



Marine Stewardship Council fisheries assessments

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New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl report Final Draft Report



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Assessment type	Reassessment
Date	February 2026

Assessment Data Sheet

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2. Glossary

ACAP	Agreement on Conservation of Albatross and Petrels
ACE	Annual Catch Entitlement
ACCOBAMS	Agreement on the Conservation of Small Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area
AEEF	Assessment of the Environmental Effects of Fishing
AEWA	African-Eurasian Migratory Waterbird Agreement
ALC	Automatic Location Communicator
AOP	Annual Operational Plan
ARR	Annual Review Report
B0	Unfished Equilibrium Biomass
BMA	Benthic Management Areas
BP	Bounty Platform
BPA	Benthic Protection Area
BRT	Boosted Regression Tree
CAY	Current Annual Yield
CASAL	C++ Algorithmic Stock Assessment Laboratory
CASAL2	C++ Algorithmic Stock Assessment Laboratory (version 2)
CITES	Convention on International Trade in Endangered Species
CLR	Catch Landing Return
CMM	Conservation Management Measures
CMS	Convention on Migratory Species
CPUE	Catch Per Unit Effort
CP	Campbell Plateau
CR	Chatham Rise
CS	Cook Strait
CSP	Conservation Services Programme
CV	Coefficient of Variation
DFAWG	Deepwater Fisheries Assessment Working Group
DOC	New Zealand Department of Conservation
DSCC	Deep Sea Conservation Coalition
DV	Deemed Value
DWC	Deepwater Council
DWG	Deepwater Group Limited
DWWG	Deep Water Working Group
ECO	Environment and Conservation Organisation
ECNI	East Coast North Island
ECSI	East Coast South Island
ELO	Environmental Liaison Officer
ESCR	East and South Chatham Rise
EEZ	Exclusive Economic Zone
ELR	Electronic Reporting
ERF	Evidence Requirements Framework
ETP	Endangered, Threatened, Protected Species
FARs	Fishery Assessment Reports
FAWGs	Fishery Assessment Working Groups
FCV	Foreign Charter Vessel
FMA	Fishery Management Areas
FPAG	Fish Plan Advisory Group
FNZ	Fisheries New Zealand-entity within MPI responsible for fisheries science and management

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GPR	Geospatial Position Reporting
HCR	Harvest Control Rule
HSS	Harvest Strategy Standard for New Zealand Fisheries
IQANZ	Independent Quality Assurance New Zealand
IQF	Individual Quick Freezing
IUCN	International Union for Conservation of Nature
LFR	Licensed Fish Receiver
LMA	Large Marine Reserve
M	Natural mortality
MLS	Minimum Legal Size
MPA	Marine Protected Area
MPSA	Monitor, Pause, Survey and Assess (Benthic Management framework)
MPI	Ministry for Primary Industries (representing the Crown and its statutory obligations to the public). Formerly the Ministry of Agriculture and Forestry and before that the Ministry of Fisheries.
MSE	Management Strategy Evaluation
MSY	Maximum Sustainable Yield
MTRP	Medium Term Research Plan (Deepwater Fisheries
NGO	Non-Governmental Organisation
NWCR	North West Chatham Rise
NZ	New Zealand
OOS	Out of Scope
PST	Population Sustainability Threshold
QMA	Quota Management Area
QMS	Quota Management System
RCP	Regions of Common Profile
RF	Random Forest
SA	Sub-Antarctic
SCA	Seamount Closure Area
SNZ	Seafood NZ
SEFRA	Spatially Explicit Fisheries Risk Assessment
SMART	Seafloor Monitoring, Automated Recording of Trawls
SPRFMO	South Pacific Regional Fisheries Management Organisation
TAC	Total Allowable Catch
TACC	Total Allowable Commercial Catch
TCEPR	Trawl Catch Effort and Processing Returns
TCER	Trawl Catch Effort Returns
TOKM	Te Ohu Kai Moana
UoA	Unit of Assessment (see MSC-MSCI Vocabulary for MSC defined terms)
UoC	Unit of Certification
UNCLOS	United Nations Convention on the Law of the Sea
UTF	Underwater Topographic Features (including hills, knolls, and seamounts)
VADE	Voluntary, Assisted, Directed and Enforced Compliance operating model
VME	Vulnerable Marine Environment
VMP	Vessel Management Plan
VMS	Vessel Monitoring System
WCPFC	Western & Central Pacific Fisheries Commission
WCSI	West Coast South Island

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3. Executive summary

This report provides details of the MSC reassessment of the New Zealand hoki hake and ling trawl fisheries that operate in the New Zealand EEZ. This report is one of three reports for the combined reassessment of NZ hoki, hake and ling trawl, southern blue whiting trawl and ling longline fisheries.

The UoAs assessed in this specific report are:

Hoki, Eastern (UoA 1) and Western (UoA 2)
Hake, Sub-Antarctic (UoA 3), Chatham Rise (UoA 4) and West Coast South Island (UoA 5)
Ling, Chatham Rise (UoA 6&7), Sub-Antarctic (UoA 8&9) and West Coast South Island (UoA 10)

These fisheries were last recertified in 2018. In this Final Draft Report (FDR), the NZ hake, hoki and ling trawl fisheries are reassessed against the MSC Fisheries Standard v 3.1 with a modified assessment tree to score shark finning under FS v2.01- SI 2.1,2d, instead of FS v3.1- SI 2.1.2d and SI 2.2.2d. The information in this FDR is a combination of information gathered and updated as part of the process of compiling the Announcement Comment Draft Report (ACDR) and preparing for the 5th annual surveillance audit for the current certification cycle. Also, most importantly new information obtained during the site visit.

Stakeholders were encouraged to review the ACDR and to provide information to the assessment team and raise any concerns with the indicative scoring. The draft scoring ranges in the ACDR were based on a review of information and documents submitted by the fishery client.

Following this, this report has been through peer and client review. The assessment team have reviewed all comments and revised scores appropriately.

The PCDR gave stakeholders a further chance to review the report and scoring. The Final Draft Report was the final presentation of our certification decision and scores.

Stakeholders had the opportunity to submit an objection to our Certification Decision presented in the Final Draft Report by following [the MSC Objections Process](#). An objection was not received.

Therefore, LRQA confirms this fishery meets the MSC requirements and hereafter is certified, subject to successful outcomes of annual surveillance audits.

The **Eligibility Date** for this assessment is the recertification date, 6th February 2026

The assessment team for this fishery assessment comprised of Jo Akroyd who acted as team leader and primary Principle 3 specialist; Andre Punt who was primarily responsible for evaluation of Principle 1 and Stewart Norman who was primarily responsible for Principle 2.

Principle 1 strengths

- Assessments of the major stocks are conducted regularly using a stock assessment method (CASAL / CASAL2) that is capable of using all of the types of data available for assessment purposes and producing the types of outputs needed to evaluate stock status relative to target and limit reference points in a probabilistic manner.
- Surveys are conducted regularly for all stocks and generally have good coverage. Age-composition data are available for surveys and most major fishery components.
- Assessments regularly explore the assumptions underlying the models used to provide management advice. These include reviews of stock structure, biological parameters and fishery specifications.

Principle 2 strengths

- The high level of observer coverage allows confidence that all species with which the UoAs interact are represented in the data available
- Representative observer coverage offers high accuracy (trueness and precision) of catch estimates.

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- Observer data analyses are up to date for non-target fish and invertebrate catch (Anderson et al 2019, Finucci et al 2024) and observer data are available to the assessment team in summarised format to the 2022-23 season through the Situation Report.
- Spatially Explicit Fishery Risk Assessments (SEFRAs) provide clear and precise estimates of total mortality for ETP/OOS bycatch species and to inform the conservation status of those species.
- ETP/OOS species management measures support a comprehensive strategy to manage the impacts of the fishery in assessment and overlapping fisheries.
- Benthic Protection Areas and the limited area of operation of the demersal trawl sector limit the impact of the fishery on less and more sensitive habitats.

Principle 3 strengths

- Management of the hoki, hake and ling trawl fisheries continued the strong management regime described in the previous full assessment. Improvements since the previous assessment include implementation of digital monitoring, which provides Ministry for Primary Industries (MPI) with daily access to data, greater opportunity to target compliance risk, and therefore further reduces the potential for unreported catch and area misreporting

Principle 1 weaknesses

- Management Strategy Evaluation work has been undertaken for hoki, hake and ling, but it has not been based on the HCRs used when providing management advice and the HCRs that have been evaluated are not used for management purposes.
- The WSCI survey does not cover all of the regions in which the HAK 7 hake stock is found, increasing uncertainty.
- The assessments of HAK1 and HAK4 are relatively dated (2021 and 2020), although these stocks are estimated to well above their management targets with exploitation rates currently well below those corresponding to the management target.

Principle 2 weaknesses

- Raised mortality estimates not available for all ETP species (e.g. basking shark)
- Observer data analyses are not UoA-specific. Data are combined for multiple UoAs as a single fishery.
- Spatially Explicit Fishery Risk Assessments (SEFRAs) for seabirds and marine mammals are not UoA-specific.
- Ecosystem impacts have been investigated in detail but have not been updated since Tuck et al 2009 reviewed research survey data.

Principle 3 weaknesses

- The hoki, hake and ling chapters of the National Fisheries Plan are all outdated by more than 10 years. However, there is evidence that this is being addressed.
- An updated external review of the fishery specific management system has not been completed but there is progress underway on this.

Determination

Following this assessment team's work, and review by stakeholders and peer-reviewers, and no objection, the determination is that this fishery has passed its assessment and should be certified. This has been confirmed by LRQA's decision making entity.

For interested readers, the report also provides background to the target species and fishery covered by the assessment, the wider impacts of the fishery and the management regime, supported by full details of the assessment team, a full list of references used and details of the stakeholder consultation process.

LRQA confirms that this fishery is within scope.

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4. Report details

4.1. Authorship and peer review details

Peer reviewer information to be completed at Public Comment Draft Report stage

Table 1: Authorship and assessment team

Role	Name	Area of expertise
Team leader	Jo Akroyd	Principle 3
Team members (Insert and delete rows as appropriate)	André Punt	Principle 1
	Stewart Norman	Principle 2

Table 2: Peer reviewers

Peer reviewers	Chris Grieve
	Peter Trott

4.2. Version details

The report shall include a statement on the versions of the fisheries program documents used for this assessment.

Table 3: Fisheries program documents versions

Document/Assessment Tree	Version number/Type
MSC Fisheries Certification Process	Version 3.1
MSC Fisheries Standard	Version 3.1
Assessment tree	<i>Modified to score shark finning using FS v2.01 - SI 2.1.2.d, instead of FS v3.1 - SI 2.1.2d and SI 2.2.2d.</i>
MSC General Certification Requirements	Version 2.7
MSC Reporting Template	Version 2.1

5. Unit(s) of Assessment and Unit(s) of Certification

5.1. Unit(s) of Assessment

Table 4: Unit(s) of Assessment (UoA)

UoA 1	Description
Species	<i>Hoki (Macrurus novaezelandiae)</i>
Target Stock	Eastern (UoA 1)
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)

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Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoA 2	Description
Species	Hoki (<i>Macruronus novaezelandiae</i>)
Target Stock	Western (UoA 2)
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoA 3	Description
Species	Hake (<i>Merluccius australis</i>)
Target Stock	Sub-Antarctic (UoA 3) HAK 1
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoA 4	Description
Species	Hake (<i>Merluccius australis</i>)
Target Stock	Chatham Rise (UoA 4) HAK 4
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoA 5	Description
Species	Hake (<i>Merluccius australis</i>)
Target Stock	West Coast South Island (UoA 5) HAK 7

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Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoA 6	Description
Species	Ling (<i>Genypterus blacodes</i>)
Target Stock	Chatham Rise LIN 3
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoA 7	Description
Species	Ling (<i>Genypterus blacodes</i>)
Target Stock	Chatham Rise LIN 4
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoA 8	Description
Species	Ling (<i>Genypterus blacodes</i>)
Target Stock	Sub-Antarctic LIN 5
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.

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UoA 9	Description
Species	Ling (<i>Genypterus blacodes</i>)
Target Stock	Sub-Antarctic LIN 6
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoA 10	Description
Species	Ling (<i>Genypterus blacodes</i>)
Target Stock	West Coast South Island LIN 7
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.

5.2. Unit(s) of Certification

Table 5: Unit(s) of Certification (UoC)

UoC 1	Description
Species	Hoki (<i>Macruronus novaezelandiae</i>)
Target Stock	Eastern (UoA 1)
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoC 2	Description
Species	Hoki (<i>Macruronus novaezelandiae</i>)
Target Stock	Western (UoA 2)

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Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoC 3	Description
Species	Hake (<i>Merluccius australis</i>)
Target Stock	Sub-Antarctic (UoA 3) HAK 1
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoC 4	Description
Species	Hake (<i>Merluccius australis</i>)
Target Stock	Chatham Rise (UoA 4) HAK 4
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoC 5	Description
Species	Hake (<i>Merluccius australis</i>)
Target Stock	West Coast South Island (UoA 5) HAK 7
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.

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UoC 6	Description
Species	Ling (<i>Genypterus blacodes</i>)
Target Stock	Chatham Rise LIN 3
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoC 7	Description
Species	Ling (<i>Genypterus blacodes</i>)
Target Stock	Chatham Rise LIN 4
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoC 8	Description
Species	Ling (<i>Genypterus blacodes</i>)
Target Stock	Sub-Antarctic LIN 5
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoC 9	Description
Species	Ling (<i>Genypterus blacodes</i>)
Target Stock	Sub-Antarctic LIN 6
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)

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Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.
UoC 10	Description
Species	Ling (<i>Genypterus blacodes</i>)
Target Stock	West Coast South Island LIN 7
Geographical area	New Zealand EEZ
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Seafood NZ, Deep Water Council (DWC)
Other eligible fishers	(From previous report) New Zealand flagged vessels, licenced to fish for hoki, hake and ling with demersal and semi demersal pelagic trawl, in management areas (HOK 1, 2; HAK 1, 4, 7; LIN 3, 4, 5, 6, 7 and with access to quota for these species.

6. Confirmation of scope

This is not an enhanced fishery and does not include any introduced species.

LRQA confirms that the UoAs under assessment are in scope and meets the requirements of the MSC Fisheries Standard Section 1.

- The target species are not amphibians, reptiles, birds or mammals (MSC Fisheries Standard v 3.1, 1.1.1)
- The UoAs do not use poisons or explosives (MSC Fisheries standard v3.1, 1.1.2)
- The UoAs are not enhanced fisheries (MSC Fisheries Standard v3.1, 1.1.3)
- The fisheries are not an introduced species-based fishery (MSC Fisheries Standard v3.1, 1.1.4)
- None of the client group vessels have been implicated in the conviction of a serious crime for an offence listed in MSC Fisheries Standard v3.1, Table 3 List of offences, while undertaking fishing operations in the last two year
- The client or client group does not include any vessel that has been implicated in a conviction for a shark-finning violation in the last two years (MSC Fisheries Standard v3.1, 1.1.6)
- LRQA confirms that the client group has submitted the completed MSC At Sea Labour Eligibility Requirements Reporting Template.

7. Overview of the fishery

7.1. Client Group

Seafood New Zealand, Deepwater Council formally Deepwater Group Limited (DWG) <http://deepwatergroup.org> –(now SeaFood New Zealand Deepwater Council, DWC) was formed in September 2005, this non-profit organisation is an amalgamation of EEZ fisheries quota owners in New Zealand. Species targeted by DWG are usually fished at depths between 200 and 1,200 m within the New Zealand Exclusive Economic Zone (EEZ). These include hoki, hake, ling, southern blue whiting, orange roughy, oreo dory, squid and jack mackerel. The client group catches about 72% of the recorded hoki, hake and ling landings.

Other eligible fishers are those operators who have been fully assessed against the MSC's Principles and Criteria for

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Sustainable Fishing as part of the UoCs and are not currently part of the client group but may become eligible to join the client group under a certificate sharing arrangement. The client group has stated their willingness to enter into certificate sharing arrangements.

7.2. Fishing Method and Vessels

Demersal and semi pelagic trawl - the trawl vessels possess exclusively high aspect ratio multipurpose trawl doors that allow demersal (seabed contact) or midwater operation. Vessels exclusively use Furuno CN22/24 net monitoring system electronics, which monitor the headline and groundrope height in relation to the seabed water temperature. Some of the fleet have Scanmar or Simrad systems monitoring door spread and codend “fullness”, but none have trawl sonar, as cabled systems are prohibited by law due to the risk posed to seabirds by the cable connecting the sonar to the vessel.

Bottom trawl nets are single or much less commonly twin-rig, and of two types:

- Alfredo type derivatives that are characterised by low twine surface area (small nets), low headline height (3-5 m), short groundrope (20-30 m), small mesh (max 300 mm, min 100 mm) and medium groundrigs (300-450 mm diameter rubber bobbins).
- “Spanish” type multipurpose trawls that are characterised by similar headline height and mesh sizes to Alfredo types, but with much longer groundrope and wings and smaller diameter groundrope rigs.

The midwater trawls tend to be domestic leaning on influences from Japanese, French and Russian designs in origin (although some Icelandic gear is imported), with a wide range of sizes measured by either headline length or headline opening (opening from 25-75 m). The use of the fishing circle measurement common in Europe is not encountered in New Zealand. Vessels have an all-nylon net with rope construction in the forepanel mesh in body and weights to open the net. Polyethylene may be used in the smaller meshes and in lengtheners and codends. Mesh sizes range from 65 m to 100 mm (codend) and can be used as pelagic or semi-pelagic gear.

“Kapron” trawls are used by the chartered 'Russian/Ukraine fleet'. The nets are of nylon construction with a 12 m maximum mesh size and a 60 m maximum opening. They are a multipurpose trawl used on wide variety of species.

The hoki, hake and ling trawl fishery has a minimum mesh size of 100 mm for the codend mesh. Codends are usually of knotless material to improve catch quality and often larger than minimum legal requirement, e.g. 110 mm instead of 100 mm. The fleet characteristics are summarized in Table 6.

Table 6. Table showing the fleet characterisation for the hoki, hake and ling trawl fishery (Source: Seafood New Zealand, Deepwater Council).

	<28 m	28 - 43 m			>43 m		
Year	Fresher	Fresher	Limited Processing	Fillet	Fresher	Limited Processing	Fillet
2011/12	24	5	4	1	1	17	10
2012/13	24	5	3	1	1	16	10
2013/14	21	7	3	2	0	13	10
2014/15	20	5	4	2	0	14	10
2015/16	20	7	4	2	0	12	10
2016/17	20	5	3	1	0	12	10
2017/18	19	4	3	1	0	12	10
2018/19	18	3	2	1	0	12	10
2019/20	16	3	2	0	0	12	10
2020/21	15	3	2	0	0	12	10
2021/22	14	3	2	0	0	12	9

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2022/23	14	3	2	0	0	12	9
2023/24	12	4	2	2	1	12	9

7.3. Operation of the fishery

Figure 1 shows maps of the location of the stocks and fisheries.

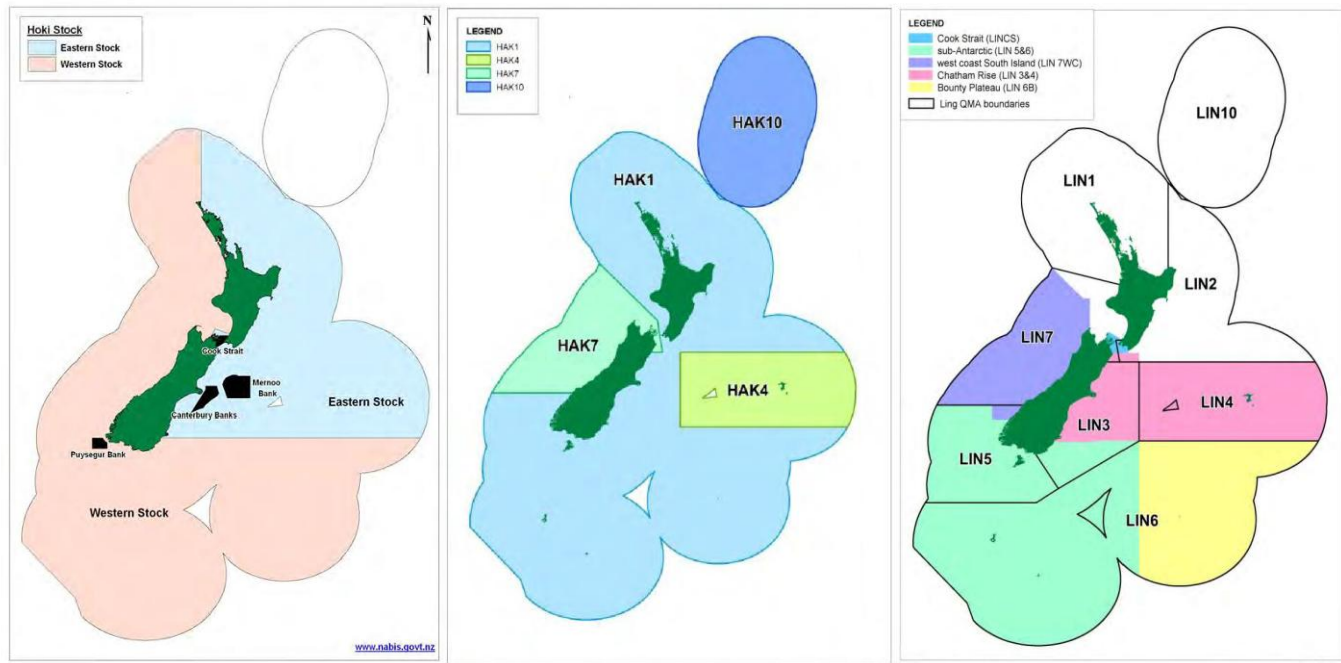


Figure 1. The management units for hoki, hake and ling respectively. The outer boundary represents the New Zealand 200 mile EEZ.

7.4. Monitoring of the fishery

The hoki, hake and ling trawl fishery management system has documented a comprehensive and effective monitoring, control and surveillance system through:

1. compulsory use of satellite-based Vessel Monitoring System (VMS) with an onboard automatic location communicator (ALC);
2. government observers who may be placed on board to observe fishing, transshipment and transportation to collect any information on hoki, hake and ling fisheries resources. This includes information to monitor the effects of hoki, hake and ling fishing on the aquatic environment; and,
3. accurate recordkeeping and recording requirements to establish auditable and traceable records to ensure all catches are counted and do not exceed the ACE held by each operator.

Deepwater and middle-depth fisheries are those generally between 12 nautical miles and 200 nautical miles offshore. Fisheries are categorised into three tiers:

- Tier 1 – high volume, high value quota management system stocks that commercial fishers usually target;
- Tier 2 –quota management system stocks that are smaller or less valuable bycatch fisheries, or are only targeted at certain times of the year; and
- Tier 3 – bycatch species that are not managed through the quota management system.

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The hoki, hake and ling trawl fishery, considered one combined trawl fishery, the southern blue whiting trawl fishery and the ling bottom longline fishery all fall under Tier 1.

The management of the majority of New Zealand's deepwater fisheries takes an evidence-based approach, supported by a robust and comprehensive monitoring and research programme. Information and data come from a variety of sources including independent Fisheries New Zealand Observer data, industry reporting, contracted fisheries independent research surveys, and contracted projects (FNZ, 2024). Research needs to inform management of New Zealand's deepwater fisheries are reflected in the medium term research plan ([MTRP](#)). The MTRP is a living document, updated regularly to reflect changes in management priorities where these occur, and identification of new information requirements. The MTRP should be read alongside the National Fisheries Plan for Deepwater and Middle depth fisheries (FNZ (2019), National Deepwater Plan). Annual research plans are consulted with stakeholders through the Deepwater Fish Plan Advisory Group and reported in the Annual Operational Plans and Annual Review Reports for deepwater fisheries.

The basic information for each species (see Section 10.1.1.1) needed when conducting stock assessments relates to information on stock structure, biological parameters such as natural mortality, length as function of age, weight as a function of age, and fecundity as a function of age. The species descriptions (see Section 10.1.1) refer to whether these parameters depend on sex and for natural mortality whether there is evidence for age or length dependence. The stock assessment for hoki involves specifications related to how movement occurs. The stock assessment may pre-specify the values for these parameters based on monitoring data or estimate them as part of the model-fitting process. In addition, the stock assessment may examine the evidence for changes over time in some of the biological parameters such as length and weight as functions of age.

7.4.1. At sea scientific observers

Fisheries New Zealand plans at-sea observer coverage based on biological sampling targets for stock monitoring (e.g. length frequencies (LF) and otolith samples) and percentage coverage targets for the estimation of protected species interactions. Observer coverage is planned and delivered based on the number of 'observer days' required for each fishery on a financial year basis. Fisheries New Zealand and the Department of Conservation work together each year to develop a sea days plan ([Fisheries observer services | NZ Government \(mpi.govt.nz\)](#)). See Section 9.3.2 in the [Annual Operational Plan for deepwater fisheries](#).

The number of observer days necessary to achieve biological sampling requirements are calculated using the following information from the most recent fishing year:

- the total number of target tows in each area.
- the number of observed target tows in each area
- the number of samples collected by observers for each species/area combination; and
- the number of sea days delivered for each area.

It is challenging to plan required observer coverage in advance because of the variability in fishing effort over the range of fisheries each year, and delivery can be affected by fishing activities during a year (e.g. if there is no fishing in a particular fishery, it will appear that coverage in terms of observed tows and length/age samples did not meet the target).

The National Institute of Water and Atmospheric Research (NIWA) currently carries out the role of Data Manager and Custodian for the fisheries research data owned by the Ministry for Primary Industries (MPI) formerly the Ministry of Fisheries. The Scientific Observer Programme (SOP) was created in 1986 to send observers, contracted to the then

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MAF Fisheries, to monitor the catches of commercial trawlers. Since then observer duties have extended to a number of fisheries and collecting observations for a range of data sets. The Scientific Observer Programme was later renamed to the Observer Programme, and in late 2004 re-branded as 'Observer Services'. The Centralized Observer Database (COD) is dedicated to information collected by these Ministry Observers (Sanders and Fisher, 2023).

The COD database contains the catch and effort information for observed commercial fishing vessels, ageing materials, length frequency and biological data for commercial species as measured by the observers, as well as relevant trip and tow information. Observers on each vessel are responsible for completing their Observer Catch Effort forms typically contained in a logbook. Each logbook documents details for every trawl shot, line set or other fishing effort by the vessel such as position, time, total catch; the composition and weight of each catch; and the details of all fish processing carried out on board the vessel. In 1990, the format of the trawl logbooks changed slightly, and was revised again in 2007 as version 3.

Since 2007 when version 3 of the trawl catch effort logbook was introduced, NIWA has received zip files from MFish, and subsequently MPI containing the observer trawl catch effort logbook data, which is loaded into the load tables of cod. The cod database is the major source of length frequency data from commercial fishing operations, and so plays a major role in the stock assessment process. Currently the cod database holds information for over 100 species, with the major species including hoki, southern blue whiting, orange roughy, scampi, oreos, ling, jack mackerels, hake, barracouta, and silver warehou.

Access to this database and data are restricted to specific Nominated Personnel as specified in the current Data Management contract between the Ministry for Primary Industries and NIWA.

Observer coverage statistics are available from multiple platforms including the Annual Operational Plans for each sector, the Aquatic Environment and Biodiversity Annual Review (AEBAR), the protected species captures summary website, and various scientific research works presenting mathematical analyses and extrapolations of mortality for each fishing sector based off observer records. Ultimately though all data are held by the Ministry for Primary Industries (MPI) and subsequent reports summarise those datasets. Each of the aforementioned platforms publish at different intervals and aggregate the various components of the fisheries differently (e.g. by area, gear type, taxon or taxon groups). The MPI publishes annual planned observer sea days and days achieved for the financial year period 01 July to 30 June each year, with the most recent full 12 month period being the 2023/24 period up until 30 June 2024 ([58306-2022-2023-observer-seadays \(mpi.govt.nz\)](#)). The MPI reports do not indicate the proportion of commercial fishing effort observed, and plans coverage based on fishery, fishing area and depth of fishing activity. That is not exactly in line with the manner in which the Units of Assessment are defined as target species/stock and gear type are not always apparent.

The most recent year for which observer coverage statistics are reported and for which data have been used to collate mortality statistics appears to be the 2020/21 fishing season (October 2020 to September 2021), though data are available as far back as 1990, and some fisheries do not run for the full 12-month period. Observer coverage in the UoAs is presented for the five-year period covering the 2016/17 to 2020/21 fishing seasons in Table 7 and fisheries are aggregated based on the gear type and declared target species. Updated, to 2022/23 fishing season, observer coverage statistics were provided to the assessment team through the Situation Reports published by SeaFood New Zealand, Deepwater Council (SNZ, 2024) and are reported under Principle 2 scoring.

Table 7. Observer coverage (percentage of tows observed) in the hoki, hake, and ling trawl fishery (reported separately) for the period 2016/17 to 2020/21. Source: Protected Species Captures Version 7, <https://protectedspeciescaptures.nz/PSCv7/download/>.

Fishery	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	Average
Hoki trawl	22.45	34.57	28.71	40.82	42.08	33.726
Hake trawl	83.52	58.37	46.91	76.49	62.74	65.606
Ling trawl	20.54	29.78	24.74	25.56	20.75	24.274

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7.4.2. Land-based catch sampling

For most deepwater fisheries, at-sea observers provide adequate sampling to support stock assessments. However, for some fisheries, getting sufficient observer coverage to collect representative samples can be challenging. Where fish are not fully processed at sea, research providers can be contracted to visit the landing sites and collect the required samples at that point.

Results from the sampling of commercial catches is a key input to several stock assessments. For these stocks, sufficient, representative samples of the length and/or age of the commercial catch must be available for the stock assessments to accurately estimate stock status. This mechanism is currently in place for the hoki fishery to collect samples from the Cook Strait and the West Coast South Island within 25nm of the coast. This project is scheduled to be completed annually.

7.4.3. Surveys

The research required to manage deepwater fisheries is detailed in the Medium-Term Research Plan for Deepwater Fisheries. Some research is contracted on an annual basis, while other research, such as trawl surveys, are contracted via multi-year contracts. Surveys provide important fishery-independent information for monitoring several deepwater fish stocks. Table 8 lists the surveys planned for 2024/25 to 2027/28.

Table 8. Future survey schedules (Source:FNZ<https://www.mpi.govt.nz/dmsdocument/21746-medium-term-research-plan-for-deepwater-fisheries-report>).

	2024/25	2025/26	2026/27	2027/28
Wide-area trawl surveys				
Chatham Rise		Jan 2026		Jan 2028
Sub-Antarctic	Dec 2024		Dec 2026	
WCSI	June/July 2024		June/July 2027	
Acoustic survey				
HOK1 1 (Cook Strait/Pegasus Canyon/Conway Canyon)	July/Aug 2025		July/Aug 2027	
SBW 6B	Aug 2025	Aug 2025	Aug 2026	Aug 2027
SBW 6I	Sep 2025			Sep 2028

7.4.3.1. Trawl surveys

Wide-area trawl surveys collect biological information and provide abundance indices for a wide range of species. There are three deepwater and middle-depth wide-area trawl surveys that cover the three main deepwater fishing grounds: Chatham Rise, Sub-Antarctic, and the West Coast of the South Island (WCSI). The surveys are optimised to provide information on relevant Tier 1 middle-depth fish stocks, but also provide valuable information on a range of Tier 2 and non-QMS species, including data that informs risk assessments for sharks, and important ecosystem data (e.g. sea temperature, stomach sampling) in these key fishery areas.

The Chatham Rise wide-area trawl survey is carried out in January every other year. The survey series provides biomass trend and distribution information on 142 species, which are included as data inputs to stock assessments for several species, including hoki, hake and ling.

The Sub-Antarctic trawl survey is carried out in December every other year in the alternate financial year to the Chatham Rise trawl survey. The Sub-Antarctic trawl survey provides information on 134 species and data inputs to stock assessments for several Tier 1 species, including hoki, hake and ling.

The last West Coast South Island (WCSI) wide-area trawl survey was completed in 2021 and is scheduled for completion in June/July every third year thereafter. The WCSI trawl survey was initially developed and designed as an acoustic

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survey focused on indexing spawning hoki abundance on the WCSI each winter. The survey methodology was amended in 2016 to focus on hake and ling rather than hoki following a review of the hoki model which concluded that the west coast acoustic index was not significantly influential in the model. The importance of the trawl survey to other species, including hake and ling, is the key reason the survey has continued.

7.4.3.2. Acoustic surveys

Acoustic surveys at regular cycles are employed to monitor hoki in the Cook Strait, and southern blue whiting during their respective spawning periods. In 2019, the survey of the hoki eastern spawning stock was expanded to include the Pegasus Canyon and Conway Trough spawning areas on the east coast of the South Island. This extension to the survey has continued in 2021 and after. The Cook Strait and Pegasus hoki acoustic survey is scheduled to be completed every two years. The main spawning area for the western hoki stock is off the west coast of the South Island. This survey has been completed irregularly in the past and there are no plans to carry out an acoustic survey for hoki on the west coast of the South Island in the near future.

Southern blue whiting mainly occurs in the Sub-Antarctic waters of New Zealand, with the largest stock found around Campbell Island (SBW 6I). A smaller stock is found around Bounty Island (SBW 6B). Southern blue whiting exhibit highly variable year-class strength and are characterised by episodic recruitment events. Stocks are therefore surveyed regularly, with an HCR for SBW 6B applied regular both to allow for utilisation of significant recruitment events, but also to respond when large year-classes leave the fishery or fish abundance declines suddenly. Surveys are planned for SBW 6B (annually) and SBW 6I (every third year). Timing, weather, and operational factors can mean that no usable biomass estimate is generated – as was the case for the SBW 6B stock in 2018, 2019, 2020 and 2021. Should the survey continue to be unsuccessful, consideration will be given to other monitoring approaches.

7.4.4. Digital monitoring

The current digital monitoring framework for the deepwater fleet comprises:

- ER - electronic reporting of catch, effort, protected species captures, and landing information; and
- GPR - electronic position reporting.

The Deepwater Info Portal, a digital system developed by the Deepwater Council (DWC) and Dragonfly Data Science, is available on trawlers and other vessels in the DWC for vessels to access protected species information and other documents, to:

- provide more relevant and easy-to-access information based on the fishery;
- replace paper-based systems with digital ones to save costs and avoid version issues; and
- enhance connectivity and communication between DWC and vessel.

The InfoPortal helps skippers, crew and vessel managers to maintain good environmental performance and improve efficiency. The InfoPortal has been rolled out across the deepwater trawl fleet.

7.4.5. Stock assessments

Stock assessments have been accepted to guide management for around 70% of Tier 1 (including hoki, hake, ling and southern blue whiting) deepwater fisheries (by both volume and value). Annual Fisheries Assessment Plenary reports, organised by fish stock, provide summaries of the available fisheries and scientific information and are in turn supported by 70–100 more detailed reports published on-line each year, with a cumulative total of almost 2000 such supporting, detailed documents. The plenary reports summarise fisheries, biological, environmental, stock assessment and stock status information for 83 of New Zealand's commercial fish species or species groups in a series of Science Working Group (SWG) or Plenary reports.

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Each species or species group is split into 1–10 stocks for management purposes. However, the boundaries of biological stocks often differ from the management boundaries. In general, biological stocks tend to occur at smaller scales than management boundaries, although in a few instances the reverse is true. Most stock assessments are conducted at biologically meaningful scales.

Science Working Group (SWG) and Plenary meetings have continued the effort to populate the Status of the Stocks summary tables, which are used to provide comprehensive summary information about current stock status and the prognosis for these stocks, to evaluate fisheries performance relative to the 2008 Harvest Strategy Standard for New Zealand Fisheries and other management measures, and to rank the quality of stock assessment inputs and outputs based on the 2011 Research and Science Information Standard for New Zealand Fisheries. Even when complete information is not available, it is sometimes possible to at least make scientifically sound statements about recent trends in stock size and fishing intensity levels.

Over time, continual improvements have been made in data acquisition, stock assessment techniques and the development of reference points to guide fisheries management decisions. SWG and Plenary meetings have continued the effort to populate the Status of the Stocks summary tables, which are used to provide summary information about current stock status and the prognosis for these stocks, to evaluate fisheries performance relative to the 2008 Harvest Strategy Standard for New Zealand Fisheries and other management measures, and to rank the quality of stock assessment inputs and outputs based on the 2011 Research and Science Information Standard for New Zealand Fisheries. Even when complete information is not available, it is sometimes possible to at least make scientifically sound statements about recent trends in stock size and fishing intensity levels.

The Plenary reports take into account the most recent data and analyses available to SWGs and Fisheries Assessment Plenary meetings, and also incorporate relevant analyses undertaken in previous years. Due to time and resource constraints, recent data for some stocks may not yet have been fully analysed by the SWGs or the Plenary. Table 9 lists the schedule for assessments of various hoki, hake, ling and southern blue whiting stocks

Table 9. Summary of the recent and planned assessments of the stocks.

	Before	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
HOK 1		Yes	Yes	Yes	Planned	Planned	Planned	Planned	Planned
HAK 1	2020/21				Planned			Planned	
HAK 4	2020/21								
HAK 7				Yes			Planned		
LIN 3&4		Yes			Planned			Planned	
LIN 5&6				Yes ¹			Planned		
LIN 7WC			Yes			Planned			Planned
SBW 6B				HCR ²	HCR ²	HCR ²	HCR ²	HCR ²	HCR ²
SBW 6I			Yes			Planned			Planned

1: First assessment to include LIN 6B; 2: Application of the HCR

The information needed to assess stock status relative to the limit and target reference points (ling, hake, and southern blue whiting) or the management target range (hoki), and to conduct projections are an estimate of recent abundance, B_{current} , an estimate of the unfished biomass B_0 , and estimates of recruitment. This information is obtained from quantitative stock assessments based on fitting population dynamics models to monitoring data. The stock assessment process is open to anyone who elects to participate. The process is managed by Fisheries New Zealand and supported by quota owners through DWG.

The review of stock assessments has been conducted primarily through meetings of the MPI Deepwater Fisheries Assessment Working Group, which consists of scientists from NIWA, MPI, representatives of environmental NGOs, and industry (FNZ, 2024b).

The objectives of the FNZ Assessment Working Groups (SWGs) are to:

1. review new research information on stock structure, productivity, abundance and related topics for each fish

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- stock/issue under the purview of individual Stock Assessment Working Groups;
2. where possible, derive appropriate MSY-compatible reference points for use as reference points for determining stock status, based on the Harvest Strategy Standard for New Zealand Fisheries;
3. conduct stock assessments or evaluations for selected fish stocks in order to determine the status of the stocks relative to MSY-compatible reference points and associated limits, based on the "Guide to Biological Reference Points for Fisheries Assessment Meetings", the Harvest Strategy Standard, and relevant management reference points and performance measures set by fisheries managers;
4. for stocks where the status is unknown, use existing data and analyses to draw logical conclusions about likely future trends in biomass levels and/or fishing mortality (or exploitation) rates if current catches and/or TACs/TACCs are maintained, or if fishers or fisheries managers are considering modifying them in other ways;
5. where appropriate and practical, conduct projections of likely future stock status using alternative fishing mortality (or exploitation) rates, or catches, or other relevant management actions, based on the Harvest Strategy Standard and input from the Stock Assessment Working Group and fisheries managers;
6. for stocks that are deemed to be depleted or collapsed, develop alternative rebuilding scenarios based on the Harvest Strategy Standard and input from the Stock Assessment Working Group and fisheries managers; and
7. for fish stocks for which new stock assessments or analyses are not conducted in the current year, review the existing Fisheries Assessment Plenary report text on the "Status of the Stocks" in order to determine whether the latest reported stock status summary is still relevant; else to revise the evaluations of stock status based on new data or analyses, or other relevant information.

The SWG process includes protocols for member and participation (FNZ, 2024b). The reports of Stock Assessment Working Groups are available through annual summaries, with the results of detailed analyses reported in Fishery Assessment Reports (FARs). The assessment process for hoki, hake, ling and southern blue whiting is conducted through the Deepwater Working Group. Participation in the SWGs is restricted to members of the Stock Assessment Working Groups, which consist of NIWA scientists, representative of Fisheries New Zealand, consultant scientists, industry and members of conservation NGOs. The possibility of external review of the stocks exist, and an external international review of hoki was conducted in 2017 by external reviewers from Australia, the USA, and South Africa. The NZ Plenary also include independent reviewers for some assessment (e.g. Alistair Dunn and Jim Roberts – hoki; Jim Roberts and Kevin Sullivan – ling).

The New Zealand stock assessment plenary identifies research tasks during its review of the stock assessments (the FNZ medium term research plan for deepwater fisheries also outlines potential research projects that involve methodological development). This section repeats some of the key research tasks identified by the plenary during 2024.

Hoki

- Continue development and review of the single stock model.
- Explore alternative spatial and movement hypotheses, including evidence for density-dependent movement from the Chatham Rise, spatial and temporal structure of the Sub-Antarctic fisheries, and separation of maturity from migration to the spawning grounds for the single stock and two stock models.
- Explore differences in Cook Strait acoustic catchability between models and how these relate to corresponding selectivity ogives.
- Explore combining the Chatham Rise and Sub-Antarctic fisheries within the models so as to simplify assumptions about migration or structure a series of sensitivities that explore different migration hypotheses to highlight plausible options.
- Conduct spatial and temporal analysis of age structure for the hoki fishery.

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- Explore environmental drivers of recruitment and the spatial distribution of the hoki stock.
- Explore spatial and temporal variability in length-weight relationships and growth by sex.
- Investigate the potential impacts on model results of mature fish not spawning every year.
- Investigate the appropriateness of age-based selectivity ogives shared by sex in non-spawning fisheries where growth rates vary by sex.
- Further investigate alternative M values and alternative implementations (e.g., length-based M) and assess appropriate values for sensitivity runs.
- Explore alternative model structures in conjunction with ways of making better use of fishery-dependent data (e.g., CPUE or industry-collected length data).
- Investigate the potential effects of cryptic mortality, focusing on years of high juvenile abundance where density-dependent effects may occur.
- Collect more and better quality abundance data including length frequencies, otoliths, and gonad stages from the Pegasus Canyon and surrounding areas. Any temporal or areal differences in the availability of hoki in the Cook Strait and Pegasus Canyon spawning fisheries could then be integrated into the model.
- Collect additional data (length-frequencies and otoliths) required to fill identified information gaps (e.g., otolith samples from the Sub-Antarctic and East Coast South Island, targeted sampling for larger vessels (40 to 46m) on the Chatham Rise and West Coast South Island-inside).

Hake

- Review historical ageing of hake to address the uncertainty seen in the 1990s.
- Review the age and length data for Sub-Antarctic hake in HAK1 and verify the estimated proportions at age for the commercial data, specifically for periods up to 2000. Explore the spatial-temporal structure of Sub-Antarctic hake in HAK1 and refine the best possible definitions of fisheries for this stock.
- Consider exclusion of the 2017 *Tangaroa* Sub-Antarctic trawl survey biomass estimate from future stock assessments of HAK 1, given that making adjustments to correct this estimate will introduce some undefinable uncertainty.
- Explore the linkage between HAK 7 and HAK 1, particularly the linkage to Puysegur.
- Consider novel options to address concerns regarding the West Coast South Island trawl survey coverage in relation to the HAK 7 stock, particularly the region south of the survey area where much of the commercial fishery takes place.
- Determine the optimal frequency or periodicity of *RV Tangaroa* surveys to monitor biomass and detect recruitment patterns (e.g., two consecutive surveys every 5 years, or one survey every 3 years), considering both costs and potential benefits.
- Continue development of spatio-temporal analyses to understand the length, age and sex structure of the West Coast South Island hake survey and commercial data using alternative spatial analyses, with consideration of seasonal spawning cycles and the timing of surveys.
- Consider development of spatial age-length relationships and the value of additional age data. Further evaluate ageing “outliers”.
- Explore potential climate impacts on spatial and temporal population dynamics and recruitment to the stock.
- Consider an assessment model that does not use an informed prior on the catchability for the *Tangaroa* survey.

Ling

- Revisit maturity ogives and biological parameters for all stocks.
- Apply updates in fishery definitions and fishery seasons to the ageing project.
- Obtain additional observer-collected length data and age readings to develop an age frequency and associated selectivity for the pot fishery in LIN 3&4, LIN 5&6, and LIN 7WC.
- Further investigate spatial-temporal standardisation of commercial and Chatham Rise survey data.
- Conduct further work on the most appropriate implementation of M for LIN 5&6 and LIN 6B.
- Collect more data to further explore the links between LIN 5&6 and LIN 6B.
- Conduct Ageing of the otoliths that were collected in Statistical Area 025 to better delineate the LIN 3&4 and LIN 5&6 stock.

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- Include the *Tangaroa* Sub-Antarctic trawl survey biomass estimate (but not age compositions) for 2016 future stock assessments for LIN 5&6 and LIN 6B.
- Investigate ways to monitor LIN 5 and LIN 6 separately to help inform management, including trawl survey data or spatial CPUE analysis
- Longline age frequencies are currently calculated based on data collected between May and August. However, most of the fishery and observer data collection happens at other times of the year. The sampling of length and ages to estimate age frequencies should be reevaluated and sampled at more appropriate times of the year.
- Determine how to best represent mean weights-at-age in the projections for SBW 6l given the negative relationship between year-class strength and growth.
- Update the HCR for the Bounty Plateau stock to account for catch being above or below the TACC. Explicit allowance within the HCR for a minimum catch for surveys should also be evaluated; this would require a revised simulation approach because risk is currently estimated without reference to absolute catch levels.

Target stocks (HOK, HAK, LIN)

Section 10.1.1.1 of this report provides species summaries for the target stocks and section 10.1.1.3 provides a summary of the assessments by UoA.

Tier 2 stocks

Tier 2 species and stocks are typically less valuable bycatch fisheries or are only target fisheries at certain times of the year. Because of the nature of these fisheries, Tier 2 fisheries are often data limited making full stock assessments problematic. The abundance of Tier 2 stocks may be monitored using a number of approaches including stock assessment, CPUE indices, age and/or size structure, and trawl survey indices. Reviews of stock status for Tier 2 stocks are primarily undertaken based either on significant changes in catch volume (e.g. decrease in bycatch in another target fishery suggesting a potential sustainability issue or an increase suggesting an increase in abundance), or when specific concerns are raised by stakeholders. In addition, trends in the bycatch of Tier 2 (and non-QMS) species and stocks will continue to be monitored through bycatch reports prepared through the Aquatic Environment research stream, and the three wide area multi-species trawl surveys.

7.4.6. Aquatic Environment specific to Deepwater

Under the Fisheries Act 1996, significant adverse impacts on the aquatic environment should be avoided, remedied, or mitigated. In addition, the biological diversity of the aquatic environment must be maintained. Drivers of research in this area also include the National Plan of Action (NPOA)-Seabirds, NPOA-Sharks, Threat Management Plan (TMP) for New Zealand Sea Lions and TMP for Hector's and Maui Dolphins.

Projects to monitor impacts of fisheries on the aquatic environment are planned and contracted through the Aquatic Environment research planning process. Fisheries New Zealand is currently developing a multi-year research plan for Aquatic Environment Research which will be incorporated to the MTRP when completed.

Some information is available to assess the nature and extent of any adverse effects on the marine environment on a case by case basis, and data to support the estimation of effects from fishing is limited to areas with high observer coverage and those issues with a high public profile. Over the past few years, stock-specific plenary reports have included sections on environmental and ecosystem considerations that have been developed for some species by the SWGs that oversee aquatic environment and biodiversity issues associated with New Zealand fisheries and the ocean environment in which they reside. Chapter sections on how ocean warming, ocean acidification and other ecosystem trends affect, for example, productivity and fish distributions will be incorporated as new information becomes available (see species summaries in Section 10.1.1.1).

Data and information collection is prioritised to reduce uncertainty in formal, quantitative risk assessments for protected species, and to provide information on issues where there is public interest in of risks from fishing to the aquatic environment. Implementation of a risk-based approach has enabled prioritisation of areas on which to focus mitigation or data collection efforts.

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The Aquatic environment and biodiversity annual review ([AEBAR, 2021](#)) last updated in 2021, with Chapter 10 chondrichthyans updated 2024, primarily addresses interactions between the seafood sector, biodiversity, and the aquatic environment. The AEBAR is supported by more detailed reports and science papers published on-line each year. The information contained within the AEBAR informs decision-making in Fisheries New Zealand. The AEBAR is organised by topic (e.g., protected species, bycatch, benthic impacts, etc.), and almost all topics involve more than one fish stock or fishery.

Fisheries New Zealand Science Working Groups contribute substantially to the AEBAR. These are primarily the Aquatic Environment Working Group (AEWG), the Antarctic Working Group (ANTWG), and the Biodiversity Research Advisory Group (BRAG). Over time, relationships with industry, recreational, and environmental interests have been developed through the working groups and it has become expedient to finalise AEBAR chapters through the Science Working Group processes. The AEBAR 2021 was led by the Science Group within the Directorate of Fisheries Science and Information in Fisheries New Zealand.

Research and science standards and the terms of reference for each working group have been developed to ensure a high quality and consistent peer review process. A wide variety of relevant, peer-reviewed research that has not been contracted through Fisheries New Zealand is summarised in the AEBAR. This work is included only when it meets the [Fisheries New Zealand Research and Science Information Standard](#).

8. Assessment results overview

8.1. Determination

Following this assessment team's work, and review by stakeholders and peer-reviewers, and no objection, the determination is that this fishery has passed its assessment and should be certified. This has been confirmed by LRQA's decision making entity.

8.2. Principle level scores

To be drafted at Client and Peer Review Draft Report stage

The CAB shall include in the report the scores for each of the three MSC principles in the table below.

Reference(s): FCP v3.1 Section 7.15

Table 10: Principle level scores

Principle	UoA 1	UoA 2	UoA 3	UoA 4	UoA 5	UoA6	UoC 7	UoA8	UoA9	UoA10
Principle 1: Target species	91.7	95.0	94.2	94.2	90.8	94.2	94.2	94.2	94.2	94.2
Principle 2: Ecosystem impacts	91.3	91.3	91.3	91.3	91.3	91.3	91.3	91.3	91.3	91.3
Principle 3: Management system	96.3	96.3	96.3	96.3	96.3	96.3	96.3	96.3	96.3	96.3

Summary of Performance Indicator level scores

The CAB shall include in the report a completed copy of the Fishery Assessment Scoring Worksheet.

Table 11. Fishery Assessment Scoring worksheet

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Principle	Component	Performance Indicator (PI)		UoA 1	UoA 2	UoA 3	UoA 4	UoA 5	UoA 6	UoA 7	UoA 8	UoA 9	UoA 10
One	Outcome	1.1.1	Stock status	90	100	100	100	90	100	100	100	100	100
	Management	1.2.1	Harvest strategy	95	95	95	95	95	95	95	95	95	95
		1.2.2	Harvest control rules & tools	95	95	95	95	95	95	95	95	95	95
		1.2.3	Information & monitoring	85	85	85	85	85	85	85	85	85	85
		1.2.4	Assessment of stock status	95	95	90	90	90	90	90	90	90	90
Two	In-Scope species	2.1.1	Outcome	90	90	90	90	90	90	90	90	90	90
		2.1.2	Management strategy	85	85	85	85	85	85	85	85	85	85
		2.1.3	Information/Monitoring	90	90	90	90	90	90	90	90	90	90
	ETP/Out of Scope Species	2.2.1	Outcome	100	100	100	100	100	100	100	100	100	100
		2.2.2	Management strategy	95	95	95	95	95	95	95	95	95	95
		2.2.3	Information/Monitoring	95	95	95	95	95	95	95	95	95	95
	Habitats	2.3.1	Outcome	100	100	100	100	100	100	100	100	100	100
		2.3.2	Management strategy	90	90	90	90	90	90	90	90	90	90
		2.3.3	Information strategy	100	100	100	100	100	100	100	100	100	100
	Ecosystem	2.4.1	Outcome	80	80	80	80	80	80	80	80	80	80
		2.4.2	Management strategy	80	80	80	80	80	80	80	80	80	80
		2.4.3	Information	90	90	90	90	90	90	90	90	90	90
Three	Governance and policy	3.1.1	Legal &/or customary framework	100	100	100	100	100	100	100	100	100	100
		3.1.2	Consultation, roles & responsibilities	100	100	100	100	100	100	100	100	100	100
		3.1.3	Long term objectives	100	100	100	100	100	100	100	100	100	100
	Fishery specific management system	3.2.1	Fishery specific objectives	90	90	90	90	90	90	90	90	90	90
		3.2.2	Decision making processes	90	90	90	90	90	90	90	90	90	90
		3.2.3	Compliance & enforcement	100	100	100	100	100	100	100	100	100	100
		3.2.4	Monitoring & management performance evaluation	90	90	90	90	90	90	90	90	90	90

The MSC Fisheries Standard Toolbox was used in the reassessment.

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Evidence required framework was applied to

- P1 1.2.1 SI (e).
P2 2.2 SI (d) 2.1.3 SI (a) 2.1.3 SI (b) 2.2.3 SI (a) 2.3.2 SI (c) 2.3.3 SI (b)
P3 3.2.3 SI (c)

8.3. Summary of conditions

There are no conditions raised at this reassessment

8.3.1. Recommendations

To be drafted at Client and Peer Review Draft Report stage

Principle 2

Recommendation (#1) Sharp (2025) updated cryptic mortality multipliers used in the Edwards et al 2023 Seabirds SEFRA, parcelled out the mortality attributable to the trawl UoAs under assessment and used updated observer data from the most recent 5-year period accounting for improvements in reporting and seabird bycatch mitigation measures. Sharp (2025) focused on the three most at risk species: southern Buller's albatross, Salvin's albatross and white-capped albatross. It is Recommended that a similar approach is applied to the balance of the seabird species that interact with the trawl UoAs.

Recommendation (#2) The fishery client conduct a spatial assessment of the degree of overlap of the trawl UoAs with each of the 9 bioregions identified by Stephenson et al 2023, following a similar assessment approach as applied by MacGibbon & Mules, 2023.

Recommendation (#3) The fishery review and collate available research trawl information/data that may be used to provide up to date determinations of changes to key ecosystem indicators.

Principle 3

Recommendation (#4) Progress on the update to the fishery specific chapters are to be completed. Progress to be provided at each surveillance audit

Recommendation (#5) Progress on an external review of the fishery specific management system is provide. . Progress to be provided at each surveillance audit

9. Traceability and eligibility

9.1. Eligibility date

The **Eligibility Date** for this assessment is the recertification date, 6th February 2026

9.2. Traceability within the fishery

To be drafted for the Client and Peer Review Draft Report

Reference(s): FCP v3.1 7.17.1 and 7.17.6 a-d

Table 12: Traceability within the fishery

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Statement on fishery's ability to track and trace to each Unit of Certification
Systems allow the fishery client to track to trace any fish or fish products sold as MSC certified back to the individual UoC.
Movement of fish and fish product between harvest and landing <i>An illustration of movement of product between harvest and landing. Include when any of the following happen: Harvesting, At-Sea processing, Translocation, Transshipment, Offloading, Landing.</i> Factory vessels are equipped with fully integrated weighing and labelling systems in which every carton is barcoded on production and before storage in the hold. This system allows non-certified product to be barcoded as non-certified and to be trackable and separable by scanning at any subsequent stage. In port, vessel product data are reconciled with landing figures to arrive at a final inventory. Fresher vessels land their fish whole, and standard practice involves all fish bins being labelled as per MPI and NZFSA requirements. These outer markings are used to separate and inventory all product on landing. There is no transshipment.
Movement of fish and fish products between landing and start of the CoC if relevant. <i>An illustration of movement of product between landing and start of CoC. Include when any of the following is happening: Transport, Storage, Sorting/ Grading, Packing, Auction.</i>
Description of any processing and sorting/ grading prior to change of ownership
All fish and fish product is landed to Licenced Fish Receivers (LFR) who hold Chain of Custody certification requiring strict, approved procedures to ensure certified and non-certified products are separately stored and are identifiable as certified or non-certified throughout the landing, processing, storage and transportation stages. In addition, MPI regulations require all packaged fish on a LFR's premises to be labelled such that the species name, date of landing, LFR name, processed state and area caught are clearly displayed. The process is considered to be well managed.
For the critical tracking events (i.e. where in the product flow this data needs to be transferred) of all fish and fish product handling and sale not covered by CoC describe: • Process of segregating to each Unit of Certification • Key data elements (i.e. the data or documents to identify the UoC such as species, catch area, gear)
Existing fisheries management requirements include the clear identification of species, quantity, fishing method and area of capture by all vessels landing fish from the fishery. All catches are reported in logbooks and in catch and effort landing returns. On-board observer coverage also monitors, cross checks and verifies catches and landings with the vessel's logbook. Cross referencing of VMS data with logbooks, observer and aerial and at-sea surveillance reports also ensures that fish is reported from the correct area of capture. All landings are monitored by a dockside monitoring program. Vessels must advise MPI before landing and may be subject to monitoring by enforcement officers.
Where there are IPI stock(s) within the scope of certification, describe the verification of traceability systems
NA
Other relevant information on the systems to track and trace to each UoC
Where there is potential for mixing, these risks are managed by the operators who have their own protocols in place to separate these catches. They are legally required to record in catch and effort logbooks catch weight by position, and method, as well as on the official catch landing form. Further, the operators have their own internal reporting systems that record the date and time of fishing activities against the packaged product (if processed).

9.3. Traceability risks and mitigations

Table 13: Traceability risks and mitigation within the fishery

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Factor	Description of the traceability risk factors and details of the risk mitigation and management <i>Include in each description:</i> • Whether each factor occurs • When it occurs and how frequently (e.g. regularly, seasonally, rarely) • How any potential traceability risks are mitigated and any risk management • If covered by information provided elsewhere in the assessment report (such as table 9 for segregation or in section 5 MSC Fisheries Standard – Principle 3 – Effective management for regulatory frameworks), cross reference as needed.
Will the fishery use gears that are not part of the UoC? If Yes, include in the description: • If this may occur on the same trip, on the same vessels, or during the same season; • How any risks are mitigated.	No. The fisheries only use trawl gear
Will vessels in the UoC also fish outside the UoC geographic area? If Yes, include in the description: • If this may occur on the same trip; • How any risks are mitigated.	New Zealand vessels do not fish for hoki, hake and ling outside New Zealand's EEZ. The processes and procedures for reporting and landing fish in New Zealand will ensure that ling caught in geographic area LIN2 (lower east coast North Island and Cook Straight) are never sold as MSC-certified. If a vessel were fishing outside the UoC there are systems in place to record that fact. All factory trawlers in New Zealand are operating under New Zealand Food Safety Authority (NZFSA) and New Zealand Fisheries Act rules and regulations. As such, they are required to both land all catch of QMS species (such as hoki, hake and ling) and ensure that any fish that will not be fit for human consumption, e.g. through damage or accidental contamination, is not able to be inadvertently sold into market.
Do vessels from outside the UoC and/or client group ever fish on the same stock?	NZ Seafood, DWC represents quota owners who own the majority (~90%) of the allowable catch for each of the UoCs. For those not a part of the DWC, they are required to have a certificate sharing agreement.
Do the fishery client members ever handle certified and non-certified products during any of the activities covered by the fishery certificate? This refers to both at-sea activities and on-land activities and should reflect those listed in product movement in Table 9. It includes: • Translocation • Transshipment • Transport • Storage • Processing	Existing fisheries management requirements include the clear identification of species, quantity, fishing method and area of capture by all vessels landing fish from the fishery. All catches are reported in logbooks and in catch and effort landing returns. On-board observer coverage also monitors, cross checks and verifies catches and landings with the vessel's logbook. Cross referencing of VMS data with logbooks, observer and aerial and at-sea surveillance reports also ensures that fish is reported from the correct area of capture. All landings are monitored by a dockside monitoring program. Vessels must advise MPI before landing and may be subject to monitoring by enforcement officers. Where there is potential for mixing, these risks are managed by the operators who have their own protocols in place to separate these catches. They are legally required to record in catch and effort logbooks catch weight by position, and method, as well as on the official catch landing form. Further, the

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Factor	Description of the traceability risk factors and details of the risk mitigation and management <i>Include in each description:</i> • Whether each factor occurs • When it occurs and how frequently (e.g. regularly, seasonally, rarely) • How any potential traceability risks are mitigated and any risk management • If covered by information provided elsewhere in the assessment report (such as table 9 for segregation or in section 5 MSC Fisheries Standard – Principle 3 – Effective management for regulatory frameworks), cross reference as needed.
• Sorting/ grading • Packing • Landing • Auction	operators have their own internal reporting systems that record the date and time of fishing activities against the packaged product (if processed)
Does transhipment occur within the fishery? If yes, include in the description: • What is the type of transhipment in-port/ high seas/ other • What are the systems used to track and trace to UoC For high seas transhipment include in the description how the systems to track and trace to the UoC: • Are verified independently of the fishery client • Cover all fishing and receiving vessels involved in transhipment • Apply to all transhipment events If any of these 3 criteria above are not met for high seas transhipment CoC certification is required for both the fishing and receiving vessels involved in this transhipment.	There is no transhipment of catches at sea within the EEZ by New Zealand vessels If there was any doubt whether hoki hake or ling landed into an LFR is from a certified fishery the product is treated as non-certified. No transhipments have occurred in New Zealand waters in recent years and any transhipment requires the presence of fisheries officers or government observers
Are trading agents to be covered within the fishery certificate? If yes, include in the description: • How information on UoC is passed through	No

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Factor	Description of the traceability risk factors and details of the risk mitigation and management <i>Include in each description:</i> • Whether each factor occurs • When it occurs and how frequently (e.g. regularly, seasonally, rarely) • How any potential traceability risks are mitigated and any risk management • If covered by information provided elsewhere in the assessment report (such as table 9 for segregation or in section 5 MSC Fisheries Standard – Principle 3 – Effective management for regulatory frameworks), cross reference as needed.
Are there any other risks of mixing or substitution between certified and non-certified fish? If No, refer to the section describing product movement and segregation which demonstrates this.	No. Factory vessels are equipped with fully integrated weighing and labelling systems in which every carton is barcoded on production and before storage in the hold. This system allows non-certified product to be barcoded as non-certified and to be trackable and separable by scanning at any subsequent stage. In port, vessel product data are reconciled with landing figures to arrive at a final inventory. Fresher vessels land their fish whole, and standard practice involves all fish bins being labelled as per MPI and NZFSA requirements. These outer markings are used to separate and inventory all product on landing
Are there any other risks of mixing between different Units of Certification? If Yes, include in the description: • link to any relevant variations relating to this If No, refer to the section describing product movement and segregation which demonstrates this.	No. All fish and fish product is landed to Licenced Fish Receivers (LFR) who hold Chain of Custody certification requiring strict, approved procedures to ensure certified and non-certified products are separately stored and are identifiable as certified or non-certified throughout the landing, processing, storage and transportation stages. In addition, MPI regulations require all packaged fish on a LFR's premises to be labelled such that the species name, date of landing, LFR name, processed state and area caught are clearly displayed. The process is considered to be well managed.

9.4. Eligibility to enter further chains of custody

Table 14: Eligibility to enter Chain of Custody

Determination on whether fish and fish products from the certified UoC(s) can go onto be sold as certified. Including: • Whether the ability for fish and fish products to be sold as certified is conditional upon CoC certification; • If traceability systems still need to be established prior to either CoC certification OR revised fishery determination.
Delete as appropriate: • It is determined that fish and fish products from the certified Units of Certification can go onto be sold as certified.
The point of change of ownership of product to any party not covered by the fishery certificate and detail of any trading between client group members prior to this
The scope of this certification ends at the points of landing. Downstream certification of the product would require appropriate certification of storage and handling facilities at these locations.

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The point from which subsequent Chain of Custody (CoC) is required
<i>The latest this can happen is the point of change of ownership of fish or fish product to any party not covered by the fishery certificate (reference section above) but it may happen sooner in which case describe as per the product flow (in table 9). Note the requirement for when CoC is required to start on High Seas Transshipment.</i>
In order for subsequent links in the distribution chain to be able to use the MSC logo, hoki, hake and ling products must enter into a separate chain of custody certification from the point of landing forward
The entities, or categories of entities, at the point of landing and/or sale required to have separate CoC including any auctions, selling agents, offloaders or storage facilities and so not covered in the tables above
The subsequent links must be able to prove that they can trace hoki, hake and ling products back to the permitted vessels which landed the product. The main points of landing for this fishery are all major New Zealand ports
A list of entities, or categories of entities, eligible to access the certificate and sell product as certified including: • <i>Confirm if all vessels within the geographic area and gear of the UoC are eligible to sell fish and fish products as certified</i> • <i>Any other limits to vessel types, ownership, client group membership</i> • <i>Include any trading agents used</i>
The eligible parties to use the fisheries certificate are shareholders of the NZ Seafood Deepwater Council. DWC represents quota owners who own the majority (~90%) of the allowable catch for each of the UoCs. Anyone who owns hoki, hake or ling quota has the opportunity to become a DWC shareholder. Those not a part of the DWC are required to have a certificate sharing agreement. Traceability of fishing activity within New Zealand is largely provided by the statutory requirements to record and report estimated catches in near-real-time via the Ministry's Electronic Reporting (ELR) system and through the Ministry's monitoring and compliance programmes. All vessels in the UoAs are equipped with Geospatial Position Reporting (GPR) equipment as well as being subject to monitoring by MPI observers and fisheries enforcement officers. Extensive record keeping is required for reporting landings and processing activity and this information is reported electronically to MPI. Fishing beyond the New Zealand EEZ requires special permitting prior to the activity of fishing and MPI observers on board during fishing operations. All EEZ and high seas fishing activities must be reported to MPI. No transshipment or motherships are used and no change of ownership of any orange roughy (raw or finished product) occurs prior to landing
Points of landing, auctions or other transfer which may be used for the sale of fish from the certified fishery into further chains of custody, either: • <i>The geographic region where all landing points are possible, or</i> • <i>Named landing points, auctions or other transfer sites if there are limits</i>
The ports of landing where the listed species were landed

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HOKI	HAKE	LING
Nelson	Timaru	Nelson
Timaru	Nelson	Timaru
Picton	Dunedin	Dunedin
Lyttleton	Lyttleton	Bluff
Dunedin	Bluff	Lyttleton
Greymouth	Greymouth	Greymouth
Wellington	Westport	Napier
Bluff	Picton	Jacksons Bay
Westport		Picton
Tauranga		Wellington
Napier		Westport
Gisborne		Kaikoura
Greywater		Careys bay
Auckland		Christchurch
Paramata		Waitangi
Kaikoura		South Bay
Onehunga		
Whangarei		

Any specific eligibility criteria for product to be sold as certified, or where to find this information where relevant, including:

- *Product form*
- *Trip type (e.g. includes outside EEZ)*
- *Need for Chain of Custody*
- *Need for trading through client group members*

NA

How fish or fish products can be identified or can be confirmed as certified at the point it enters certified CoC, including:

- *How information on gear, species, stock, area, vessel (where relevant) client group member (where relevant) is provided*
- *Any segregation to UoC required of first buyers (e.g. sort batches by species)*
- *Where relevant how any specific eligibility criteria can be confirmed by the first buyer (as per section above)*

Existing fisheries management requirements include the clear identification of species, quantity, fishing method and area of capture by all vessels landing fish from the fishery. All catches are reported in logbooks and in catch and effort landing returns. On-board observer coverage also monitors, cross checks and verifies catches and landings with the vessel's logbook.

Cross referencing of VMS data with logbooks, observer and aerial and at-sea surveillance reports also ensures that fish is reported from the correct area of capture. All landings are monitored by a dockside monitoring program. Vessels have to advise MPI before landing and may be subject to monitoring by enforcement officers. All fish and fish product is landed to Licenced Fish Receivers (LFR) who hold Chain of Custody certification requiring strict, approved procedures to ensure certified and non-certified products are separately stored and are identifiable as certified or non-certified throughout the landing, processing, storage and transportation stages. In addition, MPI regulations require all packaged fish on a LFR's premises to be labelled such that the species name, date of landing, LFR name, processed state and area caught are clearly displayed. The process is considered to be well managed.

How IPI is identified to first buyers at the point it enters certified CoC where relevant

NA

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9.5. Eligibility of Inseparable or Practicably Inseparable (IPI) stock(s) to enter further chains of custody

No IPI stocks

10. Scoring

10.1. Principle 1

10.1.1. Principle 1 background

10.1.1.1. Species background

10.1.1.1.1. Hoki

Biology and ecological role

Hoki belong to the Merlucciidae family (hakes) and are distributed throughout New Zealand from 34°S to 54°S and from 10 – 900+m, with the greatest abundance between 200 and 600m. Large adult hoki are found in deeper waters (>400m), with juveniles more abundant in shallower water. Small hoki (<30cm) appear to be absent from areas with bottom temperatures above 15°C and are observed most frequently at 13-14°C. Adults prefer cooler temperatures of about 6-10°C (Dunn et al., 2022)

There are two main spawning grounds for hoki in New Zealand (West Coast South Island, WCSI, and Cook Strait, CS), with the main spawning area off the WSCI located in the Hokitika Canyon and in the Cook Strait Canyon in CS. The fish that spawn in those two spawning grounds are considered separate stocks based on geographical separation as well as due to morphometric differences between fish on the Chatham Rise and in the Sub-Antarctic area. However, to date no genetic differences have been detected with neutral markers (Smith et al., 1981, 1996), but as noted by FNZ (2024), a low exchange rate would reduce genetic differentiation.

Figure 2 provides a conceptual overview of the distribution and movement of the two stocks. Spawning occurs from late-June to mid-September, although spawning has occurred during early June off the WSCI in recent years. Eggs and larvae are distributed widely so that 0+ and 1-year-old fish can be found in most coastal areas of the South Island and parts of the North Island. The major nursery ground for juvenile hoki aged 2-4 years is along the CR, in depths of 200-600m. Old fish disperse to deeper water and are widely distributed in the Sub-Antarctic (SA) and on the CR. A significant proportion of hoki move from the CR to the SA as they approach maturity, with most movement between 3 and 7 years of age.

Hoki live to between 20 and 25 years. Growth is rapid, with juveniles reaching about 27-35cm at the end of their first year, and there is some evidence for time-variation in growth rates. The growth rate is sex-specific after maturation, with females reaching a larger size than males.

Hoki is the species with the highest biomass in the bottom fish community of the upper slope (200-800m), particularly around the South Island and is considered to be a key biological component of the upper slope ecosystem. Hoki prey primarily on lanternfish and other midwater fishes and natant decapods on the Chatham Rise (Clark, 1985a, b; Dunn et al., 2009; Connell et al., 2010; Stevens et al., 2011). The diet changes ontogenetically, with larger hoki (>80cm) consuming proportionally more fish and squid than smaller hoki. Hoki are prey to several piscivores, particularly hake, but also stargazers, smooth skates, and several deepwater sharks, and ling (Dunn et al., 2009). Hoki are also key prey for New Zealand fur seals off the WCSI and New Zealand sea lions at the Auckland Islands (Boren, 2010; Meynier et al., 2009), with some evidence that annual pup survivorship of New Zealand sea lions at the Auckland Islands depends on the local availability of hoki.

The link between climate, oceanographic conditions, and hoki population dynamics, including recruitment is still not well understood, although Roberts et al. (2022) found a correlation between mixed layer depth and Sea Surface Temperature, with year-class strengths for the eastern (but not western) stock. An evaluation of the sensitivity and exposure of hoki to climate change-associated threats is given in Cummings et al. (2021), with hoki vulnerability assessed to be 'low', although Brooks (2020) predicted, using ecological niche models, that hoki habitat would contract

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to the south Chatham Rise and sub-tropical convergence zone around southern New Zealand, and be lost from the WCSI under more extreme climate change scenarios.

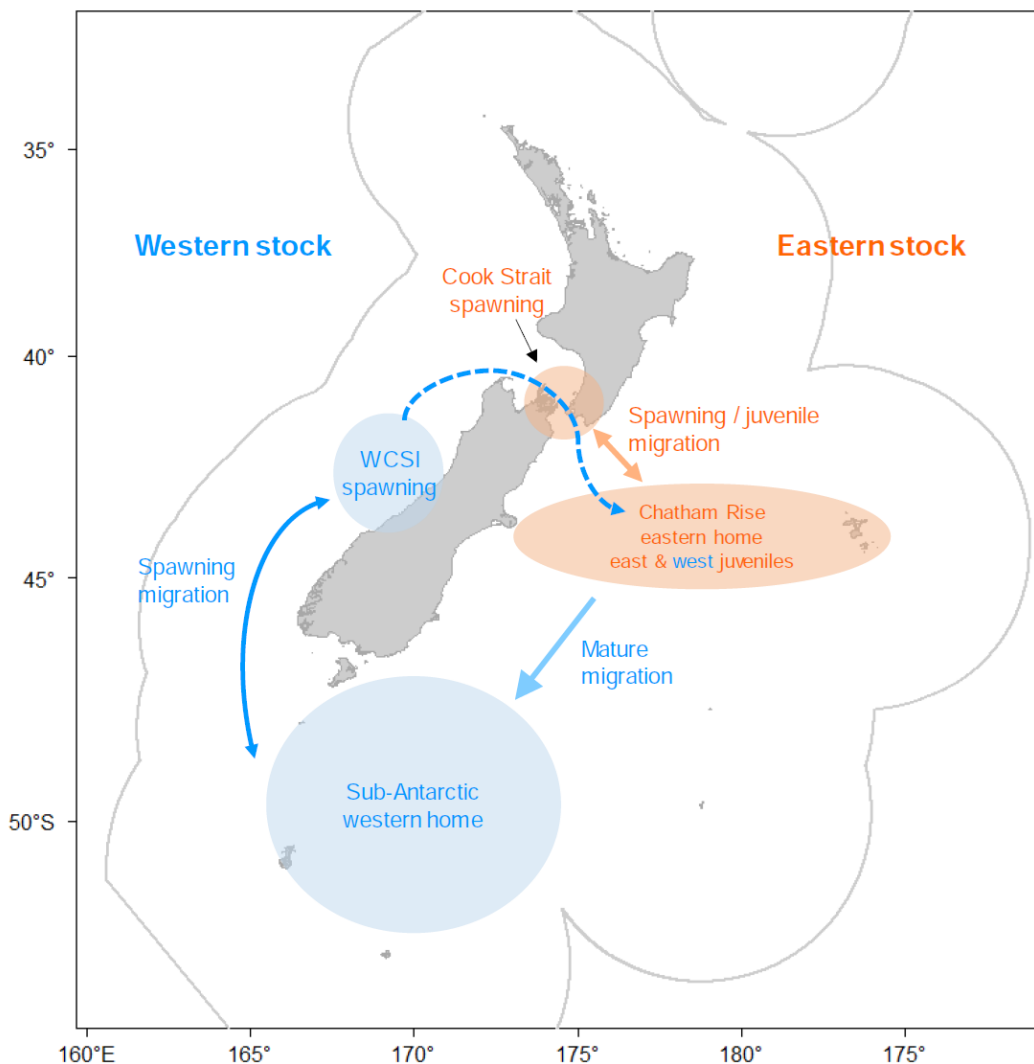


Figure 2. Hoki juvenile nurseries, spawning grounds, and assumed migration routes for the eastern and western stocks. (Source: FNZ, 2024).

Fisheries

Hoki are caught by trawling all around New Zealand and are most common in CS and off the WCSI during the winter spawning season. They are fished on the CR and in the south on the Campbell Plateau at other times of the year.

Historically, the main fishery for hoki operated from mid-July to late-August off the WCSI around the Hokitika Canyon. The second spawning fishery started in 1988 in CS. This fishery occurs from late-June to mid-September. Spawning hoki are also taken from spawning grounds off the east coast of the South Island (ECSI) and Puysegur Bank. Outside of the spawning season, major fisheries operate on the CR and in the SA. Out-of-season catches are taken from CS and the east coast of the North Island.

The fishery started in the early 1970s with foreign vessels (Table 15). From 1986 to 1990 surimi vessels dominated the fishery. However, the surimi component of the fishery decreased and processing to head and gut, or fillet product increased after 1991, as did “fresher” catch for shore processing. Since 1998 twin-rigging rigs have operated in some

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hoki fisheries, and trawls made of spectra twine were introduced to some vessels during the 2007-08 fishing year. Approval to use a Modular Harvest System was approved in 1998. The use of this system peaked during the 2018-19 fishing year, but usage is much reduced at present given the current preference for block product and unavailability of materials for MHS codends.

Vessels larger than 46m in overall length may not fish inside the 12nm Territorial Sea, and there are other vessel size limits. On the WSCI, a 25-nm line closes much of the hoki spawning area in the Hokitika Canyon, and most of the area south to Cook Canyon, to vessels larger than 46m overall length. In CS, the whole spawning area is closed to vessels over 46m overall length. Bottom trawling is closed in 17 Benthic Protection Areas.

Operational Procedures introduced by the fishing industry in 2009 aim to manage and monitor fishing effort within four industry Hoki Management Areas, where there are thought to be high abundances of juvenile hoki (Narrows Basin of CS, Canterbury Banks, Mernoo Bank, and Puysegur). These areas are closed to trawlers over 28m targeting hoki, with increased monitoring when targeting species other than hoki. There is also a general recommendation that vessels move from areas where catches of juvenile hoki (now defined as shorter than 55cm total length) comprise more than 20% of the hoki catch by number. There have been seasonal spawning area closures in the past (FNZ, 2024), but none were in place for the 2022-23 fishing season.

Table 15. Reported trawl catches (t) by fleet from 1969 to 1987-88 - 1969-1983 by calendar year, 1983-84 to 1987-88 by fishing year (Oct-Sept). (Source: FNZ, 2024).

Year	USSR	Japan	South Korea	New Zealand		Total
				Domestic	Chartered	
1969	–	95	–	–	–	95
1970	–	414	–	–	–	414
1971	–	411	–	–	–	411
1972	7 300	1 636	–	–	–	8 936
1973	3 900	4 758	–	–	–	8 658
1974	13 700	2 160	–	125	–	15 985
1975	36 300	4 748	–	62	–	41 110
1976	41 800	24 830	–	142	–	66 772
1977	33 500	54 168	9 865	217	–	97 750
1978*	2 028†	1 296	4 580	678	–	8 581
1979	4 007	8 550	1 178	2 395	7 970	24 100
1980	2 516	6 554	–	2 658	16 042	27 770
1981	2 718	9 141	2	5 284	15 657	32 802
1982	2 251	7 591	–	6 982	15 192	32 018
1983	3 853	7 748	137	7 706	20 697	40 141
1983–84	4 520	7 897	93	9 229	28 668	50 407
1984–85	1 547	6 807	35	7 213	28 068	43 670
1985–86	4 056	6 413	499	8 280	80 375	99 623
1986–87	1 845	4 107	6	8 091	153 222	167 271
1987–88	2 412	4 159	10	7 078	216 680	230 339

Table 15 and Table 16 list the catches before and after the 1987-88 season respectively. The pattern of fishing has changed markedly since the 1988-89 fishing season, when over 90% of the total catch was taken in the WSCI spawning fishery. The WSCI fishery accounted for 29% of the total catch during 2022-23, with the CR fishery now being the largest (35%). There was a redistribution of catch from eastern stock areas (CR, ECSI, ECNI, and CS) to western stock areas (WSCI, Puysegur and the SA) from 1999-2000 to 2001-2002.

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Table 16. Estimated total catch (t) of hoki by area 1988-89 to present. Catches from 1988-89 to 1997-98 are rounded to the nearest 500 t and catches from 1998-99 to present are rounded to the nearest t. Unrep. is catch with no location information. (Source: FNZ, 2024).

Year	Spawning fisheries					Non-spawning fisheries			Unrep.	Total Catch
	WCSI	Puysegur	Cook Strait	ECSI	Sub-Antarctic	Chatham and ECSI	ECNI	WCNI		
1988-89	188 000	3 500	7 000	—	5 000	5 000	—	—	—	208 500
1989-90	165 000	8 000	14 000	1 058	10 000	12 388	—	—	—	210 000
1990-91	154 000	4 000	26 500	2 574	18 000	28 910	—	—	—	215 000
1991-92	105 000	5 000	25 000	2 541	34 000	46 548	—	—	—	215 000
1992-93	98 000	2 000	21 000	1 050	26 000	43 446	2 000	—	3 000	195 000
1993-94	113 000	2 000	37 000	1 547	12 000	21 663	2 000	—	1 000	191 000
1994-95	80 000	1 000	40 000	3 192	13 000	35 815	1 000	—	—	174 000
1995-96	73 000	3 000	67 000	3 659	12 000	46 285	3 000	—	2 000	210 000
1996-97	91 000	5 000	61 000	5 038	25 000	52 399	5 000	—	1 000	246 000
1997-98	107 000	2 000	53 000	4 579	24 000	74 094	4 000	—	3 000	269 000
1998-99	94 565	2 874	45 240	3 237	23 780	71 700	2 315	62	134	244 540
1999-00	102 723	2 880	43 192	4 080	33 772	54 282	1 387	98	4	242 421
2000-01	102 235	6 798	36 298	4 759	30 076	47 042	2 035	147	—	229 847
2001-02	92 720	5 322	23 976	5 485	30 175	36 637	1 147	39	—	195 501
2002-03	73 860	5 948	36 713	9 812	20 199	36 659	929	532	8	184 662
2003-04	45 112	1 158	41 034	7 821	11 635	27 969	880	126	—	135 735
2004-05	33 111	5 548	24 833	4 827	6 244	29 090	522	37	—	104 212
2005-06	38 989	1 437	21 803	2 148	6 732	32 575	686	8	—	104 378
2006-07	33 328	408	20 113	2 967	7 661	35 851	667	8	—	101 004
2007-08	20 931	308	18 470	5 294	8 708	34 949	640	17	—	89 317
2008-09	20 548	233	17 535	3 480	9 807	36 585	588	25	—	88 801
2009-10	36 349	272	17 880	1 943	12 275	37 864	618	7	—	107 208
2010-11	48 373	1 176	14 937	2 157	12 655	37 915	1 588	2	—	118 803
2011-12	54 532	1 308	15 859	4 405	15 743	37 372	858	31	—	130 108
2012-13	56 219	955	19 396	5 445	14 098	34 402	1 051	9	—	131 575
2013-14	69 400	778	18 400	3 613	19 927	32 889	1 326	9	—	146 342
2014-15	78 705	1 875	20 100	4 250	16 378	39 444	766	11	5	161 535
2015-16	68 877	1 056	18 378	5 311	6 639	35 530	888	20	—	136 698
2016-17	65 962	1 209	16 084	5 440	13 157	38 957	826	6	—	141 568
2017-18	55 533	1 133	21 473	4 924	15 431	35 779	1 141	4	—	135 418
2018-19	46 464	1 268	20 349	10 605	9 061	33 533	1 177	4	—	122 459
2019-20	43 927	349	16 909	9 658	8 039	28 011	844	6	—	107 735
2020-21	35 142	448	12 524	9 655	9 136	33 161	746	7	—	100 819
2021-22	31 559	566	10 151	9 690	8 340	30 689	623	6	—	91 663
2022-23	30 317	160	13 711	10 898	12 890	36 926	650	2	—	105 554

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Catches and catch limits

Table 17 lists the TACCs and the western and eastern catch limits. Industry has shelved some of their ACE (Annual Catch Entitlement) given stock status. The TACC for HOK 1 has been 110,000t since October 2021, with an agreed catch split agreement of 65,000t from the eastern stock areas and 45,000t from the western stock areas. The 2022-23 TAC was 111,140t accounting for mortality due to other sources (1,100t) and allowances for customary and recreational take (20t). 10,000t of the HOK 1 TACC was shelved for the 2022-23 season,

Hake and ling are mainly taken as a bycatch in the hoki trawl fishery although target fisheries for both exist, particularly with ling being targeted by a longline fishery (which is also MSC certified and the subject of a parallel re-assessment).

Table 17. TACC, voluntary catch limits (prior to shelving), total ACE generated, and industry shelving agreements by year. The voluntary eastern and western catch limits represent the limits prior to any shelving of ACE. Values are in tonnes. (Source: FNZ, 2024).

Year	TACC	Eastern catch limit	Western catch limit	Total HOK 1 ACE generated ¹	Industry shelving of ACE
2001–02	200 000	70 000	130 000	200 000	–
2002–03	200 000	70 000	130 000	203 943	–
2003–04	180 000	70 000	110 000	180 000	–
2004–05	100 000	60 000	40 000	100 000	–
2005–06	100 000	60 000	40 000	100 251	–
2006–07	100 000	60 000	40 000	100 493	–
2007–08	90 000	65 000	25 000	90 000	–
2008–09	90 000	65 000	25 000	90 682	–
2009–10	110 000	60 000	50 000	111 872	–
2010–11	120 000	60 000	60 000	124 666	–
2011–12	130 000	60 000	70 000	135 770	–
2012–13	130 000	60 000	70 000	135 650	–
2013–14	150 000	60 000	90 000	153 959	–
2014–15	160 000	60 000	100 000	167 572	–
2015–16	150 000	60 000	90 000	150 000	–
2016–17	150 000	60 000	90 000	161 205	–
2017–18	150 000	60 000	90 000	166 075	–
2018–19	150 000	60 000	90 000	164 730	20 000 (from western)
2019–20	115 000	60 000	55 000	115 000	–
2020–21	115 000	60 000	55 000	122 259	20 000 (split evenly eastern/western)
2021–22	110 000	65 000	45 000	110 000	10 000 (from east)
2022–23	110 000	65 000	45 000	119 165	10 000 (from eastern/western)
2023–24	110 000	65 000	45 000	113 626	–

10.1.1.1.2. Hake

Biology and ecological role

Hake are mainly distributed between 250-800m and, mostly south of 40°S. Juveniles are found in shallow inshore waters (<250m) whereas the adults are generally found deeper (250-800m). There are three main hake spawning areas: off the west coast of the South Island (WCSI), on the Chatham Rise (CR), and on the Campbell Plateau (CP). Additional evidence for stock structure includes differences in size-frequencies between the west coast and other areas, as well as differences in growth parameters among areas (Horn, 1997). There are no morphometric differences between hake

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from the CR and from off the east coast of the North Island (ECNI), but significant differences are evident between fish on the CR and off the ECNI and those from the Sub-Antarctic (SA), Puysegur, and from the WCSI, with the fish off Puysegur most similar to those off the WCSI and generally indistinguishable from those in the SA. Spawning off the WCSI can extend from June to October, on the CR from September to January, and on the CP from September to February. Spawning can also occur off Puysegur at a similar time to spawning on the CP. Management divides the fishery into four units, three of which are covered in this report: (a) the Challenger Fisheries Management Area (FMA) (HAK 7), (b) the CR FMA (HAK 4), and (c) the remainder of the NZ Exclusive Economic Zone (Auckland, Central, Southeast, Southland, and the SA) FMA (HAK 1). HAK 10 (Kermadec) exists, but is not considered here (FNZ, 2024).

The males, which rarely exceed 100cm total length (TL), do not grow as large as the females, which can grow to 120cm TL or more. Males on the CR (HAK 4) reach sexual maturity at about 5.5 years while females do so at about 7 years (FNZ, 2024). In contrast, SA hake (HAK 1) mature at about 6 years (males) and 6.5 years (females), while those off the WCSI mature at about 4.5 (males) and 5 years (females) (FNZ, 2024).

Natural mortality (M) is often estimated within stock assessments but is inferred to be higher for males ($M \sim 0.2\text{yr}^{-1}$) than females ($M \sim 0.18\text{yr}^{-1}$). Table 18 summarizes the estimates of biological parameters for the SA, CR and WCSI.

Table 18. Estimates of biological parameters for hake in the SA, on the CR and off the WCSI. (Source: FNZ, 2024).

Parameter		Estimate				Source							
<u>1. Natural mortality</u>													
	Males	$M = 0.20$				Dunn et al. (2000)							
	Females	$M = 0.18$				Dunn et al. (2000)							
	Both sexes	$M = 0.19$				Horn and Francis (2010)							
<u>2. Weight = $a(\text{length})^b$ (Weight in t, length in cm)</u>													
Sub-Antarctic	Males	$a = 2.34 \times 10^{-9}$	$b = 3.258$		Dunn et al. (2021a)								
	Females	$a = 1.86 \times 10^{-9}$	$b = 3.310$		Dunn et al. (2021a)								
	Both sexes	$a = 1.50 \times 10^{-9}$	$b = 3.262$		Dunn et al. (2021a)								
Chatham Rise	Males	$a = 2.56 \times 10^{-9}$	$b = 3.228$		Horn (2013)								
	Females	$a = 1.88 \times 10^{-9}$	$b = 3.305$		Horn (2013)								
	Both sexes	$a = 2.00 \times 10^{-9}$	$b = 3.288$		Horn (2013)								
WCSI	Males	$a = 3.34 \times 10^{-9}$	$b = 3.175$		Dunn et al. (2023a)								
	Females	$a = 3.48 \times 10^{-9}$	$b = 3.177$		Dunn et al. (2023a)								
	Both sexes	$a = 3.02 \times 10^{-9}$	$b = 3.204$		Dunn et al. (2023a)								
<u>3. von Bertalanffy growth parameters</u>													
Sub-Antarctic	Males	$k = 0.260$	$t_0 = -0.71$	$L_\infty = 89.3$	$cv = 0.07$	Dunn et al. (2021a)							
	Females	$k = 0.160$	$t_0 = -1.33$	$L_\infty = 115.5$	$cv = 0.08$	Dunn et al. (2021a)							
Chatham Rise	Males	$k = 0.330$	$t_0 = 0.09$	$L_\infty = 85.3$	Horn (2008)								
	Females	$k = 0.229$	$t_0 = 0.01$	$L_\infty = 106.5$	Horn (2008)								
WCSI	Males	$k = 0.329$	$t_0 = -0.43$	$L_\infty = 83.1$	$cv = 0.07$	Dunn et al. (2023a)							
	Females	$k = 0.192$	$t_0 = -0.98$	$L_\infty = 107.0$	$cv = 0.10$	Dunn et al. (2023a)							
<u>4. Schnute growth parameters ($T_1 = 1$ and $T_2 = 20$ for all stocks)</u>													
Chatham Rise	Males	$y_1 = 24.6$	$y_2 = 90.1$		$a = 0.184$	$b = 1.742$	Horn (2008)						
	Females	$y_1 = 24.4$	$y_2 = 114.5$		$a = 0.098$	$b = 1.764$	Horn (2008)						
	Both sexes	$y_1 = 24.5$	$y_2 = 104.8$		$a = 0.131$	$b = 1.700$	Horn & Francis (2010)						
<u>5. Maturity ogives (proportion mature at age) (Horn, 2013)</u>													
	Age	2	3	4	5	6	7	8	9	10	11	12	13
SubAnt	Males	0.01	0.04	0.11	0.30	0.59	0.83	0.94	0.98	0.99	1.00	1.00	1.00

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	Females	0.01	0.03	0.08	0.19	0.38	0.62	0.81	0.92	0.97	0.99	1.00	1.00
	Both	0.01	0.03	0.09	0.24	0.49	0.73	0.88	0.95	0.98	0.99	1.00	1.00
Chatham	Males	0.02	0.07	0.20	0.44	0.72	0.89	0.96	0.99	1.00	1.00	1.00	1.00
	Females	0.01	0.02	0.06	0.14	0.28	0.50	0.72	0.86	0.94	0.98	0.99	1.00
	Both	0.02	0.05	0.13	0.29	0.50	0.70	0.84	0.93	0.97	0.99	0.99	1.00
WCSI	Males	0.01	0.05	0.27	0.73	0.95	0.99	1.00	1.00	1.00	1.00	1.00	1.00
	Females	0.02	0.07	0.25	0.57	0.84	0.96	0.99	1.00	1.00	1.00	1.00	1.00
	Both	0.01	0.06	0.26	0.65	0.90	0.97	0.99	1.00	1.00	1.00	1.00	1.00

Hake prey predominantly on teleost fish on the Chatham Rise (Dunn et al., 2010), with Macrouridae accounting for 44% of prey weight (with javelinfish the most frequently observed prey). Hoki constituted 37% of the prey weight, and squid and crustaceans 5 and 19% respectively.

Fisheries, catches and catch limits

Hake are targeted by larger trawlers but are also caught as bycatch in hoki-directed fisheries. Table 19 and Table 20 list the catches before and after the 1987-88 fishing season respectively and by Fish stock. There is evidence of past misreporting of catches. Dunn (2003) revised the catch series for the CR and WCSI between 1994-95 and 2000-01 (mainly June, July, and September). Under-reporting of catch for HAK7 before the introduction of the TACCs in 1991-92 is evidenced by comparisons of catches from vessels with and without observers (Colman & Vignaux, 1992). The catch for HAK7 was estimated for 1988-89 to 1990-91 by multiplying the total hoki catch (which was assumed to be correctly reported by vessels with and without observers) by the rate of hake to hoki in the catches of vessels carrying observers.

Table 19. Reported hake catches (t) from 1975 to 1987-88. Data from 1975 to 1983 from the Ministry of Agriculture and Fisheries (MAF); data from 1983-84 to 1985-86 from FSU; data from 1986-87 to 1987-88 from the Quota Management System (QMS). (Source: FNZ, 2024).

Fishing year	New Zealand			Foreign licensed				Total
	Domestic	Chartered	Total	Japan	Korea	USSR	Total	
1975 ¹	0	0	0	382	0	0	382	382
1976 ¹	0	0	0	5 474	0	300	5 774	5 774
1977 ¹	0	0	0	12 482	5 784	1 200	19 466	19 466
1978-79 ²	0	3	3	398	308	585	1 291	1 294
1979-80 ²	0	5 283	5 283	293	0	134	427	5 710
1980-81 ²	No data available							
1981-82 ²	0	3 513	3 513	268	9	44	321	3 834
1982-83 ²	38	2 107	2 145	203	53	0	255	2 400
1983 ³	2	1 006	1 008	382	67	2	451	1 459
1983-84 ⁴	196	1 212	1 408	522	76	5	603	2 011
1984-85 ⁴	265	1 318	1 583	400	35	16	451	2 034
1985-86 ⁴	241	2 104	2 345	465	52	13	530	2 875
1986-87 ⁴	229	3 666	3 895	234	1	1	236	4 131
1987-88 ⁴	122	4 334	4 456	231	1	1	233	4 689

2. Calendar year; 2. April 1 to March 31. 3. April 1 to September 30; 4. October 1 to September 30.

Table 20. Reported landings (t) of hake by Fishstock from 1983-84 to present and actual TACCs (t) for 1986-87 to present. FSU data from 1984-1986; QMS data from 1986 to the present. (Source: FNZ, 2024).

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Fish stock	HAK 1		HAK 4		HAK 7	
	Landings	TACC	Landings	TACC	Landings	TACC
1983–84 1	886	–	180	–	945	–
1984–85 1	670	–	399	–	965	–
1985–86 1	1 047	–	133	–	1 695	–
1986–87	1 022	2 500	200	1 000	2 909	3 000
1987–88	1 381	2 500	288	1 000	3 019	3 000
1988–89	1 487	2 513	554	1 000	6 835	3 004
1989–90	2 115	2 610	763	1 000	4 903	3 310
1990–91	2 603	2 610	743	1 000	6 148	3 310
1991–92	3 156	3 500	2 013	3 500	3 027	6 770
1992–93	3 525	3 501	2 546	3 500	7 154	6 835
1993–94	1 803	3 501	2 587	3 500	2 974	6 835
1994–95	2 572	3 632	3 369	3 500	8 841	6 855
1995–96	3 956	3 632	3 466	3 500	8 678	6 855
1996–97	3 534	3 632	3 524	3 500	6 118	6 855
1997–98	3 810	3 632	3 524	3 500	7 416	6 855
1998–99	3 845	3 632	3 324	3 500	8 165	6 855
1999–00	3 899	3 632	2 803	3 500	6 898	6 855
2000–01	3 429	3 632	2 784	3 500	7 698	6 855
2001–02	2 870	3 701	1 424	3 500	7 519	6 855
2002–03	3 336	3 701	811	3 500	7 433	6 855
2003–04	3 466	3 701	2 275	3 500	7 945	6 855
2004–05	4 795	3 701	1 264	1 800	7 317	6 855
2005–06	2 742	3 701	305	1 800	6 905	7 700
2006–07	2 025	3 701	899	1 800	7 668	7 700
2007–08	2 445	3 701	865	1 800	2 620	7 700
2008–09	3 415	3 701	856	1 800	5 954	7 700
2009–10	2 156	3 701	208	1 800	2 352	7 700
2010–11	1 904	3 701	179	1 800	3 754	7 700
2011–12	1 948	3 701	161	1 800	4 459	7 700
2012–13	2 079	3 701	177	1 800	5 434	7 700
2013–14	1 883	3 701	168	1 800	3 642	7 700
2014–15	1 725	3 701	304	1 800	6 219	7 700
2015–16	1 584	3 701	274	1 800	2 864	7 700
2016–17	1 175	3 701	268	1 800	4 701	7 700
2017–18	1 350	3 701	267	1 800	3 086	5 064
2018–19	896	3 701	183	1 800	1 563	5 064
2019–20	1 062	3 701	137	1 800	2 063	2 272
2020–21	1 503	3 701	207	1 800	1 368	2 272
2021–22	1 692	3 701	137	1 800	1 325	2 272
2022–23	1 083	3 701	124	1 800	1 696	2 272

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The CR stock is considered to include the whole of the CR (including the western end, currently part of the HAK 1 management area) for the purposes of stock assessment. The catch series used in stock assessments are listed in Table 21.

Table 21. Landings for the Sub-Antarctic and Chatham Rise stocks and the West Coast South Island for 1975 to 2020-21 fishing years. Note, these relate to biological fish stocks, not QMA Fishstocks (Source: FNZ, 2024).

Fishing year	West Coast S.I.	Sub-Antarctic	Chatham Rise	Fishing year	West Coast S.I.	Sub-Antarctic	Chatham Rise
1974–75	71	120	191	1999–00	7 031	3 011	3 174
1975–76	5 005	281	488	2000–01	8 346	2 787	2 962
1976–77	17 806	372	1 288	2001–02	7 498	2 510	1 770
1977–78	498	762	34	2002–03	7 404	2 741	1 401
1978–79	4 737	364	609	2003–04	7 939	3 251	2 465
1979–80	3 600	350	750	2004–05	7 298	2 530	3 518
1980–81	2 565	272	997	2005–06	6 892	2 555	489
1981–82	1 625	179	596	2006–07	7 660	1 812	1 081
1982–83	745	448	302	2007–08	2 583	2 204	1 096
1983–84	945	722	344	2008–09	5 912	2 427	1 825
1984–85	965	525	544	2009–10	2 282	1 958	391
1985–86	1 918	818	362	2010–11	3 462	1 288	951
1986–87	3 755	713	509	2011–12	4 299	1 893	194
1987–88	3 009	1 095	574	2012–13	5 171	1 883	344
1988–89	8 696	1 827	804	2013–14	3 387	1 832	187
1989–90	8 741	2 366	950	2014–15	5 966	1 639	348
1990–91	8 246	2 749	931	2015–16	2 733	1 504	355
1991–92	3 010	3 265	2 418	2016–17	4 701	1 037	406
1992–93	7 059	1 452	2 798	2017–18	3 085	1 205	412
1993–94	2 971	1 844	2 934	2018–19	1 562	636	443
1994–95	9 535	2 888	3 271	2019–20	2 063	930	318
1995–96	9 082	2 273	3 959	2020–21	1 367	1 355	355
1996–97	6 838	2 599	3 890	2021–22	1 324	–	–
1997–98	7 674	2 789	4 074	2022–23	1 695	–	–
1998–99	8 742	2 789	3 589				

10.1.1.1.3. Ling

Biology and ecological role

Ling are widely distributed throughout the 200-800m depth range within the New Zealand EEZ, particularly to the south of 40°S. Horn (2005) examined stock structure of New Zealand ling using morphometrics, genetics, growth, population age structures, and reproductive biology and behaviour, and indicated that there are at least five ling stocks (i.e., east coast South Island (ECSI), Chatham Rise (CR), Cook Strait (CS), Bounty Platform (BP), and the Southern Plateau (including the Stewart-Snares shelf on Puyesgur Bank (PB)). Stock affinities of ling in CS are unknown, but spawning is known to occur there (FNZ, 2024). Horn (2022) suggested that LIN 5&6 and LIN 6B are a single stock, with some area seasonal movement. The stock structure of Sub-Antarctic ling was further investigated in 2024 (Mormede et al. 2024a), with differences in growth suggesting that LIN 3&4, LIN 5&6, and LIN 7WC were likely different stocks, and that the current boundaries between those stocks were likely adequate. Based on available catch rate, age structure, and growth information, LIN 6B was considered unlikely to be part of LIN 3&4, with only relatively weak evidence (differences in longline length frequencies, in growth curves for older animals, and in the length of spawning – more protracted for LIN 6B, Mormede et al., 2024a) that it was not part of LIN 5&6. Because of the paucity of data available to assess LIN

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6B as a separate stock, and the similarities in the information between LIN 5&6 and LIN 6B, the Deepwater Working Group decided to include LIN 6B with LIN 5&6 as a single Sub-Antarctic ling stock (LIN 5&6 and LIN 6B) (FNZ, 2024).

Ling live to a maximum age of about 30 years; fewer than 0.2% of successfully aged ling have been older than 30 years. A growth study of ling from five areas (west coast South Island (WCSI), CR, BP, Campbell Plateau (CP), and CS) showed that females grew significantly faster and reached a greater size than males in all areas, and that growth rates are significantly different between areas (FNZ, 2024). Ling grow fastest in CS and slowest on the CP (Horn, 2005). Maturity has been recently re-estimated by Mormede et al. (2024a) for LIN 5&6 (Table 22), with no evidence for changes over time.

Natural mortality (M) varies among stocks (Horn, 2008; Edwards, 2017). Although M has been estimated for all areas, the estimates are very imprecise, so a common value is assumed for all areas (Table 22). Spawning appears to vary among areas: August to October on the CR, September to December on the CP and Puysegur Bank, September to February on the BP, and July to September off the WSCI and in CS. Little of known regarding the distribution of juveniles (<40cm).

Ling appear to be mainly bottom dwellers feeding on crustaceans and also on fish, with commercial fishing discards being a significant dietary component (Dunn et al., 2010). However, they can be caught well above the bottom, e.g. when feeding on hoki during the hoki spawning season.

Table 22. Estimates of biological parameters. (Source: FNZ, 2024).

1. Natural mortality (M)									
All stocks	0.18								
2. Weight = a (length) ^{b} (Weight in g, length in cm total length)									
	Female			Male					
	A	B	a	b					
LIN 3&4	0.00138	3.271	0.00128	3.294	Chatham Rise				
LIN 5&6	0.00132	3.293	0.00213	3.179	Southern Plateau				
LIN 6B	0.00114	3.318	0.001	3.354	Bounty Platform				
LIN 7WC	0.00098	3.362	0.00131	3.292	West Coast S.I.				
LIN 7CK	0.000934	3.368	0.001146	3.318	Cook Strait				
3. von Bertalanffy growth									
				Female				Male	
FMA	K	t_0	L_∞	CV	K	t_0	L_∞	CV	
LIN 3&4	0.09	-0.71	153.3	0.09	0.13	-0.65	112.2	0.09	Chatham Rise
LIN 5&6	0.13	-1.53	110.6	0.08	0.19	-1.16	91.2	0.07	Southern Plateau
LIN 6B	0.12	-0.1	138.9	0.08	0.15	-0.1	117.1	0.07	Bounty Platform
LIN 7WC	0.08	-0.86	164.1	0.08	0.08	-1.08	140	0.08	West Coast S.I.
LIN 7CK	0.097	-0.54	163.6		0.08	-1.94	158.9		Cook Strait

Fisheries, catches and catch limits

Ling were caught in a large foreign (Japanese and Korean) longline fishery on the CR from 1975 to 1980. Since 1980 ling have been caught by large trawlers, both domestic and foreign owned, and by small domestic longliners. The latter vessels tend to operate on the WCSI and the east coast of both main islands south of East Cape. The larger trawlers take most of their catches on the Puysegur Bank and the slope of the Stewart-Snares shelf and waters in the Auckland Islands area and the CR, primarily as bycatch in the fisheries for hoki.

The domestic fleet was increased by the addition of several larger longliners with autoline equipment during the 1990s, which led to increased catches of ling off the east and south of the South Island (LIN 3, 4, 5 and 6). Potting for ling represented less than 1% until recently, but it represented 10-16% of the catch in LIN 3&4 between 2018 and 2022 and 31% of the total catch in the 2023 fishing year (Table 23). Potting has also increased in other areas, constituting 22% of the 2023 total catch in LIN 7WC and 12% of the total catch in Lin 5&6 (Table 26). Small amounts of ling are taken by recreational fishers, but the estimates are small and highly uncertain (FNZ, 2024).

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FNZ (2024) notes that it is believed that some ling bycatch from the west coast hoki fishery was not reported up to the mid-1990s. The catch estimates include non-reported catches. Furthermore, FNZ (2024) notes that some catch from LIN 7 (250-400t; Dunn, 2003) was reported against other fish stocks (probably LIN 3, 5 and 6)

Table 23 lists the catches for the QMAs considered in this report from 1931-32 to 1982, with catches reported catch by nation given in Table 24 and reported landings and TACCs in Table 25. The catch histories by assessed stock (separated by fishing method [trawl, longline, or pot]) are given in Table 26.

Table 23. Reported landings (t) for the main QMAs from 1931 to 1982. (Source: FNZ, 2024).

Year	LIN 3	LIN 4	LIN 5	LIN 6	LIN 7
1931–32	11	0	1	0	0
1932–33	14	0	2	0	35
1933–34	59	0	1	0	67
1934–35	70	0	1	0	94
1935–36	124	0	1	0	66
1936–37	103	0	1	0	61
1937–38	320	0	1	0	57
1938–39	280	0	24	0	37
1939–40	320	0	16	0	26
1940–41	286	0	21	0	46
1941–42	308	0	22	0	40
1942–43	254	0	24	0	29
1943–44	264	0	19	0	40
1944	224	0	13	0	46
1945	199	0	13	0	80
1946	348	0	9	0	78
1947	474	0	24	0	96
1948	403	0	24	0	66
1949	402	0	20	0	67
1950	352	0	29	0	61
1951	230	0	16	0	34
1952	235	0	16	0	36
1953	212	0	19	0	34
1954	208	0	7	0	44
1955	160	0	6	0	27
1956	155	0	4	0	15
1957	175	0	8	0	19
1958	178	0	15	0	28
1959	157	0	13	0	27
1960	196	0	21	0	19
1961	230	0	20	0	19
1962	211	0	13	0	16
1963	213	0	14	0	11
1964	223	0	16	0	13
1965	195	0	24	0	13
1966	141	0	16	0	17

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1967	106	0	14	0	36
1968	88	0	11	0	42
1969	154	0	10	0	23
1970	167	0	14	0	51
1971	203	0	20	1	37
1972	522	6	22	0	33
1973	1 425	0	23	0	41
1974	575	42	335	44	82
1975	1 770	15	1 513	344	224
1976	1 567	14	2 630	0	1 739
1977	1 149	466	1 683	0	2 810
1978	487	0	2 515	391	240
1979	799	246	4 400	1 431	454
1980	265	182	4 064	933	928
1981	427	444	3 576	636	1 020
1982	924	435	2 109	317	1 208

Table 24. Reported landings (t) from 1975 to 1987-88. Data from 1975 to 1983 from MAF; data from 1983-84 to 1985-86 from FSU; data from 1986-87 to 1987-88 from QMS. - indicates no data available. (Source: FNZ, 2024).

Fishing year	New Zealand		Total	Foreign Licensed					Grand total
	Domestic	Chartered		Longline (Japan + Korea)	Japan	Korea	USSR	Total	
1975*	486	0	486	9 269	2 180	0	0	11 499	11 935
1976*	447	0	447	19 381	5 108	0	1 300	25 789	26 236
1977*	549	0	549	28 633	5 014	200	700	34 547	35 096
1978-79#	657	24	681	8 904	3 151	133	452	12 640	13 321
1979-80#	915	2 598	3 513	3 501	3 856	226	245	7 828	11 341
1980-81#	1 028	-	-	-	-	-	-	-	-
1981-82#	1 581	2 423	4 004	0	2 087	56	247	2 391	6 395
1982-83#	2 135	2 501	4 636	0	1 256	27	40	1 322	5 958
1983†	2 695	1 523	4 218	0	982	33	48	1 063	5 281
1983-84§	2 705	2 500	5 205	0	2 145	173	174	2 491	7 696
1984-85§	2 646	2 166	4 812	0	1 934	77	130	2 141	6 953
1985-86§	2 126	2 948	5 074	0	2 050	48	33	2 131	7 205
1986-87§	2 469	3 177	5 646	0	1 261	13	21	1 294	6 940
1987-88§	2 212	5 030	7 242	0	624	27	8	659	7 901

* Reported by calendar year; # Reported April 1 to March 31(except domestic vessels, which reported by calendar year); † Reported April 1 to September 30 (except domestic vessels, which reported by calendar year); § Reported October 1 to September 30

Table 25. Reported landings (t) of ling by Fishstock from 1983-84 to present and actual TACCs (t) from 1986-87 to present. Estimated landings for LIN 7 from 1987-88 to 1992-93 include an adjustment for ling bycatch of hoki trawlers, based on records from vessels carrying observers. QMS data from 1986-present. Source: FNZ, 2024).

LIN 3	LIN 4	LIN 5	LIN 6	LIN 7

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	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Reported Landings	Estimated Landings	TACC
1983–84*	1 306	–	352	–	2 605	–	869	–	1 552	–	–
1984–85*	1 067	–	356	–	1 824	–	1 283	–	1 705	–	–
1985–86*	1 243	–	280	–	2 089	–	1 489	–	1 458	–	–
1986–87	1 311	1 850	465	4 300	1 859	2 500	956	7 000	1 851	–	1 960
1987–88	1 562	1 909	280	4 400	2 213	2 506	1 710	7 000	1 853	1 777	2 008
1988–89	1 665	1 917	232	4 400	2 375	2 506	340	7 000	2 956	2 844	2 150
1989–90	1 876	2 137	587	4 401	2 277	2 706	935	7 000	2 452	3 171	2 176
1990–91	2 419	2 160	2 372	4 401	2 285	2 706	2 738	7 000	2 531	3 149	2 192
1991–92	2 430	2 160	4 716	4 401	3 863	2 706	3 459	7 000	2 251	2 728	2 192
1992–93	2 246	2 162	4 100	4 401	2 546	2 706	6 501	7 000	2 475	2 817	2 212
1993–94	2 171	2 167	3 920	4 401	2 460	2 706	4 249	7 000	2 142	–	2 213
1994–95	2 679	2 810	5 072	5 720	2 557	3 001	5 477	7 100	2 946	–	2 225
1995–96	2 956	2 810	4 632	5 720	3 137	3 001	6 314	7 100	3 102	–	2 225
1996–97	2 963	2 810	4 087	5 720	3 438	3 001	7 510	7 100	3 024	–	2 225
1997–98	2 916	2 810	5 215	5 720	3 321	3 001	7 331	7 100	3 027	–	2 225
1998–99	2 706	2 810	4 642	5 720	2 937	3 001	6 112	7 100	3 345	–	2 225
1999–00	2 799	2 810	4 402	5 720	3 136	3 001	6 707	7 100	3 274	–	2 225
2000–01	2 330	2 060	3 861	4 200	3 430	3 001	6 177	7 100	3 352	–	2 225
2001–02	2 164	2 060	3 602	4 200	3 295	3 001	5 945	7 100	3 219	–	2 225
2002–03	2 529	2 060	2 997	4 200	2 939	3 001	6 283	7 100	2 918	–	2 225
2003–04	1 990	2 060	2 618	4 200	2 899	3 001	7 032	7 100	2 926	–	2 225
2004–05	1 597	2 060	2 758	4 200	3 584	3 595	5 506	8 505	2 522	–	2 225
2005–06	1 711	2 060	1 769	4 200	3 522	3 595	3 553	8 505	2 479	–	2 225
2006–07	2 089	2 060	2 113	4 200	3 731	3 595	4 696	8 505	2 295	–	2 225
2007–08	1 778	2 060	2 383	4 200	4 145	3 595	4 502	8 505	2 282	–	2 225
2008–09	1 751	2 060	2 000	4 200	3 232	3 595	2 977	8 505	2 223	–	2 225
2009–10	1 718	2 060	2 026	4 200	3 034	3 595	2 414	8 505	2 446	–	2 474
2010–11	1 665	2 060	1 572	4 200	3 856	3 595	1 335	8 505	2 800	–	2 474
2011–12	1 292	2 060	2 305	4 200	3 649	3 595	2 047	8 505	2 771	–	2 474
2012–13	1 475	2 060	2 181	4 200	3 610	3 595	3 102	8 505	3 010	–	2 474
2013–14	1 442	2 060	2 373	4 200	3 935	3 955	3 221	8 505	3 200	–	3 080
2014–15	1 325	2 060	2 246	4 200	3 924	3 955	3 115	8 505	3 343	–	3 080
2015–16	1 440	2 060	2 659	4 200	3 868	3 955	2 222	8 505	3 340	–	3 080
2016–17	1 808	2 060	2 565	4 200	3 356	3 955	2 473	8 505	3 428	–	3 080
2017–18	2 171	2 060	2 636	4 200	4 034	3 955	4 846	8 505	3 487	–	3 080
2018–19	2 016	2 060	2 044	4 200	4 596	4 735	3 706	8 505	3 059	–	3 080
2019–20	1 685	2 060	1 778	4 200	4 678	4 735	3 972	8 505	3 216	–	3 387
2020–21	1 489	2 060	2 129	4 200	4 949	4 735	3 916	8 505	3 308	–	3 387
2021–22	1 175	2 060	2 604	4 200	5 044	5 208	3 881	8 505	3 325	–	3 387
2022–23	1 366	2 060	1 892	4 200	4 906	5 208	4 780	8 505	3 540	–	3 387

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Table 26. Estimated catch histories (t) for LIN 3&4 (Chatham Rise), LIN 5&6 (Campbell Plateau), LIN 6B (Bounty Platform), and LIN 7WC (WCSI section of LIN 7). Landings have been separated by fishing method (trawl or longline). The catch histories for LIN 3&4, LIN 5&6 & LIN 6B and LIN 7WC are expressed in calendar year. (source: FNZ, 2024).

Year	LIN 3&4			LIN 5&6		LIN6B	LIN 7WC	
	trawl	line	pot	trawl	line	line	trawl	line
1972	0	0	0	0	0	0	0	0
1973	250	0	0	500	0	0	85	20
1974	382	0	0	1 120	0	0	144	40
1975	953	8 439	0	900	118	0	401	800
1976	2 100	17 436	0	3 402	190	0	565	2 100
1977	2 055	23 994	0	3 100	301	0	715	4 300
1978	1 400	7 577	0	1 945	494	10	300	323
1979	2 380	821	0	3 707	1 022	0	539	360
1980	1 340	360	0	5 200	0	0	540	305
1981	673	160	0	4 427	0	10	492	300
1982	1 183	339	0	2 402	0	0	675	400
1983	1 210	326	0	2 778	5	10	1 040	710
1984	1 366	406	0	3 203	2	6	924	595
1985	1 351	401	0	4 480	25	2	1 156	302
1986	1 494	375	0	3 182	2	0	1 082	362
1987	1 313	306	0	3 962	0	0	1 105	370
1988	1 636	290	0	2 065	6	0	1 428	291
1989	1 397	488	0	2 923	10	9	1 959	370
1990	3 170	243	2	5 004	0	14	2 173	229
1991	3 979	1 786	16	3 537	407	139	2 025	425
1992	3 851	3 388	37	7 663	1 026	1 244	1 572	873
1993	2 836	3 963	13	6 202	1 166	1 260	1 590	699
1994	2 374	4 241	11	6 782	1 423	652	1 312	1 003
1995	2 680	5 391	7	5 064	2 032	534	1 759	994
1996	3 375	4 699	1	6 872	2 101	614	2 019	994
1997	3 901	4 182	38	7 468	3 588	312	2 034	1 323
1998	5 140	3 299	40	5 771	3 267	493	1 995	1 065
1999	4 306	2 994	41	6 013	2 952	707	2 389	916
2000	3 826	3 228	23	7 506	2 328	1 175	2 479	947
2001	2 941	3 082	2	5 701	1 819	1 061	2 400	1 007
2002	3 637	2 330	1	7 720	1 264	859	2 475	762
2003	3 563	2 150	1	8 423	668	988	2 094	926
2004	2 714	1 731	4	8 016	1 509	422	2 092	764
2005	2 250	2 259	10	7 295	892	48	1 595	845
2006	1 890	1 489	54	7 118	781	110	1 773	781
2007	2 841	1 571	55	8 083	890	218	1 323	1 161
2008	2 432	2 034	15	5 345	659	446	1 150	1 021
2009	1 459	1 897	12	4 425	550	232	1 216	992
2010	1 530	1 973	39	4 391	1 064	2	1 386	1 199
2011	1 030	1 658	33	4 445	842	55	1 606	1 143

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2012	1 470	2 087	11	6 608	1 168	4	1 697	1 285
2013	1 125	2 394	24	5 535	259	219	1 959	1 089
2014	1 349	2 443	58	6 075	925	75	1 914	1 444
2015	1 513	1 685	46	5 735	759	38	2 092	1 350
2016	1 551	2 695	164	4 482	618	214	2 159	1 487
2017	1 811	2 432	201	7 309	761	970	2 451	1 470
2018	1 330	2 870	543	7 355	768	149	2 440	1 239
2019	1 347	1 877	674	7 264	1 286	171	1 834	1 408
2020	1 060	1 627	402	6 168	2 033	255	1 687	1 752
2021	765	1 598	360	7 338	1 205	636	1 406	2 057
2022	–	–	–	7 198	1 378	249	1 440	1 464
2023	–	–	–	6 325	3 318	303	–	–

10.1.1.2. Assessments

The information needed to assess stock status relative to the limit and target reference points (ling and hake) or the management target range (hoki), and to conduct projections are an estimate of recent abundance, B_{current} , an estimate of the unfished biomass B_0 , and estimates of recruitment. This information is obtained from quantitative stock assessments based on fitting population dynamics models to monitoring data. The stock assessment process is open to anyone who elects to participate. The process is managed by Fisheries New Zealand and supported by quota owners through DWG.

Stock assessments for the stocks of hoki, hake and ling have been conducted using the general stock assessment package CASAL (Bull et al., 2012) and more recently Casal2 (Casal2 Development Team, 2022, 2024; Doonan et al., 2016). CASAL and Casal2 have many of the features of modern state-of-the-art stock assessment methods, including the ability to consider spatial structure, multiple fisheries and surveys, and populations divided by sex, location and maturity state. CASAL and Casal2 can use a variety of data sets for model-fitting purposes, with the most common data sources being catches by fishery, survey and CPUE-based indices of relative abundance, and fishery and survey age-composition data. The model fitting procedure allows for “additional variance” when fitting to the survey indices of abundance and the catch and fishery age compositions. The assessment sections for each stock in the Plenary Report document the basis for the extent of additional variance.

CASAL/Casal2 can estimate the key biological parameters of a population dynamics model (e.g., natural mortality, growth parameters, stock-recruitment steepness and unfished biomass) as well as those related to fishery selectivity and survey catchability. Informative prior (or penalty) distributions can be placed on the parameters of the model. However, it is not uncommon the pre-specify the values of some of these parameters based on auxiliary information. The results of the assessment can be provided as Maximum Posterior Density (MPD) estimates and as well as samples from a Bayesian posterior for the final models. The results of the Bayesian analyses provide the basis to estimate the probability of stock biomass being above or below management reference points and the likelihood of declines in the future given pre-specified time-trajectories of catches.

Assessments generally involve the selection of the data sets for inclusion in the assessment. The Stock Assessment Working Group then examines a variety of candidate model specifications and agrees to a base model (or base models) and a set of sensitivity analyses. Some of the results are based on MPD estimates but the primary focus of the results section of the summary report are the Bayesian results.

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10.1.1.3. Assessments and Stock status

Table 27. Summaries of stock status (biomass relative to B_0) and the probability of being below the limit and target reference points based on the base model runs.

Stock	Most recent assessment	Depletion [Year]	P < Limit	P < Target
HOK 1 East*	2024	51 (41-62) [2024]	< 1%	< 1%
HOK 1 West*	2024	41 (34-50) [2024]	< 1%	5%
HAK 1	2021	62 (50-75) [2021]	< 1%	< 1%
HAK 4	2020	55 (46-66) [2020]	< 1%	1%
HAK 7	2024	47 (34-68) [2024]	< 1%	27%
LIN 3 & 4	2022	56 (47-66) [2022]	< 1%	< 1%
LIN 5 & 6*	2024	66 (55-78) [2024]	< 1%	< 1%
LIN 7WC	2023	55 (38-64) [2023]	< 1%	5%

* Lower limit of the target range

10.1.1.3.1 Hoki (HOK 1)

Assessments of hoki are conducted essentially every year. The last three assessments (2022-2024; McGregor et al., 2022, 2023; McGregor & Langley, 2024) were based on different assumptions than the earlier assessments following a review of input data and model structure assumptions by Dunn & Langley (2018) and Langley (2020). The 2023 and 2024 assessments were based on Casal2 unlike the 2022 assessment which was based on CASAL.

Model structure

The 2024 assessment was based on a two-sex, two maturity partition, two-stock age-structured population dynamics model with four areas (Chatham Rise (CR), west coast South Island (WCSI), Sub-Antarctic (SA), and Cook Strait (CS)). The west coast of the North and South Islands and the south of New Zealand including Puysegur, the Stewart-Snares shelf and the SA were taken as one unit ('the western stock'; HOK1W). The area off the East Coast South Island (ECSI), Mernoo Bank, the CR, CS and the East Coast North Island (ECNI) up to North Cape was taken as other stock (the 'eastern stock'; HOK1E). The model assumed that adult fish from the two stocks do not mix; those from the western stock spawn off the WCSI and spend the rest of the year in the SA; the eastern fish move between their spawning ground, CS, and their "home" ground, CR. Juvenile fish from both stocks are found on the CR, with natal fidelity assumed in Model 1. There is little direct evidence for natal fidelity and 100% natal fidelity is unlikely (Horn, 2011). A single-stock model (Model 2) was therefore considered as a sensitivity to the combined predictions of the two-stock model (FNZ, 2024), in which once fish migrate from the CR to the SA they do not return and effectively become western stock animals. Unlike the two-stock model, only one time-series of recruitment deviations is estimated for the single-stock model.

The model considered ages 1-18yr, with age 18 taken to be a plus-group. Table 28 summarizes the annual cycle of the model. There are four types of migration (FNZ, 2024). The first type of migration involves only newly spawned fish, all of which are assumed to move from the spawning grounds (CS and the WCSI) to arrive at the CR at time-step 2 and approximate age 1.6 yrs. The second migration affects only young western fish, some of which are assumed to migrate, at time-step 3, from the CR to the SA. The last two types of migrations relate to spawning. Each year fish migrate from their "home" ground (the CR for eastern fish, the SA for western fish) to their spawning ground (CS for eastern fish, the WCSI for western fish) at time-step 4. At time-step 1 in the following year all spawners return to their "home" grounds.

Table 28. Annual cycle of the assessment for the two-stock model, showing the processes taking place at each time step, their sequence within each time step, and the available biomass observations. Any fishing and natural mortality within a time step occur after all other processes, with half of the natural mortality occurring before and after the fishing mortality. The last column ('Prop mort') shows the proportion of that time step's total mortality that was assumed to have taken place when each observation is made. (Source: FNZ, 2024).

Step	Approx. months	Process	M fraction	Age fraction	Observations	Prop mort
					Label	
1	Oct-Nov	post-spawning migrations: WC→SA, CS→CR	0.17	0.25	–	
2	Dec-Mar	recruitment at age 1+ to CR (for both stocks)	0.33	0.6	survey_SA_summer_abundance	0.5

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		non-spawning fisheries (CR, SA)			survey_CR_summer_abundance	0.6
3	Apr-Jun	migration: CR→SA	0.25	0.9	survey_SA_autumn_abundance	0.1
4	End Jun	spawning migrations: SA→WC, CR→CS	0	0.9		
5	Jul-Sep	increment ages	0.25	0	survey_CS_spawning_abundance	0.5
		spawning fisheries (WC, CS, PUY)			survey_WC_abundance	0.5

Maturity and growth were pre-specified based on auxiliary analyses, with natural mortality assumed to be constant and independent of time (see Table 29 for the values for the biological parameters).

Table 29. Biological parameter values used in the base version of the stock assessment for HOK 1 (McGregor & Langley, 2024).

Function	Parameter	Western Male	Female	Eastern Male	Female	Source
Natural mortality	M_{avg}				0.26	McGregor & Langley (2024)
	M_{diff}				0.04	McGregor & Langley (2024)
Growth	L_{∞} (cm)	92.6	104.0	89.5	101.18	Horn & Sullivan (1996)
	k (yr ⁻¹)	0.261	0.213	0.232	0.161	Horn & Sullivan (1996)
	t_0 (y)	-0.50	-0.60	-1.23	-2.18	Horn & Sullivan (1996)
Maturation	a_{50}	2	3	2	3	Assumed
Logistic	$a_{50yto95}$	2	3	2	3	Assumed
Length-weight	a	4.79e ⁻⁹	4.79e ⁻⁹	4.79e ⁻⁹	4.79e ⁻⁹	Francis (2003)
	b	2.89	2.89	2.89	2.89	Francis (2003)
Recruitment	h				0.75	Assumed
	p_{male}				0.5	Assumed

The model includes 10 fisheries (Table 30), and six series of abundance estimates were used in the assessment (Table 31 and Table 32). The fisheries were designed based on the review conducted by Langley (2020). The fisheries were defined within four main spatial regions: WC, the spawning ground for the western stock, CS, the spawning ground for the eastern stock, SA, the non-spawning ground for the western stock, and CR, the non-spawning ground for the eastern stock and for juveniles of both stocks. Where there are multiple fisheries within one region, selectivity ogives account for differences in the age structure of fish available to each of the fisheries. The WC region consists of three fisheries: WC_south, WC_north, and WC_inside, and the PUY spawn fishery also occurs within the WC region in the model. Fish are generally younger in the north (fishery WCSI_north), and older fish are caught inside the 25 n.mile line (fishery WCSI_inside), although this is more apparent for males (McGregor et al., 2023). The CS region consists of one fishery in the base model, and when the ECSI spawning fishery is included as its own fishery, this is modelled within the CS region. The sub-Antarctic region was split into three fisheries. Hoki caught on the Stewart-Snares shelf (fishery SA_snares) are younger and hoki caught around the Auckland Islands (fishery SA_auck) are of medium size and age. The remainder of the SA region was defined as fishery SA_suba, which tends to catch older fish, particularly females. CR was split into deep and shallow fisheries to reflect that larger older fish caught in the deeper areas, although this is only really apparent in the data for females.

Compared to the 2023 assessment, the 2024 assessment included a time-series of acoustic estimates of abundance for the Pegasus Canyon (ECSI) for the first time. The total CVs for the acoustic surveys were calculated using a simulation procedure intended to include all sources of uncertainty (O'Driscoll, 2002).

Table 30. The division of annual catches by area and months into the 10 model fisheries. (Source: FNZ, 2024).

Fishery	Description	Areas/months

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CR_deep	Chatham Rise deep (effort depth ≥475m), non-spawning	CR (excluding ECSI spawning), CS (Oct-May), ECNI, ECSI (Oct-June)
CR_shallow	Chatham Rise shallow (effort depth <475m), non-spawning	CR (excluding ECSI spawning), CS (Oct-May), ECNI, ECSI (Oct-June)
CS	Cook Strait spawning	CS (Jun-Sep)
ECSI	ECSI spawning	ECSI (Jul-Sept)
SA_auck	Sub-Antarctic Auckland Islands, non-spawning	Sub-Antarctic Auckland Islands
SA_snares	Sub-Antarctic Snares shelf, non-spawning	Sub-Antarctic Snares, Puysegur (Oct-May)
SA_suba	Sub-Antarctic excluding Auckland Islands and Snares shelf, non-spawning	Sub-Antarctic
PUY_spn	Puysegur spawning fishery	Puysegur (Jun-Sep)
WC_inside	West coast, spawning, inside 25nm line	West coast inside
WC_north	West coast north spawning fishery	West coast north
WC_south	West coast south fishery	West coast south

Table 31. Age data used in the assessment. Years are model years (1990 = 1989-90). (Source: FNZ, 2024).

Area	Label	Data type	Years	Source of age data
WC	fishery_WC_inside_age	Catch-at-age	2000–2010, 2012–2023	Otoliths
	fishery_WC_north	Catch-at-age	1988–2023	Otoliths
	fishery_WC_south_age	Catch-at-age	1988–2023	Otoliths
SA	fishery_SA_auck_age	Catch-at-age	2001, 2003, 2004, 2006–2023	Otoliths
	fishery_SA_snares_age	Catch-at-age	2001, 2006–2023 2001, 2002, 2003, 2009, 2010, 2012,	Otoliths
	fishery_SA_suba_age	Catch-at-age	2016, 2018–2023 1992–1994, 2001–20, 2012–2013,	Otoliths
CS	survey_SA_summer_age	Trawl survey	2015, 2017, 2019, 2021, 2023	Otoliths
	survey_SA_autumn_age	Trawl survey	1992, 1996, 1998	Otoliths
	fishery_CS_spwn_age	Catch-at-age	1990–2005, 2007–2010, 2014–2023 2003, 2004, 2006, 2008, 2019, 2022,	Otoliths
CS	Fishery_ECSI_spwn_age	Catch-at-age	2023	Otoliths
CR	fishery_CR_deep_age	Catch-at-age	2001–2023	Otoliths
	fishery_CR_shallow_age	Catch-at-age	1999–2019, 2001–2023 1992–2014, 2016, 2018, 2020, 2022,	Otoliths
	survey_CR_summer_age	Trawl survey	2024	Otoliths

Table 32. Abundance indices ('000 t) used in the stock assessment. Years are fishing years (1990 = 1989-90). - no data. Biomass estimates are for all age classes in the core survey area. Trawl survey Sub-Antarctic December index is for age 3++ and Trawl survey Chatham Rise January index is for age 2++. (Source: FNZ, 2024).

Year	Acoustic survey WCSI Winter ¹	Trawl survey Sub-Antarctic December ²	Trawl survey Sub-Antarctic April ³	Trawl survey Chatham Rise January ⁴	Acoustic survey Pegasus Canyon Winter ⁶	Acoustic survey Cook Strait inter ⁵
1988	266	–	–	–	–	–

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1989	165	—	—	—	—	—
1990	169	—	—	—	—	—
1991	227	—	—	—	—	88
1992	229	78	68	119	—	—
1993	380	87	—	153	—	283
1994	—	96	—	132	—	278
1995	—	—	—	115	—	194
1996	—	—	89	125	—	92
1997	445	—	—	155	—	141
1998	—	—	68	82	—	80
1999	—	—	—	84	—	114
2000	263	—	—	57	—	—
2001	—	56	—	60	—	102
2002	—	38	—	52	60*	145
2003	—	37	—	48	45*	104
2004	—	12	—	38	—	—
2005	—	14	—	67	—	59
2006	—	18	—	73	17*	60
2007	—	13	—	62	—	104
2008	—	43	—	61	20*	82
2009	—	44	—	119	—	166
2010	—	53	—	78	—	—
2011	—	—	—	67	—	141
2012	283	44	—	84	—	—
2013	233	55	—	66	64*	168
2014	—	—	—	95	—	—
2015	—	29	—	—	—	204
2016	—	—	—	59	—	—
2017	—	31	—	—	—	102
2018	123	—	—	85	—	—
2019	—	30	—	—	55*	91
2020	—	—	—	61	—	—
2021	—	31	—	—	102*	159
2022	—	—	—	89	—	—
2023	—	48	—	—	103*	58*
2024	—	—	—	94*	—	—

1. survey_WC_abundance; 2. survey_SA_summer_abundance (truncated at age 3); 3. Survey_SA_autumn_abundance; 4. survey_CR_summer_abundance (truncated at age 2); 5. survey_CS_spawning_abundance; 6. survey_ECSI_spawning_abundance

The final models were based on the catch history in Table 33.

Table 33. Model catch history (t) by fishery and fishing year (1972 means fishing year 1971-72). Years are fishing years (1990 = 1989-90). The 2024 catch is assumed. (Source: FNZ, 2024).

Year	CR_deep	CR_shallow	CS_spwn	ECSI_spwn	SA_auck	SA_snares	SA_suba	WC_inside	WC_north	WC_south	Total

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1972	3 500	500						1 700	3 300	10	9 010
1973	3 500	500						1 700	3 300	10	9 010
1974	5 200	800						1 700	3 300	10	11 010
1975	31 300	4 700						3 400	6 600	10	46 010
1976	32 200	4 800						10 200	19 700	100	67 000
1977	33 100	4 900						20 500	39 400	100	98 000
1978	2 600	400						1 700	3 300	10	8 010
1979	5 200	800						6 100	11 800	10	23 910
1980	7 000	1 000						6 800	13 100	10	27 910
1981	7 000	1 000						8 500	16 400	100	33 000
1982	6 100	900						8 500	16 400	100	32 000
1983	8 700	1 300			1 300	1 700	400	9 100	17 410	100	40 010
1984	8 700	1 300			1 700	2 300	600	12 100	23 210	100	50 010
1985	8 700	1 300			1 500	1 900	500	10 300	19 710	100	44 010
1986	14 800	2 200			3 500	4 700	1 100	24 800	47 700	200	99 000
1987	14 800	2 200			6 800	9 000	2 200	47 700	91 900	300	174 900
1988	7 100	1 100	7 400		10 300	13 700	3 300	72 500	139 600	500	255 500
1989	5 500	800	5 700		8 200	11 000	2 600	57 800	111 400	400	203 400
1990	9 407	4 011	14 675	1 058	660	9 646	1596	1 765	86 316	79 716	208 851
1991	24 847	5 099	29 160	2 574	1 748	8 244	6 798	1 180	77 359	55 711	212 720
1992	35 878	12 117	24 509	2 541	2 496	17 039	11 252	754	69 226	36 355	212 167
1993	35 405	10 114	21 721	1 050	3 635	14 258	7 492	1 039	85 480	11 799	191 994
1994	18 152	7 158	35 602	1 547	865	8 562	2 246	1 647	98 312	18 293	192 384
1995	32 386	11 341	34 918	3 192	2 089	7 254	4 375	2 384	55 008	23 840	176 787
1996	38 978	18 739	59 279	3 659	1 666	9 249	2 379	4 244	45 538	25 907	209 639
1997	47 592	19 104	55 883	5 038	6 573	11 467	4 074	7 992	67 787	21 242	246 752
1998	61 561	24 402	45 007	4 579	9 149	10 181	6 263	7 769	73 109	27 202	269 222
1999	55 130	25 287	39 608	3 237	7 983	11 238	5 211	7 218	52 787	36 827	244 526
2000	40 659	18 931	39 283	4 080	13 985	13 820	6 377	14 136	67 195	23 952	242 419
2001	37 041	16 383	32 420	4 759	11 391	12 690	7 039	21 574	49 303	37 257	229 858
2002	29 964	10 177	21 620	5 485	9 018	7 456	14 209	21 825	50 450	25 298	195 501
2003	26 963	13 004	34 339	9 812	7 921	3 485	9 152	16 479	44 103	19 401	184 659
2004	22 723	8 343	38 818	7 821	4 778	2 604	4 687	18 784	15 184	11 995	135 736
2005	25 081	6 389	23 032	4 827	2 654	2 293	1 399	7 893	21 242	9 459	104 269
2006	23 997	11 237	19 836	2 148	1 232	4 843	883	5 220	19 001	15 985	104 383
2007	32 303	6 534	17 796	2 967	1 780	5 388	651	3 109	23 936	6 541	101 006
2008	31 872	6 601	15 587	5 294	2 801	4 557	1 525	914	17 085	3 082	89 317
2009	32 579	7 292	14 836	3 480	2 201	6 394	1 326	1 151	16 837	2 705	88 801
2010	33 692	6 972	15 697	1 943	2 527	8 365	1 550	2 933	31 173	2 357	107 209
2011	32 948	9 846	11 646	2 157	3 272	7 805	1 657	7 509	36 552	5 411	118 802
2012	33 802	7 412	12 876	4 405	2 973	11 195	1 988	8 487	36 479	10 492	130 108
2013	31 400	8 183	15 266	5 445	4 257	7 819	2 518	6 858	35 649	14 181	131 575
2014	30 945	7 075	14 596	3 613	5 784	7 406	7 115	10 355	44 435	15 019	146 343
2015	36 886	7 262	16 162	4 250	4 575	9 370	3 013	13 388	51 146	15 477	161 528

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2016	29 848	9 537	15 432	5 311	2 406	2 716	1 644	16 172	38 321	15 333	136 720
2017	34 802	8 355	12 739	5 440	2 494	6 046	4 923	16 764	33 299	16 706	141 567
2018	31 313	9 021	18 060	4 924	3 693	4 917	7 008	17 087	19 352	20 045	135 419
2019	29 907	6 181	18 972	10 605	2 441	4 367	2 494	14 990	15 369	17 134	122 460
2020	25 895	4 766	15 101	9 658	3 013	3 906	1 211	13 728	18 207	12 250	107 736
2021	31 262	4 126	11 044	9 655	4 105	3 702	1 539	9 985	12 422	12 981	100 821
2022	28 784	4 345	8 335	9 690	3 052	2 704	2 625	9 748	10 701	11 682	91 666
2023	34 386	4 890	12 014	10 898	5 065	2 582	5 285	10 321	7 851	12 267	105 557
2024	34 386	4 890	12 014	10 898	5 065	2 582	5 285	10 321	7 851	12 267	105 557

The estimable parameters of the assessment model were unfished biomass, year-class strengths for 1975-2019 (two stock models) or 1975-2020 (one stock model), catchability (Q) for the each of the surveys, the values determining the parameters of the selectivity ogives, and parameters governing the migration between the CR and SA. The priors for acoustic survey Q (lognormal) were defined by: a mean of 0.55 and a CV 0.90 for the CS and ESCI and a mean of 0.39 and a CV of 0.77 for the WCSI (O' Driscoll at al., 2016). There were 17 selectivity ogives (11 for the eastern and western spawning and non-spawning fisheries, and six for the trawl surveys on the CR and the SA), and two migration curves. (CR to SA, for each of males and females).

The 2024 assessment was based two model configurations:

- **Model 1:** Two spawning stocks, which spawn in CS and off the WCSI. Recruits from both stocks reside on the CR as juveniles. Western-spawned fish migrate to the SA (with the movement ogive estimated). Mature West Coast-stock fish migrate from the SA to the WCSI to spawn, and mature CR-stock fish move from the CR to CS to spawn. After spawning, all mature fish return (WC to SA and CS to CR). Natural mortality for males and females is set to 0.3yr^{-1} and 0.22yr^{-1} respectively, with stock-recruitment steepness set to 0.75.
- **Model 2:** A model with one spawning stock, which spawns on the CS and WCSI, but retains the spatial, temporal and fishery structure of Model 1. Recruits from both spawning grounds reside on the CR as juveniles. A fixed estimated proportion of fish by sex migrate to the SA. These fish effectively become 'western stock' fish as they never return to the CR. Mature fish migrate from the SA to the WCSI to spawn and similarly from the CR to the CS to spawn. After spawning, all mature fish return (WCSI to SA and CS to CR).

The assessment examined the sensitivity of the results to values for natural mortality, stock-recruitment steepness, and the maturation ogive using Maximum Posterior Density estimates (the main model results are based on Bayesian sampling using MCMC). The sensitivity tests in which natural mortality was lowered from its base-case value led to the most pessimistic results as expected (Table 8 of McGregor & Langely, 2024). The MCMC algorithm used to sample from the posterior was improved for the 2024 assessment (FNZ, 2024Ho).

Figure 3 shows the fit of the models 1 and 2 to the biomass indices. The fits are all adequate. The fits to the age-composition data are also adequate (Figures 51-67 of McGregor & Langely, 2024).

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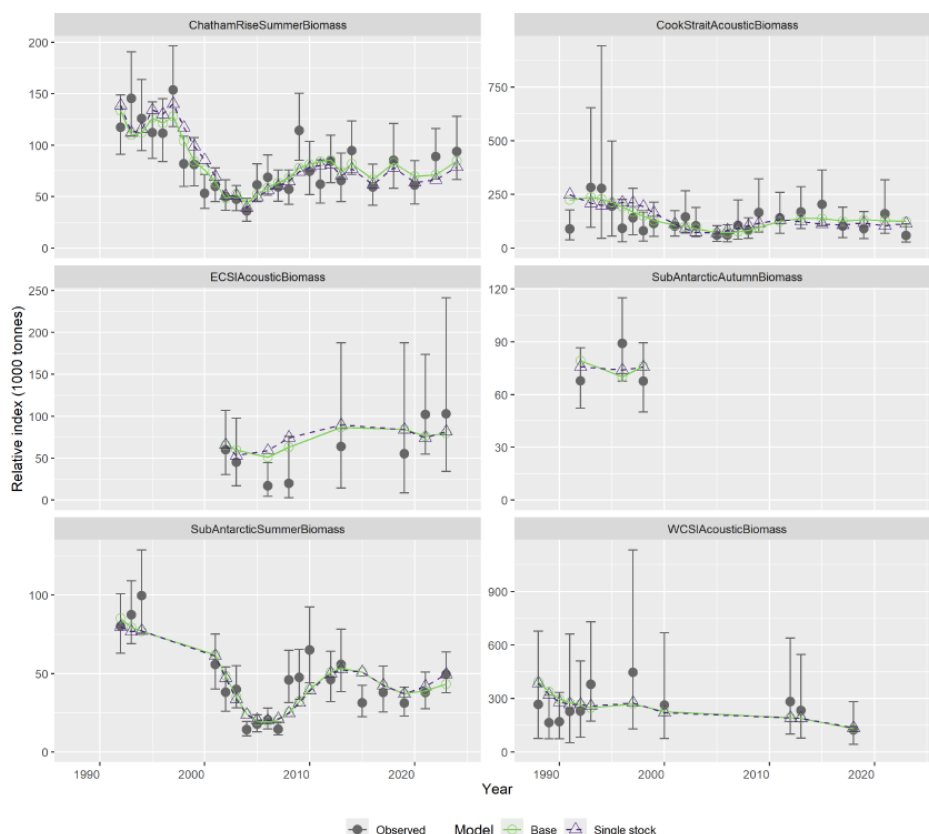


Figure 3. Fits the biomass indices used in the base and single-stock model; error bars are 95% confidence intervals. (Source: McGregor & Langely, 2024).

Biomass and recruitment

The biomasses of both stocks were at their lowest points from about 2004 to 2006 ($\sim 0.3B_0$ for the eastern stock and $\sim 0.2B_0$ for the western stock) for the base model (Figure 4), after the western stock experienced seven consecutive years of poor recruitment from 1995 to 2001 inclusive, and the eastern stock had below average recruitment over the same period (Figure 5). Both stocks then increased to above the target range of $0.35\text{--}0.5B_0$, then declined, with the eastern stock now near the top of the target range and the western stock near the lower limit of the target range. Recruitment to the western stock following the 1995–2001 period of poor recruitment remained low for two more years then was estimated to have been above average for about five years before dropping again, with recruitment below average for 2011–2019. The recruitment patterns were similar for the eastern stock over these years, except for two strong year classes in 2011 and 2015 (Figure 5).

The exploitation rate for the eastern stock corresponds to the center of the management target range whereas the exploitation rate for the western stock is lower than that corresponding to the upper limit of the management target range (Figure 6).

The 2024 depletion (biomass relative to B_0) of the eastern stock was estimated to be 0.51 (95% confidence interval 0.41–0.62) while the 2024 depletion of western stock was estimated to be 0.41 (95% confidence interval 0.34–0.50). The 2024 depletion of HOK1 in total was estimated to be 0.45 (95% confidence interval 0.40–0.50) (Table 34). The probability of 2024 biomass being below the soft limit was estimated to be <0.01 for both stocks, with the probability of being below the lower limit of management target range being <0.01 for HOK 1 East and 0.052 for HOK 1 West (Table 34). The 2024 depletion of HOK 1 based on the single-stock model is similar to that of the two-stock model (0.46; 95% confidence interval 0.40–0.52).

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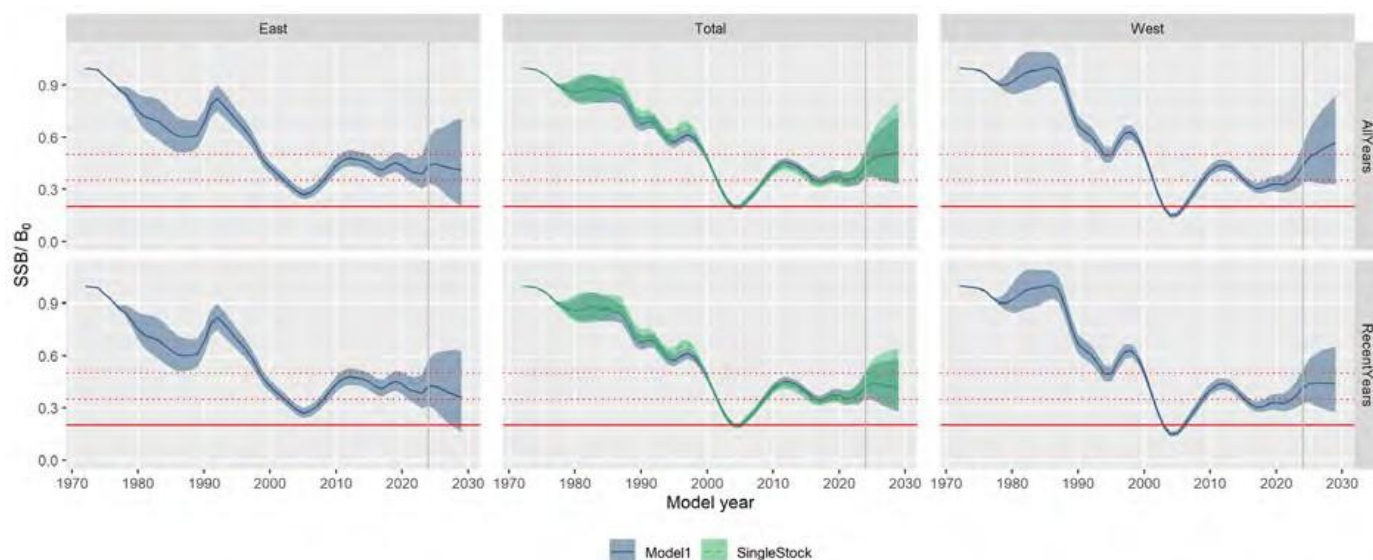


Figure 4. Projected spawning biomass (as % B_0) from model 1 (blue) and model 2 (green) under two recruitment scenarios: recent (2010–2019 (model 1) 2010–2020 (model 2) (bottom); long-term (1975–2019 (model 1) 1975–2020 (model 2) (top), for the eastern stock (left), total (middle), and western stock (right), with catches assumed at the current TACC (110,000 t). The horizontal dotted red lines represent the target management range of 0.35–0.50 B_0 . The horizontal solid red line shows 0.2 B_0 . Shaded areas give 95% CIs, and central line gives median SSB/B_0 . (Source: FNZ, 2024).

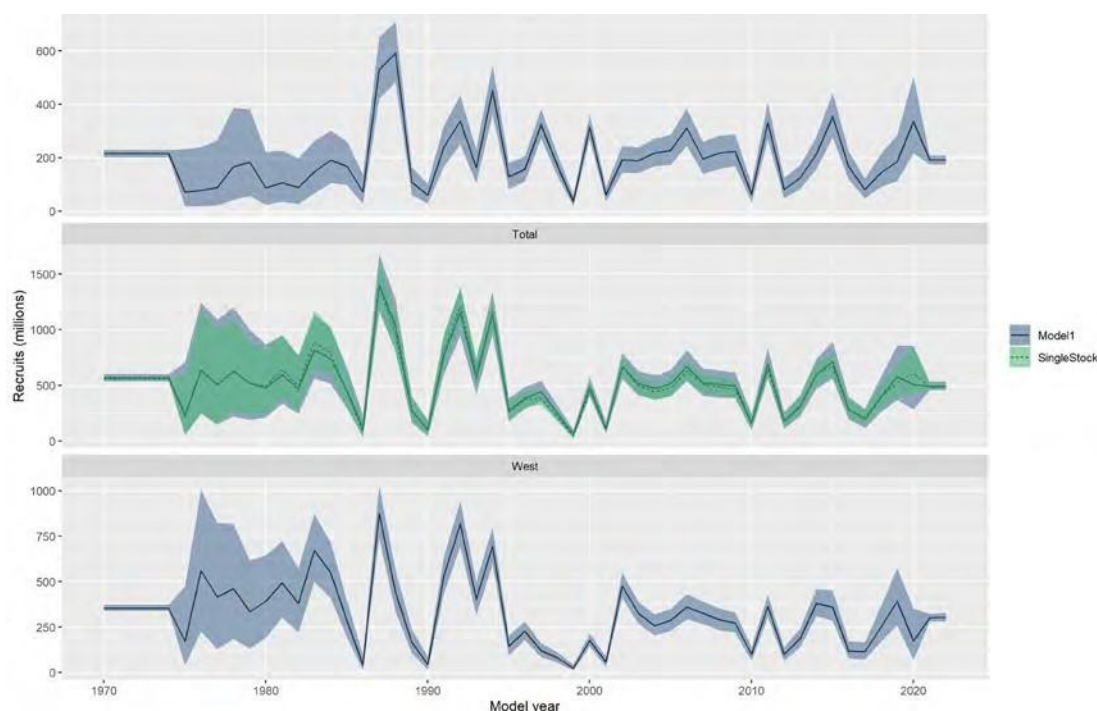


Figure 5. Recruits (millions) for the eastern (top), total (middle) and western (bottom) stocks from model 1 (blue) and model 2 (green) from MCMC samples. Shaded areas are 95% CIs; solid lines are median values. Years are model years (1990 = 1989–90). (Source: FNZ, 2024).

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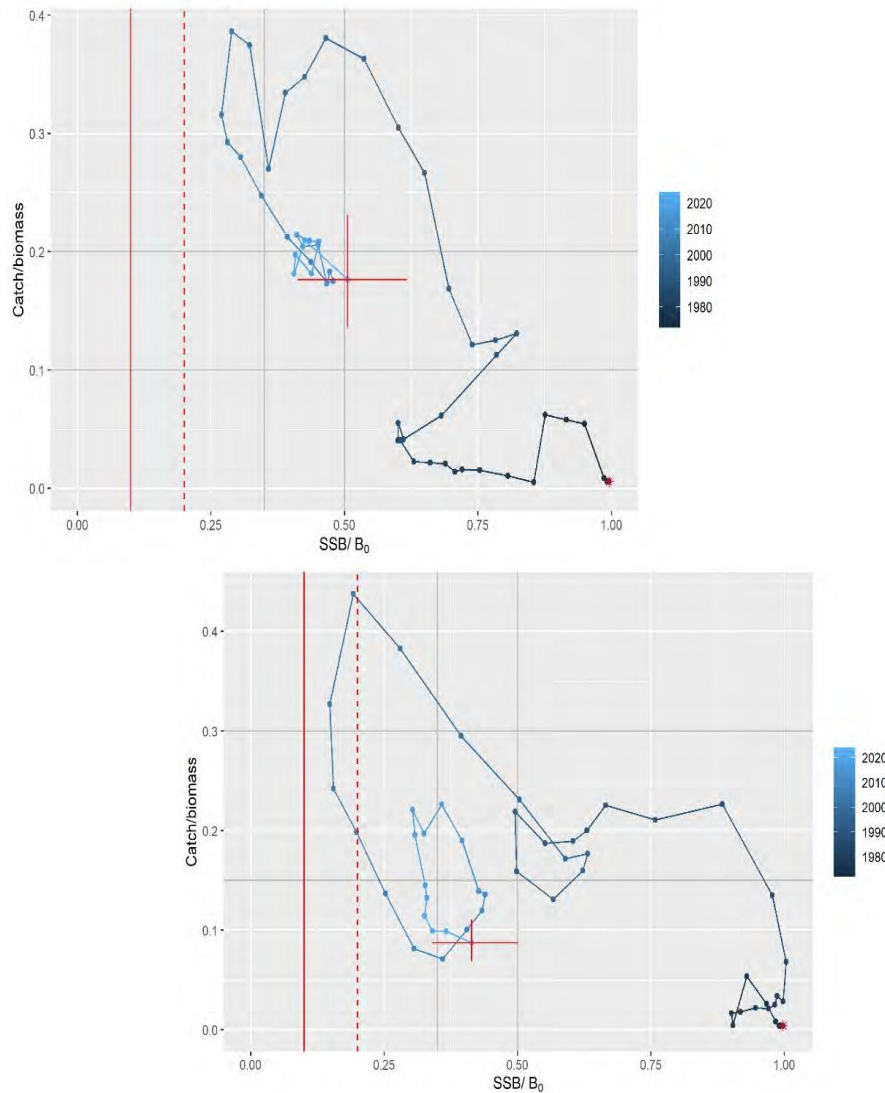


Figure 6. Trajectories over time of fishing intensity (U ; Catch/mid-season SSB) and relative spawning biomass (SSB/B_0), for the eastern hoki stock (left panel) and the western hoki stock (right panel) from the start of the assessment period in 1972 (represented by a red asterisk) to 2023 (centre of red cross). The red solid vertical line at $0.1B_0$ represents the hard limit, the red dashed line at $0.2B_0$ is the soft limit, and the grey lines represent the management target ranges in biomass and fishing intensity, with fishing intensity estimated in the 2024 assessment using long-term recruitment. Biomass and fishing intensity. (Source: FNZ, 2024).

Table 34. Bayesian median estimates (95% credible intervals) (MCMC) of B_0 , B_{2024} , and B_{2024} as a percentage of B_0 for two HOK 1 models. “E” denotes the east stock, “W” denotes the west stock, and “T” denotes the total. (Source: FNZ, 2024; McGregor and Langley, 2024).

Model	B_0 ('000t)			B_{2024} ('000t)			B_{2024}/B_0		
	E	W	T	E	W	T	E	W	T
Model 1	696	1198	1894	352	496	852	51	41	45
	[652, 743]	[1152, 1251]	[1804, 1994]	[269,459]	[392, 627]	[723, 999]	[41,62]	[34, 50]	[40,50]
Model 2			1957			893			46
			[1902,2020]			[761, 1051]			[40,52]

Model	$P(< 0.4B_0)$			$P(< 0.35B_0)$			$P(< 0.2B_0)$		
	E	W	T	E	W	T	E	W	T
Model 1	0.02	0.364	0.03	<0.01	0.052	<0.01	<0.01	<0.01	<0.01

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Projections

Five-year projections were conducted for models 1 and 2 by randomly selecting future recruitments based on two scenarios: (i) recruitments estimated for 2010–2019 (model 1) and 2010–2020 (model 2) (recent recruitment), and (ii) recruitments estimated for 1975–2019 (model 1) and 1975–2020 (model 2) (long-term recruitment). The projections involved a TACC of 110,000t (45,000t western stock, 65,000t eastern stock). The projections indicated that the eastern biomass would remain constant under long-term recruitment and decline over the next 5 years under recent recruitment but would likely remain within the target range. The western biomass was projected to increase under long-term recruitment and remain constant within the target range under recent recruitment (FNZ, 2024).

10.1.1.3.2 Hake (HAK 1; Sub Antarctic)

The most recent stock assessment of the Sub-Antarctic stock (HAK 1) was conducted during 2021 (FNZ, 2024). It involved a data summary (Dunn et al., 2021a) and the use of CASAL to fit a population dynamics model, estimate stock status relative to management reference points and conduct projections (Dunn et al., 2021b) and considered the period 1974–2021.

Model structure

The 2021 assessment was based on a two-sex age-structured population dynamics model, with the model year taken to be September to August, which led to the catch series in Table 1 of Dunn et al. (2021b), where the catch for 2021 was set equal to the average of the most recent five years with catch data. The catch history for the fishery was split into summer and winter based on the relative reported catches in each season. The selectivity patterns for the summer and winter fisheries were assumed to be the same because age data for the winter period were not available to allow the winter fishery selectivity to be estimated.

The model considered ages 1–30yr, with age 30 taken to be a plus-group. The population was assumed to be unfished equilibrium at the start of the modelled period (1974) and recruitments for the years 1974–2016 were estimated. Table 35 summarizes the annual cycle of the model. Maturity and growth were pre-specified based on auxiliary analyses, with natural mortality assumed to be constant and independent of time (see Table 36 for the values for the biological parameters).

Table 35. Annual cycle of the model for HAK 1, showing the processes taking place at each time step, their sequence within each time step, and the available observations. Fishing and natural mortality that occur within a time step occur after all other processes with half of the natural mortality for that time step occurring before and half after the fishing mortality. (Source: FNZ, 2024).

Step	Period	Processes	M*	Age†	Observations	
					Description	%Z‡
1	August-Mar	Ageing	0.58	0.2	Commercial catch-at-age	0.5
		Recruitment			Trawl catch-at-age	0.5
		Summer trawl fishery (~78%)			Trawl survey (November)	0.5
		Maturation and spawning			CPUE (sensitivity)	0.5
2	Apr-July	Winter trawl fishery (~22%)	0.42	0.5	Trawl survey (April)	0

Table 36. Biological parameters for HAK 1. (Source: Dunn et al., 2021b).

(a) Natural mortality, growth, and stock-recruitment

Relationship	Reference	Parameter (units)	Both		
			Both	Male	Female
Natural mortality ¹	Horn & Francis (2010)	M (yr ⁻¹)		0.19	0.19
von Bertalanffy growth	Dunn et al. (2021a)	t_0 (y)		-0.71	-1.33
		k (yr ⁻¹)		0.26	0.16
		L_∞ (cm)		89.3	114.5

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		CV	0.07	0.09
Length-weight	Dunn et al. (2021a)	a (g.cm ⁻¹)	2.34e-6	1.86e-6
		b	3.258	3.31
Stock recruitment relationship				
Stock recruitment steepness	Horn & Francis (2010)	h	0.8	
Recruitment variability ²		σ_R	1.1	
Ageing error	Horn & Francis (2010)	CV	0.08	
Proportion male at birth			0.5	
Proportion of mature that spawn			1	
Maximum exploitation rate		U_{max}	0.7	

1. Estimated in the base case assessment model; 2. Calculated in projections from the model Markov chain Monte Carlo runs

(b) Maturity-at-age

Age	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Male	0.01	0.03	0.09	0.22	0.46	0.71	0.88	0.96	0.98	1.00	1.00	1.00	1.00	1.00
Female	0.01	0.02	0.05	0.11	0.23	0.43	0.64	0.81	0.91	0.96	0.98	0.99	1.00	1.00

The model was fitted to time-series of survey estimates of abundance, survey age-composition data, CPUE, and fishery age-composition data (Table 37). Fishery selectivity was assumed to be logistic while it was assumed to be double-normal (domed) for each of the November-December and April-May trawl surveys. All selectivity patterns were assumed to be time-invariant.

Table 37. Summary of the relative abundance series applied in the models for HAK 1. (Source: FNZ, 2024).

Data series	Model years
Trawl survey biomass (Tangaroa, November)	1992–94, 2001–10, 2012–13, 2015, 2017, 2019, 2021
Trawl survey proportion-at-age (Tangaroa, November)	1992–94, 2001–10, 2012–13, 2015, 2019, 2021
Trawl survey biomass (Tangaroa, April)	1992–93, 1996, 1998
Trawl survey proportion-at-age (Tangaroa, April)	1992–93, 1996, 1998
CPUE	1991–2020
Commercial trawl proportion-at-age	1990, 1992–1994, 1996, 1998–2020

The estimable parameters of the assessment model were unfished biomass, year-class strengths for 1974-2016, catchability (Q) for the trawl survey and for CPUE, the values determining the parameters of the selectivity ogives, and natural mortality. The bounds and priors for the parameters are listed in Table 8 of Dunn et al. (2021a). The prior for survey Q (lognormal with a mean of 0.16 and a CV 0.79) was the product of areal availability (0.50–1.00), vertical availability (0.50–1.00), and vulnerability (0.01–0.50) (Dunn et al., 2021b). The prior for natural mortality (M) was assumed to be normal, with mean 0.19 yr⁻¹ and standard deviation 0.05, based on previous stock assessments. A sensitivity with a prior for M with mean 0.19 yr⁻¹ and standard deviation of 0.2 was also investigated (see Table 9 of Dunn et al., 2021b for the sensitivities examined using MPD fits). These tests included inclusion of fishery CPUE data, and exploration of the effects of incidental mortality and unreported catch prior to the introduction of the QMS.

The model fitted the biomass indices acceptably (Figure 7) and the fits to the survey and fishery age-composition data were also acceptable (Dunn et al., 2021b; Figs 7-11).

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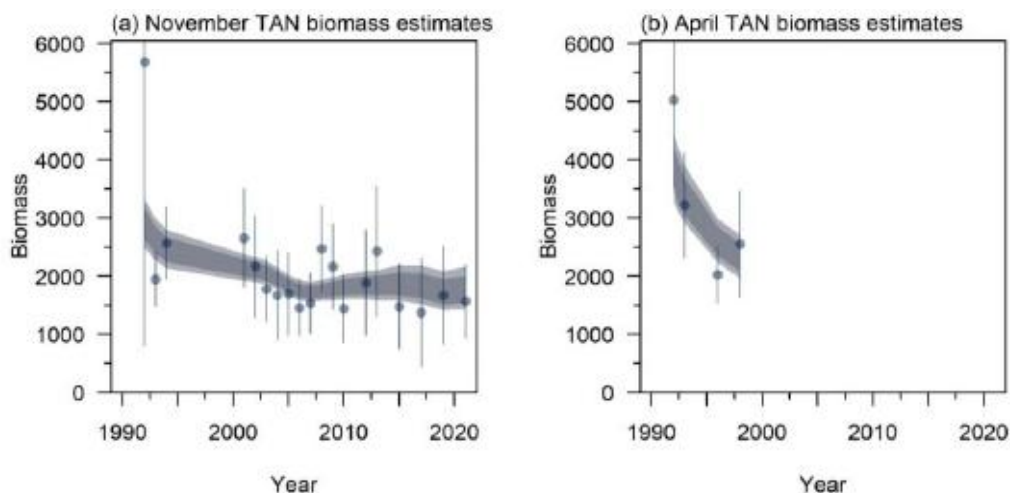


Figure 7. MCMC observed (points) and expected values for the reference model for HAK 1 to the (a) November and (b) April research trawl biomass indices. Dark shaded areas represent the 80% CIs, and light shaded areas the 95% CIs. (Source: FNZ 2024).

Biomass and recruitment

Estimated recruitment to the HAK 1 stock indicates a group of above average year-class strengths during the late 1970s, a very strong year-class in 1980, followed by a period of average to less than average recruitment through to 2016 (Figure 8). The biomass trajectory has an increase (in response to the above recruitments in the 1970s) followed by a decline and then relative stability (Figure 9). The prior for survey Q was updated substantially compared to the prior, with posterior medians of 0.033 (November series) and 0.059 (April-May series). FNZ (2024) notes that although survey Q would be expected to be higher, hake are believed to be relatively more abundant over rough ground, and it is known that they tend to school off-bottom, particularly during their spring-summer spawning season.

The base model estimate of B_0 was 59,000t, with a 2021 depletion (biomass relative to B_0) of 0.62 (95% credibility interval; 0.50-0.75) (Table 38). The probability of being below $0.4B_0$ in 2021 was estimated to be less than 1%, with a negligible probability of being below $0.2B_0$. Exploitation rates have consistently been less than that corresponding to the target biomass of $0.4B_0$ since 2006 (Figure 10).

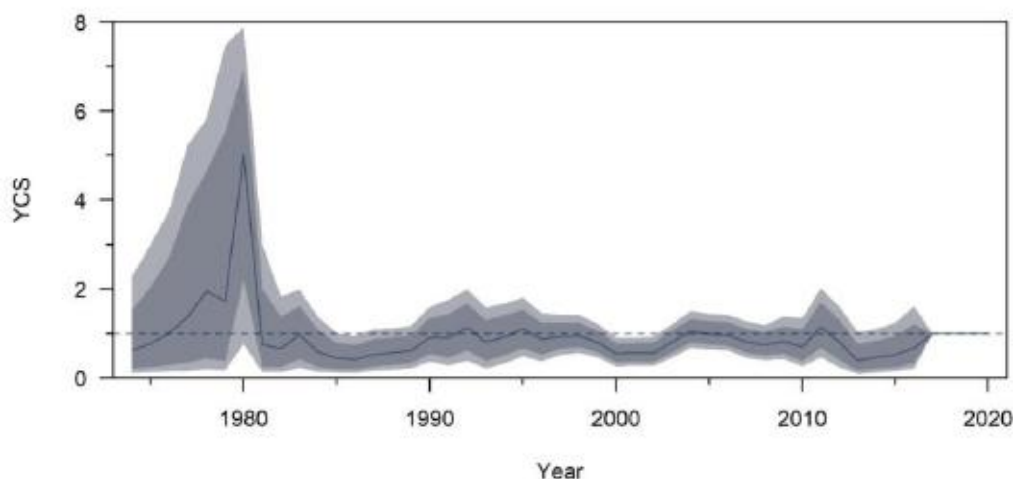


Figure 8. Estimated posterior distributions of year-class strengths for the reference case for HAK 1. The dashed horizontal line indicates a year class strength of one. Dark shaded areas represent the 80% CIs, and light shaded areas the 95% CIs. (Source: FNZ 2024).

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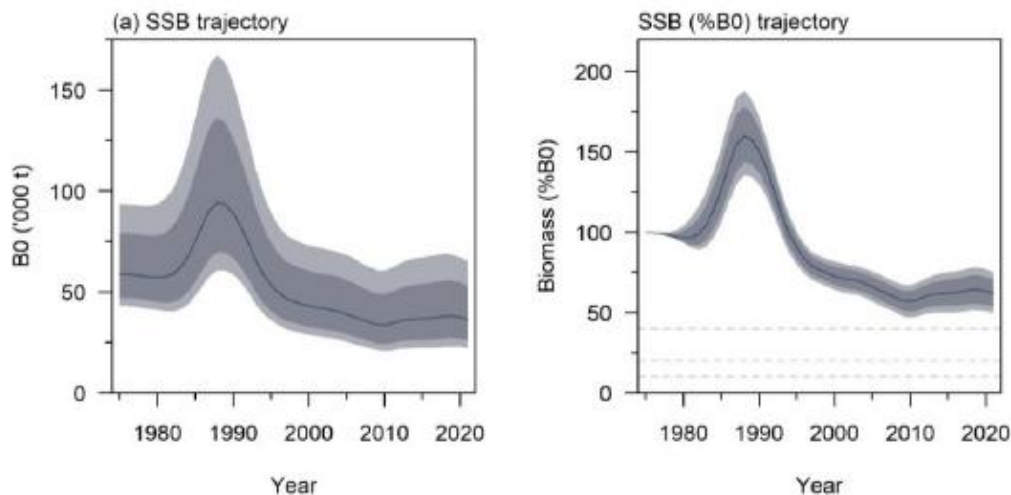


Figure 9. Reference model MCMC trajectories for absolute spawning stock biomass and spawning stock biomass as a percentage of B_0 for HAK 1. Dark shaded areas represent the 80% CIs, and light shaded areas the 95% CIs. The management target ($0.4B_0$, solid dotted horizontal line), and hard limit ($0.1B_0$, dotted horizontal line) are shown on the right-hand panel. (Source: FNZ, 2024).

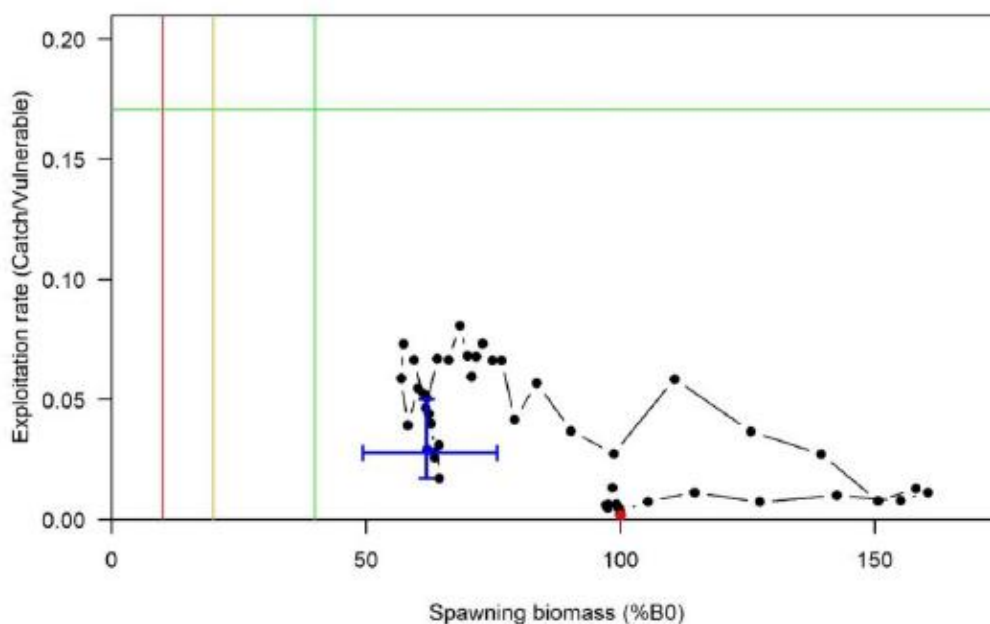


Figure 10. Trajectory over time of exploitation rate (U) and spawning biomass ($\%B_0$), for HAK 1 reference model from the start of the assessment period in 1974 (represented by a red point), to 2021 (blue cross). The red vertical line at $0.1B_0$ represents the hard limit, the orange line at $0.2B_0$ is the soft limit, and green lines are the biomass target ($0.4B_0$) and the corresponding exploitation rate ($U_{40}=0.17$ calculated using CASAL CAY calculation). Biomass and exploitation rate estimates are medians from MCMC results. (Source: FNZ 2024).

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Table 38. Bayesian median (95% credible intervals) (MCMC) of B_0 , B_{2021} , B_{2021} as a percentage of B_0 , and the probability of B_{2021} being below the target ($0.4B_0$) and the soft limit ($0.2B_0$), for the HAK 1 base model and two sensitivity runs. (Source: FNZ 2024).

Case	B_0	B_{2021}	B_{2021} (% B_0)	$P(B_{2021} < 0.4B_0)$	$P(B_{2021} < 0.2B_0)$
Base	59,000 (43,220-93,600)	36,490 (22,250-65,510)	62 (50-75)	<0.01	<0.01
$M=0.15\text{yr}^{-1}$	40,440 (36,050-46,170)	20,990 (14,970-28,760)	52 (41-64)	0.02	<0.01
$M=0.23\text{yr}^{-1}$	75,130 (55,310-110,190)	51,700 (33,480-85,480)	68 (55-84)	<0.01	<0.01

Projections

Projections were undertaken for the current catch (1,066t) and the TACC (3,701t). Spawning biomass was predicted to be stable under the current catch but to decline under the TACC. However, the probability of spawning biomass dropping below $0.2B_0$ under the current TACC was less than 2% (FNZ, 2024).

10.1.1.3.3 Hake (HAK 4; Chatham Rise)

Most recent stock assessment of the Sub-Antarctic stock (HAK 4 and HAK 1 north of the Otago Peninsular) was conducted during 2020 (FNZ, 2024). It involved the use of CASAL to fit a population dynamics model, estimate stock status relative to management reference points and conduct projections (Holmes, 2021), and considered the period 1975 to 2020.

Model structure

The 2020 assessment was based on a two-region single-sex age-structured population dynamics model, with the model year taken to be September to August. The fishery on the Chatham Rise was stratified using a tree-based regression on mean lengths of hake in tows where observers had measured five or more hake (Horn & Dunn, 2007). The defined strata are shown in Figure 11. Mean fish length tends to increase from west to east, and with increasing depth. Area 404 (equivalent to Statistical Area 404) includes a known spawning ground. However, Horn & Francis (2010) showed that the two western fisheries had similar age-frequency distributions, and the two eastern fisheries were data poor. Consequently, they used two strata, eastern and western, divided at 178.1°E , and this distinction was maintained for the 2020 assessment. Table 39 shows the resulting catch series.

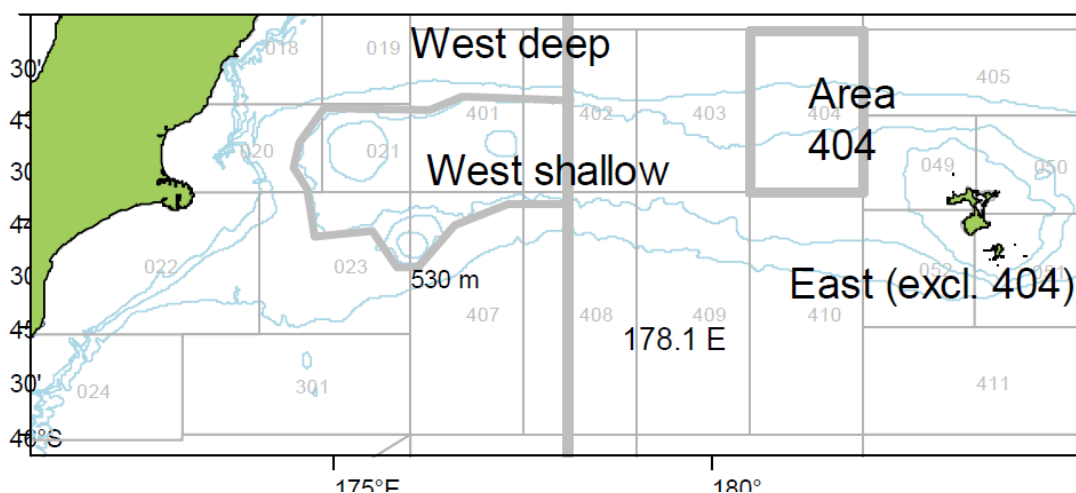


Figure 11. Fishery strata defined for the Chatham Rise hake fishery. Large numbers show longitudes or depths of fishery boundaries; small numbers denote statistical areas. The stratum boundary defined by depth (530 m) is shown only approximately. Isobaths at 1000, 500, and 250 m are also shown. (Source: Holmes, 2021).

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Table 39. Commercial catch history (t) by fishery (West and East) and in total, for HAK 4. The totals by model year from 1990 differ from those for fishing year because the September catch has been shifted from the fishing year into the following model year. The 2020 values are the averages for those for 2016 to 2020. (Source: FNZ, 2024).

Model Year	West	East	Total	Model year	West	East	Total
1975	80	111	191	1998	1 424	1 124	2 547
1976	152	336	488	1999	1 169	3 339	4 509
1977	74	1 214	1 288	2000	1 155	2 130	3 285
1978	28	6	34	2001	1 208	1 700	2 908
1979	103	506	609	2002	454	1 058	1 512
1980	481	269	750	2003	497	718	1 215
1981	914	83	997	2004	687	1 983	2 671
1982	393	203	596	2005	2 585	1 434	4 019
1983	154	148	302	2006	184	255	440
1984	224	120	344	2007	270	683	953
1985	232	312	544	2008	259	901	1 159
1986	282	80	362	2009	1 084	838	1 922
1987	387	122	509	2010	275	134	409
1988	385	189	574	2011	777	165	942
1989	386	418	804	2012	108	101	209
1990	309	689	998	2013	249	117	366
1991	409	503	912	2014	109	96	205
1992	718	1 087	1 805	2015	139	83	222
1993	656	1 996	2 652	2016	249	209	458
1994	368	2 912	3 280	2017	302	124	426
1995	597	2 903	3 500	2018	228	173	401
1996	1 353	2 483	3 836	2019	364	93	457
1997	1 475	1 820	3 295	2020*	286	150	436

The model considered ages 1-30yr, with age 30 taken to be a plus-group. The population was assumed to be at unfished equilibrium at the start of the modelled period (1975) and recruitments for the years 1975-2017 were estimated. Table 40 summarizes the annual cycle of the model. Maturity and growth were pre-specified based on auxiliary analyses, with natural mortality assumed to be constant and independent of time (see Table 41. for the values for the biological parameters). Selectivity was assumed to be double-normal for the west fishery and the survey, and logistic for the east fishery, with selectivity assumed to be time-invariant.

Table 40. Annual cycle of the HAK 4 model, showing the processes taking place at each time step, their sequence within each time step, and the available observations. Fishing and natural mortality that occur within a time step occur after all other processes, with half of the natural mortality for that time step occurring before and half after the fishing mortality. (Source: FNZ, 2024).

Step	Period	Processes	M ¹	Age ²	Observations	
					Description	%Z ³
1	Sep-Feb	Fishing, recruitment & Spawning	0.42	0.25	January trawl survey CPUE (sensitivity)	100 50
2	Mar-May	None	0.25	0.50		
3	Jan-Aug	Increment age	0.33	0.00		

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1. M is the proportion of natural mortality that was assumed to have occurred in that time step; 2. Age is the age fraction, used for determining length-at-age, that was assumed to occur in that time step; 3. %Z is the percentage of the total mortality in the step that was assumed to have taken place at the time each observation was made.

Table 41. Biological parameters for HAK 4. (Source: Holmes, 2021; FNZ 2024).

(a) Natural mortality, growth, and stock-recruitment															
Relationship				Reference				Parameter		Both		Male		Female	
								(units)							
Natural mortality				Dunn et al. (2000)				M (yr ⁻¹)		0.19		0.20		0.18	
von Bertalanffy growth				Horn (2013)				t_0 (y)				0.09		0.01	
								k (yr ⁻¹)				0.330		0.229	
								L_∞ (cm)				85.3		106.5	
Schnute growth curve				Horn (2008)				y_1 (cm)		24.5		24.6		24.4	
								Horn & Francis, (2010)				y_1 (cm)		104.8	
				a		0.131						0.184		0.098	
				b		1.700						1.742		1.764	
				CV		0.1		0.1		0.1					
Length-weight				Horn (2013)				a (g.cm-1)		2.00 x10-9		2.56 x10-9		1.88 x10-9	
								b		3.288		3.228		3.395	
Stock recruitment relationship															
Stock recruitment steepness								h		0.84					
Recruitment variability								σ_R		1.0					
Ageing error								CV		0.08					
Proportion male at birth										0.5					
Proportion of mature that spawn										1					
Maximum exploitation rate								U_{max}		0.7					
(b) Maturity-at-age															
Age	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Male	0.01	0.03	0.09	0.22	0.46	0.71	0.88	0.96	0.98	1.00	1.00	1.00	1.00	1.00	
Female	0.01	0.02	0.05	0.11	0.23	0.43	0.64	0.81	0.91	0.96	0.98	0.99	1.00	1.00	

The model was fitted to time-series of survey estimates of abundance, survey age-composition data, CPUE (sensitivity only) and fishery age-composition data (Table 42).

Table 42. Summary of the relative abundance series applied in the models for HAK 4. (Source: Holmes, 2021).

Data series	Model years
Trawl survey proportion at age (<i>Tangaroa</i> , Jan)	1992–2014, 2016, 2018, 2020
Trawl survey biomass (<i>Tangaroa</i> , Jan)	1992–2014, 2016, 2018, 2020
CPUE (trawl, Chatham East)	1990–2019
CPUE (trawl, Chatham West)	1990–2019
CPUE (trawl, whole Chatham Rise)	1990–2019
Commercial trawl proportion-at-age (Chat observer data West) (all year); unsexed	1992, 1994–2006, 2008–2011, 2014, 2016
Commercial trawl proportion-at-age (Chat observer data East) (all year); unsexed	1992, 1995, 1997–1998, 2001, 2004, 2007, 2015

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The estimable parameters of the assessment model were unfished biomass, year-class strengths for 1975-2017, catchability (Q) for the trawl survey and for CPUE, and the values determining the parameters of the selectivity ogives. The bounds and priors for the parameters are listed in Table 8 of Holmes (2021). The prior for survey Q (lognormal with a means of 0.16 and a CV 0.79) matched that for the assessment of HAK 1. A base-case model and four sensitivity analyses were conducted ("High M ", "Low M ", "All double normal", and "with-east CPUE"), with the results robust to changing M , assuming double normal instead of logistic selectivity for the east commercial fishery, and including a CPUE series for the east commercial fishery.

The model fitted the biomass indices acceptably (Figure 12) and the fits to the survey and fishery age-composition data were also acceptable (Appendices B and C of Holmes, 2021).

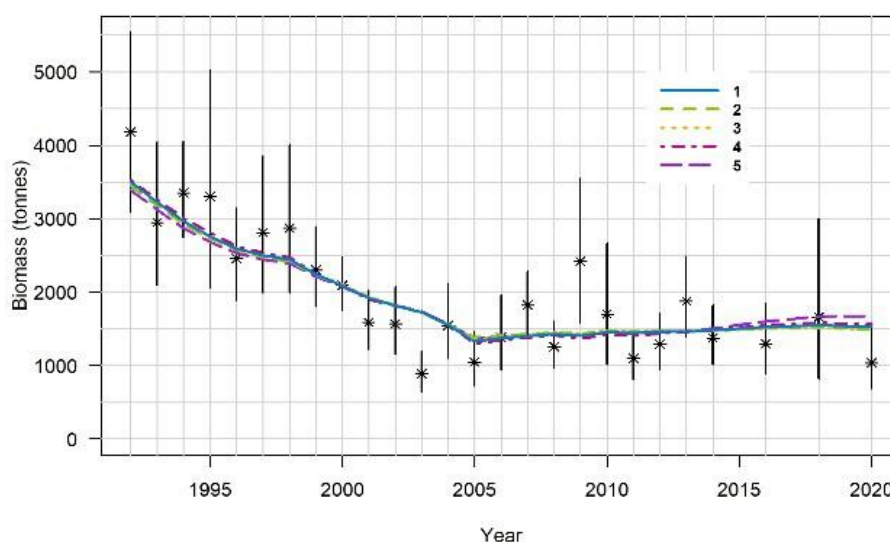


Figure 12. MPD fits to biomass indices for the trawl survey for HAK 4: (1) Base run, (2) Old base run, (3) High M run, (4) Low M run, (5) CPUE-east run. Vertical lines show the 95% confidence intervals (Source: Holmes, 2021).

Biomass and recruitment

Estimated recruitment was high during the late 1970 to early 1980s and again during the early 1990s, there was a very strong year class in 2002, and less than average recruitment from 2014 (Figure 13). The biomass increased slightly during the 1980s and then declined until 2006. The biomass increased again as the strong 2002 recruitment entered the population, and again from 2016 as the 2011 year-class entered the population (Figure 14). The probability of being below $0.4B_0$ in 2020 was estimated to be 0.01, with a negligible (<1%) probability of being below $0.2B_0$. (Table 43). Exploitation rates have consistently been estimated to be less than that corresponding to the target biomass of $0.4B_0$ since 2006 (Figure 15).

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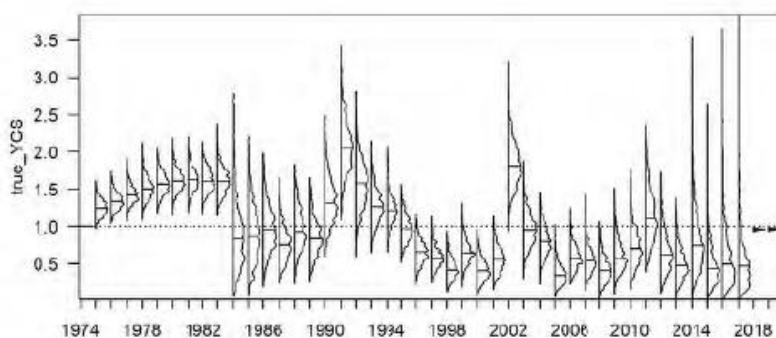


Figure 13. Estimated posterior distributions of year-class strengths for the base case model for HAK 4. The dashed horizontal line indicates a year-class strength of one. Individual distributions show the marginal posterior distribution, with horizontal lines indicating the median. (Source: FNZ, 2024).

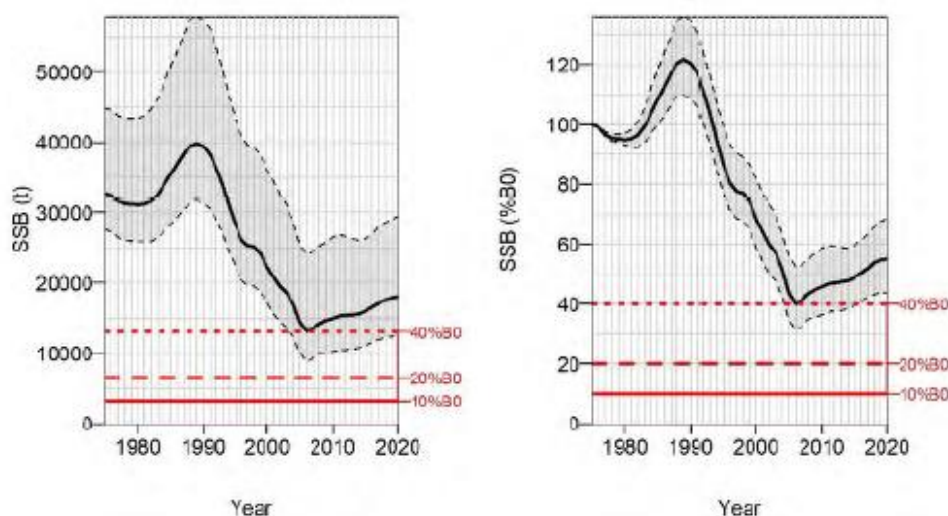


Figure 14. Estimated median trajectories (with 95% credible intervals shown as dashed lines) for the HAK 4 base model for absolute biomass and biomass as a percentage of B_0 . The management target ($0.4B_0$, solid horizontal line) and soft limit ($0.2B_0$, dotted horizontal line) are shown on the right-hand panel. (Source: FNZ, 2024).

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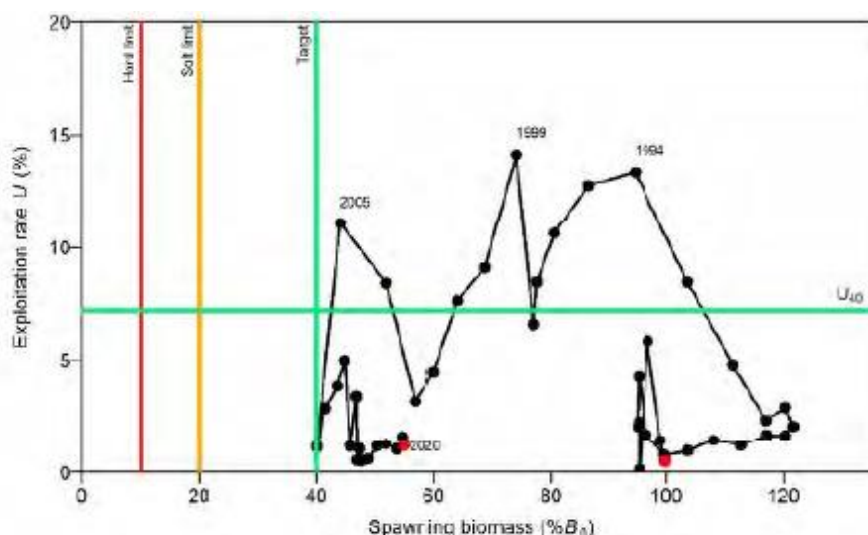


Figure 15. Trajectory over time of exploitation rate (U) and spawning biomass ($\% B_0$), for the HAK 4 base model from the start of the assessment period in 1975 (represented by a red point), to 2020. The red vertical line at $0.1B_0$ represents the hard limit, the orange line at $0.2B_0$ is the soft limit, and green lines are the biomass target ($0.4B_0$) and the corresponding exploitation rate (U_{40}). Biomass and exploitation rate estimates are medians from MCMC results. (Source: FNZ, 2024).

Table 43. Bayesian median (95% credible intervals) (MCMC) of B_0 , B_{2020} , B_{2020} as a percentage of B_0 , the probability of B_{2020} being below the management target ($0.4B_0$), and the probability of B_{2020} being below the soft limit ($0.2B_0$), for the HAK 4 base model and

Case	B_0	B_{2020}	B_{2020} ($\%B_0$)	$P(B_{2020} < 0.4B_0)$	$P(B_{2020} < 0.2B_0)$
Base	32,838 (28,280-42,721)	18,150 (12,204-27,258)	55 (46-66)	0.01	0.01
Double normal	32,859 (27,998-43,444)	18,237 (13,175-27,659)	55 (45-67)	<0.01	<0.01
CPUE	34,367 (29,504-44,113)	20,035 (15,096-28,979)	58 (50-68)	<0.01	<0.01

Projections

Catches from HAK 4 have been consistently much less than the TACC. Five-year projections were based on the base model and a catch equal to the current TACC (1,800t) or the average catch over the last six years (362t). The stock will rebuild further under catches of 362t while it will decline under a catch of 1,800t, with the probability of dropping between $0.2B_0$ by 2025 less than 1%.

10.1.1.3.4 Hake (HAK 7; West coast South Island)

The latest assessment of HAK 7 (west coast South Island) was conducted during 2024 (FNZ, 2024). The 2024 assessment (Dunn, 2024) updated the 2023 assessment (Dunn et al., 2023a,b). The 2024 assessment considered the period 1974-75 to 2023-24 and was conducted using Casal2.

Model structure

The 2024 assessment was based on a two-sex age-structured population dynamics model, with the model year taken to be October to September, which led to the catch series in Table 20, with the catch for 2023-24 set equal to that for 2022-23. The catch history for the fishery was split into 'south shallow' (south of 42.55°S and shallower than 629m), 'north shallow' (north of 42.55°S and shallower than 629m), and 'deep' (deeper than 629m) fisheries following Horn (2011).

The model considered ages 1-30yr, with age 30 taken to be a plus-group. The population was assumed to be at unfished equilibrium at the start of the modelled period (1975) and recruitments for the years 1975-2015 were estimated. Table

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44 summarizes the annual cycle of the model. Maturity and growth were pre-specified based on auxiliary analyses, with natural mortality assumed to be constant and independent of time (see Table 45 for the values for the biological parameters).

Table 44. Annual cycle of the stock assessment model for HAK 7, giving the time steps, and the timing of biological processes (ageing, recruitment, maturation, growth, natural mortality, and spawning), and observations (resource surveys and associated and associated age frequencies (*Tangaroa*) or length frequencies (*Kaharoa*), and observer age frequencies (AFs). (source: Dunn, 2024).

Step	Period	Processes	M^1	Age ²	Observations	
					Description	%Z ³
1	Oct-May	Ageing	0.67	0.5		
		Recruitment				
2	Jun-Sept	Trawl survey	0.33	0.5		
		Fishery			Commercial catch-at-age	0.5
		Maturation and spawning			Trawl survey (April)	0.5

1. M is the proportion of natural mortality that was assumed to have occurred in that time step; 2. Age is the age fraction, used for determining length-at-age, that was assumed to occur in that time step; 3. %Z is the percentage of the total mortality in the step that was assumed to have taken place at the time each observation was made

Table 45. Biological parameters for HAK 7. (Source: Dunn, 2024).

(a) Natural mortality, growth, and stock-recruitment

(d) Natural mortality, growth, and stock recruitment					
Relationship	Reference	Parameter			
		(units)	Both	Male	Female
Natural mortality ¹	Horn & Francis (2010)	M (yr ⁻¹)		0.19	0.19
von Bertalanffy growth	Dunn et al. (2021b)	t_0 (y)		-0.43	-0.98
		k (yr ⁻¹)		0.329	0.192
		L_∞ (cm)		83.1	107.0
		CV		0.07	0.10
Length-weight	Dunn et al. (2021b)	a (g.cm-1)		3.34e-06	348e-06
		b		3.175	3.177
Stock recruitment relationship					
Stock recruitment steepness	Horn & Francis (2010)	h	0.84		
Recruitment variability ²		σ_R	1.1		
Ageing error	Horn & Francis (2010)	CV	0.08		
Proportion male at birth			0.5		
Proportion of mature that spawn			1		
Maximum exploitation rate		$U_{\max}$	0.7		

1. Estimated in the base case assessment model.;2. Calculated in projections from the model Markov chain Monte Carlo runs

(b) Maturity-at-age

Age	1	2	3	4	5	6	7	8	9	10+
Male	0.00	0.01	0.05	0.27	0.22	0.73	0.95	0.99	1.00	1.00
Female	0.00	0.02	0.07	0.25	0.57	0.84	0.96	0.99	1.00	1.00

The model on which the assessment was based was fitted to time-series of survey estimates of biomass, survey age-composition data, and fishery age-composition data (Table 46). The base model was fitted to only the *Tangaroa* survey indices ('core area' 300-650m), with the *Kaharoa* survey indices included in one of the tests of sensitivity. The surveys by *Tangaroa* initially covered an area from 300-650m north of the Hokitika Canyon (the 'core area'). The survey was subsequently extended to 200-800m and then to 800-100m (FNZ, 2024). The survey remains north of the Hokitika

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Canyon so does not monitor hake in and south of the Canyon. FNZ (2024) notes that how representative the *Tangaroa* survey is of the WCSI population unknown given its spatial footprint and the fact that a substantial proportion of the catch occurs south of the Hokitika Canyon.

Fishery CPUE data have been used in previous assessments of HAK 7, but the trends in abundance from CPUE and the survey had diverged to the point that they could not be used in the same assessment (Horn, 2017; FNZ 2024). Hake smaller than about 67 cm were excluded from the survey and fishery length-compositions, and fish aged less than 5 years were excluded from the survey biomass indices and the fishery and survey age-compositions because these fish do not provide reliable indices of recruitment and make up a negligible fraction of the catch/survey biomass (FNZ, 2024).

Fishery selectivity was assumed to be logistic by sex for all fisheries and for the survey. All selectivity patterns were assumed to be time-invariant.

Table 46. Summary of the relative abundance series applied in the models for HAK 7. (Source: Dunn, 2024).

Data series	Model years
Trawl survey biomass (<i>Tangaroa</i>)	2000, 2012, 2013, 2016, 2018, 2021
Trawl survey proportion-at-age (<i>Tangaroa</i>)	2000, 2012, 2013, 2016, 2018, 2021
Trawl survey biomass (<i>Kaharoa</i> ; not used)	1992, 1994, 1995, 1997, 2000, 2003, 2005, 2007, 2009, 2011-13, 2015-19, 2021
Commercial trawl proportion-at-age (south-shallow)	1990-1993, 1997-2022
Commercial trawl proportion-at-age (north-shallow)	1990-1993, 1997-2022
Commercial trawl proportion-at-age (deep)	1990-1993, 1997-2022

The estimable parameters of the assessment model were unfished biomass, year-class strengths for 1975-2016, catchability (Q) for the trawl survey, and the values determining the parameters of the selectivity ogives by fishery/survey and sex. The bounds and priors for the parameters are listed in Table 47. The prior for the survey Q was informative and was estimated using the hake survey Q priors for other areas as a starting point because the survey series in other areas used the same vessel and fishing gear. However, the WCSI survey area in the 200–800 m depth range comprised 12,928 km², while the seabed area in that depth range in the entire HAK 7 biological stock area (excluding the Challenger Plateau) is estimated to be about 24,000 km². The mean of the Chatham Rise prior was modified accordingly (i.e., $0.16 \times 0.54 = 0.09$) because the biomass survey coverage only includes 54% of the known WCSI hake habitat.

Table 47. The assumed priors for key parameters (and transformation used when estimated) for HAK 7. The parameters are mean and CV for lognormal and normal priors, and mean and sigma for the Student's t prior. (Source: FNZ, 2024).

Parameter description	Distribution	Parameters	Bounds
B_0 (log)	Students- t (μ , σ)	$\mu=11.4$; $CV=05$	10 ; 13
Year class strengths (simplex)	Lognormal (μ , CV)	$\mu=1.0$; $CV=01.1$	-10 ; 10
Trawl survey q	Lognormal (μ , CV)	$\mu=0.09$; $CV=0.79$	0.01;1.00
Selectivities	Students- t (μ , σ)	$\mu=2-8^*$; $\sigma=30$	1 ; 25-2001*

* A range of values was used for the mean and upper bounds depending on the specific selectivity parameter.

The assessment consisted of a base model and four main sensitivity models: (1) no process error for the survey, (2) upweighted age-composition data, (3) low M (0.15yr^{-1}), and (4) high M (0.23yr^{-1}). Additional sensitivities (Dunn, 2024) explored dome-shaped selectivity for the fisheries, length-based natural mortality, alternative values for stock-recruitment steepness, and use of the juvenile age data.

The model fitted the biomass indices acceptably (Figure 16) and the fits to the survey and fishery age-composition data were also acceptable (Dunn, 2024). The assessment exhibits a fair strong retrospective pattern based on the MPD estimated (Dunn, 2024). This is attributable in large part to recruitment having been consistently below the expectation from the stock-recruitment relationship for several years.

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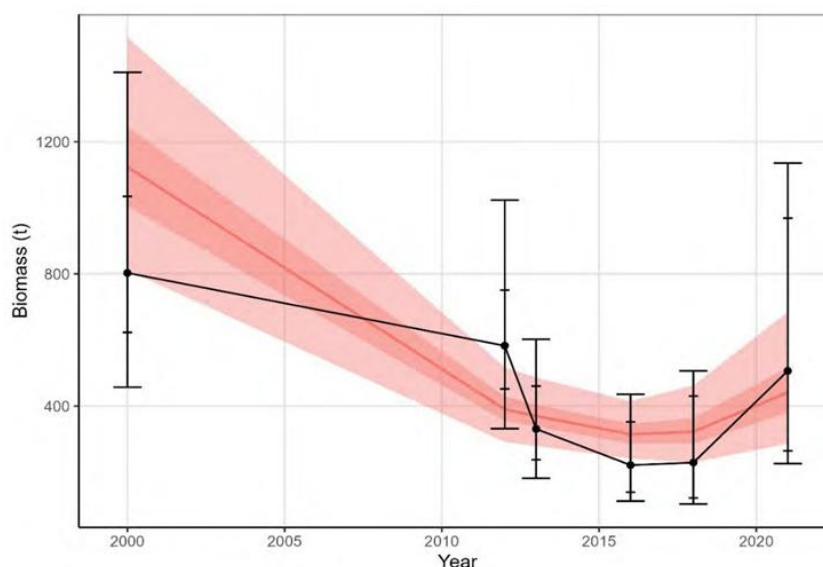


Figure 16. Base case model posterior distribution for the expected values for the Tangaroa core strata biomass survey series. Observed values (and 95% confidence intervals) are shown as vertical lines for the initial sampling CV (small ticks) and the total CV with the addition of process error (large ticks). The pink line indicates the median MCMC, with the shaded pink region giving the interquartile range (dark shading) and 95% CIs (light shading). (Source: FNZ 2024).

Biomass and recruitment

The base case model estimated that the spawning stock biomass declined throughout the late 1970s then increased through the mid-1980s, after which it declined to a nadir in 2018-19 ($0.21B_0$; 95% CI $0.16-0.3B_0$) because of higher levels of exploitation and below average recruitment (Figure 17). The spawning stock biomass increased thereafter. Recruitment was variable before 2000, with recruitment below expectation until 2015 (Figure 18).

The base model estimate of B_0 was 75,482t, with a 2024 depletion (biomass relative to B_0) of 0.47 (95% credibility interval; 0.35-0.68; Table 48). The probability of being below $0.4B_0$ in 2024 was estimated to be 0.27, with a negligible probability of being below $0.2B_0$. Estimated exploitation rates have consistently been consistent with the management target (FNZ, 2024; Figure 19). The results are, however, sensitive to how recent recruitment is modelled, with stock status estimated to be $0.39B_0$ when recent year classes were assumed to be the average during 2007-2016 instead of being the overall average (Table 48, "latest YCS").

Table 48. Bayesian median (95% credible intervals) (MCMC) of B_0 and B_{2024} (t), and B_{2024} as a percentage of B_0 and the probabilities of B_{2024} being less than the target biomass, $P(<0.4B_0)$, and the soft limit, $P(<0.2B_0)$ for HAK 7. (Source: FNZ, 2024; Dunn, 2024)

Case	B_0	B_{2024}	B_{2024} (% B_0)	$P(<0.4B_0)$	$P(<0.2B_0)$
Base	75,482 (70,834-81,830)	29,698 (16,314-56,044)	47 (34-68)	0.27	<0.01
Latest YCS	75,480 (70,830-81,830)	35,580 (24,640-54,660)	39 (23-70)	0.52	0.01

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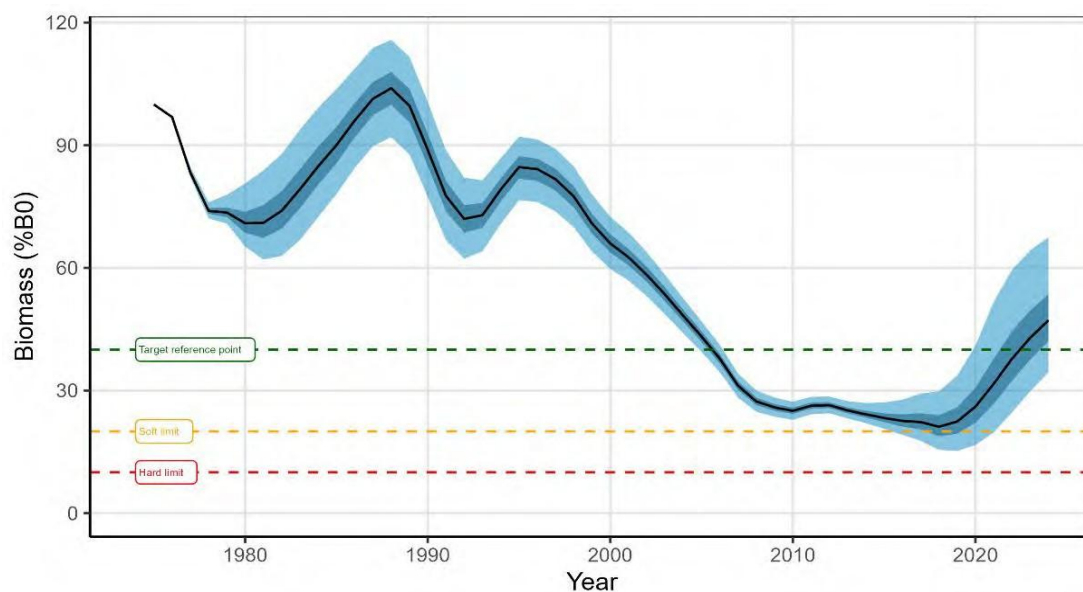


Figure 17. Posterior distribution for historical (1975-2024) stock biomass ($\%B_0$) for the base case model for HAK 7. The solid line indicates the median trajectory, with the interquartile range (dark shading) and 95% CIs (light shading). The red horizontal line at $0.1B_0$ represents the hard limit, the orange line at $0.2B_0$ is the soft limit, and the green line is the biomass target, $0.4B_0$. (Source: FNZ, 2024).

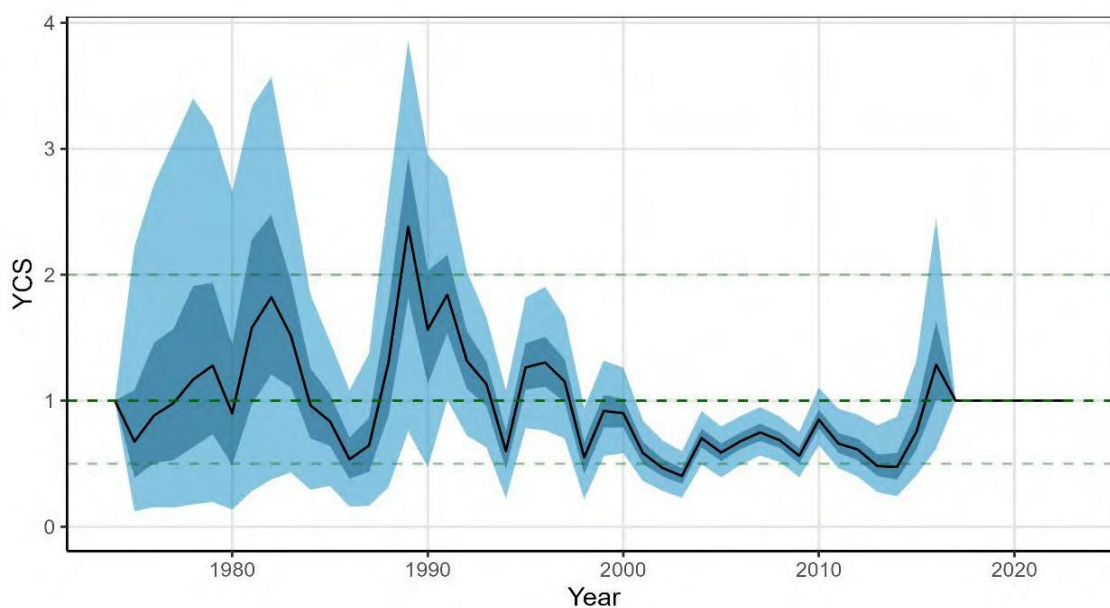


Figure 18. MCMC estimates of relative year-class strengths for the base case model for HAK 7. The solid line indicates the median, the dark shaded area the interquartile range, and the light shaded area the 95% CIs. The horizontal dashed green lines indicate the values of 0.5, 1, and 2 respectively. (Source: FNZ, 2024).

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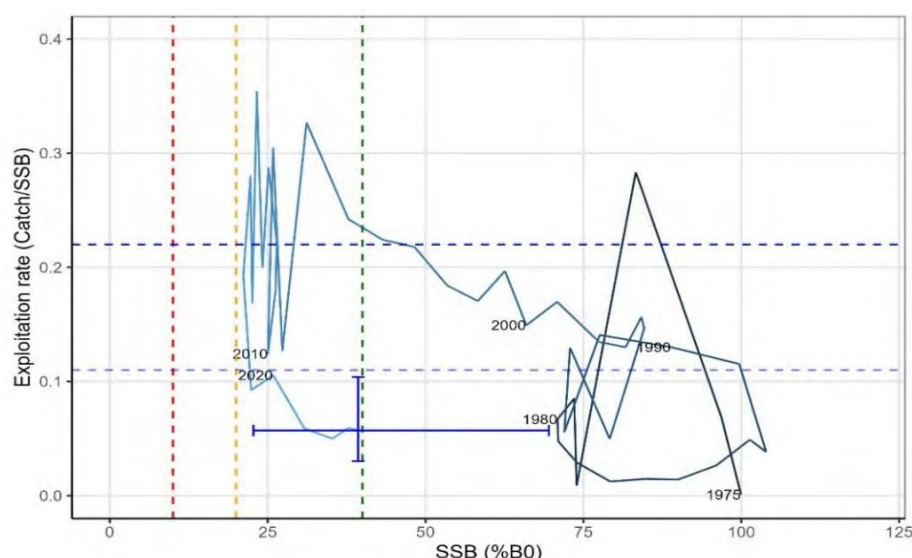


Figure 19. Trajectory over time of exploitation rate (U) and spawning biomass ($\% B_0$), for the HAK 7 base case model, from the start of the assessment period in 1975 (represented by a yellow point), to 2024. The red vertical line at $0.1 B_0$ represents the hard limit, the orange line at $0.2 B_0$ is the soft limit, and green lines are the biomass target ($0.4 B_0$) and the corresponding exploitation rate U_{ssb} $0.4 B_0 = 0.22$ based on all YCS (dark blue dashed horizontal line) and U_{ssb} $0.4 B_0 = 0.11$ based on the most recent estimated 10-years YCS (light blue dashed horizontal line). Biomass and exploitation rate estimates are medians from MCMC results. (Source: FNZ, 2024).

Projections

Three-year projections (2025-2027) were undertaken assuming two scenarios for future catches: (1) the average of 2021-2023 (1,462t) and (2) the TACC (2,272t). Future recruitment deviates were sampled from either all years (1975-2016) or for the most recent ten years (2007-2016). The biomass was predicted to increase under all four scenarios, with the rate of increase greatest if recruitments increased to the earlier levels.

10.1.1.3.5 Ling (LIN 3&4; Chatham Rise)

The most recent assessment of ling on the Chatham Rise was updated during 2022 (Mormede et al., 2023a). The 2022 assessment considered the period 1972 to 2022 and was conducted using Casal2.

Model structure

The 2022 assessment was based on a two-sex age-structured population dynamics model, with the model year taken to be October to September. The stock assessment considered three fisheries (trawl, longline, and pot), with the catch history for the assessment given in Table 49.

Table 49. Landings (t) for fishing years 1975 to 2022 for LIN3&4. Year is model year, which is calendar year. Longline is bottom longline, trawl is bottom trawl, and pot is all potting methods combined. (Source: Mormede et al. 2022).

Year	Longline	Trawl	Pot	Year	Longline	Trawl	Pot
1990	243	3 170	2	2006	1 489	1 890	54
1991	1 786	3 979	16	2007	1 571	2 841	55
1992	3 388	3 851	37	2008	2 034	2 432	15
1993	3 963	2 836	13	2009	1 897	1 459	12
1994	4 241	2 374	11	2010	1 973	1 530	39
1995	5 391	2 680	7	2011	1 658	1 030	33
1996	4 699	3 375	1	2012	2 087	1 470	11
1997	4 182	3 901	38	2013	2 394	1 125	24

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1998	3 299	5 140	40	2014	2 443	1 349	58
1999	2 994	4 306	41	2015	1 685	1 513	46
2000	3 228	3 826	23	2016	2 695	1 551	164
2001	3 082	2 941	2	2017	2 432	1 811	201
2002	2 330	3 637	1	2018	2 870	1 330	543
2003	2 150	3 563	1	2019	1 877	1 347	674
2004	1 731	2 714	4	2020	1 627	1 060	402
2005	2 259	2 250	10	2021	1 598	765	360

The model considered ages 3-25yr, with age 25 taken to be a plus-group. The population was assumed to be at unfished equilibrium at the start of the modelled period (1972) and recruitments for the years 1973-2015 were estimated. Table 50 summarizes the annual cycle of the model. Maturity and growth were pre-specified based on auxiliary analyses, with natural mortality assumed to be constant, sex-dependent and independent of time (see Table 51 for the values for the biological parameters).

Table 50. Annual cycle of the model for LIN 3&4, showing the processes taking place at each time step, their sequence within each time step, and the available observations. Fishing and natural mortality that occur within a time step occur after all other processes, with half of the natural mortality for that time step occurring before and half after the fishing mortality. (Source: FNZ, 2024).

Step	Period	Processes	M ¹	Age ²	Observations	
					Description	%Z ³
1	Jan-Jun	Recruitment	0.9	0.5	Trawl survey (summer)	0.2
2	Jul-Dec	Spawning	0.1	0	-	
		fisheries			Longline CPUE	
		(longline			Longline catch-at-age/length	
		and trawl)			Trawl catch-at-age	0.5
		Increment in ages		0.5		

1: M is the proportion of natural mortality that was assumed to have occurred in that time step; 2: Age is the age fraction, used for determining length-at-age, that was assumed to occur by the start of that time step; 3: %Z is the percentage of the total mortality in the step that was assumed to have taken place at the time each observation was made.

Table 51. Biological parameters for LIN 3&4. (Source: Mormede et al., 2023a).

(a) Natural mortality, growth, and stock-recruitment

Relationship	Reference	Parameter (units)			
			Both	Male	Female
von Bertalanffy growth	Mormede et al. (2022)	t_0 (y)		-0.65	-0.71
		k (yr ⁻¹)		0.130	0.090
		L_∞ (cm)		112.2	153.3
		CV		0.09	0.09
Length-weight	Mormede et al. (2022)	a (g.cm ⁻¹)		1.28e ⁻⁹	1.38e ⁻⁹
		B		3.294	3.271
Stock recruitment relationship					
Stock recruitment steepness	Holmes (2019)	h	0.86		
Recruitment variability		σ_R	0.6		
Ageing error	Holmes (2019)	CV	0.05		
Proportion male at birth			0.5		

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Proportion of mature that spawn										1.0			
Maximum exploitation rate										$U_{\max}$ 0.6			
(b) Maturity-at-age (Horn, 2005)													
Age	3	4	5	6	7	8	9	10	11	12	13	14	15
Male	0.0	0.03	0.063	0.14	0.28	0.48	0.069	0.85	0.93	0.97	0.99	1.00	1.00
Female	0.0	0.00	0.003	0.01	0.014	0.033	0.08	0.16	0.31	0.54	0.76	0.93	1.00

The selectivity patterns were all assumed to be logistic, with those for the trawl fishery and the trawl survey fitted as double normal, but with the right-hand limb fixed so the resulting patterns were close to asymptotic. The left-hand limb of the selectivity ogive was fixed at its MPD values due its high uncertainty. Selectivity for the pot fishery was set to that of the longline fishery because of lack of age data for the pot fishery and based on trip limit frequency (Mormede et al., 2022). Selectivity was assumed to be time-invariant.

The model was fitted to time-series of survey estimates of biomass, survey age-composition data, and fishery age-composition data (Table 52). The longline age-composition for 2019, although available, was omitted from the model-fitting process owing to low sample size and high uncertainty. In addition, although available, the time-series of biomass indices from the *Kaharoa* survey were not included in the assessment owing to inadequate spatial coverage (FNZ, 2024).

Table 52. Summary of the relative abundance series applied in the models for LIN 3&4, including source years (Years). (Source: FNZ, 2024).

Data series	Year
Trawl survey biomass (Tangaroa, Jan)	1992–2014, 2016, 2018, 2020, 2022
Trawl survey proportion at age (Tangaroa, Jan), sexed	1992–2014, 2016, 2018, 2020
CPUE (longline, all year) (sensitivity only)	1991–2021
Commercial longline proportion-at-age (Jun–Oct), sexed	2002–09, 2013–2018, 2020
Commercial trawl proportion-at-age (Oct–May), sexed	1992, 1994–2020

The model on which the assessment was based estimated unfished biomass, year-class strengths for 1975 to 2013, and the fishery and survey selectivity patterns. An informative prior was assumed for the trawl survey Q. This prior was determined assuming that survey Q was a product of areal availability (0.5–1.0), vertical availability (0.5–1.0), and vulnerability between the trawl doors (0.03–0.40). The resulting (approximately lognormal) distribution had mean 0.13 and CV 0.70, with bounds assumed to be 0.02 to 0.30 (FNZ, 2024).

Three model runs were undertaken: (1) a base model that used age-frequency and survey index data, (2) a sensitivity model that used the age-frequency data and longline CPUE data, and (3) a sensitivity model in which natural mortality was fixed to the values used in the model fitted to the longline CPUE data. The base model excluded the longline CPUE data, given the trawl survey was assumed to provide a better index than the CPUE data.

The fits to the biomass indices were reasonable (Figure 20) as well as those to the age-composition data (Mormede et al., 2023a). The trawl survey biomass index was found to be in conflict with the age data (FNZ, 2024) because the longline CPUE index dropped from 1991 to 1997, but the trawl survey index remained relatively flat. The MPD analyses suggested that the age-composition data were in agreement with the longline fishery CPUE series rather than the trawl survey index.

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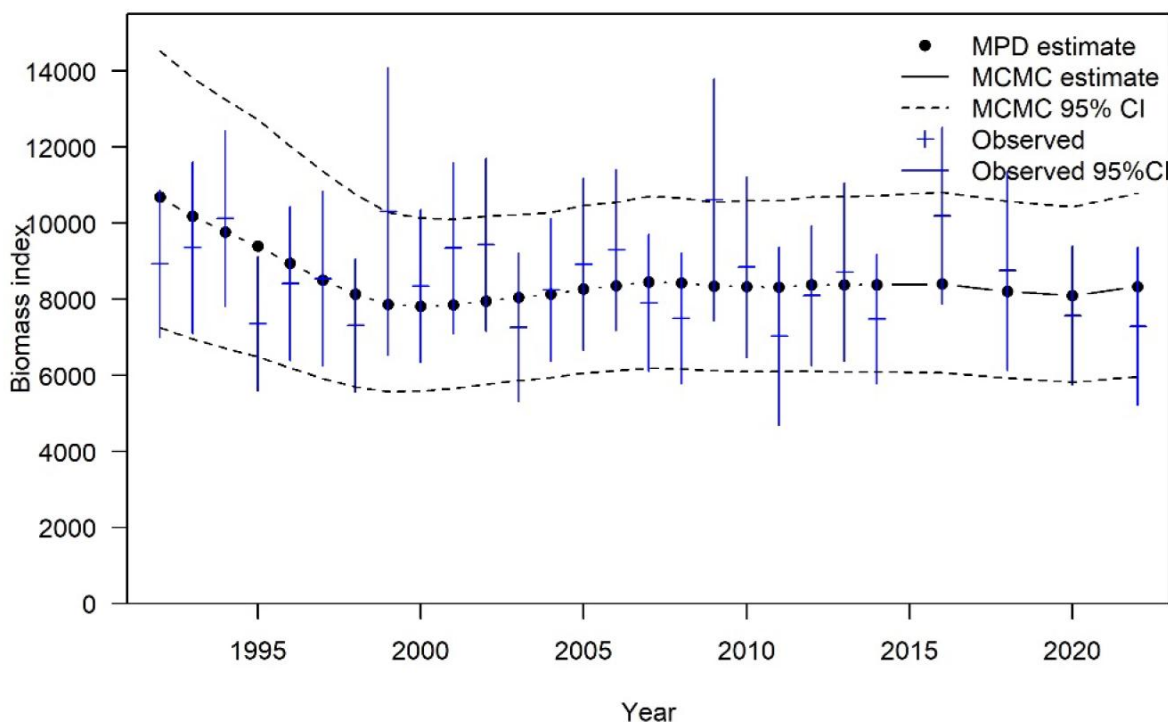


Figure 20. Fits to the survey biomass index at the MCMC level for LIN 3&4. Black dots and vertical lines are the observed estimates and 95% credible intervals, blue is expected and grey band the 95% credible interval. (Source Mormede et al., 2023a).

Biomass and recruitment

The biomass was estimated to have fluctuated essentially without trend (Figure 21), with recruitment deviations relatively constant over time although the posterior median for recent recruitment was below the long-term average (Figure 22). Biomass is estimated to have varied over time but to have consistently been larger than $0.4B_0$ (Figure 21), with exploitation rates well below those corresponding to target biomass (Figure 23). The estimates of 2022 biomass relative to B_0 (Table 53) differ markedly between the base model and the model that fits to the longline CPUE data. The Working Group considered that the sensitivity run with the longline CPUE not to be reliable because the longline CPUE showed a marked drop in the early 1990s that is not reflected in the survey index (Mormede et al., 2023a).

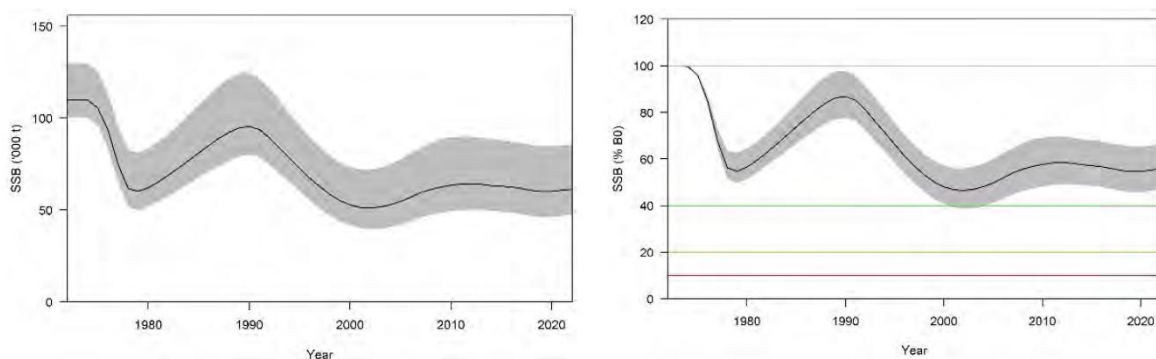


Figure 21. Estimated median trajectories (with 95% credible intervals shown as grey band) for absolute biomass and biomass as a percentage of B_0 from the base-case run for LIN 3&4. The red horizontal line at $0.1B_0$ represents the hard limit, the orange line at $0.2B_0$ is the soft limit, and the green line is the biomass target, $0.4B_0$.

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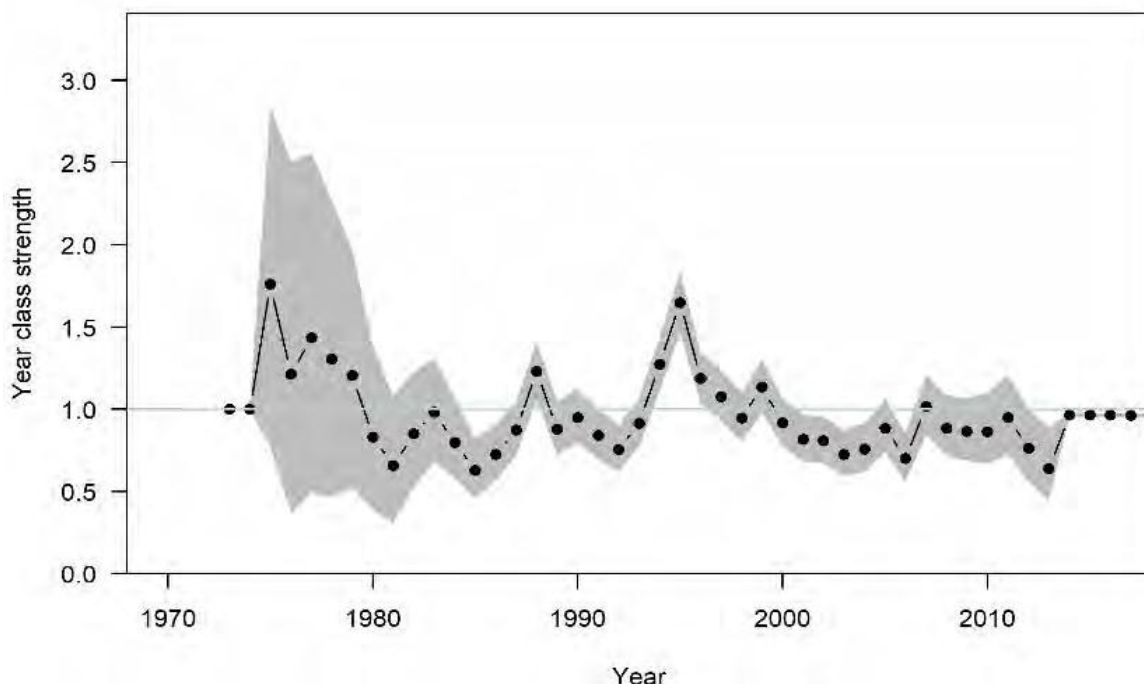


Figure 22. Estimated posterior distributions of year-class strength from the base case run for LIN 3&4, with median (line and individual points) and 95% credible intervals (grey band). The horizontal line indicates a year-class strength of one. (Source: FNZ, 2024).

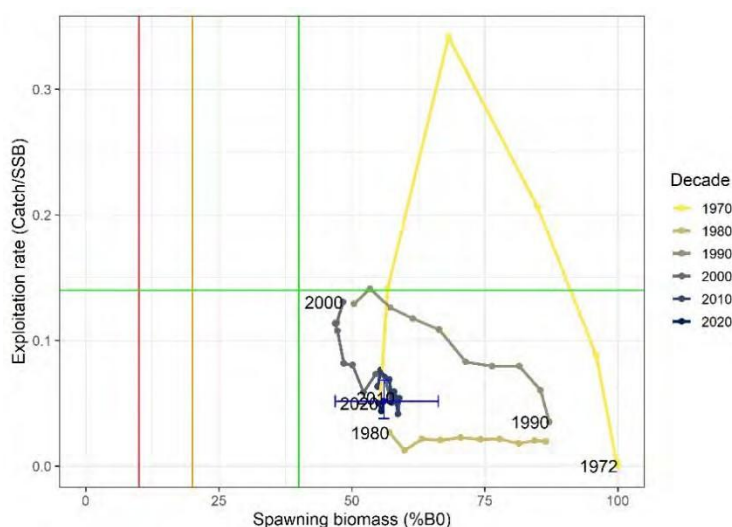


Figure 23. Trajectory over time of exploitation rate (U) and spawning biomass ($\% B_0$), for the LIN 3&4 base model from the start of the assessment period in 1972 to 2022. The red vertical line at $0.1 B_0$ represents the hard limit, the orange line at $0.2 B_0$ is the soft limit, and green lines are the biomass target ($0.4 B_0$) and the corresponding exploitation rate ($U_{40} = 0.14$ calculated using CASAL CAY function). (Source: FNZ, 2024).

Biomass and exploitation rate estimates are medians from MCMC posteriors for the base model. The blue cross represents the limits of the 95% confidence intervals of the estimated ratio of the spawning biomass to B_0 and exploitation rate in 2022.

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Table 53. Bayesian median and 95% credible intervals (in parentheses) of B_0 and B_{2022} (in tonnes, and as a percentage of B_0) for the base model run for LIN 3&4 and a sensitivity model, along with the probability that B_{2022} is below $0.4B_0$ or below $0.2B_0$. (Source: FNZ, 204).

Model run	B_0 ('000t)	B_{2022}	B_{2022} (% B_0)	$P(<0.4B_0)$	$P(<0.2B_0)$
Base case	110 (111 – 130)	62 (47 – 86)	56 (47 – 66)	<0.01	<0.01
Sensitivity (CPUE)	92 (88 – 96)	31 (25 – 39)	34 (27 – 41)	>0.95	<0.01

Projections

Three-year projections (2023-2027) were undertaken assuming two scenarios for future catches (divided among fleets based on the actual catch split for 2019-2021): (1) the average of 2019-2021 (1,057t) and (2) the TACC (2,044t). Future recruitment deviates were sampled from either all years (1975-2013) or for the most recent eleven years (2003-2013). The biomass was predicted to increase under all four scenarios, with the rate of increase greatest if recruitments increased to the earlier levels.

10.1.1.3.6 Ling (LIN 5&6; Sub Antarctic)

The most recent assessment for ling in the Sub-Antarctic area was undertaken during 2024 (Mormede et al., 2024b,c). The 2024 assessment considered the period 1973 to 2024 and was conducted using Casal2.

Model structure

The 2024 assessment was based on a two-sex age-structured population dynamics model, with the model year taken to be October to September. The stock assessment considered three fisheries (trawl, longline, and pot), with the catch history for the assessment given in Table 54.

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Table 54. Landings (t) for fishing years 1975 to 2023 for LIN5&6 and LIN 6B. Year was model year, which was defined as the calendar year. Bottom longline includes bottom longline and all potting methods, and bottom trawl includes all other catches. (Source: Source: Mormede et al., 2024c).

Year	Bottom trawl	LIN 5&6 Bottom longline	LIN 6B Bottom longline	Year	Bottom trawl	LIN 5&6 Bottom longline	LIN 6B Bottom longline
1972	0	0	0	1998	5 771	3 267	493
1973	500	0	0	1999	6 013	2 952	707
1974	1 120	0	0	2000	7 506	2 328	1 175
1975	900	118	0	2001	5 701	1 819	1 061
1976	3 402	190	0	2002	7 720	1 264	859
1977	3 100	301	0	2003	8 423	668	988
1978	1 945	494	10	2004	8 016	1 509	422
1979	3 707	1 022	0	2005	7 295	892	48
1980	5 200	0	0	2006	7 118	781	110
1981	4 427	0	10	2007	8 083	890	218
1982	2 402	0	0	2008	5 345	659	446
1983	2 778	5	10	2009	4 425	550	232
1984	3 203	2	6	2010	4 391	1 064	2
1985	4 480	25	2	2011	4 445	842	55
1986	3 182	2	0	2012	6 608	1 168	4
1987	3 962	0	0	2013	5 535	259	219
1988	2 065	6	0	2014	6 075	925	75
1989	2 923	10	9	2015	5 735	759	38
1990	5 004	0	14	2016	4 482	618	214
1991	3 537	407	139	2017	7 309	761	970
1992	7 663	1 026	1 244	2018	7 355	768	149
1993	6 202	1 166	1 260	2019	7 264	1 286	171
1994	6 782	1 423	652	2020	6 168	2 033	255
1995	5 064	2 032	534	2021	7 338	1 205	636
1996	6 872	2 101	614	2022	7 198	1 378	249
1997	7 468	3 588	312	2023	6 325	3 318	303

The model on which the assessment was based considered ages 3-28yr, with age 28 taken to be a plus-group. The population was assumed to be at unfished equilibrium at the start of the modelled period (1973), and recruitments for the years 1973-2017 were estimated. Table 55 summarizes the annual cycle of the model. Maturity and growth were pre-specified based on auxiliary analyses, with natural mortality assumed to be constant, and independent of time (see Table 56 for the values for the biological parameters).

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Table 55. Annual cycle of the model for LIN 5&6 and LIN 6B, showing the processes taking place at each time step, their sequence within each time step, and the available observations. Fishing and natural mortality that occur within a time step occur after all other processes, with half of the natural mortality for that time step occurring before and half after the fishing mortality. (Source: FNZ, 2024).

Step	Period	Processes	M ¹	Age ²	Observations	
					Description	%Z ³
1	Jan-Aug		0.67	0.5	Trawl survey (autumn)	0.5
2	Sep-Dec	Spawning	0.33	0.0	Longline CPUE	0.5
		Trawl and longline fisheries			Longline catch-at-age	0.5
		Increment in ages		0.5	Trawl catch-at-age	0.5
					Trawl survey (summer)	0.9

1: M is the proportion of natural mortality that was assumed to have occurred in that time step; 2: Age is the age fraction, used for determining length-at-age, that was assumed to occur by the start of that time step; 3: %Z is the percentage of the total mortality in the step that was assumed to have taken place at the time each observation was made.

Table 56. Biological parameters for LIN 5&6. (Source: FNZ, 2024).

(a) Natural mortality, growth, and stock-recruitment

(a) Natural mortality, growth, and stock recruitment					
Relationship	Reference	Parameter			
		(units)	Both	Male	Female
Natural mortality	FNZ (2024)	M (yr ⁻¹)	0.18		
von Bertalanffy growth	FNZ (2024)	t_0 (y)		-1.16	-1.53
		k (yr ⁻¹)		0.19	0.13
		L_∞ (cm)		91.2	110.6
		CV		0.07	0.08
Length-weight	Mormede et al. (2022)	a (g.cm-1)		0.00213	0.00132
		b		3.179	3.293
Stock recruitment relationship					
Stock recruitment steepness	Holmes (2019)	H	0.84		
Recruitment variability		σ_R	0.7		
Ageing error	Holmes (2019)	CV	0.06		
Proportion male at birth			0.5		
Proportion of mature that spawn			1.0		
Maximum exploitation rate		$U_{\max}$	0.6		

(b) Maturity-at-age (Mormede et al., 2024c)

Age	3	4	5	6	7	8	9	10	11	12	13
Male	0.0	0.04	0.16	0.41	0.72	0.91	0.98	0.99	1.00	1.00	
Female	0.0	0.01	0.01	0.12	0.28	0.55	0.78	0.91	0.97	0.99	1.00

The selectivity patterns were all assumed to be logistic, with those for the trawl fishery taken to be double normal, but with the value of right-hand limb parameter set to 100. Selectivity for the pot fishery was set to that of the longline fishery. Selectivity was assumed to be time-invariant.

The model was fitted to time-series of survey estimates of biomass, survey age-composition data, and fishery age-composition data (Table 57).

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Table 57. Summary of the relative abundance series applied in the models for LIN 5&6 and LIN 6B, including source years (Model years). The estimate of biomass for 2016 from the trawl survey and its associated age-composition data were not included in the assessment. (Source: FNZ, 2024).

Data series	Model year
Trawl survey biomass (<i>Tangaroa</i> , Nov–Dec)	1991–93, 2000–09, 2011–12, 2014, 2018, 2020, 2022
Trawl survey proportion at age (<i>Tangaroa</i> , Nov–Dec)	1991–93, 2000–09, 2011–12, 2014, 2018, 2020, 2022
Trawl survey biomass (<i>Tangaroa</i> , Mar–May)	1992–93, 1996, 1998
Trawl survey proportion at age (<i>Tangaroa</i> , Mar–May)	1992–93, 1996, 1998
LIN 5&6 CPUE (longline) –sensitivity	1991–2023
LIN 5&6 commercial longline proportion-at-age	1996, 1998–2012, 2014, 2016–2020, 2022
LIN 5&6 commercial trawl proportion-at-age	1993, 1996, 1998–2022

The model estimated unfished biomass, survey catchability, year-class strengths for 1975 to 2013, and the fishery and survey selectivity patterns. The assessment explored sensitivity to:

- $M=0.16$ / $M=0.20$: Changing natural mortality to 0.16yr^{-1} and 0.20yr^{-1} .
- Length-based M : Allowing for length-based (Lorenzen) natural mortality.
- Base + CPUE: Including the longline CPUE index in the model fitting process.
- Additional catch: Increasing the historical catches (5% prior to 1986 and 2% thereafter).

The fits to the biomass indices were reasonable (Figure 24) and to the age-composition data (Figures A.2 and A.3 of Mormede et al., 2024b).

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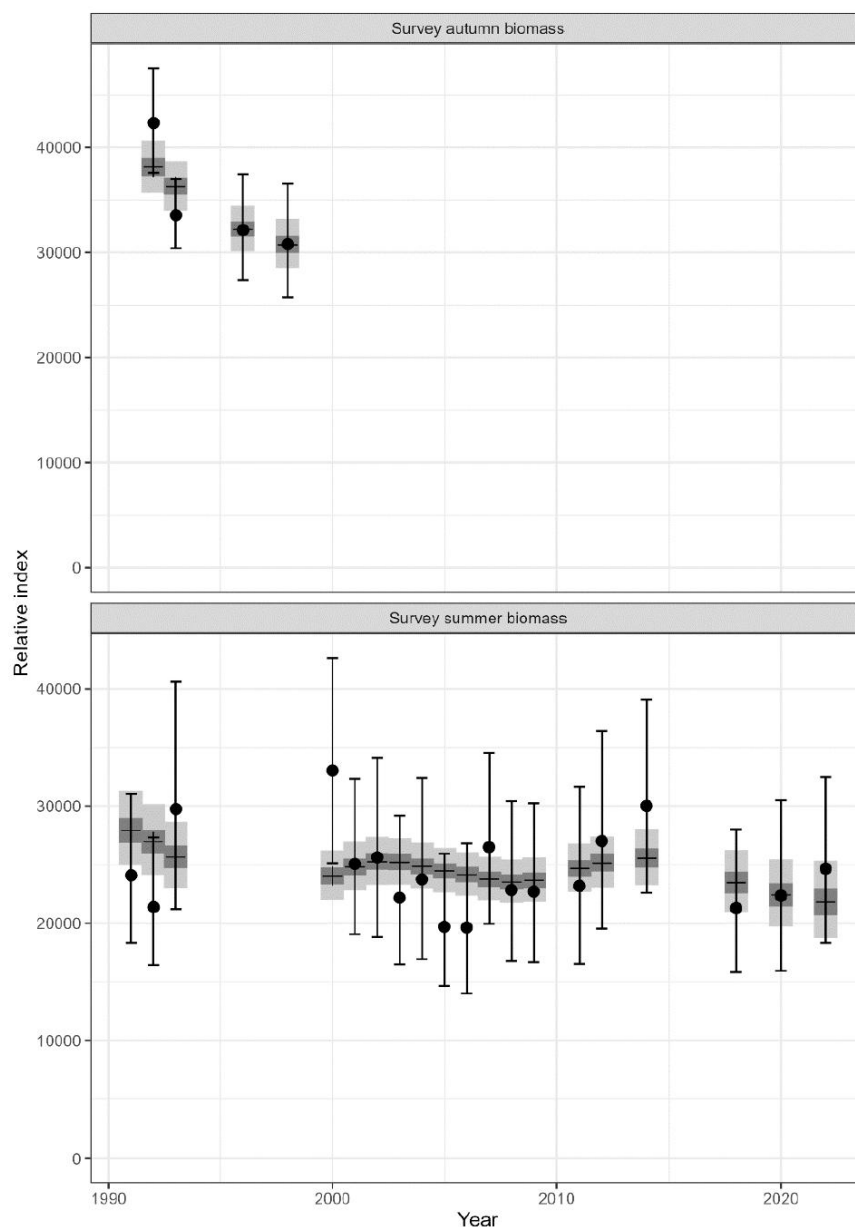


Figure 24. Fits to the survey biomass index at the MCMC level for LIN 5&6. Fits to the abundance indices with the interquartile range (dark grey) and 95% credible interval (light grey). (Source Mormede et al., 2024b).

Biomass and recruitment

All models were taken through to MCMC (Table 58). The biomass shows a declining trend over time, but stock size was estimated to be well above the management target (Figure 25), with no evidence for trends over time in the deviations in recruitment about the stock-recruitment relationship (Figure 26). The estimated exploitation rates are increasing over time, but are well below that corresponding to biomass target of $0.4B_0$ (Figure 27).

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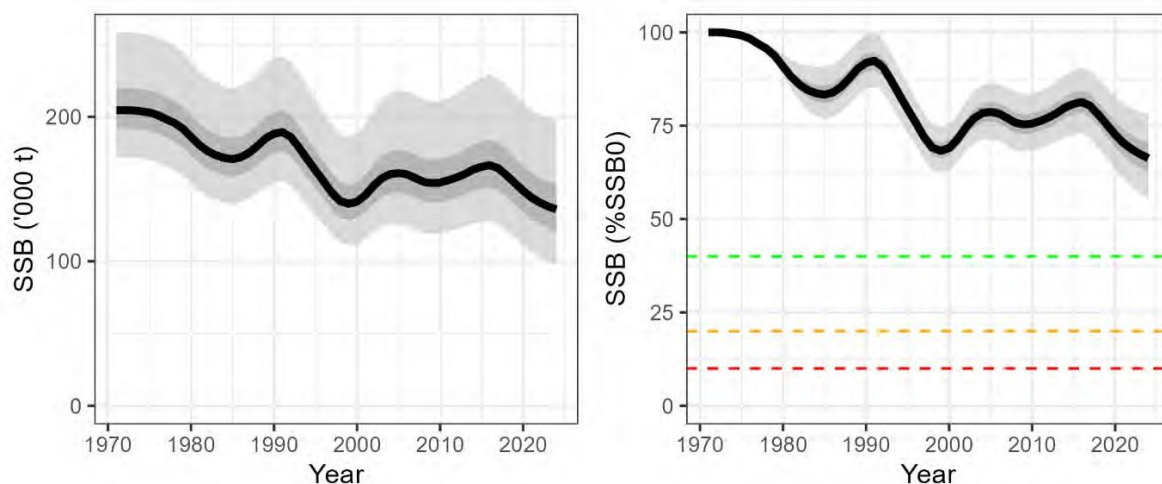


Figure 25. Estimated median trajectories (with interquartile range shown as dark grey bands and 95% credible intervals as light grey bands) for absolute biomass and biomass as a percentage of B_0 for LIN 5&6 and LIN 6B. The red horizontal line at $0.1B_0$ represents the hard limit, the orange line at $0.2B_0$ is the soft limit, and the green line is the biomass target, $0.4B_0$. (Source: FNZ, 2024)

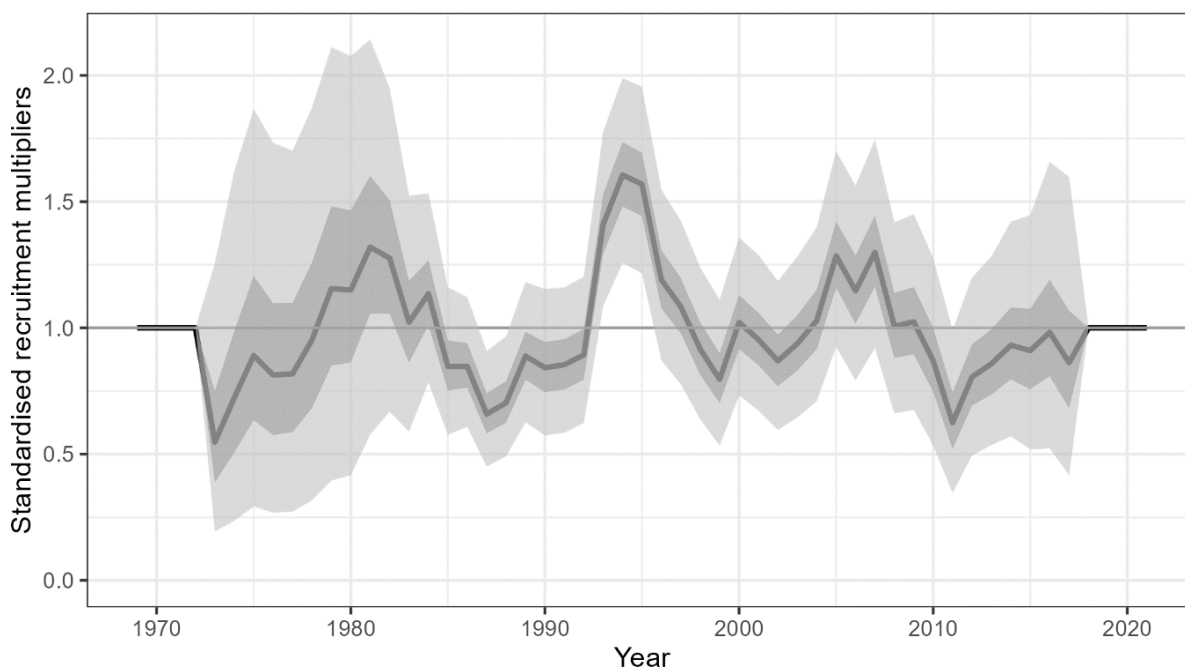


Figure 26. Estimated posterior distribution of year class strength from the base case run, with median (line and individual points), interquartile range (dark grey band) and 95% credible interval (light grey band) for LIN 5&6 and LIN 6B. The horizontal line indicates a year class strength of one. (Source: FNZ, 2024).

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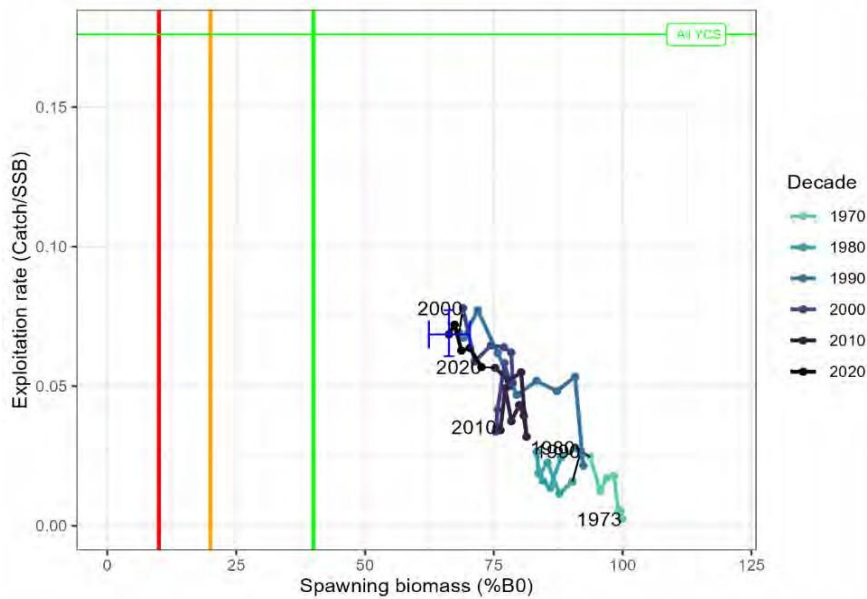


Figure 27. Trajectory over time of exploitation rate (catch / SSB) and spawning biomass ($%B_0$), for the LIN 5&6 and LIN 6B base model from the start of the assessment period in 1973 to 2024. The red vertical line at $0.1B_0$ represents the hard limit, the orange line at $0.2B_0$ is the soft limit, and green lines are the biomass target ($0.4B_0$) and the corresponding exploitation rate (catch divided by SSB $U_{40} = 0.176$ under average recruitment assumptions). Biomass and exploitation rate estimates are medians from MCMC results. The blue cross represents the limits of the 95% credible intervals of the estimated ratio of the biomass to B_0 and exploitation rate in 2024. (Source: FNZ, 2024).

Table 58. Bayesian median (95% credible intervals) (MCMC) of B_0 and B_{2024} (t), and B_{2024} as a percentage of B_0 for LIN 5&6 and LIN 6B for the five model runs (Source: FNZ, 2024).

Case	B_0 ('000t)	B_{2024} ('000t)	B_{2024} ($%B_0$)	$P(<40%B_0)$	$P(<20%B_0)$
Base case	205 [172, 258]	135 [97, 198]	66 [55, 78]	<0.01	<0.01
$M=0.16$	158 [142, 179]	98 [73, 134]	52 [42, 62]	<0.01	<0.01
$M=0.20$	305 [226, 429]	147 [104, 221]	77 [65, 88]	<0.01	<0.01
Length-based M	206 [174, 256]	82 [61, 110]	65 [54, 76]	<0.01	<0.01
Base + CPUE	181 [157, 215]	133 [96, 188]	54 [46, 64]	<0.01	<0.01
Additional catch	209 [175, 2063]	139 [99, 202]	66 [55, 78]	<0.01	<0.01

Projections

Five-year projections (2025-2029) were undertaken with catches set equal to the average catch during 2020-2023 (6,954t) or the TACC (10,235t). Biomass was estimated to remain about $0.4B_0$ in 2029 with high probability (FNZ, 2024d).

10.1.1.3.7 Ling (LIN 7WC; west coast South Island)

The most recent assessment of ling off the west coast of South Island occurred during 2023 (Mormede et al., 2024d). This assessment considered the period 1972-2023 and was conducted using Casal2.

Model structure

The 2023 assessment was based on a two-sex age-structured population dynamics model, with the model year taken to be October to September. The stock assessment considered three fisheries (trawl, longline, and pot), with the catch history for the assessment given in Table 59.

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Table 59. Landings (t) for fishing years 1975 to 2022 for LIN7WC. Longline includes bottom longline and all potting methods, and trawl represents all other catches. (Source: Mormede et al., 2024d).

Year	Trawl	Longline	Year	Trawl	Longline
1972	0	0	1998	1 995	1 065
1973	85	20	1999	2 389	916
1974	144	40	2000	2 479	947
1975	401	800	2001	2 400	1 007
1976	565	2 100	2002	2 475	762
1977	715	4 300	2003	2 094	926
1978	300	323	2004	2 092	764
1979	539	360	2005	1 595	845
1980	540	305	2006	1 773	781
1981	492	300	2007	1 323	1 161
1982	675	400	2008	1 150	1 021
1983	1 040	710	2009	1 216	992
1984	924	595	2010	1 386	1 199
1985	1 156	302	2011	1 606	1 143
1986	1 082	362	2012	1 697	1 285
1987	1 105	370	2013	1 959	1 089
1988	1 428	291	2014	1 914	1 444
1989	1 959	370	2015	2 092	1 350
1990	2 173	229	2016	2 159	1 487
1991	2 025	425	2017	2 451	1 470
1992	1 572	873	2018	2 440	1 239
1993	1 590	699	2019	1 834	1 408
1994	1 312	1 003	2020	1 687	1 752
1995	1 759	994	2021	1 406	2 057
1996	2 019	994	2022	1 440	1 464
1997	2 034	1 323			

The model on which the assessment was based considered ages 1-28yr, with age 28 taken to be a plus-group. The population was assumed to be at unfished equilibrium at the start of the modelled period (1972) and recruitments for the years 1973-2014 were estimated Table 60 summarizes the annual cycle of the model. Maturity and growth were pre-specified based on auxiliary analyses, with natural mortality assumed to be constant, and independent of time (see Table 61).

Table 60. Annual cycle of the model for LIN 7WC, showing the processes taking place at each time step, their sequence within each time-step, and the available observations. Fishing and natural mortality that occur within a time-step occur after all other processes, with half of the natural mortality for that time step occurring before and half after the fishing mortality. (Source: FNZ, 2024).

Step	Period	Processes	M ¹	Age ²	Observations	
					Description	%Z ³
1	Jan-Dec	Recruitment	1.0	0.0		
		Spawning fishery (longline)			Longline catch-at-age	0.5
					Longline CPUE	0.5
		Trawl fishery			Trawl catch-at-age	0.5
					Trawl CPUE	0.5
					Trawl survey biomass	0.5

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1	End of Dec	Increment in ages	0.0	0.1	Trawl survey catch-at-age	0.5

1: M is the proportion of natural mortality that was assumed to have occurred in that time step; 2: Age is the age fraction, used for determining length-at-age, that was assumed to occur in that time step; 3: %Z is the percentage of the total mortality in the step that was assumed to have taken place at the time each observation was made.

Table 61. Biological parameters for LIN 7WC. (Source: Mormede et al., 2024d).

(a) Natural mortality, growth, and stock-recruitment											
Relationship			Reference			Parameter					
						(units)	Both				
Natural mortality			Mormede et al. (2023b)			M (yr ⁻¹)	0.18				
von Bertalanffy growth						t_0 (y)		-1.08	-0.86		
						k (yr ⁻¹)		0.08	0.08		
						L_∞ (cm)		140.0	164.1		
			Mormede et al. (2023b)			CV		0.08	0.09		
Length-weight						a (g.cm-1)		1.31e ⁻⁹	0.98e ⁻⁹		
						b		3.292	3.362		
Stock recruitment relationship											
Stock recruitment steepness			Kienzle (2021)			h	0.84				
Recruitment variability						σ_R	0.6				
Ageing error			FNZ (2024)			CV	0.05				
Proportion male at birth							0.5				
Proportion of mature that spawn							1.0				
Maximum exploitation rate						$U_{\max}$	0.6				
(b) Maturity-at-age (Horn, 2005)											
Age	3	4	5	6	7	8	9	10	11	12	
Male	0.0	0.015	0.095	0.39	0.77	0.95	1.00	1.00	1.00	1.00	
Female	0.0	0.004	0.017	0.06	0.18	0.39	0.65	.085	0.94	1.00	

Selectivity for the longline fishery and the mature fish trawl survey were assumed to be logistic while selectivity for the immature fish trawl survey was assumed to be a capped logistic function. Selectivity for the commercial trawl fishery was assumed to be double-normal. Selectivity was assumed to be time-invariant.

The model was fitted to time-series of survey estimates of abundance, survey age-composition data, and fishery age-composition data (Table 62). Although available, the 2024 assessment did not make use of the estimates of biomass based on the *Kaharoa* surveys as these had been deemed not be useful (Stevenson, 2007).

Table 62. Summary of the relative abundance and stock composition series applied in the models, including source years (Years) for LIN 7WC. (Source: FNZ, 2024).

Data series	Model year
Commercial trawl CPUE	1997–2022
Commercial trawl proportion-at-age (Jun–Sep)	1991, 1994–2008, 2012–2022
Commercial longline CPUE (aggregated)	1991–2022
Commercial longline proportion-at-age (May–Aug, Oct–Dec for 2021)	2003, 2006, 2007, 2012, 2015, 2021
Trawl survey biomass (Tangaroa, Jul)	2000, 2012–13, 2016, 2018, 2021
Trawl survey age data	2000, 2012–13, 2016, 2018, 2021

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The model on which the assessment was based estimated unfished biomass, survey catchability, year-class strengths for 1975 to 2014, and the fishery and survey selectivity patterns. The prior for survey Q was lognormal with mean of 0.07 and a CV of 0.7.

The various model runs explored (a) the effects of alternative indices of abundance and how they are fitted, (b) a different value (0.6) for the steepness parameter, (c) different values for the rate of natural mortality M (0.15, 0.18 and 0.21yr⁻¹), and a different prior for survey Q (mean 0.043, CV 0.7).

The fits to the biomass indices and age data were reasonable (Figure 28), although the selectivity patterns were somewhat unexpected because the survey was estimated to select older fish than the commercial trawl fishery. The fits to the age-composition data were adequate (Figs A.2 and A.3 of Mormede et al., 2024d).

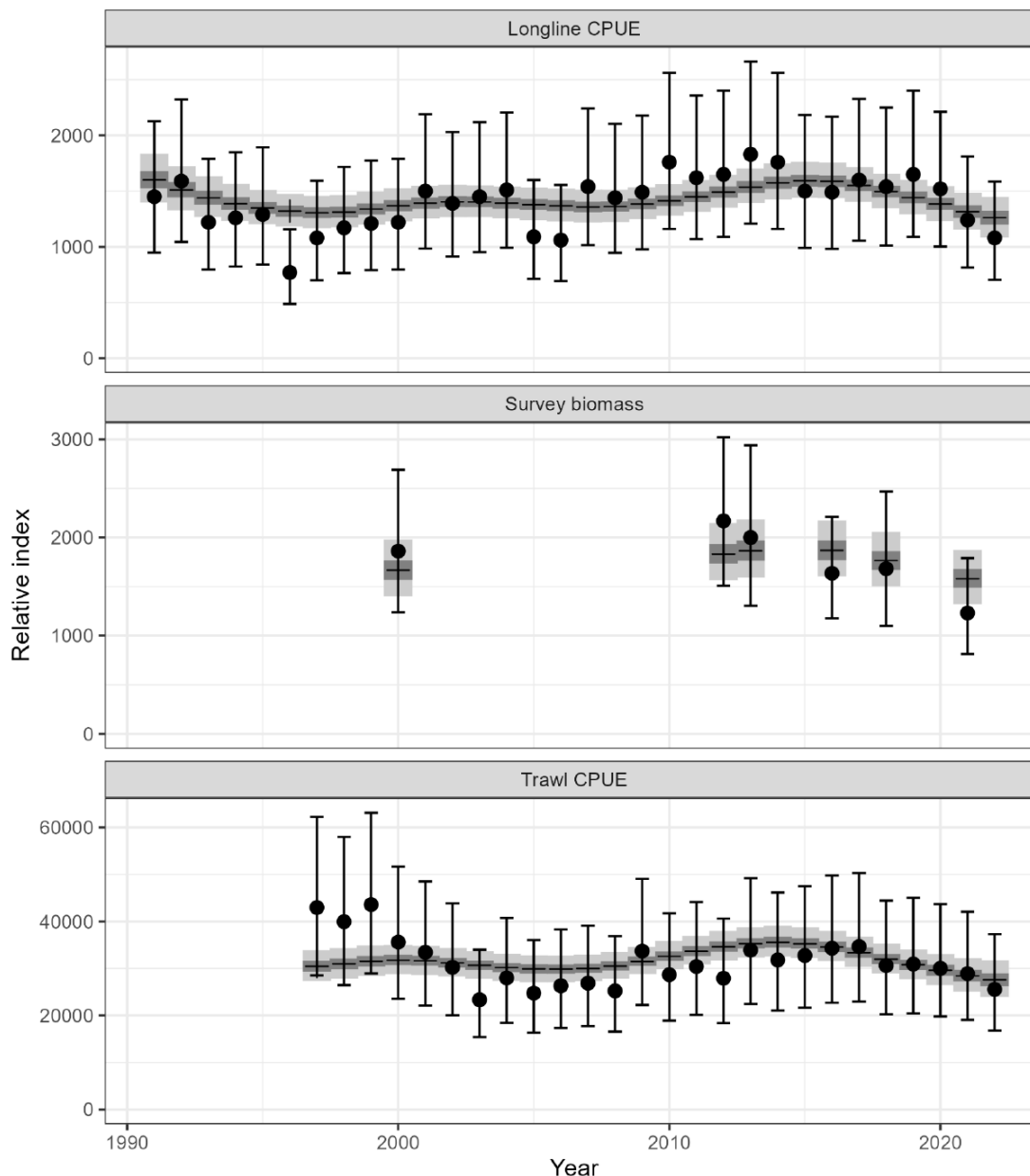


Figure 28. Fits to the abundance indices with the interquartile range (dark grey) and 95% credible interval (light grey) for the LIN 7WC base model. (Source: Mormede et al., 2024d).

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Biomass and recruitment

The trend in biomass is downward but the stock was estimated to continue to be larger than $0.4B_0$, with recruitment relatively constant throughout the period of the assessment (Figure 29 and Figure 30). Exploitation rates were estimated to be less than that corresponding to the biomass target of $0.4B_0$ (Figure 31), although the exploitation rate due to longline fishing has increased. The estimates of biomass and biomass relative to B_0 were moderately sensitive to steepness and dropping the trawl CPUE data, but quite sensitive to a lower value for M of 0.15yr^{-1} (Table 63).

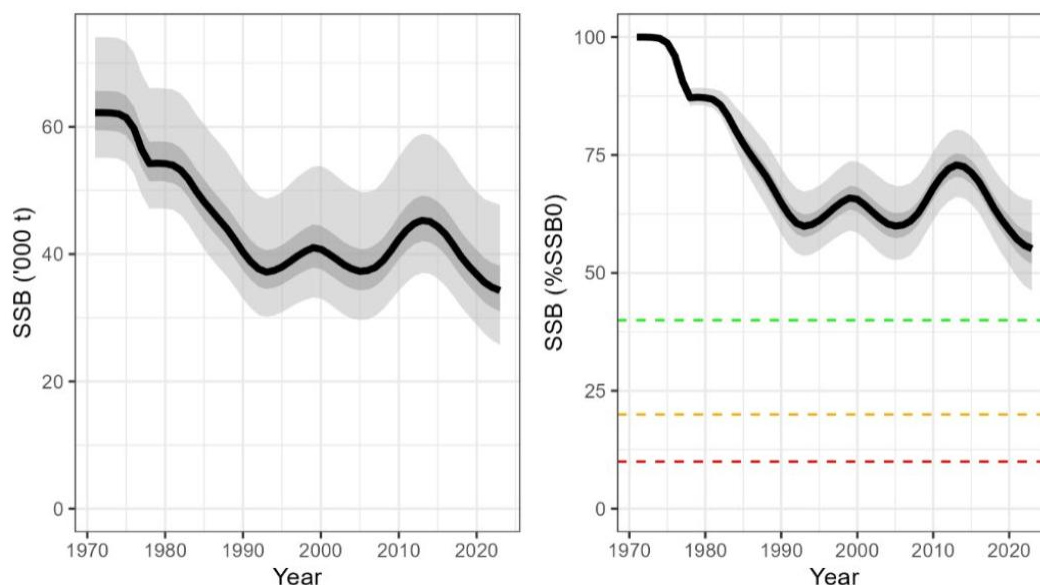


Figure 29. Estimated posterior distribution of the spawning stock biomass (SSB in tonnes, left) for the LIN 7WC base case and of the proportion of initial spawning biomass (% B_0 , right) trajectory and estimated unfished spawning stock biomass reference points (0.4 , 0.2 , and $0.1B_0$) for the base case model. The solid black line represents the median values and the dark grey shading interquartile range and light shading 95% credible interval. (Source: FNZ, 2024).

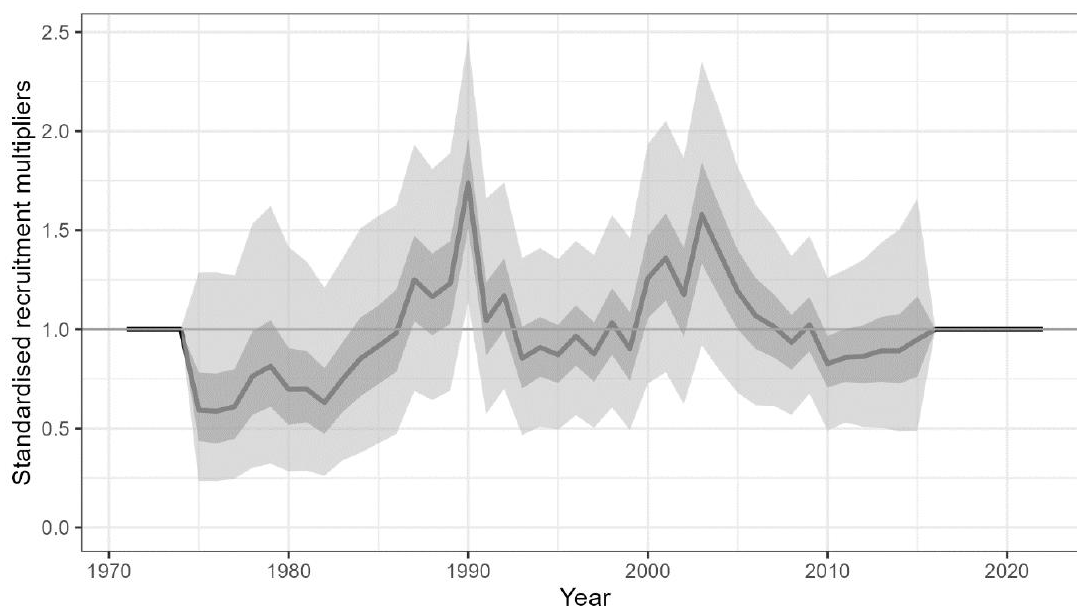


Figure 30. Estimated posterior distributions for standardised recruitment multipliers from the base case run for LIN 7WC, with median (line), the interquartile range (dark grey), and 95% credible interval (light grey). The horizontal line indicates a recruitment multiplier value of one. (Source: FNZ, 2024).

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Table 63. Bayesian median (95% credible intervals) (MCMC) of B_0 and B_{2023} (t), and B_{2023} as a percentage of B_0 for LIN 7WC for the five model runs. (Source: FNZ, 2024).

Case	B_0	B_{2023}	B_{2023} (% B_0)	$P(<40\%B_0)$	$P(<20\%B_0)$
Base case	62,168 [55,007-74,122]	34,265 [25,711-47,751]	51 [38-64]	0.05	<0.01
No Trawl	59,725 [53,183-70,139]	30,970 [23,237-42,440]	52 [43-62]	<0.01	<0.01
CPUE $h=0.6$	66,716 [59,468-78,689]	34,803 [26,105-48,449]	52 [44-62]	<0.01	<0.01
$M=0.15$	58,067 [54,568-62,211]	20,776 [17,255-24,804]	36 [32-40]	0.97	<0.01
$M=0.21$	72,175 [59,611-96,155]	47,907 [31,186-72,670]	66 [56-78]	<0.01	<0.01

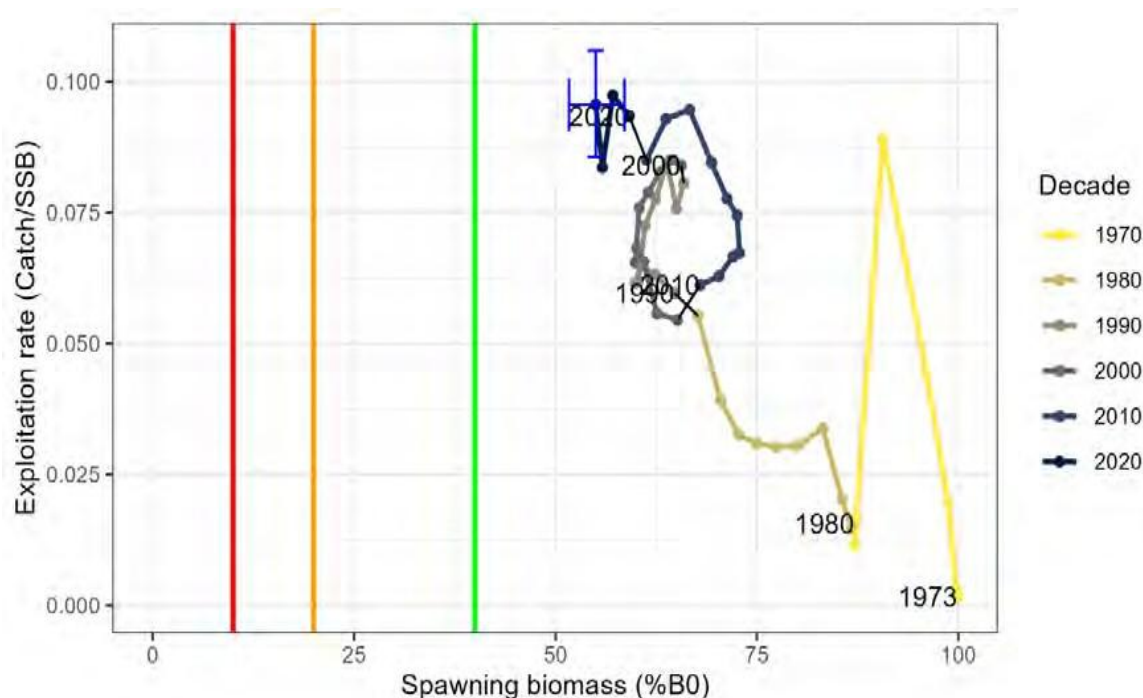


Figure 31. Trajectory over time of exploitation rate (U) and spawning biomass (% B_0), for the LIN 7WC base model from the start of the assessment period in 1972 to 2023 (in blue). The red vertical line at $0.1B_0$ represents the hard limit, the orange line at $0.2B_0$ is the soft limit, and the green line is the biomass target ($0.4B_0$). Biomass and exploitation rate estimates are medians from MCMC results. The blue cross represents the limits of the 95% confidence intervals of estimated the ratio of the biomass to B_0 and exploitation rate in 2023. (Source: FNZ, 2024).

Projections

Projections out to 2028 for LIN 7WC using the base-case model indicated that biomass is likely to reduce slightly with future catches equal to the average of catch in 2020–2022 (3,269 t), which includes Statistical Area 032 and excludes Cook Strait, and year-class strengths resampled over the entire range of the model. Under those assumptions, the probability of biomass in 2028 being above $0.4B_0$ is 0.97 and the probability of being below $0.2B_0$ is 0.

10.1.1.4. Harvest strategies

10.1.1.4.1 Reference points and harvest strategy

Management advice on setting TACs for hoki, hake, and ling has to be broadly consistent with the Harvest Strategy

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Standard for New Zealand Fisheries (HSS). The HSS (MPI, 2008, 2011) aims to:

“provide a consistent and transparent framework for setting fishery and stock targets and limits and associated fisheries management measures, so that there is a high probability of achieving targets, a very low probability of breaching limits, and acceptable probabilities of rebuilding stocks that nevertheless become depleted, in a timely manner”.

The HSS specifies probabilities for each of these outcomes. The HSS is consistent with the 2008 Amendments to the Fisheries Act 1996. The Standard (i.e., not the Fisheries Act) includes the need for a target reference point, a soft limit and a hard limit. Stocks that are assessed to be depleted to below the soft limit require a formal, time-constrained rebuilding plan, while stocks that are depleted to below the hard limit should be considered for closure. Under the HSS, stocks depleted to below the soft limit should be rebuilt (with an acceptable probability) to at least the target level/range between T_{MIN} and $2 \times T_{MIN}$ where T_{MIN} is the theoretical minimum number of years required to rebuild a stock to the target level/range in the absence of fishing (MPI, 2008). The HSS was established following extensive consultation and review (including international peer-review of a draft of the standard). The Standard is not, however, a management strategy because it does not specify, for example, the form of the HCR, and the monitoring requirements, although both monitoring and some form of an HCR are needed to implement the HSS.

The TAC is set by the Minister for Oceans and Fisheries (who executes the responsibilities of the Minister of Fisheries) through a public process. The Minister, under Section 13 of the Fisheries Act 1996, sets a TAC for a quota management species that:

- a) *maintains the stock at or above a level that can produce the maximum sustainable level; or,*
- b) *enables the level of any stock whose current level is below that which can produce the maximum sustainable level to be altered:*
 - i. *in a way and at a rate that will result in the stock being restored to or above a level that can produce the maximum sustainable level and*
 - ii. *within a period appropriate to the stock, having regard to the biological characteristics of the stock and any environmental conditions affecting the stock or*
- c) *enables the level of any stock whose current level is above that which can produce maximum sustainable level to be altered in a way and at a rate that will result in the stock moving towards or above a level that can produce the maximum sustainable yield.*

The Fisheries Act 1996 does not refer to harvest strategies or HCRs. However, the HSS refers to both. MPI (2011) outlines the generic Harvest Control Rule (HCR), which is used to inform sustainable harvesting of all New Zealand fisheries. It consists of three core elements:

- Specified target based upon MSY-compatible reference points (B_{MSY} and F_{MSY}) or better about which a fishery or stock should fluctuate with at least a 50% probability of achieving the target
- Soft limit (default of $0.5B_{MSY}$ or $0.2B_0$ whichever is higher) that triggers a requirement for a formal, time-constrained rebuilding plan when probability that stock biomass is below this soft limit is greater than 50% probability.
- Hard limit (default of $0.25B_{MSY}$ or $0.1B_0$ whichever is higher) below which fisheries should be considered for closure when the probability that stock biomass is below this hard limit is greater than 50% probability

The status of fisheries and stocks is characterised according to these reference points:

- If the MSY-compatible fishing mortality rate, F_{MSY} , or an appropriate proxy is exceeded on average (over 3.5 years), **overfishing** is deemed to have been occurring, as stocks fished at rates exceeding F_{MSY} will ultimately be depleted below B_{MSY} .
- A stock that is determined to be below the soft limit will be designated as **depleted** and in need of rebuilding.
- A stock that is determined to be below the hard limit is designated as **collapsed**.

Actions when current biomass is likely to be above soft and hard limits but below targets (or thresholds):

1. Stock Assessment Working Groups will provide best estimates and confidence intervals for current biomass and/or fishing mortality (or related biological reference points).
2. If current biomass is estimated to be between the target (or the threshold) and the soft limit, SWGs should work with fisheries managers to define and evaluate the TACC consequences of:

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- a. reducing fishing mortality proportionately to the estimated decrease in biomass below the target or threshold (or taking steps to approximate this for low information stocks), in order to avoid breaching either the soft or hard limits, and/or
 - b. reducing catch super-proportionately to the estimated decrease in biomass below the target or threshold (or taking steps to approximate this for low information stocks), in order to avoid breaching either the soft or hard limits.
3. If current biomass is estimated to be above some threshold, Stock Assessment Working Groups will work with fisheries managers to define and evaluate the TACC consequences of:
- a. maintaining a constant F that will achieve the target biomass on average (or taking steps to approximate this for low information stocks), and/or
 - b. reducing catch proportionately to the estimated decrease in biomass towards the threshold (or taking steps to approximate this for low information stocks), and/or
 - c. increasing catch proportionately to the estimated increase in biomass above the threshold (or taking steps to approximate this for low information stocks).

Stocks will be considered to have been fully rebuilt when it can be demonstrated that there is at least a 70% probability that the target has been achieved and there is at least a 50% probability that the stock is above the soft limit. The form of the biomass – fishing mortality relationship is an emergent property of the above HCR and is not a proscribed analytical function. This (and the genetic HCR outline in Fig. 6 of MPI, 2011) is consistent with HCR reduces exploitation rates as the limit reference point is approached.

The effective HCR for hoki, hake, and ling is consistent with the HSS and associated Operational Guidelines and consists of the following:

- Assessment by the Deepwater Fisheries Assessment Working Group every 1-3 years to estimate probability of current biomass and/or fishing mortality relative to limit and target reference points.
- Conduct of 5-year projections to evaluate the probability of stock biomass being below the management target (or management target range), the hard limit and the soft limit; these are done for a base case model and for models that explore the main uncertainties in the assessment; these are made using the Markov Chain Monte Carlo (MCMC) samples from the stock assessment, with recruitment drawn randomly from the distribution of year-class strengths over the assessment time period, or more recently (e.g., 10 years) as deemed appropriate by the Deepwater Fisheries Assessment Working Group.
- Decision by the New Zealand Minister of Fisheries on TAC (and associated TACC) during projection period, consistent with HSS and informed by Stock Assessment Working Group and stakeholder engagement; consultation during this step can result in additional projections undertaken by MPI.
- Monitoring of stock performance during projection period to ensure that stock status is not being compromised by the management actions.

The approach outlined above is not a formal (well-specified) harvest control rule but contains the elements of such. There is evidence based on the hoki fishery that the TACC (and exploitation rate) for a fish stock will be reduced when its biomass drops below the target level (and is hence starting to approach the New Zealand soft limit). In this case, the 2021 stock assessment for hoki found that five-year projections of biomass under the current catch limits would lead to the stock being predicted to drop below the management target range the following year. A series of options for TACCs for HOK1 were consulted on (FNZ, 2021) and the Minister of Fisheries selected an option that reduced the catch limit for HOK1W by 10,000t and increased the catch limit for HOK1E by 5,000t (Minister of Fisheries, 2021). This option was predicted to have a 56% probability of the HOK1W stock being within the management target range (FNZ, 2021).

The process for setting TACs first involves Fisheries New Zealand providing a discussion document that outlines a set of options for the TAC (and other management controls including TACCs and other catch limits), and provides the context for the Minister's decision and other relevant background material such as previous management decisions and the results of the stock assessment, including the main uncertainties (e.g., FNZ, 2022, 2024a). The discussion document also outlines for how each option is consistent with the Fisheries Act 1996 and with the harvest strategy (e.g. FNZ, 2022, 2024a). Regarding the latter, in its consideration of TACC options, MPI explicitly addresses whether or not illegal catch and misreporting are issues. Determination on whether or not adjustment to the TACC is required is based upon risk analyses undertaken by MPI as part of its compliance monitoring. The discussion document is then released for a four-

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to six-week public consultation period during which submissions are received from stakeholders, including industry and non-governmental organizations. These submissions are incorporated into a decision document, which forms the basis for the Minister's decision (e.g., Minister of Fisheries, 2022, 2024).

MPI (2025) outlines a series of proposed amendments to the Fisheries Act. These proposals include the ability for the Minister of Fisheries to set TACs in advance for up to five years and approve procedures that specify how and why catch limits would be adjusted for a period up to five years (essentially formal harvest control rules). The procedures would be consulted on prior to approval, with the decision on catch limits (within the bounds of the procedure) delegated to the MPI Chief Executive. The procedures would include: (a) the objectives for the stocks concerned, (b) the biomass target (if any), (c) performance measure(s), (d) an equation that calculates the appropriate catch limit based on the performance measures, and (e) operating specifications and parameters about how it would operate (including provision for exceptional circumstances where a procedure may not be allowed).

10.1.1.4.2 Informing B_{MSY} and the limit reference point

The default values for the hard and soft limits are $0.1B_0$ and $0.2B_0$. A limit reference point of $0.2B_0$ is consistent with the MSC guidance on the limit reference point is used in this assessment for scoring purposes. Values for B_{MSY} are not routinely calculated during stock assessments for New Zealand fish stocks, *inter alia* because these are usually based on deterministic dynamics and can lead to maximum production being inferred to occur at very small fractions of the unfished level (e.g., Dunn, 2024). Rather "management targets" are established. The proxy for B_{MSY} has been defined as $0.35B_0$ for medium productivity species and $0.4-0.5B_0$ for low productivity species (MPI, 2011).

The current B_{MSY} proxies are $0.4B_0$ for hake and ling, and $0.35-0.5B_0$ for hoki, with the latter supported by a management strategy evaluation (see below)

10.1.1.4.3 Management strategy evaluations

Management strategy evaluation (MSE) is the use of simulation to evaluate the extent to which management strategies (combinations of monitoring schemes, stock assessment approaches and harvest control rules) are able to satisfy the management objectives (Punt et al., 2016). MSE involves the development of operating models (OMs) that represent the system being managed. The OMs aim to be realistic and plausible to capture a range of uncertainties. OMs are often divided into a 'reference set' on which final recommendations regarding the management strategy to adopt is based and a 'robustness set', which is used to evaluate whether the management strategy behaves as expected given a situation that may less likely than the OMs in the reference set but nevertheless not entirely implausible.

The work to select harvest control rules (HCRs) aimed to identify HCRs that involve the following elements (Seafood New Zealand, 2025):

- Developing a stock assessment approximately every four years, with peer review provided by the relevant Assessment Working Group, to estimate the probability of current biomass and/or fishing mortality relative to target and limit reference points.
- Conducting multi-year projections to evaluate, in a probabilistic manner, where the stock is and will be in future years in relation to reference points. This would be done for a base model case as well as for models that explore key uncertainties in the assessment.
- Making decisions on the TAC by the Minister of Oceans and Fisheries in a manner consistent with HSS and informed by Assessment Working Group advice and stakeholder engagement. Consultation during this step may result in additional projections being undertaken by Fisheries New Zealand.
- Monitoring of the fishery and stock performance during the projection period to ensure that stock status is not being compromised by the management actions.

The research conducted to evaluate candidate HCRs aimed to identify HCRs that achieve a variety of management objectives, including those related to biological objective as well as the resilience of the management measures under uncertainty and potential socio-economic implications (Seafood New Zealand, 2025). The HSS specifies minimum performance criteria to be met by MSEs: (a) a $\geq 50\%$ probability of achieving the MSY-compatible target or better, (b) a $\leq 10\%$ probability of breaching the soft limit, and (b) a $\leq 2\%$ probability of breaching the hard limit. The NZ government has not adopted HCRs but the Deepwater Council and Fisheries New Zealand intend to apply selected HCRs to support setting of catch limits. This will involve: (a) providing the output from running the selected HCR to inform the formulation

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of TAC and TACC options, (b) grounding the advice to the Minister of Fisheries in the results of the HCR projections alongside the scientific and stakeholder input, and (c) where there is divergence between the HCR-recommended catch and a Ministerial decision, the Deepwater Council will implement the lower of the two as a precautionary measure (Seafood New Zealand, 2025).

The guidelines for applying the HSS (MPI, 2011) refer to the fisheries management targets accounting for ecosystem (and other) considerations and that catch levels should be set more conservatively than those that meet single-species considerations alone. None of the species considered in the report would be considered low trophic level species. However, the MSE work has not referenced how ecological role was accounted for.

10.1.1.4.3.1 Hoki

In 2023, a Management Strategy Evaluation (MSE) was undertaken for hoki (Langley, 2023). The operating model for the MSE was based on the 2022 base-case stock assessment model and assumed eastern and western recruitments equivalent to those for 2001–2020, a period characterised by lower recruitment for the western stock relative to long-term recruitment. The MSE evaluated a range of Harvest Control Rules (HCRs), including alternative target biomass levels and corresponding catch levels. The HCRs specified a base level of catch for the eastern and western fisheries when the respective stock units were assessed to be within the target biomass range and varied the level of catch proportionally when the stock was below or above the target biomass range. The initial set of HCRs reaffirmed the current target biomass range of $0.35\text{--}0.5B_0$; the lower bound ensuring the stock had a very low risk of declining below the soft limit ($0.2B_0$). A range of other performance indicators were derived to evaluate the individual HCRs, including average annual fishery catches, variability in annual catches, magnitude and frequency of catch adjustments and relative CPUE, and average fish weight by fishery.

For the final set of HCRs, the base levels of catch yielded average total annual catches of about 112–118 kt, approximately partitioned 47 kt Chatham Rise, 40–46 kt WCSI, 10 kt Sub-Antarctic, and 15 kt Cook Strait. Those scenarios yielded average stock sizes close to the upper range of the target biomass (i.e., $0.45\text{--}0.5B_0$). However, there was considerable variability in catches between years due to variability in annual recruitments and the precision of the simulated annual assessments. The study highlighted the need to make frequent large changes to fishery catch allocations to maintain the stock within the target biomass range. HCRs that yielded lower levels of total catch (approximately 100 kt) resulted in higher overall biomass levels and less frequent large changes in annual catches.

The robustness of the MSE results, including the selection of specific HCRs, depended on the fundamental stock structure assumptions of the assessment model, particularly the assumption of separate eastern and western stocks with a common nursery ground on the Chatham Rise (natal fidelity). Alternative stock assumptions may influence the potential yields from key fisheries, in particular the impact of the Chatham Rise catches on the magnitude of recruitment to the western fisheries.

The 2023 Plenary did not adopt an HCR for the management of the hoki fishery (FNZ, 2024b). Instead, the results of the MSE were considered useful to inform managers regarding the likely level of yields available from the hoki fishery and the scale of management response required to maintain the stock at the optimal target biomass levels. FNZ (2024b) stated that the adoption of a specific HCR would require wider consultation to fully evaluate the relative trade-offs between stock outcomes (informed by key performance indicators). Implementation of a specific set of HCRs would also require the specification of a set of breakout rules for managing the stock beyond the scope of the current operating model, e.g., in response to a sustained period of low recruitments.

The range of HCRs considered by Langley (2023) was configured with base levels of catch associated with each main fishery area: Chatham Rise, Cook Strait, and WCSI and Sub-Antarctic combined (Figure 32). The HCRs set the catches at that base level while the respective stocks (eastern or western) are assessed to be within a specified target biomass range. Annual catches are decreased if the stock is below the lower range of the target biomass or increased when the stock was above the upper range of the target biomass (Figure 32). The base levels of catch for HCR 38 are WCSI+Sub-Antarctic: 50,000t; Chatham Rise: 50,000t; Cook Strait: 15,000t, and for HCR 46 are WCSI+Sub-Antarctic: 60,000t; Chatham Rise: 50,000t; Cook Strait: 15,000t).

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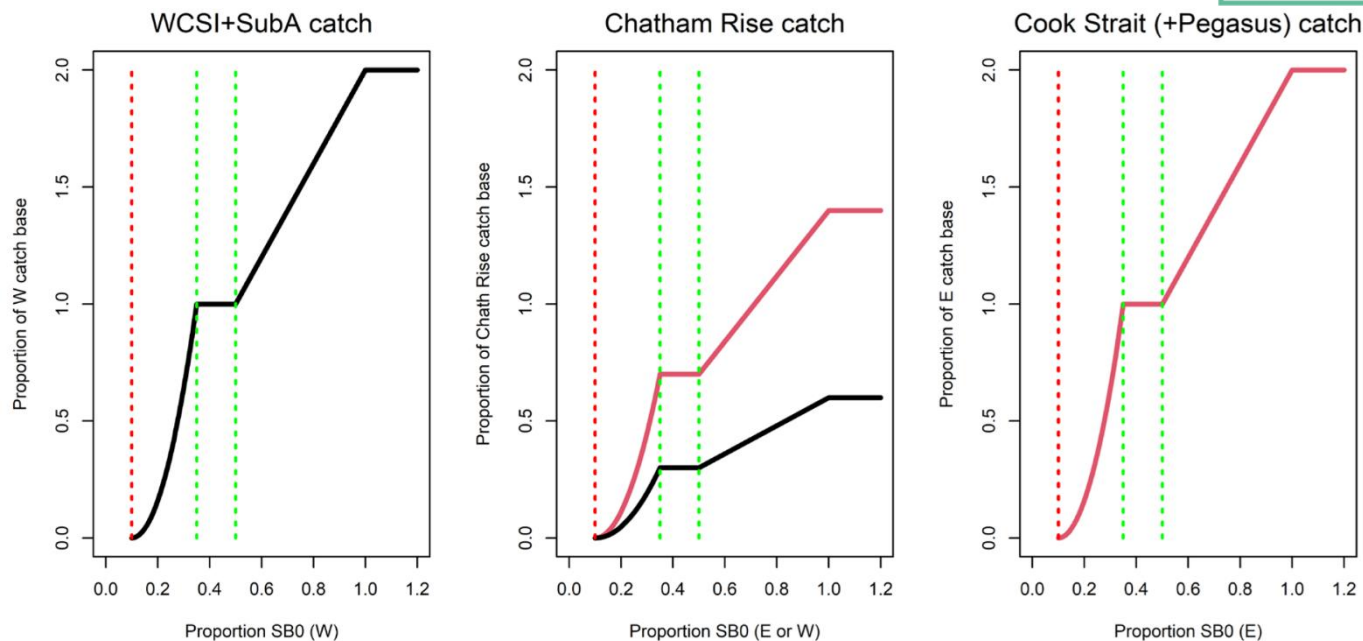


Figure 32. Generic structure of the candidate HCRs for hoki. The red and black lines are associated with the status of the eastern and western stocks, respectively. The example apportionments 70% of the Chatham Rise catch based on the eastern stock status and 30% based on the western stock status ($PropE$ 0.7). The red dashed vertical line represents the hard limit ($0.1 B_0$) and the green dashed vertical lines represent the lower and upper limits of the target biomass level (in this case 35% and 50%, respectively) (Langley, 2023).

Although not formally adopted by the NZ government, the hoki quota owners have voluntarily committed to follow HCRs 38 and 64. This adherence has been implemented during 2023-24 and 2024-25 fishing years and is intended to be continue into the future, including until the formal adoption processes are complete.

10.1.1.4.3.2 Hake

Dunn (2024a,b) conducted an evaluation of harvest control rules (HCRs) based on the most recent stock assessments for HAK 1, HAK4, and HAK 7. The operating models assumed that recruitment averaged at a level comparable to that for the most 10 years (HAK1 - 2007-2017; HAK 4 - 2008-2017; HAK7 - 2008-2017), as estimated within the stock assessment, although the MSE also explored sensitivity to autocorrelation in future recruitment. The MSE did not explore alternative values for other population parameters such as natural mortality and stock-recruit steepness.

The results of the MSE were based on performance metrics related to catches, catch variability, and the probabilities of dropping below various biomass reference points, including the current management target of $0.4B_0$ and the New Zealand soft and hard limits of $0.2B_0$ and $0.1B_0$. The analyst defined selection criteria for the performance metrics considered, including that the probability of dropping below $0.2B_0$ should not exceed 0.10.

The analyst examined several groups of candidate HCRs: a constant exploitation rate strategy, three threshold strategies in which fishing mortality was ramped up from 0, $0.1B_0$ and $0.2B_0$, and two strategies that ramped fishing mortality from 0 and $0.2B_0$ to either $0.4B_0$ or $(1-M) \times 0.4B_0$. Assessments and TAC updates were assumed to occur every three years, and three levels of catch variability constraint were explored (no constraint, a 10% threshold before changes were applied, and a 20% maximum change in catch limits). Future estimates of spawning stock biomass were generated from lognormal distributions, in some cases with autocorrelated errors, i.e. using the “shortcut” approach to MSE.

Dunn (2024b) noted that deterministic B_{MSY} is less than $0.2B_0$, but that the “real world” B_{MSY} would be higher than this. Dunn (2024a,b) therefore also assessed a potential management target range for HAK1, HAK4, HAK 7 based on the results of the simulations and identified $0.35-50B_0$ as a level that would maintain the stock above the New Zealand soft limit of $0.2B_0$ and such that biomass would fluctuate about $0.4B_0$.

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Evidence suggests that the TACs set for HAK1, HAK4 and HAK7 have been less than those that would arise from the tested HCRs, but no HCRs have yet been adopted by the NZ government (Seafood New Zealand, 2025). Industry selected an HCR for HAK1, HAK4, and HAK7 that involved a target level of fishing mortality corresponding to $0.4B_0$, which is achieved when spawning biomass exceeds 34.5% of unfished spawning biomass, with TACs set to zero at 10% of unfished spawning biomass (Rule-4 in Figure 4 Seafood New Zealand, 2025).

10.1.1.4.3.3 Ling

Mormede (2024) conducted an evaluation of harvest control rules (HCRs) linked to a CASAL-based estimation method ("full MSE") for three ling stocks (LIN 3&4, 5&6, and 7WC). The operating models were the current stock assessments, with parameter uncertainty accounted for by sampling parameter vectors from the results of MCMC-based stock assessments. The operating models considered uncertainty in natural mortality, stock-recruit steepness and future recruitment. Future data were simulated based on the levels of error for the last observed year for the assessment. The HCRs were of the threshold form with a target exploitation rate of $U_{40\%}$ and options for the low and top inflection points. The candidate HCRs involved a ramp starting at $0.1B_0$ with full fishing mortality applied at $(1-M) \times 0.4B_0$ as well as catch constraints (either no limit or a $\pm 20\%$ cap).

The results of the MSE were based on performance metrics related to catches, catch variability, and the probabilities of dropping below various biomass reference points, including the New Zealand soft and hard limits of $0.2B_0$ and $0.1B_0$. The analyst identified a set of HCRs (in conjunction with industry and Fisheries New Zealand representatives), in particular those with a low inflection point of $0.1B_0$ and a top inflection point of $(1-M) \times 0.4B_0$ for final analyses. This type of HCR reduces exploitation rate as the soft limit is approached - none of the HCRs considered in the final analyses breached the soft limit (Mormede, 2024).

Mormede (2024) also assessed a potential management target range for the NZ ling stocks based on the results of the simulations and identified $0.33-55B_0$, such that control rules with a lower target would not achieve a 50% probability of being above the lower end of the target range given the uncertainties considered in the MSE.

The methods and results were reviewed by the deepwater working group. No HCRs have yet been adopted by the NZ government (Seafood New Zealand, 2025). Industry have voluntarily committed to following an HCR with a target level of fishing mortality corresponding to $0.4B_0$, which is achieved when spawning biomass exceeds 33% of unfished spawning biomass, with TACs set to zero at 10% of unfished spawning biomass (Seafood New Zealand, 2025).

10.1.1.5. Tools

The tools to control fishing to achieve the objectives of the harvest strategy have not changed since the last recertification. To summarize, since 1986, the 636 fish stocks harvested by the major commercial fisheries in New Zealand fisheries waters, have been managed through a quota management system (QMS) using individual transferable quotas (ITQs). Each fish stock has 100,000,000 quota shares issued in perpetuity. The quota shares are a property right. This system is fully described on MPI's website (<https://fs.fish.govt.nz/>). Within the QMS, fisheries sustainability objectives are achieved by setting an overall annual total allowable catch (TAC) that is consistent with the productivity of a fishery. The TAC is apportioned amongst user groups such as the TACC for the commercial fishery, allocations for Maori and the recreational sector and an allocation to address other fishing-related mortality such as illegal fishing or accidental loss of fish from nets.

Each license holder owns a set of tradable shares associated with a particular fish stock. The TACC for each fishery is split across these shares and thus apportioned amongst quota owners. The sum of these shares is the licensee's Annual Catch Entitlement (ACE). The ACE is a hard limit. Each commercial fishing permit holder must balance their catch against their ACE holding. If the permit holder does not hold ACE, they must purchase ACE from another ACE holder. Some ACE is held by entities that do not intend to fish but sell their ACE to fishers who need to balance their catch against ACE. If a licensee catches more fish than their ACE, a charge is levied as per a Deemed Value (DV) determined annually by MPI on an increasing scale above the ACE. Thus, while TACC overruns can occur, there is a large financial incentive for licensees to maintain their catch within their allotted ACEs.

The boundaries for some of the stocks do not conform to the management boundaries used by MPI for catch control. In

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the case of the Chatham Rise ling stock, the TACCs are apportioned to areas LIN 3 and LIN 4 based upon an analysis of the biological distribution of the stock in survey data. In the case of the Sub-Antarctic ling stock, the TACCs are again apportioned to areas LIN 5 and LIN 4, again based upon an analysis of the biological distribution of the stock in survey data. For LIN 7, MPI uses the results of the West Coast South Island (LIN 7WC) stock assessment as the basis of the TACC.

The 1996 Fisheries Act and associated regulations describe a wide array of effort-based tools (e.g. gear configuration, time and area closures, etc.), which are used in addition to quotas to control fishing mortality.

10.1.2. Catch data

Table 15 and Table 16 summarize the catch data for hoki by area and FishStock, while this information is provided in Table 19, Table 20, and Table 21 for hake, and in Table 23, Table 24, Table 25, and Table 26 for ling.

10.1.3. Principle 1 catch

Table 64. TACC (agreed catch proportion) and catch data for hoki (HOK 1 East).

TACC / Catch Data	Year	Amount
TACC (catch limit)	Year (2022-23)	65,000 t
UoA share of TACC	Year (2022-23)	65,000 t
Total catch by UoC (most recent year)	Year (2022-23)	60,063 t
Total catch by UoC (second most recent year)	Year (2021-22)	48,942 t

Table 65. TACC (agreed catch proportion) and catch data for hoki (HOK 1 West).

TACC / Catch Data	Year	Amount
TACC (catch limit)	Year (2022-23)	45,000 t
UoA share of TACC	Year (2022-23)	45,000 t
Total catch by UoC (most recent year)	Year (2022-23)	45,500 t
Total catch by UoC (second most recent year)	Year (2021-22)	42,767 t

Table 66. TACC (agreed catch proportion) and catch data for hake (HAK 1).

TACC / Catch Data	Year	Amount
TACC	Year (2022-23)	3,701 t
UoA share of TACC	Year (2022-23)	3,701 t
Total catch by UoC (most recent year)	Year (2022-23)	1,083 t
Total catch by UoC (second most recent year)	Year (2021-22)	1,672 t

Table 67. TACC (agreed catch proportion) and catch data for hake (HAK 4).

TACC / Catch Data	Year	Amount
TACC	Year (2022-23)	1,800 t
UoA share of TACC	Year (2022-23)	1,800 t
Total catch by UoC (most recent year)	Year (2022-23)	124 t

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Total catch by UoC (second most recent year)	Year (2021-22)	137 t

Table 68. TACC (agreed catch proportion) and catch data for hake (HAK 7).

TACC / Catch Data	Year	Amount
TACC	Year (2022-23)	2,272 t
UoA share of TACC	Year (2022-23)	2,272 t
Total catch by UoC (most recent year)	Year (2022-23)	1,696 t
Total catch by UoC (second most recent year)	Year (2021-22)	1,325 t

Table 69. TACC (agreed catch proportion) and catch data for ling (LIN 3).

TACC / Catch Data	Year	Amount
TACC	Year (2022-23)	2,060 t
UoA share of TACC	Year (2022-23)	2,060 t
Total catch by UoC (most recent year)	Year (2022-23)	2,264 t
Total catch by UoC (second most recent year)	Year (2021-22)	2,252 t

Table 70. TACC (agreed catch proportion) and catch data for ling (LIN 4).

TACC / Catch Data	Year	Amount
TACC	Year (2022-23)	4,200 t
UoA share of TACC	Year (2022-23)	4,200 t
Total catch by UoC (most recent year)	Year (2022-23)	4,619 t
Total catch by UoC (second most recent year)	Year (2021-22)	4,626 t

Table 71. TACC (agreed catch proportion) and catch data for ling (LIN 5).

TACC / Catch Data	Year	Amount
TACC	Year (2022-23)	5,208 t
UoA share of TACC	Year (2022-23)	5,208 t
Total catch by UoC (most recent year)	Year (2022-23)	4,906 t
Total catch by UoC (second most recent year)	Year (2021-22)	5,049 t

Table 72. TACC (agreed catch proportion) and catch data for ling (LIN 6).

TACC / Catch Data	Year	Amount
TACC	Year (2022-23)	8,505 t
UoA share of TACC	Year (2022-23)	8,505 t
Total catch by UoC (most recent year)	Year (2022-23)	4,780 t
Total catch by UoC (second most recent year)	Year (2021-22)	3,881 t

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Table 73. TACC (agreed catch proportion) and catch data for ling (LIN 7).

TACC / Catch Data	Year	Amount
TACC	Year (2022-23)	3,387 t
UoA share of TACC	Year (2022-23)	3,387 t
Total catch by UoC (most recent year)	Year (2022-23)	3,540 t
Total catch by UoC (second most recent year)	Year (2021-22)	3,325 t

10.1.4. Principle 1 species

Fishing method	Species	Management Area	Stock	UoC
Demersal & Semi-pelagic trawl	Hoki	HOK 1	Eastern	1
	(<i>Macruronus novaezealandiae</i>)	HOK 1	Western	2
	Hake	HAK 1	Sub-Antarctic	3
	(<i>Merluccius australis</i>)	HAK 4	Chatham Rise	4
		HAK 7	West Coast South Island	5
	Ling	LIN 3	Chatham Rise (LIN 3 & 4)	6
	(<i>Genypterus blacodes</i>)	LIN 4	Chatham Rise (LIN 3 & 4)	7
		LIN 5	Sub-Antarctic (LIN 5 & 6)	8
		LIN 6	Sub-Antarctic (LIN 5 & 6)	9
		LIN 7	West Coast South Island (LIN 7WC)	10

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10.1.5. Principle 1 Performance Indicator scores and rationales

PI 1.1.1 – Stock status

PI 1.1.1		The stock is at a level that maintains high productivity and has a low probability of recruitment overfishing		
Scoring issue		SG 60	SG 80	SG 100
a	Stock status relative to recruitment impairment			
	Guidepost	It is likely that the stock is above the point of recruitment impairment (PRI).	It is highly likely that the stock is above the PRI.	There is a high degree of certainty that the stock is above the PRI.
	Met?	HOK 1W: Y HOK 1E: Y HAK 1: Y HAK 4: Y HAK 7: Y LIN 3&4: Y LIN 5&6: Y LIN 7WC: Y	HOK 1W: Y HOK 1E: Y HAK 1: Y HAK 4: Y HAK 7: Y LIN 3&4: Y LIN 5&6: Y LIN 7WC: Y	HOK 1W: Y HOK 1E: Y HAK 1: Y HAK 4: Y HAK 7: Y LIN 3&4: Y LIN 5&6: Y LIN 7WC: Y
Rationale		For the purposes of this assessment the PRI is taken to be the soft limit in the New Zealand Harvest Strategy Standard (20% of unfished spawning stock biomass). The stock assessments, which account for the biology and fisheries for the stocks concerned, estimate stock status relative to the estimate of unfished spawning biomass for a range of model configurations and identify a base-model. MCMC sampling is used to compute posterior distributions for current spawning biomass and current spawning biomass relative to unfished spawning biomass (i.e. $B_{current}/B_0$). Based on section 10.1.1.3 the probability that the spawning biomass from the most recent assessment is below $0.2B_0$ is: HOK1W: <1%; HOK1E: <1%; HAK1 <1%; HAK4: <1%; HAK 7: <1%; LIN 3&4: <1%; LIN 5&6: <1%; LIN 7WC: <1% (Table 27). The probabilities of being above the PRI exceed 0.95 for all UoA so SG 60, 80 and 100 are met .		
b	Stock status in relation to achievement of maximum sustainable yield (MSY)			
	Guidepost		The stock is at or fluctuating around a level consistent with MSY.	There is a high degree of certainty that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years.
	Met?		HOK 1W: Y HOK 1E: Y HAK 1: Y HAK 4: Y HAK 7: Y LIN 3&4: Y LIN 5&6: Y LIN 7WC: Y	HOK 1W: N HOK 1E: Y HAK 1: Y HAK 4 : Y HAK 7: N LIN 3&4: Y LIN 5&6: Y LIN 7WC: Y

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Rationale	For the purposes of this assessment whether the stock is fluctuating at a level consistent with the biomass level corresponding to MSY is based on the biomass relative to the management target for the stocks ($0.35-0.5B_0$ for hoki; $0.4B_0$ for hake, and ling). This range is larger than the estimate of B_{MSY} that would be computed from the stock assessments based on the assumption of deterministic dynamics given the assumed values for stock-recruitment steepness but is not inconsistent with the management targets for similar species. The stock assessments estimate stock status relative to the estimate of unfished spawning biomass for a range of model configurations and identify a base-model. MCMC sampling is used to compute posterior distributions for current spawning biomass and current spawning biomass relative to unfished spawning biomass (i.e. $B_{current}/B_0$). Based on section 10.1.1.3 the probability that the spawning biomass from the most recent assessment is below the management target (hake and ling) or the lower end of the management target range (hoki) is: HOK1W: 5%; HOK1E: <1%; HAK1: <1%; HAK4: 1%; HAK 7: 0.27; LIN 3&4: <1%; LIN 5&6: <1%; LIN 7WC: 5% (Table 27). SG 80 is met for all UoAs as stock status exceeds the management target with greater than 50% probability. UoAs 2, 3, 4, 6, 7 and 8 have all been within management target range (HOK 1E) or above the management target (HAK1, HAK4, LIN 3&4, LIN 5&6, LIN 7WC) for several years. However, UoAs 1 (HOK 1W) 5 (HAK 7) and have been below the management target range until recently (Figure 4 and Figure 17). Thus, while SG 100 is met for UoAs 2, 3, 4, 6, 7 and 8 SG 100 is not met for UoAs 1 and 5.

Stock status relative to reference points			
	Type of reference point	Value of reference point	Current stock status relative to reference point
Reference point used in scoring stock relative to PRI (SIa)	HOK1W: Spawning biomass HOK1E: Spawning biomass HAK1: Spawning biomass HAK4: Spawning biomass HAK7: Spawning biomass LIN 3&4: Spawning biomass LIN 5&6: Spawning biomass LIN 7WC: Spawning biomass	HOK1W: $0.2B_0$ HOK1E: $0.2B_0$ HAK1: $0.2B_0$ HAK4: $0.2B_0$ HAK7: $0.2B_0$ LIN 3&4: $0.2B_0$ LIN 5&6: $0.2B_0$ LIN 7WC: $0.2B_0$	HOK1: $0.41B_0$ HOK1W: $0.51B_0$ HAK1: $0.62B_0$ HAK4: $0.55B_0$ HAK7: $0.47B_0$ LIN 3&4: $0.56B_0$ LIN 5&6: $0.66B_0$ LIN 7WC: $0.55B_0$
Reference point used in scoring stock relative to MSY (SIb)	HOK1W: Spawning biomass HOK1E: Spawning biomass HAK1: Spawning biomass HAK4: Spawning biomass HAK7: Spawning biomass LIN 3&4: Spawning biomass LIN 5&6: Spawning biomass LIN 7WC: Spawning biomass	HOK1W: $0.35-5B_0$ HOK1E: $0.35-5B_0$ HAK1: $0.4B_0$ HAK4: $0.4B_0$ HAK7: $0.4B_0$ LIN 3&4: $0.4B_0$ LIN 5&6: $0.4B_0$ LIN 7WC: $0.4B_0$	HOK1: $0.41B_0$ HOK1W: $0.51B_0$ HAK1: $0.62B_0$ HAK4: $0.55B_0$ HAK7: $0.47B_0$ LIN 3&4: $0.56B_0$ LIN 5&6: $0.66B_0$ LIN 7WC: $0.55B_0$

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	HOK1W: ≥ 80 HOK1E: ≥ 80 HAK1: ≥ 80 HAK4: ≥ 80 HAK7: ≥ 80 LIN 3&4: ≥ 80 LIN 5&6: ≥ 80

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	LIN 7WC: ≥ 80
Information gap indicator	None

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	HOK1W: 90 HOK1E: 100 HAK1: 100 HAK4: 100 HAK7: 90 LIN 3&4: 100 LIN 5&6: 100 LIN 7WC: 100
Condition number (if relevant)	N/A

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PI 1.2.1 – Harvest strategy

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring issue		SG 60	SG 80	SG 100
a	Harvest strategy design			
	Guide post	The harvest strategy is expected to achieve stock management objectives reflected in PI 1.1.1/PI 1.1.1A SG80.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving stock management objectives reflected in PI 1.1.1/PI 1.1.1A SG80.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in PI 1.1.1/PI 1.1.1A SG80.
	Met?	Yes	Yes	Yes
Rationale		The harvest strategy for hoki, hake and ling involves monitoring (generally catches, estimates of biomass from surveys, and fishery and survey age-compositions), application of an integrated age-structured method of stock assessment (CASAL/Casal2) to determine stock status relative to the biomass reference points on which the evaluation of PI1.1.1 can be based, and use of projections to assess the consequences of the future catches. For stocks assessed to be below the soft limit, a time-constrained rebuilding analysis is required based on the NZ Harvest Strategy Standard. The HCR selected by industry, which was selected using a Management Strategy Evaluation process, involves a target level of fishing mortality corresponding to $0.4B_0$, which is achieved when spawning biomass exceeds a threshold level of unfished spawning biomass, with TACs set to zero at 10% of unfished spawning biomass. These elements are responsive to stock status and are designed to move stocks towards to the management target / management target range. The MSE results suggest that spawning biomass will remain about the estimate of B_{MSY} from the stock assessment with very high probability (>80%) although B_{MSY} as inferred from the stock assessment is a low proportion of unfished biomass. The harvest strategy has led to changes to the TACCs for stocks. For example, the TACCs for HOK 1 and HAK 7 were reduced because their stock sizes were below their target levels and were approaching their limit reference points (Table 17 and Table 20). All UoAs meet SG 60, 80 and 100.		
b	Harvest strategy evaluation			
	Guide post	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy has been tested and is expected to meet the objectives reflected in PI 1.1.1/ PI 1.1.1A SG80 or there is evidence that the harvest strategy is achieving its objectives reflected in PI 1.1.1/ PI 1.1.1A SG80.	The performance of the harvest strategy has been evaluated and evidence exists to show that it is achieving the objectives reflected in PI 1.1.1/ PI 1.1.1A SG80, including being clearly able to maintain stocks at target levels.
	Met?	Yes	Yes	Yes
Rationale		The harvest strategy for hoki, hake and ling is well defined and responsive to the state of the stock. It is consistent with the NZ Harvest Strategy Standard as well as the Fisheries Act (Section 10.1.1.4.1). Many of the TACCs have not be adjusted based on this harvest strategy as the associated stocks are assessed to be above their management targets, but the TACCs for hoki (HOK1W and HOK1E) as well as that of HAK 7 have been modified in recent years given the results of the stock assessments and projections, providing evidence that the harvest strategy is		

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	achieving its objectives as reflected in PI 1.1.1. Given the nature of the assessment/projection approach to providing advice, there is no explicit aim to increase exploitation rates to “drive” stocks to the management target, with the consequence that some stocks (e.g. HOK1E, HAK 1, HAK 4, LIN3&4, LIN 5&6, and LIN 7WC) are currently well above their management targets.			
	MSE analyses have been conducted for hoki, hake and ling (Sections 10.1.1.4.3.1, 10.1.1.4.3.2, and 10.1.1.4.3.3). These MSEs examined the primary sources of uncertainty appropriate to the scale and intensity of the fishery (e.g. natural mortality, obtained uncertainty, process uncertainty, and productivity). The results of the MSEs provided the basis for selecting the HCRs that will support management decision making for hoki, hake and ling. Thus, there is evidence that the harvest strategy is achieving its objectives so SG 60 and 80 are met for all UoAs . HCRs have been evaluated using MSE and show that they are able to maintain stocks at target levels, so all UOAs achieve SG 100 .			
c	Harvest strategy monitoring			
	Guide post	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	Yes		
Rationale		Survey estimates of abundance are available for all UoAs on a regular basis, which provide the primary manner for tracking changes over time in biomass (Section 7.4). The assessments also make use of fishery and survey age-compositions, which are collected regularly from the primary fishery sectors and during surveys. The medium-term research plan for deepwater fisheries (FNZ< 2024c) includes data collection at the level needed to support the assessments. All UoAs consequently meet SG 60.		
d	Harvest strategy review			
	Guide post			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			No
Rationale		The HCRs for hoki, hake, and ling were revised in 2025 based on analyses in 2024, but the harvest strategy itself was not reviewed, which means that SG 100 was not met.		
e	Shark finning			
	Guide post	There is a high degree of certainty that shark finning is not taking place.		
	Met?	NA		
Rationale		Not scores - shark is not a target species in any of the fisheries concerned.		
f	Review of alternative measures			
	Guide post	There has been a review of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock.	There is a review every 5 years of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock and they are implemented as appropriate.	There is a review that happens every 2 years of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock, and they

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				are implemented, as appropriate.
	Met?	Yes	Yes	No
Rationale	Anderson et al. (2019) provides information on amount of target species, bycatch and discard in the hoki-hake-ling fishery during 2002 to 2017, including estimates by region. The proportion of the catch that is discard is low (1.2% hoki, 0.42% hake, 0.21% ling). The process for dealing with unwanted catch has changed over time. For example, under the new discard rules introduced by the Fisheries Amendment Act 2022 (https://www.legislation.govt.nz/act/public/2022/0056/latest/whole.html), all QMS species must be retained and landed unless the target species are subject to a Ministerial exemption or are permitted for return under observer-authorised provisions pursuant to s72 of the Fisheries Act 1996. The form in which it is landed is not specified (Vessels with meal plants onboard will meal this unwanted catch, vessels without meal plants onboard will still have to land the product.), but all QMS species landed must have an associated catch weight estimate reported by fishstock (irrespective of product type landed). Also, for any authorised discards of QMS species, a catch report must also be provided (catch weight estimate, stock, area, etc.). The industry maintains move-on provisions for avoiding catches of small hoki. The principle objectives for the Hoki Code of Conduct are: (a) strengthen the integrity and effectiveness of the HMAs by ensuring any non-hoki target fishing in these areas is, in reality catching acceptable ratios of target species and therefore minimal hoki; and (b) improve and enhance measures to ensure vessels do not continue to fish in any area across the whole HOK 1 QMA where juvenile hoki are prevalent in the catch (Seafood New Zealand Deepwater Council, 2024). The move-on rules have been reviewed and revised over time. The 2024 and 2025 landings and discard exceptions documents (FNZ, 2024c, 2025) outline the rules related to discarding, including of the target species. The measures to reduce unwanted catch have been reviewed in the last five years so SG 60 and 80 are met. Alternative measures are not reviewed every two years therefore SG 100 is not met.			

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	HOK1W: ≥ 80 HOK1E: ≥ 80 HAK1: ≥ 80 HAK4: ≥ 80 HAK7: ≥ 80 LIN 3&4: ≥ 80 LIN 5&6: ≥ 80 LIN 7WC: ≥ 80
Information gap indicator	None

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	HOK1W: 90 HOK1E: 90 HAK1: 90 HAK4: 90 HAK7: 90 LIN 3&4: 90 LIN 5&6: 90

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	LIN 7WC: 90
Condition number (if relevant)	N/A

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PI 1.2.2 – Harvest control rules and tools

PI 1.2.2		There are well-defined and effective HCRs in place		
Scoring issue		SG 60	SG 80	SG 100
a	HCRs design and application			
	Guide post	Generally understood HCRs are in place that are expected to reduce the exploitation rate as the PRI is approached .	Well-defined HCRs are in place that ensure the exploitation rate is reduced as the PRI is approached, and are expected to keep the stock fluctuating around a target level consistent with (or above) MSY, or for key LTL species at levels consistent with ecosystem needs.	The HCRs are expected to keep the stock fluctuating at or above a target level consistent with MSY, or another more appropriate level most of the time, taking into account the ecological role of the stock.
	Met?	Yes	Yes	No
Rationale		The New Zealand system is well structured to ensure that catches remain below the catch limits. The harvest strategy for hoki, hake, and ling involves projections under different levels of catch and an assessment of the probability whether a stock is projected to drop below the soft limit. Stocks assessed to be below the soft limit are required to have rebuilding plans in place that rebuild them, where the time to recover is time-constrained. If current biomass is estimated to be between the target (or the threshold) and the soft limit, Stock Assessment Working Groups should work with fisheries managers to define and evaluate the TACC consequences of (a) reducing fishing mortality proportionately to the estimated decrease in biomass below the target or threshold (or taking steps to approximate this for low information stocks), in order to avoid breaching either the soft or hard limits, and/or (b) reducing catch super-proportionately to the estimated decrease in biomass below the target or threshold (or taking steps to approximate this for low information stocks), in order to avoid breaching either the soft or hard limits. The industry-selected HCRs for hoki, hake and ling reduce fishing mortality if spawning biomass is less than a species-specific threshold in terms of unfished spawning biomass, with TACs set to zero at 10% of unfished spawning biomass. Thus, generally understood HCRs are in place that are expected to reduce the exploitation rate as the PRI is approached so SG 60 is met . In addition, the exploitation is reduced as the PRI is approached under the selected HCR, meaning that SG 80 is met . The MSE-based simulations show that the stocks of hoki, hake, and ling should fluctuate about their management targets (or management target range in the case of hoki) However, the MSE did not account for the ecological role of the stocks so SG 100 is not met .		
b	The robustness of HCRs to uncertainty			
	Guide post		The HCRs are likely to be robust to the main uncertainties.	The HCRs take account of a wide range of uncertainties including the ecological role of the stock, and there is evidence that the HCRs are robust to the main uncertainties.
	Met?		Yes	No
Rationale		The assessments for hoki, hake and ling account for the main uncertainties related to the biology and monitoring of the stocks. Projections are usually conducted for two recruitment scenarios: (a) the entire period of estimated recruitments, and (b) recent recruitment, with parameter values selected from the Bayesian posterior distributions. Uncertainty in future recruitment is usually the main source of uncertainty when conducting projections under future catches. Assessments		

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	include multiple sensitivity tests and the results of these tests are presented to the DWWG and their results are reviewed by the members of the group, who include members of the FNZ management team and their advisors. These sensitivity tests are documented in detail in the final Fishery Assessment Reports, which are also available to managers. Managers can, and do, request additional projections, including for different recruitment periods and for different catch assumptions. Thus, the application of the harvest strategy takes a wide range of uncertainties into account. Therefore, the HCRs are likely to be robust to the main uncertainties meeting SG 80. The MSE accounts for some sources of uncertainties but not a wide range so SG 100 is not met.			
c	Evaluation of HCRs			
	Guide post	There is some evidence that tools used or available to implement HCRs are appropriate and effective in controlling exploitation.	Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs.	Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the HCRs.
	Met?	Yes	Yes	Yes
Rationale	The primary tool in the NZ system are the TACCs are the associated monitoring programs. However, the 1996 Fisheries Act and associated regulations describe a wide array of effort-based tools (e.g. gear configuration, time and area closures, etc.), which can be used in addition to catch limits to control fishing mortality (Section 10610.1.1.5). Catches in New Zealand fisheries are at or below agreed catch limits (Section 10.1.1). While there is some evidence that catches for some deepwater species have been mis-reported in the past, there is no evidence for substantial mis-reporting. Thus, the evidence clearly shows that the tools are effective at achieving the exploitation levels consistent with the HCR. All UoAs meet SG 60, 80 and 100.			

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	HOK1W: ≥ 60 HOK1E: ≥ 60 HAK1: ≥ 60 HAK4: ≥ 60 HAK7: ≥ 60 LIN 3&4: ≥ 60 LIN 5&6: ≥ 60 LIN 7WC: ≥ 60
Information gap indicator	None

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	HOK1W: 85 HOK1E: 85 HAK1: 85 HAK4: 85 HAK7: 85 LIN 3&4: 85 LIN 5&6: 85 LIN 7WC: 85
Condition number (if relevant)	N/A

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PI 1.2.3 – Information and monitoring

PI 1.2.3		Relevant information is collected to support the harvest strategy		
Scoring issue		SG 60	SG 80	SG 100
a	Range of information			
	Guide post	Some relevant information related to stock structure, stock productivity, and fleet composition is available to support the harvest strategy.	Sufficient relevant information related to stock structure, stock productivity, fleet composition, and other data are available to support the harvest strategy.	A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals, and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met?	Yes	Yes	No
Rationale		The stocks of hoki, hake and ling have been subject to considerable biological and ecological research. Stock structure assumptions are based on the outcomes of the analysis of a variety of data types including genetic studies, morphology, and trends in demographic parameters such as age-structure. The stock structure hypotheses on which assessments and management advice are based are reviewed as part of the annual stock assessment process. Information is available on length as a function of age, weight as a function of age, and maturity at the level needed to support the stock assessments. Information on the rate of natural mortality, <i>M</i>, is less certain, and assessments explore whether it is possible estimate <i>M</i> as a part of the model fitting process, and some assessments consider length-specific natural mortality in the tests of sensitivity. Knowledge of the fleet is comprehensive. Some of the assessments report knowledge of environmental information pertinent to the stocks. Knowledge of the population dynamics of the species is sufficient to support the harvest strategy hence SG 60 and 80 are met. The most notable gap in knowledge relates to the form and parameters of the stock-recruitment relationship, which remains assumed. This means information is not comprehensive so SG 100 is not met, but given recruitment deviations are estimated, the information is sufficient to support the harvest strategy. There is a plan for when surveys and assessments are to be conducted (Table 8 and Table 9), but no such plan exists regarding improving biological knowledge, including stock structure and environmental impacts on population dynamics.		
b	Monitoring			
	Guide post	Stock abundance and UoA removals are monitored and at least 1 indicator is available and monitored with sufficient frequency to support the harvest strategy.	Stock abundance and UoA removals are regularly monitored at a level of accuracy and coverage consistent with the harvest strategy , and 1 or more indicators are available and monitored with sufficient frequency to support the harvest strategy.	All information required by the harvest strategy is monitored with high frequency and a high degree of certainty , and there is a good understanding of the inherent uncertainties in the information (data) and the robustness of assessment and management in dealing with this uncertainty.
	Met?	Yes	Yes	No

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Rationale	Catches of hoke, hake and ling are reported to Fisheries New Zealand. Reporting requirements are set out in the Fisheries (Reporting) Regulations 2001, most notably in sections 5 and 6. Trawl Catch, Effort and Processing Returns (TCEPRs) provide information about each fishing operation, with tow-by-tow records of latitude and longitude and date-time for the start and end of each tow, target species, tow duration, tow speed, and gear parameters, amongst others. The Trawl Catch Effort returns (TCERs) provide similar tow-by-tow data, but with start of the tow position information only which necessitates the generation of an endpoint. The Electronic Reporting System (ERS) collects data similar to the TCEPR; however, the position data are at a finer resolution – TCER and TCEPR data are generally recorded in degrees to one or two decimal places, whereas ERS data are recorded to four decimal places. Fisheries New Zealand observers have recorded details of catch and discards by species or species groups for the fleet of vessels involved in hoki, hake and ling trawl fishery in every fishing year since 1990–91. Only a minority of the fishing effort can be covered, however, and the allocation of observers on commercial vessels considers a range of data collection requirements and compliance issues for multiple fisheries, as well as the capacity of vessels to accommodate additional personnel. Although it is not possible to achieve a perfectly representative or random spread of observer effort across the fishery, the analyses used in, for example, Anderson et al. (2019), Spatially Explicit Fisheries Risk Assessments (SEFRAs e.g. Edwards et al., 2023) and Finnuci et al. (2020), find that the observer coverage closely matches the overall spatial and temporal spread of the commercial fisheries. It is illegal under the Fisheries Act 1996 to discard any species in the Quota Management System (QMS) at-sea unless the species is listed on Schedule 6 (of the Fisheries Act), the return to the sea is recorded, and the specified conditions are met, or an MPI observer on the vessel authorizes the discard. As hoki, hake and ling are QMS species, all catch of these species is recorded and reported with a high degree of accuracy. The biomasses of the stocks are monitored using surveys. Most stocks have one indicator of stock biomass, while some have multiple indicators (section 10.1.1). Surveys are conducted regularly (usually every 2-3 years; Table 8). Coverage of the stock areas is adequate, although there is uncertainty whether the survey for HAK 7 leads to an index of abundance that is proportional to biomass given its coverage. Overall, stock abundance of UoA removals are regularly monitored at a level of accuracy and coverage consistent with the harvest strategy, and one or more indicators are available and monitored with sufficient frequency to support the harvest strategy. A 2-3 year survey frequency is sufficient to support the assessments but is not high compared to some similar species. Thus, SG 60 and 80 are met for all UoAs but not SG100.		
c	Comprehensiveness of information		
	Guide post		There is good information on all other fishery removals from the stock.
	Met?		Yes
Rationale	As QMS stocks, hoki, hake, and ling are monitored across all sectors that take these species – reporting is required by the Fisheries (Reporting) Regulations 2001. Therefore, there is good information on all removals. According to the NZ plenary, the estimates of recreation take and catches by customary users for these species is considered negligible, although small catches of ling by recreational fishers have been reported. Thus, SG 80 is met.		

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	HOK1W: ≥ 80 HOK1E: ≥ 80

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	HAK1: ≥ 80 HAK4: ≥ 80 HAK7: ≥ 80 LIN 3&4: ≥ 80 LIN 5&6: ≥ 80 LIN 7WC: ≥ 80
Information gap indicator	None

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	HOK1W: 80 HOK1E: 80 HAK1: 80 HAK4: 80 HAK7: 80 LIN 3&4: 80 LIN 5&6: 80 LIN 7WC: 80
Condition number (if relevant)	N/A

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PI 1.2.4 – Assessment of stock status

PI 1.2.4		There is an assessment of the stock status		
Scoring issue		SG 60	SG 80	SG 100
a	Appropriateness of assessment to stock under consideration			
	Guide post		The assessment is appropriate for the stock and for the harvest strategy.	The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA.
	Met?		Yes	Yes
Rationale		The most recent assessments involve fitting an age-structured population dynamics model to catch and monitoring data. The parameters governing growth and stock-recruitment steepness are pre-specified, while natural mortality is pre-specified in some assessments and estimated in others. All assessments for hoki, hake, and ling involve estimating fishery and survey selectivity patterns. Key inputs to the assessments include prior distributions for survey catchability (Q). The assessments involve multiple model runs to identify a base model, which is then fitted using Bayesian techniques. The assessment then explores sensitivity (usually based on MPD estimation) to various assumed parameters and data set choices. The assessments then form the basis for projections under future catch scenarios, with sensitivity explored to the level of future recruitment. The assessments are configured within the CASAL / Casal2 package to take key specifics, including the biology of the species and the nature of the fishery, into account. All UoAs meet SG 80 and 100.		
b	Assessment approach			
	Guide post	The assessment estimates stock status relative to generic reference points appropriate to the species category.	The assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated.	
	Met?	Yes	Yes	
Rationale		The assessment estimates stock status relative to the hard limit, soft limit and management target/management target range (see Table 27 for a summary), thus meeting SG 60 and 80 .		
c	Uncertainty in the assessment			
	Guide post	The assessment identifies major sources of uncertainty.	The assessment takes uncertainty into account .	The assessment evaluates stock status relative to reference points in a probabilistic way .
	Met?	Yes	Yes	Yes
Rationale		The assessment method is Bayesian, and the results are expressed in terms of posterior distributions for quantities of management interest such as current spawning biomass and current spawning biomass relative to B_0. The uncertainty in the assessment is also quantified using sensitivity tests, and some of those sensitivity tests are carried forward to form the basis for projections. The number of sensitivity tests reported in the assessment reports and the plenary report are fairly low compared to the numbers that would be seen in other assessments for some similar methods, but sufficient to support the harvest strategy.		

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		The assessments provide the ability to assess stock status in probabilistic terms using Bayesian methods (Table 27). Consequently, the assessments take uncertainty into account and evaluate stock status relative to reference points in a probabilistic way. Therefore, all UoAs meet SG 60, 80 and 100		
d	Evaluation of assessment			
	Guide post			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			No
Rationale		The basic assessment method (integrated analysis) is used for many fisheries around the world and simulation studies have led to an understanding of how assessment methods of this type perform. However, no formal evaluations of an assessment method that is identical to CASAL/Casal2 have been undertaken. In particular, no evaluation of the implications of errors in specifying priors for key parameters has been undertaken. The assessment method (CASAL/Casal2) has yet to be formally tested using simulations and hence not tested the way it is configured for hoki, hake, and ling, thus not meeting SG 100.		
e	Peer review of assessment			
	Guide post		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met?		Yes	Yes: HOK 1W, HOK 1E; No: HAK1, HAK4, HAK7; No LIN 3&4, LIN 5&6; LIN 7WC
Rationale		The assessment is reviewed by the Deepwater Working Group, which has a broad range of members, including those from government, industry and NGOs, meeting SG80. However, the assessments have not recently been formally reviewed by scientists external to the New Zealand assessment process except for hoki, which was reviewed by external panel in 2017 (section 7.4.5). Thus, the SG 80 is met for all UoAs SG 100 is met for hoki, but not the other UoAs.		

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	HOK1W: ≥ 80 HOK1E: ≥ 80 HAK1: ≥ 80 HAK4: ≥ 80 HAK7: ≥ 80 LIN 3&4: ≥ 80 LIN 5&6: ≥ 80 LIN 7WC: ≥ 80
Information gap indicator	Is there a plan for an assessment of HAK 4?

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

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Overall Performance Indicator score	HOK1W: 95 HOK1E: 95 HAK1: 90 HAK4: 90 HAK7: 90 LIN 3&4: 90 LIN 5&6: 90 LIN 7WC: 90
Condition number (if relevant)	N/A

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10.2. Principle 2

10.2.1. Principle 2 background

Deepwater and middle-depth fisheries are those generally between 12 nautical miles and 200 nautical miles offshore. Fisheries are categorised into three tiers:

- Tier 1 – high volume, high value quota management system stocks that commercial fishers usually target;
- Tier 2 – quota management system stocks that are smaller or less valuable bycatch fisheries, or are only targeted at certain times of the year; and
- Tier 3 – bycatch species that are not managed through the quota management system.

Each species or species group is split into 1–10 stocks for management purposes. However, the boundaries of biological stocks often differ from the management boundaries. In general, biological stocks tend to occur at smaller scales than management boundaries, although in a few instances the reverse is true (Table 74).

The hoki, hake and ling trawl fishery, considered one combined trawl fishery, the southern blue whiting trawl fishery and the ling bottom longline fishery all fall under Tier 1. The trawl fleet characteristics are presented in Table 75.

The management of the majority of New Zealand's deepwater fisheries takes an evidence-based approach, supported by a robust and comprehensive monitoring and research programme. Information and data come from a variety of sources including independent Fisheries New Zealand Observer data, industry reporting, contracted fisheries independent research surveys, and contracted projects (FNZ, 2024). Research needs to inform management of New Zealand's deepwater fisheries are reflected in the medium term research plan (MTRP; FNZ 2024). The MTRP is a living document, updated regularly to reflect changes in management priorities where these occur, and identification of new information requirements. The MTRP should be read alongside the National Fisheries Plan for Deepwater and Middledepth fisheries (National Deepwater Plan; FNZ, 2019). Annual research plans are consulted with stakeholders through the Deepwater Fish Plan Advisory Group and reported in the Annual Operational Plans and Annual Review Reports for deepwater fisheries.

Table 74. New Zealand general Fishery Management Areas (FMAs) in relation to Quota Management Areas (QMAs) for stocks of hoki, hake and ling.

FMA		Hoki	Hake	Ling
1	Auckland (east)	HOK1E	HAK1	LIN1
2	Central (east)			LIN2
3	South-east coast			LIN3
4	South-east (Chatman Rise)		HAK4	LIN4
5	Southland	HOK1W	HAK1	LIN5
6	Sub-Antarctic			LIN6
7	Challenger/Central (plateau)		HAK7	LIN7
8	Central (Egmont)		HAK1	
9	Auckland (west)			LIN1
10	Kermadec	HOK10	HAK10	LIN10

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Table 75. Fleet characteristics, 2023/24, for the trawl fleet targeting one or more UoA stocks – hoki, hake, ling (Rob Tilney pers comm.)

Vessel Size (LOA)	Freezer with meal plant	Freezer no meal plant	Fresher	No. Vessels
> 80 m	7	0	0	7
56 - 69 m	9	6	0	15
32 - 45 m	0	1	4	5
24 - 28 m	0	0	4	4
< 24 m (inshore)	0	0	4	4
Totals	16	7	12	35

10.2.1.1. In-Scope species

Anderson et al 2019 reviewed observer data for all trawls targeting hake, hoki, ling, white and silver warehou from 1990–91 to 2016–17. Trawl fisheries for silver warehou and white warehou operate in similar areas to the hoki, hake, and ling fisheries and use the same vessel fleet and similar gear types, and so in their report the target fishery definition was expanded to include all five species. Observed fish catch and discards of the top 120 fish species or species groups by weight from observer records for the target trawl fishery from 1 Oct 2002 to 30 Sep 2017 are presented in Table 76.

Anderson et al 2019 also present observed catches and discards of the top 120 invertebrate species or species groups (Table 77).

Anderson et al 2019 note that, “Although it is not possible to achieve a perfectly representative or random spread of observer effort across the fishery, the analyses used here assume that the bias from such non-representativeness is sufficiently low that that results are not substantially biased.” Various tests were presented to confirm representativeness of observer coverage:

- to objectively assess spatial observer coverage, a comparison of the latitude and longitude of observed tows with all commercial tows recorded with position data was produced using density plots. Figure 33 shows that the spread of observed trawls over the longitudinal and latitudinal extent of the fishery was well matched for all years combined, although regions centred at about 171° E and 174° E (relating to the centre of effort in the WCSI and CHAT fisheries, respectively) were slightly over-represented by observer sampling in all periods.
- Comparisons made between vessel sizes in the commercial fleet and the observed portion (Figure 34) showed that, across all years, the full range of vessel sizes was well covered by observers in these fisheries.
- The spread of observer effort throughout each fishing year was compared with the spread of total effort in the fishery by applying a density function to the numbers of trawls per day (Figure 35). Observer effort has tended to be more evenly spread, with coverage throughout the year in most years and only a modest increase in effort during the hoki spawning period. This means that the spawning period was relatively under-sampled and the off-season over-sampled in many years.

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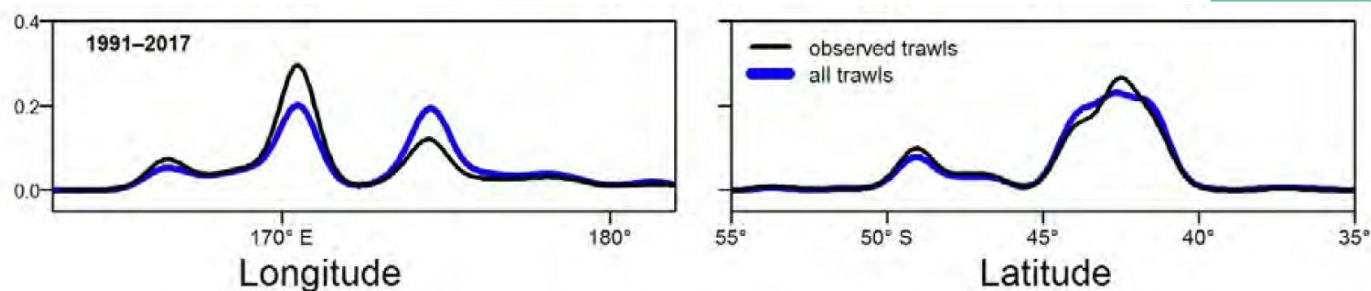


Figure 33. Comparison of start positions (latitude and longitude) of observed tows with those of all commercial tows in the HOK, HAK, LIN, SWA and WWA target trawl fishery, for all years combined, for fishing years 1990–91 to 2016–17. The relative frequency was calculated from a density function which used linear approximation to estimate frequencies at a series of equally spaced points.

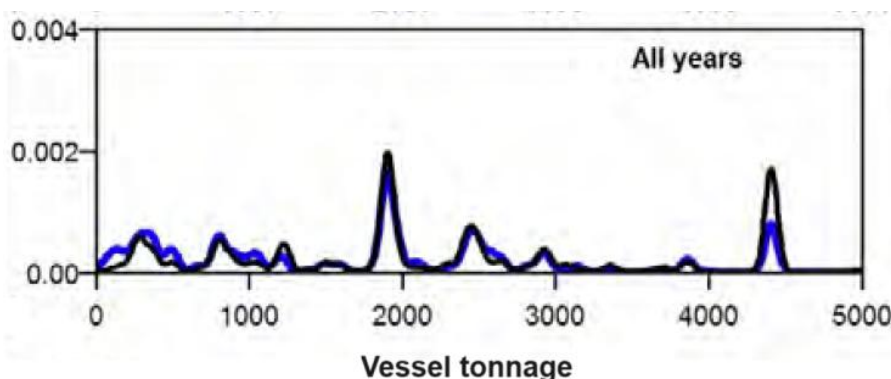


Figure 34. Comparison of vessel sizes (Gross Registered Tonnage) for observed tows vs all recorded commercial tows for all years combined, for fishing years 1990–91 to 2016–17, in the HOK, HAK, LIN, SWA and WWA target trawl fishery. The relative frequency of the numbers of tows was calculated from a density function which used linear approximation to estimate frequencies at a series of equally spaced points.

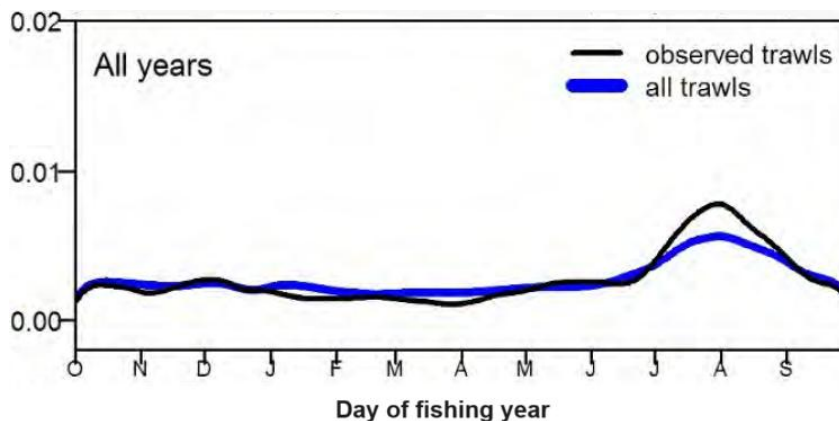


Figure 35. Comparison of the temporal spread of observed tows with all commercial tows for the target HOK, HAK, LIN, SWA and WWA fishery, for all years combined, for fishing years 1990–91 to 2016–17. The relative frequency of the numbers of tows was calculated from a density function which used linear approximation to estimate frequencies at a series of equally spaced points. The representativity of the observer data is relevant to the determination of the negligible component of the catch (MSC 2024, V3.1, Figure SA3, SA3.1.1d.ii). Anderson et al 2019 provides only the estimated total catch and total bycatch, i.e. for the observed and unobserved components of the fishery, for all QMS species combined, all non-QMS fish species combined, and all non-QMS invertebrate species combined, as well as discards of the target species. For the balance of the fish and invertebrate species caught, raised catch estimates are not provided per species. Considering the

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observer data are representative of the fishery there is a high degree of confidence that the proportionate catch of each species relative to the total catch, as presented in Table 76 and Table 77, is both accurate and precise.

The same methodologies were applied by Finucci et al 2024 essentially updating the Anderson et al 2019 analyses with the inclusion of observer and commercial data for the intervening years from 2017/18 to 2021/22. The authors drew similar conclusions that observer coverage is well distributed both spatially and temporally and that vessels between 50 and 100 m in length were well observed, vessels smaller than 50 m were generally under-observed, and vessels greater than 100 m were over-observed.

Updated catch composition data from the MPI Fishery Observer Services programme from 2018-19 to 2022-23 were provided to the assessment team in the Situation Report. While observer data contained ~600 individual species, 17 species comprised 98% of the total catch (Table 78). These data extend the time series analysed by Anderson et al 2019 to the most recent fishing season and corroborate those data for fish catch composition in the assessed fishery. The same was completed for ETP and non-ETP invertebrates though those data are not represented here.

Following the site visit commercial catch statistics were supplied by FishServe that included both landings and disposals records for the most recent 5-year period from October 2019 to September 2024. These data constitute the catch composition for trawl trips that targeted only hoki, hake and ling (n = 2353) a subset of the data excluding trips that targeted other species (n = 2376). The utility of these data allow for validation of observer data through comparison of the proportionate contribution of each species relative to the total catch. The overlapping reporting period for the two datasets runs from 2019/2020 to 2022/2023. The 4-year average proportional contributions from each dataset reflect the strength of the observer program to accurately sub-sample the commercial catch with the same top 20 species comprising 98.7% and 98.8% of the commercial and observer reported catch respectively

Per SA3.1.1d.ii, *For fish or invertebrate species, negligible means the UoA mortalities represent less than 2% of total UoA catch, except where the total catch of the UoA is exceptionally large.* Guidance is provided that assessment teams should (GSA3.1.1.d.ii), interpret “exceptionally large” as being when the UoA catch is equal to or greater than 400,000mt. The fishery under assessment does not meet the criteria for exceptionally large catches, therefore any species contributing less than 2% of the total catch meets the definition of negligible. There are four species with catches greater than 2% of the total catch, being hoki, hake, ling and white warehou (Table 76).

It is further relevant to note that per SA3.2.4.1, *If the fishery assessment comprises more than one UoA, the team shall not categorise the P1 species from the other UoA(s) as a scoring element under Principle 2.* Catches of hoki, hake and ling are therefore not assessed under Principle 2 in the combined target species fishery.

Also per SA3.2.2, *The team shall categorise any invertebrate species that is benthic-habitat forming as a scoring element under the habitats component, irrespective of the species endangered, threatened or protected (ETP) status and irrespective of its catch proportions.* There are no criteria in the MSC Standard V3.1 or associated guidance to classify benthic habitat forming invertebrates. The assessment team takes these to be species that form aggregations, are mostly sessile, enhance complexity of physical habitats and support other biodiversity and ecosystem functions, including corals, sponges and sea pens but excluding horse mussels and anemones.

From Table 76 and Table 77 (Anderson et al 2019) and Table 78 (updated MPI observer records), that includes species categorisation denominations, there is then only a single fish or invertebrate species that will be assessed under the in-scope species performance indicators, **silver warehou (*Seriolella punctata*)**. Benthic-habitat forming invertebrates will be assessed under the habitats components of the standard, noting however that each species will not be assessed as a separate scoring element but as components of benthic habitats that are defined by their substratum, geomorphology and characteristic floral or faunal groups (SA3.12.2).

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Table 76. Observed FISH catch and discards for target HOK, HAK, LIN, SWA or WWA trawls. Species codes, common and scientific names, percentage of total catch, and overall percentage discarded of the top 120 fish species or species groups by weight from observer records for the target trawl fishery from 1 Oct 2002 to 30 Sep 2017. Records are ordered by decreasing percentage of catch. Codes in bold are QMS species (as of 1 October 2016); codes in italics are Schedule 6 QMA species (can legally be returned to the sea). From Anderson et al 2019. Species are categorized per SA3.2 of the MSC Standard V3.1 (MSC 2024).

Species code	Common name	Scientific name	Observed catch (t)	% of catch	% discarded	SA3.2 Identification and categorisation of Principle 2 fish species
HOK	Hoki	<i>Macruronus novaezelandiae</i>	462 579.50	73.05	1.20	SA3.2.4.1 Principle 1
HAK	Hake	<i>Merluccius australis</i>	42 414.20	6.70	0.42	SA3.2.4.1 Principle 1
LIN	Ling	<i>Genypterus blacodes</i>	32 949.20	5.20	0.21	SA3.2.4.1 Principle 1
SWA	Silver warehou	<i>Seriolella punctata</i>	24 380.20	3.85	0.55	SA3.2.10 In-scope
JAV	Javelin fish	<i>Lepidorhynchus denticulatus</i>	11 844.00	1.87	37.40	SA3.2.3 Negligible
RAT	Rattails (unspecified)	Macrouridae	9 838.20	1.55	42.67	SA3.2.3 Negligible
SPD	Spiny dogfish	<i>Squalus acanthias</i>	8 923.70	1.41	69.35	SA3.2.3 Negligible
WWA	Mllite warehou	<i>Seriolella caerulea</i>	8 474.70	1.34	0.21	SA3.2.3 Negligible
BAR	Bamacouta	<i>Thyrstites atun</i>	2 989.80	0.47	6.44	SA3.2.3 Negligible
FRO	Frostfish	<i>Lepidopus caudatus</i>	2 630.80	0.42	5.87	SA3.2.3 Negligible
GSP	Pale ghost shark	<i>Hydrolagus bemisi</i>	2 009.60	0.32	2.39	SA3.2.3 Negligible
RIB	Ribaldo	<i>Mora moro</i>	1 756.40	0.28	3.13	SA3.2.3 Negligible
SPE	Sea perch	<i>Helicolenus</i> spp.	1 708.80	0.27	4.81	SA3.2.3 Negligible
GSH	Dark ghost shark	<i>Hydrolagus novaezealandiae</i>	1 500.20	0.24	16.04	SA3.2.3 Negligible
LDO	Lookdown dory	<i>Cyttus traversi</i>	1 436.30	0.23	5.27	SA3.2.3 Negligible
BOE	Black oreo	<i>Allocyttus niger</i>	1 325.10	0.21	0.07	SA3.2.3 Negligible
SBW	Southern blue whiting	<i>Micromesistius australis</i>	1 052.50	0.17	2.31	SA3.2.3 Negligible
GIZ	Giant stargazer	<i>Kathetostoma</i> spp.	1 009.40	0.16	1.94	SA3.2.3 Negligible
RCO	Red cod	<i>Pseudophycis bachus</i>	909.00	0.14	3.44	SA3.2.3 Negligible
SSK	Smooth skate	<i>Dipturus innominatus</i>	795.70	0.13	5.54	SA3.2.3 Negligible
SND	Shovelnose dogfish	<i>Deania Calcea</i>	793.30	0.13	55.15	SA3.2.3 Negligible
RSO	Gemfish	<i>Rexea</i> spp.	789.00	0.12	3.02	SA3.2.3 Negligible
JMA	Jack mackerel	<i>Trachurus declivis</i> , <i>T. murphyi</i> , <i>T. nz</i>	520.60	0.08	0.64	SA3.2.3 Negligible
ETB	Baxters lantern dogfish	<i>Etmopterus baxteri</i>	499.40	0.08	31.47	SA3.2.3 Negligible
BYS	Alfonsino	<i>Beryx splendens</i>	463.10	0.07	4.15	SA3.2.3 Negligible
RBT	Redbait	<i>Emmelichthys nitidus</i>	436.40	0.07	32.94	SA3.2.3 Negligible
SSI	Silverside	<i>Argentina elongata</i>	430.50	0.07	67.71	SA3.2.3 Negligible
CSQ	Leafscale gulper shark	<i>Centrophorus squamosus</i>	402.60	0.06	61.11	SA3.2.5 ETP/OOS SA3.2.3 Negligible



Species code	Common name	Scientific name	Observed catch (t)	% of catch	% discarded	SA3.2 Identification and categorisation of Principle 2 fish species
SDO	Silver doty	<i>Cyttus novaezealandiae</i>	395.20	0.06	76.66	SA3.2.3 Negligible
RBM	Rays bream	<i>Brama brama</i>	355.30	0.06	3.10	SA3.2.3 Negligible
OSD	Other sharks and dogs	Selachii	353.70	0.06	69.55	SA3.2.3 Negligible
CON	Conger eel	<i>Conger</i> spp.	305.60	0.05	90.02	SA3.2.3 Negligible
LCH	Long-nosed chimaera	<i>Harriotta raleighana</i>	279.90	0.04	23.65	SA3.2.3 Negligible
RSK	Rough skate	<i>Zearaja nasuta</i>	271.00	0.04	5.53	SA3.2.3 Negligible
BSH	Seal shark	<i>Dalatias licha</i>	263.60	0.04	66.67	SA3.2.3 Negligible
BBE	Banded bellowsfish	<i>Centriscoops humerosus</i>	262.10	0.04	78.94	SA3.2.3 Negligible
SCH	School shark	<i>Galeorhinus galeus</i>	238.40	0.04	10.85	SA3.2.5 ETP/OOS SA3.2.3 Negligible
FHD	Deepsea flathead	<i>Hoplichthys haswelli</i>	236.30	0.04	74.59	SA3.2.3 Negligible
BEN	Scabbardfish	<i>Benthodesmus</i> spp.	234.50	0.04	11.96	SA3.2.3 Negligible
RHY	Common roughy	<i>Paratrachichthys trailli</i>	229.20	0.04	95.92	SA3.2.3 Negligible
CDL	Cardinalfish	Epigonidae	224.20	0.04	6.34	SA3.2.3 Negligible
SCO	Swollenhead conger	Bassanago bulbiceps	213.60	0.03	93.84	SA3.2.3 Negligible
BYX	Alfonsino & long-finned beryx	<i>Beryx splendens</i> & <i>B. decadactylus</i>	208.30	0.03	9.26	SA3.2.3 Negligible
BNS	Bluenose	<i>Hyperoglyphe antarctica</i>	196.20	0.03	7.20	SA3.2.3 Negligible
RUD	Rudderfish	<i>Centrolophus niger</i>	196.10	0.03	64.33	SA3.2.3 Negligible
WAR	Common warehou	<i>Seriola brama</i>	193.00	0.03	0.81	SA3.2.3 Negligible
SOR	Spiky oreo	<i>Neocyttus rhomboidalis</i>	191.60	0.03	4.62	SA3.2.3 Negligible
DWD	Deepwater dogfish	-	175.60	0.03	78.51	SA3.2.3 Negligible
BSK	Basking shark	<i>Cetorhinus maximus</i>	170.20	0.03	56.14	SA3.2.5 ETP/OOS SA3.2.3 Negligible
CBO	Bollons rattail	<i>Coelorinchus bollonsi</i>	150.30	0.02	31.79	SA3.2.3 Negligible
ORH	Orange roughy	<i>Hoplostethus atlanticus</i>	142.20	0.02	1.02	SA3.2.3 Negligible
HAP	Hapuku	<i>Polyprion oxygeneios</i>	139.80	0.02	1.77	SA3.2.3 Negligible

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Species code	Common name	Scientific name	Observed catch (t)	% of catch	% discarded	SA3.2 Identification and categorisation of Principle 2 fish species
SSO	Smooth oreo	<i>Pseudocyttus maculatus</i>	127.00	0.02	0.02	SA3.2.3 Negligible
ETL	Lucifer dogfish	<i>Etmopterus lucifer</i>	120.50	0.02	70.99	SA3.2.3 Negligible
POS	Porbeagle shark	<i>Lamna nasus</i>	119.40	0.02	64.35	SA3.2.5 ETP/OOS SA3.2.3 Negligible
SRH	Silver roughy	<i>Hoplostethus mediterraneus</i>	105.70	0.02	83.33	SA3.2.3 Negligible
NMP	Tarakihi	<i>Nemadactylus macropterus</i> & <i>N. sp.</i> (king tarakihi)	96.60	0.02	3.30	SA3.2.3 Negligible
CBE	Crested bellowsfish	<i>Notopogon lilliei</i>	95.80	0.02	98.17	SA3.2.3 Negligible
CYP	Longnose velvet dogfish	<i>Centroscyminus crepidater</i>	94.10	0.01	56.04	SA3.2.3 Negligible
SSH	Slender smooth-hound	<i>Gollum attenuates</i>	91.60	0.01	82.16	SA3.2.3 Negligible
TOA	Toadfish	Psychrolutidae	84.00	0.01	61.62	SA3.2.3 Negligible
NSD	Northern spiny dogfish	<i>Squalus griffin</i>	83.10	0.01	74.60	SA3.2.3 Negligible
OPE	Orange perch	<i>Lepidoperca aurantia</i>	72.30	0.01	20.67	SA3.2.3 Negligible
COL	Olivers rattail	<i>Coelorinchus oliverianus</i>	71.20	0.01	41.12	SA3.2.3 Negligible
BEL	Bellowsfish	<i>Centriscops spp.</i>	64.80	0.01	93.42	SA3.2.3 Negligible
SWO	Broadbill swordfish	<i>Xiphias gladius</i>	57.30	0.01	8.49	SA3.2.3 Negligible
MDO	Minor dory	<i>Zenopsis nebulosa</i>	55.90	0.01	3.72	SA3.2.3 Negligible
PLS	Plunket's shark	<i>Proscymnodon plunketi</i>	55.60	0.01	80.90	SA3.2.3 Negligible
SBK	Spineback	<i>Notacanthus sexspinis</i>	49.20	0.01	74.30	SA3.2.3 Negligible
CAR	Carpet shark	<i>Cephaloscyllium isabellum</i>	49.00	0.01	100.00	SA3.2.3 Negligible
PIG	Pigfish	<i>Congiopodus leucopaecilus</i>	44.10	0.01	100.00	SA3.2.3 Negligible
DEA	Dealfish	<i>Trachipterus trachipterus</i>	43.40	0.01	18.27	SA3.2.3 Negligible
WHX	White rattail	<i>Trachyrincus aphyodes</i>	42.70	0.01	65.11	SA3.2.3 Negligible
STN	Southern bluefin tuna	<i>Thunnus maccoyii</i>	39.80	0.01	56.00	SA3.2.3 Negligible
RDO	Rosy cloy	<i>Cyttopsis roseus</i>	39.30	0.01	87.13	SA3.2.3 Negligible
ERA	Electric ray	<i>Torpedo fairchildi</i>	36.20	0.01	93.16	SA3.2.3 Negligible

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Species code	Common name	Scientific name	Observed catch (t)	% of catch	% discarded	SA3.2 Identification and categorisation of Principle 2 fish species
SLK	Slickhead	Alepocephalidae	32.70	0.01	100.00	SA3.2.3 Negligible
WIT	Witch	<i>Arnoglossus scapha</i>	32.60	0.01	90.67	SA3.2.3 Negligible
EPL	Bigeye cardinalfish	<i>Epigonus lenimen</i>	32.30	0.01	88.33	SA3.2.3 Negligible
TOP	Pale toadfish	<i>Amblophthalmos angustus</i>	26.30	<0.01	65.05	SA3.2.3 Negligible
PDG	Prickly dogfish	<i>Oxynotus bruniensis</i>	24.60	<0.01	67.99	SA3.2.3 Negligible
YBO	Yellow boarfish	<i>Pentaceros decacanthus</i>	23.50	<0.01	77.94	SA3.2.3 Negligible
RBY	Rubyfish	<i>Plagiogeneion rubiginosum</i>	22.90	<0.01	8.24	SA3.2.3 Negligible
HEX	Sixgill shark	<i>Hexanchus griseus</i>	22.70	<0.01	92.19	SA3.2.3 Negligible
GUR	Gumard	<i>Chelidonichthys kumu</i>	22.30	<0.01	7.79	SA3.2.3 Negligible
EMA	Blue mackerel	<i>Scomber australasicus</i>	22.30	<0.01	0.06	SA3.2.3 Negligible
BEE	Basketwork eel	<i>Diastobranchus capensis</i>	22.20	<0.01	78.43	SA3.2.3 Negligible
CYO	Smooth skin dogfish	<i>Centroscyrmnus owstoni</i>	22.00	<0.01	82.89	SA3.2.3 Negligible
ETM		<i>Etmopterus</i> sp.	21.90	<0.01	47.06	SA3.2.3 Negligible
NAN	Deepsea smelt	<i>Nansenia</i> spp.	20.50	<0.01	0.00	SA3.2.3 Negligible
CDO	Capro dory	<i>Capromimus abbreviatus</i>	20.00	<0.01	37.60	SA3.2.3 Negligible
HCO	Hairy conger	<i>Bassanago hirsutus</i>	19.90	<0.01	59.67	SA3.2.3 Negligible
HPB	Hapuku & bass	<i>Polyprion oxygeneios</i> & <i>P. americanus</i>	19.50	<0.01	3.97	SA3.2.3 Negligible
BCO	Blue cod	<i>Parapercis colias</i>	19.00	<0.01	19.48	SA3.2.3 Negligible
GON		<i>Gonorynchus forsteri</i> & <i>G. greyi</i>	18.80	<0.01	100.00	SA3.2.3 Negligible
DSK	Deepwater spiny skate (arctic skate)	<i>Amblyraja hyperborea</i>	17.90	<0.01	92.15	SA3.2.3 Negligible
OSK	Skate other	Rajidae	17.80	<0.01	94.44	SA3.2.3 Negligible
HAG	Hagfish	<i>Eptatretus cirrhatus</i>	16.40	<0.01	42.65	SA3.2.3 Negligible
WO	Johnson's cod	<i>Halargyreus johnsonii</i>	15.80	<0.01	44.56	SA3.2.3 Negligible
SRA	Skate	<i>Rajidae</i> & <i>Arhynchobatidae</i>	15.30	<0.01	82.38	SA3.2.3 Negligible
THR	Thresher shark	<i>Alopias vulpinus</i>	15.20	<0.01	100.00	SA3.2.5 ETP/OOS

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						SA3.2.3 Negligible
MAK	Mako shark	<i>Isurus oxyrinchus</i>	14.70	<0.01	67.38	SA3.2.5 ETP/OOS SA3.2.3 Negligible
BSL	Black slickhead	<i>Xenodermichthys</i> spp.	14.50	<0.01	90.76	SA3.2.3 Negligible
SCM	Largespine velvet dogfish	<i>Centroscyrmnus macracanthus</i>	14.40	<0.01	58.50	SA3.2.3 Negligible
SNI	Snipefish	<i>Macroramphosus scolopax</i>	12.80	<0.01	99.99	SA3.2.3 Negligible
CYL	Portuguese dogfish	<i>Centroscyrmnus coelolepis</i>	12.30	<0.01	89.16	SA3.2.3 Negligible
DWE	Deepwater eel	-	12.10	<0.01	41.28	SA3.2.3 Negligible
CAS	Oblique banded rattail	<i>Coelorinchus aspercephalus</i>	11.90	<0.01	74.32	SA3.2.3 Negligible
MOD	Morid cods	Moridae	11.90	<0.01	58.07	SA3.2.3 Negligible
BYD	Longfinned beryx	<i>Beryx decadactylus</i>	10.80	<0.01	0.37	SA3.2.3 Negligible
OPA	Opalfish	<i>Hemerocoetes</i> spp.	10.80	<0.01	100.00	SA3.2.3 Negligible
MCA	Ridge scaled rattail	<i>Macrourus carinatus</i>	9.70	<0.01	43.22	SA3.2.3 Negligible
APR	Catshark	<i>Apristurus</i> spp.	9.70	<0.01	46.79	SA3.2.3 Negligible
EUC	Eucla cod	<i>Euclichthys polynemus</i>	9.20	<0.01	99.22	SA3.2.3 Negligible
WHR	Unicorn rattail	<i>Trachyrincus longirostris</i>	8.80	<0.01	76.59	SA3.2.3 Negligible
BTS	Prickly deepsea skate	<i>Brochiraja spinifera</i>	8.70	<0.01	96.70	SA3.2.3 Negligible
PSK	Longnosed deepsea skate	<i>Bathyraja shuntovi</i>	8.40	<0.01	45.70	SA3.2.3 Negligible
JGU	Spotted gumard	<i>Pterygotrigla picta</i>	8.10	<0.01	26.03	SA3.2.3 Negligible
BAS	Bass groper	<i>Polyprius americanus</i>	7.80	<0.01	2.53	SA3.2.3 Negligible
LAN	Lantern fish	Myctophidae	7.70	<0.01	20.86	SA3.2.3 Negligible

Table 77. Observed INVERTEBRATE bycatch and discards for target HOK, HAK, LIN, SWA or WWA trawls. Species codes, common and scientific names, estimated catch, percentage of total catch, and overall percentage discarded for the top 120 invertebrate species or species groups by weight from observer records for the target trawl fishery from 1 Oct 2002 to 30 Sep 2017.

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Records are ordered by decreasing percentage of catch. Codes in bold are QMS species; codes in italics are sea). From Anderson et al 2019. Species are categorized per SA3.2 of the MSC Standard V3.1 (MSC 2024).

Schedule 6 QMA species (can legally be returned to the

Species code	Common name	Scientific name	Observed catch (t)	% of catch	% discarded	SA3.2 Identification and categorisation of Principle 2 invertebrate species
SQU	Arrow squids	Nototodarus sloanii & N. gouldi	3 268.10	0.51	6.45	SA3.2.3 Negligible
WSQ	Warty squids	Onykia spp.	259.60	0.04	52.77	SA3.2.3 Negligible
HYA	Floppy tubular sponge	Hyalascus sp.	120.30	0.02	3.05	SA3.2.2 Habitats
ONG	Sponges	Porifera	111.60	0.02	36.44	SA3.2.3 Negligible
SFI	Starfish	Asteroidea & Ophiuroidea	51.60	0.01	72.71	SA3.2.3 Negligible
MIQ	Warty squid	Onykia ingens	45.00	0.01	26.15	SA3.2.3 Negligible
GSC	Giant spider crab	Jacquiniotia edwardsii	43.80	0.01	84.40	SA3.2.3 Negligible
GLS	Glass sponges	Hexactinellida	43.70	0.01	31.95	SA3.2.2 Habitats
OPI	Umbrella octopus	Opisthoteuthis spp.	42.80	0.01	96.19	SA3.2.3 Negligible
SCI	Scampi	Metanephrops challenger	36.90	0.01	3.75	SA3.2.3 Negligible
TSQ		Todares filippovae	21.60	<0.01	65.92	SA3.2.3 Negligible
TAM	Tam O shanter urchin	Echinothuriidae & Phormosomatidae	18.30	<0.01	87.00	SA3.2.3 Negligible
ACS	Smooth deepsea anemones	Actinostolidae	17.60	<0.01	1.05	SA3.2.3 Negligible
HOR	Horse mussel	Atrina zelandica	16.40	<0.01	100.00	SA3.2.3 Negligible
DWO	Deepwater octopus	Graneledone spp.	14.40	<0.01	88.63	SA3.2.3 Negligible
FMA		Fusitriton magellanicus	13.80	<0.01	35.50	SA3.2.3 Negligible
VSQ	Violet squids	Histioteuthis spp.	13.60	<0.01	87.22	SA3.2.3 Negligible
GSQ	Giant squid	Architeuthis spp.	11.70	<0.01	61.07	SA3.2.3 Negligible
SQX	Squid		11.60	<0.01	56.90	SA3.2.3 Negligible
RSQ	Red squid	Ommastrephes bartrami	10.70	<0.01	83.18	SA3.2.3 Negligible
OCT	Octopus	Pinnoctopus cordiformis	9.50	<0.01	70.44	SA3.2.3 Negligible
HMT	Deepsea anemone	Hormathiidae	6.60	<0.01	2.24	SA3.2.3 Negligible

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Species code	Common name	Scientific name	Observed catch (t)	% of catch	% discarded	SA3.2 Identification and categorisation of Principle 2 invertebrate species
QSC	Queen scallop	Zygochlamys delicatula	6.30	<0.01	93.96	SA3.2.3 Negligible
CRB	Crab		5.60	<0.01	100.00	SA3.2.3 Negligible
PSI	Geometric star	Psilaster acuminatus	5.00	<0.01	78.46	SA3.2.3 Negligible
ANT	Anemones	Anthozoa	4.90	<0.01	19.92	SA3.2.3 Negligible
CJA	Sun star	Crossaster multispinus	4.00	<0.01	80.70	SA3.2.3 Negligible
GMC	Garricks masking crab	Leptomithrax garricki	4.00	<0.01	100.00	SA3.2.3 Negligible
BPI		Benthopecten pikei	3.60	<0.01	7.01	SA3.2.3 Negligible
PKN	Abyssal star	Plutonaster knoxi	3.50	<0.01	40.41	SA3.2.3 Negligible
MRQ	Warty squid	Onykia robsoni	3.30	<0.01	6.13	SA3.2.3 Negligible
JFI	Jellyfish		3.20	<0.01	100.00	SA3.2.3 Negligible
DMG	Magnificent starfish	Dipsacaster magnificus	3.20	<0.01	69.92	SA3.2.3 Negligible
GAS	Gastropods	Gastropoda	3.20	<0.01	55.11	SA3.2.3 Negligible
PSQ	Large red scaly squid	Pholidoteuthis massyae	3.20	<0.01	86.89	SA3.2.3 Negligible
ASR	Asteroid (starfish)		3.00	<0.01	79.15	SA3.2.3 Negligible
ZOR	Rat-tail star	Zoroaster spp.	2.70	<0.01	54.35	SA3.2.3 Negligible
CPA	Pentagon star	Ceramaster patagonicus	2.40	<0.01	13.20	SA3.2.3 Negligible
PRK	Prawn killer	Ibacus alticrenatus	2.30	<0.01	74.71	SA3.2.3 Negligible
HTR	Trojan starfish	Hippasteria phrygiana	2.10	<0.01	100.00	SA3.2.3 Negligible
GRM	Sea urchin	Gracilechinus multidentatus	2.00	<0.01	26.19	SA3.2.3 Negligible
NCB	Smooth red swimming crab	Nectocarcinus bennetti	1.90	<0.01	94.51	SA3.2.3 Negligible
LLC	Long-legged masking crab	Leptomithrax longipes	1.90	<0.01	90.18	SA3.2.3 Negligible
HTH	Sea cucumber	Holothurian unidentified	1.90	<0.01	62.81	SA3.2.3 Negligible
LHO	Omega prawn	Lipkuis holthuisi	1.90	<0.01	12.30	SA3.2.3 Negligible

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KIC	King crab	Lithodes murrayi, Neolithodes brodiei	1.80	<0.01	2.49	SA3.2.3 Negligible
LVN	Rock star	Lithosoma novaezelandiae	1.80	<0.01	20.44	SA3.2.3 Negligible
GOR		Gorgonocephalus spp.	1.50	<0.01	62.13	SA3.2.3 Negligible
URO	Sea urchin other		1.50	<0.01	84.71	SA3.2.3 Negligible
WHE	Whelks		1.40	<0.01	80.35	SA3.2.3 Negligible
CRM	Airy finger sponge	Callyspongia cf ramosa	1.30	<0.01	100.00	SA3.2.2 Habitats
LMU	Murray's king crab	Lithodes murrayi	1.30	<0.01	100.00	SA3.2.3 Negligible
EZE	Yellow octopus	Enteroctopus zealandicus	1.00	<0.01	42.12	SA3.2.3 Negligible
SDM	Pagurid	Sympagurus dimorphus	1.00	<0.01	55.69	SA3.2.3 Negligible
PLT		Plutonaster spp.	1.00	<0.01	28.53	SA3.2.3 Negligible
COF	Flabellum coral	Flabellum spp.	1.00	<0.01	3.95	SA3.2.2 Habitats
SMO	Cross-fish	Sclerasterias mollis	0.90	<0.01	88.20	SA3.2.3 Negligible
PRA	Prawn		0.90	<0.01	51.72	SA3.2.3 Negligible
PRU		Pseudechinaster rubens	0.90	<0.01	73.93	SA3.2.3 Negligible
SOT		Solaster torulatus	0.90	<0.01	53.29	SA3.2.3 Negligible
HDF	Feathery hydroids	Leptomeduseae and Anthoathecatae (excluding Stylasteridae)	0.80	<0.01	100.00	SA3.2.2 Habitats
ECT		Echinothuriidae	0.80	<0.01	100.00	SA3.2.3 Negligible
PHB	Grey fibrous massive sponge	Phorbos spp.	0.80	<0.01	0.13	SA3.2.2 Habitats
COU	Coral (unspecified)	Alcyonacea, Gorgonacea, Scleractinia, Antipatharia (O) & Stylasteridae (F)	0.70	<0.01	8.00	SA3.2.2 Habitats
GVO	Golden volute	Provocator mirabilis	0.70	<0.01	80.02	SA3.2.3 Negligible
MOL	Molluscs		0.70	<0.01	41.75	SA3.2.3 Negligible
TDQ	Dana octopus squid	Taningia danae	0.70	<0.01	50.15	SA3.2.3 Negligible
DIR	Pagurid	Diacanthurus rubricatus	0.70	<0.01	82.50	SA3.2.3 Negligible

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SMK	Spiny masking crab	Teratomaia richardsoni	0.70	<0.01	88.22	SA3.2.3 Negligible
TLD	Furry oval sponge	Tetilla leptoderma	0.60	<0.01	100.00	SA3.2.2 Habitats
MSL	Starfish	Mediaster sladeni	0.60	<0.01	83.18	SA3.2.3 Negligible
DHO	Sea urchin	Dermechinus horridus	0.60	<0.01	43.20	SA3.2.3 Negligible
ECH	Echinoderms	Echinodermata	0.50	<0.01	31.20	SA3.2.3 Negligible
VOL	Volute	Volutidae	0.50	<0.01	75.28	SA3.2.3 Negligible
CBD	Coral rubble - dead		0.50	<0.01	100.00	SA3.2.2 Habitats
AER		Aeneator recens	0.50	<0.01	47.68	SA3.2.3 Negligible
PNE		Proserpinaster neozelanicus	0.50	<0.01	63.34	SA3.2.3 Negligible
PMO		Pseudostichopus mollis	0.40	<0.01	37.15	SA3.2.3 Negligible
PLY		Polychaetes spp.	0.40	<0.01	97.05	SA3.2.3 Negligible
PAO		Pillsburiaster aoteanus	0.40	<0.01	38.52	SA3.2.3 Negligible
SSP	Scallop spat	Pecten novaezelandiae	0.40	<0.01	100.00	SA3.2.3 Negligible
SPT	Heart urchin	Spatangus multispinus	0.40	<0.01	34.06	SA3.2.3 Negligible
CHQ	Cranchiid squid	Cranchiidae	0.40	<0.01	3.66	SA3.2.3 Negligible
SUA	Fleshy club sponge	Suberites affinis	0.40	<0.01	0.29	SA3.2.2 Habitats
BES		Benthopecten spp.	0.30	<0.01	69.55	SA3.2.3 Negligible
PZE	Prickly king crab	Paralomis zealandica	0.30	<0.01	26.96	SA3.2.3 Negligible
PCH		Penion chathamensis	0.30	<0.01	66.69	SA3.2.3 Negligible
NEB	Brodies king crab	Neolithodes brodiei	0.30	<0.01	15.64	SA3.2.3 Negligible
SPI	Spider crab		0.30	<0.01	100.00	SA3.2.3 Negligible
SCA	Scallop	Pecten novaezelandiae	0.30	<0.01	7.53	SA3.2.3 Negligible
BOC	Deepsea anemone	Bolocera spp.	0.30	<0.01	1.79	SA3.2.3 Negligible
RGR		Radiaster gracilis	0.30	<0.01	52.81	SA3.2.3 Negligible

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PNN	Feathery sea pens	Pennatula spp.	0.30	<0.01	0.40	SA3.2.2 Habitats
LMI	Masking crabs	Leptomithrax spp.	0.20	<0.01	100.00	SA3.2.3 Negligible
BNO		Benthoctopus spp.	0.20	<0.01	24.50	SA3.2.3 Negligible
SCC	Sea cucumber	Stichopus mollis	0.20	<0.01	68.14	SA3.2.3 Negligible
ANZ	Knobbly sandpaper sponge	Ecionemia novaezelandiae	0.20	<0.01	100.00	SA3.2.2 Habitats
GRE	Curling stone sponge	Geodia regina	0.20	<0.01	100.00	SA3.2.2 Habitats
BHE		Bathypsectinura heros	0.20	<0.01	84.93	SA3.2.3 Negligible
ECN	Echinoid (sea urchin)		0.20	<0.01	100.00	SA3.2.3 Negligible
OCO	Octopus spp.	Octopus spp.	0.20	<0.01	55.14	SA3.2.3 Negligible
PAD	Paddle crab	Ovalipes catharus	0.20	<0.01	100.00	SA3.2.3 Negligible
CIC	Orange frond sponge	Crena incrustans	0.20	<0.01	100.00	SA3.2.2 Habitats
PTU	Sea pens	Pennatulacea	0.20	<0.01	10.41	SA3.2.2 Habitats
GPA	Sea urchin	Goniocidaris parasol	0.20	<0.01	85.92	SA3.2.3 Negligible
DAP	Antlered crab	Dagnaudus petterdi	0.20	<0.01	94.89	SA3.2.3 Negligible
LSQ		Lycoteuthis lorigera	0.20	<0.01	17.34	SA3.2.3 Negligible
PAG	Pagurid	Paguroidea	0.20	<0.01	64.12	SA3.2.3 Negligible
PHW		Psammocinia cf hawere	0.20	<0.01	100.00	SA3.2.3 Negligible
SUR	Kina	Evechinus chloroticus	0.20	<0.01	40.88	SA3.2.3 Negligible
ERO	Branching coral	Enallopsammia rostrata	0.20	<0.01	3.19	SA3.2.2 Habitats
CDY		Cosmasterias dyscrita	0.20	<0.01	48.97	SA3.2.3 Negligible
KWH	Knobbed whelk	Austrofucus glans	0.20	<0.01	20.27	SA3.2.3 Negligible
GDU	Bushy hard coral	Goniocorella Dumosa	0.20	<0.01	100.00	SA3.2.2 Habitats
DPP		Diplopteraster sp.	0.20	<0.01	43.56	SA3.2.3 Negligible

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Species code	Common name	Scientific name	Observed catch (t)	% of catch	% discarded	SA3.2 Identification and categorisation of Principle 2 invertebrate species
TFA	Friiled crab	Trichopeltarion fantasticum	0.10	<0.01	53.15	SA3.2.3 Negligible
HSI	Jackknife prawn	Haliporoides sibogae	0.10	<0.01	45.49	SA3.2.3 Negligible
ODT	Pentagonal tooth-star	Odontaster spp.	0.10	<0.01	65.01	SA3.2.3 Negligible
LGR	Scaled squid	Lepidoteuthis grimaldii	0.10	<0.01	34.33	SA3.2.3 Negligible
SSC	Giant masking crab	Leptomithrax australis	0.10	<0.01	32.82	SA3.2.3 Negligible

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Table 78. Catch composition (t) from MPI Fishery Observer Services data for targeted tows in the hoki/hake/ling fishery. Species comprising the top 98.5% of the observed catch are represented. White rows are QMS species, grey rows are non-QMS species. Source: Situation Report HHL Trawl Fishery.

Species	Listing	2018-19	2019-20	2020-21	2021-22	2022-23	5-year Average	5-year Average %	SA3.2 Identification and categorisation of Principle 2 fish species
Hoki <i>Macruronus novaezelandiae</i>	NA	39,521	46,444	44,279	44,403	47,124	44,354	76.89%	SA3.2.4.1 Principle 1
Ling <i>Genypterus blacodes</i>	NA	3,451	3,749	3,829	5,024	4,712	4,153	7.20%	SA3.2.4.1 Principle 1
Hake <i>Merluccius australis</i>	NA	1,380	2,234	2,000	2,015	2,170	1,960	3.40%	SA3.2.4.1 Principle 1
Silver warehou <i>Seriolella punctata</i>	NA	1,384	927	794	1,336	1,467	1,181	2.05%	SA3.2.10 In-scope
Javelin fish <i>Lepidorhynchus denticulatus</i>	NA	877	1,021	1,434	1,201	1,133	1,133	1.96%	SA3.2.3 Negligible
Rattails <i>Macrouridae</i>	NA	827	856	1,069	815	1,140	941	1.63%	SA3.2.3 Negligible
Spiny dogfish <i>Squalus acanthias</i>	Chondrichthyes IUCN - VU National legislation - NA CITES II – NA	612	427	595	839	687	632	1.10%	SA3.2.3 Negligible
Gemfish <i>Rexea solandri</i>	NA	335	602	378	510	599	485	0.84%	SA3.2.3 Negligible
Frostfish <i>Lepidopus caudatus</i>	NA	407	165	195	316	176	252	0.44%	SA3.2.3 Negligible
White warehou <i>Seriolella caerulea</i>	NA	214	186	271	249	189	222	0.38%	SA3.2.3 Negligible
Pale ghost shark <i>Hydrolagus bemisi</i>	Chondrichthyes IUCN - LC National legislation - NA CITES II – NA	203	225	230	197	191	209	0.36%	SA3.2.3 Negligible
Southern blue whiting <i>Micromesistius australis</i>	NA	111	129	170	157	195	152	0.26%	SA3.2.3 Negligible
Lookdown dory <i>Cyttus traversi</i>	NA	121	140	153	146	164	145	0.25%	SA3.2.3 Negligible

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Species	Listing	2018-19	2019-20	2020-21	2021-22	2022-23	5-year Average	5-year Average %	SA3.2 Identification and categorisation of Principle 2 fish species
Black oreo Allocyttus niger	NA	72	74	247	185	77	131	0.23%	SA3.2.3 Negligible
Sea perch Helicolenus spp.	NA	89	113	112	119	144	115	0.20%	SA3.2.3 Negligible
Shovelnose spiny dogfish Deania Calcea	Chondrichthyes IUCN - NT National legislation - NA CITES II – NA	91	77	135	177	68	110	0.19%	SA3.2.3 Negligible
Jack mackerel Trachurus spp.	NA	134	6	62	90	254	109	0.19%	SA3.2.3 Negligible
Silverside Argentina elongata	NA	85	186	73	73	121	108	0.19%	SA3.2.3 Negligible
Arrow squid Nototodarus gould / N. sloanii	NA	86	114	101	167	59	105	0.18%	SA3.2.3 Negligible
Ribaldo Mora moro	NA	92	98	85	101	142	104	0.18%	SA3.2.3 Negligible
Giant stargazer Kathetostoma spp.	NA	64	70	59	106	70	74	0.13%	SA3.2.3 Negligible
Baxters lantern dogfish Etmopterus baxteri	Chondrichthyes IUCN - NA National legislation - NA CITES II – NA	79	53	69	51	74	65	0.11%	SA3.2.3 Negligible
Smooth skate Dipturus innominatus	Chondrichthyes IUCN - LC National legislation - NA CITES II – NA	46	71	55	58	54	57	0.10%	SA3.2.3 Negligible

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10.2.1.1.1. In-scope species management

The Fisheries Act 1996 provides the legal basis for managing fisheries in New Zealand, including the Minister's responsibilities for setting and varying sustainability measures such as TACCs. The management of New Zealand's deepwater fisheries is a collaborative arrangement between Fisheries New Zealand and the commercial fishing industry, represented by Seafood New Zealand's Deepwater Council (DWC).

The management of deepwater fisheries encompasses all target and bycatch stocks and the environmental effects of fishing. All 28 deepwater species/species groups in the quota management system (QMS), have been categorised into two tiers according to their commercial value and volume of catch. Tier 1 fisheries are high volume and/or high value fisheries and are the targets of dedicated fisheries. Tier 2 fisheries are typically less commercially valuable, may comprise the bycatch component of Tier 1 fisheries, or are only targeted periodically throughout the year (National Fisheries Plan for Deepwater and Middle-depth Fisheries 2019. Fisheries New Zealand Technical Paper No: 2019/03. 34 p. <https://www.mpi.govt.nz/dmsdocument/3967/direct>). Tier 3 species are non-QMS and are generally of little or no commercial value.

10.2.1.2. ETP/OOS Species

Observed ETP species captures

Information on incidental captures of ETP species reported by the MPI Observer Programme are published on the Dragonfly website (<https://protectedspeciescaptures.nz/PSCv7/>), which enable the incidental captures of seabirds, chondrichthyans, marine mammals and turtles by the commercial fisheries to be monitored on an ongoing basis.

Observed captures include distinction of the capture method (being warp or door, deck, net, mitigation device for trawlers), the identification method (observer, necropsy, imputation, photograph), the status (dead or alive), the fishing method and declared target species (which allows distinction between UoAs), vessel size, fishing area, location of capture, mitigation equipment used and whether the record is included in further analysis. These data are not presented in full in this report. Observed interactions with all ETP species, their status (alive/dead/decomposed) for trawls targeting hake, hoki, ling, silver and white warehou for the most recent five years fishing seasons from 2016/17-2020/21 are presented in Table 79. Data are available for each gear-target species combination separately such that the impact of the UoA(s) can be estimated for each ETP/OOS unit (as required by the scoring guideposts under PI2.3.3a).

Table 79. Observed interactions with all ETP species (grand total and annual average), their status (alive/dead/decomposed) for trawls targeting hake, hoki, ling, silver and white warehou for the most recent five years fishing seasons for which data are available from 2016/17-2020/21. Records are ordered by decreasing annual average observed mortalities. Data extracted from <https://protectedspeciescaptures.nz/PSCv7/download/protected-species-captures-v7-released.zip> /protected_species_captures.csv

ETP Taxon	Status			Grand Total	Observed 5-year average	
	alive	Dead	decomposed		Interactions	Mortalities
White-chinned petrel	44	134		178	35.6	26.8
New Zealand fur seal	28	131	4	163	32.6	26.2
Salvin's albatross	42	82		124	24.8	16.4
Sooty shearwater	21	77		98	19.6	15.4
New Zealand white-capped albatross	57	58	2	117	23.4	11.6
Southern Buller's albatross	27	55	1	83	16.6	11
Westland petrel	4	13		17	3.4	2.6
Basking shark	6	4		10	2	0.8
Campbell black-browed albatross	1	3		4	0.8	0.6
Common diving petrel	7	3		10	2	0.6
Fairy prion	9	3		12	2.4	0.6
Flesh-footed shearwater	3	2		5	1	0.4
New Zealand sea lion		2		2	0.4	0.4
Northern giant petrel	2	2		4	0.8	0.4
Pilot whale long-finned		2		2	0.4	0.4
Southern giant petrel	1	2		3	0.6	0.4
Black-bellied storm petrel		1		1	0.2	0.2
Broad-billed prion		1		1	0.2	0.2

ETP Taxon	Status			Grand Total	Observed 5-year average	
	alive	Dead	decomposed		Interactions	Mortalities
Buller's albatross		1		1	0.2	0.2
Cape petrel	5	1		6	1.2	0.2
Chatham Island albatross		1		1	0.2	0.2
Dusky dolphin		1		1	0.2	0.2
Eurasian blackbird		1		1	0.2	0.2
Mottled petrel	1	1		2	0.4	0.2
Orca		1		1	0.2	0.2
Prions	1	1		2	0.4	0.2
Snares Cape petrel	2	1		3	0.6	0.2
Southern royal albatross	5	1		6	1.2	0.2
Wandering albatrosses		1		1	0.2	0.2
Albatrosses	1			1	0.2	0
Black-browed albatrosses	1			1	0.2	0
Buller's shearwater	1			1	0.2	0
Cape petrels	1			1	0.2	0
Double-banded plover	1			1	0.2	0
Gadfly petrels	2			2	0.4	0
Gibson's albatross	1			1	0.2	0
Great albatrosses	2			2	0.4	0
Grey-backed storm petrel	3			3	0.6	0
Grey-faced petrel	3			3	0.6	0
Mid-sized petrels & shearwaters	1			1	0.2	0
New Zealand white-faced storm petrel	3			3	0.6	0
Northern royal albatross	1			1	0.2	0
Petrels, prions, and shearwaters	1			1	0.2	0
Procellaria petrels	2			2	0.4	0
Seabirds	1			1	0.2	0
Smalltooth sand tiger shark	1			1	0.2	0
Storm petrels	1			1	0.2	0

Per SA3.1.1d, "Negligible" has two specific definitions depending on the taxa of a species:

- For amphibians, birds, mammals and reptiles (out-of-scope species), negligible means the average estimates of total mortality from the UoA are less than 10 individuals per year, and the lower bound of estimated breeding population size is equal to or greater than 5,000 individuals.
- For fish or invertebrate species, negligible means the UoA mortalities represent less than 2% of total UoA catch, except where the total catch of the UoA is exceptionally large.

Where observed captures are useful to determine the species with which the fishery interacts, raised estimates to ascertain average total annual mortality are required to determine whether the UoA(s) impacts are negligible. Further analysis is conducted through Dragonfly protected species captures that includes estimation of total captures in some

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fisheries for seabirds, fur seals and common dolphins. 'Cryptic mortalities' (unobserved) are not included in the estimates of total captures and any mortalities not directly associated with the fishing gear are also excluded (for example where an individual is decomposed or interacted with the deck). Whilst those total capture estimates can be a helpful indication of the trend in captures over time and the proportion of animals released alive as a proxy for uptake of mitigation and release procedures, spatially explicit risk assessments provide a more accurate estimate of fishing related captures and crucially, mortality. However in both cases, through the analytical and modelling approaches applied, the representativity of observer coverage is tested and a degree of confidence or coefficient of variation is determined for total mortality estimate point or mean values. Where available both spatially explicit assessments raised mortality estimates and Dragonfly data protected species raised capture estimates are used during this assessment.

Seabirds

All New Zealand seabird species, with one exception, are protected species under the Wildlife Act 1953 and the Fisheries Act 1996. The one that is not protected is the black-backed gull (*Larus dominicanus*).

Edwards et al 2023 (Spatially Explicit Fisheries Risk Assessment – SEFRA) supplies the annual estimated mortality, including cryptic mortality, for each commercial fishery and fishery group, attempting to quantify the impact of commercial fisheries on New Zealand populations of 71 seabird species. This allowed the assessment team to distinguish the hoki, hake and ling UoAs impacts from the trawl sector as a whole (that includes hoki, hake, ling, southern blue whiting, mackerel, scampi and squid trawls). The SEFRA also provides summary statistics for the annual number of breeding pairs, proportion of adults breeding, current age at first reproduction and optimum survivorship (see Table 13 of Edwards et al 2023). In combination this permits the assessment team to determine which of the top thirty at risk seabirds have negligible interaction with the UoAs.

Edwards et al 2023 also provide total annual estimated mortality for seabirds outside of the top 30 at risk species, but do not breakdown estimated mortality for each fishery and fishery group. Where these species are included in estimated mortalities for the trawl sector as a whole, they are treated as scoring elements for the trawl hoki, hake and ling UoAs.

Data extracted from Edwards et al 2023 for the total annual estimated mortality of seabirds alongside the annual number of breeding pairs is presented in Table 80. It is clear that for a number of species where the total trawl mortality is used and the annual estimated mortality is only slightly greater than 10, that if trawl group-specific mortality was available that interactions with these species would likely be negligible for the UoAs. The sub-set of data presented represent only deepwater, large freezer, large fresher, small inshore (<28m) and small inshore (17-28m) – taken to be the sub-group of trawl vessels targeting hoki, hake and ling, though it is likely that this sub-set includes vessels not part of the UoAs, for example orange roughy and oreo species trawlers. This was investigated at the site visit at the same time as the fishery client supplied a critical re-evaluation of Edwards et al 2023 SEFRA estimates of fisheries deaths and risk in key deepwater trawl fisheries, with reference to southern Buller's albatross, Salvin's albatross, and white-capped albatross (Sharp, 2025). The main reason for the re-assessment was to address outdated estimates of 'cryptic mortality' used in Edwards et al 2023 and to estimate seabird captures by target deepwater trawl fisheries that capture southern bullers albatross (i.e. hoki-hake-ling, squid, scampi, and barracuda target fisheries). This is a useful review in that it uses observer data from 2019-2024 focusing on the three most at risk seabird species, that it provides mortality estimates for the trawl fisheries separately (excluding vessels not part of the UoAs), and critically updates the cryptic mortality multipliers that ignore substantial changes to fishery operations, including a major focus on developing and implementing seabird capture mitigation. Sharp (2025) found that the 2023 SEFRA overestimated seabird deaths and population level risk in deepwater trawl fisheries, by roughly a factor of 5. The revised, lower, estimates from Sharp (2025) are used in scoring PI2.2.1 for those three most at risk seabird species whilst a Recommendation (#1) is raised to apply the same revised approach to the remaining seabird species that interact with the fishery UoAs in assessment.

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Table 80. Mean annual deaths (>0) of seabirds that interact with the trawl fisheries in New Zealand. Species in **bold** represent all trawl fisheries, all other species represent only deepwater, large freezer, large fresher, small inshore (<28m) and small inshore (17-28m) – taken to include the sub-group of trawl vessels targeting hoki, hake and ling. Species in *italics* meet the criteria for a negligible mortality rate per SA3.1.1.d.ii. The mean annual number of breeding pairs is taken to be the estimated breeding population size, with the lower and upper bounds of the breeding population size presented with 95% CI. Data extracted from Edwards et al 2023.

Code	Species name	Scientific name	Mean annual deaths	Mean annual number of breeding pairs	95% CI
XWM	New Zealand white-capped albatross	<i>Thalassarche cauta</i> <i>steadii</i>	1559	86856	[70655-104919]
XSA	Salvin's albatross	<i>Thalassarche salvini</i>	1380	41062	[28886-55978]
XDP	Common diving petrel	<i>Pelecanoides urinatrix</i>	317	1114330	[379547-2060986]
XSH	Sooty shearwater	<i>Puffinus griseus</i>	313	3123462	[1696071-5270288]
XBM	Southern Buller's albatross	<i>Thalassarche bulleri</i> <i>bulleri</i>	268	14951	[13798-16227]
XWC	White-chinned petrel	<i>Procellaria aequinoctialis</i>	222	247117	[207810-294036]
XPP	Spotted shag	<i>Stictocorbo punctatus</i>	202	21080	[10734-29546]
XWF	New Zealand white-faced storm petrel	<i>Pelagodroma marina</i> <i>maoriana</i>	125	1942863	[802859-2944297]
XPV	Broad-billed prion	<i>Pachyptila vittata</i>	112	346081	[285514-417214]
XFP	Fairy prion	<i>Pachyptila turtur</i>	95	1465686	[1202255-1772379]
XFS	Flesh-footed shearwater	<i>Puffinus carneipes</i>	66	21302	[17114-25205]
XMP	Mottled petrel	<i>Pterodroma inexpectata</i>	61	344456	[301932-396127]
XWP	Westland petrel	<i>Procellaria westlandica</i>	52	5180	[3001-8362]
XBP	Black petrel	<i>Procellaria parkinsoni</i>	51	5413	[4270-6769]
XNB	Northern Buller's albatross	<i>Thalassarche bulleri</i> <i>platei</i>	37	20293	[19339-21291]
XBS	Buller's shearwater	<i>Puffinus bulleri</i>	25	78795	[67624-89529]
XCI	Chatham Island albatross	<i>Thalassarche eremita</i>	24	5295	[5145-5442]
XPR	Antarctic prion	<i>Pachyptila desolata</i>	22	569939	[354620-959018]
XPH	Hutton's shearwater	<i>Puffinus huttoni</i>	21	105042	[69719-151766]
XCM	Campbell black-browed albatross	<i>Thalassarche impavida</i>	18	356	[289-430]
XGF	Grey-faced petrel	<i>Pterodroma macroptera</i> <i>gouldi</i>	15	238890	[201513-295234]
XBG	Southern black-backed gull	<i>Larus dominicanus</i> <i>dominicanus</i>	15	1215308	[710470-2623469]
XFT	Black-bellied storm petrel	<i>Fregetta tropica</i>	11	73794	[51097-98497]
PTCO	Cook's petrel	<i>Pterodroma cookii</i>	10	279970	[217888-399754]
XRA	<i>Southern royal albatross</i>	<i>Diomedea epomophora</i>	9	8611	[7049-10445]
XNP	<i>Northern giant petrel</i>	<i>Macronectes halli</i>	8	2781	[2214-3127]
XCA	<i>Snares Cape petrel</i>	<i>Daption capense australe</i>	8	198297	[102102-447085]
XFL	Fluttering shearwater	<i>Puffinus gavia</i>	8	10814	[5806-18576]
XGP	<i>Grey petrel</i>	<i>Procellaria cineria</i>	3	47439	[32476-70499]
XLM	Light-mantled sooty albatross	<i>Phoebastria palpebrata</i>	2	140918	[77083-231948]

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Code	Species name	Scientific name	Mean annual deaths	Mean annual number of breeding pairs	95% CI
<i>XWH</i>	<i>White-headed petrel</i>	<i>Pterodroma lessonii</i>	2	6835	[6774-6897]

The SEFRA approach uses a limit reference to measure the likely risk of population decline given estimated deaths. The reference point is dependent on the intrinsic growth rate for each species. This reference point is referred to as the Population Sustainability Threshold (PST). The default objective is that Risk = 1 corresponds to a median population-stabilisation outcome of 75% of the unimpacted level (Richard et al., 2020; Fisheries New Zealand, 2020; Sharp, 2017).

The results from the 2023 SEFRA show that only southern Buller's albatross (code XBM) was estimated to have a risk metric of greater than one, indicating that current captures are higher than can be sustained by the population over the long term (Table 81), noting that the SEFRA considered captures by all trawl, longline and setnet fisheries in the EEZ and did not specifically include a category for hoki, hake and ling targeted tows. It is assumed that the bulk of captures by the UoA would have been accounted for within the categories 'Large Freezer', 'Large Fresher' and 'Small inshore (17-28m)' which accounted for 27% of all southern Buller's captures over the period 2006-07 to 2019-20 (Edwards et al., 2023a). PST for southern Buller's albatross is estimated at 612.71 individuals (95% CI: 297.27-946.87, Edwards et al 2023, Table 15), whilst mean annual deaths attributed to the trawl UoAs is 268 (Table 80).

Sharp (2025) generated estimates of seabird captures summed by fishing method, by FMA, and by target species and updated the estimation of seabird cryptic mortality (i.e. unobservable fisheries deaths) in key deepwater trawl fisheries to generate improved fishery-specific estimates of seabird deaths and population-level risk, using new fisheries observer data not utilized by the 2023 SEFRA (Edwards et al 2023). Sharp (2025) estimated total annual mortality using observer data from 2019-2024 rather than pooling data across the full history of the protected species captures database extending back to 2006. Sharp (2025) estimated mean annual deaths attributable to the trawl UoAs and the risk that the equilibrium population size will be reduced as follows:

- Southern buller's albatross: 36.3 individuals; risk = 0.089
- Salvin's albatross: 122.6 individuals; risk = 0.048
- White-capped albatross: 78.5 individuals; risk = 0.022

These updated results indicate that the mortalities caused by the trawl UoAs in assessment targeting hoki, hake and ling, are lower than can be sustained by the populations over the long-term.

Table 81: Annual observable captures, deaths and risk per species, ranked from highest to lowest median risk for the top 31 species. Red: risk ratio with a median over 1 or upper 95% credible limit (u.c.l.) over 2; dark orange: median over 0.3 or u.c.l. over 1; light orange: median over 0.1 or u.c.l. over 0.3; yellow: u.c.l. over 0.1.

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Code	C_E		D_E		Risk	
	Mean	95% CI	Mean	95% CI	Median	95% CI
XBM	242.2	[208.0-280.7]	728.5	[554.5-938.7]	1.19	[0.71-2.65]
XSA	299.5	[256.0-349.0]	1706.3	[1291.0-2258.5]	0.69	[0.35-1.69]
XWM	570.0	[506.3-638.3]	2634.8	[2071.1-3334.1]	0.50	[0.29-1.07]
XBP	221.8	[180.3-279.0]	256.1	[177.6-352.2]	0.49	[0.30-0.82]
XWP	89.9	[65.7-121.3]	143.3	[91.2-220.5]	0.38	[0.17-0.88]
XCI	26.9	[14.7-43.0]	61.5	[33.5-98.7]	0.27	[0.13-0.68]
XFS	253.0	[211.7-296.7]	368.1	[264.3-493.5]	0.22	[0.12-0.44]
XNB	63.2	[43.3-88.7]	173.8	[109.3-262.9]	0.19	[0.10-0.43]
XAU	33.0	[20.7-48.0]	41.9	[22.9-68.4]	0.16	[0.08-0.37]
XAN	31.8	[21.0-44.0]	38.3	[21.8-60.3]	0.16	[0.08-0.35]
XWC	895.8	[820.0-975.0]	1694.3	[1295.3-2319.9]	0.09	[0.06-0.18]
XRA	22.5	[12.7-36.3]	49.6	[25.9-84.6]	0.08	[0.04-0.17]
XNP	6.2	[1.7-14.3]	16.0	[4.1-35.0]	0.08	[0.02-0.22]
XCM	30.9	[18.7-46.7]	68.5	[37.8-117.6]	0.05	[0.03-0.14]
XYP	11.2	[5.3-18.7]	10.6	[5.0-17.9]	0.04	[0.02-0.08]
XPP	188.5	[131.0-257.0]	226.1	[149.3-337.9]	0.04	[0.02-0.10]
XNR	5.9	[1.7-12.3]	13.0	[2.6-35.2]	0.04	[0.01-0.15]
XLM	4.7	[1.0-11.3]	14.8	[2.3-43.8]	0.03	[0.01-0.14]
XGM	4.4	[1.0-10.7]	12.5	[1.6-37.0]	0.03	[0.01-0.14]
XGP	52.3	[35.0-73.0]	78.1	[50.7-113.4]	0.02	[0.01-0.05]
XCA	2.1	[0.3-6.0]	29.8	[0.4-120.4]	0.02	[0.00-0.13]
XSI	2.9	[0.0-10.0]	3.2	[0.0-12.1]	0.01	[0.00-0.06]
XBS	30.2	[15.7-49.0]	79.0	[22.2-240.5]	0.01	[0.00-0.04]
XKS	0.7	[0.0-4.3]	0.8	[0.0-5.0]	0.01	[0.00-0.18]
XBC	3.2	[0.0-12.7]	3.6	[0.0-13.7]	0.01	[0.00-0.04]
XFC	2.7	[0.3-6.7]	2.8	[0.3-7.3]	0.01	[0.00-0.02]
XPS	5.5	[0.7-15.0]	6.0	[0.9-16.4]	0.00	[0.00-0.01]
XPV	12.4	[4.0-26.0]	173.7	[24.5-613.6]	0.00	[0.00-0.02]
AFX	1.0	[0.0-5.0]	1.1	[0.0-6.3]	0.00	[0.00-0.04]
XSH	275.7	[238.7-316.7]	688.7	[469.8-1024.6]	0.00	[0.00-0.01]
XFL	43.7	[14.7-96.7]	51.3	[16.0-117.2]	0.00	[0.00-0.01]

Reviewing the 2017 (Richard et al., 2017), 2020 (Richard et al., 2020) and 2023 (Edwards et al 2023) risk assessment results indicates, overall, a continued reduction in risk, indicating that ongoing operational mitigation is resulting in beneficial outcomes. The 2020 risk assessment (FNZ, 2020), noted an overall decline in seabird interactions consistent with the declining effort in all trawl fisheries over the study period.

The median risk ratios of the top 5 most at risk seabird species from the 2015, 2017, 2020 and the 2023 Spatially Explicit Fisheries Risk Assessment (SEFRA) are provided below (Table 82). Species with a median risk ratio <1 are not expected to hinder the achievement of population management (Richard et al., 2020). While the risk ratio for southern Buller's albatross is currently assessed to be >1, it is clear that estimates for this species have been highly variable over the last four risk assessments, and it is important to note that these risk assessments consider impacts by all fisheries in New Zealand waters, not just the UoA fisheries.

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Table 82: Median risk ratios (and 95% CIs) and SEFRA risk classifications for captures of the top 5 seabird species across all trawl, longline and setnet fisheries in New Zealand waters.

Species	2015 risk ratio (data to 2012-13)	2017 risk ratio (data to 2014-15)	2020 risk ratio (data to 2016-17)	2023 risk ratio (data to 2019-20)	2023 SEFRA Risk Classification (all fisheries combined)	Risk Ratio Trend
Southern Buller's albatross	1.82 (0.97-3.67)	0.4 (0.22-0.69)	0.37 (0.21-0.6)	1.19 (0.71-2.65)	Very high	Variable
Salvin's albatross	3.44 (1.82-6.50)	0.79 (0.52-1.12)	0.65 (0.42-0.94)	0.69 (0.35-1.69)	High	Steady
White-capped albatross	1.10 (0.59-1.97)	0.38 (0.22-0.62)	0.29 (0.18-0.46)	0.50 (0.29-1.07)	High	Variable
Black petrel	11.34 (6.85-19.81)	1.15 (0.51-2.03)	1.23 (0.55-2.11)	0.49 (0.30-0.82)	High	Decreasing
Westland petrel	0.53 (0.21-1.38)	0.55 (0.21-1.28)	0.54 (0.26-1.12)	0.38 (0.17-0.88)	High	Steady

DOC's conservation status classifications (Robertson et al., 2012; 2016; 2021), and putative 2023 classifications, are provided below (Table 83) for the main species incidentally captured by New Zealand fisheries.

Table 83. Change in DOC threat classifications for the most prevalent incidental seabird captures in all trawl fisheries. From Department of Conservation publications¹, summarised in SNL, 2024.

Species	DOC Threat Classification 2012	DOC Threat Classification 2016	DOC Threat Classification 2021	DOC Threat Classification 2023	Status change
Southern Buller's albatross	Naturally Uncommon	Naturally Uncommon	At Risk - Declining	Nationally Critical	Worse
Salvin's albatross	Nationally Critical	Nationally Critical	Nationally Critical	At Risk - Declining	Better
White-capped albatross	At Risk – Declining	At Risk – Declining	At Risk - Declining	At Risk - Declining	No change
Black (Parkinson's) petrel	Nationally Vulnerable	Nationally Vulnerable	Nationally Vulnerable	Nationally Vulnerable	No change
Westland petrel	Naturally Uncommon	Naturally Uncommon	Naturally Uncommon	Naturally Uncommon	No change

¹ <https://www.doc.govt.nz/about-us/science-publications/conservation-publications/nz-threat-classification-system/>

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Chondrichthyans

A total of eight fish species, all of them chondrichthyans, are designated as ETP, based on the decision tree for species categorisation (Figure SA3). All meet the 'negligible' criteria. One species, basking shark, is protected under New Zealand legislation (Table 84). The bigeye thresher and blue shark do not appear in Anderson et al 2019 (Table 76) but appear in updated data from the MPI provided to the assessment team in the 2024 Situation Report (Table 84).

Table 84: Fish species designated as Endangered Threatened or Protected based on the decision tree for species categorisation. Observed catches in tonnes; catch percentages based on overall observed catch composition. Data from MPI observed catch composition. Data source: FNZ Rep Log 15659 from [HHL Trawl situation report](#).

Species	ETP/OOS Designation	2018/19	2019/20	2020/21	2021/22	2022/23	5-yr average (t)	5-yr average (%)	Designation
School shark <i>Galeorhinus galeus</i>	Chondrichthyan IUCN - CR	15	14	18	18	23	18	0.03	ETP - negligible
Basking shark <i>Cetorhinus maximus</i>	ETP – National legislation CITES-CMS IUCN - EN NZ Wildlife Act 1953	6	0	0	0	0	0.2	0.002	ETP - negligible
Leafscale gulper shark <i>Centrophorus squamosus</i>	Chondrichthyan IUCN – EN	42	35	47	40	37	40	0.07	ETP - negligible
Short finned mako <i>Isurus oxyrinchus</i>	Chondrichthyan IUCN – EN	1	0	1	1	0	1	0.001	ETP - negligible
Porbeagle <i>Lamna nasus</i>	Chondrichthyan CITES Appendix II IUCN - VU Does not meet modification criteria	5	1	4	5	9	5	0.01	ETP - negligible
Thresher shark <i>Alopias vulpinus</i>	Chondrichthyan CMS Appendix II IUCN-VU Does not meet modification criteria	1	2	3	3	2	2	0.004	ETP - negligible
Big eye thresher shark <i>Alopias superciliosus</i>	Chondrichthyan CMS Appendix II IUCN-VU Does not meet modification criteria	0	0.1	0	0	0	0.02	<0.001	ETP - negligible

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Species	ETP/OOS Designation	2018/19	2019/20	2020/21	2021/22	2022/23	5-yr average (t)	5-yr average (%)	Designation
Blue shark <i>Prionace glauca</i>	Chondrichthyan CMS Appendix II IUCN-NT Does not meet modification criteria	0	0	0	0.2	0.2	0	<0.001	ETP - negligible

The Wildlife Act 1953 protects seven species of chondrichthyans:

- *Basking shark (since 2007)*
- *White pointer shark (since 2007)*
- *Whale shark (since 2010)*
- *Deepwater nurse shark / small toothed sand tiger shark (since 2010)*
- *Oceanic whitetip shark (since 2013)*
- *Spine-tailed devil ray (since 2010)*
- *Manta ray (since 2010)*

Basking shark

Anderson et al 2019 assessed non-target fish and invertebrate catch and discards in New Zealand hoki, hake, ling, silver warehou, and white warehou trawl fisheries from 1990–91 to 2016–17. The only protected chondrichthyan reported in their analysis was the basking shark (*Cetorhinus maximus*) at an estimated 0.03% of the total observed catch (see Table A1 in Anderson et al 2019). This is accordant with more recent observer records presented through Dragonfly (<https://protectedspeciescaptures.nz/PSCv7/>) that indicate for the period 2016/17 – 2020/21 fishing seasons a total of 10 records with four mortalities (Table 79). Anderson et al 2019 went on to estimate total catch and total bycatch, i.e. for the observed and unobserved components of the fishery, for all QMS species combined, all non-QMS fish species combined, and all non-QMS invertebrate species combined, as well as discards of the target species.

Based on the representativeness of the observer data (see summary under Section 10.2.1.1 and Figure 33, Figure 34, Figure 35) it is therefore safe to assume that total catches of basking shark fall below 2% of the total catches of the hake, hoki, ling, white and silver warehou target fishery (and each separate fishery and UoA individually). Therefore, per SA3.1.1d.ii, catches of this species are negligible and there is no requirement for further assessment (MSC 2024, V3.1, Figure SA3).

Deepwater nurse shark / small toothed sand tiger shark

The deepwater nurse shark does not appear in the observed catch composition for the fishery (Anderson et al 2019). A single observed live release over the period 2016/17-2020/21 is reported by Dragon Fly Science (Table 79).

Based on Anderson et al 2019 the species does not appear in the trawl fishery observed catch composition and the single reported observed live release in the most recent 5-year period for which data are available also does not meet the 2% threshold for non-negligible catches. Therefore, per SA3.1.1d.ii, catches of this species are negligible and there is no requirement for further assessment (MSC 2024, V3.1, Figure SA3).

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School shark

Per Anderson et al 2019 (Table 76) the catches of school shark amount to just 0.04% of the total trawl UoAs catch. This is accordant with the more recent 2018/19-2022/23 observer data (Table 84) indicating the species accounts for just 0.03% of the catch on average. Therefore, per SA3.1.1d.ii, catches of this species are negligible and there is no requirement for further assessment (MSC 2024, V3.1, Figure SA3).

Leafscale gulper shark

Per Anderson et al 2019 (Table 76) the catches of Leafscale gulper shark amount to just 0.06% of the total trawl UoAs catch. This is accordant with the more recent 2018/19-2022/23 observer data (Table 84) indicating the species accounts for just 0.07% of the catch on average. Therefore, per SA3.1.1d.ii, catches of this species are negligible and there is no requirement for further assessment (MSC 2024, V3.1, Figure SA3).

Short finned mako shark

Per Anderson et al 2019 (Table 76) the catches of Short finned mako amount to just <0.01% of the total trawl UoAs catch. This is accordant with the more recent 2018/19-2022/23 observer data (Table 84) indicating the species accounts for just 0.001% of the catch on average. Therefore, per SA3.1.1d.ii, catches of this species are negligible and there is no requirement for further assessment (MSC 2024, V3.1, Figure SA3).

Other ETP shark species

Porbeagle, thresher, bigeye thresher and blue shark are open to modification per SA3.2.9 from the ETP/OOS categorisation to the in-scope species component if at least two of three modification criteria are met (life-history characteristics, management status, stock status). Despite all four species catch meeting the negligible criteria (being <2% of the total catch) modification to score as in-scope species was tested.

Porbeagle shark

Table 85. Productivity attributes for porbeagle shark. Biological characteristics from Fish Base (<https://www.fishbase.se/summary/Lamna-nasus.html>).

Productivity		
Scoring element (species)	Porbeagle	
Attribute	Justification	Score
Average age at maturity	8-11 years males 15-18 years females	2
Average maximum age	65	3
Fecundity	4 pups per year	3
Average maximum size Not scored for invertebrates	200cm	2
Average size at maturity Not scored for invertebrates	186.5cm	3
Reproductive strategy	viviparous	3
Trophic level	4.6	3
Productivity score from RBF	2.71	

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Management status

The porbeagle is managed as part of the QMS, there are some specific provisions for the species, regarding the removal of fins and returning individuals to the water (i.e., Schedule 6). However, there are no other management measures in place and the species is not managed using LRP or TRP (or equivalent) therefore the species does not meet the modification criteria for management status (SA3.2.9b).

Stock status

The stock structure of porbeagle sharks in the Southern Hemisphere is unknown (Fisheries New Zealand, 2019c) however, it seems likely that sharks in the south-west Pacific comprise a single stock. The stock status of porbeagle sharks from the entire Southern Hemisphere range of the species was assessed in 2017 (Hoyle, et al, 2017). The assessment noted that although the stock status of the species is currently unknown the results of the assessment show that fishing mortality on the Southern Hemisphere stock is very low, and that it decreases eastward from the waters off South Africa to the waters off New Zealand. although the stock status of the species is currently unknown there is a very low risk that the Southern Hemisphere porbeagle shark is subject to overfishing anywhere within its range. A qualitative risk assessment was completed on all chondrichthyans (sharks, skates, rays and chimaeras) at the New Zealand scale in 2017 (Ford et al, 2018). Porbeagle sharks had a risk score of 15 and were ranked second equal lowest risk of the eleven QMS chondrichthyan species.

Porbeagle does not meet any of the three modification criteria and therefore is classified as ETP/OOS in accordance with SA3.2.9.

Thresher shark

Table 86, Productivity attributes for thresher shark. Biological characteristics from Fish Base (<https://www.fishbase.se/summary/SpeciesSummary.php?ID=2535&AT=thresher+shark>).

Productivity		
Scoring element (species)	Thresher shark	
Attribute	Justification	Score
Average age at maturity	5-13 years	2
Average maximum age	25 years	2
Fecundity	2 to 4 young in a litter	3
Average maximum size Not scored for invertebrates	573 cm TL male, 549.0 cm TL female	3
Average size at maturity Not scored for invertebrates	250-375cm	3
Reproductive strategy	Ovoviparous,	3
Trophic level	4.5 ±0.0 se; based on diet studies	3
Productivity score from RBF	2.90	

Management status

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There are no other management measures in place and the species is not managed using LRP or TRP (or equivalent) therefore the species does not meet the modification criteria for management status (SA3.2.9b)

Stock status

There are no data for population size of the Common Thresher. Genetic results indicate one global population, however there is some genetic structuring between the Northwest Atlantic and the Pacific Oceans (www.iuncnredlist.org). The Common Thresher is estimated to be declining in the North Atlantic and increasing in the Eastern North Pacific. However, the increasing trend in the Eastern North Pacific is from a managed fishery and may not be representative of trends in the wider Pacific. Trends are uncertain and there is a lack of data from other regions of the world except North Pacific (www.iuncnredlist.org). Therefore, the species does not meet the modification criteria for stock status (SA3.2.9c)

Thresher shark does not meet any of the three modification criteria and therefore is classified as ETP/OOS in accordance with SA3.2.9.

Bigeye thresher shark

Table 87. Productivity attributes for bigeye thresher shark. Biological characteristics from Fish Base (<https://www.fishbase.se/summary/SpeciesSummary.php?ID=2534&AT=bigeye+thresher+shark>).

Productivity		
Scoring element (species)	Bigeye Thresher shark	
Attribute	Justification	Score
Average age at maturity	7- 14 years	2
Average maximum age	20 years	2
Fecundity	2 to 4 young in a litter	3
Average maximum size Not scored for invertebrates	488 cm male	3
Average size at maturity Not scored for invertebrates	138-270cm	3
Reproductive strategy	Ovoviviparous,	3
Trophic level	4.5 ±0.0 se; based on diet studies	3
Productivity score from RBF	2.90	

Management Status

There are no other management measures in place and the species is not managed using LRP or TRP (or equivalent) therefore the species does not meet the modification criteria for management status (SA3.2.9b)

Stock Status

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No Pacific Ocean stock assessment of bigeye thresher shark have been conducted. Information gaps and changes in reporting and observer coverage over time and space, make traditional approaches to stock assessment impractical (Fu, et al., 2016). Fu, et al., (2016) conducted a spatially explicit and quantitative sustainability risk assessment on available data. However, impact was uncertain in the southwest Pacific. Therefore, the species does not meet the modification criteria for management status (SA3.2.9c).

Bigeye thresher shark does not meet any of the three modification criteria and therefore is classified as ETP/OOS in accordance with SA3.2.9.

Blue shark

Table 88. Productivity attributes for blue shark. Biological characteristics from Fish Base (<https://www.fishbase.se/summary/SpeciesSummary.php?ID=898&AT=blue+shark>).

Productivity		
Scoring element (species)	Blue shark	
Attribute	Justification	Score
Average age at maturity	4 years	1
Average maximum age	20 years	2
Fecundity	4-63 young in a litter, gestation 9-12 months	3
Average maximum size Not scored for invertebrates	400cm	3
Average size at maturity Not scored for invertebrates	199 (range 170 – 221)	3
Reproductive strategy	viviparous	3
Trophic level	4.4 ±0.2 se; based on diet studies	3
Productivity score from RBF	2.57	

Management Status

Blue shark is a QMS, Schedule 6 species and be returned to the water alive or dead and if dead, balanced against ACE. Blue shark was introduced into the QMS on 1 October 2004 under a single QMA, BWS 1, with allowances, TACC (1 860t), and TAC (2 080t) however, it is unclear what information these metrics were based on. There are no other management measures in place and the species is not managed using LRP or TRP (or equivalent) therefore the species does not meet the modification criteria for management status (SA3.2.9b)

Stock status

Blue shark in the southwest Pacific is considered a single stock (Neubauer et al., 2021). A recent stock assessment found that 90% of model runs indicated that fishing mortality at the end of the assessment period was below F_{MSY} and 96% of model runs show that the biomass is above SB_{MSY} (Neubauer et al., 2021). Fishing mortality had declined over the last decade and is currently relatively low, as blue sharks are not retained by most longline fleets. Neubauer, et al., (2021) concluded that the stock on average does not appear to be overfished and overfishing is not occurring. Therefore, the stock assessment criteria are met in accordance with SA3.2.9c.

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Blue shark does not meet at least two of the modification criteria and is therefore assessed as ETP/OOS in accordance with SA3.2.9.

Marine mammals

All species of seal (*Pinnipedia*), whale, dolphin, and porpoise (*Cetacea*), and dugong and manatee (*Sirenia*) are protected under the Marine Mammal Protection Act 1978.

In the most recent 5 years for which data is publicly available (2016/17-2020/21, Table 79) the hoki, hake and ling trawl fishery has interacted with New Zealand fur seal (*Arctocephalus forsteri*), New Zealand sea lion (*Phocarctos hookeri*), long finned pilot whale (*Globicephala melas*), dusky dolphin (*Lagenorhynchus obscurus*) and killer whale (*Orcinus orca*).

New Zealand fur seal

New Zealand fur seals (*Arctocephalus forsteri*) are classified as 'Not threatened' by the New Zealand Department of Conservation (Baker et al 2019) and as 'Least Concern' by the International Union for Conservation of Nature (Chilvers and Goldsworthy, 2015).

Abrahams et al 2017 multi-species marine mammal risk assessment showed the level of risk from fisheries to the New Zealand fur seal is unlikely to pose a threat to the NZ fur seal population sustainability. Briefly the SEFRA method uses spatially resolved species density layers and the location, and amount, of observed fishing effort to quantify the 'overlap' between the protected species and observed fishing activities, which is then used in combination with observed species captures to estimate the 'catchability' of the species in different fisheries. Once catchability has been estimated, the total number of captures can be predicted for the set of commercial effort of interest. Further calculations are used to convert the number of captures to a predicted number of deaths, enabling quantification of a risk metric for the impact of fishing-related deaths on the protected species populations.

The PST estimated for NZ fur seal by Abraham et al 2017 was 3393.7 (95 c.i. 1644.0-6414.0). The risk ratio is the number of annual potential fatalities in fisheries to the Population Sustainability Threshold (PST) with New Zealand fur seal found to have a mean ratio of 0.31 (95% c.i. 0.13-0.64) (Abraham et al. 2017).

An updated SEFRA by Mackenzie et al 2022 did not use PST, hence their results are not directly comparable with those of Abraham et al. (2017). They produced updated intrinsic rate of population increase (r_{max}) estimates for species where demographic parameters were available, predicted annual exploitation rates (predicted fishing-related death per individual in the population) and determined the equilibrium status metric of population impact (proportion of carrying capacity K after long-term constant exploitation rate).

For New Zealand fur seal the following results from Mackenzie et al 2022:

r_{max} :	0.074 (95% credible interval, 0.040 - 0.115)
Derived annual deaths:	1,172.35 (95%, 893.3 - 1,541.5)
Predicted exploitation rate:	stock 0.60 (95%, 0.3-1.0), NZ population 0.95 (95%, 0.5-1.5)
Predicted equilibrium status:	stock 91.38 (95%, 84.1 - 96.0), NZ population 86.40 (95%, 74.9 - 93.7)

Observed captures reported by the MPI Observer Programme and estimated annual captures are published on the Dragonfly website for New Zealand fur seal since the 2002/03 fishing season. The most recent 5-years total annual estimated captures are presented in Table 79. The annual average estimated captures by trawls targeting hoki, hake and ling (Table 89) that includes both live releases and mortalities) supports this finding for the UoAs under assessment.

Table 89. Annual estimated captures of New Zealand fur seal for the hoki, hake and ling targeted trawl fishery for the most recent 5-year period for which data are available, 2016/17-2020/21. Data from <https://protectedspeciescaptures.nz/PSCv7/>

Target	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	Total	Average

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Hoki	237	204	130	120	152	843	168.7
Hake	3	2	3	1	1	10	2.0
Ling	13	8	8	11	10	50	10.1

Based on the results of both Abraham et al 2017 and Mackenzie et al 2022, it would appear that the risk to New Zealand fur seal from all commercial fisheries in New Zealand is below the level that would reduce the population to a level below 50% of the carrying capacity (defined as favourable conservation status per SA3.9.2.1). For the hake and ling UoAs the impact meets the definition of negligible per SA3.1.1d as captures are below 10 per annum and the estimated population size for the New Zealand fur seal (NZ and Australia) is 192 632 (Mackenzie et al 2022) and the population size within New Zealand (i.e. the portion of the population managed within the geographic boundary of New Zealand) is 126 945 (Abraham et al 2017).

New Zealand Sea Lion

The status of New Zealand sea lion (*Phocarctos hookeri*) has improved from Threatened – Nationally Critical to Threatened – Nationally Vulnerable (Baker et al 2019). The overall rate of population decline has slowed to 29%, though a precautionary approach is taken, and the decline is estimated at >30% over three generations. Populations are stable or increasing at most breeding locations. Pup production is presently increasing at both Stewart Island and mainland New Zealand but appears to be approximately stable (i.e. $\pm 10\%$) at both the Auckland Islands and Campbell Island.

Two data sets were used in estimating the number of mature females (Roberts 2017, Roberts 2018). These two estimates combined provide a total estimate of mature females of 3570 (Baker et al 2019). Assuming a female to male sex ratio of 1:1 (based on a known birth rate ratio of 1:1 and broadly consistent survival rates between sexes), this would lead to a total estimate of the number of mature individuals (i.e. females and males) of 7140. Mackenzie et al 2022 estimated the New Zealand population size at 11 743 individuals.

For New Zealand sea lion the following results from Mackenzie et al 2022:

r_{max} : 0.102 (95% credible interval, 0.070 - 0.131)

Derived annual deaths: 33.46 (95%, 26.9 - 42.1)

Predicted exploitation rate: stock 0.29 (95%, 0.2-0.4)

Predicted equilibrium status: stock 97.09 (95%, 95.9 - 97.9)

The PST estimated for NZ sea lion by Abraham et al 2017 was 257.6 (95 c.i. 168.9–379.8). The risk ratio is the number of annual potential fatalities in fisheries to the Population Sustainability Threshold (PST) with New Zealand sea lion found to have a mean ratio of 0.10 (95% c.i. 0.05–0.19) (Abraham et al. 2017).

A total of two individuals were observed dead in the hoki, hake, ling trawl fishery over the period 2016/17-2020/21 in trawls targeting ling in the subantarctic area, one in each of the 2017/18 and 2018/19 fishing seasons (<https://protectedspeciescaptures.nz/PSCv7/>). Both were observed to be captured in the net. The dragon fly website does not provide raised total capture estimates for the species.

Based on the low level of observed mortalities and the PST estimated by Abraham et al 2017, coupled with the predicted equilibrium status close to 1.00 estimated by Mackenzie et al 2022, it is clear that the New Zealand sea lion is not at risk of being hindered in its recovery due to the impacts of the hoki, hake and ling trawl fishery. According to SA3.1.1d the impact of the UoAs collectively, and individually, is deemed negligible.

Long-finned pilot whale

The long-finned pilot whale (*Globicephala melas*) is classified as 'Not threatened' by the New Zealand Department of Conservation (Baker et al 2019). Mackenzie et al 2022 estimated the global stock population size at 188118 individuals

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with 0.04% (7525 individuals) of the worldwide stock within New Zealand waters. A total of two mortalities were observed in the trawl fishery over the period 2016/17-2020/21 (Table 79).

For long-finned pilot whale the following results from Mackenzie et al 2022:

r_{max} :	0.063 (95% credible interval, 0.046 - 0.079)
Derived annual deaths:	3.63 (95%, 1.5 - 7)
Predicted exploitation rate:	stock 0.00 (95%, 0.0-0.0), NZ population 0.05 (95%, 0.0-0.1)
Predicted equilibrium status:	stock 99.97 (95%, 99.9 – 100.0), NZ population 99.26 (95%, 98.5-99.7)

Based on the low level of observed mortalities, coupled with the predicted equilibrium status close to 1.00 estimated by Mackenzie et al 2022, it is clear that the long-finned pilot whale is not at risk of being hindered in its recovery due to the impacts of the hoki, hake and ling trawl fishery. According to SA3.1.1d the impact of the UoAs collectively, and individually, is deemed negligible.

Dusky dolphin

The dusky dolphin (*Lagenorhynchus obscurus*) is classified as 'Not threatened' by the New Zealand Department of Conservation (Baker et al 2019). Mackenzie et al 2022 estimated the New Zealand stock population size at 28442 individuals. A total of one mortality was observed in the trawl fishery over the period 2016/17-2020/21 (Table 79).

For dusky dolphin the following results from Mackenzie et al 2022:

r_{max} :	0.064 (95% credible interval, 0.034 - 0.107)
Derived annual deaths:	13.24 (95%, 5.8-24.1)
Predicted exploitation rate:	stock 0.05 (95%, 0.0-0.1)
Predicted equilibrium status:	stock 99.2 (95%, 98.4-99.7)

Based on the low level of observed mortalities, coupled with the predicted equilibrium status close to 1.00 estimated by Mackenzie et al 2022, it is clear that the dusky dolphin is not at risk of being hindered in its recovery due to the impacts of the hoki, hake and ling trawl fishery. According to SA3.1.1d the impact of the UoAs collectively, and individually, is deemed negligible.

Killer whale

The killer whale/orca (*Orcinus orca*) is classified 'Threatened – nationally critical' by the New Zealand Department of Conservation (Baker et al 2019). Mackenzie et al 2022 estimated the global stock population size at 48750 individuals with 0.021% (1024 individuals) of the worldwide stock within New Zealand waters. A total of one mortality was observed in the trawl fishery over the period 2016/17-2020/21 (Table 79).

For killer whale the following results from Mackenzie et al 2022:

r_{max} :	0.028 (95% credible interval, 0.010 - 0.045)
Derived annual deaths:	1.04 (95%, 0.2-2.7)
Predicted exploitation rate:	stock 0.00 (95%, 0.0-0.0), NZ population 0.10 (95%, 0.0-0.3)
Predicted equilibrium status:	stock 99.91 (95%, 99.8 – 100.0), NZ population 95.83 (95%, 88.9-99.3)

Based on the low level of observed mortalities, coupled with the predicted equilibrium status close to 1.00 estimated by Mackenzie et al 2022, it is clear that the killer whale is not at risk of being hindered in its recovery due to the impacts of the hoki, hake and ling trawl fishery. According to SA3.1.1d the impact of the UoAs collectively, and individually, is deemed negligible.

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10.2.1.2.1. ETP/OOS Management

A range of management measures, including 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 deepwater industry's monitoring of ETP species are described in DWG's Operational Procedures (OPs) and Vessel Management Plans (VMPs), (DWG, 2024), which include:

- Hoki OPs
- Hoki OPs Coastal Trawl Fisheries
- Marine Mammals OPs
- Reporting OPs
- Seabirds OPs
- Sharks OPs
- Deepwater Trawl VMP (template)
- Trawl Vessel Protected Species Risk Management Plan (template)
- Ten Commandments for:
 - Fresh Fish Hoki
 - Marine Mammals
 - Saving Seabirds
- Ten Golden Rules for Protected Species Reporting.

The Operational Procedures (OPs) for each species-group include elements of identifying and mitigating risk, safe handling and release following capture, reporting and event response, audit and review. They are monitored and administered by the Deepwater Council (DWC) with performance and conformance audited by Fisheries New Zealand Observers. The OPs are underpinned by New Zealand legislation and National Plans of Action (NPOAs).

Key legislation includes :

- Seabird Scaring Devices Regulations 2006: requires trawlers over 28 m LOA to deploy devices to reduce warp risk to seabirds
- Fisheries Act 1996: requires that:
 - measures are taken to avoid, remedy or mitigate any adverse effects of fishing-related mortality on any protected species.
 - This Act also includes requirements to report captures of protected species.
 - All catch be reported
 - All QMS-species be landed if taken, except where Schedule 6 applies and provides for their return to the sea (e.g. blue, mako, porbeagle, rig, school shark and spiny dogfish)
 - Adherence to the prohibition of Shark Finning
- Wildlife Act 1953 states it is an offence to deliberately take, or attempt to take, harass, injure, mutilate or retain all or any part of any Protected Species
- Animal Welfare Act 1999
- Marine Mammals Protection Act 1978: the accidental capture of any marine mammal is permitted provided that the capture is reported to the appropriate authority without delay. It is an offence to accidentally capture a marine mammal and to not report it.

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All coastal vessels >28 m are not required by law to carry and use seabird scaring devices. However, DWC and hoki quota owners require that all hoki vessels <28 m LOA have Protected Species Risk Management Plans (PSRMP) on board. The PSRMP is a one-page document outlining information on:

- The vessel, including a photo
- Vessel-specific seabird risks
- Vessel's offal control system
- Vessel's seabird mitigation devices, including a photo of the actual warp mitigation on board.

PSRMPs are now onboard all the fresh fish hoki fleet of <28 m vessels. These plans are a much simpler version of the deepwater trawlers' VMPs, but retain the three basic management procedures of offal control, warp mitigation, and risk awareness, reduction & reporting.

National Plans of Action

New Zealand has a responsibility to act in accordance with the objective of International Plans of Action for Seabirds and Sharks. The two NPOAs applicable to deepwater fisheries are:

NPOA-Sharks 2022 (FNZ, 2022)

New Zealand's first NPOA-Sharks was in 2008 and the most recent one was NPOA-Sharks 2013. The 2013 NPOA has been reviewed and the NPOA-Sharks 2022 has been consulted on and a draft NPOA circulated. The final NPOA-Sharks 2022 is imminent with consultations having closed in September 2022.

The NPOA sharks 2022's vision is New Zealanders work toward ensuring the long-term viability, biodiversity and functional role of sharks, and that any utilisation of sharks in Aotearoa is sustainable. Its seven goals are:

- 1) Maintaining biodiversity and ecological long-term viability of shark populations;
- 2) Ensuring full utilisation of sharks and maintaining the prohibition on shark finning in New Zealand;
- 3) Avoiding protected and unwanted shark captures, and maximising post release survival;
- 4) Minimising anthropogenic effects other than direct fisheries impacts;
- 5) Better Integration of Tangata Whenua Perspectives and Value;
- 6) International engagement through enhanced monitoring, data collection and information sharing; and
- 7) Continuous improvement in the research, data and information to conserve and manage sharks, guided by the SEFRA framework and conservation threat status.

NPOA Seabirds (FNZ, 2020)

New Zealand's first NPOA was published in 2004 and a revised NPOA-Seabirds published in 2013. The NPOA Seabirds 2020 is New Zealand's third iteration of a national plan of action.

The NPOA Seabirds 2020's vision is New Zealanders work towards zero fishing-related seabird mortalities. Its four goals are:

- 1) Avoiding bycatch — effective bycatch mitigation practices are implemented in New Zealand fisheries;
- 2) Healthy seabird populations — direct effects of New Zealand fishing do not threaten seabird populations or their recovery;
- 3) Research and information — information to effectively manage direct fisheries effects on seabirds is continuously improved; and
- 4) International engagement — New Zealand actively engages internationally to promote measures and practices that reduce impacts on New Zealand seabirds.

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10.2.1.3. Habitats

According to the MSC Standard V3.1, the assessment of the habitats component of the Standard shall be done in relation to the effects of the UoA on the structure and function of the habitats impacted by the UoA.

As per MSC V3.1 SA3.2.2 *The team shall categorise any invertebrate species that is benthic-habitat forming as a scoring element under the habitats component, irrespective of the species endangered, threatened or protected (ETP) status and irrespective of its catch proportions.* This contradicts SA3.12.1a *The team shall score each habitat as a separate scoring element* as per SA3.13.2 (MSC V2.01) and SA3.12.2 (MSC V3.1): If a benthic habitat is being assessed, the team shall recognise habitats based on the following habitat characteristics:

- a) Substratum – sediment type.
- b) Geomorphology – seafloor topography.
- c) Biota – characteristic floral and/or faunal group(s).

Habitats, as defined by the MSC Standard are not single benthic habitat-forming invertebrate species, rather they are a combination of substratum, geomorphology and community of biota. In response to this apparent contradiction the assessment team follow that all benthic habitat-forming invertebrates are listed as scoring elements but distinct broader habitat types are assessed under PI2.3.1.

MSC V3.1 SA3.12.6 and MSC V2.01 SA3.13.5 stipulates that “When assessing the status of habitats and the impacts of fishing, the team shall consider the full area managed by the local, regional, national, or international body(ies) responsible for fisheries management in the area(s) where the UoA operates, otherwise known as the “managed area”.

and SA3.13.5.3 (V2.01) “In cases where a habitat’s range overlaps the “managed area”, the team shall consider the habitat’s range both inside and outside the “managed area”.”

and SA3.12.6.4 (V3.1) “If a habitat’s range extends beyond the “managed area”, the team shall consider the habitat’s range both inside and outside the “managed area”.”

Habitat Distribution

In New Zealand the Benthic-Optimised Marine Environment Classification, BOMECE (Leathwick et al. 2012), used a combination of environmental predictors and distributional data for eight taxonomic groups (Table 90) to train an environmental classification for New Zealand’s Exclusive Economic Zone (EEZ) with depths of 3000m or less. The combination of these predictors and biota meets the requirements of SA3.12.2 (MSC V3.1) for recognising distinct benthic habitat types.

Table 90. Environmental predictors and taxonomic groups used in the BOMECE analysis (Leathwick et al 2012).

Environmental predictors	Taxonomic groups
Depth (m)	Asteroids
Temperature (°C)	Bryozoans
Salinity (psu)	Benthic fish
SST gradient (°C km ⁻¹)	Foraminiferans
Productivity (mgC m ⁻² d ⁻¹)	Octocorals
Tidal current(m s ⁻¹)	Polychaetes
Sediment size (mm)	Matrix-forming scleratinian corals
Orbital velocity (dm s ⁻¹)	Sponges
Sediment resuspension	
Suspended particulate matter	
Dissolved organic matter	

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Environmental predictors	Taxonomic groups
Seabed relief	

Fifteen groups were recognised by the BOMECS as providing an appropriate level of detail for broad-scale classification of New Zealand’s EEZ to depths of 3000m. The groups showed strong separation in relation to depth, comprising three inshore groups (A, B and D), three shelf groups (C, E and F) and nine deeper water groups (G-O) (Figure 36).

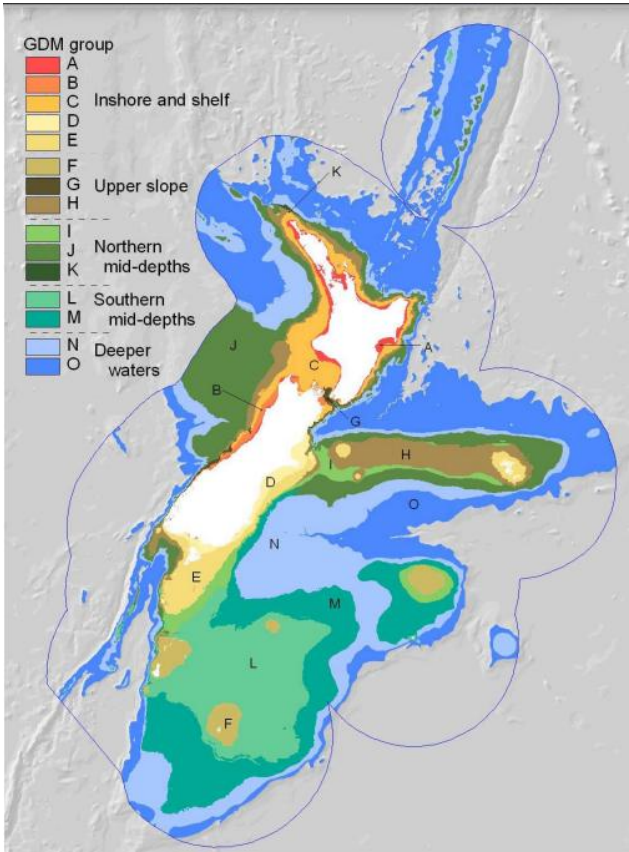


Figure 36. Map of the distribution of Benthic-Optimised Marine Environment Classification (BOMECS) classes defined by multivariate classification of environmental data transformed using results from GDM analyses of relationships between environment and species turnover averaged across eight taxonomic groups of benthic species. [From Leathwick et al. (2012).]

The Department of Conservation recently commissioned a Seafloor Community Classification (SCC, Stephenson et al. 2022). Like the previous classifications, the SCC is a numerical classification, and it provides advances on both the MEC and BOMECS because substantially more biological and environmental data were used. Whilst the BOMECS classes are informative for the classification of substratum and geomorphology the Seafloor Community Classification (SCC) of Stephenson et al 2022 provides a clearer description of species compositional turnover. The classification used a broad suite of biotic groups [benthic invertebrates, macroalgae, reef fish and demersal fish] and transformed 33 environmental variables to represent spatial patterns of taxa compositional turnover (Figure 37). For each of the 75 SCCs classified a detailed description of the characterising demersal fish, benthic invertebrate, macroalgae, and reef fish characterising taxa is provided in Supplementary materials as a useful and interpretable reference for stakeholders (Peterson et al 2020).

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Subsequently Stephenson et al 2023 developed a 9-class New Zealand Seafloor Bioregionalisation. During the site visit stakeholders, including co-authors of the report, recommended this 9-class characterization would be more appropriate than the 12 Class BOMECS to determine the impact of the trawl UoAs on benthic habitat types as it includes additional biological ground-truthing data as used in the SCC described above. This was only possible on an indicative, qualitative level (Figure 38) because the overlap of the trawl UoAs has not been assessed to the same degree as has been done by MacGibbon & Mules, 2023 for the BOMECS. A Recommendation is raised that the fishery client conduct a spatial assessment of the degree of overlap of the trawl UoAs with each of the 9 bioregions identified by Stephenson et al 2023, following a similar assessment approach as applied by MacGibbon & Mules, 2023.

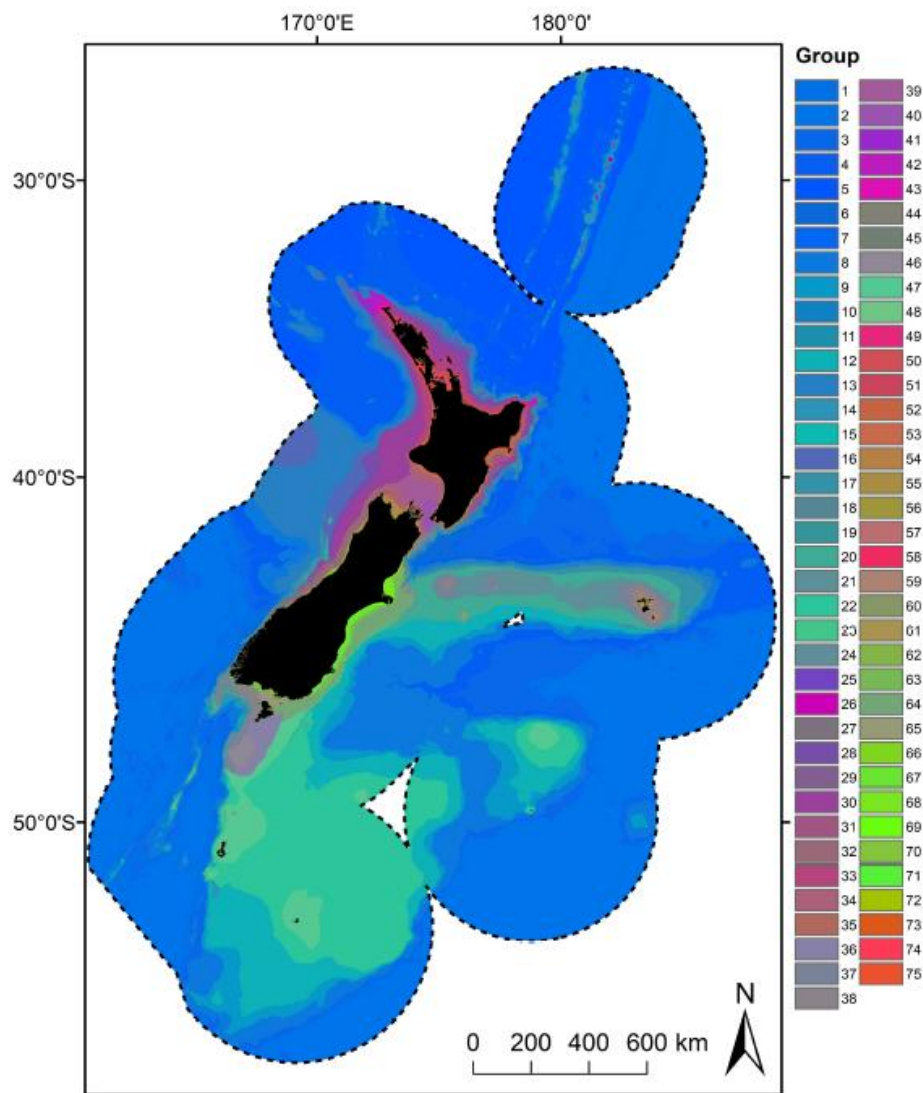


Figure 37. Geographic distribution of the Seafloor Community Classification (75 groups) derived from combined bootstrapped Gradient Forest model. Colours are based on the first three axes of the PCA analysis applied to the group means for each of the transformed predictor variables, so that similarities/differences in colour correspond broadly to similarities/differences in predicted compositional turnover. Stephenson et al 2022.

What is important to recall is the fundamental distinction between: i) habitat types, ii) defined or *known* VME habitats within those habitat types, and iii) the VME indicator taxa that are known or likely to occur in some habitat types but not others and in varying densities where they do occur. When referring to VMEs, in fact reference should be made to finer

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scale Vulnerable Marine Communities (VMCs) (Watling and Auster, 2021). Broad benthic habitat types support communities of several kinds. Simply because VME indicator taxa occur within a BOMECE habitat type does not warrant that the entire extent of the BOMECE should be considered as a VME habitat.

In the case of MSC Standard V3.1 the assessment team proposes that sand covered hard substrate with emergent fauna (i.e., sponges, bryozoans, corals) and all black, gorgonian, stony, and hydrocorals, protected under the Wildlife Act 1953, are considered as 'more sensitive' habitats characterized by complex benthic communities. Underwater Topographic Features (UTFs) are also classified as vulnerable marine ecosystems as they can host fragile and slow-growing benthic communities that are readily impacted by bottom trawling and are slow to recover from damage (see references in Clarke et al, 2022).

The preferred habitats of target species, over which the majority of trawling effort takes place, i.e. BOMECE class habitats outside of UTFs, are then considered as 'less sensitive' habitats, comprising gravel, mud, and sand, upper and mid-slope environments with lower complexity.

Fishing overlap

The most recent spatial analysis (MacGibbon and Mules, 2023) of bottom-contacting trawl effort by commercial trawlers within the New Zealand 200 nm Exclusive Economic Zone and Territorial Sea (EEZ+TS), in waters open to trawling down to 1600 m in depth (the 'fishable area'), provides an assessment of spatial coverage of bottom-contacting tows for the period 1990-2021 and 2021 exclusively. The 'fishable' area represents waters in 0–1600 m depths that are open to trawling: that is, waters exclusive of Benthic Protection Areas (BPAs) that were introduced in 2007, closed areas to protect underwater features including seamounts (the first of which were closed in 2001), marine farms, and marine reserves. Overlap is reported both against BOMECE areas (Table 91, Table 92) and depth zone (Table 93, Table 94) and indicates further that bottom contact was targeted at the preferred habitat of the target species (Table 95).

By target species, the following key observations were made:

- HOK
 - During 1989–90 to 2018–19, about 434 000 bottom-contacting hoki trawls were reported on TCEPRs, TCERs, and ERS (MacGibbon & Mules 2023). The total footprint generated from these tows was estimated at about 167 236 km². This footprint represented coverage of 4.1% of the seafloor of the combined EEZ and the Territorial Sea areas and 12% of the 'fishable area', that is, the seafloor area open to trawling, in depths of less than 1600 m.
 - In the 2020–21 fishing year, almost 8700 hoki tows resulted in a trawl footprint of 20 497 km², equivalent to 0.5% of the EEZ and Territorial Sea and 1.47% of the fishable area (MacGibbon & Mules 2023).
 - The Benthic-optimised Marine Environment Classification (BOMECE, Leathwick et al 2012) classes with the highest proportion of area covered by the hoki footprint 1990-2021 (Table 91) were classes G (Cook Strait) 31.65%, H (Chatham Rise) 28.12%, I (Chatham Rise slope and shelf edge of the east coast South Island) 66.14%, and L (Southern Plateau waters) 15.89%.
 - In 2021 (Table 92), 1.12% of class G, 2.17% of class H, 18.26% of class I, and 0.75% of class L were contacted by the hoki footprint.
 - The overall trawl footprint for hoki (1989–90 to 2020-21) covered 19% of the seafloor in 200–400 m, 28% of 400–600 m seafloor, and 28% of the 600–800 m seafloor at those depths (Table 93).
 - Table 94 shows that HOK tows in 2021 overlapped 1.47% of the fishable area overall and that the preferred depths for HOK tows were the 400 – 600 and 600 – 800 depth zones and these represented only 5.66% and 2.65% of the area at those depths respectively.
- HAK

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- The Benthic-optimised Marine Environment Classification (BOMECE, Leathwick et al 2012) classes with the highest proportion of area covered by the hake footprint 1990-2021 (Table 2) were classes H (Chatham Rise) 5.58%, I (Chatham Rise slope and shelf edge of the east coast South Island) 3.75%, and J (northern mid-depths continental slope).
- The 2021 estimated footprint for HAK bottom-contacting trawls was 695.8 km² or 0.05% of the fishable area less than 1600m depth (Table 94).
- The preferred depths for HAK tows were the 400 – 600 and 600 – 800 depth zones and these represented only 0.13% and 0.18% of the fishable area at those depths respectively.

• LIN

- The Benthic-optimised Marine Environment Classification (BOMECE, Leathwick et al 2012) classes with the highest proportion of area covered by the hake footprint 1990-2021 (Table 2) were classes G (Cook Strait), H (Chatham Rise), and I (Chatham Rise slope and shelf edge of the east coast South Island) covering 11.37%, 7.25% and 8.57% over the time period respectively.
- The 2021 estimated footprint for LIN bottom-contacting trawls was 1670 km² or 0.12% of the fishable area less than 1600m depth (Table 94).
- All ling trawls took place in water depths less than 800m.

Table 91. The total area of each BOMECE class within the EEZ+TS and the percentage of each area covered by the 1990–2021 footprint for the Tier 1 deepwater target species. Note: there are some large differences in the areas of some classes. – indicates no overlap. Source: MacGibbon & Mules, 2023.

Class	Area (km ²)	Footprint area overlap (%)									
		HAK	HOK	JMA	LIN	OEO	ORH	SBW	SCI	SQU	Tier 1
A	30 661.00	0.00	0.50	0.39	0.03	0.01	0.13	0.01	0.22	1.23	2.46
B	12 786.10	0.38	6.16	0.65	2.93	0.01	0.09	0.13	0.05	0.36	10.21
C	90 256.50	0.09	3.12	27.87	0.37	0.01	0.10	–	0.62	1.72	33.09
D	28 085.70	0.02	3.04	1.70	0.65	0.07	0.14	–	0.01	4.34	8.25
E	61 258.00	0.39	9.00	14.39	2.30	0.13	0.03	0.01	0.16	25.38	34.01
F	38 775.80	0.04	1.08	0.31	1.17	0.01	0.00	5.09	0.76	11.24	17.66
G	6 702.30	1.14	31.65	0.27	11.37	0.06	1.44	–	1.48	0.08	42.21
H	138 399.10	5.58	28.12	7.72	7.25	0.05	0.16	0.02	8.31	5.24	43.69
I	52 008.30	3.75	66.14	0.64	8.57	0.56	0.24	4.38	0.10	9.75	73.92
J	312 604.90	3.16	12.02	0.32	0.85	2.50	10.64	0.01	0.83	0.58	24.91
K	1 200.20	–	0.23	–	–	–	0.03	–	–	–	0.26
L	198 578.40	0.45	15.89	0.03	3.85	0.03	0.00	9.32	2.73	2.16	28.42
M	233 837.40	0.08	4.53	0.00	0.09	2.88	0.37	0.26	0.01	0.17	7.88
N	495 154.20	0.00	0.31	0.01	0.01	0.42	1.78	0.00	0.03	0.06	2.37
O	1 006 911.10	–	0.00	–	0.00	0.02	0.04	–	0.00	0.00	0.05
All	2 707 219.00	0.78	6.18	1.73	1.06	0.64	1.63	0.87	0.77	1.56	12.14

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Table 92. The total area of each BOMECE class within the EEZ+TS and the percentage of each area covered by the 2021 bottom-contacting trawl footprint for the Tier 1 deepwater target species. – indicates no overlap. Source: MacGibbon & Mules, 2023.

Class	Area (km ²)	Footprint area overlap (%)									
		HAK	HOK	JMA	LIN	OEO	ORH	SBW	SCI	SQU	Tier 1
A	30 661.0	<0.01	0.01	–	<0.01	–	–	–	–	–	0.01
B	12 786.1	0.06	0.03	–	0.40	–	–	–	–	–	0.47
C	90 256.5	0.01	0.06	2.37	0.04	–	–	–	–	–	2.46
D	28 085.7	–	0.03	0.03	0.01	–	0.01	–	–	0.08	0.16
E	61 258.0	–	0.12	0.51	0.03	–	–	–	–	3.26	3.88
F	38 775.8	–	0.01	<0.01	<0.01	–	–	0.01	–	0.68	0.71
G	6 702.3	0.19	1.12	–	1.39	–	0.01	–	–	–	2.68
H	138 399.1	0.03	2.71	0.25	0.30	–	<0.01	–	2.04	0.48	5.67
I	52 008.3	0.17	18.26	0.01	0.30	<0.01	0.01	0.03	0.01	0.74	19.27
J	312 604.9	0.19	1.61	<0.01	0.13	0.06	1.55	–	0.08	<0.01	3.53
K	1 200.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
L	198 578.4	–	0.75	–	0.20	–	–	0.26	0.77	0.39	2.30
M	233 837.4	–	0.21	–	–	0.04	<0.01	–	–	–	0.25
N	495 154.2	–	<0.01	–	–	<0.01	0.11	–	–	–	0.12
O	1 006 911.1	–	<0.01	–	–	<0.01	<0.01	–	–	–	<0.01
All	2 707 219.0	0.03	0.76	0.10	0.06	0.01	0.20	0.02	0.17	0.15	1.47

Table 93. The total seafloor area in each depth zone within 'fishable' depth zones ≤ 1600 m, and the percentage of each depth zone contacted by the 1990–2021 Tier 1 footprint. Source: MacGibbon & Mules, 2023.

Depth zone (m)	Area (km ²)	Footprint area overlap (%)									
		HAK	HOK	JMA	LIN	OEO	ORH	SBW	SCI	SQU	Tier
< 200	249 341.90	0.1	5.3	15.8	1.2	0.0	0.1	0.0	0.7	9.9	27.4
200–400	98 295.90	1.2	18.6	6.1	7.0	0.1	0.2	3.7	9.5	8.0	36.7
400–600	253 939.20	5.1	28.0	0.4	4.8	0.1	0.2	7.6	3.6	2.1	40.1
600–800	185 161.60	3.0	28.6	0.2	3.3	0.7	0.9	0.2	0.2	1.7	31.3
800–1000	166 645.00	0.6	5.3	0.0	0.2	5.2	12.2	0.0	0.1	0.3	21.4
1000–1200	144 930.50	0.0	1.3	0.0	0.0	3.5	9.6	0.0	0.1	0.2	13.3
1200–1400	168 376.80	0.0	0.3	0.0	0.0	0.9	3.2	0.0	0.0	0.1	4.1
1400–1600	124 988.80	0.0	0.3	0.0	0.0	0.3	1.5	0.0	0.1	0.1	2.0
≤ 1600	1 391 679.70	1.5	12.0	3.4	2.1	1.3	3.2	1.7	1.5	3.0	23.6

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Table 94. The total area of the seafloor in each depth zone within 'fishable' waters, all depth zones ≤ 1600 m combined, and the percentage of each depth zone covered by the 2021 trawl footprint for each Tier 1 target species and for the Tier 1 targets combined. – indicates no overlap. Source: MacGibbon & Mules, 2023.

Depth zone (m)	Area (km ²)	Footprint area overlap (%)									
		HAK	HOK	JMA	LIN	OEO	ORH	SBW	SCI	SQU	Tier 1
< 200	249 341.90	0.01	0.06	1.10	0.05	–	0.00	–	0.01	1.09	2.30
200–400	98 295.90	0.04	0.73	0.06	0.32	–	0.00	0.01	2.73	1.07	4.81
400–600	253 939.20	0.13	5.66	0.00	0.37	–	0.00	0.21	0.75	0.12	7.07
600–800	185 161.60	0.18	2.65	0.00	0.12	0.00	0.06	–	0.00	0.00	2.94
800–1000	166 645.00	0.01	0.20	–	0.00	0.09	1.91	–	0.00	0.00	2.22
1000–1200	144 930.50	0.00	0.00	–	–	0.08	1.13	–	–	–	1.21
1200–1400	168 376.80	–	0.00	–	–	0.01	0.23	–	–	–	0.24
1400–1600	124 988.80	–	0.00	–	–	0.00	0.07	–	–	–	0.08
≤ 1600	1 391 679.70	0.05	1.47	0.20	0.12	0.02	0.39	0.04	0.33	0.29	2.86

Table 95. The total area of each 'preferred habitat' (probability of capture) and the percentage of each species 'preferred habitat' (probability of capture) area (for HAK, HOK, LIN and SBW) covered by the 1990–2021 and 2021 bottom-contact trawl footprint for the Tier 1 deepwater target species that form part of the UoAs. – indicates no data. Source: adapted from MacGibbon & Mules, 2023 to only show species in the UoAs.

Probability occurrence (%)	HAK area (km ²)	HAK		HOK area (km ²)	HOK	
		footprint overlap (%)			footprint overlap (%)	
		1990–2021	2021		1990–2021	2021
0	157 798.9	157 798.90	0.15	59 927.6	0.27	<0.01
0.1–1.0	143 613.4	143 613.40	0.16	191 141.7	0.55	<0.01
1.1–5.0	372 123.2	372 123.20	0.13	232 065.7	1.23	0.01
5.1–10.0	157 588.0	157 588.00	0.23	94 978.0	3.25	0.02
10.1–0.0	136 822.9	136 822.90	0.40	107 078.6	3.71	0.03
20.1–30.0	89 636.3	89 636.30	0.57	47 646.2	5.77	0.07
30.1–40.0	71 790.2	71 790.20	1.10	38 300.4	6.60	0.14
40.1–50.0	64 748.6	64 748.60	2.50	31 571.6	8.43	0.23
50.1–60.0	60 031.3	60 031.30	3.88	27 614.6	10.20	0.31
60.1–70.0	55 069.8	55 069.80	5.84	31 773.8	8.59	0.43
70.1–80.0	53 189.8	53 189.80	11.53	35 949.5	10.54	0.57
80.1–90.0	26 263.0	26 263.00	16.67	58 122.5	11.16	0.92
90.1–95.0	2 801.7	2 801.70	10.04	118 974.0	17.30	1.75
95.1–99.0	202.6	202.60	2.05	316 535.4	35.30	5.44
0.0–99.0	1 391 679.7	1.52	0.05	1 391 679.7	12.01	1.47

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Probability occurrence (%)	LIN area (km ²)	LIN footprint overlap (%)		Preferred habitat (%)	SBW Area (km ²)	SBW Footprint overlap (%)	
		1990–2021	2021			1990–2021	2021
0	16 384.1	0.02	-	0	931 718.1	0.01	-
0.1–1.0	421 963.7	0.03	-	0.1–1.0	122 249.7	0.08	-
1.1–5.0	123 925.6	0.09	<0.01	1.1–5.0	140 341.1	0.27	-
5.1–10.0	70 480.9	0.27	<0.01	5.1–10.0	23 088.7	1.52	-
10.1–20.0	106 096.8	0.70	0.02	10.1–20.0	18 499.5	2.71	<0.01
20.1–30.0	70 823.3	2.18	0.07	20.1–30.0	13 156.5	3.28	<0.01
30.1–40.0	43 367.4	3.67	0.15	30.1–40.0	11 096.7	3.44	0.01
40.1–50.0	33 728.4	4.66	0.27	40.1–50.0	9 764.8	3.63	<0.01
50.1–60.0	36 340.8	3.95	0.28	50.1–60.0	8 856.4	6.14	0.01
60.1–70.0	31 498.5	4.65	0.34	60.1–70.0	8 626.1	8.74	0.03
70.1–80.0	42 477.3	4.10	0.22	70.1–80.0	11 355.4	12.02	0.07
80.1–90.0	96 312.2	4.54	0.22	80.1–90.0	21 664.4	17.54	0.74
90.1–95.0	129 835.6	6.41	0.35	90.1–95.0	20 464.7	26.49	0.91
95.1–99.0	168 444.9	5.46	0.36	95.1–99.0	50 797.8	17.67	0.37
0.0–99.0	1 391 679.7	2.33	0.13	0.0–99.0	1 391 679.7	1.69	0.04

Broad scale habitat maps indicate that sand, mud and gravel are the primary habitat types in the fishery. Surficial sediment (>40% classes) in the main fishery areas in depth zone 200–800m with sand and carbonate being the dominant sediments across the fishery areas (Table 96).

Table 96. Percentage overlap of the seafloor area of the substrate classes by the fishable area 1990–2021 and 2021 for all Tier 1 stocks. For gravel, mud, and sand, the percentage classes total 100% of the fishable area, while for carbonate the percentage represents the proportion that is carbonate versus noncarbonate. Source: (MacGibbon & Mules, 2023).

Substrate	Class (%)	Class area within fishable area (km ²)	1990–2021 overlap (%)	2021 overlap (%)
Carbonate	0–20	138 252.7	63.5	14.9
Carbonate	20–40	282 469.8	48.4	9.0
Carbonate	40–60	275 070.0	33.6	4.3
Carbonate	60–80	288 732.7	22.8	3.0
Carbonate	80–100	369 402.8	21.2	2.2
Gravel	0–20	1 037 250.7	35.0	5.9
Gravel	20–40	188 550.0	37.4	5.7
Gravel	40–60	77 886.4	25.8	2.6
Gravel	60–80	26 682.0	22.1	0.7
Gravel	80–100	14 188.5	11.0	2.9
Mud	0–20	387 549.1	38.8	6.1
Mud	20–40	323 852.0	34.8	5.2
Mud	40–60	299 719.3	34.8	6.3
Mud	60–80	233 123.9	27.9	4.7
Mud	80–100	109 712.9	26.3	3.9
Sand	0–20	142 639.8	28.9	4.5
Sand	20–40	348 482.0	26.5	4.3
Sand	40–60	482 383.1	34.6	5.4
Sand	60–80	303 832.8	40.3	6.3
Sand	80–100	77 166.5	49.3	10.5

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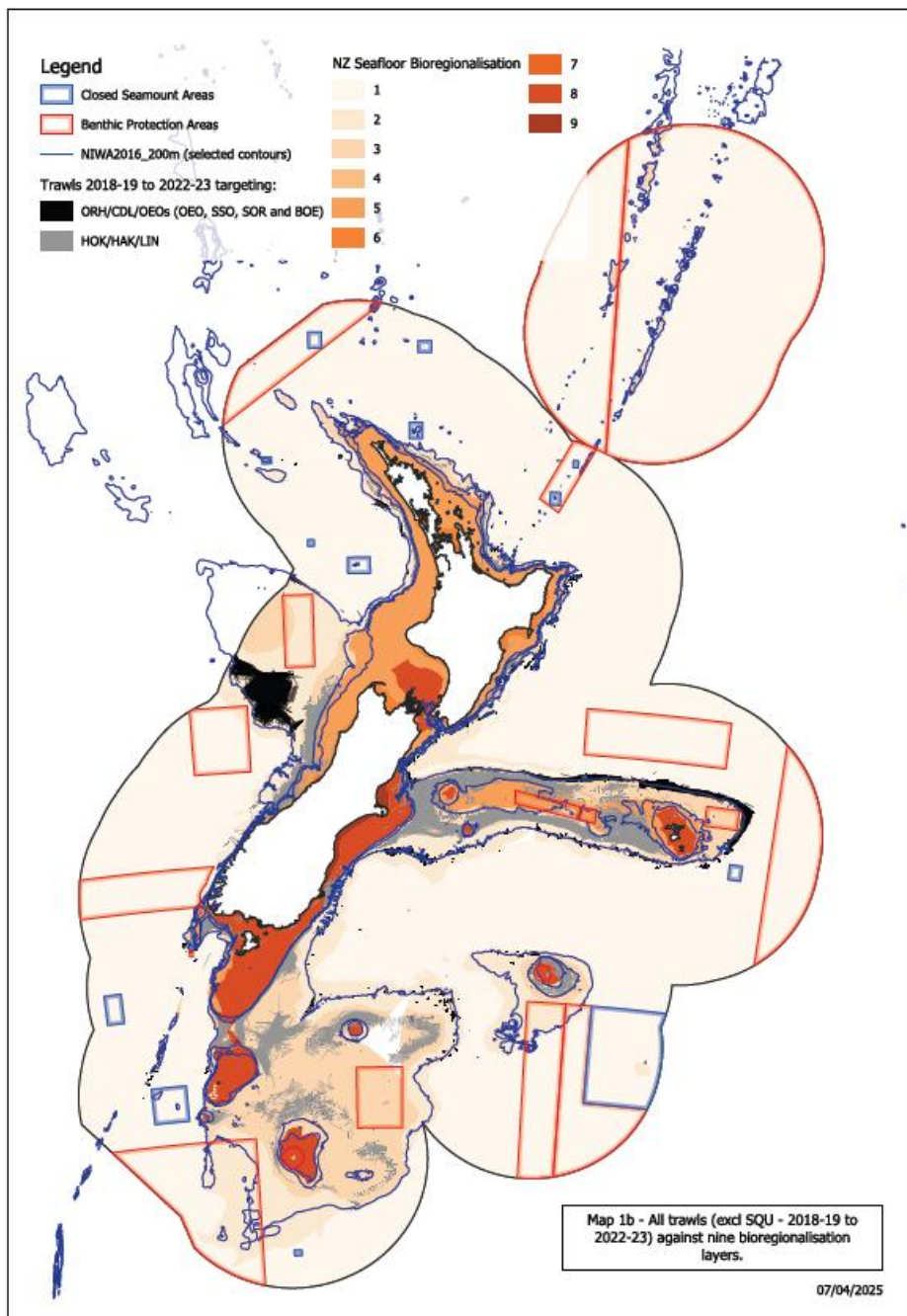


Figure 38. All trawls (excluding squid), for the period 2018/19-2022/23, plotted against the 9-class New Zealand Seafloor Bioregionalisation (Stephenson et al 2023).

Extent of new areas contacted

A measure of change across all years is the number of cells contacted in a year (for example 2021) that were not contacted in previous years (1990–2020); these cells are referred to as ‘new cells’ (MacGibbon and Mules, 2023). For the most recent year, 2021, 42 new cells were contacted, the lowest number in the time series. The estimated trawl footprint and aggregate area within those new cells provides an indication of the extent of area newly contacted and the intensity of contact in those newly contacted areas. In most years given in Table 97, there is little difference between the aggregate area and the footprint, and the areas are small and likely represent the edge of the main fishing areas.

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There has been a gradual decline in the number of new cells contacted over time for hoki, hake and ling target stocks but a small increase for southern blue whiting (Table 97). Furthermore there has been an overall decrease in the total number of bottom-contacting tows by year for the Deepwater Tier 1 species (Figure 39).

Table 97. For deepwater Tier 1 targets, the number of 25-km² cells contacted during 1990–1994 and the number of ‘new’ cells contacted for the first time in subsequent years and the aggregate area (km²) and footprint (km²) estimated for those new cells, where data for 1995 represent cells contacted in 1995 but not in 1990–1994, and data for 1996 represent cells contacted in 1996 but not in 1990–1995, etc.

Fishing year	HAK			HOK			LIN		
	New cells	Aggregate	Footprint	New cells	Aggregate	Footprint	New cells	Aggregate	Footprint
1990–1994	No. cells = 1 728			No. cells = 11 691			No. cells = 2 809		
1995	207	147.5	144.6	1 069	925.3	858.6	125	65.0	64.0
1996	165	134.7	128.9	1 045	1 160.0	891.8	67	40.2	39.0
1997	83	79.2	75.6	879	653.5	625.0	219	151.9	149.9
1998	235	148.6	146.8	1 124	1 338.1	1 072.5	217	258.8	247.6
1999	268	239.5	228.6	574	422.8	413.7	78	42.6	42.3
2000	130	168.9	151.9	1 137	1 690.4	1 543.7	347	490.4	440.6
2001	149	105.3	103.2	850	810.0	787.4	258	265.3	256.5
2002	239	360.7	321.0	863	757.2	742.5	225	201.5	195.4
2003	206	149.9	148.7	667	754.6	687.7	177	130.5	128.1
2004	139	190.2	169.4	259	273.7	255.8	98	111.5	105.4
2005	114	130.8	122.2	106	72.1	71.0	105	105.8	96.8
2006	106	82.6	82.0	49	21.7	21.7	193	205.7	193.2
2007	95	61.4	60.5	53	33.9	33.6	220	130.8	130.1
2008	75	61.7	61.3	44	20.9	20.9	460	458.3	421.5
2009	165	150.6	140.3	47	31.7	31.7	181	86.6	84.5
2010	12	7.3	7.2	72	28.8	28.5	242	124.3	122.0
2011	61	40.1	39.2	86	50.4	50.3	137	51.1	50.1
2012	49	20.3	20.3	90	39.9	39.9	75	23.9	23.9
2013	49	35.2	32.1	47	26.8	26.8	69	29.4	29.4
2014	21	7.2	7.2	66	31.8	31.8	61	40.5	37.0
2015	28	12.7	12.7	55	27.8	27.8	53	26.1	25.8
2016	22	9.4	9.4	52	27.5	27.5	85	47.4	42.7
2017	13	5.4	5.4	22	13.3	13.3	44	14.0	14.0
2018	13	2.6	2.6	35	12.3	12.3	78	52.1	50.7
2019	4	2.3	2.3	54	23.5	22.2	40	20.0	20.0
2020	22	7.3	7.3	14	6.1	6.1	69	38.8	38.8
2021	28	6.5	6.5	9	2.9	2.9	52	28.2	28.2

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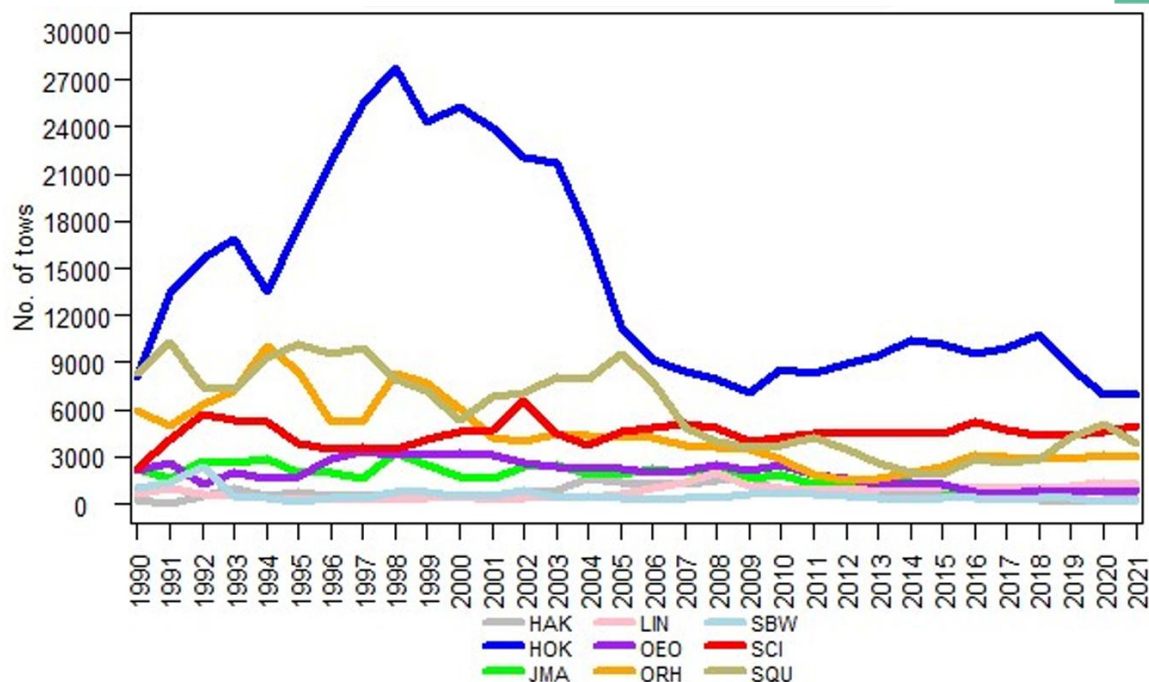


Figure 39. The number of bottom-contacting tows by year for the Deepwater Tier 1 species (MacGibbon and Mules, 2023).

Sensitive habitats

Underwater Topographic Features (UTFs)

Clarke et al 2022 assessed the extent to which feature-based fisheries have trawled on or near underwater topographic features (UTFs, Figure 40) in the New Zealand Exclusive Economic Zone (EEZ). They first updated the SEAMOUNT database (initially developed by Clarke et al 1999) to a final composition of 2964 UTFs, distributed within the Territorial Sea (89), Exclusive Economic Zone (EEZ) (1907), and outside the EEZ (968) - Figure 41. Comprising 414 seamounts (≥ 1000 m elevation), 1495 knolls (250–999 m), and 1055 hills (100–249 m). 42 descriptor fields are supplied for each UTF, comprising, *inter alia*, a unique database 'identification (id) number'; a 'registration number' (a sequential numbering system based on the NIWA dataset); the location relative to the EEZ (either inside the EEZ, inside an EEZ enclave, in the Territorial Sea (12 nautical mile zone) or outside the EEZ); the Fishery Management Area within which the UTF is located; the UTF name; data source; and the protection status of the UTF (if inside a Seamount Closure Area (SCA), a Benthic Protection Area (BPA), or a Marine Protected Area (MPA)—the latter refers to gazetted marine reserves, classified as Type 1 MPAs).

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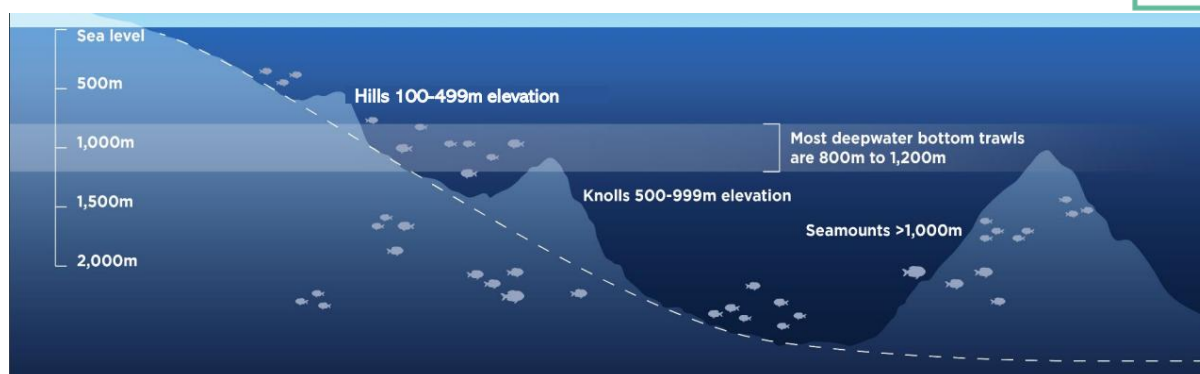


Figure 40. Illustrative classification of Underwater Topographic Features (UTFs) within and outside the New Zealand Territorial Seas and Exclusive Economic Zone (image from Deepwater Council Annual Report 2022-23²).

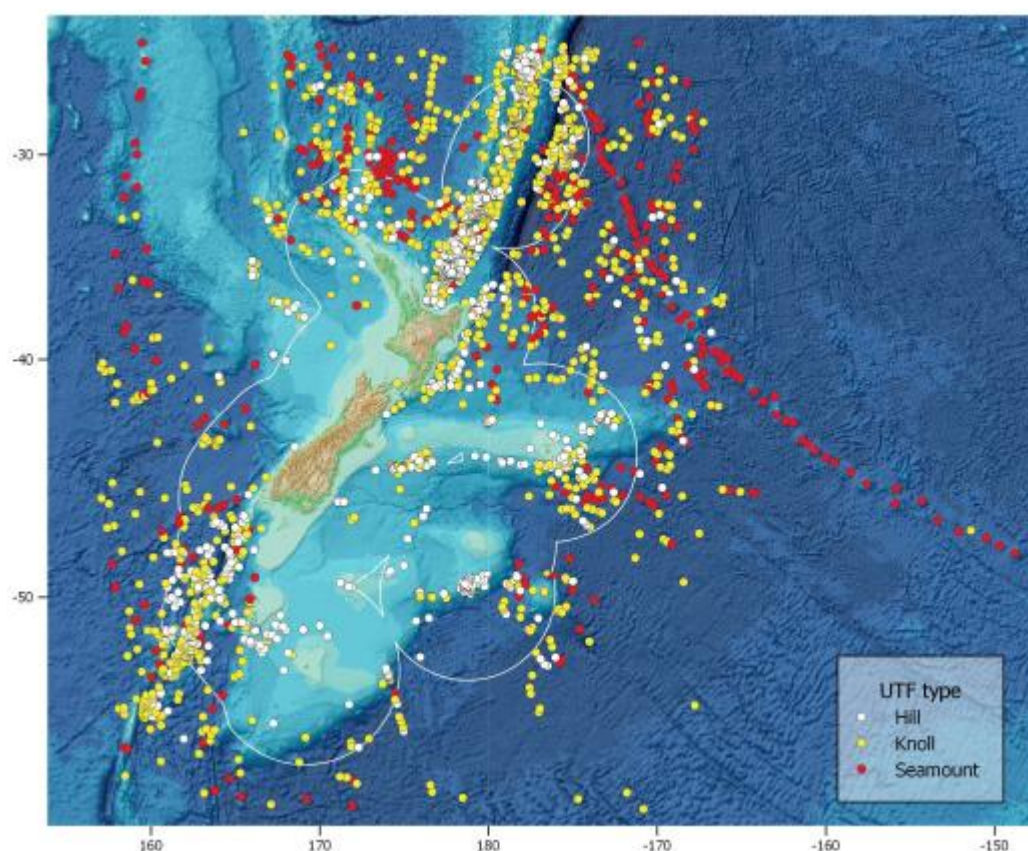


Figure 41. Distribution of Underwater Topographic Features (UTFs) in the New Zealand region. Clarke et al 2022.

A total of 916 UTFs are currently protected from bottom trawling as they are within either a BPA or a SCA (Figure 42). Clarke et al 2022 found a total of 229 UTFs had overlapping bottom trawl footprints within the EEZ (and TS). By UTF type these were: – Seamount: 21 – Knoll: 128 – Hill: 80. The assessment team has taken the approach to categorise UTFs as ‘more sensitive’ habitats (per MSC V3.1) and as Vulnerable Marine Ecosystems (VMEs, per MSC 2.01). The occurrence of UTFs extends both within the managed area (NZ TS and EEZ) and outside of it. Table 98 shows the total

² <https://deepwatergroup.org/wp-content/uploads/2024/02/Annual-Report-2022-23.pdf>

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number of UTFs by type, area and depth, the number that have never been trawled, numbers that have been trawled between 1989/90 and 2019/20) and the proportion of trawled and untrawled UTFs by area and depth.

Table 98. Summary of trawled and untrawled underwater topographic features (UTFs) by type, area and depth within and outside the New Zealand EEZ and TS as well as the proportion the total UTF habitat type range fished within and outside the “managed area” and proportion fished within the managed area within the ‘fishable area’ (<1600m). Total number and number of trawled and untrawled features from Clarke et al 2022.

	Total number inside and outside managed area	Total number within managed area - TS and EEZ	Total number within managed area - TS and EEZ < 1600m summit depth	Never fished inside and outside managed area	Never fished within managed area	Fished within managed area	Proportion of total habitat range fished	Proportion of total within the managed area fished	Proportion of total within the managed area < 1600m summit depth fished
All UTFs	2964	1 996	613	2735	1767	229	7.7%	11.5%	37.4%
UTFs 100-250m (hills)	1055	894	270	975	814	80	7.6%	8.9%	29.6%
UTFs 250-1000m (knolls)	1495	956	291	1367	828	128	8.6%	13.4%	44.0%
UTFs > 1000m (seamounts)	414	146	52	393	125	21	5.1%	14.4%	40.4%

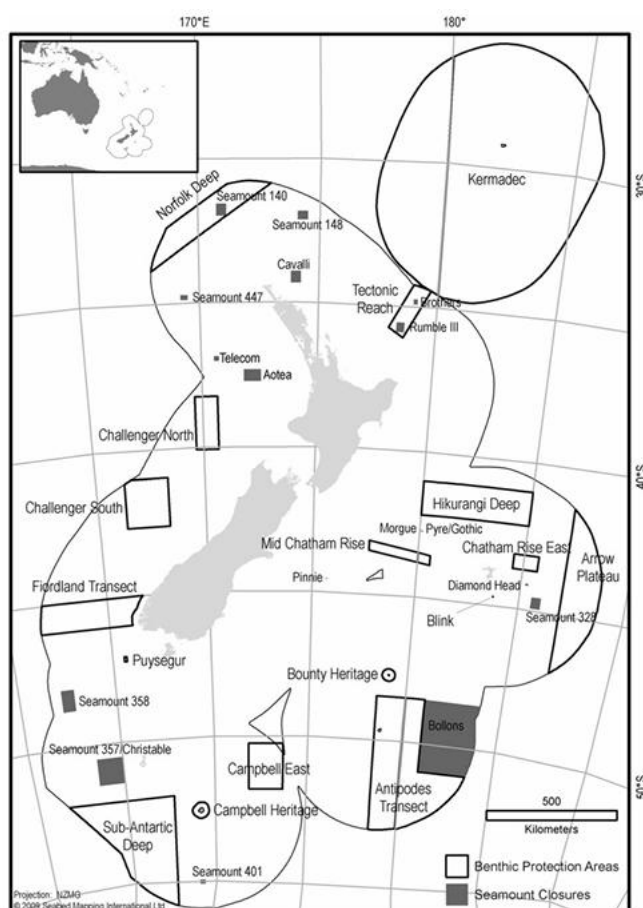


Figure 42. Location of benthic protection areas (BPAs) and seamount closures in New Zealand's EEZ. Helson et al 2010.

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Corals, bryozoans, sponges and anemones

Recognising that benthic habitat forming invertebrates will also occur outside of UTFs in areas of availability of hard substrata, habitat suitability models have been developed to produce predicted habitat distributions for sessile benthic taxa in the New Zealand EEZ (e.g. Anderson et al., 2014, 2015, 2019; Bowden et al., 2019, 2019a; Georgian et al., 2019).

The resolution of both the input data and the predicted outputs from the recent modelling are at a reasonably fine scale of 1 x 1 km cells and the predicted abundances of benthic taxa are presented as the number of individuals per 1000 m². The relative confidence in the predictions is assessed using a bootstrapping technique, at the scale of individual cells, to produce spatially explicit uncertainty measures. Model uncertainties are calculated as the coefficient of variation (CV) of the bootstrap output (Bowden et al., 2021).

As a basis for estimating the impact of the hoki/hake/ling fisheries on sensitive benthic habitats, the recent trawl footprint for the period 2018-19 to 2022-23 fishing years was plotted against predicted distributions for protected corals, bryozoans, sponges and anemones at the >50th percentile level (SNZ, 2024). The analyses indicate that the overlap of the hoki/hake/ling trawl fisheries on sessile benthic invertebrate habitats is very slight (Figure 43; Figure 44; Figure 45; Figure 46; Table 99).

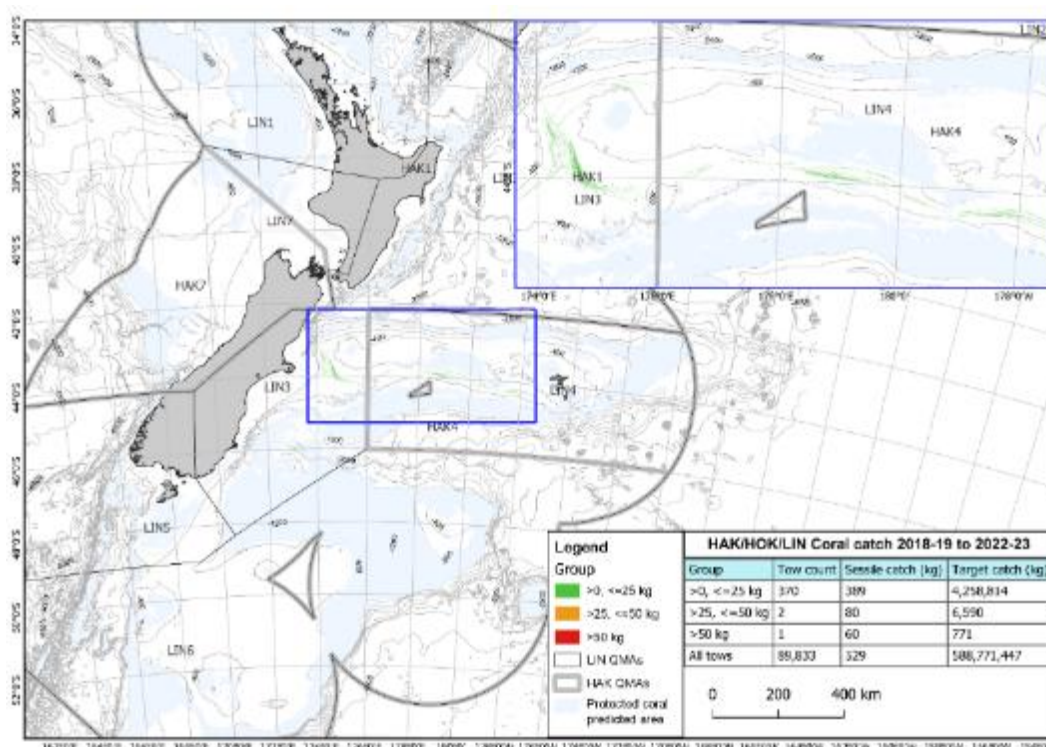


Figure 43: Plotted HOK/HAK/LIN trawl tracks for tows with incidental captures of ETP corals (by catch category) for the period 2018-19 to 2022-23, and predicted coral habitat distribution areas (light blue shading).

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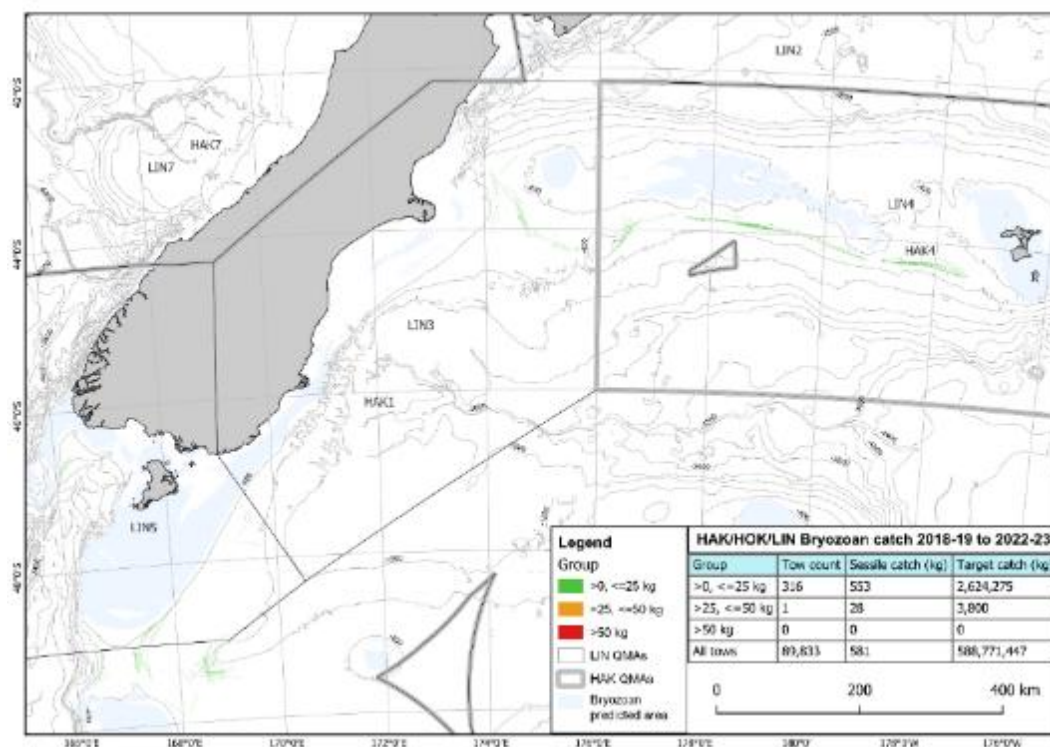


Figure 44: Plotted HOK/HAK/LIN trawl tracks for tows with incidental captures of bryozoans (by catch category) for the period 2018-19 to 2022-23, and predicted bryozoan habitat distribution areas (light blue shading).

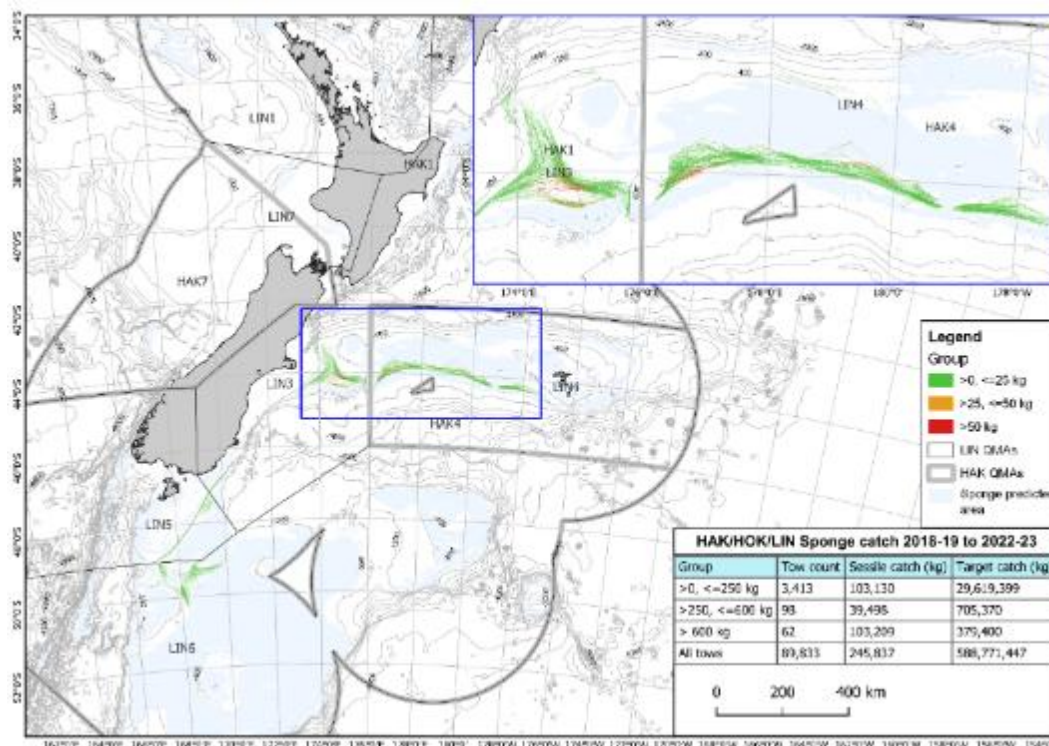


Figure 45: Plotted HOK/HAK/LIN trawl tracks for tows with incidental captures of sponges (by catch category) for the period 2018-19 to 2022-23, and predicted sponge habitat distribution areas (light blue shading).

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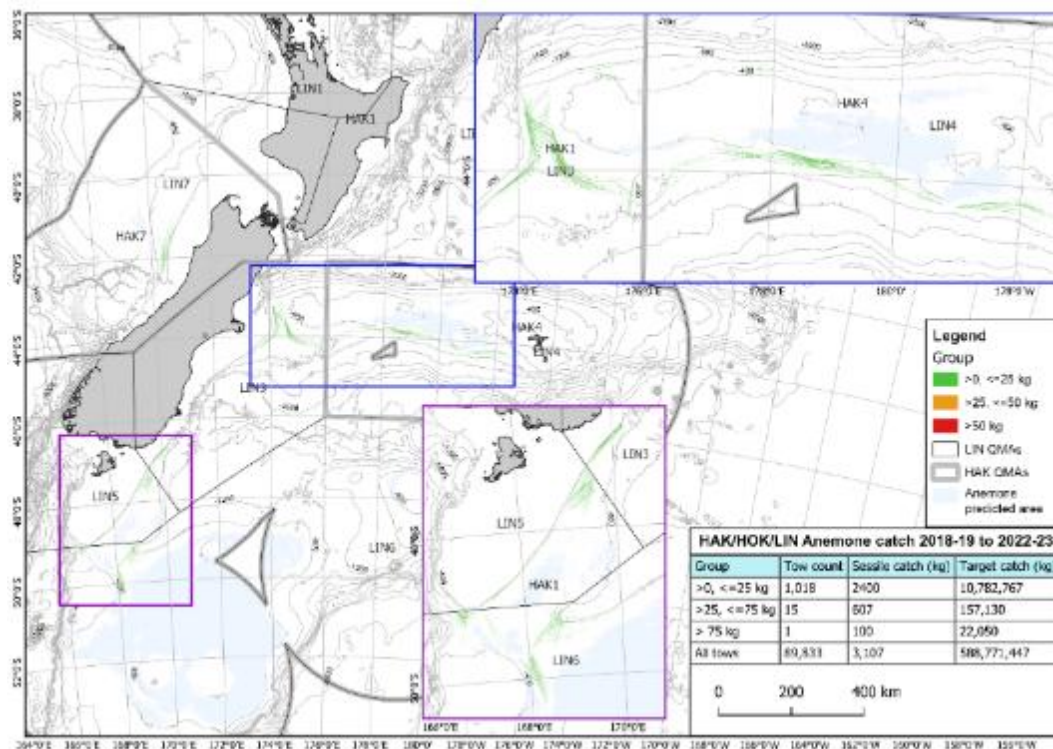


Figure 46: Plotted HOK/HAK/LIN trawl tracks for tows with incidental captures of anemones (by catch category) for the period 2018-19 to 2022-23, and predicted anemone habitat distribution areas (light blue shading).

Table 99: Hoki/hake/ling trawl footprint overlap with predicted distributions of benthic habitat-forming taxa. Data source: FNZ. Analysis: L. Easterbrook-Clark, GNS Science in SNZ, 2024).

Taxa	Parameters	Metrics
ETP Corals	Predicted distribution (km ²) within UoAs	961,512.63
	Trawl footprint in predicted area (km ²)	826.04
	Percentage of predicted area towed	0.09%
Bryozoans	Predicted distribution (km ²) within UoAs	139,796.13
	Trawl footprint in predicted area (km ²)	923.34
	Percentage of predicted area towed	0.66%
Sponges	Predicted distribution (km ²) within UoAs	631,368.81
	Trawl footprint in predicted area (km ²)	4,221.86
	Percentage of predicted area towed	0.67%
Anemones	Predicted distribution (km ²) within UoAs	183,677.13
	Trawl footprint in predicted area (km ²)	2,047.60
	Percentage of predicted area towed	1.11%

Protected corals are rarely encountered by hoki, hake and ling trawlers, which operate primarily over sandy, muddy and gravely seabed. The observed coral bycatch by these fisheries averaged ~73 kg/year over the 5-year period 2018-19 to 2022-23 (Table 100). The estimated coral catch, raised in proportion to the average observed rate (i.e. ~ 44% of

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tows), amounts to around 166 Kg per annum. In contrast, the incidental capture of ETP corals reported by vessels on Non-Fish Protected Species catch forms, averaged 85 kg per annum, suggestive of a less vigorous reporting regime by vessels (Table 101).

Table 100: Observed incidental capture of ETP corals (kg) by hoki, hake and ling target tows, 2018-19 to 2022-23. Percentages calculated against total observed fish and invertebrate catch (Source: SNZ, 2024).

Species	Species Code	2018/19	2019/20	2020/21	2021/22	2022/23	5-Year Avg. (kg)	5-Year Avg. (%)
Flabellum cup corals	COF	25.8	23.3	38.8	28.8	18.9	27.1	0.00005%
Crested cup coral	DDI	10.1					10.1	0.00002%
Stony corals	SIA				20.0	0.2	10.1	0.00002%
Coral (Unidentified)	COU	4.3	2.0	10.6	2.5	3.4	4.6	0.00001%
Bushy hard coral	GDU	6.2		0.2	3.0		3.1	0.00001%
Metallic coral	MTL				2.9		2.9	0.00001%
Feathery hydroids	HDF	1.0	1.0		1.9	4.2	2.0	0.00000%
Black corals	COB				1.7		1.7	0.00000%
Hydroids	HDR	0.1		1.0	4.0		1.7	0.00000%
Bottlebrush coral	THO			0.2	3.0		1.6	0.00000%
Stony branching corals	CBR		0.8		-	4.0	1.6	0.00000%
Coral rubble	CBB	2.0			1.0		1.5	0.00000%
Soft coral	SOC		1.0		1.1		1.1	0.00000%
Hydrocorals	COR			1.0			1.0	0.00000%
Long polyp soft corals	TLO		1.0				1.0	0.00000%
Golden corals	CHR	1.0			0.4	1.0	0.8	0.00000%
Gorgonian coral	GOC	0.1		0.6	0.1	1.0	0.5	0.00000%
Stony cup corals	CUP			0.6	0.1		0.4	0.00000%
Deepwater branching coral	ERO				0.3		0.3	0.00000%
Solitary bowl coral	STP					0.2	0.2	0.00000%
Bamboo coral	BOO					0.1	0.1	0.00000%
Totals		50.6	29.1	53.0	70.8	33.0	73.3	0.00013%

Table 101: Vessel-reported incidental catches of ETP corals (generic reporting code COU) by hoki, hake and ling UoA trawl fisheries (data source: FNZ Non-Fish Protected Species catch forms, in SNZ 2024).

Species Group	Reporting Code	2018-19	2019-20	2020-21	2021-22	2022-23	5-Year Avg. (kg)	5-Year Avg. (%)
Corals	COU	16	3	69	128	210	85	0.00007%

The most commonly captured non-protected sessile benthic species group is sponges, which are encountered mainly on the western Chatham Rise. Deepsea anemones and sea pens are occasionally encountered in small quantities. Observer-reported and vessel-reported catches are provided in Table 102 and Table 103 respectively.

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Table 102: Observed incidental capture of non-ETP sessile benthic invertebrates (kg) by hoki, hake and ling target tows, 2018-19 to 2022-23. Percentages calculated against total observed catch of all fish and invertebrate species (data source: FNZ COD database from SNZ, 2024).

Common name	Species Code	2018/19	2019/20	2020/21	2021/22	2022/23	5-Year Avg. (kg)	5-Year Avg. (%)
Floppy tubular sponge	HYA	4,377	18,825	3,137	4,978	4,429	7,149	0.01239%
Sponges	ONG	8,504	5,410	6,219	5,510	6,270	6,383	0.01106%
Fibrous massive sponge	PHB	3,108	3,205	19,753	1,775	1,775	5,923	0.01027%
Glass sponges	GLS	2,600		900		22	1,174	0.00204%
Warty deepsea anemones	HMT	411	378	517	356	404	413	0.00072%
Anemones	ANT	90	280	344	74	887	335	0.00058%
Smooth deepsea anemones	ACS	524	156	276	200	333	298	0.00052%
Purple sea pen	PNN	22	49	40	77	6	39	0.00007%
Airy finger sponge	CRM	86	34	14	48	4	37	0.00006%
Common anemone	ACB	50	3				27	0.00005%
Sponge	RAS				25		25	0.00004%
Sea pens	PTU	1		14	61	19	24	0.00004%
Sea pen	SPN	2	11	32	10		14	0.00002%
Rocky dumpling sponge	PAZ		13	3	33	3	13	0.00002%
Orange frond sponge	CIC	17		1			9	0.00002%
Fleshy club sponge	SUA	28	0	6	3	3	8	0.00001%
Demosponges	DSO				7		7	0.00001%
Sea anemones	ATR			8		5	7	0.00001%
Sponge	LAA				5		5	0.00001%
Curling stone sponge	GRE	1	11	2	3	2	4	0.00001%
Bryozoan	COZ				3		3	0.00001%
Siboga sea pen	GYS	5		2	3		3	0.00001%
Deepsea anemones	LIP	3					3	0.00001%
Deepsea anemones	BOC	4	1	1	5	1	2	0.00000%
Pink ice egg sponge	RHA	1	3		1	2	2	0.00000%
Rubber sponge	PHW				2		2	0.00000%
Coral-like anemones	CLM	1	1	1	2	4	2	0.00000%
Sea lily, Stalked crinoid	CRN					1	1	0.00000%
Fibreglass cup sponge	PLN		1				1	0.00000%
Bristle ball sponge	TTL					1	1	0.00000%
Knobbly sandpaper sponge	ANZ	1					1	0.00000%
Ostrich egg sponge	GVE				0		0	0.00000%
Smooth white cup sponge	CFU			0			0	0.00000%
Corals, Sponges, Bryozoans	CSB				0		0	0.00000%
Yoyo sponge	THN	0					0	0.00000%
Furry oval sponge	TLD			0			0	0.00000%
Totals		19,834	28,381	31,268	13,180	14,171	21,913	0.03799%

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Incidental catches of non-protected anemones, bryozoans and sponges are reported by vessels on Non-Fish Protected Species (NFPS) forms, along with catches of protected seabirds and marine mammals (Table 103). Note: code CSB is sometimes used when mixed catches of unidentified sessile benthics occur.

Table 103: Vessel-reported incidental catches of non-protected sessile benthic species by hoki, hake and ling UoA trawl fisheries. (data source: FNZ Non-Fish Protected Species catch forms and ER reports, in SNZ, 2024).

Species Group	Reporting Code	2018-19	2019-20	2020-21	2021-22	2022-23	5-Year Avg. (kg)	5-Year Avg. (%)
Anemones	ANT	10	-	-	81	105	65	0.00005%
Bryozoans	COZ	-	-	-	236	390	125	0.00010%
Coral/Sponge/Bryozoan	CSB	-	-	-	-	4	1	0.00000%
Sponges	ONG	69,209	51,649	38,380	26,904	45,526	46,333	0.03557%

Benthic status

Rowden et al 2024 recently characterized mobile bottom fishing gear configurations and assessed the spatial and temporal extent of bottom contact by those various configurations.

Measures of Relative Benthic Status (RBS) for benthic taxa considered to be indicators for vulnerable marine ecosystems (VMEs) were generated. RBS is a quantitative method for assessing risk to benthic habitats by mobile bottom fishing methods. RBS estimates the long term relative abundance of biota as a fraction of its unimpacted level or carrying capacity.

The RBS method used depletion/recovery rates for a range of VME indicator taxa including stony corals, sponges, sea pens, lace corals, black coral and soft corals. They did not however include any information on the actual distribution of the VME indicator taxa when assessing the RBS, rather inferring the potential for impact or the naturalness of the particular functional group/VME indicator taxon within the trawl swept area/footprint.

The approach by Rowden et al 2024 took into account the relative widths of 24 separate gear categories (incorporated directly into Swept Area Ratio (SAR) calculations), but it was not possible to account for the varying impacts on the benthos from the range of ground gear types in use (i.e., rubber disks, rockhopper, bobbins, chain, wire/chain) in the calculation of the SAR. RBS was not calculated separately for each gear category, using gear category specific SARs.

The outputs of the RBS calculations are expressed on a scale of 0–1, where a value of 1 represents the untrawled status and a value of 0 represents fully depleted status. Differences in RBS among the taxa represented by the seven unique sets of d and R values are subtle, but a general graduation can be seen in overall status from most depleted (stony corals, with the highest d and lowest R values) to least depleted (Pennatulacea, with the lowest d and highest R values). The spatial patterns of status across the study area are strongly driven by fishing intensity. The areas showing the most depleted state for RBS were on the Chatham Rise, off the north and east coasts of the North Island, the west coast of the South Island, and various regions of the southern plateaus.

Ultimately Rowden et al 2024 concluded that the RBS work illustrated VME indicators at very low status in highly fished areas, but high status (approaching 80–100%) in areas in which fishing levels were below that at which recovery of benthic taxa may be severely compromised.

The RBS method accounts for future trawling as well as the potential for recovery, although estimates an equilibrium state based on assumptions about the level of future trawling that may lead to an underestimate of naturalness if future trawling intensity decreases, or vice versa.

Anderson et al 2023 set out to 1) collate and analyse cold water coral records from existing seabed towed camera transects in the New Zealand region, with a particular focus on areas known to overlap with fishing effort, 2) To identify hotspots of abundance for selected protected coral species in the New Zealand region using predictions from

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abundance-based species distribution models, and 3) To better understand the historical effects of fishing on observed patterns of coral distribution and relative abundances.

The first two objectives were presented as maps of abundance within the New Zealand region for eleven coral taxa (4 taxa proving too rare in the data for models to be produced), based on species distribution modelling using abundance values measured at 949 sample sites from image data collected by towed camera or remotely operated vehicle (ROV) systems. Protected coral taxa modelled and number of Deep Towed Imaging System (DTIS) transects with positive abundance available for use in abundance models is presented in Table 104.

Table 104. Protected coral taxa modelled, and number of DTIS transects with positive abundance available for use in abundance models. Shading used to distinguish taxonomic groupings. Source: Anderson et al 2023.

Order	Taxon	Description	Number of DTIS transects
Scleractinia	<i>Solenosmilia variabilis</i>	Reef-forming coral	108
	<i>Goniocorella dumosa</i>	Reef-forming coral	73
	<i>Enallopsammia rostrata</i>	Reef-forming coral	21
	<i>Madrepora oculata</i>	Reef-forming coral	18
	Caryophylliidae	Solitary coral	228
	<i>Stephanocyathus</i> spp.	Solitary coral	41
	<i>Flabellum</i> spp.	Solitary coral	301
Gorgonian alcyonaceans	All*	Sea-fans/sea-whips/bamboo & bubble-gum corals	405
	Keratoisididae/Mopseidae	Bamboo corals	144
	Primnoidae	Sea-fans and bottle brush corals	196
	Paragorgiidae	Bubble-gum corals	25
	<i>Radicipes</i> spp.	Sea whips	113
Antipatharia	Antipatharia (all)	Black corals	221
Anthoathecata	Stylasteridae	Hydrocorals	232
Pennatulacea	Pennatulacea	Sea-pens	415

*Includes the three other alcyonacean taxa in the list as well as any other species outside of these groups

The raster layer of overall coral abundance produced from the individual model output layers was plotted as a map with abundance in four categories: 0–10, 10–20, 20–40, and >40 individuals per 1000 m² (Figure 47).

Abundance of the protected corals modelled were predicted to be less than 10 per 1000 m² across about 32% of the modelled area (the area within the New Zealand region in depths of 50–3000 m). Abundance of 10–20 per 1000 m² was predicted for about 54% of the area, and abundance of 20–40 per 1000 m² for about a further 12% of the area. Hotspots of coral abundance, nominally defined as areas where overall abundance was predicted to be over 40 individuals per 1000 m², represented about 2% of the modelled area (the area of the seafloor between 50 m and 3000 m). These hotspots were spread widely around the region, most notably on the Norfolk Ridges, Challenger Plateau, Macquarie Ridge, Eastern Chatham Rise, and Kermadec Ridge (Anderson et al 2023).

The third objective was less informative as areas where conditions are highly suitable for the corals modelled may only weakly overlap with areas that are highly productive for commercial fish species or, perhaps more likely, a lack of a temporal spread in the coral sample data may be limiting the model's ability to detect negative effects from fishing disturbance, with DTIS surveys spanning only the period from 2007 to 2020.

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The arbitrary selection of >40 individuals per 1000 m² is difficult to align with the sensitive habitat criteria specified in Schedule 6 of the Exclusive Economic Zone and Continental Shelf Regulations (2013) (Table 106) but at this stage is taken to capture those criteria.

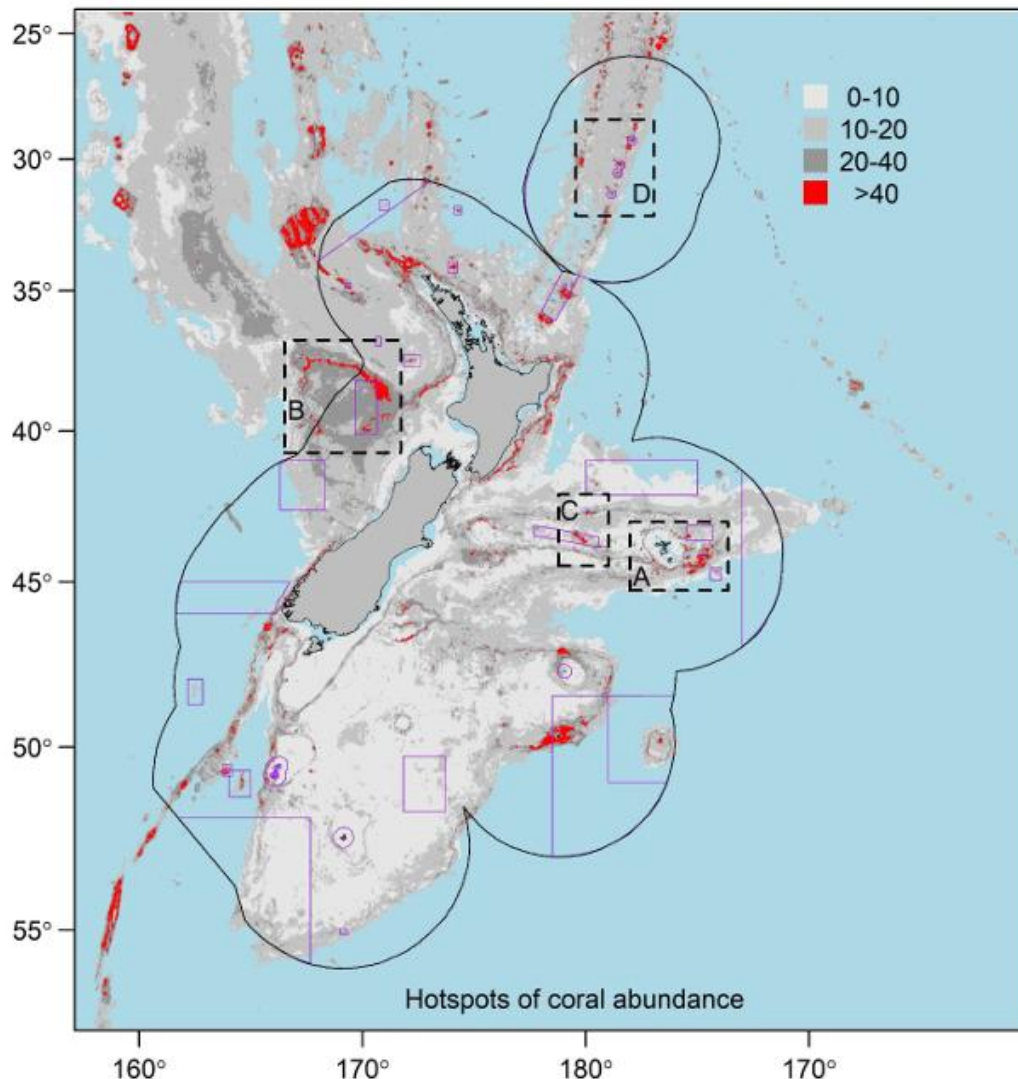


Figure 47. Hotspots of protected coral in the New Zealand region. Abundance was calculated by adding together estimates from each model, so that the plot represents the total number of individuals per 1000 m² across all modelled taxa. Areas of greatest abundance of protected corals (>40/1000 m²) are highlighted in red. Boundaries of existing Benthic Protection Areas, Marine Reserves, and closed seamounts are shown in purple. Focus boxes for Figure 3–26 in Anderson et al 2023 delineated with dashed lines. Source: Anderson et al 2023.

Clarke et al 2019 investigated the resilience and recovery dynamics of deep-sea habitats impacted by bottom trawling at the Graveyard Knolls, a group of six small seamount features off New Zealand. The six seamounts studied encompassed a range of trawl histories, including one with high and persistent levels of trawling throughout the survey period (Graveyard), two with intermittent and intermediate levels of trawling (Zombie, Diabolical), two which were low/untrawled (Gothic, Ghoul), and one, 'Morgue', which was closed to trawling in 2001, having been heavily trawled up to that point. Pre-disturbance benthic communities were dominated by thicket-forming scleractinian corals, which were used as a measure of the degree of impact and recovery, alongside abundance, species richness, and diversity of benthic communities at the study areas.

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Their study indicated that as few as 10 trawls in deep-sea environments can reduce average coral cover from 15 to 20% down to zero (no visible cover). Other observations pertinent to benthic status and recovery were that repeated trawling over time has some degree of cumulative effect through the regular 're-setting' of the community by disturbance from trawling, as evidenced by the persistently trawled seamount showing a less variable community structure over time relative to the lightly trawled and untrawled seamounts (Figure 48).

Ultimately the findings of Clarke et al 2019 promote that spatial management is likely to be the most effective strategy to conserve benthic communities of seamount ecosystems based on little indication that communities on Morgue were converging with those on low/untrawled or intermittently trawled seamounts, 15 years after being closed to trawling in 2001.

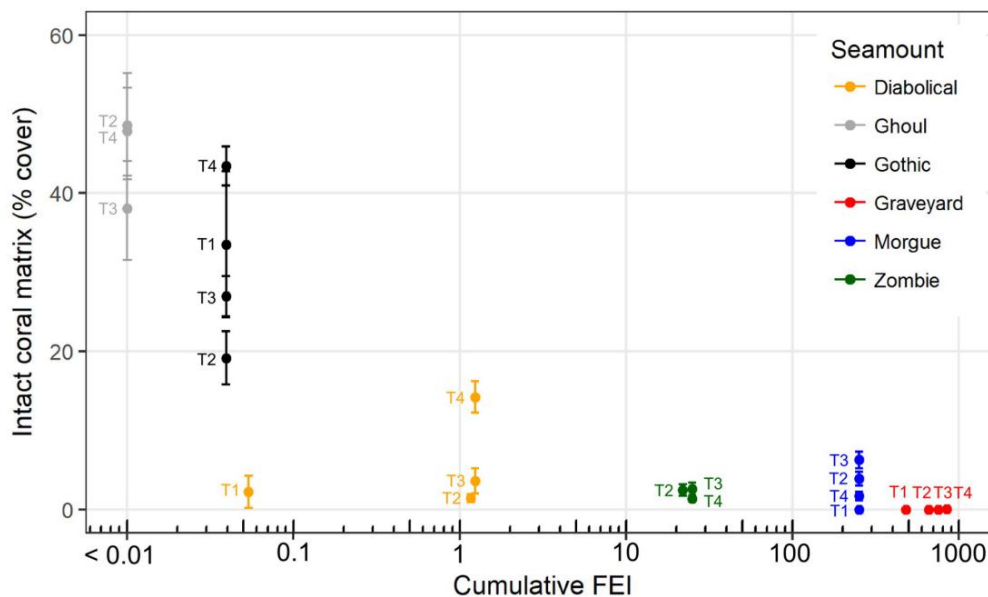


Figure 48. Intact coral matrix, as mean percent cover measured in individual seabed photographs, on six seamounts at each of four survey times (2001, 'T1'; 2006, 'T2'; 2009, 'T3' and 2015, 'T4') in relation to cumulative trawling impact (Fishing Effects Index, FEI, all years up to and including the year of each survey). Error bars show ± 1 SE. Plotted x-values are $\log_{10}(\text{FEI})$ with back-transformed axis labels, but because zero values cannot be plotted on a log scale, FEI values for Ghoul seamount (zero at all time steps) are plotted as $\log_{10}(\text{FEI} + 0.01)$. Clarke et al 2019.

Habitat Management

There are a suite of management measures in place in New Zealand deepwater fisheries to conserve benthic habitats and ecosystems.

- Key legislation
 - Wildlife Act 1953
 - Conservation Act 1987
 - Fisheries Act 1996 (Fisheries Amendment Act 2022)
 - Marine Reserves Act 1971
 - Resource Management Act 1991
 - Marine and Coastal Area (Takutai Moana) Act 2011
 - Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012
- Plans

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- National Fisheries Plan for Deepwater and Middle-depth Fisheries, 2019³
- Annual Operational Plan for Deepwater Fisheries⁴
- Medium term research plan for deepwater fisheries 2024/25-2029/30⁵
- Conservation Services Programme Annual Plan⁶
- Deepwater Trawl Benthic Operational Procedures⁷ (apply to all trawlers over 28 m)
 - Ten Commandments – Benthic⁸
- Reporting
 - Trawl Catch Effort and Processing Returns (TCEPRs), Trawl Catch and Effort
 - Returns (TCERs), Catch Effort and Landing Returns (CELRs), and Electronic Reporting (ERS).
 - Fisheries New Zealand Electronic Reporting System (ERS) Guidelines and Requirements
 - Capture of non-fish or protected fish species (NFPS) report (only for corals, sponges and bryozoans)
 - Disposal report (for any other types of benthic organisms)
 - At sea observers report catches of protected and non-protected sessile benthic invertebrates
- Research
 - The Aquatic and Biodiversity Annual Review list ongoing and completed pieces of research on key aquatic environment issues for fisheries management. Themes include six broad areas of research: protected species (PRO), non-QMS bycatch (mostly fish) (BYC/NPB), benthic effects (BEN), ecosystem issues (ECO), marine biodiversity (ZBD), and aquaculture.
 - Some key benthic effects projects include:
 - BEN2019-04 - A spatially explicit benthic impact assessment for inshore and deepwater fisheries in New Zealand
 - BEN2019-05 - Towards the development of a spatial decision support tool for managing the impacts of bottom fishing on in-zone, particularly vulnerable or sensitive habitats
 - BEN2020-01 - Extent and intensity of seabed contact by mobile bottom fishing in the New Zealand Territorial Sea and Exclusive Economic Zone
 - BEN2020-07 - Extent and intensity of trawl effort on or near underwater topographic features in New Zealand's Exclusive Economic Zone
 - BEN2021-01 - Characterisation of benthic habitats in four inshore areas and their potential as HPSFM
 - The trawl footprint of New Zealand's trawl fisheries is assessed annually to monitor their interactions with the benthic habitat (see MacGibbon and Mules 2023).
 - New proposed fisheries research projects are published annually through the MPI⁹ and previous years completed work is also published.

To date New Zealand's MPA Policy has only been applied to the 12 nm TS. The Fisheries Act 1996 has been the primary legislation for establishing marine protection in the EEZ (given the Marine Reserves Act only applies in the TS). The main protection measures established in the EEZ to date have been the 'Seamount' Closures and the Benthic

³ <https://www.mpi.govt.nz/dmsdocument/3967-National-Fisheries-Plan-for-Deepwater-and-Middle-depth-Fisheries-2019>

⁴ <https://www.mpi.govt.nz/dmsdocument/51892-Annual-Operational-Plan-for-Deepwater-Fisheries-202223>

⁵ <https://www.mpi.govt.nz/dmsdocument/21746-medium-term-research-plan-for-deepwater-fisheries-report>

⁶ <https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/plans-and-submissions/202425/final-csp-annual-plan-2024-25.pdf>

⁷ <https://deepwatergroup.org/wp-content/uploads/2022/09/Benthic-OP-version-2022-23.pdf>

⁸ <https://deepwatergroup.org/wp-content/uploads/2024/08/SNZ-DWC-Benthic-10-commandments-2023-24.pdf>

⁹ <https://www.mpi.govt.nz/dmsdocument/51409-Fisheries-Research-Services-for-202425>

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Protection Areas. Marine reserves, SCAs, BPAs and other major spatial restrictions to trawling are presented in Figure 49.

In 2007 New Zealand established Benthic Protection Areas (BPAs). BPAs close 17 large areas to bottom trawling and to dredging. These areas comprise over 1.1 million km² of largely pristine seabed, an area equal to about 30% of New Zealand's EEZ. Within the BPAs, bottom trawling and dredging is prohibited and any form of mid-water trawling may only be undertaken under strictly controlled and monitored conditions to preclude contact with, and therefore impacts on, the benthic environment.

Table 105. New Zealand MPA Policy Classification.

NZ MPA Policy Classification	Type of Area	Main Objective
Type 1 MPA	Marine reserves	Established under the Marine Reserves Act for the purpose of preserving marine life for scientific study
Type 2 MPA	Other MPAs	Meets the MPA Policy's Protection Standard but has not been established under the Marine Reserves Act such as marine mammal sanctuaries
Protection Tools	-	Not recognised as an MPA because does not meet the MPA Policy Standard but still recognised as a protection tool

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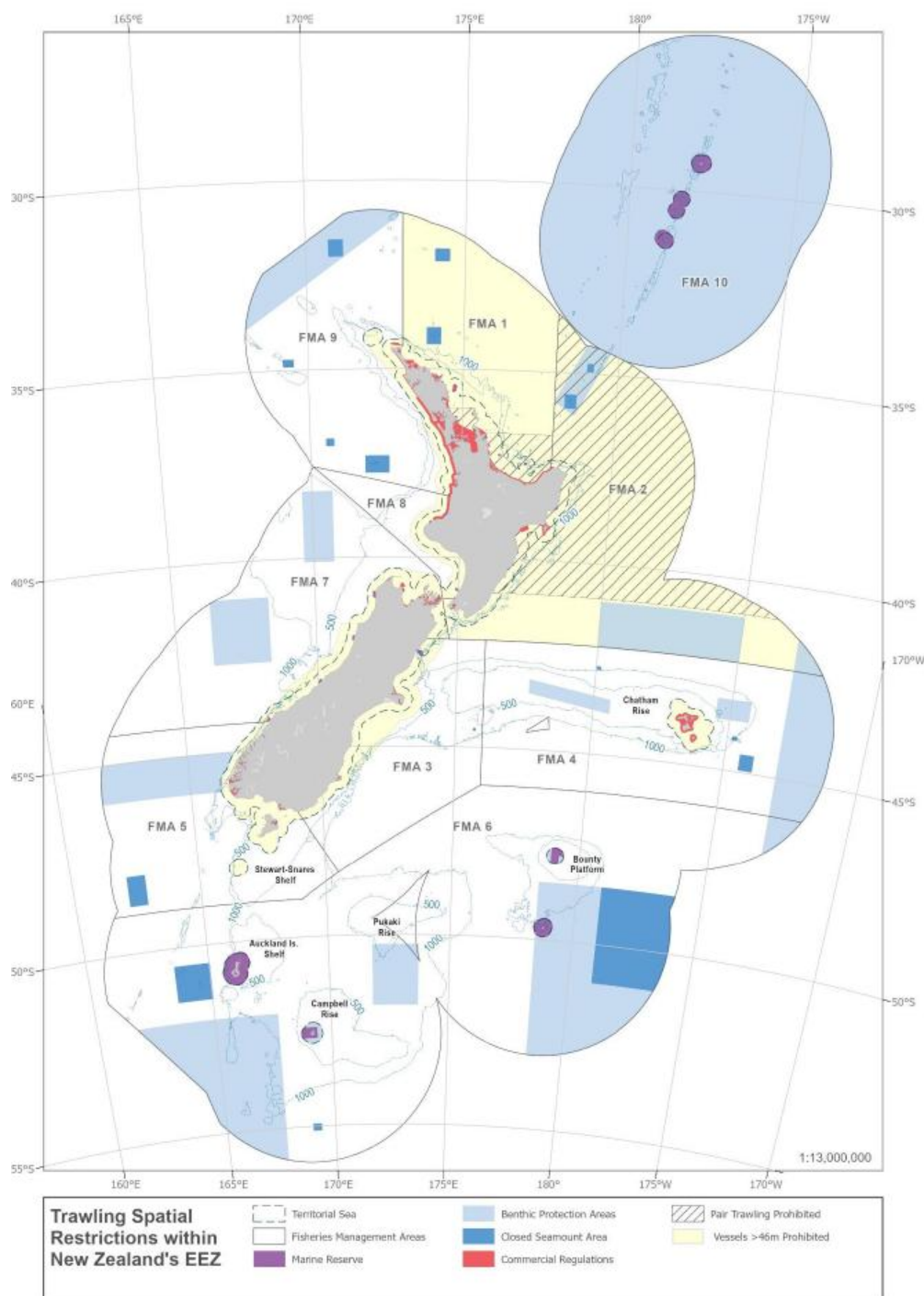


Figure 49. Map of the major spatial restrictions to trawling and Fisheries Management Areas (FMAs) within the outer boundary of the New Zealand EEZ. (AEBAR 2021 – Chapter 11).

Most coral species are protected under the Wildlife Act, 1953, within one of the orders or family groups as indicated below:

- Gorgonians – Order Gorgonacea
- Black corals – Order Antipatharia
- Stony Corals – Order Scleractinia

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- Hydrocorals – Family Stylasteridae

Schedule 6 of the Exclusive Economic Zone and Continental Shelf Regulations (2013) lists sensitive environments and thresholds to indicate their existence (Ministry for Environment 2013)¹⁰

Table 106. Ministry for Environment 2013, Schedule 6, sensitive environments.

Sensitive environment	Indicator of existence of sensitive environment
Stony coral thickets or reefs	A stony coral reef or thicket exists if— - a colony of a structure-forming species (ie, <i>Madrepora oculata</i>, <i>Solenosmilia variabilis</i>, <i>Goniocorella dumosa</i>, <i>Enallopsammia rostrata</i>, <i>Oculina virgosa</i>) covers 15% or more of the seabed in a visual imaging survey of 100 m² or more; or - a specimen of a thicket-forming species is found in 2 successive point samples; or - a specimen of a structure-forming species is found in a sample collected using towed gear.
Xenophyophores (sessile protozoan) beds	A xenophyophore bed exists if average densities of all species of xenophyophore found (including fragments) equal or exceed 1 specimen per m ² sampled.
Bryozoan thickets	A bryozoan thicket exists if— - colonies of large frame-building bryozoan species cover at least 50% of the of an area between 10 m² and 100 m²; or - colonies of large frame-building bryozoan species cover at least 40% of an area that exceeds 10 km²; or - a specimen of a large frame-building bryozoan species is found in a sample collected using towed gear; or 1 or more large frame-building bryozoan species is found in successive point samples.
Calcareous tube worm thickets	A sensitive tube worm thicket exists if— 1 or more tube worm mounds per 250 m² are visible in a seabed imaging survey; or 2 or more specimens of a mound-forming species of tube worm are found in a point sample; or - mound-forming species of tube worm comprise 10% or more by weight or volume of a towed sample.
Chaetopteridae worm fields	A sensitive chaetopteridae worm field exists if worm tubes or epifaunal species— - cover 25% or more of the seabed in a visual imaging survey of 500 m² or more; or - make up 25% or more of the volume of a sample collected using towed gear; or - are found in 2 successive point samples.
Sea pen field	A sea pen field exists if— - a specimen of sea pen is found in successive point samples; or 2 or more specimens of sea pen per m² are found in a visual imaging survey or a survey collected using towed gear.
Rhodolith (maerl) beds	A rhodolith bed— - exists if living coralline thalli are found to cover more than 10% of an area in a visual imaging survey; - is to be taken to exist if a single specimen of a rhodolith species is found in any sample.
Sponge gardens	A sponge garden exists if metazoans of classes Demospongiae, Hexactinellida, Calcarea, or Homoscleromorpha— - comprise 25% or more by volume of successive point samples; or - comprise 20% or more by volume of any sample collected using towed gear; or - cover 25% or more of the seabed over an area of 100 m² or more in a visual imaging survey.
Beds of large bivalve molluscs	A bed of large bivalve molluscs exists if living and dead specimens— cover 30% or more of the seabed in a visual imaging survey; or

¹⁰ Ministry for the Environment. 2013. Exclusive Economic Zone and Continental Shelf (Environmental Effects—Permitted Activities) Regulations 2013. (SR 2013/283).

<https://www.legislation.govt.nz/regulation/public/2013/0283/latest/whole.html#DLM5270660>

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Sensitive environment	Indicator of existence of sensitive environment
	- comprise 30% or more by weight or volume of the catch in a sample collected using towed gear; or - comprise 30% or more by weight or volume in successive point samples.
Macro-algae beds	A macro-algae bed exists if a specimen of a red, green, or brown macro-algae is found in a visual imaging survey or any sample.
Brachiopods	A brachiopod bed exists if 1 or more live brachiopods— - are found per m² sampled using towed gear; or - are found in successive point samples.
Deep-sea hydrothermal vents	A sensitive hydrothermal vent exists if a live specimen of a known vent species is found in a visual imaging survey or any sample. The following vent species are known to exist in New Zealand waters: <i>Vulcanolepis osheai</i>: <i>Ashinkailepas kermadecensis</i>: <i>Gigantidas gladius</i>: <i>Vulcanidas insolatus</i>: <i>Alvinocaris niwa</i>: <i>A. longirostris</i>: <i>A. alexander</i>: <i>Lebbeus wera</i>: <i>Nautilocaris saintlaurentae</i>: <i>Gandalfus puia</i>: <i>Xenograpsus ngatama</i>: <i>Paralomis hirtella</i>: <i>Bathyaustriella thionipta</i>: <i>Siboglinum</i> sp: <i>Oasisia fujikurai</i>: <i>Lamellibrachia juni</i>: <i>Sclerasterias eructans</i>: <i>Parachnoidea rowdeni</i>: <i>Pyrolycus moelleri</i>: <i>Symphurus thermophiles</i>.
Methane or cold seeps	A methane or cold seep exists if a single occurrence of one of the following taxa is found in a visual imaging survey or any sample: - large siboglinid tubeworms <i>Lamellibrachia</i> sp: - vesicomid clams <i>Calyptogena</i> sp: - mussels in the family Bathymodiolinae: - solemyid clams (<i>Acharax clarificata</i>): - the sponges <i>Stelletta</i> n sp and <i>Pseudosuberites</i> sp: - ampharetid, dorvilleid, and pogonophoran (<i>Siboglinum</i> sp) polychaete worms.

Additional sector-specific spatial and temporal management measures that have indirect application to conserving benthic habitats are also in place for the hoki, hake and ling trawl fishery:

HOK 1 - Vessels larger than 46 m in overall length may not fish inside the 12 nautical mile (nm) Territorial Sea, and there are other various vessel size restrictions around some parts of the coast. On the WCSI, a 25- nm line closes much of the hoki spawning area in the Hokitika Canyon, and most of the area south to the Cook Canyon,

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to vessels larger than 46 m overall length. In Cook Strait, the whole spawning area is closed to vessels over 46 m overall length.

The fishing industry introduced a Code of Practice (COP) for hoki target trawling in 2001 with the aim to protect small fish (less than 60 cm). The main components of this COP were:

- 1) a restriction on fishing in waters shallower than 450 m;
- 2) a rule requiring vessels to 'move on' if there are more than 10% small hoki in the catch; and
- 3) seasonal and area closures in spawning fisheries.

The COP was superseded by Operational Procedures for Hoki Fisheries, also introduced by the fishing industry from 1 October 2009. The Operational Procedures aim to manage and monitor fishing effort within four industry Hoki Management areas where there are thought to be high abundances of juvenile hoki (Narrows Basin of Cook Strait, Canterbury Banks, Mernoo Bank, and Puysegur). These areas are closed to trawlers over 28 m targeting hoki, with increased monitoring when targeting species other than hoki. There is also a general recommendation that vessels move from areas where catches of juvenile hoki (now defined as less than 55 cm total length) comprise more than 20% of the hoki catch by number.

From 2018–19 to 2021–22 there was agreement from industry to close certain fishing grounds to target fishing for hoki to allow spawning to occur undisturbed at peak times (Operational Procedures version 18). Seasonal spawning closures were:

- WCSI inside the 25-nm line: between 0000 h 18 July and 2400 h 24 July.
- WCSI outside the 25-nm closure, shallower than 800 m, between Kahurangi Point in the north and the boundary between FMAs 5 and 7 in the south: between 0000 h 25 July and 2400 h 31 July.
- Cook Strait: Entire fishery between 0000 h 1 August and 2400 h 7 August.
- Pegasus: between 0000 h 1 September and 2400 h 7 September.

In 2022–23 there were no seasonal spawning area closures.

10.2.1.4. Ecosystem

Research into deepwater ecosystems in the New Zealand EEZ is most advanced in the vicinity of Chatham Rise region. Primary production is high in the region due to the convergence of subantarctic and subtropical water and the region supports valuable deepwater fisheries, an unusually rich benthic ecosystem and large seabird populations (FNZ, 2022c). Ecosystem modelling of the Chatham Rise food web has been conducted since the mid-2000s (FNZ, 2022c).

Data from the Sub-Antarctic and Chatham Rise trawl surveys were used to develop ecosystem indicators using diversity, fish size, and trophic level (Tuck et al., 2009). Their analyses showed some evidence of change in ecosystem indicators over time. For example, there was evidence of increasing evenness (reducing diversity) but no evidence that species were being lost from the food-web. Some size characteristics of fish in research trawls on the Chatham Rise had changed, with fewer fish longer than 30 cm or heavier than 750 g being taken by trawl gear, although the median length of the catch did not change. There was also evidence that the proportion of piscivorous fish and of true demersal (rather than benthopelagic) species declined over the studied period, but "low-resilience" species such as dogfish and rays had increased relative to other species on the Chatham Rise. There were also changes in the spatial distribution of fish species, with 16 out of 47 species showing changes (half declining and half increasing) in the proportion of the study area over which 90% of their abundance by weight was caught (Tuck et al., 2009). The Tuck et al. (2014) considered the utility of a suite of indicators relevant to deepwater fisheries. Recommended deep water fishery-specific indicators, included the following:

- Total removals (nationally, by region or target fishery)
- Target species biomass
- Species distribution

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- Total fish biomass
- Community diversity
- Proportion of large fish
- Mean trophic level.

There does not appear to be a more recent update of the change in ecosystem indicators over time since Tuck et al 2009. Focus has instead been on developing ecosystem models.

A balanced trophic model of Chatham Rise, with the focus on the role of demersal fish in the food web including hoki, orange roughy, smooth oreo, black oreo, ling, silver warehou, hake, javelinfish and barracouta and three fish groups: rattails, dogfish and other demersal species, showed that benthic invertebrates, macrozooplankton and mesopelagic fish had particularly high ecological importance in the foodweb (Pinkerton, (2011).

Atlantis is an end-to-end ecosystem modelling approach that can be used to create an environment in which different scenarios can be played out to test for different results and learn how a system may be reacting to changes within it. The Chatham Rise Atlantis comprehensive ecosystem model is a valuable tool for understanding potential system-wide responses to fisheries management strategies in one of New Zealand's largest fishing grounds.

For the Chatham Rise deep-sea ecosystem, MacGregor et al, (2019) calculated 'keystoneness' as a measure of the effect a species or group has on the rest of the system (change in biomass of the other species groups), that takes into account its proportion of the total biomass. There were four species groups that stood out as having more effect than the other groups: orange roughy, hoki, pelagic fish small (primarily myctophids), and spiny dogfish (MacGregor et al, 2019). Hoki are a key biological component of the upper slope (200–800 m) ecosystem and is the species with the highest biomass, and was ranked highest by MacGregor et al (2019) for keystoneness. They found however that the small pelagics fish (primarily myctophids) had both high keystoneness and responsiveness and so may be most important and influential in scenarios explored with the Chatham Rise Atlantis model (Figure 50).

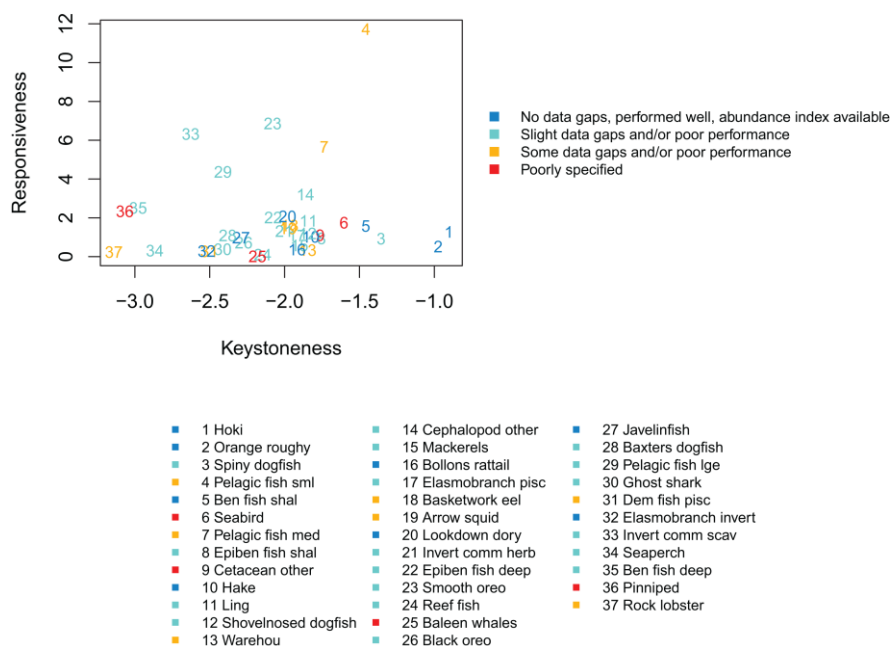


Figure 50. Keystoneness (x-axis) and responsiveness (y-axis) with numbers showing keystoneness ranking and colours how well each species group was informed and/or performed in the model (legend). Source: MacGregor et al, 2019.

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MacGregor et al, (2020) then assessed the sensitivity of their Atlantic model to initial conditions finding the Chatham Rise Atlantis model was robust to initialisation uncertainty at the system level, at small, and even quite large (up to 50%) changes, finding the model produced very similar results with respect to ecosystem indicators. Focusing on small pelagics as a key species on the Chatham Rise ecosystem MacGregor et al (2020) found that the effects of uncertainty from the oceanographic variables had a greater range than those from perturbing the initial conditions. It appears that since the late 1970's following a significant increase in fishing pressure, that this group has significantly increased in biomass (Figure 51).

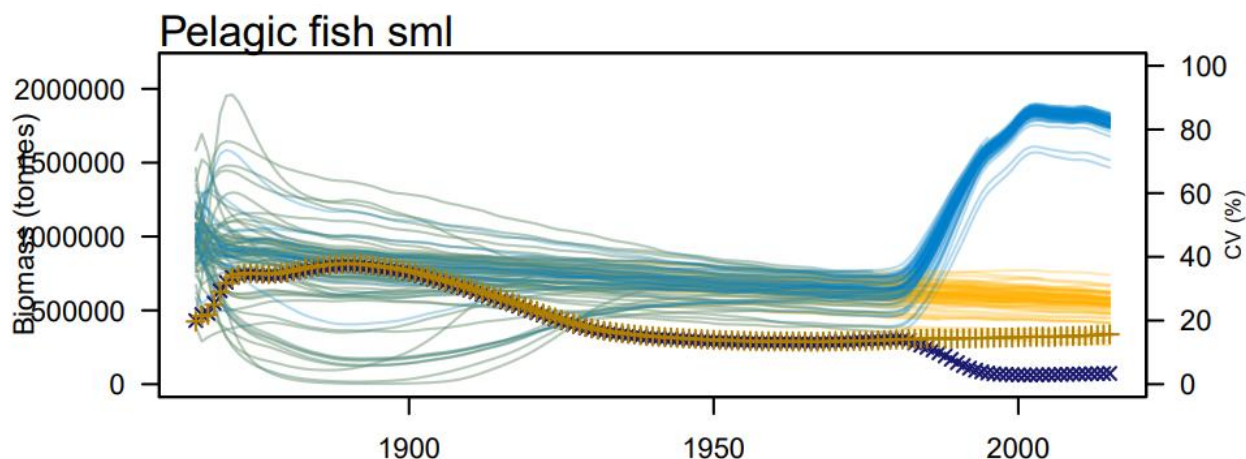


Figure 51. Biomass trajectories from models with fishing included (blue lines) and no fishing (orange lines) for each species group, with CVs from across the model runs by time from fished models (midnight blue crosses) and unfished models (dark orange pluses) overlaid and using the right-hand axis. Source: MacGregor et al 2020, supplemental information DOI: [10.7717/peerj.9254/supp-1](https://doi.org/10.7717/peerj.9254/supp-1).

10.2.1.5. Principle 2 Scoring Elements

Scoring Element		Stock	Component	Rationale for categorisation
Common name	Scientific name			
Silver warehou	<i>Seriotelella punctata</i>	SWA 1	In-scope - minor	See Table 76
		SWA 3	In-scope - minor	
		SWA 4	In-scope - minor	
New Zealand white-capped albatross	<i>Thalassarche cauta steadi</i>	N/A	Out of scope	See Table 80
Salvin's albatross	<i>Thalassarche salvini</i>	N/A	Out of scope	
Common diving petrel	<i>Pelecanoides urinatrix</i>	N/A	Out of scope	
Sooty shearwater	<i>Puffinus griseus</i>	N/A	Out of scope	
Southern Buller's albatross	<i>Thalassarche bulleri bulleri</i>	N/A	Out of scope	
White-chinned petrel	<i>Procellaria aequinoctialis</i>	N/A	Out of scope	
Spotted shag	<i>Stictocarbo punctatus</i>	N/A	Out of scope	
New Zealand white-faced storm petrel	<i>Pelagodroma marina maoriana</i>	N/A	Out of scope	
Broad-billed prion	<i>Pachyptila vittata</i>	N/A	Out of scope	
Fairy prion	<i>Pachyptila turtur</i>	N/A	Out of scope	
Flesh-footed shearwater	<i>Puffinus carneipes</i>	N/A	Out of scope	

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Scoring Element		Stock	Component	Rationale for categorisation
Common name	Scientific name			
Mottled petrel	<i>Pterodroma inexpectata</i>	N/A	Out of scope	
Westland petrel	<i>Procellaria westlandica</i>	N/A	Out of scope	
Black petrel	<i>Procellaria parkinsoni</i>	N/A	Out of scope	
Northern Buller's albatross	<i>Thalassarche bulleri platei</i>	N/A	Out of scope	
Buller's shearwater	<i>Puffinus bulleri</i>	N/A	Out of scope	
Chatham Island albatross	<i>Thalassarche eremita</i>	N/A	Out of scope	
Antarctic prion	<i>Pachyptila desolata</i>	N/A	Out of scope	
Hutton's shearwater	<i>Puffinus huttoni</i>	N/A	Out of scope	
Campbell black-browed albatross	<i>Thalassarche impavida</i>	N/A	Out of scope	
Grey-faced petrel	<i>Pterodroma macroptera gouldi</i>	N/A	Out of scope	
Southern black-backed gull	<i>Larus dominicanus dominicanus</i>	N/A	Out of scope	
Black-bellied storm petrel	<i>Fregetta tropica</i>	N/A	Out of scope	
Cook's petrel	<i>Pterodroma cookii</i>	N/A	Out of scope	
New Zealand fur seal	<i>Arctocephalus forsteri</i>	New Zealand	Out of scope	See Table 89
Sponges	<i>Porifera</i>	N/A	Habitats	See Table 77
Glass sponges	<i>Hexactinellida</i>	N/A	Habitats	
Flabellum coral	<i>Flabellum spp.</i>	N/A	Habitats	
Feathery hydroids	<i>Leptomeduseae and Anthoathecatae (excluding Stylasteridae)</i>	N/A	Habitats	
Grey fibrous massive sponge	<i>Phorbas spp.</i>	N/A	Habitats	
Coral (unspecified)	<i>Alcyonacea, Gorgonacea, Scleractinia, Antipatharia (O) & Stylasteridae (F)</i>	N/A	Habitats	
Furry oval sponge	<i>Tetilla leptoderma</i>	N/A	Habitats	
Feathery sea pens	<i>Pennatula spp.</i>	N/A	Habitats	
Knobbly sandpaper sponge	<i>Ecionemia novaezelandiae</i>	N/A	Habitats	
Curling stone sponge	<i>Geodia regina</i>	N/A	Habitats	
Orange frond sponge	<i>Crena incrustans</i>	N/A	Habitats	
Sea pens	<i>Pennatulacea</i>	N/A	Habitats	
Branching coral	<i>Enallopsammia rostrata</i>	N/A	Habitats	
Bushy hard coral	<i>Goniocorella Dumosa</i>	N/A	Habitats	
BOMECS Classes A-O		N/A	Habitats – less sensitive	See Section 10.2.1.3
Underwater Topographic Features		N/A	Habitats – more sensitive	See Section 10.2.1.3
Community composition/diversity		N/A	Ecosystem	

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10.2.2. Principle 2 Performance Indicator scores and rationales

PI 2.1.1 – In-scope species outcome

PI 2.1.1		The UoA aims to maintain in-scope species above the PRI and does not hinder recovery of in-scope species if they are below the PRI		
Scoring issue		SG 60	SG 80	SG 100
a	Main in-scope species stock status			
	Guide post	Main in-scope species are likely to be above the PRI. or If the species is below the PRI, it is likely that the UoA does not hinder recovery and rebuilding.	Main in-scope species are highly likely to be above the PRI. or If the species is below the PRI, there is evidence of recovery, or it is highly likely that the UoA does not hinder recovery and rebuilding.	There is a high degree of certainty that main in-scope species are fluctuating around a level consistent with MSY.
	Met?	Yes	Yes	Yes
Rationale		Per SA3.6.3 the assessment team shall categorise a scoring element as a “main species” if: - The catch of a species by the UoA comprises 5% or more by weight of the total catch of all species by the UoA, or - The species is classified as “less resilient” and the catch of the species by the UoA comprises 2% or more by weight of the total catch of all species by the UoA, or - The species is a shark and the fishery client trades in shark fins. Less resilient species are those for which the productivity of the species indicates that it is intrinsically of low resilience, and/or its intrinsic resilience is high and existing knowledge of the species indicates that its resilience has been lowered because of anthropogenic or natural changes to its life history. MSC provides guidance as follows per GSA3.6.3.b, <i>The team may take an overall average productivity score of ≥ 2 to indicate that the species has a life-history equivalent to medium or lower productivity. Using this threshold would be a precautionary way of designating a species as “less resilient”.</i> The only in-scope species for which catches are non-negligible is the silver warehou (<i>Seriola punctata</i>), with catches amounting to 3.85% of the total catch of the trawl fishery targeting hoki, hake, ling, white and silver warehou (Table 76). The PSA productivity score for silver warehou equals 1.57, indicating the species has high productivity and is therefore not considered as less resilient (Table 115). There are therefore no “main” in-scope species scoring elements in the trawl fishery UoAs. Per SA3.6.5, <i>If there are no “main species” scoring elements, the team shall award a score of SG100 for scoring issue (a).</i> SG100 is met.		

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b	Minor in-scope species stock status			
	Guide post			Minor in-scope species are highly likely to be above the PRI. or If below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of minor in-scope species.
	Met?			MSC RBF PSA score 89 – SWA
Rationale	Annual Fisheries Assessment Plenary reports, organised by fish stock, provide summaries of the available fisheries and scientific information. The plenary report for silver warehou summarises fisheries, biological, environmental, stock assessment and stock status information. In general, biological stocks tend to occur at smaller scales than management boundaries, as is the case for silver warehou. Information is not available to determine stock status in relation to reference points, derived either from analytical stock assessment or using empirical approaches. This triggers the application of the risk-based framework (RBF) alternative scoring approach per Table 5 of the ERF V1.2 and a PSA is required (Table A1, ERF V1.2). Initially the assessment team considered that only SWA 1 triggered the RBF, however during the RBF workshop it was made clear that the stock structure of silver warehou is not well known and it was recommended that all SWA fishstocks be combined and scored using the RBF methodology as a single biological stock. This approach was adopted despite that biological stocks have been considered for the purpose of stock assessment. The resulting PSA MSC score for silver warehou is 89 (low risk, Table 115). Per MSC ERF Toolbox V1.2, A5.2.1 If there is only 1 scoring element for the PI, the team shall consider this as the overall MSC score.			

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	≥80
Information gap indicator	More information sought RBF workshop at the site visit to gather stakeholder opinions on draft PSA scores and alternatives such as CPUE to be used as a proxy for stock status.

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	90
Condition number (if relevant)	NA

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PI 2.1.2 – In-scope species management strategy

PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of in-scope species		
Scoring issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are measures in place for the UoA, if necessary , that are expected to maintain or to not hinder rebuilding of the main in-scope species at/to the in-scope species outcome SG60 level.	There is a partial strategy in place for the UoA, if necessary , that is expected to maintain or to not hinder rebuilding of the main in-scope species at/to the in-scope species outcome SG80 level. or Where in-scope species outcome fails to meet the SG80, a demonstrably effective strategy is in place between all MSC UoAs that categorise this species as main in-scope to ensure that they collectively do not hinder recovery and rebuilding.	There is a strategy in place for the UoA for managing main and minor in-scope species at the in-scope species outcome SG80 level.
	Met?	Yes – SA3.7.1.1 no main species	Yes – SA3.7.1.1 no main species	No – silver warehou
Rationale		There are no main in-scope species, SG60 and SG80 are met by default. Three key components of the fisheries management system are noteworthy with respect to in-scope species management in New Zealand. They work in concert to set the catch limit of a given fish stock. Total Allowable Commercial Catch (TACC) quota is the total quantity of each fish stock that the commercial fishing industry can catch in a given year. The TACC is a portion of the TAC that is set after allowances have been made for customary and recreational fishing, and for other sources of fishing-related mortality (FNZ Infosite). have been in place since 1986-87. Species which have a TACC are part of the Quota Management System (QMS). The annual catch entitlement (ACE) scheme was added to New Zealand's quota management system for fisheries in 2001. The scheme allocates quota owners an annual share of the total allowable commercial catch (TACC) in proportion to their quota holding of a particular fishstock and overcatch attracts paid deemed values that are scaled to level over overcatch (FNZ InfoSite). ACE may also be carried over to the following fishing year. The “Adaptive Management Programme” (AMP) approach was introduced into New Zealand’s fisheries management decision making in 1991. The AMP allows a variation in the TAC for fisheries management units (defined as fishstocks) for which there is limited information on stock size (Peacey et al 2001)		

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PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of in-scope species		
		Silver warehou is classed as a ‘Tier 2’ stock as it comprises a bycatch component of the hoki, squid, barracouta, and jack mackerel trawl fisheries. Tier 2 stocks are still subject to stock assessments, with subsequent Plenary reports summarising fisheries, biological, environmental, stock assessment and stock status information. The Plenary reports take into account the most recent data and analyses available to Science Working Groups (SWGs) and Fisheries Assessment Plenary meetings, and also incorporate relevant analyses undertaken in previous years. As a key bycatch species within the target hoki, hake and ling fishery the effort and catch control measures applied to the target fishery fleet are applicable to silver warehou. Per SA3.4.1c the assessment team shall interpret “Strategy” to mean a cohesive and strategic arrangement that may comprise 1 or more measures and an understanding of how the measures work to achieve an outcome. A “strategy” should be designed to manage impact on that component specifically, it needs to be appropriate to the scale, intensity, and cultural context of the fishery and should contain mechanisms for the modification of fishing practices if unacceptable impacts are identified. The TACCs in place for the silver warehou stocks constitutes the main and only management measure in place for those stocks specifically. Whether exceeded or under caught the TACCs do not constitute a strategy as defined by the MSC, SG100 is not met for silver warehou.		
b	Management strategy effectiveness			
	Guide post	The measures, if necessary , are considered likely to work for the main in-scope species, based on plausible argument.	There is some evidence that the measures/partial strategy, if necessary , is achieving the objectives for main in-scope species set out in scoring issue (a), based on some information directly about the UoA and/or species involved.	There is evidence that the partial strategy/strategy is achieving the objectives set out in scoring issue (a), based on information directly about the UoA and/or species involved.
	Met?	Yes – SA3.7.1.1 no main species	Yes – SA3.7.1.1 no main species	No – silver warehou
Rationale		There are no main in-scope species, SG60 and SG80 are met by default. For the SWA 1 stock there is currently no reliable way of tracking abundance due to the characteristics and behaviour of the fish and the fishing fleet but the TACC has not been approached since 2001–02 because reductions in the hoki quota have resulted in much less effort off the WCSI in winter. For the SWA 3 and SWA4 stocks TACCs have been consistently exceeded (though allowance for ACE carryover is not factored in). As there is no strategy in place for managing these stocks, SG100 is not met.		
c	Review of alternative measures			
	Guide post	There is a review of alternative measures to minimise UoA-related mortality of unwanted catch of main in-scope species	There is a review at least once every 5 years of alternative measures to minimise UoA-related mortality of unwanted catch of main in-scope species and they are implemented, as appropriate .	There is a review that happens every 2 years of alternative measures to minimise UoA-related mortality of unwanted catch of all in-scope species, and they are implemented, as appropriate .

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PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of in-scope species		
	Met?	Not applicable	Not applicable	Not applicable
Rationale		Silver warehou is a QMS species that is retained by the fishery targeting hoki, hake and ling. Anderson et al 2019 in fact consider the fishery to extend to trawls that target silver and white warehou. The species is not therefore “unwanted catch” as defined by SA3.1.1e as <i>the part of the catch that the UoA did not intend to catch but could not avoid and did not want or chose not to use</i> . In addition, per Anderson et al 2019 (Table 76), only 0.55% of silver warehou is observed to have been discarded, constituting a negligible proportion of the retained catch of the species. This scoring issue is therefore not applicable as there are no ‘main’ in-scope species and the only minor in-scope species, silver warehou, is a target of the fishery with negligible discards.		
d	Shark finning (V2.01 SGs per accepted Variation Request)			
	Guide post	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Yes	Yes	Yes
Rationale		Interactions with in-scope and ETP/OOS chondrichthyans are “negligible” per SA3.2.3. It is noted that basking shark, deepwater nurse shark, short-finned mako shark, leafscale gulper shark, school shark, porbeagle shark, thresher shark, bigeye thresher shark and blue shark are assessed under the ETP/OOS Performance Indicators. However per SA3.7.4 the <i>team shall score scoring issue (d) following SA2.4.3 - SA2.4.4, regardless of the ETP status of these sharks</i> (and level of catch). There is a Fins Naturally Attached (FNA) policy requirement in New Zealand since 2014, with eight exceptions to the requirement. Following the definition of 'shark' under Fisheries Standard v3.1, three of the eight species are not scored as sharks. For the remaining five shark species it is not possible to confirm that the UoA has adopted the FNA because GSA2.4.3–GSA2.4.4 of MSC Standard v3.1 does not permit exemptions to an FNA Policy. LRQA applied for and were granted a Variation Request to apply a blanket modification to the assessment tree for scoring issue 2.1.2d and 2.2.2d, applying the requirements of SA2.4.3–SA2.4.7 (MSC V2.01) to ensure that shark finning is not being undertaken in the UoA. Subject to application of the Variation Request per MSC V2.01, at SG100: SA2.4.7.1, If sharks are landed with fins naturally attached, there is some external validation such that there is a high degree of certainty that shark finning is not taking place. SA2.4.7.2, If sharks are processed on board: a. There are comprehensive regulations in place governing the management of sharks; b. There is full documentation of the destination of all shark bodies and body parts; and c. Comprehensive external validation of the vessels’ activities is available to confirm with a high degree of certainty that shark finning is not taking place. Per GSA2.4.5-GSA2.4.7, the MSC recognises that in some fisheries adoption of a FNA Policy may be practically difficult to achieve when sharks are destined for processing and utilisation, and therefore also recognises that landing fins and other shark parts separately, including as meal, may be allowed if adequately regulated and observed.		

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PI 2.1.2	There is a strategy in place that is designed to maintain or to not hinder rebuilding of in-scope species
	External validation is prescribed as follows: At SG 80 "good external validation" should be understood to indicate a validation level equivalent to a nominal observer coverage of 20% of effort, although the CAB may accept other rates and alternative measures/evidence with sufficient justification that the same scientific outcome (highly likely confidence that finning is not taking place) is delivered. At SG 100 "comprehensive external validation" is required. This gives consideration of the continuity of data collection, precision and accuracy of information, and any bias, etc, that is capable of supporting the measures in place given the level of precaution that is implicit in the measures and the ability of the measures for detecting any changes. Anderson et al 2019 (Table 76) identified 34 species or species groups of shark in the top 120 species caught in trawls targeting hoki, hake, ling, white and silver warehou. Over the period assessed, 1 Oct 2002 to 30 Sep 2017, spiny dogfish (<i>Squalus acanthias</i>) was the most abundant species caught, comprising ~1.4% of the overall total catch. Pale ghost shark (<i>Hydrolagus bemisi</i>) was the second-most abundant chondrichthyan at 0.32% of the overall catch. Both these species are managed under the Quota Management System. The dark ghost shark (0.24%), smooth skate (0.13%) and shovelnose dogfish (0.13%) made up the top five species. In total sharks and rays comprised <3% of the overall total observed catch. Around 59 chondrichthyan species/species groups have been observed in catches over the most recent five-year period (HHL situation report 2024). Spiny dogfish (<i>Squalus acanthias</i>) is the most abundant species caught and comprises ~1.1% of the overall total catch. Pale ghost shark (<i>Hydrolagus bemisi</i>) is the second-most abundant chondrichthyan at 0.4% of the overall catch. Both these species are managed under the Quota Management System. These, together with shovelnose spiny dogfish (<i>Deania Calcea</i>) (0.2%), Baxter's lantern dogfish (<i>Etmopterus baxteri</i>) (0.1%) and smooth skate (<i>Dipturus innominatus</i>) (0.1%) make up the top five species caught. The Fisheries (Commercial Fishing) Regulations 2001 prohibit shark finning and require that any shark fins landed must be naturally attached to the remainder of the shark. However, an exception to the fins attached requirement is provided for seven QMS species to allow at-sea processing to continue. All QMS shark species must be landed if taken. However, Schedule 6 provides for exceptions to this rule by listing QMS species which may be returned to the sea (FNZ, 2022), as follows (Figure 52): 1. Rig (SPO) and School shark (SCH) – may be returned alive only 2. Blue shark (BWS), mako shark (MAK) and porbeagle shark (POS) – may be returned alive or dead and if dead, balanced against ACE 3. Spiny dogfish (SPD) – may be returned alive or dead and must always be balanced against ACE regardless of life status. In New Zealand two shark definitions are used: 1) The Fisheries (Commercial Fishing) Regulations 2001 defines sharks as 'a fish of the class Chondrichthyes, but excludes Batoidea'. 2) New Zealand's NPOA Sharks uses the term 'sharks' generally to include all species in the class Chondrichthyes (sharks, rays, skates and chimaeras).

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PI 2.1.2

There is a strategy in place that is designed to maintain or to not hinder rebuilding of in-scope species

Recognising the difference in shark definitions within New Zealand for different purposes it precautionary to apply the more comprehensive definition of the NPOA Sharks.

Approach	Description	Applicable species
Ratio	Fins must be stored and landed separately by species. The weight of fins landed must not exceed a specified percentage of the greenweight of the shark. Weight of fins must be reported on landing returns. The ratio applies to landings on a trip-by-trip basis.	Elephant fish
		Dark ghost shark
		Mako shark
		Pale ghost shark
		Porbeagle shark
		Rig
		School shark
Fins artificially attached	After being processed to the dressed state, fins must be re-attached to the shark by some artificial means. Landings to be reported with landed state of SFA (shark fins attached).	Blue shark
Fins naturally attached	After being processed to the headed and gutted state, the fins must remain attached to the body by some portion of uncut skin. Landings to be reported with landed state of SFA (shark fins attached).	Spiny dogfish
		All non-QMS species

Figure 52. New Zealand conditions for landing shark fins (FNZ AOP, 2022).

Within the trawl fleet targeting hoki, hake and ling 16 of the 35 vessels have meal plants and are known to process sharks to fishmeal (Table 75). In addition to a fishing permit these factory vessels are also permitted, in the same way as a factory on land, to process to final product. GSA2.4.5 – GSA2.4.7 permits the processing of sharks to fish meal in cases where the fishery is adequately regulated and observed.

Scoring Summary

The following information is provided to demonstrate there is a high degree of certainty shark finning is not taking place:

1. The Fisheries (Commercial Fishing) Regulations 2001.
2. NPOA-Sharks 2022 (FNZ, 2022)
3. A fleet-wide code-of conduct for deepwater vessels.
4. Information to confirm that the UoA has adopted an FNA policy is available through Operational Procedures (OPs) in place which are updated regularly/iteratively by the Deepwater Group.
5. OPs are communicated effectively to the deepwater fleet through an Information Portal available on the bridge of all UoA vessels
6. Implementation is supported through the full time Environmental Liaison Officer who is required to visit at least 90% of vessels in the Deepwater fleet each year
7. FNZ's observer protocols require observers to look for any instances of shark finning, including for sharks that go into the meal plant.
8. Where a shark is landed, observers record the species and determine its disposal code. The disposal code is cross-checked against DWC's Sharks Operational Procedures to check they are landed in accordance with DWC's operational documentation.
9. Observer reports include provision to record shark processing codes and instances of observed shark finning (noting that there have been no reported shark finning cases reported).

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PI 2.1.2	There is a strategy in place that is designed to maintain or to not hinder rebuilding of in-scope species
	10. Observers are positioned to directly observe vessel interactions with sharks throughout the catch operation, including reporting the fate of sharks either retained, processed or discarded. 11. Information to confirm that an FNA or non-retention policy is enforced in the UoA is available through the high levels of representative observer coverage in the UoAs averaging 44.3% of tows observed in the hoki, hake and ling trawl fishery over the period 2018/19-2022/23. 12. Vessel offloads are monitored Ministry for Primary Industries Fishery Officers and vessels are inspected to ensure all catch is landed from the vessel. There have been no reported instances of shark finning through dockside compliance monitoring. 13. All stakeholder interviewed during the site visit, including fishery managers, compliance officers, observer program managers, external consultants and the client where emphatic that shark finning does not take place in New Zealand deepwater fisheries. In the case of sharks processed to fishmeal, the sharks are processed whole at sea, there is full utilization of the shark (including fins still attached), observers confirm that fins are not retained or landed as a separate product. The assessment team is satisfied that the intent of the MSC in scoring shark finning scoring issues is met in these cases. The achieved level of observer coverage for each of hoki, hake and ling-targeted tows over the period 2018-19 to 2022-23 averaged out at 44.3% (Table 107). Data for 2018-19 to 2020-21 were retrieved from the Protected Species website; data for 2021-22 & 2022-23 were retrieved from MPI databases (D. Foster, FNZ, pers. comm.) For spiny dogfish and all non-QMS species the FNA applies and whether landed or processed to fishmeal, evidence is available to satisfy SA2.4.7.1, SG60, SG80 and SG100 are met. Shark species which are permitted to be landed against a fin to greenweight ratio, mako shark, porbeagle shark, rig and school shark, pale and dark ghost sharks and elephant fish, and blue shark, which are permitted to be landed with Fins Artificially Attached (Figure 52) do not meet the definition of a FNA in place, therefore the requirements of SA2.4.7.2 apply at SG100. . It is clear that there are comprehensive regulations in place governing the management of sharks, in particular there has been a Fins Naturally Attached (FNA) policy requirement in New Zealand since 2014. At the site visit the assessment team requested landing or disposal code, product state code, greenweight and shark fin weight for these seven species for the most recent 5-year period, noting all vessels are required to report landings and disposals for all QMS species through the Electronic Reporting System (ERS). This data was supplied constituting full documentation of the destination of all shark bodies and body parts, including sharks processed to meal. As stated above comprehensive external validation is required at the SG100 level. There is clear continuity of observer data collection in the trawl UoAs and there is a long history, since 01 October 2014, of the exception to the requirement for a FNA. The representativity of high levels of observer coverage has been tested, supporting confidence in the trueness and accuracy of the information supplied and limiting the possibility of bias. There is 100% reporting through the ERS and dockside monitoring is comprehensive.

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PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of in-scope species																																																																																																													
		For species landed against a fin to green weight ratio the assessment team conclude that the requirements of SA2.4.7.2 are met, SG60, S80 and SG100 are met.																																																																																																													
		Table 107. Total numbers of trawl tows, observed tows and percentage of tows observed by target fishery and fishing year. Source: SNZ, 2024.																																																																																																													
		<table><tr><th rowspan="2">Target</th><th colspan="3">2018/19</th><th colspan="3">2019/20</th><th colspan="3">2020/21</th><th colspan="3">2021/22</th><th colspan="3">2022/23</th></tr><tr><th>Total tows</th><th>Obs. tows</th><th>Obs. tows (%)</th><th>Total tows</th><th>Obs. tows</th><th>Obs. tows (%)</th><th>Total tows</th><th>Obs. tows</th><th>Obs. tows (%)</th><th>Total tows</th><th>Obs. tows</th><th>Obs. tows (%)</th><th>Total tows</th><th>Obs. tows</th><th>Obs. tows (%)</th></tr><tr><td>HOK</td><td>9,617</td><td>3,202</td><td>33.3%</td><td>8,124</td><td>3,727</td><td>45.9%</td><td>7,665</td><td>3,613</td><td>47.1%</td><td>8,059</td><td>3,663</td><td>45.5%</td><td>8,816</td><td>3,848</td><td>43.6%</td></tr><tr><td>HAK</td><td>77</td><td>76</td><td>98.7%</td><td>205</td><td>205</td><td>100%</td><td>206</td><td>165</td><td>80.1%</td><td>132</td><td>132</td><td>100%</td><td>255</td><td>241</td><td>94.5%</td></tr><tr><td>LIN</td><td>775</td><td>307</td><td>39.6%</td><td>691</td><td>332</td><td>48.0%</td><td>767</td><td>277</td><td>36.1%</td><td>700</td><td>449</td><td>64.1%</td><td>790</td><td>529</td><td>67.0%</td></tr><tr><td>Totals</td><td>10,469</td><td>3,585</td><td>34.2%</td><td>9,020</td><td>4,264</td><td>47.3%</td><td>8,638</td><td>4,055</td><td>46.9%</td><td>8,891</td><td>4,244</td><td>47.7%</td><td>9,861</td><td>4,618</td><td>46.8%</td></tr></table>															Target	2018/19			2019/20			2020/21			2021/22			2022/23			Total tows	Obs. tows	Obs. tows (%)	Total tows	Obs. tows	Obs. tows (%)	Total tows	Obs. tows	Obs. tows (%)	Total tows	Obs. tows	Obs. tows (%)	Total tows	Obs. tows	Obs. tows (%)	HOK	9,617	3,202	33.3%	8,124	3,727	45.9%	7,665	3,613	47.1%	8,059	3,663	45.5%	8,816	3,848	43.6%	HAK	77	76	98.7%	205	205	100%	206	165	80.1%	132	132	100%	255	241	94.5%	LIN	775	307	39.6%	691	332	48.0%	767	277	36.1%	700	449	64.1%	790	529	67.0%	Totals	10,469	3,585	34.2%	9,020	4,264	47.3%	8,638	4,055	46.9%	8,891	4,244	47.7%	9,861	4,618	46.8%
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e	Ghost gear management strategy																																																																																																														
	Guide post	There are measures in place for the UoA, if necessary , that are expected to minimise ghost gear and its impact on all in-scope species.					There is a partial strategy in place for the UoA, if necessary , that is expected to minimise ghost gear and its impact on all in-scope species.					There is a strategy in place for the UoA, if necessary , that is expected to minimise ghost gear and its impact on all in-scope species.																																																																																																			
	Met?	N/A					N/A					N/A																																																																																																			
Rationale		Per SA 3.7.5, The team shall only score scoring issue (e) if PI 2.2.2 scoring issue (e) is not scored (i.e. if there are no ETP/OOS scoring elements). This scoring issue is therefore not applicable .																																																																																																													

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	<60
Information gap indicator	More information sought The fishery is in the process of updating the FNA and OPs that these species will no longer be allowed to be landed against a fin to greenweight ratio. Further consultation to review the updated FNA and confirm observer protocols with respect to its enforcement will be sought at the site visit.

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	85
Condition number (if relevant)	NA

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PI 2.1.3R – In-scope species information if RBF is used to score PI 2.1.1

PI 2.1.3R		Information on the nature and amount of in-scope species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage in-scope species		
Scoring issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impact on main in-scope species			
	Guide post	Qualitative information is adequate to estimate productivity and susceptibility attributes for main in-scope species.	Some quantitative information is adequate to assess productivity and susceptibility attributes for main in-scope species.	
	Met?	NA	NA	
Rationale		There are no main in-scope species under assessment (Table 76, Table 77, Table 78). Despite this however per SA3.3.3, <i>The team shall still score the Management and Information PIs.</i> Per Table B1 of the ERF V1.2, the ERF assessment of information Trueness and Precision is not applied to PI2.1.3R. See scoring issue c for a detailed description of the adequacy of information derived from the trawl fishery.		
b	Information adequacy for assessment of impact on minor in-scope species			
	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor in-scope species with respect to status.
	Met?			Yes
Rationale		Per Table B1 and Table 5 of the MSC Fisheries Standard Toolbox v1.2, the ERF assessment of information Trueness and Precision is not applied to PI2.1.3R when scoring elements are scored under PI2.1.1 with the Risk-Based Framework. The only minor in-scope species under assessment is the silver warehou (<i>Seriolella punctata</i>). See scoring issue c for a detailed description of the adequacy of information derived from the trawl fishery. SG100 is met.		
c	Information adequacy for management strategy			
	Guide post	Information is adequate to support measures to manage main in-scope species.	Information is adequate to support a partial strategy to manage main in-scope species.	Information is adequate to support a strategy to manage all in-scope species and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	Yes	Yes	No
Rationale		The trawl fishery targeting hoki, hake and ling, combines 10 Units of Assessment (UoA): Hoki 1 & 2, Hake 3, 4 & 5 and Ling 6-10. Fishery Management Area (FMA) boundaries broadly capture the various species Quota Management Areas (QMA) (Table 74) and are useful to support distinguishing specific UoA-catch. For the most part however the trawl fishery is seen as a multi-species target fishery for the three Principle 1 species and additionally silver and white warehou (Anderson et al 2019).		

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PI 2.1.3R	Information on the nature and amount of in-scope species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage in-scope species
	Information and data come from a variety of sources including independent Fisheries New Zealand Observer data, industry reporting, contracted fisheries independent research surveys, and contracted projects. The Ministry for Primary Industries (MPI) has a clear and robust system for gathering commercial- and research-related information. Commercial, observer and scientific information is collected in a consistent manner and subject to a strong process of review and validation. The catch monitoring system, that transitioned to the Electronic Reporting System (ERS) in 2019, determines the total catch by QMA and hence the size of the catch by the target fisheries relative to the total catch. Trawl vessels submit daily the Fish catch report – an estimate of the top 5 QMS species and top 3 non-QMS species; Processing report - for vessels that process their catch on board. These must be completed and provided before the close of the day; A disposal report - for each fishing event where fish are disposed unless the vessel is submitting processing reports. In this case, they submit a disposal report covering the same period as the processing report; Landing report - a detailed inventory of catch upon landing followed by an update to the report once green weights are confirmed by licensed fish receivers. The landing report covers all species, as opposed to the daily fish catch report, and provide a reliable census of the landed catch per species stock QMA. Observer coverage of deepwater fisheries is planned by financial year and is based on biological information requirements, international requirements, percentage-level coverage targets and observer programme capacity. 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. Fisheries New Zealand 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). Fisheries New Zealand and the Department of Conservation work together each year to develop a 'seadays plan'. Fisheries New Zealand observers have recorded details of catch and discards by species or species groups for the fleet of vessels involved in hoki, hake and ling trawl fishery in every fishing year since 1990–91. Only a portion of the fishing effort can be covered, however, and the allocation of observers on commercial vessels considers a range of data collection requirements and compliance issues for multiple fisheries, as well as the capacity of vessels to accommodate additional personnel. Although it is not possible to achieve a perfectly representative or random spread of observer effort across the fishery, the analyses used in, for example, Anderson et al 2019, Spatially Explicit Fisheries Risk Assessments (SEFRAs e.g. Edwards et al 2023) and Finnuci et al 2020, find that the observer coverage closely matches the overall spatial and temporal spread of the commercial fisheries. The Observer Program Trawl Catch and Effort Logbook includes details covering the shooting of the gear, start, during the tow, end and hauling the gear. Greenweight catch is estimated for the full bag and for each species separately. For processed catch for each species the following are recorded: processed state, grade, number of processed units, unit weight, processed catch weight, conversion factor and greenweight. For all other whole fish that are discarded, discarded alive, lost, mealed, retained as specimens or stored in bulk the following information is recorded: species, type or discard status, greenweight.

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PI 2.1.3R	Information on the nature and amount of in-scope species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage in-scope species
	At-sea monitoring in the trawl fishery achieved an average level of observer coverage for the hoki-, hake- and ling-targeted tows over the period 2018-19 to 2022-23 at 44.3% (Table 107). Data for 2018-19 to 2020-21 were retrieved from the Protected Species website; data for 2021-22 & 2022-23 were retrieved from MPI databases (SNZ, 2024). Per MSC Toolbox V1.2, A1.3.8, In scoring issue (c), the team shall use its expert judgement to consider the adequacy of information in relation to supporting the management measures, partial strategy, or strategy, including the ability to detect any changes in risk level to in-scope species. The observer sea day allocation and cost-recovery system from quota holders, the independence of observers as they are employed by the MPI and the rigorous review and quality assurance processes outlined in the Science and Research Standard for all information collected, provides assurance that there is no possibility that the commercial interests of the fishery directly prejudice the collection or provision of truthful information. The high level of observer coverage, the up to date catch profiles and coverage statistics, as well as extensive analysis to confirm representativity satisfy the requirements that the observed catch profile provides estimates of total mortality with a high degree of precision. Information is adequate to support a partial strategy to manage main in-scope species, SG60 and SG80 are met. Noting the lack of clear quantitative indices of abundance, uncertainty about biological stock structure of in-scope species and inability to conduct robust stock assessments, information is not adequate to evaluate with a high degree of certainty whether the management strategy is achieving its objective, SG100 is not met.

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	90
Condition number (if relevant)	NA

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PI 2.2.1 – ETP/OOS species outcome

PI 2.2.1		The direct effects of the UoA do not hinder recovery of the ETP/OOS unit to favourable conservation status		
Scoring issue		SG 60	SG 80	SG 100
a	Direct effects			
	Guide post	The direct effects of the UoA are unlikely to hinder recovery of the ETP/OOS unit to favourable conservation status.	The direct effects of the UoA are highly unlikely to hinder recovery of the ETP/OOS unit to favourable conservation status.	There is a high degree of certainty that the direct effects of the UoA do not hinder recovery of the ETP/OOS unit to favourable conservation status.
	Met?	Yes – all 31 seabird species, New Zealand fur seal	Yes – all 31 seabird species, New Zealand fur seal	Yes – all 31 seabird species, New Zealand fur seal
Rationale		Per Table SA8 the probability required at different scoring guideposts are as follows: “Unlikely” = > 70th %ile “Highly unlikely” = > 80th %ile “High degree of certainty” = > 95th %ile Seabirds Table 80 lists the top 31 seabird species with which the trawl UoAs have recorded interactions, including designation of negligible or non-negligible interaction rates. For 24 species there are non-negligible interactions and only these species are assessed. Table 81 provides the annual observable captures, deaths and risk per species, ranked from highest to lowest median risk for the top 31 species (noting these are not necessarily the same as the top 31 species with which the trawl fisheries interact). Species with a median risk ratio <1 are not expected to hinder the achievement of population management (Richard et al., 2020). The default objective is that Risk = 1 corresponds to a median population-stabilisation outcome of 75% of the unimpacted level. This is a higher target than is set by the MSC Standard V3.1 per SA3.9.2.1, <i>The team shall consider favourable conservation status to be a level equivalent to at least 50% carrying capacity unless the team has defined a higher level based on the life history characteristics of the ETP/OOS unit.</i> The 95% credible limit is taken to be equivalent to a high degree of certainty required at the SG100 scoring level. For all species where the median risk is <1 but the upper 95th%ile credible limit is >1 the direct effects of commercial fisheries in New Zealand is only highly unlikely to hinder recovery of the species. Where both the Median risk and upper 95th%ile are <1 there is a high degree of certainty the direct effects of commercial fisheries in New Zealand do not hinder recovery of the species. It is notable however that the determined risk accounts for mortality from all commercial fisheries in New Zealand, and not just the direct effects of the trawl fishery UoAs. This is most relevant for the southern Buller's albatross where risk is currently assessed to be >1. It is assumed that the bulk of captures by the UoA would have been accounted for within the categories 'Large Freezer', 'Large Fresher' and 'Small inshore (17-28m)' which accounted for 27% (210 of 785) of all southern Buller's captures over the period 2006-07 to 2019-20 (Edwards et al., 2023a). Whilst it is not clear that by almost quartering the mortality there would be a corresponding reduction of the risk score for the species it is likely that the risk score would drop significantly if only the direct effect of the		

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PI 2.2.1	The direct effects of the UoA do not hinder recovery of the ETP/OOS unit to favourable conservation status
	UoAs was accounted for. Similarly for species where the upper 95thile credible limit is >1 the risk score would be lower if mortality only from the trawl UoAs was assessed. For all other species, it is clear that, despite including all commercial fisheries in New Zealand in the determination of the risk score, there is a high degree of certainty that the risk posed by all fisheries, and consequently by the trawl UoAs, will not hinder recovery of those species. A helpful review was provided by the fishery client through Sharp (2025) which updated cryptic mortality multipliers used in the Edwards et al 2023 SEFRA and which also parcelled out the mortality attributable to the trawl UoAs under assessment. The confirmation of mortality and subsequent risk posed by the UoAs only is presented by Sharp (2025) to be orders of magnitude lower than estimated by Edwards et al 2023. Sharp (2025) focused on the three most at risk species: southern Buller's albatross, Salvin's albatross and white-capped albatross. Sharp (2025) estimated mean annual deaths attributable to the trawl UoAs and the risk that the equilibrium population size will be reduced as follows: - Southern buller's albatross: 36.3 individuals; risk = 0.089 - Salvin's albatross: 122.6 individuals; risk = 0.048 - White-capped albatross: 78.5 individuals; risk = 0.022 These updated results indicate that the mortalities caused by the trawl UoAs in assessment targeting hoki, hake and ling, are lower than can be sustained by the populations over the long-term. With the revised risk ratios calculated for the UoAs only being significantly <1, there is a high degree of certainty that the UoAs will not hinder recovery of southern Buller's albatross, Salvin's albatross and white-capped albatross, SG60, SG80 and SG100 are met. For all other seabird species with which the trawl fishery interacts, despite the lack of UoA-specific estimates of mortality, there is a high degree of certainty that the UoAs will not hinder their recovery (risk score <1) and SG60, SG80 and SG100 are met. Chondrichthyans Per Anderson et al 2019 (Table 76), protected species capture data 2016/17-2020/21 (Table 79) and updated observer data for 2018/19-2022/23 (Table 84) all ETP/OOS chondrichthyans which interact with the trawl fishery UoAs constitute a negligible proportion of the catch per SA3.1.1d.ii, and there is no requirement for further assessment (MSC 2024, V3.1, Figure SA3). Marine Mammals Per Table 79 there are five marine mammal species with which the trawl fishery UoAs interact. Only for the New Zealand fur seal are interactions non-negligible. For the New Zealand sea lion, long-finned pilot whale, dusky dolphin and killer whale the interactions fall below ten per annum and the lower bound of estimated breeding population size is equal to or greater than 5,000 individuals, meeting the definition of "negligible per SA3.1.1.d.i and there is no requirement for further assessment (MSC 2024, V3.1, Figure SA3). New Zealand fur seal An updated SEFRA by MacKenzie et al 2022 determined the equilibrium status metric of population impact (proportion of carrying capacity K after long-term constant exploitation rate for the New Zealand fur seal population in New Zealand at 86.40 with 95% c.i 74.9 – 93.7. Therefore at the current rate of exploitation there is a high degree of certainty that the trawl fishery UoAs will not hinder recovery of the population to a favourable conservation status (a level equivalent to at least 50% carrying capacity), SG60, SG80 and SG100 are met.

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Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	≥80
Information gap indicator	More information sought The fishery is in the process of updating the FNA and OPs that these species will no longer be allowed to be landed against a fin to greenweight ratio. Further consultation to review the updated FNA and confirm observer protocols with respect to its enforcement will be sought at the site visit.

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	100
Condition number (if relevant)	NA

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PI 2.2.2 – ETP/OOS species management strategy

PI 2.2.2		The UoA has precautionary management strategies in place designed to:		
		- Ensure that incidental catches of the ETP/OOS unit are minimised and where possible eliminated - Ensure that the UoA does not hinder recovery to Favourable Conservation Status.		
Scoring issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are measures in place, if necessary , that are expected to minimise the UoA-related mortality of the ETP/OOS unit and achieve the ETP/OOS outcome SG80 level of performance.	There is a strategy in place, if necessary , that is expected to minimise the UoA-related mortality of the ETP/OOS unit and achieve the ETP/OOS outcome SG80 level of performance.	There is a comprehensive strategy in place that is expected to minimise the UoA-related mortality of the ETP/OOS unit and achieve the ETP outcome SG80 level of performance.
	Met?	Yes – all ETP/OOS species	Yes – all ETP/OOS species	Yes – all ETP/OOS species
Rationale		Per SA3.4.1 the team shall interpret: “Measures” to mean actions or tools that explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impacts elsewhere. “Strategy” to mean a cohesive and strategic arrangement that may comprise 1 or more measures and an understanding of how the measures work to achieve an outcome. A “strategy” should be designed to manage impact on that component specifically, it needs to be appropriate to the scale, intensity, and cultural context of the fishery and should contain mechanisms for the modification of fishing practices if unacceptable impacts are identified. “Comprehensive strategy” to mean a complete and tested strategy made up of linked monitoring, analyses, and management measures and responses. All ETP Species A range of management measures, including 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 deepwater industry’s monitoring of ETP species are described in DWG’s Operational Procedures (OPs) and Vessel Management Plans (VMPs), (DWG, 2024), which include: - Hoki OPs - Hoki OPs Coastal Trawl Fisheries - Marine Mammals OPs - Reporting OPs - Seabirds OPs - Sharks OPs - Deepwater Trawl VMP (template) - Trawl Vessel Protected Species Risk Management Plan (template) - Ten Commandments for:		

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PI 2.2.2	The UoA has precautionary management strategies in place designed to: • Ensure that incidental catches of the ETP/OOS unit are minimised and where possible eliminated • Ensure that the UoA does not hinder recovery to Favourable Conservation Status.
	◦ Fresh Fish Hoki ◦ Marine Mammals ◦ Saving Seabirds • Ten Golden Rules for Protected Species Reporting. The Operational Procedures (OPs) for each species-group include elements of identifying and mitigating risk, safe handling and release following capture, reporting and event response, audit and review. They are monitored and administered by the Deepwater Council (DWC) with performance and conformance audited by Fisheries New Zealand Observers. The OPs are underpinned by New Zealand legislation and National Plans of Action (NPOAs). Key legislation includes : • Seabird Scaring Devices Regulations 2006: requires trawlers over 28 m LOA to deploy devices to reduce warp risk to seabirds • Fisheries Act 1996: requires that: ◦ measures are taken to avoid, remedy or mitigate any adverse effects of fishing-related mortality on any protected species. ◦ This Act also includes requirements to report captures of protected species. ◦ All catch be reported ◦ All QMS-species be landed if taken, except where Schedule 6 applies and provides for their return to the sea (e.g. blue, mako, porbeagle, rig, school shark and spiny dogfish) ◦ Adherence to the prohibition of Shark Finning • Wildlife Act 1953 states it is an offence to deliberately take, or attempt to take, harass, injure, mutilate or retain all or any part of any Protected Species • Animal Welfare Act 1999 • Marine Mammals Protection Act 1978: the accidental capture of any marine mammal is permitted provided that the capture is reported to the appropriate authority without delay. It is an offence to accidentally capture a marine mammal and to not report it. National Plans of Action New Zealand has a responsibility to act in accordance with the objective of International Plans of Action for Seabirds and Sharks. The two NPOAs applicable to deepwater fisheries are: NPOA-Sharks 2022 New Zealand's first NPOA-Sharks was in 2008 and the most recent one was NPOA-Sharks 2013. The 2013 NPOA has been reviewed and the NPOA-Sharks 2022 has been consulted on and a draft NPOA circulated. The final NPOA-Sharks 2022 is imminent with consultations having closed in September 2022.

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PI 2.2.2	The UoA has precautionary management strategies in place designed to: • Ensure that incidental catches of the ETP/OOS unit are minimised and where possible eliminated • Ensure that the UoA does not hinder recovery to Favourable Conservation Status.
	The NPOA sharks 2022's vision is New Zealanders work toward ensuring the long-term viability, biodiversity and functional role of sharks, and that any utilisation of sharks in Aotearoa is sustainable. Its seven goals are: 1) Maintaining biodiversity and ecological long-term viability of shark populations; 2) Ensuring full utilisation of sharks and maintaining the prohibition on shark finning in New Zealand; 3) Avoiding protected and unwanted shark captures, and maximising post release survival; 4) Minimising anthropogenic effects other than direct fisheries impacts; 5) Better Integration of Tangata Whenua Perspectives and Value; 6) International engagement through enhanced monitoring, data collection and information sharing; and 7) Continuous improvement in the research, data and information to conserve and manage sharks, guided by the SEFRA framework and conservation threat status. NPOA Seabirds New Zealand's first NPOA was published in 2004 and a revised NPOA-Seabirds published in 2013. The NPOA Seabirds 2020 is New Zealand's third iteration of a national plan of action. The NPOA Seabirds 2020's vision is New Zealanders work towards zero fishing-related seabird mortalities. Its four goals are: 1) Avoiding bycatch — effective bycatch mitigation practices are implemented in New Zealand fisheries; 2) Healthy seabird populations — direct effects of New Zealand fishing do not threaten seabird populations or their recovery; 3) Research and information — information to effectively manage direct fisheries effects on seabirds is continuously improved; and 4) International engagement — New Zealand actively engages internationally to promote measures and practices that reduce impacts on New Zealand seabirds. ETP and OOS species observer programme The Conservation Services Programme (CSP), administered by the Department of Conservation, has as its aim to avoid, remedy or mitigate the adverse effects of commercial fisheries on protected species. The CSP Annual Plan outlines the conservation services projects required to be delivered each year and forms the basis for levying the commercial fishing industry to cover these costs under the Fisheries Act 1996. The CSP objectives are as follows (DOC, 2023): • Objective A: Proven mitigation strategies are in place to avoid or minimise the adverse effects of commercial fishing on protected species across the range of fisheries with known interactions • Objective B: The nature of direct adverse effects of commercial fishing on protected species is described • Objective C: The extent of known direct adverse effects of commercial fishing on protected species is adequately understood

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PI 2.2.2	The UoA has precautionary management strategies in place designed to: • Ensure that incidental catches of the ETP/OOS unit are minimised and where possible eliminated • Ensure that the UoA does not hinder recovery to Favourable Conservation Status.
	• Objective D: The nature and extent of indirect adverse effects of commercial fishing are identified and described for protected species that are at particular risk to such effects • Objective E: Adequate information on population level and susceptibility to fisheries effects exists for protected species populations identified as at medium or higher risk from fisheries. The CSP planning for middle-depth and deepwater fisheries considers and works in parallel with other relevant planning and management processes such as those prescribed in the following: • National Plan of Action (NPOA) for seabirds • National Plan of Action for sharks • Threat Management Plan (TMP) for the New Zealand sea lion The planning process is iterative and inclusive and ensures that gaps are identified and research synergies are maximised. Observer coverage is planned and prioritised based on specific monitoring objectives for protected species interactions with fisheries and achieving adequate coverage levels for high-risk fisheries to allow detection of changes in bycatch over time. Coverage is aimed at reducing uncertainty around the risks to protected species and assessing mitigation options for identified interactions. The allocation of observer coverage across fisheries is guided by factors including data needs for protected species and fisheries management, compliance, and international obligations, with particular consideration of: • Independently verifying protected species captures • Fishing effort • Past observer coverage • Monitoring of high value stocks or fisheries where there may be a sustainability risk • Current level of information, especially for recently protected species • The status of threatened protected species • Historic mortality of protected species and risk assessment work which has been undertaken • Requirements under the NPOAs and any relevant TMPs or Strategies • Planned and ongoing research priorities/projects for DOC and FNZ • Ministerial directives. Observers working in the offshore deepwater and middle-depth trawl fisheries have multiple priorities including stock assessment data collection, compliance monitoring, protected species research and benthic interaction monitoring. As these fisheries have had historically high and consistent levels of observer coverage over the last ten years, they are well characterised. CSP-focused observer days in these fisheries is therefore less than that allocated to monitoring of commercial fishing and recording of associated biological data, but still deemed sufficient for monitoring of ETP species interactions and compliance with mitigation requirements. CSP observer focus in 2023-24 was prioritised in specific fishery areas as follows (DOC, 2023): 1. Cook Strait hoki spawn fishery (HOK 1) – increased observer coverage due to high fur seal interactions.

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	2. Chatham Rise (HOK 1, HAK1&4, LIN 3&4) - observer focus is on: • ETP coral capture • Monitoring and recording of interactions with, and behaviours of, seabirds • Recording information on mitigation techniques used, including: • bird scaring devices • offal and discard management • trawling known tracks to avoid catching deep sea invertebrates. 3. Sub-Antarctic (HOK 1, HAK 1, LIN 5&6) – observer focus is on: • Monitoring and recording of interactions with, and behaviours of fur seals and sea lions • Seabird interactions and behaviour, due to the close location to many seabird breeding islands • Monitoring of ETP coral captures. 4. West Coast South Island (HOK 1, HAK 7, LIN 7) – observer coverage will target the hoki spawning season during July and August. The fleet has high levels of interactions with fur seals and a wide range of seabirds. The fleet is broadly divided between larger vessels which operate outside the 25 nm line and smaller vessels which operate within 25 nm of the coast. Observer coverage levels are specified specifically for each of these two fleets due to their different fleet dynamics and their associated bycatch profiles (DOC, 2023). The draft Conservation Services Programme Annual Plan 2024/25 presents the priorities for observer program focus and the numerous interaction projects including, for example, determining the efficacy of seabird mitigation in large vessel trawl (DOC, 2024). DWC Liaison Programme for ETP Species Risk Management The overall objectives of the Environmental Liaison Officer (ELO) programme is to: • Visit at least 90% of the deepwater trawl fleet (including fresher, factory, and seasonal hoki), and all scampi and ling bottom longline vessels. • To train senior crew and vessel managers • Promote best practice mitigation standards across the fleet and review the DWG standards set out within the OPs. • Audit Vessel Management Plans (VMPs) and best practice environmental and mitigation practices. • Encourage improvement and effectiveness of fish waste control and mitigation device use and improve real-time reporting of the capture event. • Be on call 7 days a week to respond to any multiple or trigger capture event reported by DWG vessels and reply immediately to gather further information and offer advice. The ELO visits for the 2022/23 fishing season (Cleal, 2023) included 24 of the 25 factory vessels, 3 of the 4 fresh vessels (>28m) and 12 of 12 fresh vessels (<28m). The purpose of these vessel visits is to:

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PI 2.2.2	The UoA has precautionary management strategies in place designed to: • Ensure that incidental catches of the ETP/OOS unit are minimised and where possible eliminated • Ensure that the UoA does not hinder recovery to Favourable Conservation Status.
	• 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. • Review and revise VMPs on scampi and hoki fresh fish fleet. • Provide full induction into DWC programmes to new skippers and/or vessel operators who have moved to new fisheries or have started on new vessels. • Support reviews and re-drafts of any OPs that require renewal. • Produce an end-of-year summary report to DWC, 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, 2019, 2020, 2021, 2022, 2023). The ELO reinforces to Skippers the regulatory requirements for seabird mitigation, for application by all vessels 28 metres or greater in length, that 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.

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	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. Many of the same measures for seabirds are applicable to marine mammals but particularly offal waste management, net cleaning and reducing the time the net spends at the surface. For sharks the focus of the OPs is on the safe handling and live release of animals, with comprehensive instructions provided. Scoring summary It is clear that the aforementioned measures and programs take account of the spatial and temporal fishing patterns of the fleet and supply informed guidance on the modification of fishing practices, including to mitigate risk to and maximise the likelihood of live release of captured ETP/OOS species. The mitigation measures and safe release protocols have been designed and tested and are considered to qualify as best-practice able to demonstrably achieve minimisation of mortalities to ETP/OOS species in trawl fisheries. The combination of the OPs, vessel and observer reporting and ELO program provides assurance that a comprehensive strategy is in place that is expected to minimise the UoA-related mortality of the ETP/OOS unit and achieve the ETP outcome SG80 level of performance, SG60, SG80 and SG100 is met for all ETP species groups and scoring elements.		
b	Management strategy effectiveness		
	Guide post		Evidence indicates that the measures, strategy or comprehensive strategy have reduced or minimised the mortality of the ETP/OOS unit.
	Met?		Yes – seabirds, New Zealand fur seal
Rationale	Seabirds Seabird capture rate reduction targets were established under the NPOA Seabirds for use in comparing them to baseline capture rates. The latter were defined as the average estimated capture rates across the three-year block leading up to the implementation of the NPOA Seabirds 2013 (i.e. the 2010/11 to 2012/13 fishing years), with at least 10% observer coverage and an estimated seabird capture rate coefficient of variation (CV) of less than 0.30. For vessels >28 m length in the middle depth trawl fisheries, the agreed capture rate reduction target was 2.3 estimated captures per 100 tows (i.e. a 15% reduction compared to the baseline of 2.7 estimated captures per 100 tow). The National Plan of Action Seabird reports 2018/19, 2019/20 and 2020/21 provide breakdowns of the observed seabird captures by hoki, hake and ling (i.e. middle depth) trawlers, illustrating		

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PI 2.2.2

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that small albatross species (i.e. mollymawks), petrels & shearwaters are the most abundant groups caught (FNZ, 2020a; FNZ, 2021b; FNZ, 2022a). Historical capture rates for the squid and middle depth trawl fisheries show that for the middle depth trawl fishery the capture rate has remained reasonably stable but with a slight downward trend towards the baseline level in 2020/21 of 2.36 captures per 100 tows (Figure 53), (FNZ, 2023).

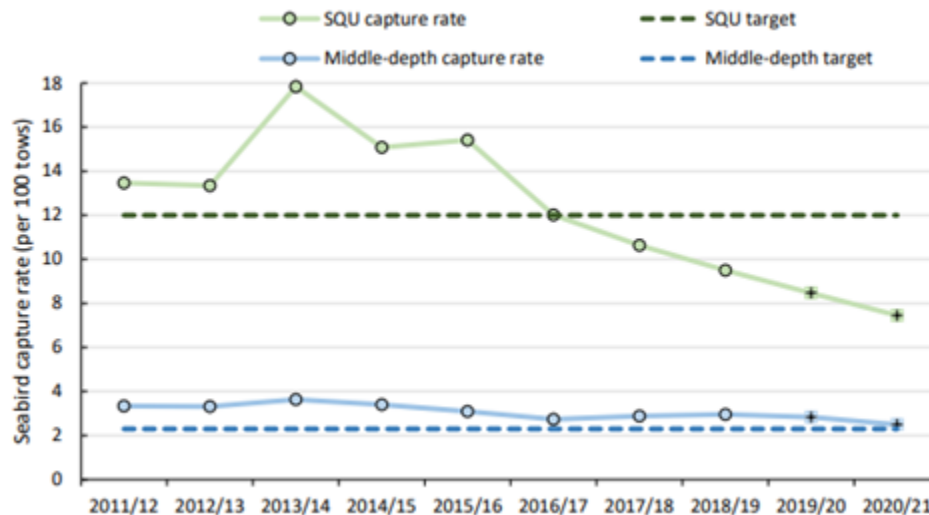


Figure 53. Estimated seabird capture rates (captures per 100 tows) relative to agreed reduction targets, for the >28 m squid and middle-depth trawl fisheries between the 2011/12 and 2020/21 fishing years. As seabird capture rates are expressed as three-year rolling averages, data for 2020/21 represents the average for the 2018/19, 2019/20 and 2020/21 years. Data taken from the Protected Species Bycatch webpage.

It is noteworthy that while seabird mitigation methods and practices (i.e. as per agreed Operational Procedures) by the middle depth and squid fisheries are identical, the squid fleet has shown a substantial catch rate reduction to well below the baseline target in recent years, while the mid water fleet catch rate has more-or-less reached and maintained the target. For seabirds it is clear that the comprehensive strategy in place has reduced the capture rate of seabirds to the NPOA target, though further work is required to minimise net interactions and mortality, **SG80 is met.**

Marine Mammals

New Zealand fur seal

The New Zealand fur seal population is estimated to be around 127,000 and numbers are increasing (Baker et al., 2019). Over the last five years, there have been on average around 18 observed and 97 estimated captures of New Zealand fur seals per year by hoki-targeted tows, with a small fraction being released alive. Observed captures by hake- and ling-targeted tows combined have averaged around 2 per year per 100 tows (Figure 54). This low-rate of interaction qualifies as “minimised” taking into account the scoring element meets SG100 for PI2.2.1 scoring issue a, and the comprehensive strategy in place meets SG100 for PI2.2.2 scoring issue a. **SG80 is met.**

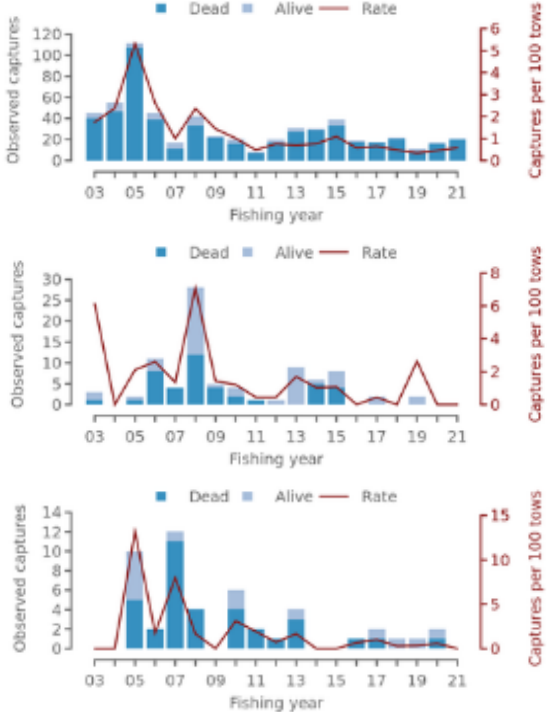
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	 Figure 54: New Zealand observed fur seal captures by the hoki (top), hake (middle) and ling (bottom) trawl fisheries from 2002-03 to 2020-21.		
c	Review of alternative measures to minimise mortality of the ETP/OOS unit		
	Guide post	There is a review at least once every 5 years of the	There is a review that happens every 2 years of

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		- Ensure that incidental catches of the ETP/OOS unit are minimised and where possible eliminated - Ensure that the UoA does not hinder recovery to Favourable Conservation Status.		
			alternative measures to minimise UoA-related mortality of the ETP/OOS unit and they are implemented as appropriate for the ETP/OOS unit.	alternative measures to minimise UoA- related mortality of the ETP/OOS unit, and they are implemented, as appropriate for the ETP/OOS unit.
	Met?		Yes – seabirds Yes – New Zealand fur seal	No – seabirds, New Zealand fur seal
Rationale		Seabirds As most captures now involve interactions with trawl nets, a Net Capture Programme was initiated in 2019 (Steele-Mortimer & Wells, 2023) to explore additional ways of reducing these interactions and is on-going. The trials have focused on three mitigation approaches to date: 1. Attraction – minimising seabird attendance by reducing cues such as sound and scent. 2. Deterrence – keeping attendant seabirds away from the danger area by distraction, scaring. 3. Prevention – creating physical and/or visual barriers to seabird-net interaction. In addition, an analysis was conducted to quantify the risks of net captures associated with different gear configurations and operational factors associated with trawl fisheries operating in the southern areas of the EEZ where seabird interactions are highest. The model estimated relative risk as a probability of seabird capture for multiple capture types, and by species group, and identified the following risks associated with fishing practices (Edwards & Dunn, 2021): • Time of day and season (i.e. higher risk at night and during breeding season) • The duration of time that a net remained on the surface (i.e. food source availability) • The magnitude of other commercial fishing effort in the local vicinity at the time of the haul (i.e. a dilution effect when large numbers of vessels were present) • The type of mesh in the codend (with rotated mesh yielding the lowest probability of capture) • The type of mesh in the lengthener (with hexagonal mesh presenting the lowest risk) • Weather conditions (i.e. lower risk in rough sea conditions) Established in 2019, the Net Capture Programme (Steele-Mortimer & Wells, 2023), focusing on New Zealand squid trawl fisheries, worked collaboratively to ensure all possible mitigation tools and approaches were considered and prioritised ideas for further work based on feasibility (i.e. the mitigation had to be practical within regulatory bounds and safe to use). A long list of mitigation tools and approaches were initially considered, seven were trialled at sea, and two had shore-based trials. In 2020 the following initial “proof of concept” trials commenced on four options at sea: 1. Strategic batching 2. White strips 3. Red streamers 4. High capacity water sprayer Subsequently, feedback has been received on each of these projects from both observers and		

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	Captains amounting to the conclusion that the process to date has highlighted the need to collect adequate data and with explicit objectives for the data such that it poses the right questions sought to be answered. Trawl net captures are complex in nature and simple forms for observers may be inadequate for this purpose. No single solution has emerged to bring about further significant reductions to the risk of seabirds getting entangled in trawl nets (Wells et al., 2021; Steele-Mortimer & Wells, 2023). Efforts to improve seabird net capture mitigation are ongoing. Taking account of the degree to which seabird bycatch is managed and captures in the trawl fishery have been reduced (see scoring under scoring issue a and b), as well as the constitution of the Net Capture Programme (albeit with a focus on squid trawl fisheries) that is convened by the Deepwater Group which the UoAs are a part of, despite that alternatives have not been implemented outside of those already mandated by the Seabird OPs, there is clearly a mechanism in place for review of alternative measures and an awareness of the need to minimise net captures in the New Zealand trawl fisheries, SG80 is met. SG100 is not met as further improvements to seabird net capture are required to minimise mortality of ETP seabirds in trawl fisheries as evidenced by the priority research proposed on this topic under project MIT2024-06 Efficacy of seabird mitigation in large vessel trawl (DOC, 2024). Marine Mammals Mitigation techniques trialled or used in trawl fisheries include acoustic (deterrent) devices, exclusion devices (of different designs), the barring of access to the net through net binding or entrance barriers, and changes to the net colour. Although only limited trials were conducted in trawl fisheries targeting hoki with high fish density and catch rates, Seal Exclusion Devices were not considered feasible for those fisheries due to large volumes of the target species being stuck on the grid leading to loss of catch and concerns about the reduction in flesh quality and value (Tremblay-Boyer, L. & Berkenbusch, K., 2022). For pinnipeds, experiments with acoustic deterrent devices and also with other loud noises, such as “seal scarers” and seal predator sounds (e.g., killer whale), were not effective in displacing fur seals from the vicinity of trawl nets, including in New Zealand’s hoki trawl fishery (Baird 2004). Temporarily closing the entrance of the net during shooting (net binding) is intended to prevent incidental captures during the deployment of the net, with the bindings breaking under increasing pressure from the trawl doors as they spread (Tremblay-Boyer, L. & Berkenbusch, K., 2022). Net binding has been trialled in hoki trawl fisheries in New Zealand and Australia to mitigate the bycatch of seabirds and fur seals (<i>A. pusillus</i> and <i>A. forsteri</i>), respectively (Cleal et al 2009a, Cleal et al. 2009b, FAO 2018). For the two pinniped species, the trials in Australian trawl fisheries seemed to indicate that this method reduces the bycatch of fur seals, but quantitative data of this research are not currently available (see Hamilton & Baker 2019). Furthermore, any successful mitigation through net binding would need to be used in combination with other techniques, to ensure that interactions are not only reduced during net shooting, but also during towing and hauling. For pinnipeds and cetaceans that enter and interact with nets to opportunistically feed on target catch, changing the net colour does not represent a disincentive deterring this behaviour (Tremblay-Boyer, L. & Berkenbusch, K., 2022). Underwood et al 2025 conducted an updated literature review of available pinniped mitigation technologies globally and determined their applicability to New Zealand fisheries (Table 108).

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	Whilst alternative measures have been investigated to minimise UoA-related mortality of NZ fur seal, the initial trials suggested an undue effect on target species catch, the high number of New Zealand fur seal mortalities in the hoki trawl fishery warrants further research into fur seal mitigation techniques for these fisheries, such as further trialling of exclusion devices to develop a fur seal-optimised SED, possibly with acoustically triggered grid section to reduce loss of target fish. A combination of net bindings and hydrostatically triggered net constriction on hauling could also be potential options (Tremblay-Boyer, L. & Berkenbusch, K., 2022, Underwood et al 2025). In sum, the deterrence of pinnipeds from trawl nets, when they are opportunistically seeking to feed from the net, is a cryptic problem for demersal trawl fisheries to mitigate. There are no clear solutions to the problem which could be implemented without creating an undue effect on target species catch. It is clear that New Zealand fisheries, particularly through the Seafood New Zealand Deepwater Council Environmental Management Program, are leaders in the field of research towards a solution. The assessment team conclude that without a clear solution that could be implemented but noting the ongoing research, that SG80 is met. In the absence of a solution but also noting the overall reduction in mortalities, ongoing research and trials, SG100 is not met as mortalities have not been minimised. Table 108. : Summary of technical mitigation measures for New Zealand fur seals. Green indicates the mitigation measure is 'used in fishery' or a 'yes' answer and red indicates the mitigation measure is a 'theory' for the particular method or a 'no' answer, while orange indicates a 'prototype/trialled' mitigation measure or a 'maybe'. Adapted from Underwood et al 2025 to show only trawl fisheries. <table><tr><th>Mitigation measure</th><th>Mitigation measure status (Theory, Prototype/trialled, Used in fishery)</th><th>Applicable to New Zealand fur seals? (Yes/No/Maybe)</th><th>Applicable to New Zealand fisheries? (Yes/No/Maybe)</th></tr><tr><td colspan="4">Trawl – HOKT, MIDT, SBWT, SQUT</td></tr><tr><td>Rigid excluder device SLED/SED</td><td>Used in fishery</td><td>Yes, with smaller spacing between bars, depending on target species size</td><td>Yes, SQUT, SBWT Maybe, HOKT</td></tr><tr><td>Soft/flexible excluder device/Oblique mesh panel & escape</td><td>Used in a fishery</td><td>Maybe, more information needed</td><td>Maybe, SQUT, SBWT, HOKT</td></tr><tr><td>Mesh Barrier - Sealnet</td><td>Used in a fishery</td><td>No</td><td>No</td></tr><tr><td>Marine Mammal Operational Procedures (MMOP)</td><td>Used in fishery</td><td>Yes</td><td>Yes, HOKT, SQUT, SBWT, MIDT</td></tr><tr><td colspan="4">Haul-back manoeuvre</td></tr><tr><td>Net binding during shooting</td><td>Used in a fishery</td><td>Yes</td><td>Yes, HOKT, SBWT, SQUT, MIDT</td></tr><tr><td>Net/codend cinching before hauling</td><td>Prototype/trialled</td><td>Yes</td><td>Yes, HOKT, SBWT, SQUT, MIDT</td></tr><tr><td>Auto-trawl systems to maintain net openness</td><td>Theory</td><td></td><td></td></tr><tr><td>Acoustic devices (ADD, AHD, TAST)</td><td>Theory, TAST</td><td>Maybe, TAST tested on pinnipeds</td><td>Maybe, more research needed for TAST</td></tr><tr><td>Spatial closures</td><td>Used in a fishery</td><td>Yes</td><td>Yes</td></tr></table> In 2014, the Minister of Conservation and the Minister for Primary Industries asked officials to develop a New Zealand sea lion/rāpoka Threat Management Plan (NZSL TMP; DOC & MPI	Mitigation measure	Mitigation measure status (Theory, Prototype/trialled, Used in fishery)	Applicable to New Zealand fur seals? (Yes/No/Maybe)	Applicable to New Zealand fisheries? (Yes/No/Maybe)	Trawl – HOKT, MIDT, SBWT, SQUT				Rigid excluder device SLED/SED	Used in fishery	Yes, with smaller spacing between bars, depending on target species size	Yes, SQUT, SBWT Maybe, HOKT	Soft/flexible excluder device/Oblique mesh panel & escape	Used in a fishery	Maybe, more information needed	Maybe, SQUT, SBWT, HOKT	Mesh Barrier - Sealnet	Used in a fishery	No	No	Marine Mammal Operational Procedures (MMOP)	Used in fishery	Yes	Yes, HOKT, SQUT, SBWT, MIDT	Haul-back manoeuvre				Net binding during shooting	Used in a fishery	Yes	Yes, HOKT, SBWT, SQUT, MIDT	Net/codend cinching before hauling	Prototype/trialled	Yes	Yes, HOKT, SBWT, SQUT, MIDT	Auto-trawl systems to maintain net openness	Theory			Acoustic devices (ADD, AHD, TAST)	Theory, TAST	Maybe, TAST tested on pinnipeds	Maybe, more research needed for TAST	Spatial closures	Used in a fishery	Yes	Yes
Mitigation measure	Mitigation measure status (Theory, Prototype/trialled, Used in fishery)	Applicable to New Zealand fur seals? (Yes/No/Maybe)	Applicable to New Zealand fisheries? (Yes/No/Maybe)																																														
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Soft/flexible excluder device/Oblique mesh panel & escape	Used in a fishery	Maybe, more information needed	Maybe, SQUT, SBWT, HOKT																																														
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Spatial closures	Used in a fishery	Yes	Yes																																														

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		(2017)). The purpose of the NZSL TMP is to describe the first 5 years of a 20 year programme of work to manage the threats to sea lions and achieve the vision of the NZSL TMP. The scope of the plan includes all key threats to the sea lion population and all known breeding sites. The negligible interaction rates with NZ sea lion in the trawl fisheries for hoki, hake and ling means that the species is not assessed as a scoring element in the trawl UoAs under assessment. The focus of the NZSL TMP being the squid and southern-blue whiting trawl fisheries where the risk and impact is highest.		
d	Shark finning (V2.01 SGs per accepted Variation Request)			
	Guide post	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Yes	Yes	Yes
Rationale		LRQA applied for and were granted a Variation Request to apply a blanket modification to the assessment tree for scoring issue 2.1.2d and 2.2.2d, applying the requirements of SA2.4.3–SA2.4.7 (MSC V2.01) to ensure that shark finning is not being undertaken in the UoA. The full variation request and response can be seen in section 12.10. See scoring under PI 2.1.2d, SG60, SG80 and SG100 are met.		
e	Ghost gear management strategy			
	Guide post	There are measures in place, if necessary , for the UoA that are expected to minimise ghost gear and its impact on the ETP/OOS unit.	There is a partial strategy in place for the UoA, if necessary , that is expected to minimise ghost gear and its impact on the ETP/OOS unit.	There is a strategy in place for the UoA, if necessary , that is expected to minimise ghost gear and its impact on the ETP/OOS unit.
	Met?	Yes – all ETP/OOS elements	Yes – all ETP/OOS elements	Yes – all ETP/OOS elements
Rationale		Trawl doors, ground ropes or floats lost at sea do not have the characteristics that would result in ghost fishing. Trawl doors would remain on the seabed, and while they may attract marine communities, they would not be classed as ‘ghost fishing’. For this type of gear, if lost, there would be no scoring elements at risk of interacting with the gear type that would cause mortality. For trawl doors, ground ropes and floats the risk of ghost gear impact is therefore demonstrably absent (GSA3.7.6). For whole trawl nets if a whole trawl were to be lost, the heavy ground gear and doors would pull the gear to the seafloor, where if it were not retrieved there is a risk of ghost fishing. If meshing alone were to be lost as sea, it may remain in the water column and move depending on current flows. However, due to the configuration of trawl nets, losing a single piece of meshing is highly unlikely. The focus of measures to minimise ghost gear and its impact on ETP/OOS scoring elements is therefore on the trawl net as a whole. New Zealand maintains stringent regulations to ensure garbage lost at sea from vessels is minimised. The regulations primarily fall under the Maritime Protection Rules but there are also components of the Fisheries Act (1996) which reduces risk of gear being lost. Vessels are also required by law to report lost gear to authorities as shown in the extracts below.		

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PI 2.2.2	The UoA has precautionary management strategies in place designed to: • Ensure that incidental catches of the ETP/OOS unit are minimised and where possible eliminated • Ensure that the UoA does not hinder recovery to Favourable Conservation Status.		
	Maritime Protection Rules 170.3. General prohibition on discharge of garbage into the sea: 1. Garbage is a harmful substance for the purposes of section 225 of the Act. 2. The discharge of garbage [including fishing gear] into the sea from a ship is prohibited, except as provided in this Part or the Act. 170.4. General exceptions to prohibition: Nothing in this Part prohibits or restricts any person from discharging garbage from a ship if – c) the discharge is an accidental loss of fishing gear from a ship and all reasonable precautions have been taken to prevent such loss; or d) the discharge is a discharge of fishing gear from a ship for the protection of the marine environment or for the safety of that ship or its crew. 170.21. Reporting accidental loss or discharge of fishing gear: In the event of an accidental loss or discharge of fishing gear referred to in 170.4(c) or (d) that poses a significant threat to the marine environment or navigation, the owner and the master of a ship to which this rule applies must report the accidental loss or discharge: a) to the Director; and b) if the accidental loss or discharge occurs within waters subject to the jurisdiction of a coastal State, to the appropriate authority in that coastal State. DWC Management Strategy for lost gear All vessels are required by law to report lost gear. This is done via Electronic Reporting System (ERS). There have been three lost gear events recorded through ERS between 2019-20 to 2021-22 for the HOK/HAK/LIN and southern blue whiting trawl fisheries combined. For one of these events the trawl was retrieved using grapnels. It is not clear what the situation was for the other two events i.e. what the specific gear was and whether it was retrieved or not. In addition to their statutory requirements vessel operators in the HOK/HAK/LIN trawl fisheries have management strategies in place to prevent, mitigate and remediate gear lost or abandoned at sea (Table 109). Discarding gear at sea is prohibited unless under the circumstances noted above. Table 109: Ghost Fishing Gear Management Strategy for HOK/HAK/LIN trawl fisheries (SNZ, 2024) <table border="1"> <tr> <td>Prevention</td><td> • There is inherently very low risk of losing trawl fishing gear in the HOK/HAK/LIN fisheries. The gear is firmly attached to the vessel throughout fishing operations. Losing this type of gear is incredibly costly to the operator and so all precautions are taken to ensure gear is not lost. • Vessel managers and skippers ensure that gear is well maintained before, during and after use. E.g. ○ nets are covered when not in use to avoid UV damage ○ warps are kept appropriately greased to prevent abrasion ○ gear maintenance is conducted when the gear is on board the vessel ○ old or damaged gear is replaced. </td></tr> </table>	Prevention	• There is inherently very low risk of losing trawl fishing gear in the HOK/HAK/LIN fisheries. The gear is firmly attached to the vessel throughout fishing operations. Losing this type of gear is incredibly costly to the operator and so all precautions are taken to ensure gear is not lost. • Vessel managers and skippers ensure that gear is well maintained before, during and after use. E.g. ○ nets are covered when not in use to avoid UV damage ○ warps are kept appropriately greased to prevent abrasion ○ gear maintenance is conducted when the gear is on board the vessel ○ old or damaged gear is replaced.
Prevention	• There is inherently very low risk of losing trawl fishing gear in the HOK/HAK/LIN fisheries. The gear is firmly attached to the vessel throughout fishing operations. Losing this type of gear is incredibly costly to the operator and so all precautions are taken to ensure gear is not lost. • Vessel managers and skippers ensure that gear is well maintained before, during and after use. E.g. ○ nets are covered when not in use to avoid UV damage ○ warps are kept appropriately greased to prevent abrasion ○ gear maintenance is conducted when the gear is on board the vessel ○ old or damaged gear is replaced.		

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PI 2.2.2	The UoA has precautionary management strategies in place designed to: • Ensure that incidental catches of the ETP/OOS unit are minimised and where possible eliminated • Ensure that the UoA does not hinder recovery to Favourable Conservation Status.	
		• In the Coastal Hoki Operational Procedures, vessels are required to have 'windows' in trawl net panels as a safety precaution if a high volume of fish in the net is a risk to crew and gear failure. • Most components of fishing gear are marked for identification
	Mitigation	• The nature of trawl fishing requires waterflow through the net to herd and funnel fish into the codend of the net. A trawl net without drag and lift will collapse and won't have the ability to catch fish. If a whole trawl were to be lost, the heavy ground gear and doors would pull the gear to the seafloor. If meshing alone were to be lost as sea, it may remain in the water column and move depending on current flows. However, due to the configuration of trawl nets, losing a single piece of meshing is highly unlikely. • Trawl doors, ground ropes or floats lost at sea do not have the characteristics that would result in ghost fishing. E.g. trawl doors would remain on the seabed, and while they may attract marine communities, they would not be classed as 'ghost fishing'.
	Remediation	• Trawl gear in these fisheries cost hundreds of thousands of dollars with expensive sensors and other electronics attached. There is significant economic incentive to retrieve gear if lost. • If in the unlikely event a trawl is lost or abandoned at sea, the catch sensors in the codend and net sonde on the headline will emit a signal for up to a week after it is lost. Vessel acoustic systems can pick up the signal and locate the lost gear. • The skipper is also required to record lost fishing gear in ERS, including the specific location of where it was lost. Some vessel operators also maintain a register of garbage (fishing gear) lost at sea. Some do not as it is such an infrequent occurrence. • Sophisticated geo-position sensors on gear during fishing also helps with locating gear. • Once the gear is located, vessels have grapnels onboard to retrieve the gear. • Garbage, including other fishing gear is occasionally trawled up by vessels. Operators will always return this rubbish to shore instead of putting back overboard.
The combination of statutory and fishery-specific management measures, alongside reporting through the ERS and low likelihood and incidence of gear loss on the trawl fishery, constitutes a strategy that is expected to minimise ghost gear and its impact on ETP/OOS scoring elements, SG100 is met. More detailed ERS reporting is recommended to determine the exact cause of gear loss and subsequent outcome (details of retrieval or reason for abandonment).		

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	60-79
Information gap indicator	More information sought

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	Further information on trials of alternative measures to reduce New Zealand fur seal mortality in hoki, hake and ling directed trawls

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	95
Condition number (if relevant)	NA

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PI 2.2.3 – ETP/OOS species information

PI 2.2.3		Information is adequate to determine the impact of the UoA on the ETP/OOS unit and the effectiveness of management measures or strategies in place		
Scoring issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts			
	Guide post	Information is adequate to broadly understand the impact of the UoA on the ETP/OOS unit.	Information is adequate to estimate the impact of the UoA on the ETP/OOS unit, and to estimate whether the UoA may be a threat to its recovery, with a high degree of accuracy .	Information is adequate to estimate the impact of the UoA on the ETP/OOS unit, and to estimate whether the UoA may be a threat to its recovery, with a very high degree of accuracy .
	Met?	Yes – TG1 and PG1 is met for all ETP/OOS species	Yes – TG2 and PG2 is met for all ETP/OOS species	No- TG3 is met for all ETP/OOS species but PG3 is not met for all ETP/OOS species, therefore SG100 is not met
Rationale		See PI2.2.2.a for a description of the Conservation Services Programme (CSP), administered by the Department of Conservation and the Deepwater Council Liaison Programme for ETP Species Risk Management. Four main sources of information are used to identify and assess the nature, extent and potential consequences of ETP/OOS species mortality in fisheries within New Zealand's jurisdiction, or fishing by New Zealand vessels on the high seas: 1. Fisheries New Zealand's observer-reported data. This provides data on ETP/OOS species captures, species identification, use of mitigation measures and general fishing practices, photographs of ETP/OOS species caught on fishing vessels, and specimens (seabirds killed by fishing operations) for onshore analysis. 2. Commercial fisher-reported data. This provides data on the spatial and temporal distribution of fishing effort, and on ETP/OOS captures. These data are summarised in annual environmental liaison officer reports. 3. Research outputs on ETP/OOS species biology, demography, ecology, and at-sea distribution. 4. Data collected by, or reported to, RFMOs. The observer non-fish bycatch and protected species interaction forms prescribe the information to be collected by observers. Observed captures include distinction of the capture method (being warp or door, deck, net, mitigation device for trawlers), the identification method (observer, necropsy, imputation, photograph) and whether the observer witnessed the interaction whilst on duty, the life status when first sighted and at the end of the interaction, the fishing method and declared target species (which allows distinction between UoAs) are linked to a specific tow on a specific vessel, the length and sex of the individual and whether it was tagged and associated details. Observers record details of the mitigation equipment used (tori lines, warp scarer, bird baffler). Through the commercial Electronic Reporting System (ERS) vessels must submit a capture of non-fish or protected fish species report. This is a report of any non-fish and protected species caught for a fishing event and must be provided with the corresponding fish catch report. If caught when not fishing, for example, while steaming, the vessel must provide a report before the close of the day on which the permit holder became aware of the capture. Protected species capture events are reported through a real-time reporting capture event threshold system against trigger points specified in the reporting and species group Operational Procedures.		

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Assessments of the risk posed to ETP bird species using the estimation of Annual Potential Fatalities (APFs) and Potential Biological Removals (PBRs) (Richard & Abraham, 2015; Baker & Hamilton, 2016; Edwards et al., 2023) and also marine mammals (Abrahams et al 2017, MacKenzie et al 2022) have culminated in the Spatially Explicit Fisheries Risk Assessment (SEFRA) methodology. observer data are used to determine fleet-level mortality. Observer data are 'groomed' as a form of validation and the similarity between the actual and expected (from the model) number of observed captures is modelled to provide a spatially-oriented numerical summary of model fit. Uncertainty with raised estimates is reported in the form of coefficients of variation or confidence intervals.

For ETP/OOS species (ERF, v1.2, GB1.3), "catch estimate" is interpreted to mean an estimate of all direct effects of the UoA. This includes an estimate of all fatal interactions with the species, whether associated with the gear or another aspect of the fishing operation.

Interactions with non-fish and protected species bycatch are reported to management authorities when they occur through the ERS system. Operators are also bound by the trawl Operational Procedures for reporting, seabirds, marine mammals and sharks that include reporting when interactions exceed trigger thresholds within a 24-hour or 7-day period. Independent verification of catches with coverage that is representative of the UoA's fishing operations is achieved through the at-sea scientific observer program. The achieved level of observer coverage for each of hoki, hake and ling-targeted tows over the period 2018-19 to 2022-23 averaged out at 44.3% (Table 107). The observer program and sampling design covers all major characteristics of the fleet of trawl vessels operating in the UoAs and has been tested to show that it is representative in both time and space (see Anderson et al 2019). Observers report which component of the fishing or mitigation gear the ETP/OOS species interacted with. They also report non-fishing gear related interactions such as seabird collisions with vessels. The independent catch monitoring system, operated at a high-level of representative coverage provides that most potential sources of bias have been mitigated, and where bias might exist, its effect on trueness is well understood and is not considered to be consequential, **TG3 is met**.

Total interactions and raised catch estimates for some species estimates are reported through DragonFly data Science protected species capture website. The Spatially Explicit Fisheries Risk Assessments (SEFRAs) that have been iteratively improved for seabirds and marine mammals include tests of observer coverage representativity (through model fit of observed and model predicted interactions) and annual average fleet-level catch estimates. Uncertainty with raised estimates is reported in the form of coefficients of variation or confidence intervals, to a level of high degree of certainty = > 95th %ile. The extent to which ecological and biological characteristics of a species influence variability in catch estimates is accounted for by a range of variables and parameters used in the multi-species SEFRA estimation model, including, for example, density overlap for a given species with a fishing event at a month by month level and species group level effect for probability of live capture. The independent catch monitoring system in place is expected to account for the main sources of random error that may affect the precision of catch estimates, **PG2 is met**. Per ERF V1.2 B1.3.4, *The team shall determine that PG3 is met if the catch monitoring system enables a census of catches using independent observation and the team should interpret the term "census" to mean the observation of all catch events, such that total catch can be known from the data rather than being estimated from a sample* (GB1.3.4). This is not the case in the hoki, hake and ling trawl fishery, **PG3 is not met**.

Information adequacy for management strategy

b	Guide post	Information is adequate to support measures to manage impacts on the ETP/OOS unit.	Information is adequate to support a strategy to manage impacts on the ETP/OOS unit, and to measure trends to	Information is adequate to support a comprehensive strategy to manage impacts on the ETP/OOS unit, and to

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			evaluate the effectiveness of the measures to minimise mortality.	evaluate the effectiveness of the measures to minimise mortality with a high degree of certainty .
	Met?	Yes – all ETP/OOS species	Yes – all ETP/OOS species	Yes – all ETP/OOS species
Rationale		See PI2.2.2.a for a description of the comprehensive management strategy in place for ETP/OOS species. The range of information collected through statutory reporting to management authorities and independent observations provides the basis for monitoring changes in risk levels to ETP/OOS species with which the trawl UoAs interact. Data and information collection is prioritised to reduce uncertainty in formal, quantitative risk assessments for protected species, and to provide information on issues where there is public interest in of risks from fishing to the aquatic environment. Implementation of a risk-based approach has enabled prioritisation of areas on which to focus mitigation or data collection efforts. The National Institute of Water and Atmospheric Research (NIWA) currently carries out the role of Data Manager and Custodian for the fisheries research data owned by the Ministry for Primary Industries (MPI). The Centralized Observer Database (COD) is dedicated to information collected by Ministry scientific observers. Observer data are reported through multiple platforms such as the DragonFly Science protected species capture website and numerous research studies the likes of SEFRAs for marine mammals and seabirds. Drivers of research in this area include the National Plan of Action (NPOA)-Seabirds and NPOA-Sharks. The Aquatic environment and biodiversity annual review (AEBAR) last updated in 2021, with Chapter 10 chondrichthyans updated 2024, primarily addresses interactions between the seafood sector, biodiversity, and the aquatic environment. The AEBAR is supported by more detailed reports and science papers published on-line each year. The information contained within the AEBAR informs decision-making in Fisheries New Zealand. The AEBAR is organised by topic (e.g., protected species, bycatch, benthic impacts, etc.), and almost all topics involve more than one fish stock or fishery. Overall, information is adequate to support a comprehensive strategy to manage impacts on the ETP/OOS unit. As noted above in PI2.2.2.e there have been limited studies to evaluate the effectiveness of alternative mitigation measures. The mitigation measures in use have been shown to be effective for seabirds (Figure 53), though net interactions remain stubbornly persistent and further research is required to mitigate them. For pinnipeds observed captures by hoki- targeted tows have averaged 18 per year and for hake- and ling-targeted tows combined have averaged around 2 per year per 100 tows (Figure 54). The evaluation of the effectiveness of mitigation measures can be assessed through observer coverage (>40% in the UoAs, Table 107) and commercial reporting through the ERS (100% coverage) at levels adequate to measure their effectiveness with a high degree of certainty. SG100 is met.		

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	≥80
Information gap indicator	More information sought Studies evaluating the effectiveness of mitigation measures

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	90
Condition number (if relevant)	NA

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PI 2.3.1 – Habitats outcome

PI 2.3.1		The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(ies) responsible for fisheries management in the area(s) where the UoA operates		
Scoring issue		SG 60	SG 80	SG 100
a	Less sensitive habitats			
	Guide post	The UoA is unlikely to reduce structure and function of less sensitive habitats to a point where there would be serious or irreversible harm .	The UoA is highly unlikely to reduce structure and function of less sensitive habitats to a point where there would be serious or irreversible harm .	There is evidence that the UoA is highly unlikely to reduce structure and function of less sensitive habitats to a point where there would be serious or irreversible harm .
	Met?	Yes – gravel, mud, and sand, upper and mid-slope within all BOMECE classes	Yes – gravel, mud, and sand, upper and mid-slope within all BOMECE classes	Yes – gravel, mud, and sand, upper and mid-slope within all BOMECE classes
Rationale		SA3.12.3a (MSC 2024) provides that the team classify habitats as 'less sensitive' if <i>the habitat would be able to recover to at least 80% of its unimpacted structure and function within 20 years if fishing were to cease entirely</i>. For the purpose of defining habitat scoring elements the fifteen groups recognised by the Benthic-Optimised Marine Environment Classification, BOMECE (Leathwick et al. 2012) were used as they provide an appropriate level of detail for broad-scale classification of New Zealand's EEZ to depths of 3000m (Table 90). The groups show strong separation in relation to depth, comprising three inshore groups (A, B and D), three shelf groups (C, E and F) and nine deeper water groups (G-O) (Figure 36). SA3.12.4 provides that <i>in the case of "less sensitive" habitats, the team shall interpret "serious or irreversible harm" as reductions in habitat structure and function, such that the habitat would be unable to recover at least 80% of its hypothetical climax state within 20 years if fishing on the habitat were to cease entirely</i>. The most recent spatial analysis (MacGibbon and Mules, 2023) of bottom-contacting trawl effort by commercial trawlers within the New Zealand 200nm Exclusive Economic Zone and Territorial Sea (EEZ+TS), in waters open to trawling down to 1600 m in depth (the 'fishable area'), provides an assessment of spatial coverage of bottom-contacting tows for the period 1990-2021. The BOMECE classes of Leathwick et al 2012 extend to 3000m depth and the analysis by MacGibbon and Mules (2023), despite focusing on the fishable area <1600m, presents the degree of overlap of trawl fishing effort by target species for the full extent of each BOMECE class (Table 91). For simplification the overlap per target fishery for the UoAs, Hoki, Hake and Ling, are extracted and presented in Table 110. The highest proportion of area covered by the hoki footprint 1990-2021 were classes G (Cook Strait) 31.65%, H (Chatham Rise) 28.12%, I (Chatham Rise slope and shelf edge of the east coast South Island) 66.14% and L (Southern Plateau waters) 15.89%. The highest proportion of area covered by the hake footprint 1990-2021 were classes H (Chatham Rise) 5.58%, and I (Chatham Rise slope and shelf edge of the east coast South Island) 3.75%. The highest proportion of area covered by the ling footprint 1990-2021 were classes G (Cook Strait), H (Chatham Rise), I (Chatham Rise slope and shelf edge of the east coast South Island)		

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PI 2.3.1

The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(ies) responsible for fisheries management in the area(s) where the UoA operates

and L (Southern Plateau waters) covering 11.37%, 7.25%, 8.57% and 3.85% over the time period respectively.

Table 110. UoA target fishery overlap with BOMECE class habitat groups for the period 1990-2021 (extracted from MacGibbon and Mules, 2023).

BOMECE		Footprint overlap (%)			
Class	Area (km ²)	HOK	HAK	LIN	Total
A	30661.00	0.50	0.00	0.03	0.53
B	12786.10	6.16	0.38	2.93	9.47
C	90256.50	3.12	0.09	0.37	3.58
D	28085.70	3.04	0.02	0.65	3.71
E	61258.00	9.00	0.39	2.30	11.69
F	38775.80	1.08	0.04	1.17	2.29
G	670130.00	31.65	1.14	11.37	44.16
H	138399.10	28.12	5.58	7.25	40.95
I	52008.30	66.14	3.75	8.57	78.46
J	312604.90	12.02	3.16	0.85	16.03
K	1200.20	0.23			0.23
L	198578.40	15.89	0.45	3.85	20.19
M	233837.40	4.53	0.08	0.09	4.70
N	49554.20	0.31	0.00	0.01	0.32
O	1006911.10	0.00		0.00	0.00
All	2707219.00	6.18	0.78	1.06	8.02

For all BOMECE habitat classes where the footprint overlaps with <20% of the BOMECE extent (Table 110) there is evidence (≤20th %ile) that at least 80% of the habitats unimpacted structure is maintained, **SG60, SG80 and SG100 are met.**

The combined footprint of the three target fisheries overlaps with >20% of the BOMECE classes G, H, I and L (Table 110), thus the scoring of habitat recoverability to an idealised expected recovery state, the unimpacted state, is relevant. Per GSA3.12.3 (MSC 2024) there is an acceptance that the UoA(s) should not be penalised for historical damage. If the unimpacted state has not been defined (as in this case), and cannot be assumed from available information or data, it should be considered as the state of the habitat in year 2006.

The four BOMECE habitat classes can be characterized according to their substratum, geomorphology and biota (SA3.12.2, MSC 2024).

The sediment size of each of these four classes is between 0.1 - 1mm, defined as fine sediment per Box GSA8 (MSC 2024). Seabed relief, measured as a standard deviation of depths in a 3 by 3 km neighbourhood for the four habitat classes is 45.1, 10.8, 11.4 and 3.5 respectively (Leathwick et al 2012). Groups G and H occur in deeper waters along the continental slope, with group G mostly around the entrance to the Cook Strait, and along the south-western coast of the South Island and locally near East Cape. Group H occurs both along the crest of the Chatman Rise and includes the shallower depths of the Challenger Plateau. Group I is restricted to sites along the southern flanks of the Chatham Rise and the eastern slope of the Stewart-Snares shelf. Group L

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PI 2.3.1	The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(ies) responsible for fisheries management in the area(s) where the UoA operates
	occurs on the gently sloping CampBell and Bounty Plateaux. The measure of seabed relief is, unsurprisingly, considering the continental slopes and troughs that characterize these habitat groups, indicative of high relief geomorphology (Box GSA8, MSC 2024). The four groups are however also characterized by strong bottom current dynamics and frequent sediment resuspension events, both of which can control the composition of benthic assemblages (Leathwick et al 2012). The final consideration of habitat classification is the biota community of epifauna, infauna and flora. BOMECS classes were trained on distributional data for eight taxonomic groups (asteroids, bryozoans, benthic foraminiferans, octocorals, polychaetes, matrix-forming scleratinian corals, sponges and benthic fish). Depth was the strongest environmental predictor for species turnover, with seafloor temperature and salinity being the strongest predictors for octocorals and bryozoans respectively (Leathwick et al 2012). Whilst the BOMECS classes are informative for the classification of substratum and geomorphology the Seafloor Community Classification (SCC) of Stephenson et al 2022 provides a clearer description of species compositional turnover. The classification used a broad suite of biotic groups [benthic invertebrates, macroalgae, reef fish and demersal fish] and transformed 33 environmental variables to represent spatial patterns of taxa compositional turnover. Environmental differences between New Zealand SCC groups were mirrored by differences in biological composition (Stephenson et al 2022). For each of the 75 SCCs classified a detailed description of the characterising demersal fish, benthic invertebrate, macroalgae, and reef fish characterising taxa is provided in Supplementary materials as a useful and interpretable reference for stakeholders (Peterson et al 2020). Whilst the SCCs do not conform to the same spatial boundaries of the BOMECS it is clear that they match each other with a degree of similarity (see section 39.1, 21.1, 20.1 and 22.1 in Peterson et al 2020) that allows the assessment team to determine the biota present in each of the relevant BOMECS areas being assessed. None of the four BOMECS areas are characterized by or dominated by erect, encrusting or burrowing communities, in line with the BOMECS characterization of each being dominated by fine sediment types. BOMECS G – SCC 39 occurs in the moderately warm shelf waters of the Cook Strait Benthic invertebrate assemblages are characterised by low frequency occurrence of coral (<i>Monomyces</i> sp. - protected), brittle stars and bivalves (Table 122 in Peterson et al 2020). Demersal fish assemblages are characterised by the high frequency occurrence of hoki, dogfish and red cod, and reef fish assemblages are characterised by several species of reef dwelling wrasse, cod and perch. This group has a high number of samples for demersal fish, a moderate number of samples for benthic invertebrates and a low number of samples for macroalgae and reef fish. BOMECS H – SCC 21 predominantly occurs along the Chatham Rise at intermediate water depths Benthic invertebrate assemblages are diverse and characterised by squid, crustacea, urchins and brachiopods (Table 65 in Peterson et al 2020). Demersal fish assemblages are also diverse and characterised by very high frequency occurrence of Hoki, ling, dory, dogfish, javelinfish and ghost shark (Table 65 in Peterson et al 2020). This group has a very high number of samples for benthic invertebrates and demersal fish and no samples for macroalgae or reef fish. BOMECS I – SCC 20 predominantly occurs along the Chatham Rise shelf break at intermediate water depths

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PI 2.3.1		The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(ies) responsible for fisheries management in the area(s) where the UoA operates		
		Benthic invertebrate assemblages are diverse and characterised by squid, crustacea, urchin, brachiopods and corals (Flabellum, Goniocorella – protected) (Table 62 in Peterson et al 2020). Demersal fish assemblages are also diverse and are characterised by very high frequency occurrence of Hoki, ling, dory and javelinfish (Table 62 in Peterson et al 2020). This group has a very high number of samples for benthic invertebrates and demersal fish and no samples for macroalgae or reef fish. BOMECL – SCC 22 occurring on Campbell and Bounty plateaus south of the Subtropical Front at intermediate water depths waters. Benthic invertebrate assemblages are diverse and characterised by squid, molluscs, crustacea, echinoderms and a brachiopod (Table 68 in Peterson et al 2020). Demersal fish assemblages are also diverse and characterised by and high frequency occurrence of ling, hoki, javelinfish and ghost shark (Table 68). This group has a very high number of samples for benthic invertebrates and demersal fish and no samples for macroalgae and reef fish (Table 68 in Peterson et al 2020). Noting the fine sediment types and that the habitat types are not dominated or characterized by fragile biota, despite that they occur on continental slopes and troughs, the assessment team conclude that if fishing were to cease entirely habitat recovery would occur at a fast pace. Noting also that demersal trawl gear is a high-impacting gear and that these areas have been fished prior to 2006, likely equating to an unimpacted state of between 1-10% of pre-fishing levels, recovery to 80% of the unimpacted state is highly likely within 20 years. Furthermore the UoAs, since 1990, have fished only 44.16%, 40.95%, 78.46% and 20.19 % of habitat classes G, H, I and L respectively (Table 110) and the total number of trawls since 1990, and markedly since 2006, have decreased dramatically (Figure 39). Despite not being afforded formal protection, or the fishery being constrained by a ringfenced footprint, the extent of new areas trawled each year has likewise decreased to historic lows (Table 97). For habitat classes G, H, I and L, considering the proportion of the habitat class fished, the physical and biological characteristics of the habitats, the 2006 unimpacted state, the reduction overall in the number of tows each year, and the contraction of tows to well-worn areas, furthermore that the trawl fishery for hoki, hake and ling is comprised of 10 UoAs each with a fraction of the impact of the fishery as a whole, there is considered to be evidence ($\leq 20^{th}$ %ile) that the UoAs are “highly unlikely” to reduce structure and function of less sensitive habitats to a point where there would be serious or irreversible harm. SG60, SG80 and SG100 are met.		
b	More sensitive habitats			
	Guide post	The UoA is unlikely to reduce structure and function of more sensitive habitats to a point where there would be serious or irreversible harm .	The UoA is highly unlikely to reduce structure and function of more sensitive habitats to a point where there would be serious or irreversible harm .	There is evidence that the UoA is highly unlikely to reduce structure and function of more sensitive habitats to a point where there would be serious or irreversible harm .
	Met?	Yes – sand covered hard substrate with emergent fauna (i.e., sponges, bryozoans, corals), all black, gorgonian,	Yes – sand covered hard substrate with emergent fauna (i.e., sponges, bryozoans, corals), all black, gorgonian,	Yes – sand covered hard substrate with emergent fauna (i.e., sponges, bryozoans, corals), all black, gorgonian,

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PI 2.3.1	The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(ies) responsible for fisheries management in the area(s) where the UoA operates
	stony, and hydrocorals and all UTFs stony, and hydrocorals and all UTFs stony, and hydrocorals and all UTFs
Rationale	SA3.12.3b (MSC 2024) provides that the team classify habitats as 'more sensitive' if the habitat would be unable to recover to at least 80% of its unimpacted structure and function within 20 years if fishing were to cease entirely. New Zealand's deep-sea corals are diverse and wide-spread assemblage and are often found in association with hard-bottom regions, including seamounts, ridges and continental shelf edges (Tracey & Hjørvarsdóttir, 2019). Coral landings are reported from a wide range of depths, with most landings from depths between 800–1000 m, deeper than most hoki/hake/ling-targeted tows for which the median tow depth is ~530 m (Tracey & Hjørvarsdóttir, 2019). The study found that the fishery areas of highest risk to protected corals, were the deepwater fisheries focussed on underwater topographic features (UTFs). Fishing for hoki/hake/ling focuses on areas of flat terrain and does not target UTFs. Trawl nets used are winged and with ground ropes that lack the rockhopper gear required for fishing on UTFs. The assessment team concludes that sand covered hard substrate with emergent fauna (i.e., sponges, bryozoans, corals), all black, gorgonian, stony, and hydrocorals and all Underwater Topographic Features (UTFs) are considered as 'more sensitive' habitats characterized by complex benthic communities. UTFs are provided protection through marine reserves, seamount closure areas (SCAs) and benthic protection areas (BPAs) – totalling 916 of the 1966 UTFs within the New Zealand Territorial Seas and Exclusive Economic Zone (Figure 42). Clarke et al 2022 found that 229 UTFs had overlapping bottom trawl footprints within the EEZ (and TS). By UTF type these were: – Seamount: 21 – Knoll: 128 – Hill: 80. UTFs. As seen in Table 98, based on analysis by Clarke et al 2022, the proportion of the hill, knoll and seamount UTFs fished by the trawl UoAs is 7.6%, 8.6% and 5.1% of the full habitat range inside and outside of the UoAs 'managed area' respectively. Recognising that more sensitive benthic habitat forming invertebrates can occur outside of UTFs, the overlap of the hoki, hake and ling trawl fishery with the modelled distribution of corals, bryozoans, sponges and anemones indicated that the overlap of the hoki/hake/ling trawl fisheries on more sensitive sessile benthic invertebrate habitats is very slight, in the order of 1% or less (Table 99). Even were fishing not to cease entirely, based on the high level of protection afforded to UTFs in New Zealand and the low overlap of the trawl UoAs with UTFs, as well as the low overlap of the fishery with the predicted distributions of corals, bryozoans, sponges and anemones, there is evidence that the UoAs are highly unlikely to reduce structure and function of more sensitive habitats to a point where there would be serious or irreversible harm. SG60, SG80 and SG100 are met.

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

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Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	100
Condition number (if relevant)	NA

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PI 2.3.2 – Habitats management strategy

PI 2.3.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats		
Scoring issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are measures in place, if necessary , that are expected to achieve the habitat outcome SG80 level.	There is a partial strategy in place, if necessary , that is expected to achieve the habitat outcome SG80 level or above.	There is a strategy in place for managing the impact of all MSC UoAs/non-MSC fisheries on habitats.
	Met?	Yes	Yes	No
Rationale		Per SA3.13.2.1, In scoring issue (a) at the SG60 and SG80 levels, the “measures” or “partial strategy” respectively, for a UoA that encounters “more sensitive” habitats shall include, at a minimum: - Requirements to comply with management “measures” to protect “more sensitive” habitats. - Implementation by the UoA of precautionary measures to avoid encounters with “more sensitive” habitats and avoid potential serious or irreversible harm. The main protection measures for benthic habitats established in the New Zealand EEZ to date have been the ‘Seamount’ Closures and the Benthic Protection Areas. Marine reserves, SCAs, BPAs and other major spatial restrictions to trawling are presented in Figure 49 and constitute management “measures” designed to protect “more sensitive” habitats by limiting the direct impacts to those habitats from trawl gear. The functioning regulatory framework is explicit with the ban on bottom-contacting gear within all BPAs and SCAs and as such represents a precautionary approach. Precautionary measures to avoid encounters with “more sensitive” habitats are prescribed in the Deepwater Trawl Benthic Operational Procedures that include benthic triggers defined as significant catches of benthos (Coral – 50 kg, Sponge – 600 kg). Any trigger point breaches must be reported to the Environmental Liaison Officer and Environmental Programme Manager within 24 hours. The immediate vessel response following a trigger is to scout the area with an echosounder, and consider how and where to undertake the next fishing event to mitigate the risk of a similar outcome. The Benthic OPs apply to trawlers >28m, however there are eight vessels <28m within the trawl fleet UoAs (Table 75). For those vessels, as well as vessels >28m, it is a statutory requirement to report captures of protected invertebrate species (corals, bryozoans, sponges) through the Electronic Reporting System (ERS) Non-fish and Protected Species (NFPS) form and all other benthic catch should be reported in the disposals report. These requirements are covered in the Coastal Trawl Fisheries OPs. Reported captures of protected and non-protected benthos enable avoidance or mitigation of catches of benthos through reviews of significant catches of benthos and make relevant operational decisions subsequently. 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 monitor vessel operators’ adherence to agreed environmental risk OPs. Independent fishery observers are required to monitor and report all interactions with benthic habitat forming invertebrates through the benthic interactions form. A summary of the observer and industry-reported catches of ETP and non-ETP benthic species is published in the Annual		

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PI 2.3.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats		
		Review Report for Deepwater Fisheries (FNZ, 2023a), this provides a cohesive link between the two data streams and acts as an indicator of the alignment of the two data sources. All vessels are required to operate in accordance with a principle of avoidance from areas where there may be significant catches of benthos as a result of prior experience or knowledge, as prescribed by the Fisheries Act (1996) that requires <i>avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment</i>. This strategy includes consideration of the effects of weather and tide on the vessel's operations and the ability to maintain gear on targeted tow lines and not drift or be forced off into areas of significant benthos. The combination of spatial measures and mandatory reporting constitutes a partial strategy that is expected to achieve the habitat outcome SG80 level or above. SG60 and SG80 are met. While the strategy is designed to avoid serious or irreversible harm to these habitats, it can only be considered a partial strategy. This is because areas with more sensitive habitats occur outside of protected areas and precautionary measures aimed at avoiding contact with more sensitive habitats are not applied to all vessels in the fleet and the response to triggers for vessels >28m rely on skipper good practice as opposed to prescribed move-on rule procedures. SG100 is not met.		
b	Management strategy effectiveness			
	Guide post	The measures, if necessary , are considered likely to work, based on plausible argument .	There is some evidence that the measures/partial strategy, if necessary , is achieving the objectives set out in SI (a), based on information directly about the UoA and/or habitats involved.	There is evidence that the partial strategy/strategy is achieving the objectives set out in SI (a), based on information directly about the UoA and/or habitats involved.
	Met?	Yes	Yes	Yes
Rationale		The main management measure to conserve more sensitive habitats are spatial exclusions from areas of sensitive habitats. Near-real-time Geospatial Position Reporting and daily Electronic Catch Reporting are mandatory in the hoki, hake and ling trawl fleet. Fisheries New Zealand 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. The Ministry for Primary Industries audits commercial vessel catch-effort and landing reports and reconciles these against multiple sources including VMS records and data collected by onboard MPI observers to ensure that all catches are reported correctly and vessels are adhering to spatial restrictions. There were no reported 'significant catches' of benthos constituting benthic triggers in the last 5-years (per ELO reports for the period 2018/19-2022/23). This is supported by analysis of incidental catches of sessile benthic invertebrate taxa during the period 1989-90 to 2022-23 and in 2022-23 (Table 111), that shows corals, bryozoans and anemones were encountered by a very minor percentage of tows and in minor quantities. Sponges were similarly encountered by a small proportion of tows but involved greater quantities (noting that catch weights were likely over-estimated due to water retention). These data, indicating the low proportion of trawls that are reported to encounter sessile benthic invertebrate taxa, provide some evidence that the operational areas of the trawl fishery for hoki, hake and ling are not taking place in areas of high		

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PI 2.3.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats																																																									
		densities of more sensitive benthic habitat-forming invertebrates and that operational procedures in place stipulating the avoidance of such areas are effective.																																																									
		Table 111: Incidental capture of sessile benthic invertebrate taxa by hoki/hake/ling-targeted tows during the period 1989-90 to 2022-23 and in 2022-23. Source: SNZ, 2024.																																																									
		<table><tr><td></td><th colspan="4">1989-90 to 2022-23</th><th colspan="4">2022-23</th></tr><tr><th>Benthic Taxa</th><th>No. tows</th><th>No. tows with captures</th><th>% tows with captures</th><th>Capture weight (kg)</th><th>No. tows</th><th>No. tows with captures</th><th>% tows with captures</th><th>Capture weight (kg)</th></tr><tr><td>Corals</td><td>89,833</td><td>373</td><td>0.4%</td><td>529</td><td>18,410</td><td>116</td><td>0.6%</td><td>205</td></tr><tr><td>Bryozoans</td><td>89,833</td><td>317</td><td>0.4%</td><td>581</td><td>18,410</td><td>179</td><td>1.0%</td><td>389</td></tr><tr><td>Sponges</td><td>89,833</td><td>3,573</td><td>4.0%</td><td>245,837</td><td>18,410</td><td>1,105</td><td>6.0%</td><td>45,799</td></tr><tr><td>Anemones</td><td>89,833</td><td>1,034</td><td>1.2%</td><td>3,107</td><td>18,410</td><td>232</td><td>1.3%</td><td>587</td></tr></table>					1989-90 to 2022-23				2022-23				Benthic Taxa	No. tows	No. tows with captures	% tows with captures	Capture weight (kg)	No. tows	No. tows with captures	% tows with captures	Capture weight (kg)	Corals	89,833	373	0.4%	529	18,410	116	0.6%	205	Bryozoans	89,833	317	0.4%	581	18,410	179	1.0%	389	Sponges	89,833	3,573	4.0%	245,837	18,410	1,105	6.0%	45,799	Anemones	89,833	1,034	1.2%	3,107	18,410	232	1.3%	587
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The low level of overlap of the trawl fishery UoAs with Underwater Topographic Features (UTFs, Table 98) and low interaction rates with sensitive benthic invertebrates (Table 99) provides some evidence, based on information directly from the UoAs and habitats involved, that the partial management strategy is achieving the objective of maintaining the habitat outcome SG80 level or above. SG60, SG80 are met. The increased percentage of tows with captures of sessile benthic invertebrate taxa in 2022/23 compared with the previous ~20 years (Table 111) may reflect a flaw in the reliance on good practice to avoid sensitive areas and may reflect trawling in sensitive areas outside of protected grounds. The effect of this increased percentage of encounters is on sessile benthic invertebrates is unclear, SG100 is not met.																																																											
c	Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect more sensitive habitats																																																										
	Guide post	Information is adequate to broadly understand compliance in the UoA with management requirements to protect more sensitive habitats.	Information is adequate to determine , with a high degree of accuracy , compliance in the UoA with both its management requirements and protection measures afforded to more sensitive habitats by other MSC UoAs/non-MSC fisheries, where relevant .	Information is adequate to determine , with a very high degree of accuracy , compliance in the UoA with both its management requirements and with protection measures afforded to more sensitive habitats by other MSC UoAs/ non-MSC fisheries, where relevant .																																																							
	Met?	Yes	Yes	Yes																																																							
Rationale		In assessing scoring issue c the assessment team are required to apply B1.2 of the Evidence Requirement Framework (ERF) to assess the trueness of information with respect to compliance with management regulations and other measures to protect more sensitive habitats. This includes: Information to confirm that the UoA has adopted management regulations and other measures to protect more sensitive habitats in the managed area; and																																																									

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PI 2.3.2	There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats
	- Information to confirm that, within the UoA, the management regulations and other measures to protect more sensitive habitats in the managed area are enforced. As part of this, the team should consider if there is clear documentation regarding the management measures and the extent to which the details of those measures are accessible to, and understood by, fishers in the UoA. The team should also consider the method and extent of the monitoring of compliance with spatial management measures in the UoA. Per SA3.13.3.2, <i>The team shall not consider levels of compliance in scoring issue (c), but rather the information available to determine this.</i> The main management measure to conserve more sensitive habitats are spatial exclusions from areas of sensitive habitats. There is clear documentation of management measures for benthos through the Deepwater Trawl and Coastal Trawler Fisheries Hoki Operational Procedures. The OPs are communicated to vessel operators by the Environmental Liaison Officer (ELO) and ELO reports are produced annually summarising the main objectives for the year and areas of success as well as areas requiring further, targeted, work. Per SA3.13.3.3, <i>In determining “where relevant”, the team shall consider and document:</i> <i>Areas where closure is clearly aimed at precautionary protection of more sensitive habitats, based on scientific rationale and best practice. The team shall not include closures that are designed for other purposes.</i> <i>Avoidance of closed areas arising from move-on rules and consideration of other “measures” implemented by all MSC UoAs.</i> <i>Avoidance of any relevant move-on areas implemented by non-MSC fisheries if the area coordinates are available.</i> A small proportion of tows in the hoki, hake and ling bottom trawl fishery occur at depths greater than 800 m, within the Orange Roughy-Oreo fishery areas. More sensitive habitat management measures for that fishery are therefore relevant to this scoring issue. The Public Certification Report for the New Zealand Orange Roughy fishery (MRAG, 2022) details that Orange roughy quota owners have agreed to implement specific benthic interaction measures to closely monitor and minimize catches of live corals within the UoA areas. These measures include identifying Benthic Management Areas (BMAs) containing extensive aggregations or communities of epibenthic organisms such as corals and sponges, and a “Monitor, Pause, Survey and Assess (MPSA)” management framework, underpinned by a set of “trigger points” that, when reached, require management action. The trigger points in the three orange roughy fishery UoAs are set at 50kg of live coral BMA indicator taxa, which can be reached in either a single tow, or cumulatively on a single tow line. The framework is summarized as follows: Monitoring includes routine reporting of non-fish bycatch by observers and industry. This activity is supported by identification keys and training for key crew members. Immediate reporting to DWG is required if the 50 kg trigger point is reached or exceeded. Pausing includes ceasing to fish on a towline when a trigger point is met in a single tow or when the accumulated catch for any towline has reached the trigger-point threshold. DWG will notify the fleet when a trigger point threshold is reached and a towline pause has been implemented, with the coordinates of the towline (start and end positions) and a request that fishing ceases until the area can be surveyed and/or assessed. - Benthic biodiversity surveying will be prioritized for each paused towline.

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PI 2.3.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats		
		4. Paused towlines will be assessed to determine any BMA characteristics in the vicinity of the paused towline. These will be used to inform appropriate management measures (e.g. re-opening the towline, or determination of the level of protection including designation as a BMA or other measure). Notification to the fleet by the Deepwater Group (DWG) refers to the fleet within the Orange Roughy UoAs. Considering that the DWG coordinates the benthic operational procedures applicable to both the hoki, hake and ling and the orange roughy fisheries there is a clear mechanism for the DWG to notify vessels in the hoki, hake and ling UoAs when a trigger point threshold is reached and a towline pause has been implemented, with the coordinates of the towline (start and end positions) and a request that fishing ceases until the area can be surveyed and/or assessed. Should such a notification be made the aforementioned methods of verifying vessel location relative to spatial closures would ensure compliance with the BMA. To structure their evaluation of information trueness the assessment team are required to assess to what extent (ERF, Table GB2): - the information free from conflict of interest; - the information pertinent or connected to the matter in hand; - does the information capture all relevant elements and dimensions; and - are different information sources in agreement. Near-real-time Geospatial Position Reporting and daily Electronic Catch Reporting are mandatory in the hoki, hake and ling trawl fleet. Fisheries New Zealand 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. The Ministry for Primary Industries audits commercial vessel catch-effort and landing reports and reconciles these against multiple sources including VMS records and data collected by onboard MPI observers to ensure that all catches are reported correctly and vessels are adhering to spatial restrictions. It is clear that within the information system available to determine compliance in the UoA with both its management requirements and with protection measures afforded to more sensitive habitats by other MSC UoAs/non-MSC fisheries, that most potential sources of bias have been mitigated, and where bias might exist, its effect on trueness is well understood and is not considered to be consequential. TG3 and consequently SG60, SG80 and SG100 are met.		
d	Ghost gear management strategy			
	Guide post	There are measures in place, if necessary , for the UoA that are expected to minimise ghost gear and its impact on all habitats.	There is a partial strategy in place for the UoA, if necessary , that is expected to minimise ghost gear and its impact on all habitats.	There is a strategy in place for the UoA, if necessary , that is expected to minimise ghost gear and its impact on all habitats.
	Met?	Yes	Yes	Yes
Rationale		New Zealand maintains stringent regulations to ensure garbage lost at sea from vessels is minimised. The regulations primarily fall under the Maritime Protection Rules but there are also components of the Fisheries Act (1996) which reduces risk of gear being lost.		

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PI 2.3.2	There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats
	Vessels are also required by law to report lost gear to authorities as shown in the extracts below. Maritime Protection Rules 170.3. General prohibition on discharge of garbage into the sea: 3. Garbage is a harmful substance for the purposes of section 225 of the Act. 4. The discharge of garbage [including fishing gear] into the sea from a ship is prohibited, except as provided in this Part or the Act. 170.4. General exceptions to prohibition: Nothing in this Part prohibits or restricts any person from discharging garbage from a ship if – e) the discharge is an accidental loss of fishing gear from a ship and all reasonable precautions have been taken to prevent such loss; or f) the discharge is a discharge of fishing gear from a ship for the protection of the marine environment or for the safety of that ship or its crew. 170.21. Reporting accidental loss or discharge of fishing gear: In the event of an accidental loss or discharge of fishing gear referred to in 170.4(c) or (d) that poses a significant threat to the marine environment or navigation, the owner and the master of a ship to which this rule applies must report the accidental loss or discharge: c) to the Director; and d) if the accidental loss or discharge occurs within waters subject to the jurisdiction of a coastal State, to the appropriate authority in that coastal State. DWC Management Strategy for lost gear All vessels are required by law to report lost gear. This is done via Electronic Reporting System (ERS). There have been three lost gear events recorded through ERS between 2019-20 to 2021-22 for the HOK/HAK/LIN and southern blue whiting trawl fisheries combined. For one of these events the trawl was retrieved using grapnels. It is not clear what the situation was for the other two events i.e. what the specific gear was and whether it was retrieved or not. In addition to their statutory requirements vessel operators in the HOK/HAK/LIN trawl fisheries have management strategies in place to prevent, mitigate and remediate gear lost or abandoned at sea (PI2.2.2, Table 109). Discarding gear at sea is prohibited unless under the circumstances noted above. The combination of statutory and fishery-specific management measures, alongside reporting through the ERS and low likelihood and incidence of gear loss on the trawl fishery, constitutes a strategy that is expected to minimise ghost gear and its impact on all habitats, SG60, SG80 and SG100 are met. More detailed ERS reporting is recommended to determine the exact cause of gear loss and subsequent outcome (details of retrieval or reason for abandonment).

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	90
Condition number (if relevant)	NA

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PI 2.3.3 – Habitats information

PI 2.3.3		Information is adequate to determine the impact of the UoA on habitats, including changes in the risk posed by the UoA over time		
Scoring issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide post	The types and distribution of habitats are broadly understood .	The nature, distribution, and vulnerability of habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA.	The distribution of habitats is known over their range, with particular attention given to the occurrence of vulnerable habitats.
	Met?	Yes	Yes	Yes
Rationale		Per SA3.14.1 The team shall interpret “vulnerability” for the SG80 and SG100 levels to mean the combination of: - The likelihood that the gear would encounter the habitat. - The likelihood that the habitat would be altered were an encounter between the gear and the habitat to occur. In New Zealand the Benthic-Optimised Marine Environment Classification, BOMECE (Leathwick et al. 2012), used a combination of environmental predictors and distributional data for eight taxonomic groups (Table 90) to train an environmental classification for New Zealand's Exclusive Economic Zone (EEZ) with depths of 3000m or less. The combination of these predictors and biota meets the requirements of SA3.12.2 (MSC V3.1) for recognising distinct benthic habitat types (Figure 36). Over and above this the Seafloor Community Classification (SCC, Stephenson et al. 2022) provides a description of species compositional turnover. The classification used a broad suite of biotic groups [benthic invertebrates, macroalgae, reef fish and demersal fish) and transformed 33 environmental variables to represent spatial patterns of taxa compositional turnover (Figure 37). Through these detailed pieces of work the nature and distributions of habitats are known at a level of detail relevant to the scale and intensity of the UoA. SG60 is met. The most recent spatial analysis (MacGibbon and Mules, 2023) of bottom-contacting trawl effort by commercial trawlers within the New Zealand 200 nm Exclusive Economic Zone and Territorial Sea (EEZ+TS), in waters open to trawling down to 1600 m in depth (the ‘fishable area’), provides an assessment of spatial coverage of bottom-contacting tows for the period 1990-2021 and 2021 exclusively. The ‘fishable’ area represents waters in 0–1600 m depths that are open to trawling: that is, waters exclusive of Benthic Protection Areas (BPAs) that were introduced in 2007, closed areas to protect underwater features including seamounts (the first of which were closed in 2001), marine farms, and marine reserves. Overlap is reported both against BOMECE areas (Table 91, Table 92) and depth zone (Table 93, Table 94) and indicates further that bottom contact was targeted at the preferred habitat of the target species (Table 95). This work speaks to the likelihood that the UoAs fishing gear would encounter the various habitat types within the managed area (meeting SA3.14.1a). Clarke et al 2019 investigated the resilience and recovery dynamics of deep-sea habitats impacted by bottom trawling at the Graveyard Knolls, a group of six small seamount features off New Zealand. Their study indicated that as few as 10 trawls in deep-sea environments can reduce average coral cover from 15 to 20% down to zero (no visible cover). Additionally Rowden et al 2024 characterized mobile bottom fishing gear configurations and assessed the spatial and temporal extent of bottom contact by those various configurations. The approach by Rowden et al 2024 took into account the relative widths of 24 separate gear categories (incorporated directly into Swept Area Ratio (SAR) calculations) to estimate the Relative Benthic Status (RBS) as a		

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PI 2.3.3		Information is adequate to determine the impact of the UoA on habitats, including changes in the risk posed by the UoA over time		
		quantitative method for assessing risk to benthic habitats by mobile bottom fishing methods. That work speaks to the likelihood that the habitat would be altered were an encounter between the gear and the habitat to occur (meeting SA3.14.1b). The consideration of vulnerability (as required per SA3.14.1), at a level of detail relevant to the scale and intensity of the UoA, satisfies the SG80 requirements, SG80 is met. As a basis for estimating the impact of the hoki/hake/ling fisheries on sensitive benthic habitats, Clarke et al 2022 assessed the extent to which feature-based fisheries have trawled on or near underwater topographic features (UTFs, Figure 40) in the New Zealand Exclusive Economic Zone (EEZ). A total of 916 UTFs are currently protected from bottom trawling as they are within either a BPA or a SCA (Figure 42). Clarke et al 2022 found a total of 229 UTFs had overlapping bottom trawl footprints within the EEZ (and TS). By UTF type these were: – Seamount: 21 – Knoll: 128 – Hill: 80. Furthermore the recent trawl footprint for the period 2018-19 to 2022-23 fishing years was plotted against predicted distributions for protected corals, bryozoans, sponges and anemones at the >50th percentile level (SNZ, 2024). The analyses indicate that the overlap of the hoki/hake/ling trawl fisheries on sessile benthic invertebrate habitats is very slight (Figure 43; Figure 44; Figure 45; Figure 46; Table 99). It is clear that particular attention is paid to vulnerable habitats and the UoAs impacts on them are known at a level of detail relevant to the scale and intensity of the UoA. SG100 is met.		
b	Information adequacy for assessment of impacts			
	Guide post	Information is adequate to broadly understand the impacts of gear use on habitats.	Information is adequate to estimate the impacts of the UoA on habitats with a high degree of accuracy .	Information is adequate to estimate the impacts of the UoA on habitats with a very high degree of accuracy .
	Met?	Yes - TG1 (all habitats) Yes - PG1 (more sensitive habitats)	Yes – TG2 (all habitats) Yes – PG1 (more sensitive habitats)	Yes – TG3 (all habitats) Yes – PG1 (more sensitive habitats)
Rationale		Per SA3.14.2 In scoring issue (b), the team shall apply the Evidence Requirements Framework in Tool B of the MSC Fisheries Standard Toolbox to determine which guidepost is met. Per Table B1 of the ERF, B1.2 (trueness) applies to all scoring elements and B1.3 (precision) applies to all scoring elements that are a habitat-forming species associated with more sensitive habitats. Per GB1.4.1 and Table B5 of the MSC Fisheries Standard Toolbox v1.2, only PG1 has to be met for all scoring elements that are a habitat-forming species associated with more sensitive habitats across SG60, 80 and 100. Information on the spatial and temporal distribution of fishing effort in the UoA in relation to habitats is available for all less sensitive habitat scoring elements through MacGibbon and Mules (2023) reporting the extent and intensity of bottom contact by trawl fisheries using data from 1990-2021. For all more sensitive habitat scoring elements Clarke et al 2022 reported the extent and intensity of trawl effort on or near the seafloor of UTFs for each fishing year between 1989/90 and 2019/20.		

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PI 2.3.3		Information is adequate to determine the impact of the UoA on habitats, including changes in the risk posed by the UoA over time				
		Information on catches in the UoA of habitat-forming species associated with more sensitive habitats are available through the commercial ERS whereby vessels must submit a capture of non-fish or protected fish species (NFPS) report (see Table 101, Table 103). All landings of protected corals must be returned to the water immediately, and commercial fishers must report their capture on NFPS catch returns. FNZ observers also record landing of both protected and other benthic bycatch such as anemones, bryozoans, sea pens and sponges (Table 100, Table 102). Initial impact and recovery time for benthic habitats, including less and more sensitive components, is available through Clarke et al 2019 and Rowden et al 2024 (see scoring issue 2.3.2a). The assessment team determines that based on the relevance of information and information categories available that most potential sources of bias have been mitigated, and where bias might exist, its effect on trueness is well understood and is not considered to be consequential. TG3 is met (SG60, 80 and 100 are met). With regards to the precision of information available with respect to habitat-forming species associated with more sensitive habitats the team is required to assess whether the catch monitoring system in place facilitates (ERF, B1.3.2): a. The estimation of catches; and b. Reporting of catch information to management authorities; and c. Independent verification of catches Information on catches in the UoA of habitat-forming species associated with more sensitive habitats are available through the commercial ERS whereby vessels must submit a capture of non-fish or protected fish species (NFPS) report (see Table 101, Table 103). All landings of protected corals must be returned to the water immediately, and commercial fishers must report their capture on NFPS catch returns. FNZ observers also record landing of both protected and other benthic bycatch such as anemones, bryozoans, sea pens and sponges (Table 100, Table 102) and the UoA fisheries have been observed at a high level of coverage over the period 2018-19 to 2022-23 at 44.3% (Table 107). In both cases reports are submitted to Ministry for Primary Industries, Fisheries New Zealand (the management authority) and are reported in the Annual Review Report for Deepwater Fisheries. The high level of observer coverage, the up to date catch profiles and coverage statistics, as well as extensive analysis to confirm representativity (see section 10.2.1.1 and analyses by Anderson et al, 2019) satisfy the requirements of PG1 of the ERF v1.2. PG2 and PG3 are not applicable to this scoring issue, therefore SG60, SG80 and SG100 are met. . Both TG3 and PG1 are met – meeting SG100.				
		Monitoring				
		c	Guide post		Adequate information continues to be collected to detect any increase in risk to habitats.	Changes in habitat distributions over time are measured.
			Met?		Yes	Yes
		Rationale		When scoring issue (c) at the SG80 level, the team should consider all potential increases in risk, such as changes in:		

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PI 2.3.3	Information is adequate to determine the impact of the UoA on habitats, including changes in the risk posed by the UoA over time
	• The scoring of the outcome PI. • The operation of the UoA. • The effectiveness of the measures. The total number of trawls since 1990, and markedly since 2006, have decreased dramatically (Figure 39). Despite not being afforded formal protection, or the fishery being constrained by a ringfenced footprint, the extent of new areas trawled each year has likewise decreased to historic lows (Table 97). The operation of the UoA and the areas trawled are therefore well monitored, sufficiently so that the impacts of fishing on benthic habitats can be monitored through annual reporting of the trawl footprint and the capture of benthic organisms. The effectiveness of habitat management measures, including spatial restrictions, gear limitations and reporting (see PI2.3.2 for a detailed description of measures in place) are monitored through near-real-time Geospatial Position Reporting and mandatory daily Electronic Catch Reporting in the hoki, hake and ling trawl fleet. Fisheries New Zealand still combines this functionality with at-sea and aerial surveillance, supported by the New Zealand Defence Force. This independently provides surveillance of activities of UoA 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. The Ministry for Primary Industries audits commercial vessel catch-effort and landing reports and reconciles these against multiple sources including VMS records and data collected by onboard MPI observers to ensure that all catches are reported correctly and vessels are adhering to management measures. SG80 is met. Iterative updates to benthic habitat maps and classification systems have been undertaken in New Zealand beginning with the original Marine Environment Classification in 2005 (Snelder et al. 2005). This was followed by a classification optimised for demersal fish (Leathwick et al. 2006), the Benthic-Optimised Marine Environment Classification, BOMECE (Leathwick et al. 2012) and most recently the Seafloor Community Classification (SCC, Stephenson et al. 2021). Additionally analyses using species distribution modelling have identified potential 'coral hotspots' (Anderson et al., 2023). The iterative research and updates to benthic habitat mapping as well as a particular focus on more sensitive habitats enshrined in policies such as the Aotearoa New Zealand Biodiversity Strategy (DOC, 2022) provides information on the changes in habitat distributions over time and allows the impacts of the UoAs on those habitats to be measured. SG100 is met.

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	100
Condition number (if relevant)	NA

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PI 2.4.1 – Ecosystem outcome

PI 2.4.1		The UoA does not cause serious or irreversible harm to the key elements underlying ecosystem structure and function		
Scoring issue		SG 60	SG 80	SG 100
a	Ecosystem status			
	Guide post	The UoA is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be serious or irreversible harm.	The UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be serious or irreversible harm.	There is evidence that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be serious or irreversible harm.
	Met?	Yes	Yes	No
Rationale		Per SA3.15.4 The team shall interpret “key” ecosystem elements as: - The features of an ecosystem considered most crucial to the ecosystem’s characteristic nature and dynamics. - The features most crucial to maintaining the integrity of its structure and functions and the key determinants of its resilience and productivity. Per Table GSA2: MSC outcome expectations for each P2 component: <i>Changes caused by the fishery that fundamentally alter the capacity of the ecosystem to maintain its key structure and function or recover from the impact. The team may interpret this to mean changes that seriously reduce the ecosystem services provided by the component to the fishery, to other fisheries, and human uses.</i> The assessment team has determined that the key ecosystem element to be assessed is: - Community composition/diversity Tuck et al. 2009 provided an ecosystem-focused review of data from the Chatham Rise and Sub-Antarctic trawl surveys. Their analyses showed some evidence of change in ecosystem indicators over time, including evidence of increasing evenness (reducing diversity) but no evidence that species were being lost from the food-web. While longer time-series would increase certainty, the available data (Tuck 2009; Finucci 2020) show no evidence of species loss. The MSC Standard V3.1 does not provide a definition of ‘serious or irreversible’ harm with respect to key ecosystem elements, however in light of no evidence of species loss, the lack of evidence for adverse ecosystem effects (e.g., trophic cascades), low discard rates (Anderson et al 2019), and strengthened regulatory measures support the conclusion that the UoAs are highly unlikely to disrupt community composition/diversity to the point where that would be the case. The assessment team are also required to, per SA3.15.5, identify whether the UoA impact on key ecosystem element(s) includes indirect effects on ETP/OOS units. The indirect effect considered by the team, being the most relevant to the trawl UoAs and the ETP/OOS scoring elements with which the fishery has non-negligible direct impacts (seabirds and fur seal), is the addition of biomass due to discards or offal discharge. Anderson et al. (2019) provides information on amount of target species bycatch and discard in the hoki-hake-ling fishery during 2002 to 2017, including estimates by region (Table 76). The proportion of the catch that is discard is low (1.2% hoki, 0.42% hake, 0.21% ling).		

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PI 2.4.1	The UoA does not cause serious or irreversible harm to the key elements underlying ecosystem structure and function
	Under the new discard rules introduced by the Fisheries Amendment Act 2022 (https://www.legislation.govt.nz/act/public/2022/0056/latest/whole.html), all QMS species must be retained and landed unless the target species are subject to a Ministerial exemption or are permitted for return under observer-authorised provisions pursuant to section 72 of the Fisheries Act 1996. The form in which it is landed is not specified (Vessels with meal plants onboard will meal this unwanted catch, vessels without meal plants onboard will still have to land the product), but all QMS species landed must have an associated catch weight estimate reported by fishstock (irrespective of product type landed). Also, for any authorised discards of QMS species, a catch report must also be provided (catch weight estimate, stock, area, etc.). Discard and offal management measures limit the indirect effects on seabirds and New Zealand fur seal such that the UoAs are unlikely to hinder the recovery of those species. SG60 and SG80 are met. The lack of more up to date determinations based on analyses of a longer time-series of trawl survey data means that there is not evidence conclude this with a higher degree of certainty and for all areas fished by the UoAs. Dialogue with ecosystem experts during the site visit reflected consensus that there is an abundance of information available from research trawl surveys to build on the work of Tuck et al 2009 but simply a lack of impetus to do so in light of other priorities. SG100 is not met. A Recommendation (#3) is raised that the fishery review and collate available research trawl information/data that may be used to provide up to date determinations of changes to key ecosystem indicators and evidence that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be serious or irreversible harm.

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	60-79
Information gap indicator	More information sought Up to date analyses of trawl survey data with respect to ecosystem indicators. Modelled trajectories of biomass under current and future predicted fishing pressure for the Chatham Island Atlantis Model.

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	80
Condition number (if relevant)	NA

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PI 2.4.2 – Ecosystem management strategy

PI 2.4.2		There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function		
Scoring issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are measures in place, if necessary , which considers the potential impacts of the UoA on the key elements underlying ecosystem structure and function.	There is a partial strategy in place, if necessary , that is expected to achieve the Ecosystem outcome SG80 level.	There is a strategy in place for managing the impact of the UoA on the key elements underlying ecosystem structure and function.
	Met?	Yes	Yes	No
Rationale		Per GSA 3.16.2, at SG80 and SG100, partial strategies and strategies, respectively, may contain measures designed and implemented to address impacts on components that have been evaluated elsewhere in this framework. If the measures address specific ecosystem impacts effectively enough to meet the appropriate standard, it is unnecessary to have special “ecosystem measures” to address the same impacts. UoAs should be capable of adapting management to environmental changes as well as managing the effect of the UoA on the ecosystem. There are numerous measures in place to manage impacts of the hoki, hake and ling trawl fishery on individual ecosystem components (and thereby ecosystem structure and function), e.g., for the target hoki, hake and ling (as described in PI 1.2.1), in-scope species (as described in PI 2.1.2), ETP/OOS species (as described in PI 2.2.2), and habitats (as described in PI 2.3.2). The management of ecosystem impacts is based around a well-structured, legislative, policy and operational framework. The overall structure includes at least the following: • Fisheries Act 1996 • Wildlife Act 1953 • Animal Welfare Act 1999 • Marine Mammals Protection Act 1978 • Aotearoa New Zealand Biodiversity Strategy Implementation Plan (DOC, 2022) • The Harvest Strategy Standard for New Zealand Fisheries (MPI, 2008) • The National Fisheries Plan for Deepwater and Middle-depth Fisheries (FNZ, 2019) • Medium term research plan for deepwater fisheries 2024/25 – 2029/30 (FNZ, 2024) • National Plans of Action for seabirds 2020 and sharks 2022 (FNZ 2020, FNZ, 2022) Operational delivery plans are then set out, including those that are both statutory and non-statutory, for example: • The Annual Operational Plan for Deepwater Fisheries (FNZ, 2022) • Conservation Services Programme Annual Plan 2023/24 (DOC, 2023) • DWG’s Operational Procedures (OPs) (DWG, 2024) • Hoki OPs • Hoki OPs Coastal Trawl Fisheries • Marine Mammals OPs • Reporting OPs • Seabirds OPs • Sharks OPs • Benthic OPs		

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PI 2.4.2		There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function		
		Data are collected, collated and reviewed regularly to inform the ongoing delivery of sustainable fisheries. For example: • Trawl surveys and annual plenary reports • The Annual Review Report for Deepwater Fisheries for 2021/22 (FNZ 2023a) • Target and bycatch fish and invertebrate species (e.g., Anderson et al 2019) • ETP/OOS species (e.g., Edwards et al 2023, Edwards and Mormede, S., 2023, MacKenzie et al 2022) • Habitats (Leathwick et al. 2012, Stephenson et al. 2022, MacGibbon and Mules, 2023, Clarke et al 2019, Rowden et al 2024, FNZ, 2022c) • Ecosystem considerations (e.g., Tuck et al. 2009, MacGregor et al 2019, FNZ, 2022c). In summary, measures address specific ecosystem impacts effectively enough to meet the appropriate standard, and there is considered to be a strategy in place to address the impact of the UoAs that is expected to achieve the ecosystem outcome SG80 level. SG60 and SG80 are met. Despite the combination of measures, the UoAs impacts on the key ecosystem element of community composition/diversity is not clearly understood in recent times, SG100 is not met.		
b	Management strategy effectiveness			
	Guide post	The measures, if necessary , are considered likely to work, based on plausible argument.	There is some evidence that the measures/partial strategy, if necessary , is achieving the objectives set out in scoring issue (a), based on some information directly about the UoA and/or the ecosystem involved.	There is evidence that the partial strategy/strategy is achieving the objectives set out in scoring issue (a) based on information directly about the UoA and/or ecosystem involved.
	Met?	Yes	Yes	No
Rationale		Strategic and operational measures that are in place are considered likely to work, based on information about the fishery and ecosystem components involved (e.g. target, retained and bycatch species, ETP/OOS species and habitats). These components are being actively managed (see PI 1.2.1, PI 2.1.2, PI 2.2.2 and PI 2.3.2). The Aquatic Environment and Biodiversity Annual Review (FNZ, 2022c) provides a comprehensive review of the efficacy of measures, and identification of ongoing and new issues. Detailed monitoring of many aspects of the fishery (e.g. catches of target, retained species, and bycatch fish and invertebrates) provides a rich source of information through which to investigate the efficacy of strategies and plans in place providing some evidence of the management measures achieving their objectives. SG60 and SG80 are met. Updated evidence of the impacts of the trawl UoAs on overall community composition/diversity for the deep-water ecosystems with which the fishery interacts across its range is not available, SG100 is not met.		

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	80
Condition number (if relevant)	NA

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PI 2.4.3 – Ecosystem information

PI 2.4.3		There is adequate knowledge of the ecosystem and the main impacts of the UoA on key ecosystem elements		
Scoring issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide post	Information is adequate to identify the key elements of the ecosystem.	Information is adequate to broadly understand the key elements of the ecosystem.	
	Met?	Yes	Yes	
Rationale		The assessment team has determined that the key ecosystem element to be assessed is: 1. Community composition/diversity The Aquatic Environment and Biodiversity Annual Review (AEBAR), compiled by Fisheries New Zealand most recently for 2021 (FNZ, 2022c) provides a thorough review of the status of research into New Zealand deep water ecosystems. Research is most advanced in the Chatham Rise region, where modelling of the foodweb has been underway since 2006, the most recent version being MacGregor et al 2019. Information from the Chatham Rise Atlantis Model identified four species groups that stood out as having more effect than the other groups: orange roughy, hoki, pelagic fish small (primarily myctophids), and spiny dogfish (MacGregor et al, 2019). The Chatham Rise Atlantis model has been shown to have sound dynamics with respect to current knowledge of the system, has been tested for sensitivity to its ocean forcing variables and spawning stock recruitment assumptions (see references in MacGregor et al 2020). In a follow up to address and explore sensitivity to initial conditions of the to the biological sub-component of the Atlantis model input variables, MacGregor et al 2020, summarised that accounting for uncertainty in four main categories of model variables (1) initial conditions; (2) environmental; (3) feeding functional response; (4) productivity/recruitment, is likely to cover the broad range of uncertainty for the model. It is clear that information is adequate to broadly understand the key elements of the ecosystem – SG60 and SG80 are met.		
b	Investigation of UoA impacts			
	Guide post	Main impacts of the UoA on the key ecosystem elements can be inferred from existing information	Main impacts of the UoA on the key elements of the ecosystem have been investigated in detail.	Main interactions between the UoA and the key ecosystem elements have been investigated in detail.
	Met?	Yes	Yes	No
Rationale		The assessment team has determined that the key ecosystem element to be assessed is: 1. Community composition/diversity Tuck et al. 2009 provided an ecosystem-focused review of data from the Chatham Rise and Sub-Antarctic trawl surveys. Their analyses showed some evidence of change in ecosystem indicators over time, including evidence of increasing evenness (reducing diversity) but no evidence that species were being lost from the food-web. The lack of more up to date determinations based on analyses of a longer time-series of trawl survey data limits the assessment teams ability to conclude this with a higher degree of certainty and for all areas fished by the UoAs. Nevertheless, the main impacts of the UoA on the ecosystem have been and continue to be investigated in detail through up to date ecosystem modelling (see MacGregor et al 2019, 2020) that take account of multiple stressors to the ecosystem (fishing		

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PI 2.4.3		There is adequate knowledge of the ecosystem and the main impacts of the UoA on key ecosystem elements		
		pressure of the trawl fishery UoAs included), SG80 is met . The main interactions of the UoAs with the ecosystem outside of the Chatham Rise and specifically follow up to the initial Tuck et al (2009) work would support scoring, at this stage SG100 is not met .		
c	Understanding of component functions			
	Guide post		The main functions of the components in the ecosystem are known .	The impacts of the UoA on the components are identified and the main functions of these components in the ecosystem are understood .
	Met?		Yes	Yes
Rationale		The main impacts of the UoAs include direct fishery removals, the addition of biomass from offal and discarding available to scavengers and impacts to community composition through top-down pressure. The main functions of the components in the ecosystem in the New Zealand deepwater ecosystem are considered to be understood, based on ecosystem modelling and associated research (e.g., Tuck et al 2009, Pinkerton 2011, MacGregor 2019, 2020). Both SG80 and SG100 are met .		
d	Monitoring			
	Guide post		Adequate data continue to be collected to detect any increase in risk level.	Information is adequate to support the development of strategies to manage ecosystem impacts.
	Met?		Yes	Yes
Rationale		Three series of scientific trawls in New Zealand waters are particularly valuable for understanding ecosystem dynamics and for monitoring for trophic and ecosystem-level effects at the level of the demersal fish community: • A scientific trawl survey has been carried out on the Chatham Rise region approximately annually since 1992 • A similar scientific trawl survey has been carried out over the Sub-Antarctic plateau over the same period, but less frequently (Bagley & O'Driscoll 2012, Tuck et al. 2009) • 15 scientific trawl surveys have been carried out in the Hauraki Gulf region between 1980 and 2000. These surveys used a consistent methodology and were used to investigate change in a series of indicators in the demersal fish community (Tuck et al. 2009). The combination of research trawls and high levels of observer coverage, mandatory commercial catch and effort reporting and mapping of the trawl footprint annually generate adequate data to detect any increase in risk level the UoAs pose to deep water ecosystems. SG80 is met . Since the launch of NZ's Biodiversity Strategy 2000, Fisheries New Zealand has run a Marine Biodiversity Research Programme with 67 projects to date, addressing biodiversity knowledge gaps. Research projects pertinent to the deepwater environment include: • ZBD2020-07 Recovery of Seamount Communities • ZBD2020-06 Recovery of biogenic habitats		

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PI 2.4.3	There is adequate knowledge of the ecosystem and the main impacts of the UoA on key ecosystem elements
	• ZBD2019-11 Development of Electronic Automated Reporting System (EARS) to improve seabird bycatch monitoring • ZBD2019-01 Quantifying benthic habitats • ZBD2019-04 Plastics and marine debris across the ocean floor in New Zealand waters • BD2018-01 5-year continuous plankton survey (Phase 3) • ZBD2018-05 Ecosystem function and regime shifts in the Subantarctic • ZBD2016-11 Quantifying benthic biodiversity across natural gradients • ZBD2016-04 Organic Carbon Recycling in Deepwater • ZBD2014-03 Sublethal effects of environmental change on fish populations. The current Aotearoa New Zealand Biodiversity Strategy, Implementation Plan (DOC, 2022) and the Aquatic Environment and Biodiversity Annual Review (AEBAR, FNZ 2022c) summarise and outline New Zealand's comprehensive strategies to manage ecosystem impacts based on information directly from the UoAs and a multitude of other sources. SG100 is met. Per SA3.17.1 In scoring issue (d) the team shall interpret "information is adequate" to include an understanding of the effects of climate change on the natural productivity of the UoAs. Current research in New Zealand focuses on identifying climate change risks to the marine environment and the seafood sector, biodiversity, deepwater corals, biogenic habitats, fish, shellfish, plankton, primary productivity, and regime shifts. Improving monitoring methods to measure change and assess future scenarios has become important and methods of incorporating climate change indicators into stock assessment, and methods to assess species movements, are underway (FNZ, 2022c). Cummings, et al., (2021) reviewed the biological and ecological characteristics of 32 commercial fisheries species or species groups and evaluated their potential to be impacted by climate related changes. The Chatham Rise Atlantis model (MacGregor et al 2019) has suggested trends in stock abundance (for hoki and other species) which is estimated in stock assessment models to be due to trends in recruitment but may be due to trends in natural mortality rate due to ecosystem changes or species interactions. Current climate change research projects include: • ZBD2018-02 Climate change, fish distribution meta-analysis • ZBD2018- 03 Climate variability, trends, and fish population parameters • ZBD2014-09 Climate change risks and opportunities. The requirement of SA3.17.1 is also met supporting scoring at the SG80 and SG100 levels.

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	90
Condition number (if relevant)	NA

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10.3. Principle 3

10.3.1. Principle 3 background

Much of the information for this section is based on Acoura (2018), MRAG (2022), SNZ, DWC (2024 situation reports) and various FNZ reports as referenced.

10.3.1.1. Management

Fisheries New Zealand (FNZ) is the key regulator tasked with guiding the sustainable use of fisheries resources to the greatest overall benefit to New Zealanders. FNZ is a business unit within the Ministry of Primary Industries (MPI).

The Quota Management System (QMS) is the overall framework for managing New Zealand fisheries. Introduced in 1986, it ensures the long-term sustainability of the fish stocks and the health of the marine ecosystems. The QMS allocates shares in each fish stock as quota. Quota generates an entitlement to catch a proportion of the TACC each year (ACE) within the relevant Quota management Area (QMA). The Minister for Oceans and Fisheries sets the TAC, guided by the *Harvest Strategy Standard*.

The *Harvest Strategy Standard* applies to all fish under the QMS and guides the way that fish stocks are managed. It is how the statutory requirements for stock sustainability, provided in Section 13 of the Fisheries Act 1996, are implemented in practice. The *Harvest Strategy Standard* states that stock targets and limits should be set more conservatively for stocks where information is sparse or uncertainty is high.

In 2019, Fisheries New Zealand finalised a *National Fisheries Plan for Deepwater and Middle-depth Fisheries*. Deepwater and middle-depth fisheries occur in water depths between 200 and 1,500 m and are located between the 12 nautical mile limit out to the edge of our EEZ. The species in this assessment, hoki, hake and ling are deepwater species.

The plan provides strategic direction for managing deepwater fisheries and an integrated and transparent way of defining management objectives.

The management of New Zealand's deepwater fisheries is a collaborative arrangement between Fisheries New Zealand (FNZ) and the commercial fishing industry, represented by Seafood New Zealand Deepwater Council (SNZ, DWC). This arrangement enables the Management Objectives to be achieved by drawing on the combined knowledge, experience, capabilities, and perspectives of both organisations.

Input from tangata whenua occurs at the iwi fisheries forums. Industry and eNGO representatives and Treaty partner representatives such as Te Ohu Kaimoana are engaged in the management of our deepwater fisheries through the Deepwater Fish Plan Advisory Group (FPAG) which meets twice a year. The FPAG is an engagement forum for stakeholders to meet with FNZ.

Wider Context and Structure

The Annual Operational Plan (AOP) is driven by the National Fisheries Plan for Deepwater and Middle-depth Fisheries 2019 (Deepwater Plan 2019). The Deepwater Plan 2019 sits within a hierarchy of fundamental legislation including the Fisheries Act 1996 (the Act) and Treaty of Waitangi obligations to Māori, which provide strategic direction for a range of policy instruments and standards (Figure 55) These legislative requirements and policies inform the Deepwater Plan 2019, which in turn sets the direction and objectives for this AOP.

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Treaty
Obligations to
Maori

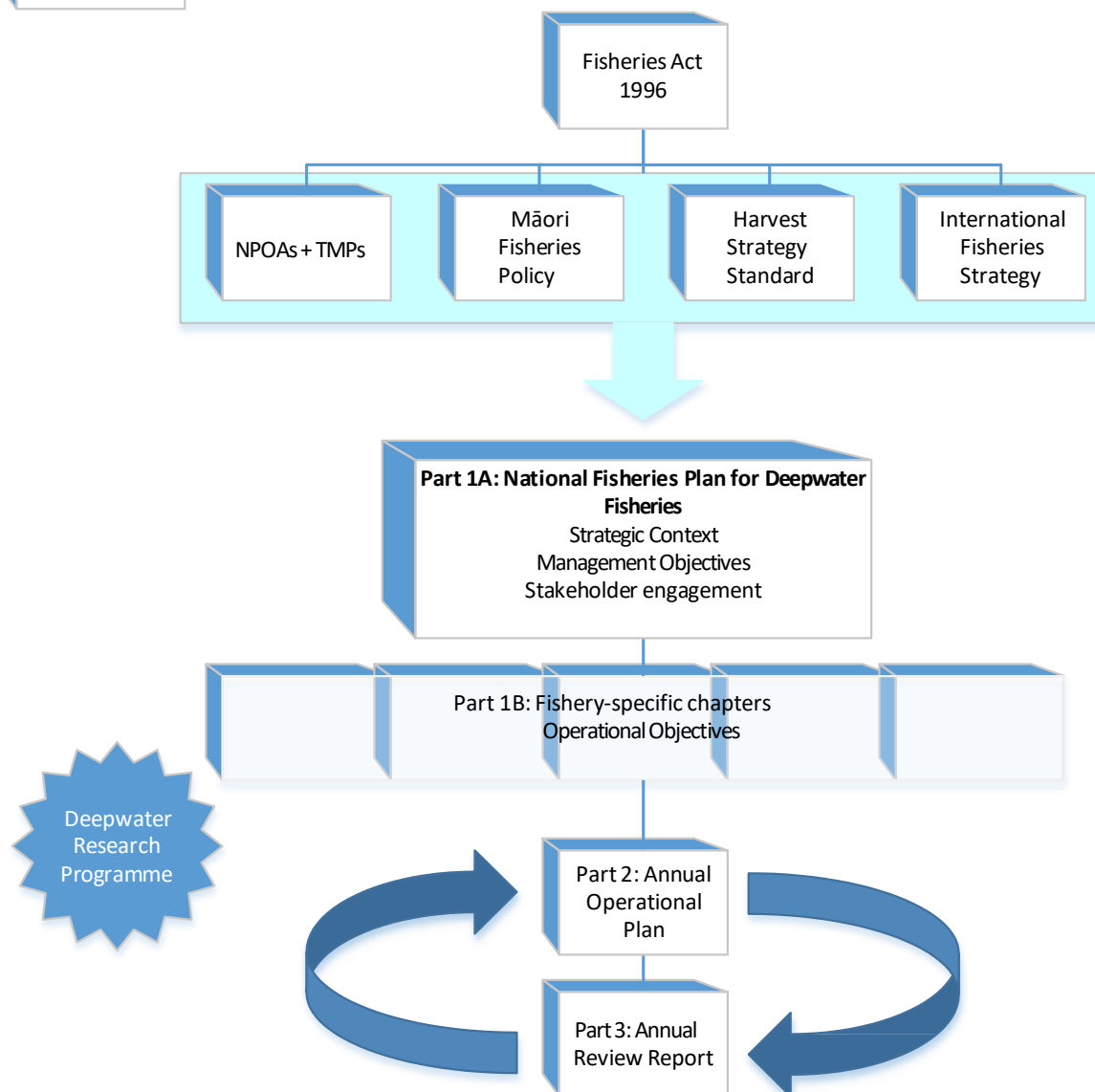


Figure 55. Structure of Management System for NZ deepwater fisheries. Source (FNZ 2024)

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10.3.1.2 Area of operation and fleet

All the UoAs operate in the Exclusive Economic Zone (EEZ) of New Zealand from within the 12 nautical miles (nm) limit of the territorial sea out to the 200n EEZ (Figure 1). No foreign fishing for these species has occurred adjacent to New Zealand in recent years and nor in the foreseeable future. The UoAs fisheries fall under the authority of the NZ government.

The Hoki hake and Ling fisheries fall under single jurisdiction with the fishing area within the EEZ

10.3.1.3 Recognised groups

The primary groups with direct interest in the fisheries are FNZ and the deepwater fishing industry, represented by NZS, DWC. Both are involved in the fishery through a partnership for management and science-based monitoring. FNZ has the responsibility for sustainable harvest under the requirements of the Fisheries Act 1996. Through policy, FNZ and DWG work closely together through a Memorandum of Understanding (DWG 2010) with a goal to ensure New Zealand's deepwater fisheries are sustainably managed.

The New Zealand Department of Conservation (DoC) Conservation Services Programme (CSP) monitors the impact of commercial fishing on protected species, studies species populations and looks at ways to limit bycatch (DoC 2021a)¹¹. Protected marine species include all marine mammals and reptiles; sea birds (except black backed gulls); seven species of fish; all black corals, gorgonian corals, stony corals and hydrocorals (DoC 2021b)¹². FNZ and DWC coordinate with DoC in management of the fisheries. However, managing the effects of fishing on these species remains the responsibility of FNZ.

Active participation in New Zealand's commercial fisheries by Iwi, Te Ohu Kai Moana (TOKM) and other Maori interests occurs through several mechanisms, including through membership in DWC and through active engagement with FNZ and Ministers.

The terms of the Maori Treaty Settlement for their rights to commercial fisheries have included delivery of commercial quota to Maori (FNZ 2021). MPI delivers the Crowns obligations to Maori under the

- Treaty of Waitangi (Fisheries claims) Settlement Act 1992
- Maori Commercial Aquaculture Claims Settlement Act 2004 and
- Maori Fisheries Act 2004

Several NGOs participate in consultations on the science and management of NZ deepwater fisheries. WWF, Royal Forest and Bird Protection Society of New Zealand, Greenpeace, and Environment and Conservation Organisations of New Zealand (ECO) are participants. Other organisations may also participate selectively such as the New Zealand Marine Sciences Society

10.3.1.4 Legislative context

The purpose of the Fisheries Act 1996 is set out in Section 8

(1) The purpose of this Act is to provide for the utilisation of fisheries resources while ensuring sustainability.

(2) In this Act –

Ensuring sustainability means

a) maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations; and

b) avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment

¹¹ <https://www.doc.govt.nz/our-work/conservation-services-programme/about-csp/>.

¹² <https://www.doc.govt.nz/our-work/conservation-services-programme/>.

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Utilisation means conserving, using, enhancing, and developing fisheries resources to enable people to provide for their social, economic, and cultural well-being.

Section 9 of the Act establishes the following environmental principles that shall be taken into account when exercising any powers under the Act in relation to the utilisation of fisheries resources or ensuring sustainability:

- a) Associated or dependent species should be maintained above a level that ensures their long-term viability
- b) Biological diversity of the aquatic environment should be maintained; and
- c) Habitat of particular significance for fisheries management should be protected.

Section 10 of the Act outlines information principles for decision makers as follows:

- a) Decisions should be based on the best available information
- b) Decision makers should consider any uncertainty in the information available in any case
- c) Decision makers should be cautious when information is uncertain, unreliable, or inadequate; and
- d) The absence of, or any uncertainty in, any information should not be used as a reason for postponing or failing to take any measure to achieve the purpose of this Act.

The Act also acknowledges external obligations, in particular, Part 1, section 5 notes that the Act shall be interpreted in a manner consistent with:

New Zealand's international obligations relating to fishing

Under the United Nations Convention on the Law of the Sea (UNCLOS) 1982 and its associated agreements, New Zealand has international obligations regarding the management of fish stocks. In deepwater fisheries, the most relevant sections are Articles 61-63 which apply to the management of marine resources within the EEZ and in cases where fish stocks extend beyond the borders of the EEZ.

The provisions of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992.

Specific treaty obligations in the Fisheries Act provide for commercial elements of the settlement (through 20% of quota as new species enter the QMS and non-commercial elements through regulations providing for customary use). The more general obligations provide for tangata whenua input and participation and having particular regard to kaitiakitanga.¹³

The passing of the Fisheries Amendment Act 2022, which has not yet been implemented, means that by 2026 discarding of all QMS species (unless expressly provided for) will be illegal. This change won't come into force until 2026.

Other domestic legislation which contributes to the management of the wider fisheries ecosystem includes the:

Wildlife Act 1953 which gives partial or full protection to all but one species of seabird; and

The Marine Mammals Protection Act 1978 which makes provision for the protection, conservation, and management of marine mammals within New Zealand waters.

10.3.1.5 Deepwater fisheries research

Research needs for deepwater fisheries are driven from the Objectives within the National Deepwater Plan 2019 and are primarily delivered through FNZ Fisheries Research Services. These research needs are outlined in the Medium-Term Research Plan (FNZ 2024) which is a living document that is updated regularly to reflect changes in management priorities where these occur, and identification of new information requirements. This research programme

¹³ Guardianship and protection

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focuses on obtaining comprehensive, consistent and robust information in a cost-effective manner. To accomplish this, the research programme specifies the routine research and data collection necessary to meet Management Objectives. Research projects contracted for each financial year, included stock assessments, and trawl and acoustic surveys. All research projects are reviewed by FNZ Science Working Groups and are assessed against the Research and Science Information Standard for New Zealand Fisheries. This review process aims to ensure the quality of the research is sufficient to underpin Deepwater Fisheries Management.

Progress reports are not available for all projects, reports are made publicly available at the conclusion of each project.

10.3.1.6 Consultation and decision-making processes

The 1996 Fisheries Act requires consultation with stakeholders. To affect this, the Minister has established consultation standards that set out:

- Best practice consultation process to be followed by fisheries managers
- Minimum performance measures where appropriate; and
- A nationally consistent approach.

A process standard for stakeholder consultation has been developed to set out how MPI meets its obligations to consult with stakeholders before providing advice to the Minister, based on requirements of the of the Fisheries Act 1996. This standard sets out best practice consultation processes to be followed by fisheries managers; minimum performance measures where appropriate; and a nationally consistent approach with reference to relevant legislation and guidelines. Within this process, it is necessary to identify both who has an interest and who are representative of those having an interest. FNZ provides an initial consultation plan and the manner of consultation, including the timeframe for the consultation and the decision. FNZ distributes the decision and subsequently reviews the process to assure that their consultation meets all requirements.

When management changes are proposed to meet sustainability requirements (such as a change to a TAC/TACC), FNZ prepares a discussion document that provides the Ministry's initial proposals for issues needing decision and a range of management options. In hoki, hake and ling fisheries such proposals primarily relate to changes in TACCs/catch limits. The proposals outlined in FNZ's discussion document are preliminary and are provided as the basis for consultation with stakeholders. Subsequently, FNZ prepares a decision document, which summarises stakeholders' views on their proposals and makes recommendations to the Minister. The decision document and the Minister's letter setting out his final decisions are posted on MPI's website as soon as they become available.

The Fisheries Act 1996 requires a precautionary approach. The MSC vocabulary defines the precautionary as: "The precautionary approach shall be interpreted to mean being cautious when information is uncertain, unreliable or inadequate and that the absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures." Section 10 of the Fisheries Act 1996 specifies four information principles, which encompass the precautionary principle, that must be taken into account in relation to the utilisation of fisheries resources or ensuring sustainability:

All persons exercising or performing functions, duties, or powers under this Act, in relation to the utilisation of fisheries resources or ensuring sustainability, shall take into account the following information principles:

- decisions should be based on the best available information:
- decision makers should consider any uncertainty in the information available in any case:
- decision makers should be cautious when information is uncertain, unreliable, or inadequate:
- the absence of, or any uncertainty in, any information should not be used as a reason for postponing or failing to take any measure to achieve the purpose of this Act.

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A decision to consult or not to consult, and any decision made after consultation, must be made in accordance with the principles of administrative law, and in accordance with Fisheries Act 1996 obligations. These principles require decision-makers to act:

- in accordance with law
- reasonably; and
- fairly, in accordance with the principles of natural justice.

Decisions that do not follow requirements are open to legal challenge.

10.3.1.7 Fisheries objectives

Fisheries 2030, MPI's overarching vision for New Zealand fisheries established in 2009, states that by 2030, New Zealand's fisheries will be:

- world-leading and recognised for achieving a track record of environmental and commercial leadership and success, both domestically and internationally
- a sector that New Zealanders are proud of, in that they understand that a precious but limited national resource is being responsibly managed, in the interests of all, for both the present and the future
- based on healthy and abundant aquatic environments that are ecologically sustainable, about which we have reliable and dynamic information.
- a sector in which there are positive Crown-Maori partnerships, balancing and optimising cultural and commercial value.
- profitable and efficient, with a strong focus on long-term economic value
- characterised by high trust and high accountability relationships amongst both use and non-extractive use interests and between stake/rights holder entities and Government; and,
- a dynamic system in which transparent and robust decisions about allocation and trading-off are being made by stake/rights holders themselves, within a more enabling legislative and regulatory framework.

Fisheries 2030 specifies an overarching goal for New Zealanders to maximise benefits from the use of fisheries within environmental limits.

There are two outcomes:

1. Use Outcome: Fisheries resources are used in a manner that provides greatest overall economic social and cultural benefit.
2. Environment Outcome: The capacity and integrity of the aquatic environment, habitats and species are sustained at levels that provide for current and future use.

The National Deepwater Plan (FNZ,2019) provides an integrated, transparent way of defining management objectives, actions, and services required to meet relevant legislative obligations and strategic directions for managing New Zealand's deepwater fisheries. The plan also provides a reporting mechanism to measure progress towards meeting objectives. The purpose of national fisheries plans is to provide clear management objectives to support the purpose and principles of the Fisheries Act 1996 and to identify key deliverables for MPI over the medium term (5 years). Work on the revision began in 2016. In May 2019, MPI approved the plan

(<https://www.mpi.govt.nz/dmsdocument/3967/direct>). The National Deepwater Plan consists of three parts:

1. Fisheries Management Framework and Objectives
 - a. Part 1A- overall strategic direction including management objectives
 - b. Part 1B- fishery specific objectives for deep water fisheries
2. Annual Operating Plan
3. Annual Review report

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MPI published a Medium-Term Research Plan for Deepwater Fisheries (MTRP; FNZ 2024) for the period 2024-25 to 2029-30. This MTRP outlines the scientific monitoring, and research needs to inform management of New Zealand's deepwater fisheries.

The science needs in this MTRP are based on the longer-term planning that has previously been consulted on with stakeholders, but not provided publicly with descriptions, context and rationale for the planned work. The MTRP remains a living document and will be updated regularly to reflect changes in management priorities where these occur, and identification of new areas of research. Annual research plans will be consulted with stakeholders through the National Deepwater Fisheries Plan forums and reported in the AOP and Annual Review Reports for deepwater fisheries.

The National Fisheries Plan for Deepwater and Middle depth fisheries (2019) sets out high level objectives under three outcomes

1. Use Outcomes

- Ensure the deepwater and middle-depth fisheries resources are managed to provide for the needs of future generations
- Ensure excellence in the management of New Zealand's deepwater and middle-depth fisheries, so they are consistent with, or exceed, international best practice
- Ensure effective management of deepwater and middle-depth fisheries is achieved through the availability of appropriate, accurate and robust information
- Ensure deepwater and middle-depth fish stocks and key bycatch fish stocks are managed to an agreed harvest strategy or reference points

2. Environment Outcomes

- Ensure that maintenance of biological diversity of the aquatic environment and protection of habitats of particular significance for fisheries management are explicitly considered in management
- Manage deepwater and middle-depth fisheries to avoid, remedy or mitigate the adverse effects of these fisheries on associated or dependent and incidentally caught fish species
- Manage deepwater and middle-depth fisheries to avoid, remedy or mitigate the adverse effects of these fisheries on the benthic habitat
- Manage deepwater and middle-depth fisheries to avoid, remedy or mitigate the adverse effects of these fisheries on the long-term viability of endangered, threatened and protected species populations

3. Governance Conditions

- Ensure the management of New Zealand's deepwater and middle-depth fisheries meets the Crown's obligations to Māori
- Ensure there is consistency and certainty of management measures and processes in the deepwater and middle-depth fisheries
- Ensure New Zealand's deepwater and middle depth fisheries are transparently managed

10.3.1.8 Regulation to meet objectives

Long term objectives are included in the Fisheries Act. The purpose of the Fisheries Act is focused on achieving a balance between sustainable utilisation of our fisheries resources, and maintenance of the marine environment. The Act implicitly recognises that:

- The biological realities of harvesting deepwater fisheries means that the future value of these fisheries can only be assured if they are managed sustainably. Measures to increase value must always be considered in the context of ensuring long-term maintenance of both target and bycatch stocks.
- Deepwater target and key bycatch fish stocks exist as part of the broader aquatic environment, and this broader environment has value, including an intrinsic value, to New Zealanders. It also recognises that, while fishing activities may have an environmental impact, not all environmental

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impacts have an adverse effect on the aquatic environment.

- Avoiding or mitigating adverse effects on the aquatic environment will ensure that the long-term viability of associated or dependent species is assured and that the biological diversity and functionality of marine communities is maintained.

10.3.1.9 Compliance, monitoring, surveillance and enforcement

The management system has a documented comprehensive and effective monitoring, control and surveillance system

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 always monitor all hake/hoki/ling vessel locations. 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 (Annual Catch Entitlement) 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 carry out in-port and at-sea inspections. These inspections relate to both inshore and deep-water vessels that are engaged in the HOK, HAK and LIN trawl fisheries

MPI Fishery Officers also conduct at-sea Royal Navy (RNZN) patrols. During these operations vessel are boarded and inspected, or hailed if boarding was not possible. The Fishery Officers were briefed to examine possible compliance risks.

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 DWC 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.

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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 2022,2023) 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 the National Plans of Action for Seabirds (FNZ, 2020) and Sharks (MPI, 2013).

10.3.1.10 Management system review

The Deepwater Fisheries Annual Review Report ARR (2022) assesses progress against the fisheries management priorities and actions identified in the Deepwater Fisheries Annual Operational Plan 2020/21. It also reports on the annual performance of New Zealand's deepwater fisheries during the 2020/21 fishing year in relation to environmental interactions and impacts.

Part 3 of the National Deepwater Plan 2019 is this Annual Review Report which is split into three parts: Part 3A describes the progress that has been made during the 2020/21 financial year (1 July– 30 June) towards delivering the management actions set out in the AOP.

Achievement of these annual priorities contributes to meeting the high-level management objectives set out in Part 1A of the National Deepwater Plan 2019.

Part 3B provides detail on delivery of fisheries service's relevant to Deepwater Fisheries Management that are planned by Financial Year. These processes include the planning and contracting of fisheries and conservation research projects, planning observer coverage on the deepwater fleet and the cost recovery regime.

Part 3C provides a summary report of the combined environmental impacts of deepwater fishing activity, and the deepwater fleet's adherence to the suite of non-regulatory management measures in place during the 2020/21 October Fishing Year (1 October– 30 September).

The AOP is reviewed annually and reported in the ARR. The Ministry conducts an extensive review of the performance of the deepwater fisheries that incorporates consultations with the industry and other stakeholders. Parts of the management system, specifically science and enforcement, undergo external review.

In 2018 an external review of the deepwater fisheries management was conducted by Quality Assurance NZ (IQANZ 2018). The review covered relevant parts of fisheries management and concluded that there was an appropriate management system in place for the ongoing sustainable management of the fisheries.

FNZ and DWG are working on terms of reference for an updated External review of the Management System (pers comm A Iving)

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10.3.2. Principle 3 Performance Indicator scores and rationales

PI 3.1.1 – Legal and/or customary framework

PI 3.1.1		The management system exists within an appropriate and effective legal and/or customary framework which ensures that it: - Is capable of delivering sustainability in the UoA(s); - Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and - Incorporates an appropriate dispute resolution framework		
Scoring issue		SG 60	SG 80	SG 100
A	Compatibility of laws or standards with effective management			
	Guide post	There is an effective national legal system and a framework for cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and organised and effective cooperation with other parties , where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and binding procedures governing cooperation with other parties that deliver management outcomes consistent with MSC Principles 1 and 2.
	Met?	Yes	Yes	Yes
Rationale		The Fisheries Act 1996 (FA) provides the legislative framework for New Zealand fisheries management, within New Zealand fisheries waters and for New Zealand flagged vessels and nationals on the high seas. The purpose of the Fisheries Act is to provide for utilisation of fisheries resources while ensuring sustainability. In giving effect to the purpose of the Act, decision makers are required to take into account environmental and information principles, and to act consistently with the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 and international obligations. Among other things, the Fisheries Act sets out New Zealand's fisheries management regime; provisions relating to access to fisheries, including foreign licensed access; a high seas fishing regime; record keeping, reporting, and disposal of fish provisions; monitoring, control, and surveillance (MCS) provisions; and a system of offences and penalties. Since 1986, the major commercial fisheries in New Zealand fisheries waters have been managed through a quota management system (QMS) based on individual transferable quotas (ITQs). Within the QMS, fisheries sustainability objectives are achieved by setting a total allowable catch (TAC) that is consistent with the productivity of a fishery. TACs can be reviewed on an annual basis and a total allowable commercial catch (TACC) is then determined. The TACC for each fishery is then apportioned to quota holders as an annual catch entitlement according to the percentage of quota each company or individual holds for a fishery. Annual catch entitlements are widely traded during their period of validity to enable fishers to balance catches taken against quota held. The Fisheries Act binds the Crown. Decisions made under power given by the Act are judicially reviewable by the Courts in the event of disputes. Procedures and processes that apply to disputes about the effects of fishing on the fishing activities of any person that has a current fishing interest provided for under the Act, are set out under Part 7 of the Fisheries Act. MPI's fisheries management responsibilities extend to the 200 nautical mile limit of the New Zealand EEZ. The requirements and obligations under the Fisheries Act 1996, Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 (and individual iwi Deeds of Settlement), the United Nations Convention on the Law of Sea (1982) and its associated agreements, the United Nations Fish		

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PI 3.1.1	The management system exists within an appropriate and effective legal and/or customary framework which ensures that it: • Is capable of delivering sustainability in the UoA(s); • Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and • Incorporates an appropriate dispute resolution framework			
	Stocks Agreement (1995), Food and Agricultural Organisation's (FAO) Code of Conduct for Responsible Fisheries and the United Nations Fish Stocks Agreement (1995) are all binding. There is an effective national and international legal system and binding procedures governing cooperation with other parties that delivers management outcomes consistent with MSC Principles 1 and 2. This SI meets SG60, SG80 and SG100.			
b	Resolution of disputes			
	Guide post	The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes which is considered to be effective in dealing with most issues and that is appropriate to the context of the UoA.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes, which is appropriate to the context of the fishery and has been tested and proven to be effective .
	Met?	Yes	Yes	Yes
Rationale	The Fisheries Act provides opportunities to negotiate and resolve disputes. Procedures and processes that apply to disputes about the effects of fishing on the fishing activities of any person that has a current fishing interest provided for under the Act, are set out under Part 7 of the Fisheries Act. The Minister may appoint a Dispute Commissioner, and the Minister makes the final determination. The consultation process is an attempt to avoid unresolved disputes by ensuring all interested parties have an opportunity to participate and have an input into decisions. There have been occasions when there has not been a satisfactory outcome and then this has gone to litigation and the Court has decided. The Memorandum of Understanding (DWG 2010) between DWG (now Seafood NZ, DWC) and MPI has encouraged better working relationships and avoided the need for litigation between the Ministry and the industry. The reduction in disputes between DWG and MPI demonstrates the effectiveness of the MOU. The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes that is appropriate to the context of the fishery and has been tested and proven to be effective. This meets the requirements of SG60, 80, and 100			
c	Respect for rights			
	Guide post	The management system has a mechanism to generally respect the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to observe the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.

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PI 3.1.1	The management system exists within an appropriate and effective legal and/or customary framework which ensures that it: • Is capable of delivering sustainability in the UoA(s); • Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and • Incorporates an appropriate dispute resolution framework		
Met?	Yes	Yes	Yes
Rationale	The terms of the Maori Treaty Settlement for their rights to commercial fisheries have included delivery of commercial quota to Maori (MPI, 2021). MPI delivers the crown's obligations to Maori under the • Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 • Maori Commercial Aquaculture Claims Settlement Act_2004 and • Maori Fisheries Act 2004 The Treaty of Waitangi guarantees the "Chiefs, Tribes and peoples of New Zealand" the "undisturbed possession" of their fisheries until they wished to dispose of them to the Crown. Recognition of their Treaty rights to commercial fisheries was agreed in the early 1990s, resulting in the Crown delivering a comprehensive settlement to Maori in three major components. The first was to purchase 10 percent of the quota shares from the market and to transfer these to the Treaty of Waitangi Fisheries Commission, set up as a transitional trust for the benefit of Maori. The second was a cash settlement that was in part used to buy half of New Zealand's largest fishing company – Sealord Limited. The third was an undertaking to deliver to Maori 20% of the commercial quota shares for any new species brought into the QMS in future. The Maori Fisheries Act 2004 has the purpose of implementing the agreements made in the Deed of Settlement dated 23 September 1992; and to provide for the development of the collective and individual interests of iwi in fisheries, fishing, and fisheries-related activities in a manner that is ultimately for the benefit of all Maori. To achieve the purposes of this Act, provision is made to establish a framework for the allocation and management of settlement assets through the allocation and transfer of specified settlement assets to iwi as provided for by or under this Act; and the central management of the remainder of those settlement assets. The management system clearly commits to rights of customary fishing, reaching SG60, 80 and 100 for all UoAs.		

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	100
Condition number (if relevant)	

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PI 3.1.2 – Consultation, roles, and responsibilities

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
Scoring issue		SG 60	SG 80	SG 100
a	Roles and responsibilities			
	Guide post	Organisations and individuals involved in the management process have been identified. Functions, roles, and responsibilities are generally understood .	Organisations and individuals involved in the management process have been identified. Functions, roles, and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction.	Organisations and individuals involved in the management process have been identified. Functions, roles, and responsibilities are explicitly defined and well understood for all areas of responsibility and interaction.
	Met?	Yes	Yes	Yes
Rationale		The primary groups with direct interest in the fishery are FNZ and the deepwater fishing industry (represented by DWC). Both are involved in the fishery through a partnership for management and science-based monitoring. FNZ has the responsibility for sustainable harvest under the requirements of the Fisheries Act 1996. Through policy, FNZ and DWC work closely together through a Memorandum of Understanding (DWG 2010) with a goal to ensure New Zealand's deepwater fisheries are sustainably managed. The New Zealand Department of Conservation (DoC) Conservation Services Programme (CSP) monitors the impact of commercial fishing on protected species, studies species populations and looks at ways to limit bycatch (DoC 2021a). FNZ and DWG coordinate with DoC in management of the fisheries. However, managing the effects of fishing on these species remains the responsibility of FNZ. The Treaty of Waitangi guarantees the “Chiefs, Tribes and peoples of New Zealand” the “undisturbed possession” of their fisheries until they wished to dispose of them to the Crown. Recognition of their Treaty rights to commercial fisheries was agreed in the early 1990s, resulting in the Crown delivering a comprehensive settlement to Maori in three major components. The New Zealand Department of Conservation (DoC) Conservation Services Programme (CSP) monitors the impact of commercial fishing on protected species, studies species populations and looks at ways to limit bycatch. Protected marine species include all marine mammals and reptiles; sea birds (except black backed gulls); seven species of fish; all black corals, gorgonian corals, stony corals and hydrocorals FNZ and DWG coordinate with DoC in management of the fisheries. A number of NGOs participate in consultations on the science and management of NZ deepwater fisheries. WWF-NZ, WWF-US, WWF-AU, Royal Forest and Bird Protection Society of New Zealand, Greenpeace, and Environment and Conservation Organisations of New Zealand (ECO) are participants. Other organisations may also participate selectively such as the New Zealand Marine Sciences Society. Organizations and individuals involved in the fishery have been identified, with roles and responsibilities well laid out, meeting the SG60, 80, and 100.		
b	Consultation processes			
	Guide post	The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge , to	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge . The management	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge . The management

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PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
		inform the management system.	system demonstrates consideration of the information obtained.	system demonstrates consideration of the information and explains how it is used or not used.
	Met?	Yes	Yes	Yes
Rationale		The 1996 Fisheries Act requires consultation with stakeholders. To affect this, the Minister has established consultation standards (MPI, https://fs.fish.govt.nz/Doc/21817/consultation_standard%5B1%5D.pdf.ashx) that set out: • Best practice consultation process to be followed by fisheries managers. • Minimum performance measures where appropriate; and • A nationally consistent approach. This process standard has been developed taking into account relevant obligations, including the provisions of s 12 of the Fisheries Act 1996, administrative law requirements, and the MFish Statement of Intent 2006-2011. These standards recognize that consultation leading to decisions must occur in accordance with law; in a reasonable manner; and fairly, in accordance with the principles of natural justice. The law requires identification of stakeholders “with an interest” in each fishery, and the identification of those who represent stakeholders with an interest. In general, the policy recommends setting a wide range of stakeholders with an interest. The Minister must notify stakeholders in advance of the consultation, and to subsequently inform them of his decisions. Within this process, it is necessary to identify both who has an interest and who are representative of those having an interest. FNZ provides an initial consultation plan and the manner of consultation, including the timeframe for the consultation and the decision. FNZ distributes the decision and subsequently reviews the process to assure that their consultation meets all requirements. When management changes are proposed to meet sustainability requirements (such as a change to a TAC/TACC), FNZ prepares a discussion document that provides the Ministry’s initial proposals for issues needing decision and a range of management options. In hoki, hake and ling fisheries such proposals primarily relate to changes in TACCs/catch limits. The proposals outlined in FNZ’s discussion document are preliminary and are provided as the basis for consultation with stakeholders. Subsequently, FNZ prepares a decision document, which summarises stakeholders’ views on their proposals and makes recommendations to the Minister. The decision document and the Minister’s letter setting out his final decisions are posted on MPI’s website as soon as they become available. The primary non-government stakeholders are the owners of the deepwater quota represented by NZ Seafood, DWC. DWG-MFish (2010) outlines the consultations undertaken by the industry and FNZ. FNZ has established open and direct involvement of all stakeholders in their science assessment processes. All of the Science Working Groups, including the annual stock assessment Plenary, are open to the public and the papers and meeting records are available to all participants. DWC invites discussions with MSC stakeholders through presentations and participation in conferences and documentaries (Clement, 2021); through direct meetings; through the public release of all information pertaining to the MSC assessment process online; and, through inviting all participants to attend any meeting between the MSC, CAB and DWG. The management system includes ongoing consultation processes that seek and use inputs, and provide information on the use of the inputs, meeting SG 60, 80, and 100 for all UoAs.		
c	Participation			

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PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
	Guide post		The consultation process provides opportunity for all interested and affected parties to be involved.	The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement.
	Met?		Yes	Yes
Rationale		A process standard for stakeholder consultation has been developed to set out how MPI meets its obligations to consult with stakeholders before providing advice to the Minister, based on requirements of the Fisheries Act 1996. Fisheries stakeholders are people or groups with a particular interest in the management of fishery resources. It includes environmental interests, commercial, customary and recreational fishers. Members of the public who are affected by the management of fisheries resources are also covered by them. This standard sets out best practice consultation processes to be followed by fisheries managers; minimum performance measures where appropriate; and a nationally consistent approach with reference to relevant legislation and guidelines. Within this process¹⁴, it is necessary to identify both who has an interest and who are representative of those having an interest. Decision-makers should • start consultation early • consult widely when appropriate • listen to what others have to say • be informative • be prepared to wait • balance the issues • ask for feedback • conduct consultation in mutual good faith • keep consultation a two-way process • be open minded The delegated decision-maker is also to determine the manner of consultation. The consultation may take place in the form of written exchange of information (i.e., hard copy, disk format, email), or in working groups, meetings or by telephone. The Consultation Standard identified three major elements to stakeholder involvement in fisheries management decisions: • Stakeholder consultation prescribed by the Fisheries Act 1996. • Constructive engagement with stakeholders, • Input and participation of tangata whenua. These procedures identify the stakeholders, assure all stakeholders receive relevant information and have opportunities to participate, and assure opportunity and encouragement for effective stakeholder engagement meeting SG80 and 100.		

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	100
Condition number (if relevant)	

¹⁴ (https://fs.fish.govt.nz/Doc/21817/consultation_standard%5B1%5D.pdf.ashx)

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PI 3.1.3 – Long term objectives

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with the MSC Fisheries Standard, and incorporates the precautionary approach		
Scoring issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	Long-term objectives to guide decision-making, consistent with the MSC Fisheries Standard and the precautionary approach , are implicit within management policy .	Clear long-term objectives that guide decision-making, consistent with the MSC Fisheries Standard and the precautionary approach , are explicit within management policy .	Clear long-term objectives that guide decision-making, consistent with the MSC Fisheries Standard and the precautionary approach , are explicit within and required by management policy.
	Met?	Yes	Yes	Yes
Rationale		The Fisheries Act 1996 requires a precautionary approach. The MSC vocabulary defines the precautionary as: “The precautionary approach shall be interpreted to mean being cautious when information is uncertain, unreliable or inadequate and that the absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures.” Section 10 of the Fisheries Act 1996 specifies four information principles, which encompass the precautionary principle, that must be taken into account in relation to the utilisation of fisheries resources or ensuring sustainability: All persons exercising or performing functions, duties, or powers under the Fisheries Act, in relation to the utilisation of fisheries resources or ensuring sustainability, shall take into account the following information principles: • decisions should be based on the best available information: • decision makers should consider any uncertainty in the information available in any case: • decision makers should be cautious when information is uncertain, unreliable, or inadequate: • the absence of, or any uncertainty in, any information should not be used as a reason for postponing or failing to take any measure to achieve the purpose of this Act. Fisheries 2030, MPI’s overarching vision for New Zealand fisheries established in 2009, specifies an overarching goal for New Zealand’s fisheries and two outcomes: Goal: New Zealanders maximising benefits from the use of fisheries within environmental limits. Use Outcome: Fisheries resources are used in a manner that provides greatest overall economic social and cultural benefit. Environment Outcome: The capacity and integrity of the aquatic environment, habitats and species are sustained at levels that provide for current and future use. The National Deepwater Plan provides an integrated, transparent way of defining management objectives, actions, and services required to meet relevant legislative obligations and strategic directions for managing New Zealand’s deepwater fisheries. The plan also provides a reporting mechanism to measure progress towards meeting objectives. The purpose of national fisheries plans is to provide clear management objectives to support the purpose and principles of the Fisheries Act 1996 and to identify key deliverables for MPI over the medium term (5 years). Work on the revision began in 2016. In May 2019, MPI approved the plan. Clear long-term objectives, consistent with the precautionary approach, are explicit and required, meeting SG60, 80, and 100.		

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	100
Condition number (if relevant)	

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PI 3.2.1 – Fishery-specific objectives

PI 3.2.1		The fishery-specific management system has clear, specific objectives designed to achieve the outcomes expressed by MSC Principles 1 and 2		
Scoring issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	Objectives , which are broadly consistent with achieving the outcomes expressed by MSC Principles 1 and 2, are implicit within the fishery-specific management system.	Short and long-term objectives , which are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, are explicit within the fishery-specific management system.	Well-defined and measurable short- and long-term objectives , which are demonstrably consistent with achieving the outcomes expressed by MSC Principles 1 and 2, are explicit within the fishery-specific management system.
	Met?	Yes	Yes	Partial
Rationale		The National Deepwater Plan provides an integrated, transparent way of defining management objectives, actions, and services required to meet relevant legislative obligations and strategic directions for managing New Zealand's deepwater fisheries. The plan also provides a reporting mechanism to measure progress towards meeting objectives. The purpose of national fisheries plans is to provide clear management objectives to support the purpose and principles of the Fisheries Act 1996 and to identify key deliverables for FNZ over the medium term (5 years). The Section 4 information provides well defined objectives. The performance indicators in Section 4 provide mechanisms for measuring success for some, but not all, of the objectives. Therefore, the management system contains well-defined and measurable objectives, although not all objectives meet the 'measurable' requirement. The DWG-MPI MOU (DWG-MFish, 2010) further lays out specific objectives for implementing the National Deepwater Plan. The fishery specific chapters for hoki, hake and ling contain Management Objectives divided into two main areas: Utilization and Environment. Each Management Objective contains a description of the current status relative to the Objective, a description of the target status at the end of the five-year period covered by the National Deepwater Plan, and a series of supporting Operational Objectives. Management and operational objectives have performance indicators defined to assist in evaluation performance. Operational objectives are specific, measurable and time bound designed to drive all management action in the fishery, and cover both long and short term. These operational objectives will be critical in determining the annual management of fisheries for the five years that the National Deepwater Plan is in place. Each Operational Objective links to one or more Management Objectives. The individual tasks that contribute to the delivery of each operational objective will be specified each year in the annual operational plan. The Management Objectives are generally broad in scope, while the Operational Objectives are specific and measurable. However, the specific fisheries chapters, date back to hoki 2010, hake 2013 and ling 2011 and need to be updated. The objectives are well defined, measurable, and explicit and probably still represent the needs of the fisheries. The chapters are currently being updated (Pers com FNZ, 2025). The Deepwater Plan and the DWG-MPI MOU meet the SG80, but the age and uncertainty that the objectives are all still relevant indicates that the SG100 is not completely met. A partial score of 90 is given as SG 60 and SG80 are met, SG 100 partially		

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	90
Condition number (if relevant)	

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PI 3.2.2 – Decision-making processes

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery		
Scoring issue		SG 60	SG 80	SG 100
a	Decision-making processes			
	Guide post	There are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.	There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.	
	Met?	Yes	Yes	
Rationale		When management changes are proposed to meet sustainability requirements (such as a change to a TAC/TACC), FNZ prepares a discussion document that provides the Ministry's initial proposals for issues needing decision and a range of management options. In hoki, hake and ling fisheries such proposals primarily relate to changes in TACCs/catch limits. The proposals outlined in FNZ's discussion document are preliminary and are provided as the basis for consultation with stakeholders. Subsequently, FNZ prepares a decision document, which summarises stakeholders' views on their proposals and makes recommendations to the Minister. The decision document and the Minister's letter setting out his final decisions are posted on MPI's website as soon as they become available. All persons exercising or performing functions, duties, or powers under this Act, in relation to the utilisation of fisheries resources or ensuring sustainability, shall take into account the following information principles: • decisions should be based on the best available information: • decision makers should consider any uncertainty in the information available in any case: • decision makers should be cautious when information is uncertain, unreliable, or inadequate: • the absence of, or any uncertainty in, any information should not be used as a reason for postponing or failing to take any measure to achieve the purpose of this Act. A decision to consult or not to consult, and any decision made after consultation, must be made in accordance with the principles of administrative law, and in accordance with Fisheries Act 1996 obligations. These principles require decision-makers to act: • in accordance with law • reasonably; and • fairly, in accordance with the principles of natural justice. Decisions that do not follow requirements are open to legal challenge. SG60 and SG80 are met		
b	Responsiveness of decision-making processes			
	Guide post	Decision-making processes respond to serious issues identified in relevant research, monitoring, evaluation, and consultation, in a transparent, timely and adaptive manner, and take some account of the wider implications of decisions.	Decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation, and consultation, in a transparent, timely, and adaptive manner, and take account of the wider implications of decisions.	Decision-making processes respond to all issues identified in relevant research, monitoring, evaluation, and consultation, in a transparent, timely, and adaptive manner, and take account of the wider implications of decisions.
	Met?	Yes	Yes	No

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PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery		
Rationale		Consultation is a central component of the management decision-making process (Fisheries Act Section 12, Stakeholder Consultation Process Standard). The Minister makes the final decision based on advice received from other parties (Section 12 – “the Minister shall consult with such persons or organisations as the Minister considers are representative of those classes of persons having an interest in the stock or the effects of fishing on the aquatic environment in the area concerned including Maori, environmental, commercial, and recreational interests”). FNZ prepares a discussion document that provides the Ministry’s initial proposals for issues needing decision and a range of management options (https://www.mpi.govt.nz/consultations/your-fisheries-your-say/). In hoki, hake and ling fisheries such proposals primarily relate to changes in TACCs/catch limits. The proposals outlined in FNZ’s discussion document are preliminary and are provided as the basis for consultation with stakeholders. Subsequently, FNZ prepares a decision document, which summarises stakeholders’ views on their proposals and makes recommendations to the Minister. The decision document and the Minister’s letter setting out his final decisions are posted on MPI’s website as soon as they become available. This demonstrates the management system responding to serious and important issues in an open and transparent way, taking into account the wider implications and alternatives for decision making. This meets the SG60 and 80. While the management system considers a wide range of issues, it is not clear that the system takes into account all issues, thus not meeting the SG100. SG60 and SG 80 are met		
c	Use of precautionary approach			
	Guide post		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		Yes	
Rationale		The Fisheries Act 1996 requires a precautionary approach. The MSC vocabulary defines the precautionary as: “The precautionary approach shall be interpreted to mean being cautious when information is uncertain, unreliable or inadequate and that the absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures.” Section 10 of the Fisheries Act 1996 specifies four information principles, which encompass the precautionary principle, that must be taken into account in relation to the utilisation of fisheries resources or ensuring sustainability. SG 80 is met		
d	Accountability and transparency of management system and decision-making process			
	Guide post	Some information on the fishery’s performance and management action is generally available on request to stakeholders.	Information on the fishery’s performance and management action is available on request , and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation, and review activity.	Formal reporting to all interested stakeholders provides comprehensive information on the fishery’s performance and management actions and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation, and review activity.

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PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery		
	Met?	Yes	Yes	Yes
Rationale		Formal reporting on management actions or inactions is part of the formal consultation process. When management changes are proposed to meet sustainability requirements (such as a change to a TAC/TACC), FNZ prepares a discussion document that provides the Ministry's initial proposals for issues needing decision and a range of management options (https://www.mpi.govt.nz/consultations/your-fisheries-your-say/). In hoki, hake and ling fisheries such proposals primarily relate to changes in TACCs/catch limits. The proposals outlined in FNZ's discussion document are preliminary and are provided as the basis for consultation with stakeholders. Subsequently, FNZ prepares a decision document, which summarises stakeholders' views on their proposals and makes recommendations to the Minister. The decision document and the Minister's letter setting out his final decisions are posted on MPI's website as soon as they become available. These measures together meet the SG60, 80, and 100 .		
e	Approach to disputes			
	Guide post	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability of the fishery.	The management system or UoA is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.	The management system or UoA acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.
	Met?	Yes	Yes	Yes
Rationale		The Minister is the decision maker in fisheries management matters and his decisions are bound by the law and are therefore open to legal review. The law requires identification of stakeholders "with an interest" in each fishery, and the identification of those who represent stakeholders with an interest. Section VII Disputes Resolution of the Fisheries Act states that the section "(a) applies to disputes about the effects of fishing (excluding fish farming) on the fishing activities of any person who has a current fishing interest provided for or authorized by or under this Act; but (b) does not apply to disputes about ensuring sustainability or about the effects of any fishing authorised under Part 9." Section VII further requires that the Minister publicly set out an approved statement of procedure for the resolution of such disputes. The Minister of Fisheries published in 1998 the dispute resolution procedures. The Minister's approved statement of procedure for the resolution of disputes consists of four steps, with each step in turn involving specific actions to be undertaken by the parties to the dispute to give effect to the requirements of Section VII of the Act: • Dispute summary report by the party identifying the report • Production and Distribution of Initial Assessment Report demonstrating the dispute is about the effects of fishing, and does not involve issues associated with ensuring sustainability • Negotiation and attempts at resolution • Prepare an Outcome Report with conclusion of the process including resolution or not of the dispute. The parties to the dispute may make recommendations that involve sustainability or customary fishing that would require action beyond the authority of the Minister.		

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PI 3.2.2	The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery
	The collaboration between the DWG and MPI works to avoid disputes, as the agreement of common goals and negotiations to achieve them occurs during the normal working relationship between the two parties. The principles in the Fisheries Act require decision-makers to act: • in accordance with law; • reasonably; and • fairly, in accordance with the principles of natural justice. Decisions that do not follow requirements are open to legal challenge. Legal challenges are uncommon in the fisheries, in part because of the collaborative decision making. Therefore, the management system proactively acts to avoid disputes. Lack of judicial decisions does not provide direct evidence of rapid implementation, but the requirements of the Fisheries Act and policies of DWG and MPI strongly suggest this would be the case. The fishery reaches the SG60, SG80, and SG100

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	90
Condition number (if relevant)	

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PI 3.2.3 – Compliance and enforcement

PI 3.2.3		Monitoring, control, and surveillance (MCS) mechanisms ensure the management measures in the UoA are enforced and complied with		
Scoring issue		SG 60	SG 80	SG 100
a	MCS system			
	Guide post	MCS mechanisms exist within the UoA.	An MCS system exists within the UoA.	A comprehensive MCS system is well-established within the UoA.
	Met?	Yes	Yes	Yes
Rationale		The Ministry for Primary Industries (MPI) 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 audits commercial vessel catch-effort and landing reports and reconciles these against multiple sources including VMS records, data collected by onboard MPI observers, and catch landing records from LFRs to ensure that all catches are reported correctly. At sea and aerial surveillance, supported by NZ defence Force, are also carried out 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. The comprehensive MCS system has demonstrated a consistent ability for effective enforcement meeting SG60, 80, and 100.		
b	Sanctions			

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PI 3.2.3		Monitoring, control, and surveillance (MCS) mechanisms ensure the management measures in the UoA are enforced and complied with		
	Guide post	Sanctions to address non-compliance exist within the UoA.	Sanctions to deal with non-compliance exist, that are appropriate to the UoA, and are applied.	Comprehensive sanctions to address non-compliance exist, that are appropriate to the UoA, and are consistently applied.
	Met?	Yes	Yes	Yes
Rationale		NZ Commercial fishers 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 fishers from over-catching their ACE holdings. The industry, with its investment in the fishery through co-management, has a strong incentive to maintain its cooperative role through compliance with legal requirements. MPI Fishery Officers carried out a total of 210 in-port and at-sea inspections for the period 1 January 2019 to 31 December 2023. 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 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. Comprehensive sanctions to address non-compliance exist, that are appropriate to the UoAs, and are consistently applied.SG60, SG 80 and SG 100 are met		
c	Compliance (information)			
	Guide post	Information is adequate to broadly understand compliance in the UoA.	Information is adequate to estimate compliance in the UoA with a high degree of accuracy .	Information is adequate to estimate compliance in the UoA with a very high degree of accuracy .
	Met?	Yes	Yes	Yes
Rationale		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-		

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PI 3.2.3	Monitoring, control, and surveillance (MCS) mechanisms ensure the management measures in the UoA are enforced and complied with						
	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. 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 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, 2013a). As Information is adequate to estimate compliance in the UoA with a very high degree of accuracy. SG 60,80 and 100 are met (TG1, 2 and 3 are met, see Table 56 below). For PI 3.2.3 c the application of Evidence Requirements Framework is required to evaluate trueness of information Table 56 .Assessment of factors determining data "trueness" for compliance data. <table><tr><th>Criteria</th><th>Assessment</th><th>Determination High/Med/Low</th></tr><tr><td>Objectivity: to what extent is the information free from conflict of interest?</td><td>The primary sources of catch composition information are skipper logbooks, and LFRs, along with a comprehensive system of offload checks and observer reports. As described above, because observers are employed, deployed and debriefed by MPI according to management arrangements</td><td>High Objectivity</td></tr></table>	Criteria	Assessment	Determination High/Med/Low	Objectivity: to what extent is the information free from conflict of interest?	The primary sources of catch composition information are skipper logbooks, and LFRs, along with a comprehensive system of offload checks and observer reports. As described above, because observers are employed, deployed and debriefed by MPI according to management arrangements	High Objectivity
Criteria	Assessment	Determination High/Med/Low					
Objectivity: to what extent is the information free from conflict of interest?	The primary sources of catch composition information are skipper logbooks, and LFRs, along with a comprehensive system of offload checks and observer reports. As described above, because observers are employed, deployed and debriefed by MPI according to management arrangements	High Objectivity					

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PI 3.2.3	Monitoring, control, and surveillance (MCS) mechanisms ensure the management measures in the UoA are enforced and complied with		
		set independently of the industry, observer information is considered highly objective. Logbook data may be less objective, simply because it is self-reported by the vessel captain, but these data are cross checked using, LFR, offload inspections and observer reports. However, having these sources of information allows for the cross-validation of catch information. In this case, the logbook and LFR catch composition information is very consistent with the observer reports. Independent sources of information pertaining to bird and mammal population statuses and broader fishery impact used are highly objective. VMS is also objective in that it cannot be influenced by humans. There is a comprehensive system of monitoring and verification of compliance with closed area management using VMS that is free of conflicts of interest. Overall, this data has high objectivity.	
	Relevance: to what extent is the information pertinent or connected to the matter in hand	The main compliance risks are identified as quota evasion, fishing in prohibited areas, failure to report interaction/retention of protected or prohibited species, and misreporting or mishandling of bycatch and discards. Quota evasion is monitored by skipper logbooks, LFRs and a high frequency of offload checks. Vessel positions are monitored via VMS and alert systems Skipper ETP interaction reporting and Observer information interaction/retention of protected or prohibited species, and misreporting or mishandling of bycatch and discards.	High Relevance
	Completeness: To what extent are different sources in agreement	Information is available from a multiplicity of monitoring tools and cross-checking procedures. eg Geospatial Position Reporting, Electronic catch reporting, at sea and aerial surveillance, port inspections and MPI audits	High Completeness
	Consistency: To what extent are different sources in agreement	Observers catch records and logbook catch, and LFR records are very consistent with each other, Bird interaction was recorded both in the logbook and by an observer. VMS is also checked relative to	High Consistency

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PI 3.2.3		Monitoring, control, and surveillance (MCS) mechanisms ensure the management measures in the UoA are enforced and complied with		
			vessel reported fishing locations and these sources of information are consistent.	
		As high objectivity, high relevance, high completeness and high consistency are met TG1,2 and 3 are met and a SG score of 100.		
d	Compliance (outcome)			
	Guide post	Systematic non-compliance of regulations specific to governing sustainable fishing practices on the water is not evident within the UoA.	Majority of regulations, including all regulations specific to governing sustainable fishing practices on the water, are likely to be complied with.	Majority of regulations, including all regulations specific to governing sustainable fishing practices on the water, are consistently complied with.
	Met?	Yes	Yes	Yes
Rationale		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 DWC 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 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 the National Plans of Action for Seabirds (FNZ, 2020) and Sharks (MPI, 2013a). The high level of meeting reporting requirements, the relatively high level of observer coverage, and ongoing monitoring by enforcement agents demonstrates no evidence of systematic non-compliance. This meets the SG60, SG80 and SG100.		

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	100
Condition number (if relevant)	

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PI 3.2.4 – Monitoring and management performance evaluation

PI 3.2.4		There is a system for monitoring and evaluating the performance of the fishery-specific management system against its objectives. There is effective and timely review of the fishery-specific management system		
Scoring issue		SG 60	SG 80	SG 100
a	Evaluation coverage			
	Guide post	There are mechanisms in place to evaluate some parts of the fishery-specific management system.	There are mechanisms in place to evaluate key parts of the fishery-specific management system.	There are mechanisms in place to evaluate all parts of the fishery-specific management system.
	Met?	Yes	Yes	Yes
Rationale		The Deepwater Fisheries Annual Review report (ARR) 2022, assesses progress against the fisheries management priorities and actions identified in the Deepwater Fisheries Annual Operational Plan 2020/21. It also reports on the annual performance of NZ’s deepwater fisheries during the 2020/21 fishing year in relation to environmental interactions and impacts. The ARR is Part 3 of the National Deepwater Plan 2019. It is split into three parts Part 3A describes the progress that has been made during the 2020/21 financial year (1 July 2020 – 30 June 2021) towards delivering the management actions set out in the 2020/21 AOP. Achievement of these annual priorities contributes to meeting the high-level management objectives set out in Part 1A of the National Deepwater Plan 2019. Part 3B provides detail on delivery of fisheries service’s relevant to Deepwater Fisheries Management that are planned by Financial Year. These processes include the planning and contracting of fisheries and conservation research projects, planning observer coverage on the deepwater fleet and the cost recovery regime. Part 3C provides a summary report of the combined environmental impacts of deepwater fishing activity, and the deepwater fleet’s adherence to the suite of non-regulatory management measures in place during the 2020/21 October Fishing Year (1 October 2020 – 30 September 2021). The ARR contains several appendices: • Appendix I summarises the commercial catch of deepwater stocks during the 2020/21 Fishing Year. Also included, where available, are observer coverage details, the amount of deemed values invoiced, and export earnings during the 2020 calendar year • Appendix II summarises the results of the October 2020 sustainability rounds • Appendix III comprises The Deepwater Fish Plan Advisory Group (FPAG) Terms of Reference • Appendix IV MSC certified stocks and the relevant data used to review the certification • Appendix V summarises cost recovery levies for deepwater stocks for the 2020/21 Financial Year; and • Appendix VI comprises the observer Interim Trip Report template. The AAR evaluates the development and implementation of the Fisheries Plan framework – National Deepwater Plan with fishery specific chapters and Annual Operational Plan for the fisheries. This review encompasses all parts of the management system, therefore reaching the SG60, SG80, and SG100.		
b	Internal and/or external review			
	Guide post	The fishery-specific management system is subject to occasional internal review.	The fishery-specific management system is subject to regular internal and occasional external review .	The fishery-specific management system is subject to regular internal and external review.

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PI 3.2.4		There is a system for monitoring and evaluating the performance of the fishery-specific management system against its objectives. There is effective and timely review of the fishery-specific management system		
	Met?	Yes	Yes	No
Rationale		Progress against the objectives in the National Fisheries Plan for Deepwater and the Annual Operational Plan is reviewed annually and reported in the Annual Review Report. FNZ conducts an extensive review of performance of the deepwater fisheries that incorporates consultations with industry and other stakeholders. Parts of the management system, specifically science and enforcement, undergo regular external review. In 2018, MPI completed an external review of the Deepwater Fisheries Management conducted by Independent Quality Assurance New Zealand (IQANZ 2018). The review covered the relevant parts of fishery management. Another such review is currently being proposed and planned. The CAB recommends that progress on this is monitored and evidence provided at the surveillance audits. SG 60 and SG 80 are met.		

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	90
Condition number (if relevant)	

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11. Appendices

11.1. Assessment information

11.1.1. Previous assessments

NZ Hoki was first certified in 2001,

<https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=hQPGww8tVYotqc18M0k72W8bifB1bPE9OaAR3rS8FgUoyYNeKcZHNHImCmc4ujvp>

Recertified in 2007

<https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=5Nm2OJvxduq3vflDZXdUplZ9jQH+sYSxbAozSALlgFcAq5AGj1DaB3p4WKbgiaTH>

and again in 2012.

<https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=RWV0oqDcAWQSmnGkPmh54Cziqsb yetTkG2Pix90vGhxuDYM1yKfwm8FcqMPblrq8>

In 2018 some NZ deepwater fisheries were combined and reassessed and hoki trawl was recertified.

<https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=/KBzIG0n9b0AUcqDq86/SvvYukcDSRgvFqYhTp3/XNKdAnTxoNdeWNfs6Hvu2N4A>

NZ Hake was first certified in 2014.

<https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=vfacEk9ysolbkPvjWI8w0EMEI7g8hhiyMWqH/TkzPMt18P2RR6Kv0m4SBSrQ0LTk>

In 2018 some NZ deepwater fisheries were combined reassessed and hake trawl was recertified.

<https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=/KBzIG0n9b0AUcqDq86/SvvYukcDSRgvFqYhTp3/XNKdAnTxoNdeWNfs6Hvu2N4A>

NZ Ling trawl and longline was first certified in 2014.

2014<https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=TRrFTiJm+lJe6L6KlwGX1i9j68l28V/RsBZATiYj7T68355Xyy+vXH9Q3rOnQac7>

In 2018 some NZ deepwater fisheries were combined reassessed and hake trawl was recertified

<https://cert.msc.org/FileLoader/FileLinkDownload.aspx/GetFile?encryptedKey=/KBzIG0n9b0AUcqDq86/SvvYukcDSRgvFqYhTp3/XNKdAnTxoNdeWNfs6Hvu2N4A>

11.2. Evaluation processes and techniques

11.2.1. Site visits

A site visit took place in Wellington, New Zealand, 23-28th February 2025. CAB assessment team members attended all meetings. Meetings with stakeholders were held both in person and remotely. The client group and their consultants, National Institute of Water and Atmospheric Research (NIWA) scientists, Ministry for Primary Industry and Fisheries New Zealand (FNZ) Managers and staff attended. The stakeholders provided invaluable input with their contributions of relevant information. The assessors have taken this into account in this CPRD report.

No NGOs wished to be involved nor wrote any submissions.

All attendees were informed that

- The CAB, LRQA is an independent body contracted to assess this fishery against the Marine Stewardship Council's standard for Sustainable Fishing
- Stakeholder involvement is a vital part of the MSC process and to please provide any information they felt might be valuable in conducting this assessment, including any concerns they may have about the fishery.

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The information they provide will be considered by the assessment team when writing the assessment report and might influence scoring decisions.

- If there is information, they wished to remain confidential they should inform us before sharing it with us. Any information referenced during this assessment must be shared with any stakeholder who wishes to see it. We can provide a confidentiality agreement on request before you share any sensitive information. Information presented to inform the assessment must be objective and verifiable

11.2.2. Stakeholder participation

Identified stakeholders were contacted by LRQA and the client and invited to participate in this reassessment. The CAB provided the hyperlink to the 'MSC template for Stakeholder Input into Fishery Assessments'.

There were no written submissions from stakeholders

Meetings were held for five days in Wellington both in person and remotely.

At each session stakeholders were given the opportunity to ask questions. The sessions were organised so that the assessors would

- Describe the Fishery under assessment / surveillance – (species, method, area, fleet)
- Explain MSC Procedures and principles - describe in manner appropriate for participants
- Ask participants to introduce themselves & key interests
- Confirm that participants are happy for information to be attributed?

Key issues of concern

- o What are they?
- o How can they be addressed?
- o What's the best source of information?
- Ask participants to identify any sources of information / other stakeholders that may be useful for assessment.
- Ask participants if they require that a note of the meeting be sent to them for comment & then included in the main report.
- Agree timescale for feedback / further input.
- Summarise key points at end of meeting

11.2.3. Evaluation techniques

- For silver warehou, assessed as a minor in-scope species under PI 2.2.1, stock status reference points are not available, derived either from analytical stock assessment or using empirical approaches. This justifies using the RBF per Table 5 of the ERF.
- RBF was used in this assessment. Refer to Section 11.8
- At the site visit:
 - o The team consulted a range of stakeholder groups.
 - o The team identified stakeholders early in the assessment process.
 - o The team organised in person and remote meetings to allow for the highest participation of stakeholders.
 - o The team structured meetings to encourage engagement amongst stakeholders
 - o The team make available background information on the UoA ahead of the meeting so that the stakeholder consultation process was focused on providing information required for the RBF scoring process, while allowing participants to express their expert opinions.

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- A key purpose of the site visit was to collect information and speak to stakeholders with an interest in the fishery. For those parts of the assessment involving the MSC's Risk- Based Framework, we used a stakeholder-driven, qualitative and semi-quantitative analysis during the site visit. To achieve a robust outcome from this consultative approach, we relied heavily on participation of a broad range of stakeholders with a balance of knowledge of the fishery. We encouraged any stakeholders with experience or knowledge of the fishery to participate in these meetings.
- The main points of discussion during the site visit for which stakeholder opinions and knowledge were canvassed include:
 - *Stock assessment modelling attempts*
 - *CPUE time-series*
 - *Distinction of biological stocks as SWA1, SWA3 and SWA4 as separate scoring elements in the UoAs*
 - *Susceptibility attributes and scores*

RBF was used in this assessment. Refer to Section 11.8

The stakeholder input should be reported in the stakeholder input appendix and incorporated in the rationales directly in the scoring tables.

Reference(s): FCP v3.1 7.14, MSC Fisheries Standard Toolbox v1.2 A2.1 and A2.3

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12. Peer Review reports

12.1.1. PRA

12.1.1.1. General Comments

Fishery	Assessment Start Year	Peer Reviewer (A/B/C)	Question	Yes/No	Peer Reviewer Justification (as given at initial Peer Review stage). Peer Reviewers should provide brief explanations for their 'Yes' or 'No' answers in this table, summarising the detailed comments made in the PI / RBF tables (first row) and conditions (second row).	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	PR A	Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	Yes	The report is well written. Further clarity and justification is required in several rationales to support stated achieved scores.	Thank you. Further clarity and justification has been provided where suggested see P! sheet
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	PR A	Are the condition(s) raised appropriately written to clearly identify relevant scoring issues and scoring elements and define any milestones, consistent with the MSC process requirements? [Reference: FCP v3.0 Section 7.16]	Yes	agreed.	Thank you.

12.1.1.2. PI Comments

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	PR comment code	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code

Fishery	Assessment Start Year	Enter UoA stock/s, and insert extra rows for P1 Pls as needed, e.g. if separate scores given for different UoA stocks	Enter UoA gear/s, and insert extra rows for P2 Pls as needed, e.g. if separate scores given for different UoA gear types	Peer Reviewer (A/B/C)	Performance Indicator (PI)	Enter code below to summarise the comment and any expected score change	Peer reviewers (PRs) should provide support for the codes used in the left column by referring to specific scoring issues and/or scoring elements, and any relevant documentation as appropriate. Additional rows should be inserted for any Pls where two or more discrete comments are raised, e.g. for different scoring issues, allowing CABs to give a different answer in each case. Paragraph breaks may also be made within cells using the Alt-return keyboard shortcut. Detailed justifications are only required where the PR is suggesting some change is needed. In other cases, either confirm 'scoring agreed' or identify any places where weak rationales could be strengthened (using the 'Change suggested to increase clarity' code).	CABs should summarise their response to the Peer Reviewer comments in the CAB Response Code column and provide justification for their response in this column. Where multiple comments are raised by Peer Reviewers with more than one row for a single PI, the CAB response should relate to each of the specific issues raised in each row. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	See codes page for response options
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake, Ling New Zealand	Trawl	PR A	1.1.1	Minor change suggested to increase clarity	SI(b) end of first paragraph, the value provide for LIN 7WC states "0.05" with no unit provided. It is believed that the LIN 7WC value written here should be 5% as per data presented in Table 28.	Thanks - that was a carry over from using proportions instead of percentages. Corrected	No score change, change to rationale
New Zealand hake, hoki, ling and Southern blue whiting fishery -	2025	Hoki, Hake, Ling New Zealand	Trawl	PR A	1.1.2	NA (PI not scored)			NA (No response needed)

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Hake, Hoki, Ling Trawl									
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake, Ling New Zealand	Trawl	PR A	1.2.1	Change to rationale or evidence expected, not to scoring	SI(a) Under MSC SA2.4.1(a) SG100 Responsiveness - The CAB has not provide sufficient information in the rational on whether “<i>action has been taken by management, when required</i>”. Whilst there is a harvest strategy in place, is there evidence of its use, in order to gauge the “responsiveness” of the harvest strategy? SA2.4.1(b) states ““<i>Designed</i>” at SG100 scoring issue (a) to mean a harvest strategy that includes a management procedure (MP) that has been developed through management strategy evaluation (MSE)”. The rational provided by the assessor does not address these two fundamental elements of SG100 when considering “design”. It is not clear whether an MP has been developed or whether a MSE was conducted?	SI(a). We have added text to clarify that the strategy is "responsive". For example, the TACCs for HOK 1 and HAK 7 were reduced because their stock sizes were below their target levels and were approaching their limit reference points (Table 18 and Table 21). We also now clarify that the HCR component of the harvest strategy was selected using a MSE process.	No score change, additional evidence presented

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New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake, Ling New Zealand	Trawl	PR A	1.2.1	Change to rationale or evidence expected, not to scoring	SI(b) SA2.4.1 (d) states "Evaluated" at SG100 scoring issue (b) to mean <i>"tested for robustness to uncertainty, appropriate to the scale and intensity of the UoA"</i> . Whilst it is understood that the harvest strategy has undergone MSE, it is not clear if that MSE tested for robustness to uncertainty, appropriate to the scale and intensity of the UoA.	There is no explicit guidance what constitutes "appropriate to the scale and intensity of the UoA" but the MSEs did examine the key uncertainties that are commonly explored in best practice MSEs although as scored under 1.2.2(b) the MSE work did not address ecological implications such as would require an ecosystem operating model. We have added additional text to clarify that the MSEs explored the primary sources of uncertainty relevant to fisheries of these types.	No score change, additional evidence presented
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake, Ling New Zealand	Trawl	PR A	1.2.1	Minor score reduction expected	SI(d) The rationale states that the HCR was reviewed in 2025. However, there is no mention of review of the HS? The HCR and HS are two different things. Was the HS reviewed? If so when and were changes made if necessary? If the HS has not been reviewed, then SG100 is not met.	The HCR is the key component of the harvest strategy but the harvest strategy standard itself was not reviewed - score reduced to a level consistent with 80.	Minor score reduction made
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake, Ling New Zealand	Trawl	PR A	1.2.2	Minor score reduction expected	SI(a) SA2.5.3 states <i>"In scoring issue (a) at the SG100 level, where quantitative simulation testing is available "most of the time", the team shall interpret the stock as being maintained at or above BMSY or some ecologically more relevant target point at least 70% of the time"</i> . The rationale provided does not address this element, The CAB has provided no indication of a value with regard to the amount of time the various stocks have been either	The rationale has been expanded to refer to the fact that the simulation results for ling show that the stocks are predicted (for most MSE scenarios) to remain well above the BMSY in the operating model (which is less than the target of the HCR).	No score change, additional evidence presented

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							maintained or above the relevant target point. If there is not a more definitive rationale provided, then SG100 is not met.		
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake, Ling New Zealand	Trawl	PR A	1.2.2	Change to rationale or evidence expected, not to scoring	SI(c) the rationale provided for SG100 being met requires further explanation as per GSA2.5.4. For example, as stated " <i>the team should not use $F < FMSY$ (i.e., catch being below agreed catch limits) as the sole evidence for the existence of an effective HCR</i> ". This could be occurring for numerous reasons and not solely reliant on the tools. Greater discussion on the tools in use and how they are effective in achieving the exploitation levels required under the HCRs.	We have added additional reference to the tools used to ensure that exploitation rates are achieved as expected.	No score change, additional evidence presented
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake, Ling New Zealand	Trawl	PR A	1.2.3	Change to rationale or evidence expected, not to scoring	SI(c) Whilst it is understood that these species are QMS species and therefore all commercial fishers need to report against catches, what about recreational catch? Further it would be good for the assessor to provide further information/justification in the rationale by including known catches/removals by the various	The report already refers to the few instances of illegal catch and catches of recreational fishers and customary users are negligible. We have added to text (and references to the plenary report where this is documented).	No score change, additional evidence presented

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							sectors, as well as illegal activity (if any), to demonstrate evidence.		
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake, Ling New Zealand	Trawl	PR A	1.2.4	No comments (scoring agreed)	scoring agreed		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	2.1.1	No comments (scoring agreed)	scoring agreed		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	2.1.2	No comments (scoring agreed)	scoring agreed		NA (No response needed)

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New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	2.1.3	No comments (scoring agreed)	To note, 2.1.3 was not scored from the default tree, as RBF was use. Therefore, 2.1.3R was scored instead. scoring agreed		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	2.2.1	No comments (scoring agreed)	scoring agreed		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	2.2.2	No comments (scoring agreed)	scoring agreed		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery -	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	2.2.3	No comments (scoring agreed)	scoring agreed		NA (No response needed)

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Hake, Hoki, Ling Trawl									
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	2.3.1	No comments (scoring agreed)	scoring agreed		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	2.3.2	No comments (scoring agreed)	scoring agreed		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	2.3.3	Change to rationale or evidence expected, not to scoring	SI(b) as per GB1.4.1 and table B5 of the MSC Fisheries Standard Toolbox v1.2, the CAB has correctly indicated that TG3 has been met for all habitats. However, only PG1 has to be met for all scoring elements across SG60, 80 and 100. Therefore, PG2 and PG3 do not need to be scored or displayed under this SI. Scoring needs to be stated at the end of the rationale so it is clear which	Thank you for that reference to the relevant guidance. We have revised the scoring rationale to reflect PG1 is met therefore, in combination with TG3 being met, SG60, 80 and 100 are met for the scoring issue.	Score increased

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							SG is met. Currently unclear which SG is met.		
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	2.4.1	No comments (scoring agreed)	scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	2.4.2	No comments (scoring agreed)	scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery -	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	2.4.3	No comments (scoring agreed)	scoring agreed.		NA (No response needed)

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Hake, Hoki, Ling Trawl									
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	3.1.1	No comments (scoring agreed)	scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	3.1.2	No comments (scoring agreed)	scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	3.1.3	No comments (scoring agreed)	scoring agreed.		NA (No response needed)

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New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	3.2.1	No comments (scoring agreed)	scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	3.2.2	No comments (scoring agreed)	scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	3.2.3	No comments (scoring agreed)	scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery -	2025	Hoki, Hake & Ling New Zealand	Trawl	PR A	3.2.4	No comments (scoring agreed)	scoring agreed.		NA (No response needed)

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Hake, Hoki, Ling Trawl										

12.1.1.3. Condition Comments

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	Condition number	Condition code	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
Fishery	Assessment Start Year	Enter UoA stock/s covered by the condition	Enter UoA gear/s covered by the condition	Peer Reviewer (A/B/C)	Performance Indicator (PI)	Condition number as currently used in the CAB report	Is the condition fully and clearly defined?	Peer reviewers (PRs) should provide support for their answers in the left column by referring to the details of each condition as appropriate. Additional rows should be inserted where two or more discrete comments are raised on the same PI or condition, e.g. for different UoAs, scoring issues or scoring elements, allowing CABs to give a different answer in each case. Paragraph breaks may also be made within cells using the Alt-return keyboard shortcut. Detailed justifications are only required where the PR is suggesting some change is needed. In other cases, either confirm 'Condition agreed' or identify any places where unclear language could be improved (using the 'Minor change suggested to increase clarity' code).	CABs should summarise their response to the Peer Reviewer comments in the CAB Response Code column and provide justification for their response in this column. Where multiple comments are raised by Peer Reviewers with more than one row for a single PI, the CAB response should relate to each of the specific issues raised in each row. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	See codes page for response options

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New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Enter UoA stock/s	Enter UoA gear/s	PR A	2.4.1	1	Yes	agreed.		No change made

12.1.1.4. RBF Comments

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	RBF Scoring	RBF Information	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
Fishery	Assessment Start Year	Enter UoA stock/s, and insert extra rows for P1 PIs as needed, e.g. if separate scores given for different UoA stocks	Enter UoA gear/s, and insert extra rows for P2 PIs as needed, e.g. if separate scores given for different UoA gear types	Peer Reviewer (A/B/C)	Performance Indicator (PI)	Does the report clearly explain how the process(es) applied to determine risk using the RBF has led to the stated outcome?	Are the RBF risk scores well-referenced?	Peer reviewers (PRs) should provide support for their answers in the left two columns by referring to specific scoring issues and/or scoring elements, and any relevant documentation as appropriate. Additional rows should be inserted for any PIs where two or more discrete comments are raised, e.g. for different scoring issues, allowing CABs to give a different answer in each case. Paragraph breaks may also be made within cells using the Alt-return keyboard shortcut. Detailed justifications are only required where the PR is	CABs should summarise their response to the Peer Reviewer comments in the CAB Response Code column and provide justification for their response in this column. Where multiple comments are raised by Peer Reviewers with more than one row for a single PI, the CAB response should relate to the specific issues raised in each row. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	See codes page for response options

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								suggesting some change is needed. In other cases, either confirm 'scoring agreed' or identify any places where weak rationales could be strengthened (using the 'Change suggested to increase clarity' code).		
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Enter UoA stock/s	Enter UoA gear/s	PR A	1.1.1 (RBF)					NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery -	2025	Enter UoA stock/s	Enter UoA gear/s	PR A	2.1.1 (RBF)					NA (No response needed)

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Hake, Hoki, Ling Trawl										
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Enter UoA stock/s	Enter UoA gear/s	PR A	2.2.1 (RBF)	No comments (scoring agreed)	No comments (scoring agreed)			NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Enter UoA stock/s	Enter UoA gear/s	PR A	2.3.1 (RBF)					NA (No response needed)
New Zealand hake, hoki, ling and	2025	Enter UoA stock/s	Enter UoA gear/s	PR A	2.4.1 (RBF)					NA (No response needed)

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Southern blue whiting fishery - Hake, Hoki, Ling Trawl									

12.1.2. PRB

12.1.2.1. General Comments

Fishery	Assessment Start Year	Peer Reviewer (A/B/C)	Question	Yes/No	Peer Reviewer Justification (as given at initial Peer Review stage). Peer Reviewers should provide brief explanations for their 'Yes' or 'No' answers in this table, summarising the detailed comments made in the PI / RBF tables (first row) and conditions (second row).	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	PR B	Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	Yes	The report is very comprehensive and well-written, covering in great detail the wealth of information, analyses and evidence available for all ten UoAs and enabling the fishery to be scored in a manner consistent with the MSC standard. The use of the RBF for one of the PIs was appropriate and sources were well-referenced, and the use of the EBF was well-explained and executed where needed throughout the report. For some PIs, there are minor changes suggested that will increase clarity. For PI 1.2.2 the scoring implications are unknown - either more information will appropriately justify the score, or the score may need to be reduced. Finally, for PI 1.2.3 the scores do not seem to add up correctly. Unless there is a justifiable	Thank you. PI justification suggestions are covered in the PI comments sheet and changes made in the report.

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					reason for awarding 85, this would indicate a score reduction is appropriate.	
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	PR B	Are the condition(s) raised appropriately written to clearly identify relevant scoring issues and scoring elements and define any milestones, consistent with the MSC process requirements? [Reference: FCP v3.0 Section 7.16]	Yes	Condition is simply and appropriately articulated, in accordance with the SG80 guidepost, and relevant milestones are set out to measure progress in achieving the outcome required in the given timeframe.	Thank you.
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if	NA	p.20, Table 4, Hake UoAs - it would help later understanding which UoA is which by referencing in this table which of them are HAK 1, HAK 4 and HAK 7 - like the table references the Ling UoAs, and as given in Sections 10.1.1.3 and 10.1.4.	We have corrected the table to include reference to the the specific hake regions (HAK1, HAK4 and HAK 7).

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			necessary). Add extra rows if needed below.			
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	PR B	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below.	NA	p.23, Section 7.2, first bullet point - mesh size dimensions - says 300 m / 100 m. Should they be mm?	Corrected
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	PR B	Optional: General Comments (continued)	NA	p.75 Projections for HAK 4 - "The stock will rebuild further under catches of 3,62t..." typo - remove comma	Comma removed - thanks
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	PR B	Optional: General Comments (continued)	NA	p.97, 2nd last paragraph, typo: should "pinta" say "points"?	Yes, it should, corrected.

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New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	PR B	Optional: General Comments (continued)	NA	p.204 Scoring Table numbering under NPOA-sharks section - starts at 8 when referring to seven goals. Suggest restarting numbering for the list for the sake of clarity.	Thank you, corrected.
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	PR B	Optional: General Comments (continued)	NA	p.238, paragraph beginning Tuck et al. 2009: typo "... lack of impotence..." should say "... lack of impetus..."	Thank you, funny if it wasn't, corrected.
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	PR B	Optional: General Comments (continued)	NA	p.251, typo in paragraph beginning "The National Fisheries for Deepwater..." should say "The National Fisheries Plan for Deepwater..."	Thank you, corrected.
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	PR B	Optional: General Comments (continued)	NA	p.253, final sentence appears incomplete: insert the words "external review of the management system" before parentheses?	Thank you, corrected.

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New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	PR B	Optional: General Comments (continued)	NA	p.268, cross reference to "Table 55 below" is incorrect (goes to a table in the P1 Background section of the report). Should be "Figure 56 below" with linked cross reference.	Corrected, thank you

12.1.2.2. PI Comments

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	PR comment code	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
Fishery	Assessment Start Year	Enter UoA stock/s, and insert extra rows for P1 PIs as needed, e.g. if separate scores given for different UoA stocks	Enter UoA gear/s, and insert extra rows for P2 PIs as needed, e.g. if separate scores given for different UoA gear types	Peer Reviewer (A/B/C)	Performance Indicator (PI)	Enter code below to summarise the comment and any expected score change	Peer reviewers (PRs) should provide support for the codes used in the left column by referring to specific scoring issues and/or scoring elements, and any relevant documentation as appropriate. Additional rows should be inserted for any PIs where two or more discrete comments are raised, e.g. for different scoring issues, allowing CABs to give a different answer in each case. Paragraph breaks may also be made within cells using the Alt-return keyboard shortcut. Detailed justifications are only required where the PR is suggesting some change is needed. In other cases, either confirm 'scoring agreed' or identify any places where weak rationales could be strengthened (using the 'Change suggested to increase clarity' code).	CABs should summarise their response to the Peer Reviewer comments in the CAB Response Code column and provide justification for their response in this column. Where multiple comments are raised by Peer Reviewers with more than one row for a single PI, the CAB response should relate to each of the specific issues raised in each row. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	See codes page for response options

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New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki Eastern (UoA 1)	Trawl	PR B	1.1.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hoki Western (UoA 2)	Trawl	PR B	1.1.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hake Sub-Antarctic (UoA 3) [HAK 1]	Trawl	PR B	1.1.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)

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New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hake Chatham Rise (UoA 4) [HAK 4]	Trawl	PR B	1.1.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Hake West Coast South Island (UoA 5) [HAK 7]	Trawl	PR B	1.1.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Ling 3 Chatham Rise (UoA 6)	Trawl	PR B	1.1.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)

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New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Ling 4 Chatham Rise (UoA 7)	Trawl	PR B	1.1.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Ling 5 Sub-Antarctic (UoA 8)	Trawl	PR B	1.1.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Ling 6 Sub-Antarctic (UoA 9)	Trawl	PR B	1.1.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)

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New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	Ling 7 West Coast South Island (UoA 10)	Trawl	PR B	1.1.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	1.2.1	Minor change suggested to increase clarity	Slf. Three references are cited: Anderson et al 2019 providing information about catch, bycatch & discard proportions; new discard rules in the Fisheries Act from 2022; and SNZDC, 2024 about maintaining existing move-on provisions for juvenile hoki. It seems implied but is not explicit in the rationale whether those references support the conclusion that measures to reduce unwanted catch across all the UoAs have been reviewed. More explicit wording would increase clarity to support the score given.	The rationale has been updated to make the link between the actions of that review (and response) has occurred clearer.	No score change, additional evidence presented

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New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	1.2.2	Scoring implications unknown	Slā. The rationale for scoring 100 does not cite references nor justify how HCRs take "into account the ecological role of the stock". Nor is the P1 Background on HCRs (and the HSS) explicit about this. The rationale and evidence cited in the background seems more consistent with a score of 80 for this Scoring Issue. If there is evidence elsewhere in the P1 Background about how HCRs, or the references points themselves, take into account the ecological role of stocks, this could support the justification for the score, but should be made explicit in the wording in the scoring table and referenced.	The guidelines for applying the HSS (MPI, 2011) refer to the fisheries management targets accounting for ecosystem (and other) considerations and that catch levels should be set more conservatively than those that meet single-species considerations alone. None of the species considered in the report would be considered low trophic level species. However, the MSE work has not referenced how ecological role was accounted for. The score has therefore been reduced to that consistent with 80. The text of harvest strategies section has been revised to include the additional material regarding ecosystem considerations.	Minor score reduction made
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	1.2.3	Scoring implications unknown	Three Scoring Issues all score 80, none score 100, but the score given for the PI is 85. Shouldn't the score be 80 for all UoAs? If an upwards adjustment is permissible in the FCP, in this case, shouldn't this be explained in the report.	The score was reduced from 85 to 80. Some initial scores were revised during the CPRDR stage but not carried into the PCDR report. Corrected	Minor score reduction made
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	1.2.4	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)

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whiting fishery - Hake, Hoki, Ling Trawl									
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	2.1.1	No comments (scoring agreed)	Scoring agreed.	Thank you	NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	2.1.2	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting	2025	All UoAs	Trawl	PR B	2.1.3	Minor change suggested to increase clarity	Slc. Final sentence. Suggest tightening up the wording of the rationale to shift the emphasis from what reads as an outcome-related statement to a statement about information adequacy. For example: "...information is not adequate to	Thank you, rationale updated for clarity.	No score change, change to rationale

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fishery - Hake, Hoki, Ling Trawl							evaluate with a high degree of certainty whether the management strategy is achieving its objective...". Otherwise scoring agreed.		
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	2.2.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	2.2.2	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern	2025	All UoAs	Trawl	PR B	2.2.3	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)

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blue whiting fishery - Hake, Hoki, Ling Trawl									
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	2.3.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	2.3.2	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	2.3.3	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)

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fishery - Hake, Hoki, Ling Trawl									
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	2.4.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	2.4.2	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting	2025	All UoAs	Trawl	PR B	2.4.3	Minor change suggested to increase clarity	Slb. 2nd paragraph includes the following sentence: "The team anticipates dialogue with ecosystem experts during the site visit might support scoring." This seems a leftover from the ACDR. Was there anything significant revealed through	Thank you. Sentence deleted.	No score change, change to rationale

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fishery - Hake, Hoki, Ling Trawl							dialogue at the site visit? If so, suggest including or delete the sentence. Otherwise scoring agreed.		
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	3.1.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	3.1.2	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern	2025	All UoAs	Trawl	PR B	3.1.3	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)

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blue whiting fishery - Hake, Hoki, Ling Trawl									
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	3.2.1	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	3.2.2	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)

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New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	3.2.3	Change to rationale or evidence expected, not to scoring	Slc. Figure 56 on Row 3, Column 1, minor structural error - should be about "Completeness. To what extent does the information capture all relevant elements and dimensions". It currently shows the "Consistency" criterion. The remainder of the row appears correctly applicable to Completeness. However, the assessment (in Figure 56) of completeness seems incomplete given the high score, mentioning only multiple sources. Being more explicit in Figure 56 about compliance information being representative of all 10 UoAs over a given time frame, or the extent to which information provides an up-to-date description of compliance in all UoAs, would strengthen the assessment that the UoAs meet the TG3 guidepost. Otherwise scoring agreed.	Thank you. Your suggestions are accepted and helpful. Changes have been made to the report	No score change, change to rationale
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs	Trawl	PR B	3.2.4	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)

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12.1.2.3. Condition Comments

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	Condition number	Condition code	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
Fishery	Assessment Start Year	Enter UoA stock/s covered by the condition	Enter UoA gear/s covered by the condition	Peer Reviewer (A/B/C)	Performance Indicator (PI)	Condition number as currently used in the CAB report	Is the condition fully and clearly defined?	Peer reviewers (PRs) should provide support for their answers in the left column by referring to the details of each condition as appropriate. Additional rows should be inserted where two or more discrete comments are raised on the same PI or condition, e.g. for different UoAs, scoring issues or scoring elements, allowing CABs to give a different answer in each case. Paragraph breaks may also be made within cells using the Alt-return keyboard shortcut. Detailed justifications are only required where the PR is suggesting some change is needed. In other cases, either confirm 'Condition agreed' or identify any places where unclear language could be improved (using the 'Minor change suggested to increase clarity' code).	CABs should summarise their response to the Peer Reviewer comments in the CAB Response Code column and provide justification for their response in this column. Where multiple comments are raised by Peer Reviewers with more than one row for a single PI, the CAB response should relate to each of the specific issues raised in each row. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	See codes page for response options
New Zealand hake, hoki, ling and Southern blue whiting fishery -	2025	All UoAs	Trawl	PR B	2.4.1	1	Yes	Condition agreed		No change made

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Hake, Hoki, Ling Trawl										

12.1.2.4. RBF Comments

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	RBF Scoring	RBF Information	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
Fishery	Assessment Start Year	Enter UoA stock/s, and insert extra rows for P1 PIs as needed, e.g. if separate scores given for different UoA stocks	Enter UoA gear/s, and insert extra rows for P2 PIs as needed, e.g. if separate scores given for different UoA gear types	Peer Reviewer (A/B/C)	Performance Indicator (PI)	Does the report clearly explain how the process(es) applied to determine risk using the RBF has led to the stated outcome?	Are the RBF risk scores well-referenced?	Peer reviewers (PRs) should provide support for their answers in the left two columns by referring to specific scoring issues and/or scoring elements, and any relevant documentation as appropriate. Additional rows should be inserted for any PIs where two or more discrete comments are raised, e.g. for different scoring issues, allowing CABs to give a different answer in each case. Paragraph breaks may also be made within cells using the Alt-return keyboard shortcut. Detailed justifications are only required where the PR is suggesting some change is needed. In other cases, either confirm 'scoring agreed' or identify any places where weak rationales could be strengthened (using the	CABs should summarise their response to the Peer Reviewer comments in the CAB Response Code column and provide justification for their response in this column. Where multiple comments are raised by Peer Reviewers with more than one row for a single PI, the CAB response should relate to the specific issues raised in each row. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	See codes page for response options

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								'Change suggested to increase clarity' code).		
New Zealand hake, hoki, ling and Southern blue whiting fishery - Hake, Hoki, Ling Trawl	2025	All UoAs - Scoring Element SWA	Trawl	PR B	2.1.1 (RBF)	No comments (scoring agreed)	No comments (scoring agreed)	Scoring agreed.		NA (No response needed)

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12.2. MSC TO Comments

SubID	PageReference	Grade	RequirementVersion	OversightDescription	Pi	CABComment
37849	114-115	Minor	FCP-7.15.10.1 v3.1	UoA 1-10 (Hoki): PI 1.2.1(f) It is unclear from the rationale if the review of alternative measures occurs every 5 years. Rationale states that review has happened within the last 5 years but does not state a plan.	1.2.1	We have added references to the 2024 and 2025 plans related to discarding
37850	53	Minor	FCP-7.15.10.1 v3.1	UoA 11 & 12 (SBW): PI 1.2.1(f): It is unclear from the rationale if the review of alternative measures occurs every 5 years. Rationale states that review has happened within the last 5 years but does not state a plan.	1.2.1	We have added references to the 2024 and 2025 plans related to discarding
37857	73	Minor	FCP-7.15.10.1 v3.1	UoA 13-17 (Ling): PI 1.2.2(a): It is unclear which scoring is attributed to this PI. The rationale states that SG100 is not met, but scoring guidepost is scored at SG100.	1.2.2	This was a typo it should have been "no" - the score was correct

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37853	102	Minor	FCP-7.15.10.1 v3.1	UoA 11&12 (SBW):PI 2.1.2(c): It is unclear from the rationale if the review of alternative measures occurs every 5 years. Rationale states that reivew has happened within the last 5 years but does not state a plan.	2.1.2	Thanks for flagging this socring issue. Upon review it has been assessed as "not applicable" as there are in fact no main or minor scoring elements with all non-target species catch meeting the definition of "negligible" per SA3.1.1.d.ii.
37858	140	Minor	FCP-7.15.10.1 v3.1	UoA 13-17 (Ling): PI 2.1.2(c): It is unclear from the rationale if the review of alternative measures occurs every 5 years. Rationale states that reivew has happened within the last 5 years but does not state a plan.	2.1.2	Thank you, additional references to the revisions tot eh Fisheries Amendments relating to discards have been added and it has been clarified that the reviews to gear changes are reported at least once every 5 years.

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37855	122-123	Minor	FCP-7.15.10.1 v3.1	UoA 11&12 (SBW): PI 2.2.3(b): It is unclear from the rationale if the scoring guidepost of SG100 has been met. The rationale does not state if the information is adequate to evaluate the effectiveness of the measures to minimise mortality with a high degree of certainty.	2.2.3	Thank you, an additional paragraph added to justify scoring at SG100.
37860	160-161	Major	FCP-7.15.7.4 v3.1	UoA 13-17 (Ling): PI 2.2.3: It is unclear as to why the overall PI score of 95 was scored for this PI. According to the rationale of 2.2.3(a) is scored at SG80, with 2.2.3(b) scored at SG100. According to FCP v3.1 clause 7.15.4.ii "The team shall assign 90 where performance against the SIs is mid-way between SG80 and SG100".	2.2.3	Corrected
37851	232	Minor	FCP-7.15.10.1 v3.1	UoA 1-10 (Hoki): PI 2.3.2(b) It is unclear from the rationale what the effect of the increased percentage of tows with captures is on the	2.3.2	Thank you for this comment, it has been incorporated into the scoring rationale with a consequent

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				sessile benthic invertebrate taxa.		reduction in score to SG80.
37852	241	Guidance	FCP-7.15.10.1 v3.1	UoA 1-10 (Hoki): PI 2.4.1(a) It is unclear from the rationale if the assessment team has considered the indirect effects on ETP/OOS. It states information regarding this after the recommendation, making it unclear if it is part of the recommendation or considered in the scoring.	2.4.1	Thank you, the text referring to indirect effects has been moved to form part of the rationale to meet SG60 and SG80. It is clearer now that the Recommendation is linked to not meeting SG100.
37856	160	Minor	FCP-7.15.10.1 v3.1	UoA 11&12 (SBW): PI 3.2.2(b): It is unclear which scoring is attributed to this PI. The rationale states that SG100 is not met, but scoring guidepost is scored at SG100. Additionally, it is unclear if the overall score for this PI has been properly adjusted.	3.2.2	Thank you. This has been corrected in the SBW report .. Also all three reports HHL, LL and SBW now score 3.2.2 at 90.
37869	31	Guidance	FCP - 7.17.6.i v3.1	As per FCP 7.17.6.i, "the CAB shall document in the 'MSC Reporting Template': how fish and fish products can be identified or can be confirmed as certified at		Text has been added in all reports, SBW, HHL and LL to show fish and fish products can be confirmed as certified at the point

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				the point that it enters certified chains of custody." While it is stated that all shareholders of the NZ Seafood Deepwater Council are all eligible to make use of the fishery certificate and sell products as certified, it is unclear how individual members of the council can be identified and verified as such at the point of sale.		that it enters certified chains of custody. Also text to show how individual members of the council can be identified and verified as such at the point of sale.

12.3. Stakeholder input

No written statements were received from any stakeholders

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12.4. Conditions

12.4.1. Summary of conditions closed under previous certificate

There were no open conditions on these fisheries.

12.4.2. Conditions

There are no new conditions

12.5. Surveillance

Table 112: Fishery surveillance program

Surveillance level	Year 1	Year 2	Year 3	Year 4
Level 4	Off-site surveillance audit	On-site surveillance audit	Off-site surveillance audit	On-site surveillance audit & re-certification site visit

Table 113: Timing of surveillance audit

Years	Anniversary date of certificate	Proposed date of surveillance audit	Justification
1	6 th February 2026	2026	Evidence of progress towards condition 2.4.1 to be provided remotely
2		2027	The auditors need to review the research plan to provide up to date determinations of changes to key ecosystem indicators
3		2028	Evidence of progress towards condition 2.4.1 to be provided remotely
4		2029	The auditors need to assess that the client fishery can demonstrate that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be serious or irreversible harm.

Table 114: Surveillance level justification

Year	Surveillance activity	Number of auditors	Justification
1	Offsite audit	2 auditors offsite	Review and collate available research trawl information/data that may be used to provide up to date determinations of changes to key ecosystem indicators.
2	On site	2 auditors on site	Develop a research plan to provide up to date determinations of changes to key ecosystem indicators.
3	Off site	2 auditors offsite	Implement research plan. Preliminary results are discussed as they become available
4	On site	3 auditors	Present outcomes of the research. The client fishery can demonstrate that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be serious or irreversible harm.

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This site visit will be combined with a reassessment

12.6. Harmonised fishery assessments

There are a few other fisheries in New Zealand and the surrounding areas that are MSC certified, but these operate on a different scale targeting different stocks compared to this fishery. While other assessments have been reviewed in relation to general fisheries management aspects under P3, it is determined that there is harmony.

Overlapping Fisheries		
Fishery Name	Certification Status	Standard version and harmonised principles
New Zealand Hoki, Hake and Ling Trawl Fishery	This fishery	This reassessment on V3.1 – P3
New Zealand orange roughy	Certified	V2.01 – P3

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12.7. Risk-Based Framework outputs

The MSC Risk Based Framework was announced for this assessment. The purpose of this section is to report the RBF activities that the team undertook before, at, and following, the site visit.

Notifications for RBF published >30 days ahead of the site visit. Prior to the site visit the team gathered the information needed for scoring these PIs as required by Annex PF and published preliminary scores for all elements based on team research. This information was used to inform the RBF stakeholder meetings and was presented to attendees; in addition to this the team collected information to inform the use of the RBF both during and after the site visit. The site visit was organised to encourage the engagement of stakeholders with the assessment team and discussions between stakeholders. The opportunities that were provided for stakeholder input to the RBF at the site visit included the interviews that the assessment team conducted with individual stakeholders and reminders issued at each meeting to further encourage stakeholder contributions to the RBF process. In addition the assessment team published a questionnaire summarising the rationale for use of the RBF, presenting draft productivity and susceptibility scores, and requesting stakeholders supply justified alternative scores or confirm the teams approach and scoring.

RBF activities which were carried out were:

- Assist in determining the appropriate fishstocks to assess using the RBF
- Comment on the provisional productivity scores assigned to each scoring element by the Assessment Team
- Assist in the scoring of the susceptibility attributes within the PSA.

The assessment team determined that the RBF process was triggered for one in-scope 'minor' species in the UoA catch, which is a QMS species: silver warehou (*Seriolella punctata*). Initially the assessment team considered that only the SWA 1 stock triggered the RBF, however during the RBF workshop it was made clear that the stock structure of silver warehou is not well known and it was recommended that all SWA fishstocks be combined and scored using the RBF methodology as a single biological stock, noting the current management areas bear little relation to known spawning areas and silver warehou distribution.

Following this revised approach the assessment team adjusted the susceptibility scores accordingly to reflect a far wider distribution of Silver warehou (effectively throughout the EEZ) and consequently a high degree of overlap with the combined trawl UoAs. Whilst the areal overlap score should be applied to each UoA separately it was recommended at the workshop that the areal overlap should be assessed at the spatial scale of the UoAs and that assessing the UoAs collectively would be more precautionary and take account of the uncertainty surrounding the silver warehou stock structure. Areal overlap therefore increased from a draft score of 1 to a final score of 3 (high degree of overlap).

The encounterability score was revised from a risk score of 3 to a risk score of 2, noting that silver warehou are a semi-pelagic species and the bulk of fishing effort is directed at demersal species. The trophic level of silver warehou was reduced from a high risk score to a medium risk score as stakeholders at the RBF workshop noted silver warehou predominantly feed on planktonic larvae. The final PSA RBF score for silver warehou was therefore calculated at 89, down from the draft score of 91 (Table 115).

Table 115. Final RBF scoring output for silver warehou (*Seriolella punctata*), all stocks combined.

Scientific name	Common name	Species type	Fishery descriptor	Productivity Scores [1-3]									Susceptibility Scores [1-3]					Cumulative only					MSC PSA-derived score	Risk Category Name	MSC scoring guidepost
				Average age at maturity	Average max age	Fecundity	Average max size	Average size at Maturity	Reproductive strategy	Trophic level	Density Dependence	Total Productivity (average)	Availability	Encounterability	Selectivity	Post-capture mortality	Total (multiplicative)	PSA Score	Catch (tons)	Weighting	Weighted Total	Weighted PSA Score			
Seriolella punctata	Silver warehou	Vertebrate	Demersal trawl	1	2	1	1	2	1	2		1.43	3	2	2	3	1.88	2.36					89	Low	≥80

12.7.1. Productivity Susceptibility Analysis (PSA)

Table 116: PSA productivity and susceptibility attributes and scores for fish and invertebrates

Performance Indicator	2.2.1	
Productivity		
Scoring element (species)	Silver warehou (<i>Seriolella punctata</i>)	
Attribute	Justification	Score
Average age at maturity	Initial growth is rapid, and fish reach sexual maturity at around 45 cm fork length in 4 years (FNZ, 2024a)	1
Average maximum age	Maximum age observed, 23 years for females and 19 years for males (FNZ, 2024a)	2
Fecundity	Silver warehou is a schooling species, aggregating to both feed and spawn. Life history of silver warehou appears typical of many teleosts. (FNZ, 2024a)	1
Average maximum size Not scored for invertebrates	von Bertalanffy growth parameters: L ∞ 54.5 (F), L ∞ 51.8 (M). (FNZ, 2024a)	1
Average size at maturity Not scored for invertebrates	Initial growth is rapid and fish reach sexual maturity at around 45 cm fork length in 4 years (FNZ, 2024a)	2
Reproductive strategy	Broadcast spawner. Silver warehou is a schooling species, aggregating to both feed and spawn. (FNZ, 2024a)	1
Trophic level	Adults mainly eat planktonic tunicates (RBF workshop)	2
Density dependence Invertebrates only	NA	NA
Susceptibility		
Fishery Only where the scoring element is scored cumulatively	NA	
Attribute	Justification	Score
Areal overlap	Stakeholder consultation during the RBF workshop recommended a score of 3 (high overlap) noting that the combined SWA fishstocks were being assessed.	3
Encounterability	Medium overlap with demersal fishing gear (medium encounterability).	2
Selectivity of gear type	Predominantly the recruited size range of 40–55 cm. (FNZ, 2024a)	2
Post capture mortality	Default score for retained species	3
Catch (weight) Only where the scoring element is scored cumulatively	NA	NA

12.8. Peer reviewers – summary of qualifications and competencies

Chris Grieve

Chris has 25+ years' experience in fisheries management and policy-making from local to global levels. First as research assistant to Australian stock assessment scientists, then the manager of complex Australian demersal trawl and dredge fisheries. She moved to the UK in 2000 to lead the Sustainable Fisheries Policy Research Programme for a London-based think tank where the mission was influencing change in the EU's Common Fisheries Policy. In 2002, Chris became International Policy Director for the Marine Stewardship Council (MSC) to lead MSC's work on standards, certification and accreditation, governing bodies and developing world fisheries. Chris's role evolved to become Associate Director between 2005 and 2010 after she established Meridian Prime as a consulting company with a diverse portfolio of work. Chris led and participated in work on the development, evolution and implementation of the MSC standard and certification requirements. She has also led and participated in sustainable fisheries-related projects for client organisations in the UK, across Europe and the USA. Chris has been team member on fishery assessments and surveillance audits under the MSC certification scheme; and is an approved independent peer reviewer for MSC's Peer Reviewer College. On a consultancy basis, Chris is Executive Director Standards & Impact of the EDGE Certified Foundation: a Swiss-based, global certification scheme focusing on gender equality in the workplace. Chris served until recently as a Board Director for WOCAN (an international non-profit focusing on gender equality in natural resource management in the global south) and was on the founding Advisory Board of Ocean Outcomes (a US-based non-profit focusing on sustainable fisheries). Chris was a founding Trustee and Vice Chair of the ISEAL Alliance, the global sustainability standards organization; and a statutory-appointed member of two Australian fisheries management public boards.

Peter Trott

Peter is Director of FishListic, an independent sustainable seafood consultancy. Peter has 20 years' experience in fisheries management, resource sharing, ecosystem principles, project management, seafood markets, supply chains and traceability. During the eight years at WWF-Australia, Peter lead on international and domestic seafood markets. Peter was the architect of key strategic seafood market partnerships with retailers, brand owners and aquaculture companies. He has been involved in the Marine Stewardship Council (MSC) and with fishery certifications across the globe, including as co-client. He is a certified MSC Chain of Custody auditor, fishery team-member, fishery team-leader, certified SA8000 social auditor and ISO19011-2018 accredited. Peter is a member of the MSC Stakeholder Advisory Council. Peter was a fisheries manager with two fisheries agencies for eight years, and holds a Bachelor of Science (Fisheries Management and Aquaculture) with an honours degree in Aquatic Sciences from Deakin University.

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12.9. Assessment Team – biographies/summaries of CVs

Jo Akroyd Team Lead and P3

Jo has over 30 years' experience in marine fisheries policy, research, management and governance. She has extensive international and Pacific experience and has worked at senior levels in both the public and private sectors in these roles. Jo was with the Ministry of Agriculture and Fisheries in New Zealand for 20 years. Starting as a fisheries scientist, she was promoted to senior chief fisheries scientist, then Assistant Director, Marine Research. She was awarded a Commemoration Medal in 1990 in recognition of her pioneering work in establishing New Zealand's fisheries quota management system. Jo has worked on many fisheries aid projects in the Pacific including Cook Islands, Solomon Island, Fiji, Vanuatu, Papua New Guinea and Timor-Leste and also in Myanmar. As well as carrying out general fisheries consultancy since 1994 she has undertaken all facets of MSC work as a lead assessor, expert team member and peer reviewer across a wide range of fisheries. Jo has completed the MSC v1.3, v2.0, v2.1, v2.2 and v 3.0 and V3.1 training modules including for enhanced fisheries, Risk based framework and traceability. She is a member of the MSC's Peer Review College,

MSC projects include Team Leader and Fisheries Management expert for New Zealand fisheries, (hoki, hake, ling, southern blue whiting, albacore and skipjack), Fiji (albacore, yellowfin and bigeye tuna), Japan (scallops, skipjack and yellowfin), China (scallops, flounder and snowcrab), Maldives (skipjack), Ross Sea (toothfish), West Papua (skipjack and yellowfin). More recently she was the Team Leader for the MSC assessment for the AGAC four oceans albacore, yellowfin and bigeye tuna fisheries. Jo has conducted multi species pre-assessments in Japan, China, Viet Nam, Australia and New Zealand and provided independent Peer review reports for tuna, scallops and prawn fisheries in many countries

Andre Punt P1

Dr. André Punt is a Professor in the School of Aquatic and Fishery Sciences at the University of Washington. He holds a PhD in Applied Mathematics from the University of Cape Town (South Africa). He has been involved in stock assessment and fisheries management for over 35 years and has been recognized for his contributions in this area with awards from CSIRO, the University of Washington, the Australian Society for Fish Biology, and the American Fisheries Society. His research relates broadly to the development and application of fisheries stock assessment techniques, bioeconomic modelling, and the evaluation of the performance of stock assessment methods and harvest control rules using the Management Strategy Evaluation approach. Dr. Punt has conducted stock assessments for a wide range of species, ranging from anchovies and sardines, to groundfish, tunas, and cetaceans. He has published over 450 papers in the peer-reviewed literature, along with over 400 technical reports. He was a member of a National Research Council panel on evaluating the effectiveness of fish stock rebuilding in the United States. Dr Punt is currently a member of the Scientific and Statistical Committee of the Pacific Fishery Management Council, the advisory committee for Center for the Advancement of Population Assessment Methodology, the Crab Plan Team of the North Pacific Fishery Management Council, and the Scientific Committee of the International Whaling Commission. He has been involved in MSC assessments, pre-assessments and surveillance audits for orange roughy, hoki, hake, and southern blue whiting in New Zealand. Dr. Punt has passed MSC training and has no Conflict of Interest in relation to this fishery. Full CV available upon request.

Stewart P2

Stewart Norman is the Director of Capricorn Marine Environmental in South Africa, responsible for overarching project management in scientific observer programs and professional consulting since the start of 2019. He holds a Master's degree from the University of Cape Town in Applied Marine Science completed in 2013, specifically focusing on highly migratory large pelagic species. He has undertaken numerous scientific research projects contracted to regional

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management organisations, most notably with the IOTC, CCSBT and ICCAT. His work involves interpreting scientific data from commercial fishing fleets and incorporating it into fisheries management. He has a key role in the provision of scientific and fisheries management advice in support of the South African hake trawl fishery as an MSC client in their accreditation processes.

Stewart has been involved in numerous pre-assessments for a range of species (octopus, menhaden, lobster, kelp, tuna (FADs/non-FADs). He has 5 years of experience as a Principle 2 expert including as part of the team conducting the global purse seine fishery assessment of the AGAC fleet, the assessment of South Korean Pacific Ocean longline fleets and Ghanaian Pole and Line fishery. He also has 5 years' experience in the role of MSC Chain of Custody auditor.

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12.10. Supporting Information

The below MSC variation request and response are available on the MSC track a Fishery website, and have been included here for completeness.

12.10.1. Variation Request

Table 1: Variation request

1	Date submitted to the MSC
24 th February 2025 (amended 17 th March 2025)	
2	CAB
LRQA	
3	Fishery name and certificate number
New Zealand hake, hoki, ling and Southern blue whiting - MSC-F-31397	
4	Lead auditor or program manager
Jo Akroyd – Lead Auditor Gillian Irvine – Program Manager	
5	Request prepared by
Gillian Irvine – Program Manager Jo Akroyd – Lead Auditor Stewart Norman – Principle 2 Auditor Andre Punt – Principle 1 Auditor	
6	Scheme requirement(s) for which variation requested
FCP v2.3 - 7.8.3 The team shall use the default assessment tree as set out in the MSC Fisheries Standard Section SA in all assessments, with the following exceptions. GCR v2.7 - 4.12.2 When submitting a variation request as allowed under these requirements, the CAB shall note that: c. The CAB shall only submit variation requests in advance of the circumstances occurring. The MSC will not accept retrospective variation requests.	
7	How many times has a variation against this requirement been accepted during this assessment or audit of this fishery?

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Table 2 – Variation justification

1	Proposed variation
LRQA requests to change standard version 3.1 - SI 2.1.2d and SI 2.2.2d with standard version 2.01 – SI2.1.2d in the v3.1 reassessment of the New Zealand hake, hoki, ling and Southern blue whiting fishery (scoring issues included in justification below) As explained below while some of the shark species do pass the v3.1 PI the variation asks for a blanket modification to the assessment tree for the scoring issue in question to avoid any confusion with individual elements being assessed against different versions of the standard.	
2	Additional time requested (where applicable)
Original deadline date	NA
Modified deadline date requested	NA
Number of additional days requested	NA
3	Justification
The New Zealand hake, hoki, ling and Southern blue whiting fishery is currently undergoing reassessment. The site visit it is planned for the week commencing 24th of February 2025. Currently, there are reassessments announced against both standard versions. And the fishery is currently certified against v1.3 of the standard. At the ACDR stage the fishery is not meeting SG60 for 2.1.2d under V3.1. There has been a regulatory FNA requirement in New Zealand since 2014, following which the Minister gazetted eight exceptions to the fins attached requirement, which acknowledging that all Quota Management System (QMS) shark species must be landed if taken, provides for at sea-processing of eight QMS species of shark. Noting the definition of 'shark' under V3.1 of the Standard, three of the eight species to which the exemption applies are not scored as sharks. Within the UoAs, interactions with in-scope and ETP shark species to which the exemption applies have been assessed to be negligible. For the shark species to which the FNA applies, the assessment team finds that the intent of PI 2.1.2d is achieved and that TG3 of the ERF is met, with the following evidence available to confirm this: - Information to confirm that the UoA has adopted an FNA policy is available through Operational Procedures (OPs) in place, which are updated regularly/iteratively by the Deepwater Group. - OPs are communicated effectively to the deepwater fleet through an Information Portal available on the bridge of all UoA vessels - Implementation is supported through the full time Environmental Liaison Officer who is required to visit at least 90% of vessels in the Deepwater fleet each year - Information to confirm that an FNA or non-retention policy is enforced in the UoA is available through the high levels of representative observer coverage in the UoAs averaging 44.6% of tows observed in the hoki, hake and ling trawl fishery, 15.9% of hooks observed in the ling longline fishery and 95.4% of tows observed in the southern blue whiting fishery over the period 2018/19-2022/23.	

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- Observer reports include provision to record shark processing codes and instances of observed shark finning (noting that there have been no reported shark finning cases reported).
- Observers are positioned to directly observe vessel interactions with sharks throughout the catch operation, including reporting the fate of sharks either retained, processed or discarded.
- Vessel offloads are monitored Ministry for Primary Industries Fishery Officers and vessels are inspected to ensure all catch is landed from the vessel.

For the five species classified as 'sharks' under V3.1 and to which the Ministerial exemption applies it is therefore not possible to confirm that the UoA has adopted the FNA because GSA2.4.3–GSA2.4.4 of MSC Standard V3.1 does not permit exemptions to an FNA Policy.

The fishery client is developing measures to address these exemptions but their application would result in loss of revenue to vessels that currently process sharks onboard and additionally may not be fully implemented in time to be able to consider this scoring issue under V3.1 met for the reassessment.

The fishery has the option to undergo reassessment against either V2.01 or V3.1 of the Standard and is voluntarily choosing to be recertified against V3.1. By opting to move forward with V3.1 the fishery is demonstrating a commitment to sustainability and supplying evidence of higher performance than what is necessary under v2.01 for all other Principle 2 PIs/SIs.

As explained above while some of the shark species do pass the v3.1 PI the variation asks for a blanket modification to the assessment tree for the scoring issue in question to avoid any confusion with individual elements being assessed against different versions of the standard.

This variation would allow the fishery, presuming a successful reassessment, to be certified against v3.1 of the standard. The fishery would be meeting the higher bar set in v3.1 of the standard on all other PIs/SIs.

The fishery shall be expected to follow the requirement that CABs shall apply the MSC Fisheries Standard v3.1 by 1 November 2030, thereby giving the fishery the same timeline as all other certified fisheries to implement what is necessary to meet SG60.

Scoring Issues

V3.1 - 2.1.2d, 2.2.2d – SG 60 - There is a high degree of certainty that shark finning is not taking place.

SA2.4.4 At scoring issue (e) at SG60, the team shall:

- a) Determine that a fins naturally attached (FNA) policy is in place for all retained sharks.
 - i. If the UoA does not retain sharks, the team shall determine that a non-retention policy is in place.
- b) Apply the Evidence Requirements Framework in Tool B of the MSC Fisheries Standard Toolbox to establish that the information used to determine that an FNA or non-retention policy is in place and enforced has a very high degree of accuracy.

ERF Table B1 specifies when an evaluation of information trueness and precision must be applied. In the case of PI 1.2.1 SI (e), PI 2.1.2 SI (d), PI 2.2.2 SI (d), B1.2 applies if these SIs are scored (evaluation of trueness), whilst B1.3 (evaluation of precision) is not applicable.

ERF Table B3 prescribes relevant information to be considered in the evaluation of trueness to be: Information needed to determine the implementation of a fins naturally attached (FNA) or non-retention policy.

ERF Table B3 directs that information categories to be considered include: Information to confirm that the UoA has adopted an FNA or non-retention policy; and Information to confirm that an FNA or non-retention policy is enforced in the UoA.

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V2.01 – 2.1.2d – SG 60 - It is likely that shark finning is not taking place.

SG80 - It is highly likely that shark finning is not taking place.

SG100 - There is a high degree of certainty that shark finning is not taking place.

SA2.4.5 When scoring SI (e) at SG60, the expectation shall be that one of the following subparagraphs applies:

SA2.4.5.1 If fins are cut on board:

- a) There are regulations in place governing the management of sharks;
- b) Shark fins and carcasses shall be landed together in compliance with a ratio specifically relevant for the species, fishing fleet and initial post catch processing (e.g., fresh/frozen/dried); and
 - i. The team shall document the justification for using the specific ratio.

- c) Good external validation of the vessels' activities is available to confirm that it is likely that shark finning is not taking place.

SA2.4.5.2 If sharks are processed on board:

- a) There are regulations in place governing the management of sharks;
- b) There is full documentation of the destination of all shark bodies and body parts; and
- c) Some external validation of the vessel's activities is available to confirm that it is likely that shark finning is not taking place.

SA2.4.6 When scoring SI (e) at SG80, the expectation shall be that one of the following subparagraphs applies:

SA2.4.6.1 All sharks are landed with fins naturally attached; SA2.4.6.2 If sharks are processed on board:

- a) There are regulations in place governing the management of sharks;
- b) There is full documentation of the destination of all shark bodies and body parts; and
- c) Good external validation of the vessels' activities is available to confirm that it is highly likely that shark finning is not taking place.

SA2.4.7 When scoring SI (e) at SG100, the expectation shall be that one of the following subparagraphs applies:

SA2.4.7.1 If sharks are landed with fins naturally attached, there is some external validation such that there is a high degree of certainty that shark finning is not taking place.

SA2.4.7.2 If sharks are processed on board

- a) There are comprehensive regulations in place governing the management of sharks;
- b) There is full documentation of the destination of all shark bodies and body parts; and
- c) Comprehensive external validation of the vessels' activities is available to confirm with a high degree of certainty that shark finning is not taking place.

4 Implications for assessment

This variation would allow the fishery, presuming a successful reassessment, to be certified against v3.1 of the standard. The fishery would be meeting the higher bar set in v3.1 on all other PIs

5 Mitigation of the implications for assessment

LRQA shall retrospectively follow the modified assessment tree steps with some modifications: a.

Apply for and obtain a variation from the MSC to 7.8.3 (this variation)

b. Inform stakeholders about the draft assessment tree and the reasons for modifications.

d. Upload the draft assessment tree to the MSC database for publication on the MSC website.

e. Allow stakeholder input on the draft modified assessment tree for a period of 15 days.

f. Consider all stakeholder input, recording why comments have been accepted or rejected.

g. Review the decision to modify the assessment tree, considering stakeholder input.

h. Upload the final assessment tree to be used to the MSC database for publication on the MSC website, within 10 days of the consultation period closing.

6 How many conditions does the fishery have?

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To be determined.

7 What is the status of the current assessment or audit?

Reassessment site visit set for the w/c 24th of February 2025

8 Other relevant information

9 If applicable, additional information added after the MSC's request

12.10.2. Variation Response



Marine Stewardship Council

Gillian Irvine
LRQA (Seafood) Limited
6 Redheughs Rigg
Edinburgh
United
Kingdom
EH12 9DQ

Sent by email

Date: 27/03/2025

New Zealand hake, hoki, ling and Southern blue whiting, request for variation to the MSC Certification Requirements.

- V2.3 - FCP-7.8.3 - The team shall use the default assessment tree as set out in the MSC Fisheries Standard Section SA in all assessments, with the following exceptions.
- V2.7 - GCR-4.12.2.c - When submitting a variation request as allowed under these requirements, the CAB shall note that:
 - c. The CAB shall only submit variation requests in advance of the circumstances occurring. The MSC will not accept retrospective variation requests.

Dear Gillian Irvine,

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I write with reference to your submission on 24/02/2025 of a request for variation to the MSC Certification Requirements (CR) to allow:

LRQA to use a modified assessment tree for the reassessment of this fishery under v3.1 of the Fisheries standard, after publishing the ACDR. The proposed modified assessment tree would score shark finning using FS v2.01 - SI 2.1.2.d, instead of FS v3.1 - SI 2.1.2d and SI 2.2.2d. All shark species shall be scored using this modified assessment tree, following FS v3.1 for the definition of shark.

The requirements are integral to ensuring all MSC accredited Conformity Assessment Bodies operate in a consistent and transparent manner. The MSC intends that these requirements be met across all fisheries and CoC certificate holders, except in exceptional, well-justified circumstances, as part of the MSC programme.

MSC notes the factors presented supporting your request, including:

- The fishery has worked with the CAB to produce two ACDRs in order to compare the scoring between v2.01 and v3.1 of the Fisheries Standard. The ACDRs were published ahead of the site visit, which was conducted in the week of the 24th of February 2025.
- There is a Fins Naturally Attached (FNA) policy requirement in New Zealand since 2014, with eight exceptions to the requirement. Following the definition of 'shark' under Fisheries Standard v3.1, three of the eight species are not scored as sharks. For the remaining five shark species it is not possible to confirm that the UoA has adopted the FNA because GSA2.4.3–GSA2.4.4 of MSC Standard v3.1 does not permit exemptions to an FNA Policy.
- The assessment team have confidence that the intent of PI 2.1.2d is achieved and that the intent of TG3 of the ERF is met with the provided evidence. Such as an established observer program with good coverage, dockside monitoring, and available information that confirms that shark finning does not occur.
- The fishery is developing measures to address these exemptions but their application would result in loss of revenue to vessels that currently process sharks onboard, and may not be fully implemented in time to able to consider this scoring issue under v3.1 met for the reassessment. The policy measures will work to meet the v3.1 requirements by 2030.
- This variation would allow the fishery, presuming a successful reassessment, to be certified against v3.1 of the standard and be held to a higher bar in all other performance areas.
- The fishery shall be expected to follow Fisheries Standard v3.1 clause 7.32, that CABs shall apply the MSC

Fisheries Standard v3.1 by 1 November 2030. Thereby giving the fishery the same timeline as all other certified fisheries to implement what is necessary to meet SG60.

Given the rationale provided, the MSC is willing to grant a variation to the CR in this case subject to the following conditions:

- The CAB shall follow the mitigation actions set out in section 5 of the variation request. This includes a public consultation period of 15 days for the draft modified assessment tree.

If you have any questions regarding this response, please do not hesitate to contact the relevant Fisheries Assessment Manager for this fishery.

Marine Stewardship Council
cc: Assurance Services
International

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The CAB shall delete the table below:

Table 117: Template version control

Version	Date of publication	Description of amendment
1.0	17 December 2018	Date of first release
1.1	29 March 2019	Minor document changes for usability
1.2	25 March 2020	Release alongside Fisheries Certification Process v2.2
2.0	26 October 2022	Release alongside Fisheries Certification Process v3.0
2.1	22 July 2024	Updated for release of Fisheries Certification Process v3.1

A controlled document list of MSC program documents is available on the MSC website (<https://www.msc.org/for-business/certification-bodies/supporting-documents>).

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