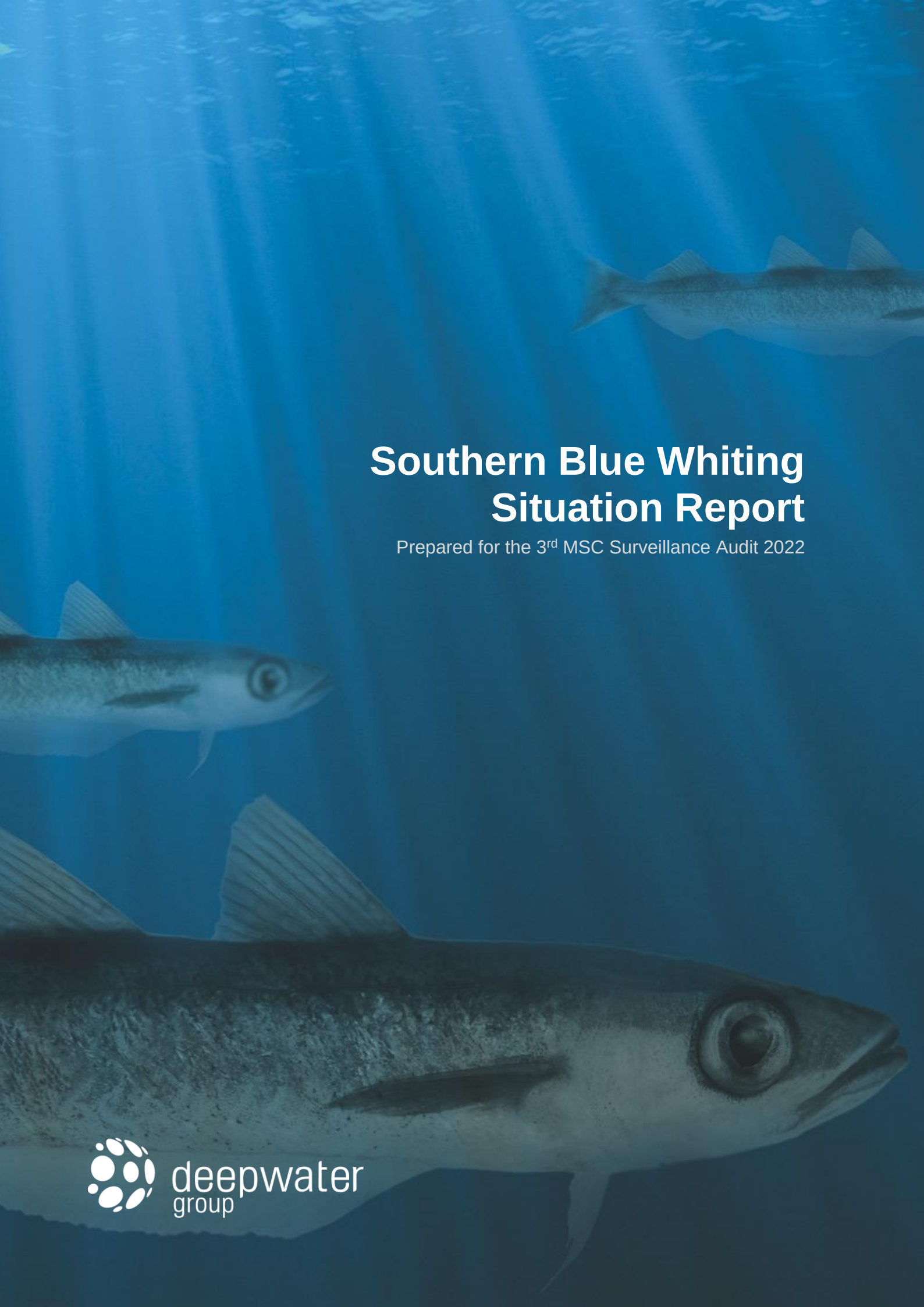

Southern Blue Whiting Situation Report

Prepared for the 3rd MSC Surveillance Audit 2022

deepwater group

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New Zealand Southern Blue Whiting

Purpose of this report

This report provides an update on two southern blue whiting Units of Certification (UoC): SBW 6B Bounty Platform and SBW 6I Campbell Island Rise, and supplements the information previously provided for the surveillance audits in 2019 and 2021.

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

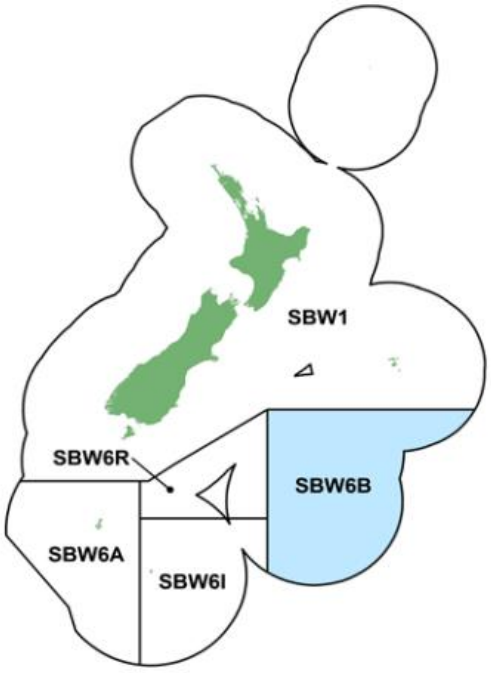

Figure 1: Quota Management Areas (QMAs) for southern blue whiting, with SBW 6B highlighted in blue.

Overview of fishery MSC certification

Southern blue whiting certification details

Certification date	Initial Certification: September 2014 Recertification: September 2018 (synchronised with Hoki)
Stock areas	UoC 1: Bounty Platform (SBW 6B) UoC 2: Campbell Island Rise (SBW 6I)
Species	*Micromesistius australis*
Method/gear	Mid-water and bottom trawling

Fishery background

Southern blue whiting is a benthopelagic species found in sub-Antarctic waters south of New Zealand on the Campbell Plateau and Bounty Platform. During August and September, fisheries occur on the dense spawning aggregations at depths between 300 – 600 m.

They are fast-growing, reaching 20 cm within the first year and 30 cm after two years, although years of high recruitment may be marked by slightly slower growth. Sexual maturity occurs at between 3-4 years of age. Southern blue whiting fisheries are characterised by episodic recruitment events, where roughly once a decade recruitment events substantially exceed the long-term average. As a result, year-class strengths, and fishable biomass, can be highly variable.

P1 Overview of Stock Status Information

Stock status, TACC & catches

UoC 1 – Bounty Platform (SBW 6B)

A stock assessment was completed for the Bounty Platform stock in 2014 using data up to 2013 from local area acoustic surveys of aggregations and the general-purpose stock assessment program, CASAL with Bayesian estimation. However, preliminary model runs did not provide satisfactory fits to both the high local area aggregation acoustic biomass estimates observed in 2007– 2008 and the lower local area aggregation biomass estimates observed since 2009.

Development of the assessment then focused on evaluating models with different assumptions that allowed a comparison of the extent to which the high biomass and subsequent decline were fitted. However, these proved unsuccessful, and the stock assessment was rejected by the Working Group in favour of developing a Harvest Control Rule.

A management strategy evaluation was completed in December 2016 which used simulation modelling to test the fishing mortality level that would be most appropriate to maintain the stock at (or recover it to) B_{MSY} and to maintain the stock above 20% B_0 at least 90% of the time. The MSE resulted in a Harvest Control Rule which estimates the annual sustainable yield and recommended catch limit based on the biomass estimate from annual acoustic surveys.

An HCR that would lead to a low risk of the stock falling below the soft limit reference point of 20% B_0 was developed and used the most recent acoustic index of abundance as an absolute measure of abundance (Doonan, 2017, 2018; FNZ, 2022). A fishing vessel completed acoustic surveys at the Bounty Platform from 2014 to 2017 (O'Driscoll, 2018), but surveys in 2018, 2019, 2020 and 2021 were unsuccessful due operational constraints (limited time on the grounds, weather) and absence of aggregations suited to acoustic surveying. As a result, the HCR has not been updated since 2018. The TACC was reduced as a precautionary measure for the 2020-21 fishing year and FNZ signalled that if no survey biomass information was forthcoming from the fishery during 2021 as a basis for updating the HCR, there would be a further precautionary TACC review prior to the 2022-23 fishing year.

Because a successful acoustic survey has not been completed since 2017, more emphasis is put on monitoring large recruitment events in this fish stock. Results from age analysis between 2015 – 2019 indicates that the fishery is being supported by three strong year classes; 2002, 2007 and 2012 (Large et al. (2021). While observer length-frequency data from the most recent fishing year shows signs of new recruitment, this pulse of fish now distributed around 30 cm in length is the first potential signal of a stronger year class

recruiting into the fishery since 2012. However, as the data is from limited sampling and has not been fully analysed, the strength of the potential recruitment is unknown.

Following the absence of updated data from an acoustic survey in 2021, FNZ was of the view that current management settings may pose a sustainability risk to the stock and advised the Minister that a precautionary decision was required and recommended that the TAC and TACC be decreased until better information becomes available (FNZ, 2022a). The Minister accordingly implemented a TACC reduction from 2,830 t to 2,264 t from 1 April 2022 (Table 1), (FNZ, 2022b).

Table 1: Extract from Minister's Decision Letter – SBW 6B TACC reduction from 1 April 2022 (MPI, 2022a).

	TAC (t)	TACC (t)	Allowances (t)		
			Customary Māori	Recreational	All other mortality
Previous	2,888	2,830	0	0	58
New	2,309 ↓	2,264 ↓	0	0	45 ↓

The TACC was substantially under-caught in the 2018-19, 2019-20 and 2020-21 fishing years, likely due to a combination of factors including the lower stock size and the fact that this is a low-value fishery where decisions to fish it are influenced by timing and economics, since the season in August overlaps with the more valuable west coast hoki spawn fishery and in early September with the large Campbell Island (SBW 6I) southern blue whiting fishery.

Work commenced during 2022 on a revised HCR for SBW 6B involving incorporation of a discount rate for each year for which a survey was not completed. Simulations were undertaken for a range of M values and years between surveys (Doonan & A'mar, 2022). This work is in progress.

In summary, DWG is of the view that while SBW 6B stock status is currently uncertain, a precautionary management approach is in place to guard against further stock depletion.

Update on stock status (Doonan, 2018)	Harvest control rule based on simulations of an age-structured model estimated that stock status was Likely (>60%) to be below target *F* and overfishing was Unlikely (<40%) to be occurring. No post-2018 update on stock status is available.
TACC 2022-23[1] TACC 2021-22	2,264 t 2,830 t

[1] Note that the fishing year for SBW is from 1 April to 31 March.

TACC 2020-21	3,145 t
TACC 2019-20	3,145 t
UoA share of TACC	100%
UoC share of TACC	87%
SBW 6B catch 2021-22	1,100 t
SBW 6B catch 2020-21	788 t
SBW 6B catch 2019-20	1,101 t
SBW 6B catch 2018-19	2,423 t

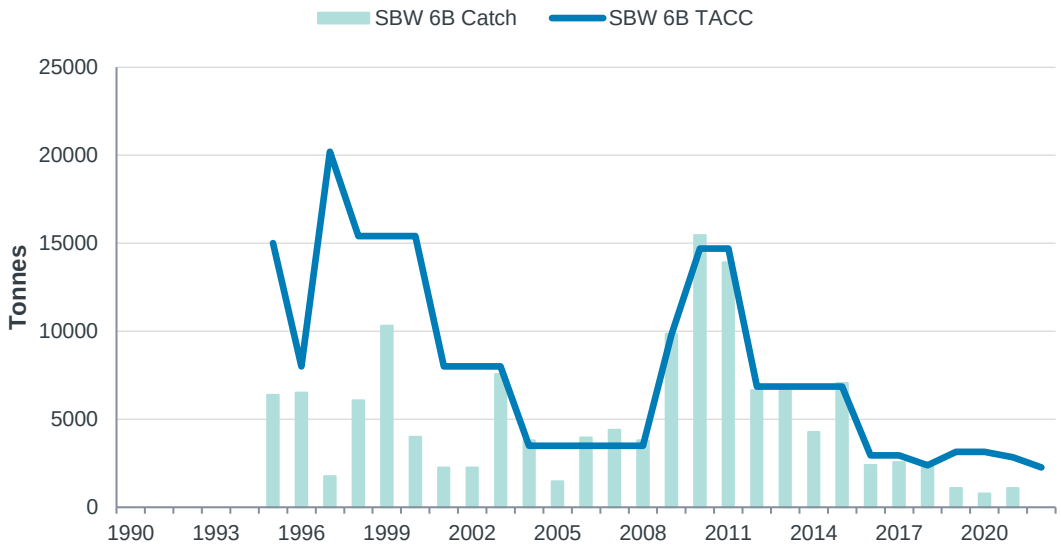

Figure 2: Total Allowable Commercial Catches and reported catches for SBW 6B

UoC 2 – Campbell Island Rise (SBW 6I)

A stock assessment of the Campbell Island Rise stock was undertaken in 2020 using research time series of abundance indices from wide-area acoustic surveys from 1993 to 2019 and proportion-at-age data from the commercial fishery. New information included a wide-area acoustic biomass survey of Campbell Island Rise in 2019, which produced an adult biomass estimate of 91,000 t. This was a slight (6%) decrease from the 2019 survey but was the fourth highest in the time series (Ladroit et al., 2020). Biomass surveys here are triennial, with the next survey scheduled in September 2022.

The general-purpose stock assessment program, CASAL was used and the approach, which used Bayesian estimation, was the same as that adopted by Roberts & Hanchet (2019). Year class strengths were estimated from 1958 and the catch history extended back to 1971, the first year of reported catches. The 2020 model produced similar estimates of status to the old model, but it also produced stable estimates of natural mortality when using Markov Chain Monte Carlo (MCMC) methods (Doonan, 2020; FNZ, 2022a.

Update on stock status (Doonan, 2020)	B_{2020} was estimated at 56% B_0 and Very Likely (>90%) to be at or above the target of 40% B_0.
TACC 2022-23 TACC 2021-22 TACC 2020-21 TACC 2019-20	39,200 39,200 t 39,200 t 39,200 t
UoA share of TACC UoC share of TACC	100% 87%
SBW 6I catch 2021-22 SBW 6I catch 2020-21 SBW 6I catch 2019-20 SBW 6I catch 2018-19	11,982 t 26,517 t 15,147 t 18,334 t

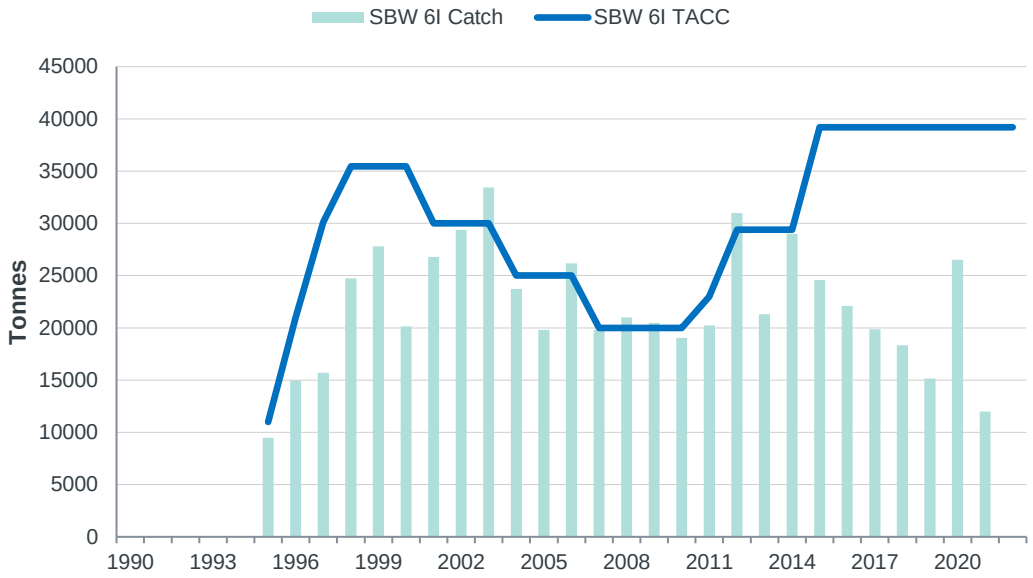

Figure 3: Total Allowable Commercial Catches and reported catches for SBW 6I[2]

[2] Southern blue whiting stocks are characterised by sporadic recruitment pulses and highly variable year-class strengths. Fisheries are characterised by high catches when strong year-classes enter the fishery, followed by gradual declines as these year-classes are fished down over time.

Key P1 references

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O'Driscoll, R.L. (2018). Acoustic biomass estimates of southern blue whiting on the Bounty Plateau in 2017. New Zealand Fisheries Assessment Report 2018/11. 28 p. https://www.mpi.govt.nz/dmsdocument/29369-far-201811-acoustic-biomass-estimates-of-southern-blue-whiting-on-the-bounty-plateau-in-2017

P2 Overview of Environmental Information

Observer coverage

Southern blue whiting fisheries had 100% observer coverage from 2012-13 to 2019-20 (Fig. 3), (FNZ, 2021).

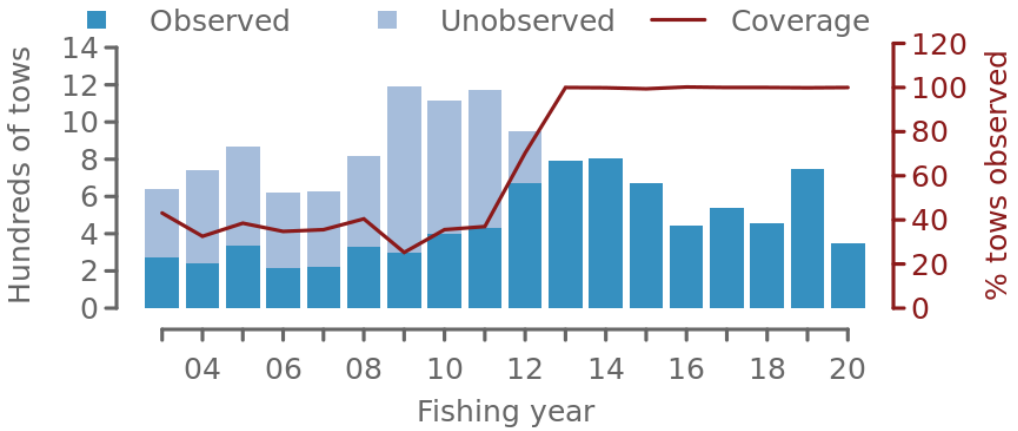

Figure 3: Fishing effort and observer coverage in all southern blue whiting fisheries 2002-03 to 2019-20.

In 2021, coverage was slightly reduced, most likely associated with Covid-19 restraints, with 59% of all tows being observed in SBW 6B and 76% observed in SBW 6I (FNZ, 2022)

Table 1: Fishing effort and observer coverage in SBW 6B and SBW 6I fisheries in 2018-19 and 2019-20 (FNZ, pers. comm.).

Fishery	2018-19			2019-20			2021-22		
	Obs. tows	Total tows	% tows obs.	Obs. tows	Total tows	% tows obs.	Obs. tows	Total tows	% tows obs.
SBW 6B	152	152	100%	14	14	100%	13	22	59%
SBW 6I	596	596	100%	334	334	100%	297	389	76%

Retained & bycatch species

The southern blue whiting fishery is characterised as a “clean” fishery with bycatch comprising less than 1% of the total catch, on average. Bycatch estimates over the most recent five-year period for which data are available (i.e., 2013-14 to 2016-17), reveal that between seven and 16 species have had catches of greater than one tonne per annum, of which 11 are managed within the Quota Management system. During this period, bycatch has been dominated by five species: ling (147 t), porbeagle shark (104 t), hoki (87 t), hake (80 t) and opah (55 t), with all but opah being QMS species (Finucci et al., 2019).

ETP species capture mitigation

In addition to FNZ’s Operational Plan to Manage the Incidental Capture of New Zealand Sea Lions in the Southern Blue Whiting Fishery, Campbell Islands (SBW 6I), DWG’s members

have agreed to implement several initiatives aimed at mitigating the capture of endangered, threatened and protected species. These include (DWG, 2022):

- Operational Procedures (OPs)
- Vessel Management Plans (VMPs)
- Marine Mammal Operational Procedures (MMOPs)
- 10 Commandments for SBW Fisheries
- A seasonal Vessel Advisory Memo to Deepwater Fleet, (DWG, 2020, 2021)

Deepwater Group has developed a mobile App to enable vessel operators, vessel managers and skippers to easily access all of the current, agreed Operational Procedures that are in place for mitigating ETP species captures by the trawl fleet. By scanning DWG's QR code, a smart-phone app is downloaded where all of the Operational Procedures can be accessed.

DWG's Environmental Liaison Officer (ELO) visited all factory vessels involved in the SBW fisheries prior to the 202-21 and 2021-22 seasons. His objectives and tasks prior to and during the fishing season include 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
- For SQU and SBW seasons, ensure the full fleet adheres to the SLED audit programme:
  - Maintain updated database of all SLEDs
  - Provide FNZ with a summary of all SLED certifications
  - Monitor in season SLED damage, repairs and re-certification
- 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 (Cleal, 2021).

Southern blue whiting trawlers operate in areas where there is an abundance of seabirds and marine mammals, and a great deal of time and energy goes into ensuring these interactions are kept at a minimum. As a consequence of the very high rate of observer coverage on vessels targeting southern blue whiting from the 2012-13 fishing year, there is a high degree

of confidence around the reported numbers of ETP species captures. A summary of ETP species captures during the period 2018-19 to 2020-21 illustrates the very low number of captures (Table 2).

Table 2: Industry-reported incidental captures of non-fish species in the southern blue whiting fisheries, 2018-19 to 2020-21.

Fishing Year	Seabirds	Sea lions	Fur seals	Dolphins/ whales
2018-19	7	0	11	0
2019-20	9	1	8	0
2020-21	0	4	7	0

New Zealand sea lions

The New Zealand sea lion is listed as 'Threatened – Nationally Vulnerable' (Baker et al., 2019). A New Zealand Sea Lion Threat Management Plan (TMP) was finalised in 2017 (DoC, 2017) with a vision to "promote recovery and ensure the long-term viability of New Zealand sea lions".

There were 13 reported incidental captures of New Zealand (NZ) sea lions in the southern blue whiting trawl fisheries in the five-year period from 2013-14 to 2019-20 (Fig. 4),(FNZ, 2021b). In 2020-21 there were 4 captures (Table 2). All captures by these fisheries were incorporated into the TMP and were not considered to pose a threat to the sea lion population (DOC, 2017).

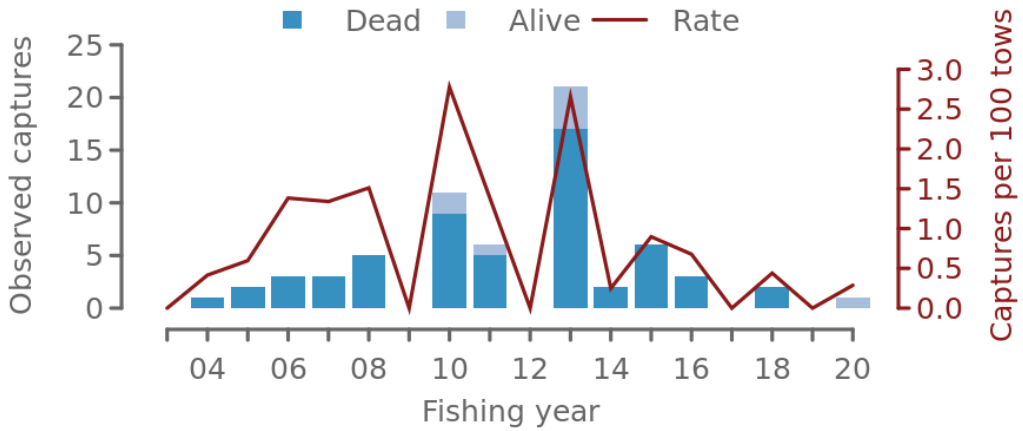

Figure 4: Observed captures of sea lions in southern blue whiting fisheries 2002-03 to 2019-20.

Following an unexplained decline in pup counts between 2007-08 and 2008-09, annual pup production has been relatively stable over the 13-year period 2008-09 to 2021-22 (Young & Manno, 2022), (Fig. 5). Note that no estimates of pup production were obtained in 2020-21 due to Covid-19-related cancellation of the field season.

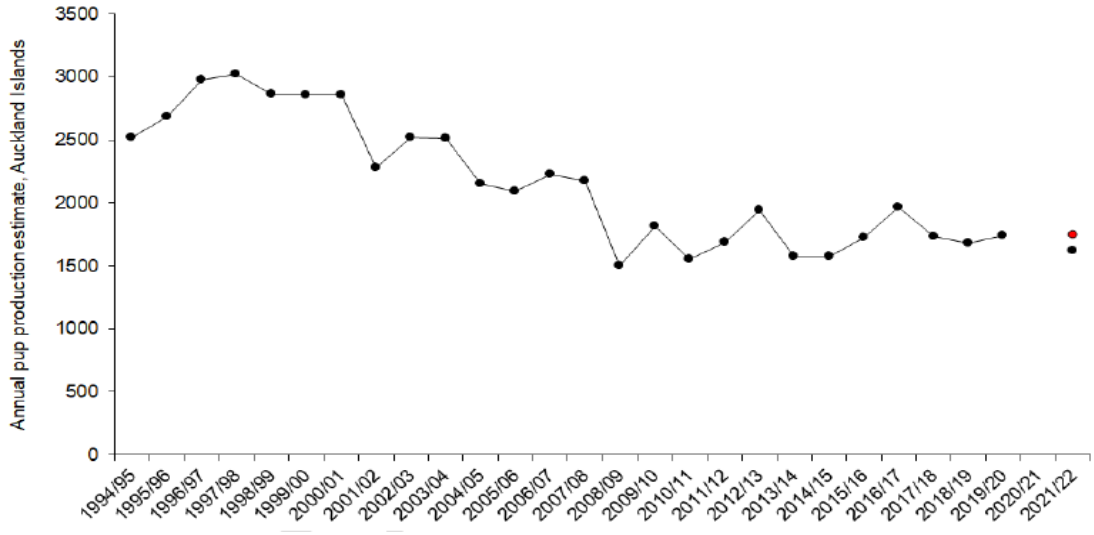

Figure 5. Total estimated sea lion pup production at the Auckland Islands (all colonies combined) 1994-95 to 2021-22. Two estimates are presented for 2021-22: a minimum estimate based on direct counts and mark-recapture (black) and an adjusted estimate based on direct counts and mark-recapture (red).

The use of sea lion exclusion devices (SLEDs) is mandatory for all southern blue whiting vessels in the SBW 6I fishery.

A summary of performance against the SBW Operational Plan for managing the incidental capture of sea lions during the 2020-21 season at Campbell Island (SBW 6I) noted the following (FNZ, 2022a):

- 10 vessels participated in the fishery during 2021, of which 8 carried at least one MPI observer (i.e., 83% observer coverage)
- Observers reported the level of adherence with the VMPs and the MMOPs was excellent
- SLEDS were used for all tows
- 2 sea lions were captured dead and 2 were released alive in 2021.

Fisheries New Zealand's Operational Plan to Manage the Incidental Capture of New Zealand Sea Lions in the Southern Blue Whiting Fishery, Campbell Islands (SBW 6I), is reviewed annually and is distributed to all vessel operators prior to season commencement (FNZ 2021). The Operational Plans set out the stringent requirements for vessels operating in the fishery including:

- Requirement to carry two SLEDs built and approved by certified manufacturer
- Carrying of observers at all times
- Prior notification of vessel departures.

The OP requires the fleet to leave the fishery should the following occur:

- A limit of 12 female sea lion mortalities is reached, or
- A total of 25 sea lion mortalities occur.

Prior to each August-September fishing season[3], DWG's Environmental Liaison Officer (ELO) ensures that all vessels have up-to-date VMPs and MMOPs aboard and ensures all SLEDs are checked and approved by a nominated net-shed. A total of 98 SLED checks were undertaken prior to commencement of the 2020-21 southern blue whiting and squid fishing seasons and all were found to be compliant with specifications (Cleal, 2021).

The ELO provides vessel owners and operators with the following information as a reminder of the strategies and actions required to reduce the fleet's interactions with sea lions (and all ETP), (DWG, 2019, 2020, 2021):

- DWG memo to SBW 6I vessel skippers: sea lion risk management actions
- FNZ Operational Plan for SBW 6I sea lion risk mitigation
- DWG Marine Mammal Operational Procedures.

New Zealand fur seals

The New Zealand fur seal is classified as "Not Threatened" under the New Zealand Threat Classification System in 2019 (Baker et al. 2019).

Observed fur seal captures for the period 2002-03 to 2017-18 are provided below (Fig. 6).

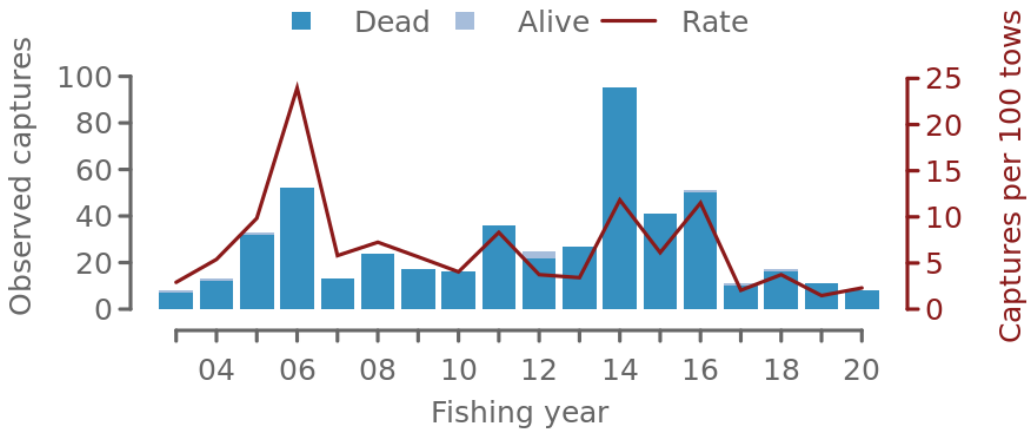

Figure 6: NZ fur seal captures and capture rates in southern blue whiting fisheries 2002-03 to 2019-20.

In the 2018-19 and 2019-20 fishing years there were 11 and 8 reported captures respectively of New Zealand fur seal in southern blue whiting trawl fisheries (FNZ, 2021b). In 2020-21 there were 7 sea lion captures reported by vessels (G. Lydon FNZ, pers. comm.), (Table 2). Most captures were from the SBW 6B fishery which is prosecuted within range of a large fur seal colony comprising approximately 20,000 animals (DOC, 2019), on the Bounty Islands.

NZ fur seals are distributed over a very extensive area, including all of the sub-Antarctic islands, and their numbers are believed to be increasing across their range.

3 The SBW fishing year runs from 1 April – 31 March, SBW fishing occurs during August-September, and the 2021 season falls into the 2019-20 fishing year. HOK, HAK & LIN fishing years run from 1 October – 30 September.

A recent experiment to investigate the use of drone technology for conducting affordable aerial photographic surveys of fur seal colonies on distant islands has proved very successful, which bodes well for future population censuses (Rexer-Huber & Parker, 2020).

Seabirds

Very low numbers of seabirds are incidentally caught by southern blue whiting fisheries, averaging around 5 per year in recent years, with the exception of 2018-19 when 37 were observed caught, of which 29 were released alive majority (27) of these captures were grey petrels . There were only 3 captures in 2019-20, all grey petrels (Fig. 7). An estimated 53,000 breeding pairs were estimated to be on the Antipodes Islands during a 2013 census and their conservation status in was moved from ‘at risk-declining’ to ‘at risk – naturally uncommon’ (Bell, 2013).

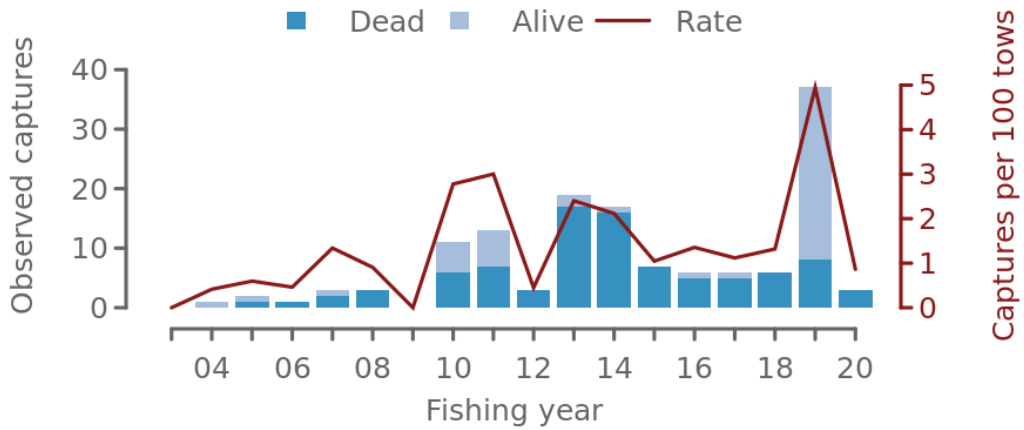

Figure 7: Observed incidental captures of seabirds in southern blue whiting fisheries and capture rates per 100 tows, 2002-03 to 2019-20.

In 2020-21 there were no seabirds captures reported in southern blue whiting trawl fisheries (G. Lydon FNZ, pers. comm.), (Table 2). As there is very high observer coverage in these fisheries there is a hight degree of confidence in these figures. This high level of observer coverage is scheduled to continue, as are the seabird mitigation measures guided by the updated NPOA seabirds (FNZ, 2020, 2020a, 2020b, 2020c).

Whales & dolphins

There have been no observed or reported whale or dolphin captures in the southern blue whiting fisheries.

Sharks

A recent study which modelled the relationship between basking shark records and environmental variables and biotic (zooplankton distribution) variables found areas of high habitat suitability around the Bounty Islands and Auckland Islands (Finucci et al., 2020). However, the only recorded capture of a basking shark by the southern blue whiting fleet has been of a single animal in the SBW 6B Bounties area during the 2016 fishing season, and there have been no further captures through to 2020-21 (G. Lydon FNZ, pers. comm.). There have been no reported captures of white pointer shark (great white) by southern blue whiting fisheries.

Corals

Protected coral bycatch has been negligible in southern blue whiting fisheries even though most trawls occur on or close to the seabed for at least part of the time. Around 99% of trawl tows are undertaken using midwater nets, which are fished both on the bottom and in midwater, and it is estimated that around 56% of tows occur on the seabed (FNZ 2022, SBW Chapter). The light groundrope used on these midwater nets is likely to be much less impactful than the heavier bobbin-rigs used on conventional bottom trawls. No corals were reported captured during the period 2018-19 to 2020-21 (Table 3), (G. Lydon FNZ, pers. comm.).

Table 3: Industry-reported coral catch by southern blue whiting fisheries 2018-19 – 2020-21.

ETP corals catch	2018-19	2019-20	2020-21
	SBW	SBW	SBW
Coral catch (kg)	0	0	0
No. tows with coral	0	0	0
No. observed tows	748	348	310
% tows with coral	0.00%	0.00%	0.00%
Catch rate (kg/tow)	0	0	0

Benthic interactions

The trawl footprint of New Zealand's trawl fisheries is assessed annually to monitor their interactions with the benthic habitat (Baird & Mules, 2021). The trawl footprint has been determined for each year, commencing in 1989-90, for all the main deep water target fisheries including southern blue whiting.

For the 2017–18 and 2018-19 fishing years, southern blue whiting bottom tows had estimated footprints of 732 km^2 and 757 km^2 respectively, which represented coverage of < 0.1% of the Fishable Area within the EEZ and Territorial Sea (i.e., 0-1,600 m depth), (Baird & Mules, 2021). The fishing grounds are well-established and very little new ground is traversed each year (Table 4).

Table 4: Trawl footprint, percentage of fishable area trawled, and new area trawled by southern blue whiting fisheries, 2017-18 – 2018-19.

SBW	Trawl footprint (km^2)	% Fishable Area (0-1600 m)	New Area Trawled (km^2)
2017-18	732	0.05%	0.3
2018-19	757	0.05%	10.9

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 effects of trawl fishing are detailed in the Annual Operational Plan for Deepwater Fisheries (FNZ, 2021a) and include the following projects (Note: * = multi-year projects). These projects are funded via DOC's Conservation Services Plan (DOC, 2021):

- The extent and intensity of seabed contact by mobile bottom fishing in the New Zealand Territorial Sea and Exclusive Economic Zone (trawl footprint), (Project BEN2020-01*)
- New Zealand sea lion: Auckland Islands pup count (Project POP2018-03*)
- Identification of seabirds captured in New Zealand fisheries (Project INT2019-02*)
- Bycatch monitoring and quantification of fish in deepwater fisheries (Project BYC2021-03)
- Temporal and spatial distribution of non-target catch and non-target species in deepwater fisheries (Project ENV2020-20)
- Auckland Islands New Zealand sea lion tracking (Project PMM2020-06)
- Opportunistic aerial survey of white-capped albatross on the Auckland Islands (Project PSB2019-09).

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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 is a species-specific chapter for southern blue whiting within this plan (MPI, 2011).

The National Deepwater Plan consists of three parts:

- Fisheries management framework and objectives:
  - Part 1A - strategic direction for deepwater 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 deepwater 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 deepwater 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 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 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, 12 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 in March 2020. This resulted in fewer in-port and at-sea inspections of fishing vessels throughout 2020 due to the tight restrictions of 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 bycatch 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 DWG's Operational Procedures (DWG, 2021), which are industry-agreed, non-regulatory measures. 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 to FNZ. The ELO is on-call 24/7 to respond to any ETP species capture issues and maintains active liaison with both vessel operators and FNZ towards ensuring effective implementation of the Operational Procedures and of the National Plans of Action for Seabirds (FNZ, 2020) and Sharks (MPI, 2013).

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 southern blue whiting 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 assesses 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) provides FNZ and DoC research projects to be undertaken during 2020-21 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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