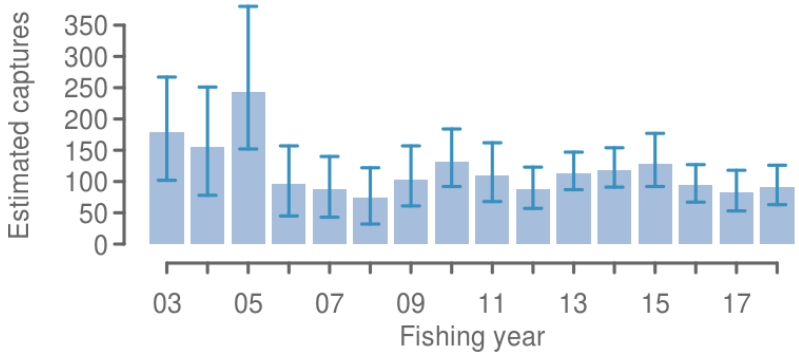

Figure 16: Estimated incidental captures of Salvin's albatross by all middle-depth and deep water trawl fisheries 2002-03 to 2017-18.

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

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). The hoki/hake/ling trawl fisheries' share of the overall risk to Westland petrel, at an average of three captures per annum over the last five years (Fig. 17), and at an average observer coverage rate of 38% of tows (Table 1), (Dragonfly, 2019), is illustrative of a low threat level to Westland petrel by these fisheries.

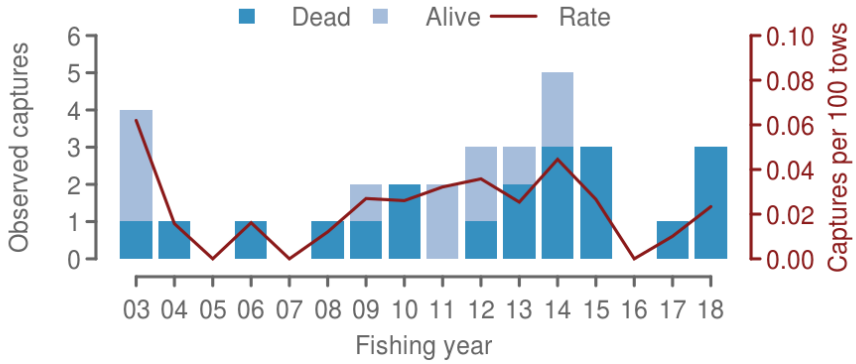

Figure 17: Observed incidental captures of Westland petrel by all trawlers > 28 m from 2002-03 to 2017-18.

DWG Liaison Programme for ETP Species Risk Management

DWG's Environmental Liaison Officer (ELO) visited 28 factory vessels, 8 fresh fish trawlers and 15 seasonal hoki trawlers involved in the hoki spawn fisheries in 2017-18 to:

- Deliver PowerPoint-assisted training courses to senior crew (and at times vessel managers) on the need for ETP species capture mitigation and on best practice mitigation methods
- Provide training material on best practice environmental operations and procedures and ensure updated versions of all OPs are on each vessel
- Check that VMP's are updated and appropriate for each vessel's fishing operations

- Physically check their seabird mitigation equipment is fit-for-purpose and functional and ensure officers and crew are aware of the need to maintain conformance with offal control and mitigation systems to reduce seabird interactions.
- Be on-call 24/7 for any communications or requests for support, including trigger capture events
- Compare fishery information with that from observers to ensure the best information is available regarding the nature of significant capture events.

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 (DWG, 2019e).

Regulatory requirements for seabird mitigation, for application by all vessels 28 metres or greater in length, include:

- Deployment of at least one type of seabird scaring device during all tows (i.e. bird bafflers, tori lines or warp deflectors)
- Management of fish waste discharge so as not to attract seabirds to risk areas (i.e. no discharge during shooting/hauling; mincing and batch-discharge while towing; installation of mincers/hashers/batching tanks/meal plants; gratings/trap systems to reduce fish waste discharge through scuppers/sump pumps)
- Seabird risk associated with trawl nets is minimised by:
  - Removal of stickers before shooting
  - Minimising the time fishing gear remains at/near the surface
  - Seabirds caught alive in/on the net are correctly handled and released to ensure maximum chance of survival.
- Seabird risk associated with deck landings and vessel impacts is minimised by:
  - Ensuring deck lighting does not attract/disorientate seabirds
  - Prompt removal of fish waste from the deck
  - Seabirds that land on the deck or impact with the vessel are correctly handled and released to ensure maximum chance of survival.

In summary, the existing seabird mitigation strategy applied by the hoki/hake/ling trawl fisheries has a high probability of ensuring the UoAs do not hinder nor threaten the recovery of any seabird populations.

New Zealand fur seal

On average over the last five years, there have been around 40 observed and 290 estimated incidental captures of New Zealand (NZ) fur seals per year in the hoki trawl fishery, with a small fraction being released alive (Fig. 18). NZ fur seal captures by the hake and ling trawl fisheries are negligible by comparison. Their DOC threat classification status is ‘Not Threatened’ and their population size is believed to be increasing (Baker et al., 2019).

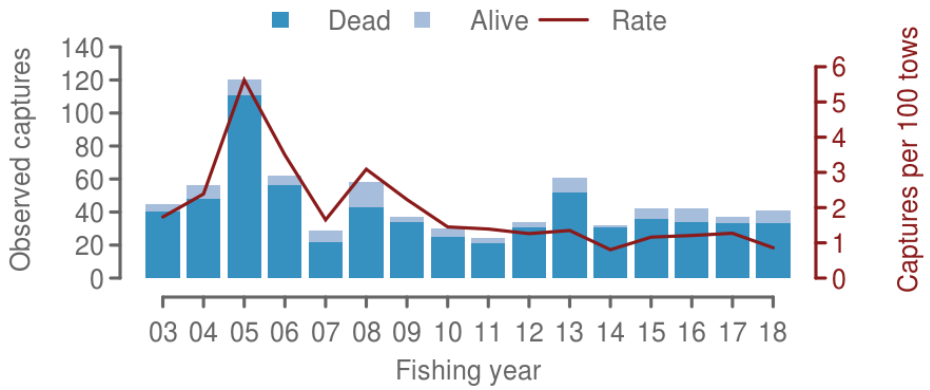

Figure 18: New Zealand fur seal captures by the hoki trawl fishery 2002-03 to 2017-18.

New Zealand sea lion

There has been only one (1) reported incidental capture of a New Zealand (NZ) sea lion in the hoki/hake/ling trawl fisheries in the last five years (2013-14 to 2017-18), (Dragonfly, 2019). These fisheries do not pose a threat to the sea lion population. All captures by these fisheries are acknowledged and considered in the NZ sea lion Threat Management Plan (DOC, 2017).

Basking shark

In 2014-15 one basking shark (*Cetorhinus maximus*) was reported captured in the hoki/hake/ling trawl fisheries.

The Department of Conservation (DOC) has recently undertaken a review of basking shark interactions (Francis, 2017).

Whales & dolphins

There have been three reported incidental captures of common dolphin (*Delphis delphis*), and one of a long-finned pilot whale in the hoki mixed species trawl fishery in the last five years (2013-14 to 2017-18), (Dragonfly, 2019). The pilot whale was in a state of decomposition when caught, indicating it may have died of natural causes (R. Wells, DWG, pers. comm.).

Coral

Observed coral bycatch in the hake/hoki/ling trawl fisheries has averaged 173 kg/year over the most recent 5-year period (2013-14 to 2017-18), (FNZ Data, D. Kerrigan, pers. comm.). The average coral catch per tow is miniscule (Table 4).

Table 4: Catch of all corals from observed tows, the number of observed tows and the average catch of coral per tow by hoki /hake/ling trawl fisheries).

	2013-14	2014-15	2015-16	2016-17	2017-18	Average
Coral catch (kg)	65.4	465.4	190.4	63	78.5	172.54
No. tows with coral	68	96	67	105	79	83
No. observed tows	5,252	4,921	4,282	3,902	5,524	4,776
% tows with coral	1.3%	2.0%	1.6%	2.7%	1.4%	1.7%
Catch rate (kg/tow)	0.01	0.09	0.04	0.02	0.01	0.04

Benthic interactions

The trawl footprint of these fisheries is monitored to assess the extent of their interactions with the benthic habitat and has been calculated for each year since 1989-90 for all targeted tows for each Tier 1 deep water species. The trawl footprints for hoki, hake and ling during the 2015-16 fishing year (the most recent year for which published information is available), range from 4.5% of the main fished depth range (i.e. 400-800 m) and 1.8% of the fishable area in the EEZ and Territorial Sea (TS) (i.e. depths less than 1,600 m) for hoki, to 0.14% of the main fished depth range and 0.1% of the fishable area for hake. For all Tier 1 deep water fisheries combined, the trawl footprint in 2015-16 was 5.5% of the main depth range and 2.9% of the fishable area (Table 5), (Baird & Wood, 2018).

Table 5: Swept area of trawls as a percentage of the 400-800 m depth zone for all hake, hoki and ling target fisheries, and as a percentage of the fishable area (<1,600 m) for all Tier 1 and Tier 2 deep water fisheries.

Fishery	EEZ Area	Swept Area 1989-90 to 2015-16 (% of EEZ Area)	Swept Area 2015-16 (% of EEZ Area)
All hake target trawls	400-800 m depth zone	3.31%	0.14%
	Fishable area (<1,600 m)	1.4%	0.1%
All hoki target trawls	400-800 m depth zone	24.46%	4.47%
	Fishable area (<1,600 m)	11.8%	1.8%
All ling target trawls	400-800 m depth zone	3.05%	0.16%
	Fishable area (<1,600 m)	1.7%	0.1%
All Tier 1 deepwater trawls	400-800 m depth zone	38.37%	5.46%
	Fishable area (<1,600 m)	22.0%	2.9%

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, 2018, pp. 29-31), and include undertaking a spatially explicit benthic impact assessment for deepwater fisheries.

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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 Maori as part of the Treaty of Waitangi Settlements that acknowledge the Treaty guaranteed Maori *"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 a 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, 2019f). There are species-specific chapters for hake, hoki and ling within this plan (MPI, 2013; MPI, 2010a; MPI, 2011).

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.

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 (MPI, 2010) was updated in 2008 and 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 vessel locations at all times. This system is now being replaced by Geospatial Position 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 to 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 conducted an at-sea RNZN patrol covering the West Coast South Island Hoki fishery in 2018. During this operation, 10 deep water vessels and one inshore vessel were inspected. The Fishery Officers were briefed to examine previous risks identified in the hoki fishery, including:

- Adherence to state for HGT and DRE product (for HOK, HAK and LIN)
- Quantification and reporting of whole and processed fish to meal
- Quantification and reporting of all product resulting from the production of fillet states (VSCF vs non-VSCF).

Further monitoring also occurred in the form of in-port inspections and sampling across the three species of HOK, HAK and LIN. During this phase, inspections were conducted on 22 vessels. Areas covered in these inspections included:

- Adherence to state for HGT and DRE product (for HOK, HAK and LIN)

- Carton/unit weights.

Some minor non-compliance was detected during the at-sea and in-port inspections. This included adherence to product state definitions on ling trunks such as tail cuts, some fish may have been going to the meal plant without it being weighed and recorded, some hoki tail cuts greater than 60mm were detected, small amounts of HOK DRE had pectoral fins attached and there was a small proportion of under-weighing of carton weights. These issues were followed up by Fisheries Compliance staff with each company through the post inspections being conducted.

Introduced in January 2019, all New Zealand vessels are transitioning in a staged implementation programme to new Electronic Reporting and Geospatial Position Reporting (replaces VMS) regulations. All New Zealand vessels now report catch daily on an event-by-event basis. These reports are validated against positional data allowing for timely interventions and compliance oversight in near real time.

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.

Observer coverage has ranged between 26% and 37% over the recent period 2013-14 to 2017-18.

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 the New Zealand Deepwater Fisheries Operational Procedures. The Minister for Fisheries relies on the effectiveness of both regulatory and non-regulatory measures to ensure the sustainable management of these fisheries.

As part of DWG's Operational Procedures, DWG has an Environmental Liaison Officer whose role is to liaise with vessel operators, skippers and FNZ to assist with the effective implementation of these Operational Procedures.

DWG personnel and vessel operators meet with FNZ's Management and Compliance teams annually to discuss and evaluate any issues that may have arisen (MPI, 2019). Any identified risks are communicated to the fleet along with proposed remedial action to be undertaken (DWG, 2019f).

Fisheries plans

The National Fisheries Plan for Deepwater Fisheries (FNZ, 2019f) 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 are fisheries-specific chapters for the hake, hoki and ling fisheries within this Plan (MPI, 2013; MPI, 2010a; MPI, 2011).

The actual management measures and delivery outcomes in the Plan are specified in FNZ's Annual Operational Plan (AOP), (FNZ, 2018), which is reviewed and updated annually. In addition, an Annual Review Report assesses performance against the AOP and is publicly available (FNZ, 2019e).

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), (MPI, 2017). 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).

Tables 8-11 and 16 of FNZ's Annual Operational Plan 2019/20 provide research projects to be undertaking that relate to deep water species during 2019-20 (FNZ, 2019g).

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