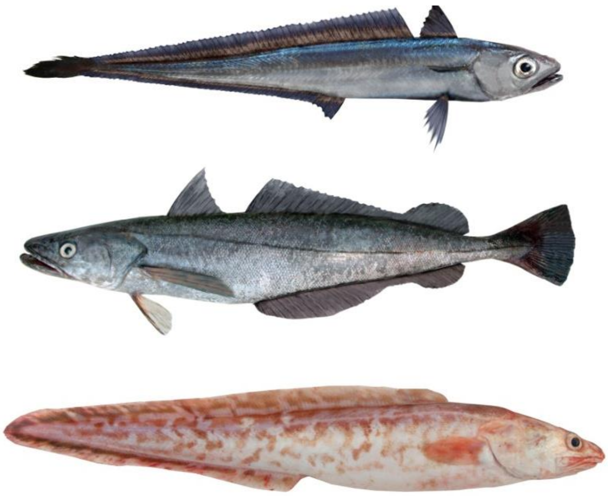
MSC SUSTAINABLE FISHERIES CERTIFICATION

New Zealand Hoki, Hake & Ling Trawl Fishery



Public Certification Report

September 2018

Prepared for: Deepwater Group Limited

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CERTIFIED SUSTAINABLE SEAFOOD MSC www.msc.org

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Glossary

ACAP	Agreement on the Conservation of Albatrosses and Petrels
ACE	Annual Catch Entitlement
BPA	Benthic Protection Area
BOMEC	Benthic-optimised Marine Environment Classification
B0	Virgin Biomass
CAY	Current Annual Yield
CITES	Convention on International Trade in Endangered Species
CPUE	Catch per Unit Effort
DOC	Department of Conservation
DWG	Deepwater Group Limited
EEZ	Exclusive Economic Zone
ENGO	Environmental Non-Governmental Organisation
ETP	Endangered, Threatened, Protected Species
F	Fishing Mortality
FAO	Food and Agriculture Organisation of the United Nations
FCV	Foreign Charter Vessel
FL	Fork length
GWT	Green weight tonnes
ITQ	Individual Transferable Quota
KPI	Key Performance Indicator
LFR	Licensed Fish Receiver
M	Natural Mortality
MARPOL	International Convention for the Prevention of Pollution from Ships
MAY	Maximum Average Yield
MCMC	Markov Chain Monte Carlo
MCS	Monitoring, Control and Surveillance
MCY	Maximum Constant Yield
MHR	Monthly Harvest Return
MPA	Marine Protected Area
MPI	Ministry for Primary Industries (also now referred to as Fisheries New Zealand, after an organisational change that took place in 2018)
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield
NFPSCR	Non-fish/Protected Species Catch Return
NIWA	National Institute of Water and Atmospheric Research Limited
PI	Performance Indicator

QMS	Quota Management System
SG	Scoring Guidepost
SI	Scoring Issue
TAC	Total Allowable Catch
TACC	Total Allowable Commercial Catch
TCEPR	Trawl Catch, Effort and Processing Return
TL	Total Length
U_{max}	Maximum Exploitation Rate
UNCLOS	United Nations Convention on the Law of the Sea
VMP	Vessel Management Plan
VMS	Vessel Monitoring System

1 Executive Summary

This report provides details of the MSC re-assessment of the hoki, hake and ling trawl fisheries operating in the New Zealand Exclusive Economic Zone (EEZ). These fisheries were previously assessed against the MSC standard and certified separately and at different times. In order to make cost and time efficiencies they have been combined in this reassessment. The fishery is now referred to as the New Zealand Hoki, Hake and Ling Trawl Fishery.

The re-assessment process began on the 20th June 2017 when the fisheries were announced as entering re-assessment (https://fisheries.msc.org/en/fisheries/new-zealand-deepwater-group-hake-hoki-ling-and-southern-blue-whiting/@@assessments) and was concluded on 12th September 2018.

This re-assessment was conducted using the MSC Certification Requirements (CR) version (v) 1.3 (MSC 2013) default assessment tree with no changes made to the text of any default Performance Indicator (PI). The assessment followed CR v 2.0 process (MSC 2014).

A variation request to extend the validity of the hoki certificate to 1st June 2018 was granted by the MSC[1]. This means the eligibility date for this re-assessment is 1st June 2018 or the re-certification date (whichever comes first).

All of the fisheries met the requirements for a “reduced re-assessment” (MSC FCR v 2.0 section 7.24.6), i.e. each species has been independently assessed at least once against the MSC standard; all conditions of certification were closed by the third surveillance audit and, all standard related stakeholder comments were addressed by the third surveillance audit.

The report has been presented using the MSC Reduced Assessment Reporting Template v 2.0 (noting that the scoring section is from v 1.3). The assessment team has added additional sections, in order to assist peer reviewers and stakeholders in better understanding the background and information that supports their evaluation.
The Risk-Based Framework (RBF) was not used in this re-assessment.

A comprehensive programme of stakeholder consultations was carried out as part of this re-assessment, complemented by a full and thorough review of relevant literature and data sources.

The assessment team undertook a detailed and rigorous re-assessment of the wide-ranging MSC Principles and Criteria. A fully referenced scoring rationale is provided in the evaluation table provided in, Appendix 1 - Scoring and Rationales, of this report.

The assessment team for this fishery comprised of Paul Knapman, who was the Lead Assessor; Bob O’Boyle, Principle 1 (P1) specialist; Rob Blyth-Skyrme Principle (P2) specialist; and Jo Akroyd Principle 3 (P3) specialist.

Client fishery strengths

The New Zealand hoki fishery has been certified since 2001, the hake and ling fisheries have been certified since 2014. Many of the operators and managers are the same for all three fisheries.

The fisheries are very well managed and this is characterised by the state of the stocks and the harvest strategies.

[1] https://fisheries.msc.org/en/fisheries/new-zealand-hoki/@@assessments

A working relationship between the client group - Deepwater Group Limited (DWG) http://deepwatergroup.org - and the government department responsible for New Zealand's fisheries – the Ministry for Primary Industries (MPI) https://www.mpi.govt.nz (also now referred to as Fisheries New Zealand, after an organisational change that took place in 2018) – is underpinned by a Memorandum of Understanding which sets out how DWG and MPI are to work collaboratively to improve the management of deepwater fisheries. As a result, DWG and MPI have developed a single joint-management framework with agreed strategic and operational priorities and workplans.

The overarching legislation and regulation affecting Principle 1 and Principle 2 are highly developed and applied specifically to the fisheries. New Zealand implements high levels of control over the fisheries to ensure compliance with regulation and minimise environmental impacts.

The amount of data available to evaluate consistency with the MSC Criteria is also a significant strength.

Determination

On completion of the re-assessment and scoring process, the assessment team concluded that the fishery **should be certified** for a period of 5 years, subject to annual surveillance audits. The MSC Principle-level scores are set out in the tables below.

UoC 1 = Hoki (HOK 1 - Eastern)
UoC 2 = Hoki (HOK 1 - Western)

	UoC 1	UoC 2
Principle	**Score**	**Score**
Principle 1 – Target Species	95.0	95.0
Principle 2 – Ecosystem	85.3	85.3
Principle 3 – Management System	97.3	97.3

UoC 3 = Hake (HAK 1 Sub-Antarctic)
UoC 4 = Hake (HAK 4 Chatham Rise)
UoC 5 = Hake (HAK 7 West Coast South Island)

	UoC 3	UoC 4	UoC 5
Principle	**Score**	**Score**	**Score**
Principle 1 – Target Species	90.6	90.6	85.0
Principle 2 – Ecosystem	86.3	86.3	86.3
Principle 3 – Management System	97.3	97.3	97.3

UoC 6 = Ling (LIN 3 Chatham Rise)
UoC 7 = Ling (LIN 4 Chatham Rise)
UoC 8 = Ling (LIN 5 Sub Antarctic)
UoC 9 = Ling (LIN 6 Sub Antarctic)
UoC 10 = Ling (Lin 7 West Coast South Island)

	UoC 6	UoC 7	UoC 8	UoC 9	UoC 10
Principle	Score	Score	Score	Score	Score
Principle 1 – Target Species	90.6	90.6	90.6	90.6	90.6
Principle 2 – Ecosystem	86.3	86.3	86.3	86.3	86.3
Principle 3 – Management System	97.3	97.3	97.3	97.3	97.3

Conditions & Recommendations

No Performance Indicators scored < 80 and so no conditions of certification were applied to the fishery. The Assessment Team has also made no recommendations.

2 Authorship and Peer Reviewers

2.1 Assessment Team

All team members listed below have completed all requisite training and signed all relevant forms for assessment team membership on this fishery.

Assessment team leader: Paul Knapman

Paul is an independent consultant based in Halifax, Nova Scotia, Canada. Paul began his career in fisheries nearly 30 years ago as a fisheries officer in the UK, responsible for the enforcement of UK and EU fisheries regulations. He then worked with the UK government's nature conservation advisors (1993-2001), as their Fisheries Programme Manager, responsible for establishing and developing an extensive programme of work with fisheries managers, scientists, the fishing industry and ENGOs, researching the effects of fishing and integrating nature conservation requirements into national and European fisheries policy and legislation.

Between 2001-2004 he was Head of the largest inshore fisheries management organisation in England, with responsibility for managing an extensive area of inshore fisheries on the North Sea coast. The organisation's responsibilities and roles included: stock assessments; setting and ensuring compliance with allowable catches; developing and applying regional fisheries regulations; the development and implementation of fisheries management plans; the lead authority for the largest marine protected area in England.

In 2004, Paul moved to Canada and established his own consultancy providing analysis, advisory and developmental work on fisheries management policy in Canada and Europe. He helped draft the management plan for one of Canada's first marine protected areas, undertook an extensive review on IUU fishing in the Baltic Sea and was appointed as rapporteur to the European Commission's Baltic Sea Regional Advisory Council.

In 2008, Paul joined Moody Marine as their Americas Regional Manager, with responsibility for managing and developing their regional MSC business. He became General Manager of the business in 2012. Paul has been involved as a lead assessor, team member and technical advisor/reviewer for more than 50 different fisheries in the MSC programme. He returned to fisheries consultancy in 2015.

Expert team member: Robert (Bob) O'Boyle (Principle 1)

Bob received his B.Sc. and M.Sc. from McGill and Guelph Universities in 1972 and 1975 respectively. He was with Canada's Department of Fisheries and Oceans (DFO) at the Bedford Institute of Oceanography (BIO) in Dartmouth, Nova Scotia during 1977 - 2007.

During this time, he conducted assessments of the region's fish resources (e.g. herring, capelin, cod, haddock, pollock, flatfishes, sharks). He headed the Marine Fish Division, with responsibility for the research programs and assessment-related activities of over 80 scientific and support staff. He subsequently coordinated the regional science advisory process for fisheries resources and ocean uses and as Associate Director of Science, managed science programs at the regional and national level. He has been involved in a number of national and international reviews, ranging from resource assessment and management to science programs.

Bob is currently president of Beta Scientific Consulting Inc. (betasci.ca) that provides technical review, analyses and assessment of ocean resources and their management. Projects have included analyses and assessments of forage species (e.g. Atlantic Herring, Gulf and Atlantic Menhaden), deepwater species (e.g. Scotian Shelf Cusk) and endangered species (e.g. Atlantic Leatherback Turtles). He has been and is currently the Principle 1 or 2 expert for a number of MSC certifications (e.g. BC Dogfish, Nova Scotia, US and Australian Swordfish, Barents Sea Cod, Haddock, and Saithe, North Sea and Baltic Sea Haddock and Danish Plaice, Deepwater Black Scabbardfish, Blue Ling, and Roundnose Grenadier, Russian Pollack. Lake Erie Walleye and Yellow Perch and US West Coast groundfish) and is a member of the MSC's Peer Review College.

Bob has been the chair and / or reviewer of numerous stock assessments and has prepared special reports on ocean management issues for government, industry and NGO groups. He was a member of the Scientific and Statistical Committee of the New England Fisheries Management Council during 2008-2016. He pursues research related to resource and ocean management and assessment and has published over 100 primary papers, special publications and technical reports. Recent projects include the impact of climate change on New England groundfish assessments, the trophic dynamics of the Eastern Scotian Shelf ecosystem, the impact of fish migrations on assessed fishery selectivity patterns, risk analysis in data poor assessments and the interaction of cod and grey seals in the Northwest Atlantic.

Expert team member: Rob Blyth-Skyrme (Principle 2)

Rob started his career in commercial aquaculture, but he subsequently shifted focus to the sustainable management of wild fisheries. After his PhD he went to the Eastern Sea Fisheries Joint Committee, one of the largest inshore fisheries management bodies in England, where he became the Deputy Chief Fishery Officer. He then moved to Natural England, the statutory adviser to UK Government on nature conservation in England and English waters, to lead the team dealing with fisheries policy, science and nationally significant fisheries and environmental casework. Rob now runs Ichthys Marine Ecological Consulting Ltd., a marine fisheries and environmental consultancy. As well as carrying out general consultancy, since 2009 he has undertaken all facets of MSC work as a lead assessor, expert team member and peer reviewer across a wide range of fisheries. Rob is a member of the MSC's Peer Review College, and has completed the MSC v1.3 and v2.0 training modules.

Expert team member: Jo Akroyd (Principle 3)

Jo has been a team member for the MSC assessments and surveillance audits for hoki, hake, ling and Southern blue whiting. Jo is a fisheries management and marine ecosystem consultant with extensive international and Pacific experience. She has worked at senior levels in both the public and private sector as a fisheries manager and marine policy expert. 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 Fisheries Management Officer, and the 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. She has carried out MSC pre and full assessments on multiple fisheries as well as these New Zealand fisheries she has been a lead assessor and team member on New Zealand albacore and scallops, Fiji albacore, Japanese albacore and yellowfin tunas, flatfish, snowcrab and scallops, Chinese scallops and Antarctic toothfish. Jo has also undertaken multiple MSC chain of custody (CoC) audits.

2.1.1 Peer Reviewers

As this is a reduced re-assessment and, in accordance with FCR 7.28.4(b), only one peer reviewer is required to review the peer review draft report.

Two potential peer reviewers were proposed and their details posted on the MSC website. Their details are provided below:

Tristan Southall
Tristan is an experienced fisheries assessor who has worked as both Principles 2 and 3 expert on a number of previous MSC assessments, including the Scottish Pelagic assessments for

both herring and mackerel. More recently Tristan led the IPSG Mackerel Assessment and has also been involved in the development and trialling of a new MSC assessment methodology, based on risk analysis, for use in data deficient situations. When not assessing the sustainability of fisheries Tristan specialises in fishing and marine industry consultancy, combining detailed understanding of marine ecosystems with broad experience of fishing and aquaculture industry systems, infrastructure and management. This provides him with an informed position which balances the needs of marine ecosystems, biodiversity and wider environment with the practicalities of the industry operation. Bridging these two important areas enables sustainably-minded consultancy, able to interpret and advise upon the impacts of different management decisions on both marine ecosystems and economics. Tristan's professional experience also includes the evaluation of fisheries on sub-sea environments, analysis of fishery and fleet performance, and a wide range of fisheries and aquaculture planning and management studies, all of which seek to combine both socio-economic and environmental perspectives. Tristan has recently coordinated EU fisheries training and promotion activities – covering all aspects of sustainable fisheries management and control. Tristan has passed MSC training and has no Conflict of Interest in relation to this fishery. A full CV is available upon request from Acoura Marine Ltd.

Andrew Payne
Andy is an honours graduate of the University of London and completed post-graduate degrees at the Universities of Stellenbosch and Port Elizabeth in South Africa. He worked in Namibia for five years, South Africa for 25 years (eventually leaving in 2000 as Director of the Sea Fisheries Research Institute), and retired in 2013 from the Centre for Environment, Fisheries and Aquaculture Science (Cefas), UK, where he was first Science Area Head for Fisheries and then "roving" international fisheries consultant in which role he inter alia managed a large commercial contract evaluating sites for future nuclear power stations to be built in the UK, and the Fisheries Science Partnership, an initiative bringing scientists and fishers together in a common aim to produce information of use to those charged with managing Europe's fish stocks. Most of his research work was conducted in South Africa, and he has published widely in the scientific literature, mainly about fisheries management and demersal fish in particular. He was an active player in the Benguela Ecology Programme, was involved in drafting South Africa's first democratic fisheries policy (which later became enshrined as the Marine Living Resources Act), and was a leading player in the establishment of the Benguela Current Large Marine Ecosystem project and the BENguela Environment, Fisheries, Interaction, and Training (BENEFIT) project, the latter two concentrating on three countries, Angola, Namibia and South Africa. From 2003 to 2011, he was Editor-in-Chief (and from 2000 to 2003 editor) of the ICES Journal of Marine Science, was the founding editor/editor-in-chief (and now international panel member) of the (South) African Journal of Marine Science and is Series editor of the Springer book series Humanity and the Seas.

Andy has conducted expert peer review of fisheries in Argentina, South Africa and the USA, and was involved in the EU's TACIS project on Sustainable Management of Caspian Fisheries, among other EU projects. He has conducted several accreditation reviews for the MSC, full ones being for the Antarctic krill continuous pumping fishery (AkerBiomarine; twice, the second being a recertification assessment), a similar one for a separate Norwegian midwater trawl fishery for Antarctic krill, and another one for Russian pollock, has acted as expert peer reviewer of the report on US Limited Entry Groundfish Trawl fishery recertification and for SA deepsea hake trawl fishery recertification, has led or participated in several surveillance audits for different fisheries and CABs, and has twice acted as condition-meeting evaluator for the client for the SA deepsea hake trawl fishery. Recently too, he was part of a three-man international team that formally evaluated the ICCAT Bluefin tuna research programme. Finally, he has personally written/edited one book − "Oceans of Life Off Southern Africa", and WAS lead-edior and contributed to two more − "Management of Shared Fish Stocks", and "Advances in Fisheries Science; 50 years on from Beverton and Holt", the latter two both for Cefas, and provides editorial services (including formal instruction courses in scientific writing) for a variety of clients.

Andy has passed MSC training and has no Conflict of Interest in relation to this fishery. A full CV is available upon request from Acoura Marine Ltd.

2.1.1 Risk Based Framework (RBF)

The RBF was not used for this fishery assessment.

2.1.2 Introduced Species Based Fishery (ISBF)

None of the target species are an introduced species.

3 Description of the Fishery

3.1 Units of Certification (UoC) and Scope of Certification Sought

The UoC is defined by MSC as, "Target stock(s) combined with the fishing method/gear and practice (including vessel type/s) pursuing that stock, and any fleets, or groups of vessels, or individual fishing operators that are covered by an MSC fishery certificate. Note that other eligible fishers may also be included in some UoCs but not initially certified (until covered by a certificate sharing arrangement). The fishery proposed for certification, in this instance, is therefore defined as:

3.1.1 Target Species and Stocks

Target Species	Stocks
Hoki (*Macruronus novaezelandiae*)	HOK 1 Eastern
	HOK 1 Western
Hake (*Merluccius australis*)	HAK 1 Sub-Antarctic
	HAK 4 Chatham Rise
	HAK 7 West Coast South Island (WCSI)
Ling (*Genypterus blacodes*)	LIN 3 Chatham Rise (LIN 3 & 4)
	LIN 4 Chatham Rise (LIN 3 & 4)
	LIN 5 Sub-Antarctic (LIN 5 & 6)
	LIN 6 Sub-Antarctic (LIN 5 & 6)
	LIN 7 WCSI (LIN 7WC)

The UoC includes fishing effort and tows targeting hoki (HOK), hake (HAK), ling (LIN), silver warehou (SWA) and white warehou (WWA) – as the same vessels, using the same gear, target and catch the three species (HOK, HAK, LIN) in what can be considered a mixed fishery.

3.1.2 Fishing Method

Demersal and semi pelagic trawl - The trawl vessels possess exclusively high aspect ratio multipurpose trawl doors which 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 sonar to vessel.

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

- Alfredo type derivatives which are characterised by low twine surface area (small nets), low headline height (3-5 m), short groundrope (20-30 m), small mesh (max 300 m, min 100 m) and medium groundrigs (300-450 mm diameter rubber bobbins).
- "Spanish" type multipurpose trawls which 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). Note that the use of the fishing circle measurement common in Europe is not encountered in New Zealand. They 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 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 set out in Table 1.

Table 1. A table showing the fleet characterisation for the hoki, hake and ling trawl fishery (Tiffany Bock, pers. comm.)

	<28 m	28 - 43 m			>43 m		
Year	Fresher	Fresher	Limited Processing	Fillet	Fresher	Limited Processing	Fillet
2011/12	48	5	4	1	1	17	10
2012/13	43	5	3	1	1	16	10
2013/14	43	7	3	2	0	13	10
2014/15	47	5	4	2	0	14	10
2015/16	53	7	4	2	0	12	10

3.1.3 Client Group

Deepwater Group Limited (DWG) http://deepwatergroup.org - 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 95% of the recorded hoki, hake and ling landings.

3.1.4 Other Eligible Fishers

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

3.1.5 The UoCs

The UoCs can be summarised as:

Fishing Method	Species	Management Area	Stock	UoC
Demersal & Semi Pelagic Trawl	Hoki (*Macruronus novaezelandiae*)	HOK 1	Eastern	**1**
		HOK 1	Western	**2**
	Hake (*Merluccius australis*)	HAK 1	Sub-Antarctic	**3**
		HAK 4	Chatham Rise	**4**
		HAK 7	West Coast South Island	**5**
	Ling (*Genypterus blacodes*)	LIN 3	Chatham Rise (LIN 3 & 4)	**6**
		LIN 4	Chatham Rise (LIN 3 & 4)	**7**

Fishing Method	Species	Management Area	Stock	UoC
		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**

Client Group	Deepwater Group Limited (DWG) http://deepwatergroup.org

Other Eligible Fishers	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

The UoC includes fishing effort and tows targeting hoki (HOK), hake (HAK), ling (LIN), silver warehou (SWA) and white warehou (WWA) – as the same vessels, using the same gear, target and catch the three species (HOK, HAK, LIN) in what can be considered a mixed fishery.

Acoura Marine Ltd confirm that the fishery is within scope of the MSC standard, i.e. it does not operate under a controversial unilateral exemption to an international agreement, use destructive fishing practices, target amphibians, birds, reptiles or mammals and is not overwhelmed by dispute.

The following figures show the geographic extent of the UoCs:

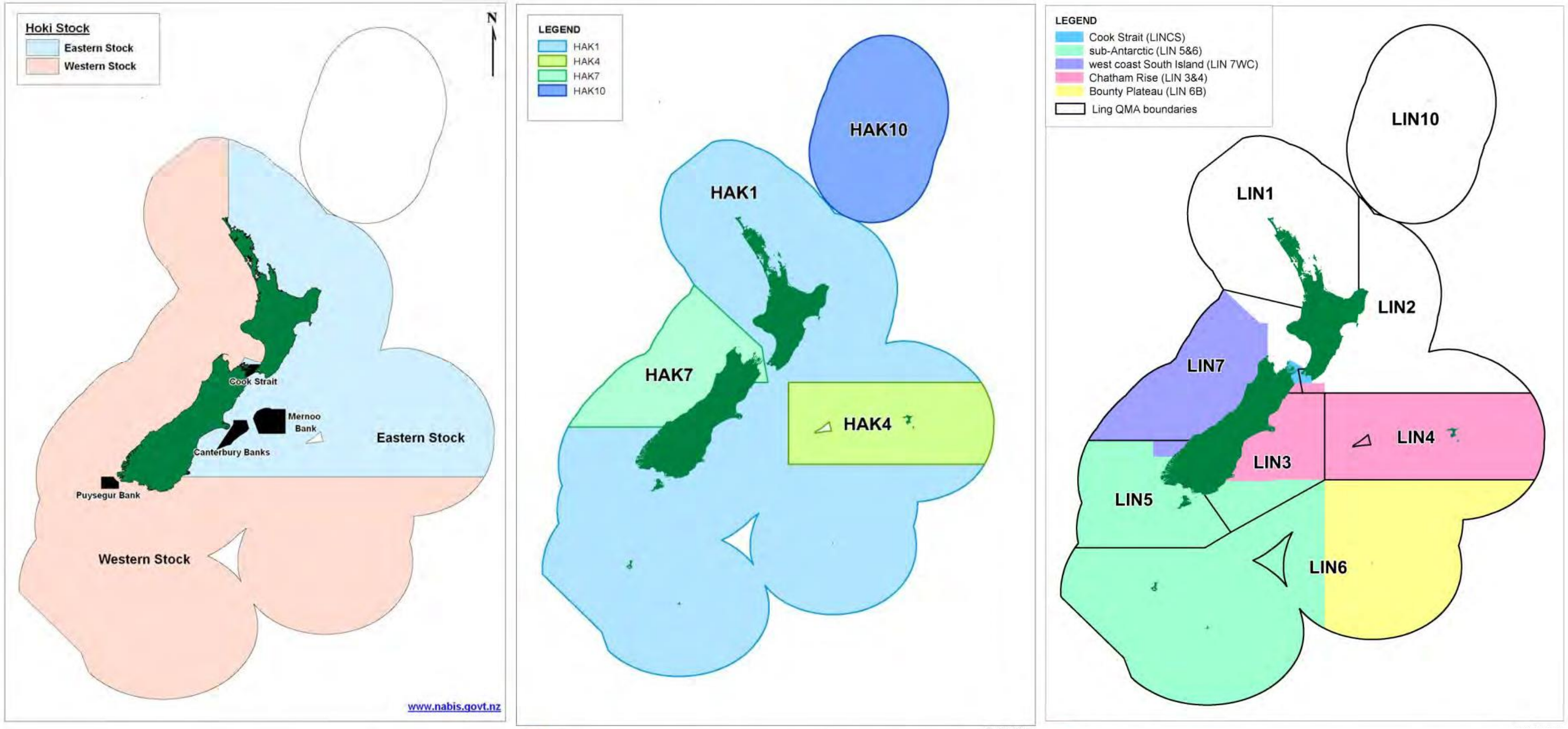


Figure 1. The management units for hoki, hake and ling. The outer boundary represents the New Zealand 200 mile EEZ

3.2 Final UoC(s)

The final Units of Certification for this fishery are as above in section 3.1.5. They have not changed throughout the process.

3.2.1 Total Allowable Commercial Catch (TACC), Catch Limit, and Catch Data

Table 2. UoC 1 – Catch Limit and catch data for hoki (HOK 1 Eastern)

Catch Limit	Year	2017	Amount	60,000 t
UoA share of Catch Limit	Year	2017	Amount	60,000 t
UoC share of Catch Limit	Year	2017	Amount	60,000 t
Total green weight catch by UoC	Year (most recent)	2016	Amount	56,533 t
	Year (second most recent)	2015	Amount	59,533 t

NB The HOK 1 TACC of 150,000 t is split using agreed catch limits to manage catches on the two stocks (60,000 t for East and 90,000 t for West).

Table 3. UoC 2 – Catch Limit and catch data for hoki (HOK 1 Western)

Catch Limit	Year	2017	Amount	90,000 t
UoA share of Catch Limit	Year	2017	Amount	90,000 t
UoC share of Catch Limit	Year	2017	Amount	90,000 t
Total green weight catch by UoC	Year (most recent)	2016	Amount	75,365 t
	Year (second most recent)	2015	Amount	78,963 t

Table 4. UoC 3 - TACC and catch data for hake (HAK 1)

TACC	Year	2017	Amount	3,701 t
UoA share of TACC	Year	2017	Amount	3,701 t
UoC share of TACC	Year	2017	Amount	3,701 t
Total green weight catch by UoC	Year (most recent)	2016	Amount	1,584 t
	Year (second most recent)	2015	Amount	1,725 t

Table 5. UoC 4 - TACC and catch data for hake (HAK 4)

TACC	Year	2017	Amount	1,800 t
UoA share of TACC	Year	2017	Amount	1,800 t
UoC share of TACC	Year	2017	Amount	1,800 t
Total green weight catch by UoC	Year (most recent)	2016	Amount	274 t
	Year (second most recent)	2015	Amount	304 t

Table 6. UoC 5 - TACC and catch data for hake (HAK 7)

TACC	Year	2017	Amount	7,700 t
UoA share of TACC	Year	2017	Amount	7,700 t
UoC share of TACC	Year	2017	Amount	7,700 t
Total green weight catch by UoC	Year (most recent)	2016	Amount	2,864 t
	Year (second most recent)	2015	Amount	6,219 t

Table 7 UoC 6 - TACC and catch data for ling (LIN 3)

TACC	Year	2017	Amount	2,060 t
UoA share of TACC	Year	2017	Amount	2,060 t
UoC share of TACC	Year	2017	Amount	2,060 t
Total green weight catch by UoC	Year (most recent)	2016	Amount	454 t
	Year (second most recent)	2015	Amount	449 t

Table 8. UoC 7 - TACC and catch data for ling (LIN 4)

TACC	Year	2017	Amount	4,200 t
UoA share of TACC	Year	2017	Amount	4,200 t
UoC share of TACC	Year	2017	Amount	4,200 t
Total green weight catch by UoC	Year (most recent)	2016	Amount	582 t
	Year (second most recent)	2015	Amount	721 t

Table 9. UoC 8 - TACC and catch data for ling (LIN 5)

TACC	Year	2017	Amount	3,955 t
UoA share of TACC	Year	2017	Amount	3,955 t
UoC share of TACC	Year	2017	Amount	3,955 t
Total green weight catch by UoC	Year (most recent)	2016	Amount	3,660 t
	Year (second most recent)	2015	Amount	3,989 t

Table 10. UoC 9 -TACC and catch data for ling (LIN 6)

TACC	Year	2017	Amount	8,505 t
UoA share of TACC	Year	2017	Amount	8,505 t
UoC share of TACC	Year	2017	Amount	8,505 t
Total green weight catch by UoC	Year (most recent)	2016	Amount	1,238 t

	Year (second most recent)	2015	Amount	1,871 t

Table 11. UoC 10 - TACC and catch data for ling (LIN 7)

TACC	Year	2017	Amount	3,080 t
UoA share of TACC	Year	2017	Amount	3,080 t
UoC share of TACC	Year	2017	Amount	3,080 t
Total green weight catch by UoC	Year (most recent)	2016	Amount	1,682 t
	Year (second most recent)	2015	Amount	1,489 t

3.3 Overview of the fishery

3.3.1 Hoki

Hoki belong to the Merlucciidae family (hakes). They are one of New Zealand's most important commercial deepwater species. Hoki are caught by trawling all around New Zealand and are most common in Cook Strait and off the west coast of South Island (WCSI) during the winter spawning season. They occur in greatest abundance between 200-600 m. Adult fish are typically found in deeper water while juveniles are found at shallower depths.

They are fished on the Chatham Rise and in the south on the Campbell Plateau other times of the year.

Hoki is a reasonably fast-growing species. Juveniles reach about 27-35 cm at the end of their first year and males and females grow to lengths of about 115 cm and 130 cm respectively (up to 7 kg in weight). Hoki characteristically spawn for the first time at age 3-5 years and can live for around 20-25 years.

Juveniles are found on the Chatham Rise throughout the year and, on reaching maturity, it is thought they migrate to join the eastern or western stock (Figure 2). Fecundity is moderately high, although not all hoki within the adult size range spawn every year.

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).

3.3.2 Hake

Hake are mainly distributed between 250-800 m depth and, mostly south of latitude 40º S. The males, which rarely exceed 100 cm total length (TL), do not grow as large as females, which can grow to 120 cm TL or more. Both sexes reach sexual maturity between 6 and 10 years of age, at lengths of about 67-75 cm TL (males) and 75-85 cm TL (females). They can live for at least 25 years (Colman 1998).

Data collected by observers on commercial trawlers and data from research trawl surveys suggest that there are at least three main spawning areas for hake: WCSI (HAK 7), where spawning can extend from June to October; West of the Chatham Islands (HAK 4), from September to January; and, the Campbell Plateau (HAK 1 – Sub-Antarctic), from September to February (see Figure 2) (Colman 1998).

Juvenile hake have been taken in coastal waters on both sides of the South Island and on the Campbell Plateau. They reach a length of about 15–20 cm TL at one year old and about 35 cm TL at 2 years (Colman 1998).

3.3.3 Ling

Ling are widely distributed through 200-800 m depth within the New Zealand EEZ, particularly to the south of 40°S. They 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 (WCSI, Chatham Rise, Bounty Plateau, Campbell Plateau and Cook Strait) showed that females grew significantly faster and reached a greater size than males in all areas, and that growth rates were significantly different between areas. Ling grow fastest in Cook Strait and slowest on the Campbell Plateau (Horn 2005).

For the large trawlers, the main sources of ling are Puysegur Bank (LIN 5) (off the south west tip of South Island) and the slope of the Stewart-Snares Shelf (south east corner of LIN 5) and waters in the Auckland Islands area (LIN 6). The principal grounds for smaller vessels are WCSI and the east coast of both main islands south of East Cape (see Figure 2).

Ling in spawning condition have been reported in a number of localities throughout the EEZ (Horn 2005). Time of spawning appears to vary between areas: July to November on the Chatham Rise; September to December on Campbell Plateau and Puysegur Bank; September to February on the Bounty Plateau; July to September off west coast South Island and in Cook Strait. Little is known about the distribution of juveniles until they are about 40 cm TL, when they begin to appear in trawl samples over most of the adult range.

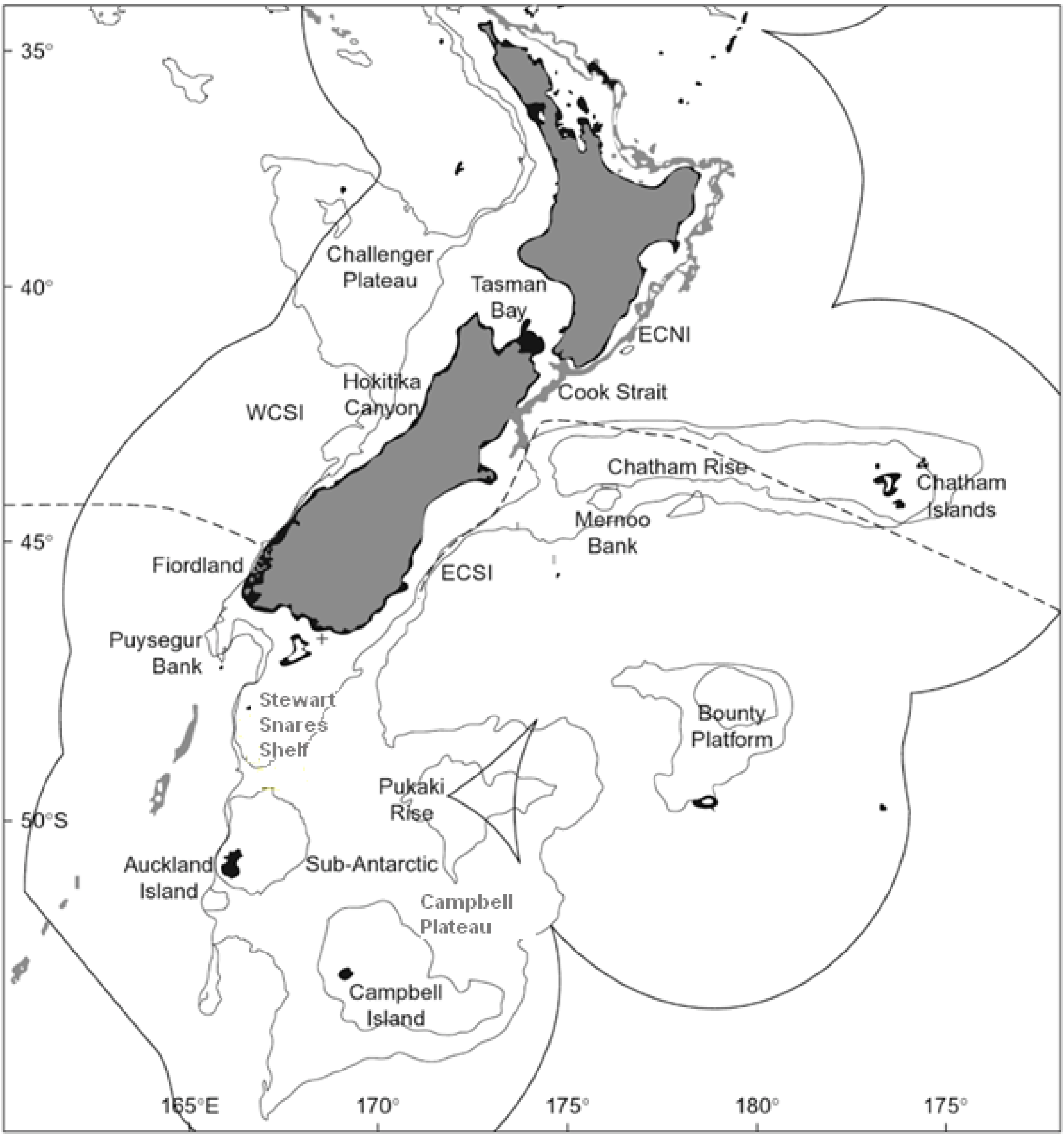


Figure 2. Oceanographic map showing some of the key features within New Zealand 200 mile EEZ (solid line) mentioned throughout the report. Bathymetry lines are 500 m and 1,000 m depths. The dashed line is the approximate position of the Subtropical Front with sub-tropical water to the north and sub-Antarctic water to the south (adapted from: Livingston and Sullivan, 2007).
WCSI = West Coast South Island;
ECSI = East Coast South Island;
ECNI = East Coast North Island

4 Changes Since Initial Assessment

4.1 Overview

These fisheries were previously assessed against the MSC standard and certified separately and at different times. In order to make cost and time efficiencies and to better assess cumulative impacts on the environment they have been combined in this reassessment. The fishery is now referred to as the New Zealand Hoki, Hake and Ling Trawl Fishery.

This is a “reduced re-assessment”. A fishery is eligible for reduced reassessment if:

a. The fishery was covered under the previous certification or scope extension;
b. The fishery had no conditions remaining after the third surveillance audit, and
c. The CAB confirms that all standard related stakeholder comments have been addressed by the third surveillance audit (MSC FCR v2.0 section 7.24.6).

The fisheries meet the above requirements as each species has been independently assessed at least once against the MSC standard; all conditions of certification were closed by the third surveillance audit and, Acoura Marine has confirmed that all standard related stakeholder comments were addressed by the third surveillance audit.

4.2 Specific Changes Since Initial Assessment

4.2.1 Principle 1

4.2.2 Hoki

Intertek (2012a) used the 2011 assessment of the Eastern and Western hoki stocks. There have been annual assessments since then. The most recent (2017) assessment is reported here.

4.2.2.1 Stock Status

Catch and Fishing Mortality

The hoki fishery was developed by Japanese and Soviet vessels in the early 1970s. Catches peaked at about 100,000 t in 1977 but dropped to less than 20,000 t in 1978 when the EEZ was declared and quota limits were introduced. From 1979 on, the hoki catch increased to about 50,000 t until an increase in the total hoki TACC during 1986 - 1990 saw the fishery expand to a maximum catch of about 255,000 t in 1987-88 (Figure 3). Since then, total hoki catch declined to 89,000 t in 2008/2009 in response to reductions in stock and TACC, and has risen subsequently to 136,719 t in 2015-16.

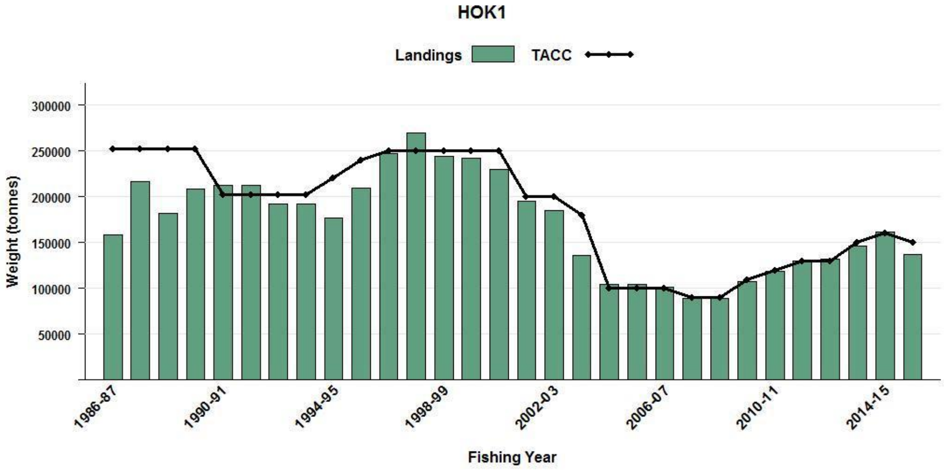
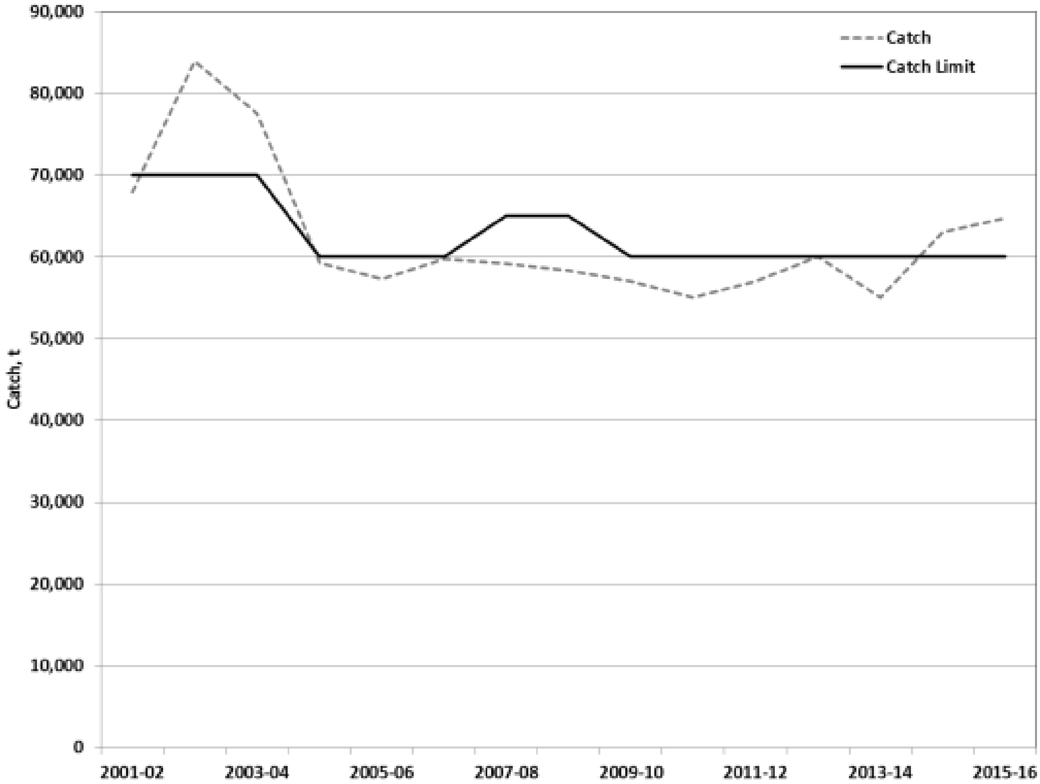


Figure 3. Reported commercial landings and TACC of hoki in management area HOK 1; from MPI (2017a)

The fishery has been managed using a combined Eastern and Western stock TACC since 1986/87. To better manage the separate stock components, industry agreed, stock-specific catch limits, which total to the TACC, were introduced in 2001/2002. Since their introduction, catch of the Eastern stock, while first above its catch limit, declined and has been close to its catch limit since then (Figure 4). Catch of the Western stock has been more variable in comparison and has also closely followed its catch limit, declining from 127,100 t in 2001/02 to 30,100 t in 2007/08, before increasing to 93,700 t in 2015/16.

a) Eastern Hoki Stock



c) Western Hoki Stock

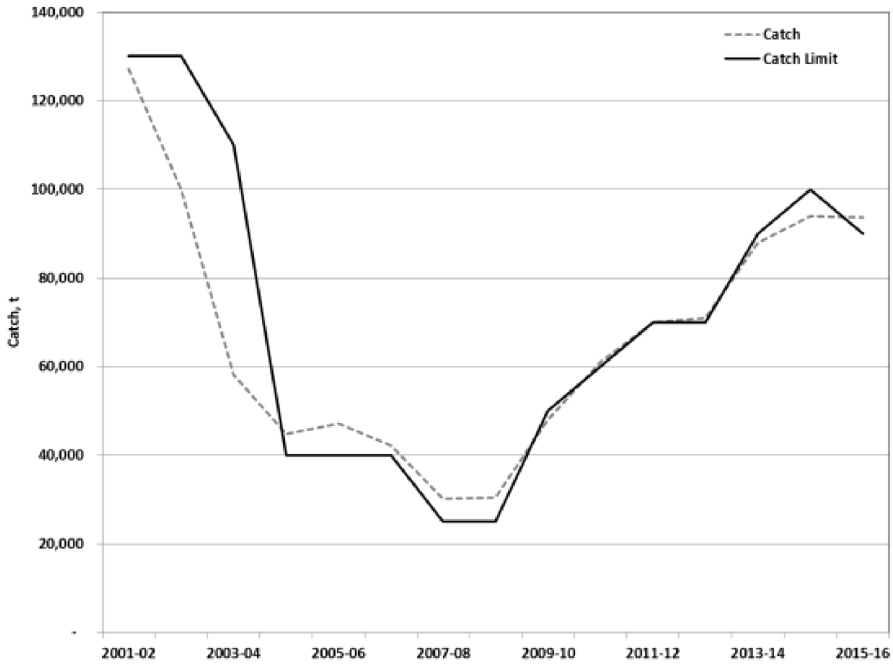


Figure 4. Reported commercial landings and catch limits of the Eastern hoki stock (top panel) and Western hoki stock (bottom panel) in management area HOK 1; data from MPI)

Exploitation rates on the Eastern and Western stocks were low during the 1970s - 1980s and rose during the 1980s - 1990s to reach a peak in 2003/04 in the Eastern stock and peaks during 1987/88 and 2001/02 in the Western stock (Figure 5). Until 2009/2010, the biomass target range was 30-40% B_0 implying higher target exploitation rates. Thus, while exploitation rates in the two stocks were within or above the management target range (0.14 - 0.21) consistent with the biomass target range (35-50% B_0) introduced in 2009/10, they were below the exploitation target rate range in place at the time (not shown in Figure 5). Since the mid-2000s, exploitation in both stocks has declined to below the previous and current management target range. Overall, exploitation rates in both stocks have been at or below management targets since the early 1970s or about 5.6 generations.

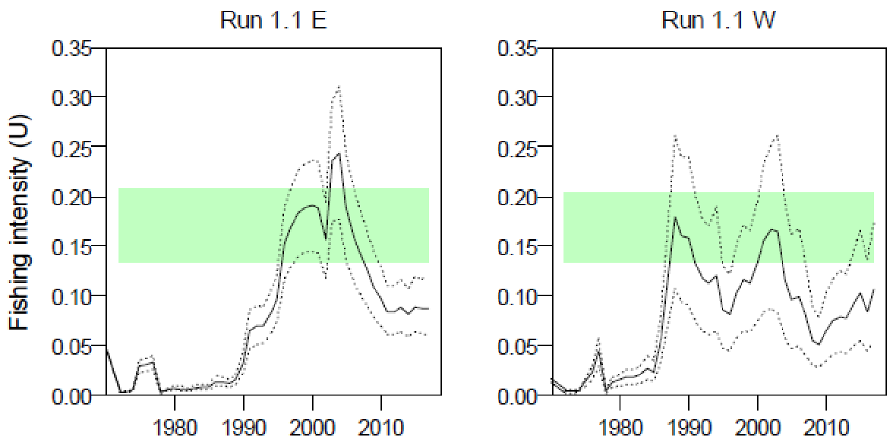


Figure 5. Median exploitation rate (U) for the Eastern (left panel) and Western (right panel) hoki stocks; 95% credible intervals indicated as dotted lines; shaded in green is management range implemented in 2009 where upper bound is reference level U35% B_0 and lower bound U50% B_0 which are exploitation rates that would cause spawning biomass to trend to 35% B_0 and 50% B_0, respectively; from MPI (2017a)

Biomass and Recruitment
Recruitment to the Eastern stock was characterized by a few very strong year-classes in the 1980-1990s followed by a period of below average recruitment until about 2010 (Figure 6). In the Western stock, following the 1995–2001 period of poor recruitment, recruitment was just below average during 2002–2009, below average in 2010 and 2012 and 2013 and 2015, and well above average in 2011 and 2014 (MPI, 2017a).

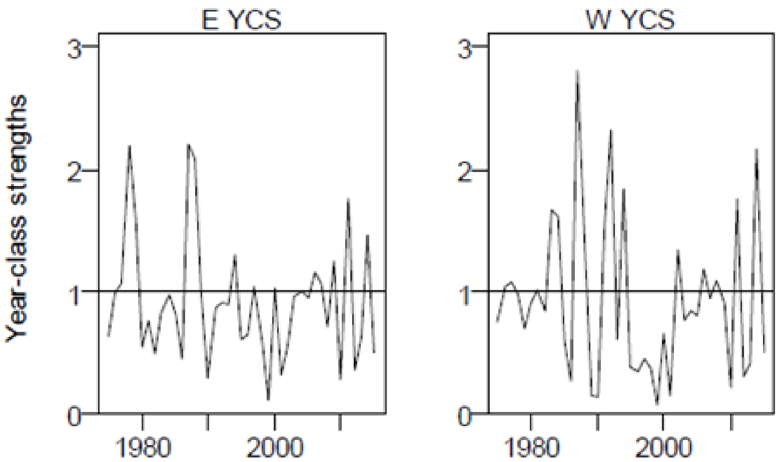


Figure 6. Trend in relative year-class strength of the Eastern (left panel) and Western (right panel) hoki stocks for the base case model; dashed horizontal line indicates year-class strength of one; from MPI (2017a)

According to the base case model, biomass of both stocks was high in the 1980-1990s and then dropped to their lowest levels during 2004 - 2006, at about 27% B_0 for the Eastern stock and 31% B_0 for the Western stock and below the lower range of the management target at that time (30-40% B_0). This was after the Western stock experienced seven consecutive years of poor recruitment during 1995 - 2001 and the Eastern stock experienced below average recruitment during the same period. Biomass of both stocks have since increased to levels which exceed the upper range of the management target range implemented in 2009 (50% B_0).

For the base case, B_{2017} of the Eastern stock is estimated to be 60% B_0 and it is virtually certain (> 99% probability) to be at or above the lower end of the target range (35% B_0) and likely (> 60%) to be at or above the upper end of the target range (50% B_0). B_{2017} of the Western stock is estimated to be 59% B_0 and very likely (> 90% probability) to be at or above the lower end of the target range and likely (> 60%) to be at or above the upper end of the target range. MPI (2017a) notes that, as per the Harvest Strategy Standard (HSS), the Western stock has been fully rebuilt (i.e. at least a 70% probability of being above the lower bound of the management target of 35% B_0 for at least three years. Both stocks have been at or above the target range since at least 2010, or almost one generation (Figure 7).

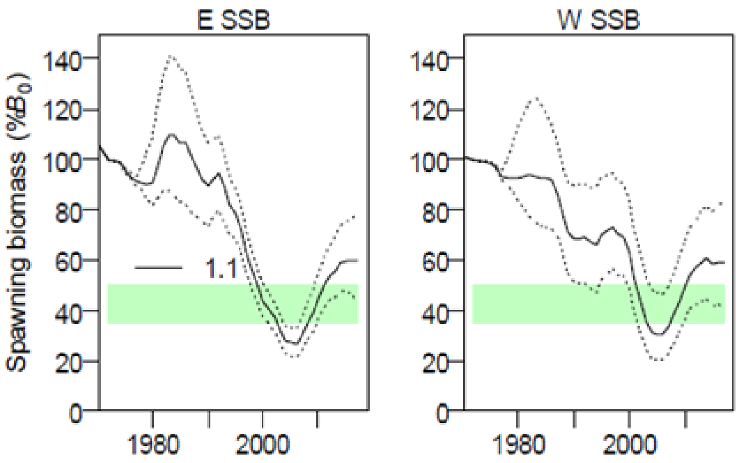


Figure 7. Trend in median biomass as percentage of B_0 for the Eastern (Left panel) and Western (right panel) hoki stocks; 95% credible intervals indicated as dashed lines; shaded green region represents the target zone of 35–50% B_0 implemented from 2009, from MPI (2017a)

Table 12. Spawning biomass for the base case and sensitivities (median of marginal posteriors, with 95% credible intervals in parentheses; $B_{current}$ is the spawning biomass in mid-season 2016–17; from MPI (2017a)

	B_0('000 t)		$B_{current}$('000 t)		$B_{current}$(%B_0)		
Run	E	W	E	W	E	W	E+W
1.1 (Base)	547(455,684)	1031(824,1594)	328(223,492)	611(338,1263)	60(44,79)	59(40,84)	60(46,77)
1.15	522(428,643)	923(782,1223)	322(205,479)	431(249,783)	62(44,81)	47(31,66)	53(40,66)
1.16	573(453,735)	1453(1037,2220)	360(232,562)	1140(638,2042)	63(46,84)	79(58,100)	75(59,92)
1.17	535(429,674)	922(778,1216)	323(212,483)	434(239,792)	60(44,81)	47(29,70)	52(41,68)

Projections to 2022 were carried out for the base case and a sensitivity model for both stocks by selecting future recruitments at random from those estimated during 2006–2015 (Table 12). Total catch was assumed to equal the current TACC of 150,000 t with 60,000 t for the Eastern stock and 90,000 t for the Western stock, as per the current catch limit agreement. The projections indicate that the biomass of the Eastern and Western stocks is likely to increase slightly over the next five years. The probability of either stock being less than the soft or the hard limit at the end of the five-year projection period is negligible and both stocks are projected to remain within or above the 35–50% B_0 target range by the end of the projection period (2022).

4.2.3 Hake

4.2.3.1 Stock Status

Hake: Sub-Antarctic (HAK 1)

Intertek (2014a) used the 2011 assessment of the Sub-Antarctic hake stock. The most recent (2014) assessment is reported here.

<u>Catch and Fishing Mortality</u>

The fishery commenced in the mid-1970s, primarily exploited by Japan, Korea and the USSR. The New Zealand domestic fishery started in 1979/80. The first TACC was introduced in 1986/87 and has been set at 3,701 t since 2001/02. Due to economic factors, though, this has not been caught since the mid-2000s (Figure 8). Average fishing year catch since 2005/06 is

2,173 t. While there is some directed fishing for hake, it is mostly caught as bycatch to the hoki trawl fishery.

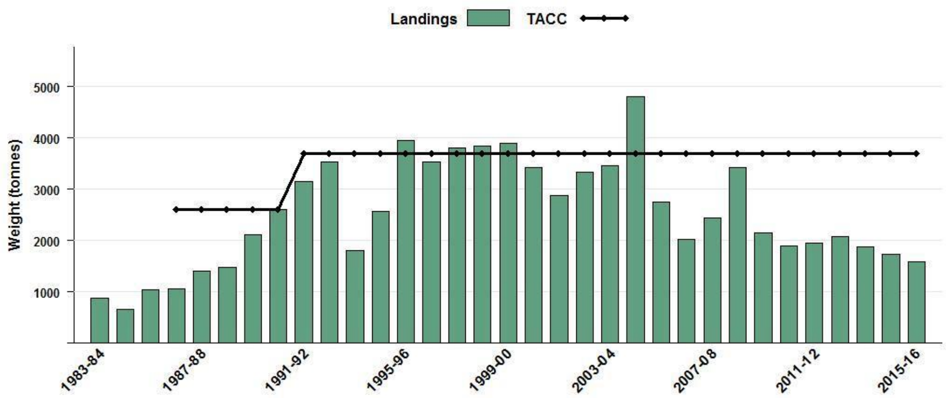


Figure 8. Reported commercial landings and TACC of Sub-Antarctic Hake (HAK 1); from MPI (2017a)

Exploitation rate (U) of the HAK 1 stock was very low in the 1970s-1980s and subsequently rose to about 0.08 by 2005. Since then, consistent with declining economics, U declined to about 0.04 by 2014 (Figure 9).

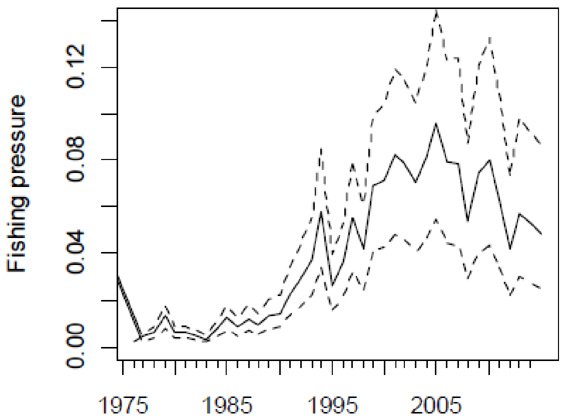


Figure 9. Exploitation rates for the Sub-Antarctic hake (HAK 1) stock base case model; dashed lines indicate 95% credible intervals; from MPI (2017a)

<u>Biomass and Recruitment</u>

Recruitment to the Sub-Antarctic hake (HAK 1) stock is characterised by a group of relatively strong year-classes in the late 1970s, a very strong year-class in 1980, followed by a period of average to less than average recruitment through to 2004. Estimates of year-class strength during 2005 - 2007 were above average (Figure 10).

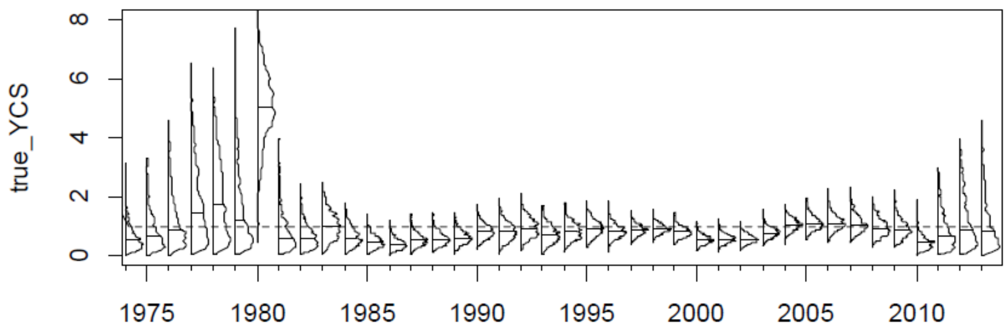


Figure 10. Trend in relative year-class strength of the Sub-Antarctic hake (HAK 1) stock for the base case model; dashed horizontal line indicates year-class strength of one; individual distributions show marginal posterior distribution, with horizontal lines indicating median; from MPI (2017a)

Stock status (%B_0) was close to virgin levels until the 1990s after which it declined but remained above the 40% B_0 target and has since increased (Figure 11). The stock appears to be healthy, with estimated 2014 biomass in the base case at 60% of B_0 (Table 13). MPI (2017a) determined that stock status in 2014 was very likely (> 90%) to be at or above the target, exceptionally unlikely (< 1%) to be below both the soft and hard limits and overfishing was very unlikely (< 10%) to be occurring. Sensitivity runs including trawl CPUE and estimating *M* as a constant both estimate higher current stock status, while less weight on the ageing data and a fixed *M* at age give slightly lower current stock status. None of the tested sensitivity runs were considered to be better models than the base run, and some were considered clearly worse (MPI, 2017a).

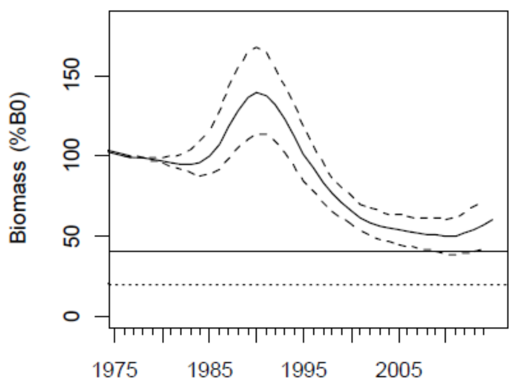


Figure 11. Trend in median stock status (% B_0) of the Sub-Antarctic hake (HAK 1) stock for the base case model; 95% credible intervals indicated as dashed lines; management target (40% B_0, solid horizontal line) and soft limit (20% B_0, dotted horizontal line) indicated; from MPI (2017a)

Table 13. Median B_0, B_{2014}, and B_{2014} as percentage of B_0 for the Sub-Antarctic hake (HAK 1) base model and sensitivity runs; 95% credible intervals indicated; from MPI (2017a)

Model run	B_0	B_{2014}	B_{2014} (%B_0)
Base	59 290 (44 040–94 040)	37 990 (19 740–70 310)	60.4 (43.6–77.6)
Half N_{eff}	50 120 (39 340–77 510)	27 910 (14 890–55 840)	55.4 (37.2–77.5)
Estimate *M*	65 610 (47 940–105 840)	44 900 (25 500–84 370)	67.8 (49.9–89.1)
Fixed *M*	60 270 (46 210–99 970)	33 620 (19 170–67 160)	54.9 (39.8–72.5)
CPUE	79 580 (59 330–102 310)	60 980 (38 140–86 890)	76.2 (62.5–87.0)

Projections from the five models were made assuming future annual catches of 2,000 t during 2015 - 2019. This catch is the average from 2008 to 2013, and is slightly lower than the average annual catch since 1990 (2,400 t). Year-class strengths from 2011 onwards were selected randomly from the previously estimated year-class strengths during 1997 - 2009.

Projections from all the models suggested that biomass will remain the same or increase between 2014 and 2019. The most pessimistic of these models suggests that there is little chance that biomass in 2019 will be lower than 35% B_0. Probabilities that current and projected biomass will drop below management reference points are shown for all five models in Table 14. For all models, it appears extremely unlikely (i.e., less than 1%) that B_{2019} will be lower than the 20% B_0 soft limit, or very unlikely (less than 9%) to be below the 40% B_0 target. For the base case model, B_{2019} is expected to be above the target with a high degree of certainty (95% CI 41.8 – 90.5%).

Table 14. Median projected biomass in 2019 (B_{2019}), B_{2019} as a percentage of B_0, and B_{2019}/B_{2014} (%) for the Sub-Antarctic hake (HAK 1) base model and sensitivity models where future annual catches are assumed to be 2,000 t; 95% credible intervals indicated; from MPI (2017a)

Model run	Future catch (t)	B_{2019}	B_{2019} (% B_0)	B_{2019}/B_{2014} (%)
Base	2 000	39 560 (19 760–79 890)	65.5 (41.8–90.5)	107 (87–135)
Half N_{eff}	2 000	29 290 (14 130–62 070)	57.7 (34.3–87.4)	103 (80–133)
Estimate *M*	2 000	45 420 (23 550–89 220)	68.0 (46.0–102.6)	99 (79–139)
Fixed *M*	2 000	33 680 (16 950–75 050)	55.1 (34.5–83.8)	100 (77–140)
CPUE	2 000	66 350 (36 280–95 320)	81.8 (59.3–101.8)	107 (88–129)

Table 15. Probabilities that B_{2014} and projected (B_{2019}) biomass will be less than 40%, 20% or 10% of B_0 for the Sub-Antarctic hake (HAK 1) stock; projected biomass probabilities presented assuming a future annual catch of 2,000 t; from Horn (2015b)

Model run	Biomass	Management reference points		
		40% B_0	20% B_0	10% B_0
Base	B_{2014}	0.007	0.000	0.000
	B_{2019}, 2000 t catch	0.020	0.000	0.000
Half N_{eff}	B_{2014}	0.049	0.000	0.000
	B_{2019}, 2000 t catch	0.088	0.001	0.000
Estimate *M*	B_{2014}	0.001	0.000	0.000
	B_{2019}, 2000 t catch	0.006	0.000	0.000
Fixed *M*	B_{2014}	0.027	0.000	0.000
	B_{2019}, 2000 t catch	0.083	0.000	0.000
CPUE	B_{2014}	0.000	0.000	0.000
	B_{2019}, 2000 t catch	0.000	0.000	0.000

Hake: Chatham Rise (HAK 4)

Intertek (2014a) used the 2012 assessment of the Chatham Rise hake stock. The most recent (2017) assessment is reported here.

Catch and Fishing Mortality

As with the Sub-Antarctic (HAK 1) stock, the fishery on the Chatham Rise stock commenced in the mid-1970s, primarily exploited by Japan, Korea and the USSR. The New Zealand domestic fishery started in 1979/80. The first TACC was introduced in 1986/87 and was 3,500 t during the 1990s and has been 1,800 t since 2004/05. Due to economic factors, the TACC has not been caught since the mid-1990s (Figure 12). The average fishing year catch since

2005/06 is 400 t. While there is some directed fishing for hake, it is mostly caught as bycatch to the hoki trawl fishery.

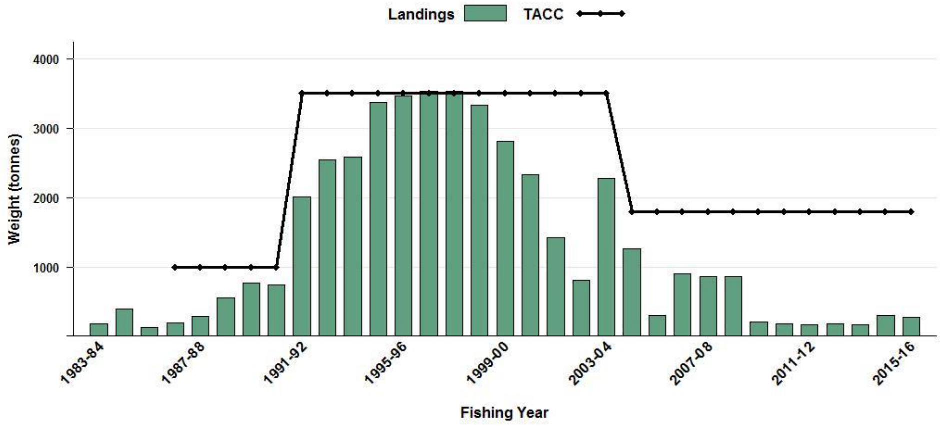


Figure 12. Reported commercial landings and TACC of Chatham Rise hake (HAK 4); from MPI (2017a)

Annual exploitation rates (U) were low (less than 0.1) up until 1993 and since 2006, but moderate (although probably less than 0.25) between these years. Since the 1990s, they have undergone an overall declining trend (Figure 13).

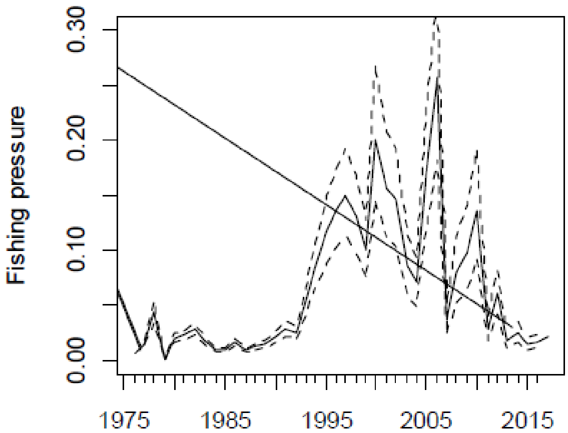


Figure 13. Median exploitation rates (U) for the Chatham Rise hake (HAK 4) stock base case model; solid line indicates declining trend in U since 1990s; 95% credible intervals indicated as dotted lines; from MPI (2017a)

<u>Biomass and Recruitment</u>

Recruitment to the Chatham Rise hake (HAK 4) stock has been characterised by a group of strong relative year-classes in the late 1970s to early 1980s, and again in the early 1990s, followed by a period of relatively poor recruitment since then, except for those of 2002, 2010 and 2011 (Figure 14).

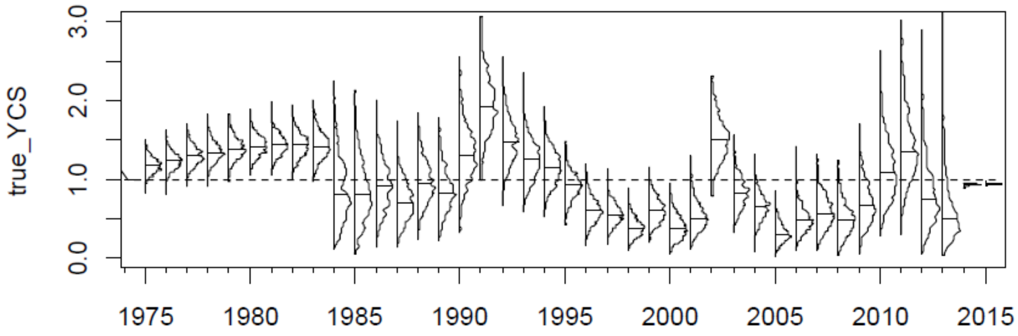


Figure 14. Trend in relative year-class strength of the Chatham Rise hake (HAK 4) stock for the base case model; dashed horizontal line indicates year-class strength of one; individual distributions show marginal posterior distribution, with horizontal lines indicating median; from MPI (2017a)

Stock status (%B_0) increased slightly during the late 1980s, then declined to below 40%B_0 by 2005 (Figure 15). The growth of the strong 2002 year-class resulted in an upturn in biomass in 2006, followed by a further upturn in 2015 as the 2010 and 2011 year-classes began to recruit. Current stock biomass (B_{2016}) was estimated at about 48% of B_0 (95 % CI 40.0 – 59.1) and likely (Pr > 60%) to be at or above the target (Table 16).

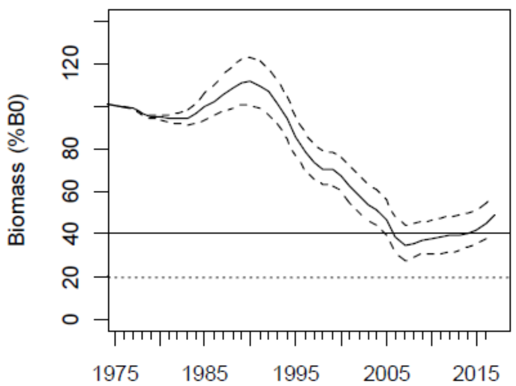


Figure 15. Trend in median stock status (% B_0) of the Chatham Rise hake (HAK 4) stock for the base case model; 95% credible intervals indicated as dashed lines; management target (40% B_0, solid horizontal line) and soft limit (20% B_0, dotted horizontal line) indicated; from MPI (2017a)

Table 16. Median B_0, B_{2016}, and B_{2016} as percentage of B_0 for the Chatham Rise hake (HAK 4) base model and sensitivity runs; 95% credible intervals indicated; from MPI (2017a)

Model run	B_0	B_{2016}	B_{2016} (%B_0)
Base case	30 080 (26 510–40 090)	14 540 (10 850–22 460)	48.2 (40.0–59.1)
Tight survey prior	32 620 (28 420–39 600)	16 000 (11 770–23 120)	49.4 (40.9–59.8)
Estimate *M*	32 500 (27 440–47 110)	19 020 (13 160–33 220)	58.0 (46.2–74.0)
CPUE	36 910 (30 760–64 230)	20 160 (14 910–40 510)	54.5 (46.8–64.7)

Base case model projections assuming a future annual catch of 1,800 t suggest that biomass will remain constant at about 48% B_0 during 2016 - 2021 (Table 17). There is little risk (i.e., < 1%) that the stock will fall below 20% B_0 in the next five years under this catch scenario. Note that 1,800 t is higher than recent annual landings (average about 400 t in the last six years), but lower than what could be taken (if all the HAK 4 TACC plus some HAK 1 catch from the western Rise was taken). Future catches of 400 t per year will allow further stock rebuilding (MPI, 2017a).

Table 17. Median projected biomass in 2021 (B_{2021}), B_{2021} as a percentage of B_0, and B_{2021}/B_{2016} (%) for the Chatham Rise hake (HAK 4) base model and sensitivity models where future annual catches are assumed to be either 1,800 or 400 t; 95% credible intervals indicated; from MPI (2017a).

Model run	Future catch (t)	B_{2021}		B_{2021} (% B_0)		B_{2021}/B_{2016} (%)	
Base	1 800	14 700	(8 850–25 600)	48.3	(32.3–69.6)	100	(75–132)
	400	19 170	(13 620–30 280)	63.7	(48.9–83.4)	132	(108–162)
Tight survey prior	1 800	16 560	(9 980–26 260)	50.3	(33.8–70.1)	101	(77–132)
	400	21 180	(14 810–31 800)	64.9	(49.2–84.1)	130	(107–160)
Estimate *M*	1 800	19 490	(11 570–35 640)	59.5	(39.9–87.0)	102	(78–133)
	400	23 770	(15 570–38 720)	72.5	(53.9–95.9)	124	(99–156)
CPUE	1 800	21 010	(13 240–44 050)	56.6	(40.4–78.2)	103	(79–136)
	400	25 580	(17 920–49 950)	68.7	(54.7–89.3)	126	(104–156)

Hake: West Coast South Island (HAK 7)

Intertek (2014a) used the 2013 assessment of the West Coast South Island hake (HAK 7) stock. The most recent (2017) assessment is reported here.

<u>Catch and Fishing Mortality</u>

As with the Sub-Antarctic and Chatham Rise stocks, the fishery on the WCSI stock commenced in the mid-1970s, primarily exploited by Japan, Korea and the USSR. The New Zealand domestic fishery started in 1979/80. The first TACC was introduced in 1986/87 and was 6,855 t during the 1990s and have been 7,700 t since 2005/06. Due to economic factors, the TACC has not been caught since the mid-2000s (Figure 16). The average fishing year catch since 2005/06 is 4,716 t. While there is some directed fishing for hake, it is mostly caught as bycatch to the hoki trawl fishery.

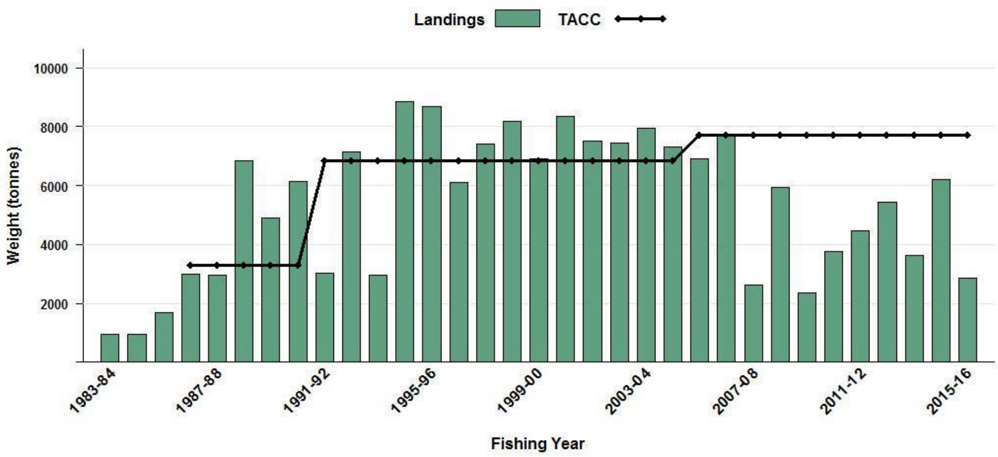


Figure 16. Reported commercial landings and TACC (t) of the WCSI hake (HAK 7) stock; from MPI (2017a)

Two assessment models were deemed to be equally plausible by the DWFAWG (MPI, 2017a; see Stock Assessment section). For both, exploitation was low in the 1980s and has risen since (Figure 17). According to the survey model, exploitation has been varying about 0.25 since the mid-2000s while the CPUE model suggests that exploitation has declined since then. Both the HAK 1 and HAK 4 stocks exhibited a decline in exploitation since the mid-2000s, consistent with a decline in market interest for the species. Also, in the HAK 7 fishery, there have been changes in fishing practices such as gear used, tow duration, and strategies to limit hake bycatch. These imply that recent hake catch rates may be biased downwards. The recent trend in declining exploitation described by the CPUE model is more consistent (than the Survey model) with the decline in economic value as well as with the recent decline in U estimated for the other two hake stocks.

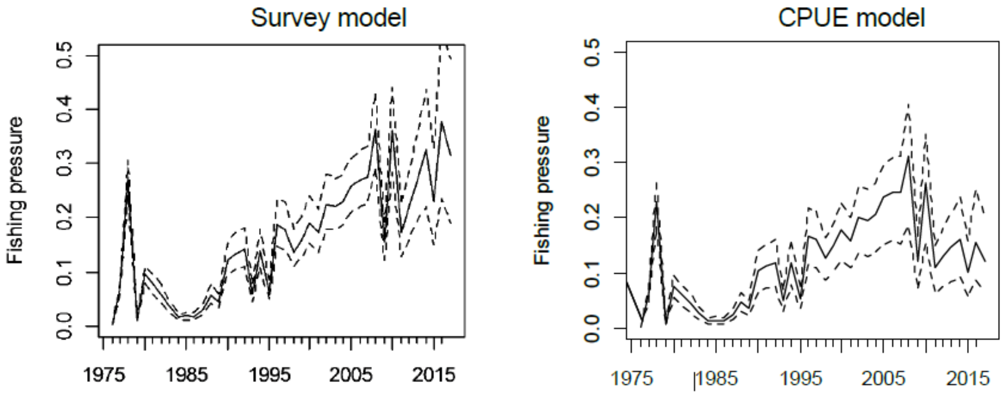


Figure 17. Exploitation rates for the WCSI (HAK 7) stock 'survey' and 'CPUE' models; 95% credible intervals indicated; from MPI (2017a)

<u>Biomass and Recruitment</u>

WCSI hake (HAK 7) relative year class-strength estimates exhibit low between-year variation, although there was a period of generally less than average recruitment during 1993-2009; the CPUE model indicates that recruitment was about average during 2006-2009 (Figure 18).

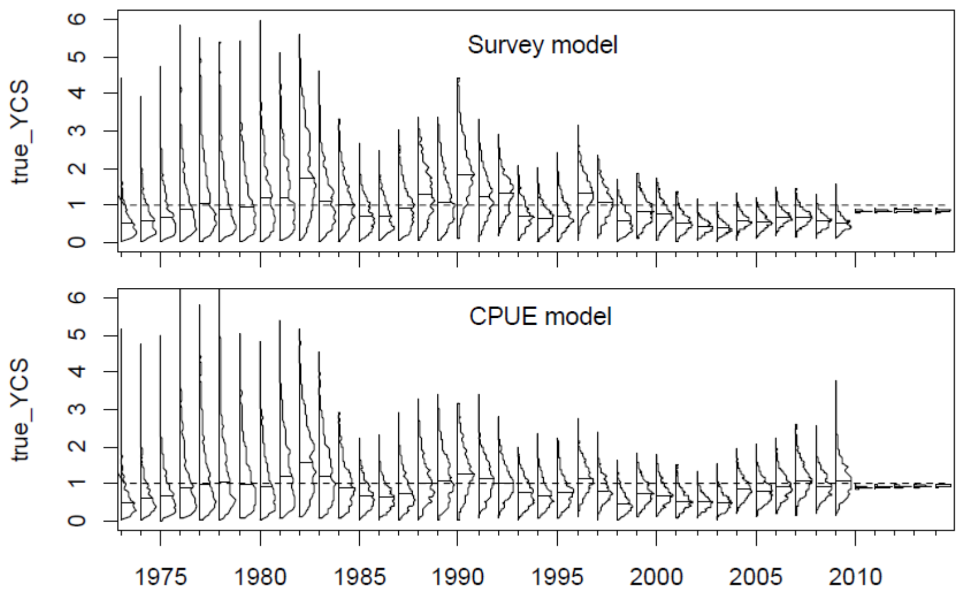


Figure 18. Trend in relative year-class strength of the WCSI hake (HAK 7) stock for the survey and CPUE models; dashed horizontal line indicates year-class strength of one; individual distributions show marginal posterior distribution, with horizontal lines indicating median; from MPI (2017a)

In both WCSI models, estimated biomass declined throughout the late 1970s owing to relatively high catch levels, then increased through the mid-1980s concurrent with a marked decline in catch (Figure 18). Biomass then steadily declined from 1988 to around 2010 owing to higher levels of exploitation and the recruitment of year-classes that were generally of below average in strength. The trends of the two models diverge from around 2010 when stock status in both was estimated to be about 25–30% of B_0. The Survey model indicates that biomass subsequently remained around this level or slightly increased owing to continued poor recruitment and relatively high exploitation rates of 0.20–0.35. Estimated current biomass (B_{2016}) from the Survey model was 25.7% B_0. The CPUE model indicates a steady recovery of stock biomass as a consequence of recruitment of several average year-classes and relatively low exploitation rates (around 0.13). Estimated current biomass (B_{2016}) from the CPUE model was 50.3% B_0 (Table 18). The assessment indicates that B_{2016} is about as likely as not (< 40–60%) to be below the soft limit (Survey model) and very unlikely (< 10%) to be below the soft limit (CPUE model). B_{2016} is estimated to be either 26% (Survey model) or 50% (CPUE model) B_0 or either very unlikely (< 10%) to be at or above the target (survey model) or very likely (> 90%) to be at or above the target (CPUE model).

To inform harvest advice, MPI (email to Acoura team of 15 August 2017 considers that the two models span a range of stock status which includes the management target (40%B_0). While there is uncertainty in the point estimates of 2016 biomass, MPI is using the lower of the two estimates to drive precautionary action, but, as stated above, the DWFAWG considered the two potential outputs (26%B_0 vs 50%B_0) to be equally plausible and therefore, MPI states that it shouldn't be considered that the stock is consistently below the target reference point. The Acoura team notes that if 2016 biomass were in the middle of the range of stock status uncertainty, it would be at 38%B_0 or within 5% of the 40%B_0 target. Further, the trends in U in the other hake assessments, combined with recent depressed market interest for hake, suggest that the CPUE model may be more likely.

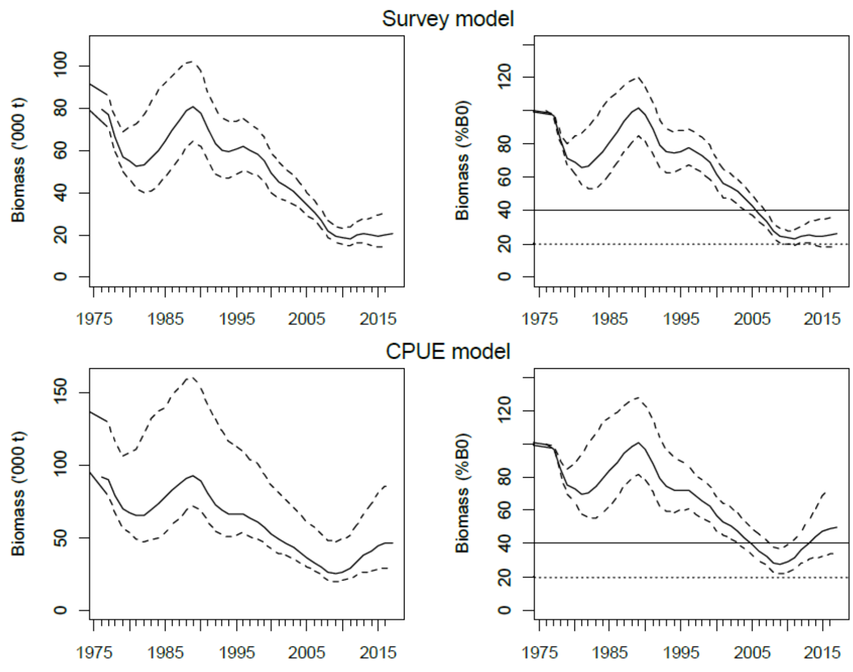


Figure 19. Trend in median biomass and biomass as a percentage of B_0 for the WCSI hake (HAK 7) stock survey and CPUE models; 95% credible intervals indicated as dashed lines; management target (40% B_0, solid horizontal line) and soft limit (20% B_0, dotted horizontal line) indicated; from MPI (2017a)

Table 18. Median B_0, B_{2016}, and B_{2016} as percentage of B_0 for the WCSI hake (HAK 7) survey and CPUE models; 95% credible intervals indicated; from MPI (2017a)

Model run	B_0		B_{2016}		B_{2016} (% B_0)	
Survey	79 190	(73 000–87 990)	20 490	(14 640–30 880)	25.7	(19.1–36.5)
CPUE	92 100	(81 410–131 360)	46 550	(29 190–87 710)	50.3	(34.6–73.6)

Projections to 2021 indicate that biomass is expected to remain constant under recent recruitment and current catch (4,100 t), and to increase under average recruitment and recent catch for both the CPUE and the survey model (Table 19). Under catches equal to the TACC (7,700 t), the biomass is expected to decline for both recruitment scenarios in both the CPUE and the Survey models. Under the Survey model scenario, biomass in 2021 will probably be below the management target (40% B_0) and could be below the soft limit (20% B_0) if catch is at the TACC. The CPUE model projects that biomass will be at or above the management target (40% B_0) in 2021 under all scenarios (Table 19).

Table 19. HAK 7 median projected biomass in 2021 (B_{2021}), B_{2021} as a percentage of B_0, and B_{2021}/B_{2016} (%) for the WCSI survey and CPUE models where future annual catches are assumed to be either 4,100 or 7,700 t; 95% credible intervals indicated; from MPI (2017a)

Future catch (t)	Future YC	B_{2016}		B_{2021}		B_{2021} (% B_0)		B_{2021}/B_{2016} (%)	
Survey model									
4 100	2000–09	15 730	(8 640–28 270)	14 230	(5 900–30 150)	18.1	(7.4–36.2)	91	(55–133)
7 700		15 830	(8 580–28 130)	8 570	(5 160–17 850)	10.8	(6.9–20.8)	55	(34–90)
4 100	1973–09	20 170	(10 470–35 660)	28 660	(10 800–56 570)	36.3	(13.7–68.6)	138	(73–261)
7 700		20 080	(10 470–36 120)	17 000	(7 180–42 180)	21.4	(9.2–52.0)	84	(39–185)
CPUE model									
4 100	2000–09	46 190	(28 500–89 320)	49 010	(26 850–95 210)	52.7	(31.7–87.0)	106	(78–136)
7 700		45 990	(28 440–86 970)	36 560	(13 880–78 510)	39.4	(16.3–70.9)	78	(44–111)
4 100	1973–09	46 440	(28 890–87 820)	52 670	(30 770–96 970)	56.8	(35.0–89.1)	111	(78–173)
7 700		46 540	(28 900–86 760)	40 740	(17 470–82 500)	43.4	(20.1–77.4)	85	(49–141)

4.2.4 Ling

4.2.4.1 Stock Status

Ling: Chatham Rise (LIN 3 & 4)

Intertek (2014b) used the 2011 assessment of the Chatham Rise ling stock. The most recent (2015) assessment is reported here.

Catch and Fishing Mortality

Fishing for ling goes back as far as the 1930s in ling management area LIN 3. During 1975 - 1980, there was a substantial fishery on the Chatham Rise (and to a lesser extent in other areas) carried out by Japanese and Korean longliners. Since 1980, ling have been caught by large trawlers, both domestic and foreign owned, and by small domestic longliners and trawlers. Quota management was introduced in 1983/84 with the stock-specific quota allocated amongst ling management areas as a TACC based upon the biological distribution of the stock (see Harvest Strategy, Section 4.2.6). In the early 1990s, the domestic fleet was increased by the addition of several larger longliners with autoline equipment, resulting in a large increase in the catches of ling off the east and south of the South Island (LIN 3, 4, 5 and 6). However, since about 2000, there has been a declining trend in catches taken by line vessels in most areas, offset, to some extent, by increased trawl landings. Annual landings from the Chatham Rise stock have been less than 4,600 t since 2004, markedly lower than the 6,000–8,000 t taken annually between 1992 and 2003 and lower than the combined LIN3 and LIN4 TACC of 2,060 + 4,200 = 6,260 t (Figure 20), most probably the result of the substantial reduction in hoki fishing at this time.

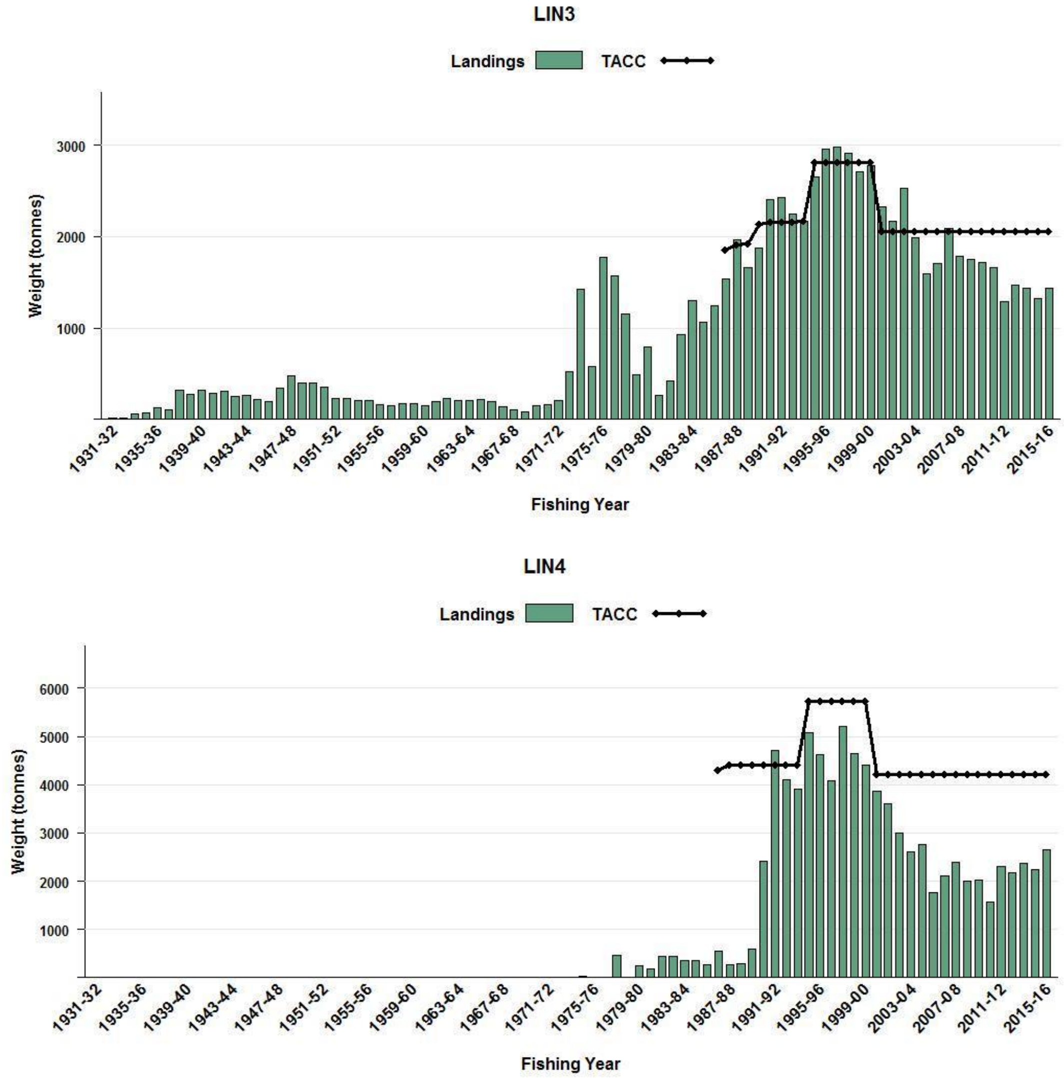


Figure 20. Reported commercial landings and TACCs (t) by ling management area of the Chatham Rise (LIN 3 & 4) ling stock; from MPI (2017a)

Annual exploitation rates (U) peaked in the late 1970s, and then declined to a low level (less than 0.1) up until 1993 when they rose to reach about 0.1 by 2000. Since then, they have undergone an overall declining trend (Figure 21).

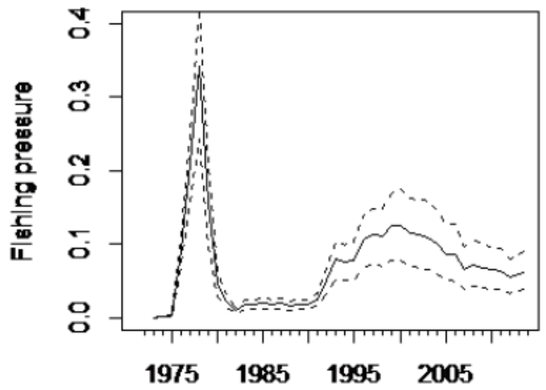


Figure 21. Median exploitation rates (catch over vulnerable biomass) for the Chatham Rise ling (LIN 3 & 4) stock base case model; 95% credible intervals indicated as dotted lines; from MPI (2017a)

<u>Biomass and Recruitment</u>

Since 1980, Chatham Rise relative year-class strengths have been below average except during 1994-1999, and in 2007 (Figure 22). Overall year-class strength variability is relatively low. Recruitment since the early 1990s is estimated to have been fluctuating slightly around the long-term average for this stock (MPI, 2017a).

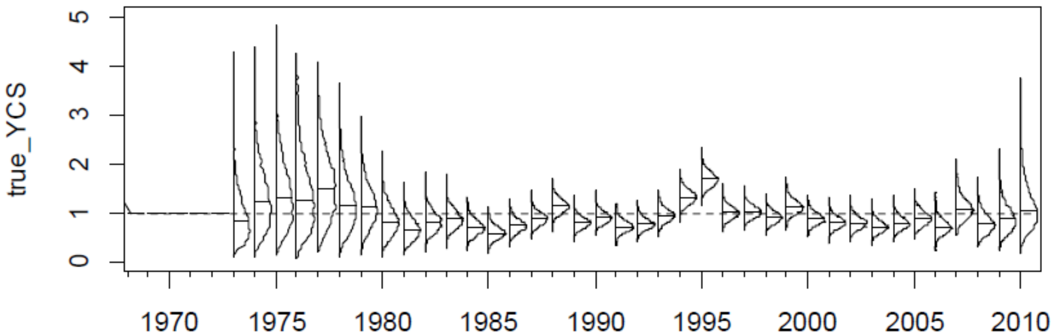


Figure 22. Trend in relative year-class strength of the Chatham Rise ling (LIN 3 & 4) stock for the base case model; dashed horizontal line indicates year-class strength of one; individual distributions show marginal posterior distribution, with horizontal lines indicating median; from MPI (2017a)

Although estimates of current and virgin stock size are imprecise, it is unlikely that B_0 is lower than 110,000 t for this stock, or that biomass in 2014 was less than 44% of B_0 (Table 20, Figure 23). B_{2014} was estimated to be about 57% B_0 and very likely (> 90%) to be above the target and exceptionally unlikely (< 1%) to be below either the soft or hard limit. Overfishing was very unlikely (<10%) to be occurring (MPI, 2017a).

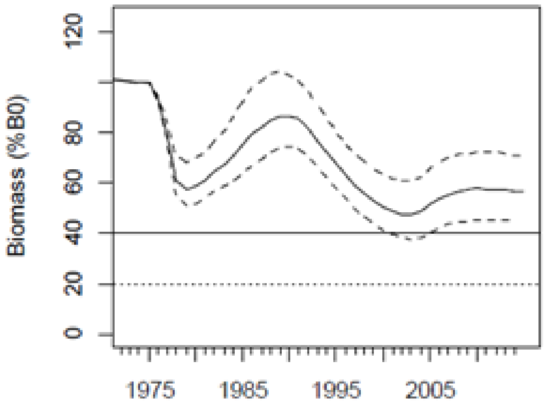


Figure 23. Trend in median stock status (% B_0) of the Chatham Rise (LIN 3 & 4) ling stock for the base case model; 95% credible intervals indicated as dashed lines; management target (40% B_0, solid horizontal line) and soft limit (20% B_0, dotted horizontal line) indicated; from MPI (2017a)

Table 20. Median B_0, B_{2014}, and B_{2014} as percentage of B_0 for the Chatham Rise (LIN 3 & 4) ling base model and sensitivity run; 95% credible intervals indicated; from MPI (2017a)

Model run	B_0		B_{2014}		B_{2014} (% B_0)		P(40% B_0)
Base	126 600	(110 700–165 100)	71 800	(50 500–115 200)	57	(45–71)	0.003
Longline	107 400	(98 700–122 700)	60 900	(42 000–85 600)	40	(30–51)	–

Projections using the base model until 2019 were performed assuming fixed catches of 6,260 or 3,564 t (Table 21). Chatham Rise stock status is likely to remain about the same assuming future catches equal to recent catch levels, or decrease to around 90% of the 2014 biomass by 2019 if catches reach the TACC. During 2013/14 – 2015/16, LIN 3 & 4 catch averaged 3,795 t, similar to the assumption of one of the projected catch scenarios. At catch close to current levels (3,564 t), B_{2019} for the base case model is expected to be 59% B_0 (95% CI 45 – 75% B_0).

Table 21. Median projected biomass in 2019 (B_{2019}), B_{2019} as a percentage of B_0, and B_{2019}/B_{2014} (%) for the Chatham Rise (LIN 3 & 4) ling base model where future annual catches are assumed to be 6,200 or 3,564 t; 95% credible intervals indicated; from MPI (2017a)

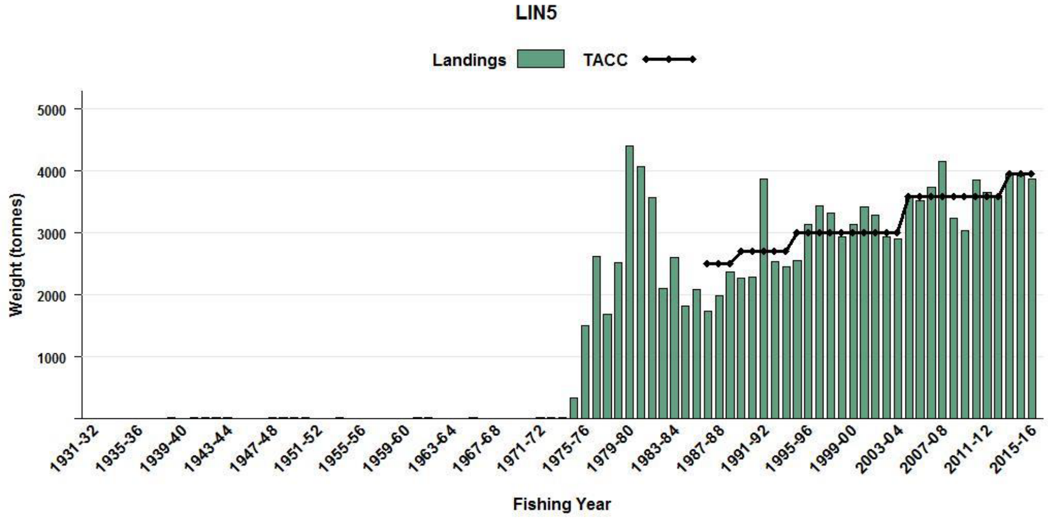
Stock and model run		Future catch (t)	B_{2019}		B_{2019} (% B_0)		B_{2019}/B_{2014} (%)	
LIN 3&4	Base	6 260	64 000	(38 900–112 100)	51	(35–69)	89	(73–106)
		3 564	75 200	(50 400–122 700)	59	(45–75)	104	(91–120)

Ling: Sub-Antarctic (LIN 5 & 6)

Intertek (2014b) used the 2011 assessment of the Sub-Antarctic Ling stock. The most recent (2015) assessment is reported here.

<u>Catch and Fishing Mortality</u>

The fishery on the Sub-Antarctic ling stock commenced in the mid-1970s. Since 1980, ling have been caught by large trawlers, both domestic and foreign owned, and by small domestic longliners and trawlers. Quota management was introduced in 1986/87 with the stock-specific quota allocated amongst ling management areas as a TACC based upon the distribution of the stock (see Harvest Strategy section). In the early 1990s, the domestic fleet was increased by the addition of several larger longliners with autoline equipment, resulting in a large increase in the catches of ling off the east and south of the South Island (LIN 3, 4, 5 and 6). Since then, catch of the stock in LIN 5 has remained close to its TACC (3,595 t) while that in LIN 6 has declined significantly below its TACC (8,505 t) (Figure 24).



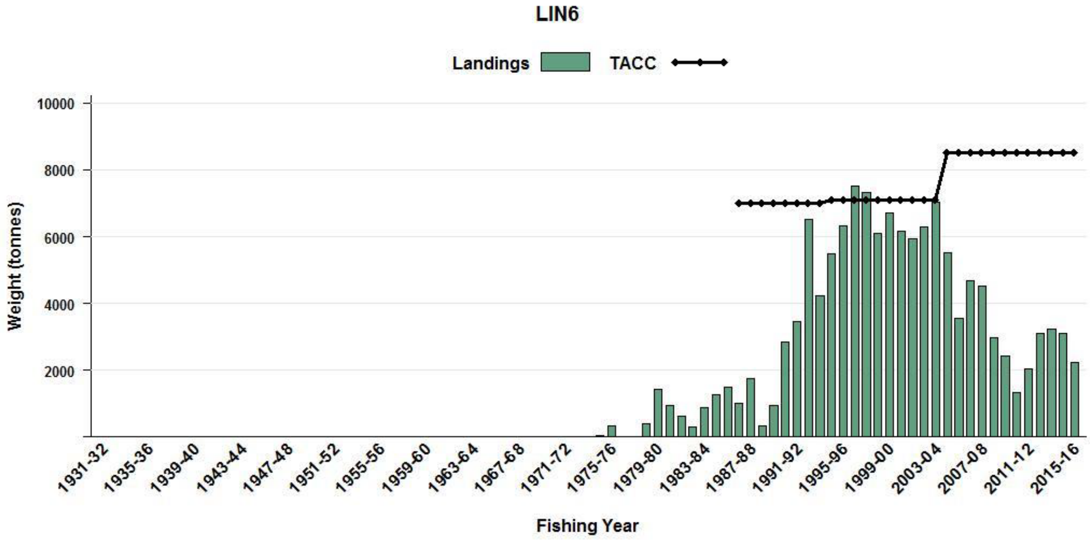


Figure 24. Reported commercial landings and TACCs (t) by ling management area of the Sub-Antarctic (LIN 5 & 6) ling stock; from MPI (2017a)

Annual exploitation rates (U) rose from vary low levels in the 1970s – 1980s to about 0.06 by 2000 and have since declined to about 0.02 (Figure 25).

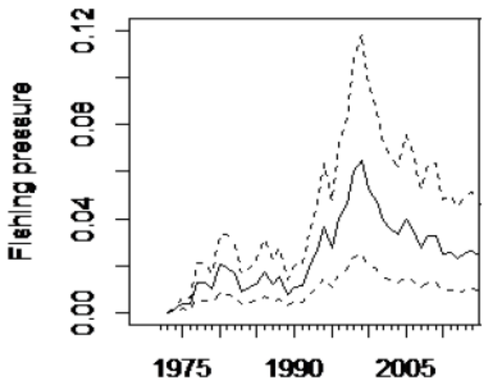


Figure 25. Median exploitation rates (catch over vulnerable biomass) for the Sub-Antarctic (LIN 5 & 6) ling stock base case model; 95% credible intervals indicated as dotted lines; from MPI (2017a)

Biomass and Recruitment

Relative year-class strength was generally weak during 1982 - 1992, strong during 1993 - 1996, and average since then, although that of 2005 may have been be strong. Overall year-class strength variability is relatively low (Figure 26).

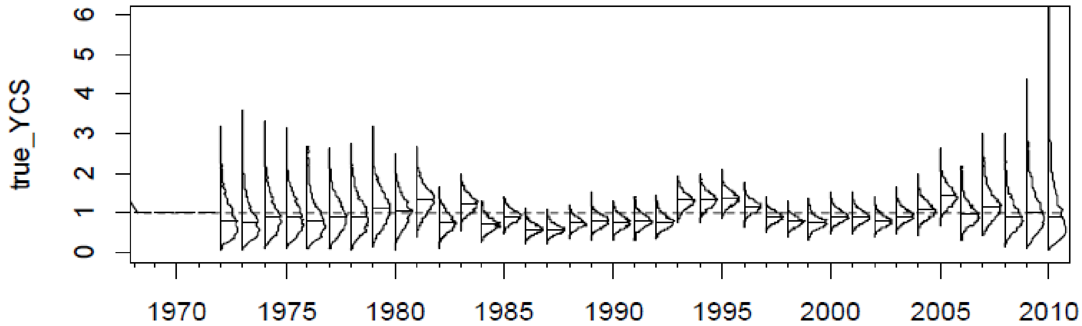


Figure 26. Trend in relative year-class strength of the Sub-Antarctic (LIN 5 & 6) ling stock for the base case model; dashed horizontal line indicates year-class strength of one; individual distributions show marginal posterior distribution, with horizontal lines indicating median; from MPI (2017a)

Stock status declined through the 1990s, but has exhibited an upturn during the last 15 years (Figure 27). The biomass trajectory from the base case model was little different to that derived from the reference model. MPI (2017a) states that B_{2014} was estimated to be 86% B_0 and virtually certain (> 99%) to be above the target, and exceptionally unlikely (< 1%) to be below either the soft or hard limit. Overfishing was exceptionally unlikely (< 1%) to be occurring (Table 22).

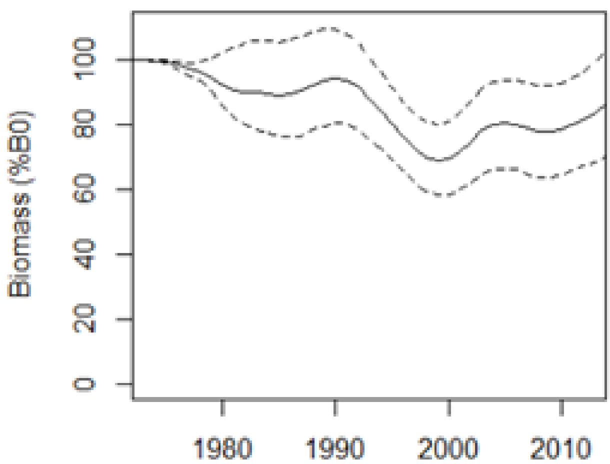


Figure 27. Trend in median stock status (% B_0) of the Sub-Antarctic (LIN 5 & 6) ling stock for the base case model; 95% credible intervals indicated as dashed lines; from MPI (2017a)

Table 22. Median B_0, B_{2014}, and B_{2014} as percentage of B_0 for the Sub-Antarctic (LIN 5 & 6) ling base and reference models; 95% credible intervals indicated; from MPI (2017a)

Model run	B_0		B_{2014}		B_{2014} (% B_0)		P(40% B_0)
Reference model	354 000	(204 000–673 000)	317 000	(155 000–655 000)	89	(72–104)	–
Base case model	289 000	(179 000–665 000)	251 000	(127 000–651 000)	86	(69–103)	0.000

Projections to 2019 were performed assuming fixed catches of 5,700 or 12,100 t. The probability of B_{2019} being below 40% of B_0 is very small when assuming either one of two future annual catch scenarios (the recent catch level of 5,700 t or the TACC of 12,100 t). Stock status is unlikely to change over the next five years at recent catch levels or the level of the TACC (i.e., 12,100 t). It is exceptionally unlikely (< 1%) that biomass will fall below limit and target reference points under either catch scenario, and those catch levels are very unlikely (<10%) to cause overfishing by 2019 (Table 23).

Table 23. Median projected biomass in 2019 (B_{2019}), B_{2019} as a percentage of B_0, and B_{2019}/B_{2014} (%) for the Sub-Antarctic (LIN 5 & 6) ling base model where future annual catches are assumed to be 5,700 or 12,100 t; 95% credible intervals indicated; from MPI (2017a)

Stock and model run		Future catch (t)	B_{2019}		B_{2019} (% B_0)		B_{2019}/B_{2014} (%)	
LIN 5&6	Base	5 700	265 500	(129 100–714 800)	91	(69–118)	104	(86–136)
		12 100	240 300	(104 000–697 300)	82	(56–113)	94	(73–127)

Ling: West Coast South Island (LIN 7WC)

Intertek (2014b) used the 2013 assessment of the WCSI Ling stock. The most recent (2017) assessment is reported here.

Catch and Fishing Mortality

The fishery on the WCSI ling stock commenced in the mid-1970s. Quota management was introduced in 1986/87 with the LIN 7 TACC based upon the WCSI assessment (see Harvest Strategy – section 4.2.6). Catches rose during the 1980s and surpassed the TACC in the 1990s but more recent catches have been in line with the TACCs, which have seen an increase since the late 2000s (Figure 28).

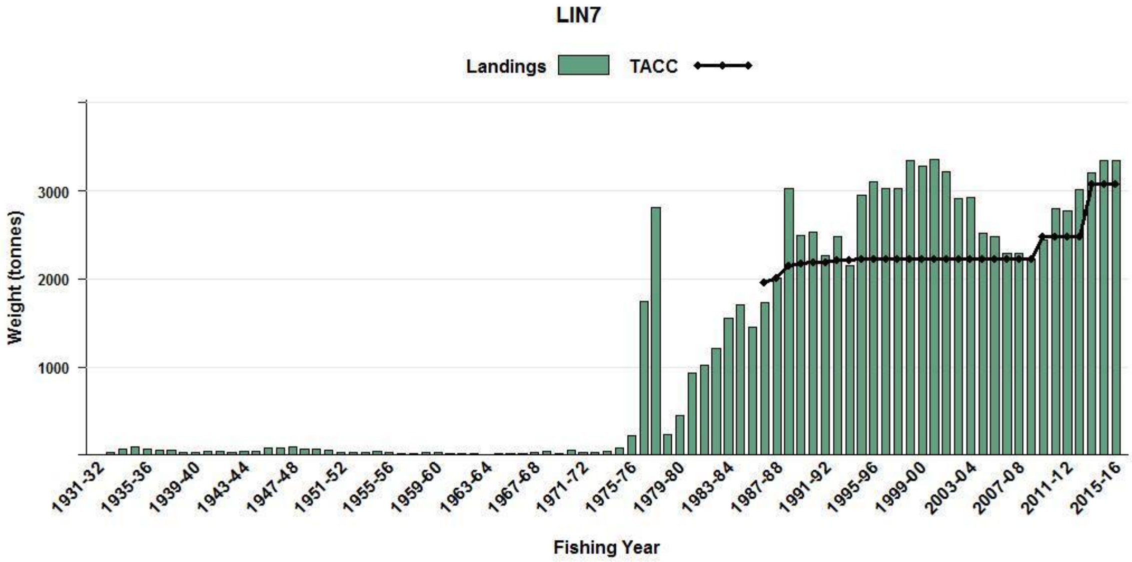


Figure 28. Reported commercial landings and TACCs (t) of ling management area 7 in which the WCSI (LIN 7WC) ling stock resides; from MPI (2017a)

Annual exploitation rates (U) by both the trawl and longline fleets rose during the 1980s to about 0.05 and have fluctuated without trend since then (Figure 29).

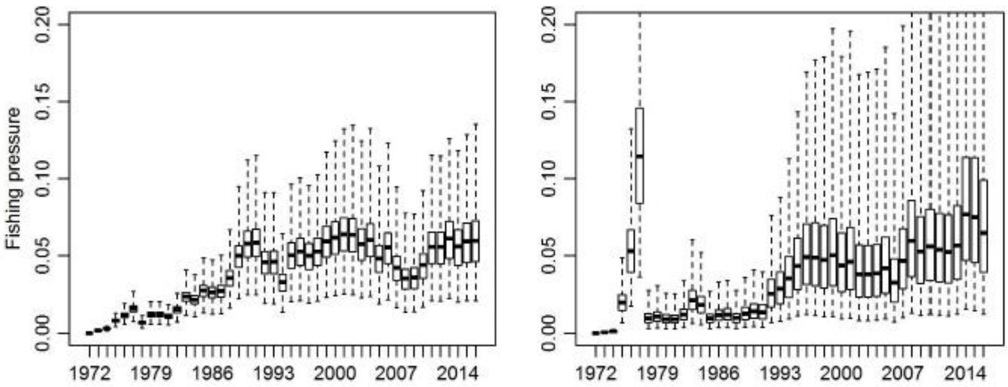


Figure 29. Estimated posterior distributions of the exploitation rate of the trawl (left panel) and longline (right panel) fleets, for the Combined CPUE WCSI (LIN 7WC) ling model; median (solid horizontal line), inter-quartile range (box; half of the estimates were within this range), and overall range of estimates (broken vertical lines) indicated; from MPI (2017a).

<u>Biomass and Recruitment</u>

Relative year-class strength of the WCSI Combined CPUE model run (other models were not visually different) estimated a period of high recruitment around 1990, and in several years since 2001 (Figure 30). Relatively strong year-classes since 2001 have started recruiting to the fishery from around 2010 (at age nine).

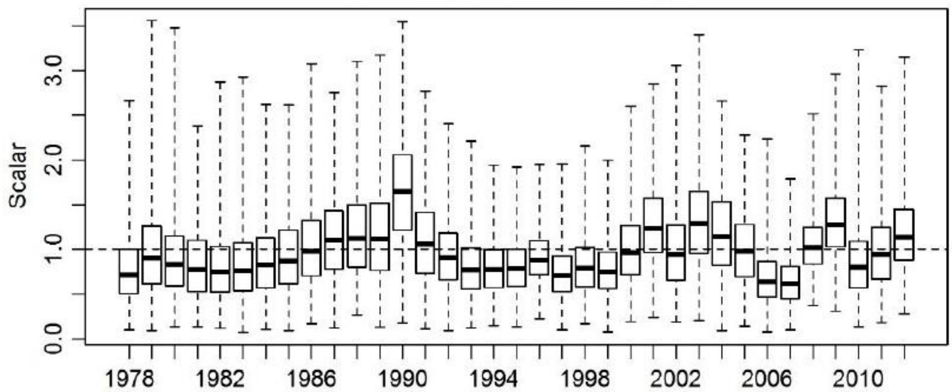


Figure 30. Trend in relative year-class strength of the WCSI (LIN 7WC) ling stock for the Combined CPUE model; dashed horizontal line indicates year-class strength of one; median (solid horizontal line), inter-quartile range (box; half of the estimates were within this range), and overall range of estimates (broken vertical lines) indicated; from MPI (2017a)

The Combined CPUE model indicates that biomass and stock status declined until 1992, followed by fluctuating but stable biomass until 2016, whereas both the Lognormal CPUE models indicate slow overall biomass declines (Figure 31). For the three models, B_{2017} ranges 54 – 79% B_0 with the lower 95% CI ranging 39 – 61% B_0 (Table 24) and very likely (Pr>90%) to be at or above the target.

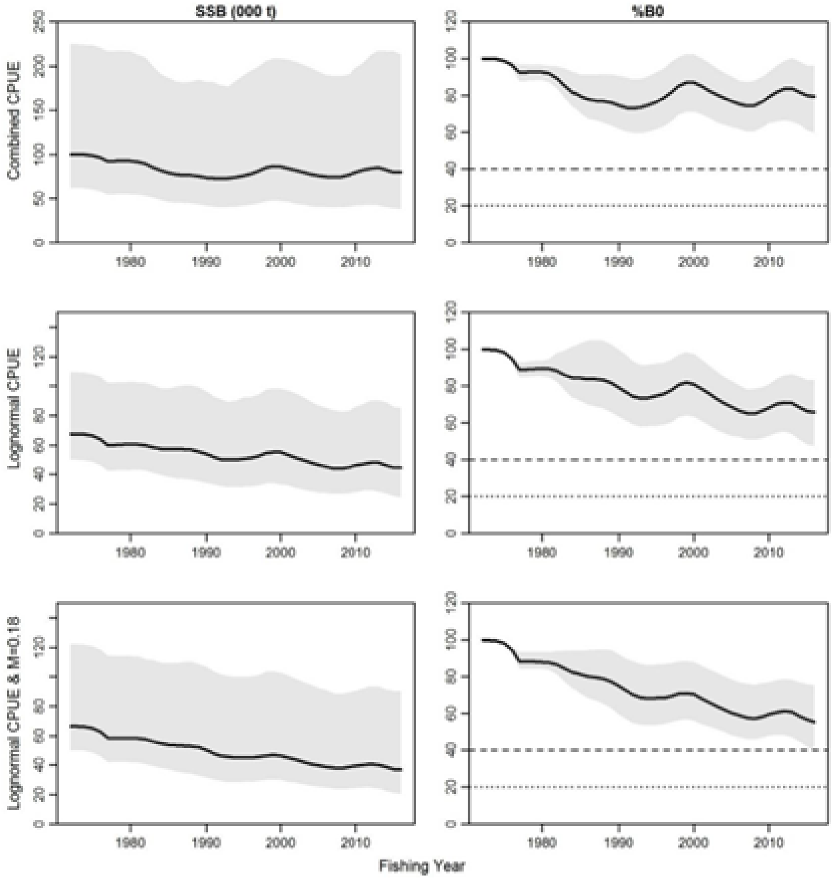


Figure 31. Posterior distributions of the WCSI (LIN 7WC) spawning stock biomass (t) and % B_0 for the three models; solid lines are median values and the shaded area are 95% CIs; dashed and dotted horizontal lines are the target reference point and soft limit reference point respectively from MPI (2017a)

Table 24. Median B_0, B_{2017}, and B_{2017} as percentage of B_0 for the WCSI ling models; 95% credible intervals indicated; from MPI (2017a)

Model run		B_0		B_{2017}		B_{2017} (% B_0)
Combined CPUE	99 300	(63 500–198 200)	77 400	(39 600–183 000)	79	(61–96)
Lognormal CPUE	69 300	(51 600–122 000)	46 300	(26 100–98 000)	66	(50–83)
Lognormal CPUE and M = 0.18	62 800	(48 900–114 500)	34 000	(19 500–84 100)	54	(39–74)

Projections to 2022 for WCSI stock indicate that biomass was likely to remain about the same with future catches equal to the average of catch between 2012 - 2016 (2,980 t), or if catches were to increase modestly (by around 10% to 3,300 t) (

Table 25). During 2013/14 – 2015/16, LIN 7 catch averaged 3,294 t, increasing in response to a TACC increase.

Table 25. Median projected biomass in 2022 (B_{2022}), B_{2022} as a percentage of B_0, and B_{2022}/B_{2016} (%) for the WCSI (LIN 7WC) ling models where future annual catches are assumed to be 2,980 or 3,300 t; 95% credible intervals indicated; from MPI (2017a)

Stock and model run		Future catch (t)	B_{2022}		B_{2022} (%B_0)		B_{2022}/B_{2016} (%)	
LIN 7WC	Combined CPUE	2980	77 300	(37 800-185 500)	79	(56–106)	100	(83–126)
		3300	76 600	(35 500-183 700)	78	(54–104)	98	(80–123)
	Lognormal CPUE	2980	47 400	(21 600–97 300)	70	(41–100)	104	(81–134)
		3300	45 900	(20 700–96 900)	68	(37–97)	102	(77–133)
	Lognormal CPUE	2980	38 100	(17 300–97 900)	57	(33–85)	100	(76–126)
	& M = 0.18	3300	36 400	(15 900–95 900)	54	(32–82)	97	(73–124)

4.2.5 Reference Points

The basis of the hoki, hake and ling reference points (RPs) have not changed since Intertek (2012a; 2014a; 2014b). The spawning stock biomass (SSB) and fishing mortality (F) reference points (RPs) in use in New Zealand fisheries are outlined in MPI (2008) with their technical basis described in MPI (2011). The overarching objective of the 1996 Fisheries Act (see Harvest Strategy section) is achievement of MSY stock conditions and, as a consequence, the primary SSB and F target RPs are B_{MSY} and F_{MSY} respectively. The Operational Guidelines (MPI, 2011) provide a range of methods, based on a review and consideration of practice elsewhere in the world, to estimate MSY-compatible RPs, from analytical models to proxies based upon a percent of virgin biomass (B_0) with default proxies provided based upon a stock's productivity.

The HSS also outlines SSB limit RPs at which further reductions in stock size are likely to lead to an unacceptably high risk of stock collapse and/or a point at which current and future utility values are diminished or compromised. While target RPs are an objective of management, limit RPs are stock levels that are to be avoided. Both soft and hard limits are defined above extinction thresholds – upper bounds where depensation may occur, and associated management actions should prevent stocks from falling into such zones – and from which the stock is likely to recover in a reasonable time. Soft limits are higher that hard limits. When a soft limit is breached, a formal, time-constrained, rebuilding plan is implemented. When a hard limit is breached, the fishery will be considered for closure until the stock has rebuilt to at least the level of the soft limit with an acceptable probability (70%). The ultimate goal of both limits is to ensure full rebuilding of the stock to the biomass target with an acceptable probability (70%). MPI (2011) states that the reason for requiring a probability level greater than 50% is that a stock that has been severely depleted is likely to have a distorted age structure (an over-reliance on juvenile fish, with relatively few large, highly fecund fish). In such instances, it is necessary to rebuild both the biomass and the age composition. MPI (2011) provides default hard and soft limits of 10% and 20% virgin biomass.

For hoki, hake and ling, the hard and soft biomass limit reference points are based upon the defaults in the HSS standard and thus, are a percent of the virgin biomass (B_0), as estimated in the stock assessments using statistical catch-at-age models, available information on the population dynamics and biomass surveys (see Stock Assessment section). As per the HSS defaults, the SSB hard and soft limit reference points are set at 10% and 20% of unexploited biomass respectively. The 20% B_0 soft limit is consistent with MSC guidance on the limit RP in MSC CR v1.3 and is used in this assessment for scoring purposes. This interpretation is consistent with Intertek (2012a) as well as that of MSC teams who have assessed other New Zealand deepwater fisheries (Intertek, 2012b; 2014a; 2014b).

Steepness, *h*, is defined as the fraction of recruitment expected at virgin biomass (R_0) obtained at 20% of virgin biomass (B_0) (Haddon, 2001). The hoki, hake and ling stock assessments use a Beverton and Holt stock-recruitment relationship with an assumed value of 0.80, 0.75 and 0.84 for steepness respectively. This implies that expected biomass at the soft limit (20%B_0) will maintain recruitment at 75 – 84% of that at virgin levels for the three species. Further, research on B_{MSY} and related proxy RPs (e.g. Punt et al, 2014) indicates that at steepness in the range of 0.75 – 0.84, B_{MSY}/B_0 ratios can be expected to be less than 0.4, implying that RPs based upon the HSS defaults are conservative. Evidence from the stock assessments suggests that recruitment has not been significantly affected by past exploitation of these fisheries.

The SSB target RPs for hake and ling are the HSS default of 40% B_0. This is supported by the higher steepness values (0.80 and 0.84) assumed for these species. The SSB target RP for hoki changed from the HSS 40% B_0 default to the currently used Management Target range of 35% - 50% B_0 in 2009. The choice of the new target reference point was informed by Management Strategy Evaluation simulations (Langley 2009, 2011). MPI (2017a) describes why this Management Target is preferable to one based upon a direct estimate of B_{MSY}. First, one based on B_{MSY} assumes a harvest strategy that is unrealistic in that it involves perfect knowledge (current biomass must be known exactly in order to calculate the target catch) and annual changes in TACC (which are unlikely to happen in New Zealand and not desirable for most stakeholders). Second, one based on B_{MSY} assumes perfect knowledge of the stock-recruitment relationship, which is very poorly known. Third, the closeness of B_{MSY} to the soft limit would permit the limit to be breached too easily and too frequently, given, for example, a limited period of low recruitment. Fourth, it would be very difficult with such a low biomass target reference point to avoid the biomass occasionally falling below 20% B_0.

The target fishing intensity (U) or exploitation for hoki is defined as that which can attain the biomass range of 35% - 50% B_0 and is a proxy for F_{MSY}. For the Eastern stock, the U target range is 0.14 – 0.21 while that for the Western stock is 0.13 – 0.20.

Hoki, hake and ling are not low trophic level species. None are in MSC CR v1.3 Box CB1. The diet of these species is not predominantly plankton and none have the biological characteristics of Low Trophic Level (LTL) species identified in MSC CR v1.3.

4.2.6 Harvest Strategy

The harvest strategy for hoki, hake and ling has not changed since Intertek (2012a; 2014a; 2014b). These did not include detail on the strategy and thus the Acoura assessment team considered that it would be useful to more fully describe the harvest strategy in this report. The following sections are based upon the interpretation of the New Zealand deepwater fisheries harvest strategy by the MSC assessment teams of the hoki (Intertek, 2012a), hake (Intertek, 2014a) and ling (Intertek, 2014b) fisheries.

Objectives

The 1996 Fisheries Act provides the legislative framework for New Zealand fisheries management, within New Zealand's fisheries waters out to 200 nm and for New Zealand flagged vessels and nationals on the high seas. The overarching objective outlined in the Fisheries Act is to provide for utilisation of fisheries resources while ensuring their sustainability. Thus, the Minister of Fisheries is responsible for ensuring that fish stocks are maintained at or above a level (B_{MSY}) that can produce Maximum Sustainable Yield (MSY), which is the greatest yield that can be achieved over time while maintaining a stock's productive capacity, having regard to the population dynamics of the stock and any environmental factors that influence the stock. The Act also outlines information principles related to the precautionary approach which state that decisions should be based on the best available information, decision makers should consider any uncertainty in the information available and be cautious when information is uncertain, unreliable, or inadequate, but that 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 the Act. The Annual Operational Plan for Deepwater Fisheries (MPI, 2016) provides the management objectives guiding the deepwater fishery, which follow from the 1996 Fisheries Act.

The conceptual sustainability objectives of the Fisheries Act are operationalized through the 2008 Harvest Strategy Standard (HSS: MPI, 2008) which is a policy statement of best practice in relation to the setting of stock targets and limits for fish stocks in New Zealand's Quota Management System (QMS), which has been in place since 1986. It outlines the approach on how fisheries law will be applied in practice, by establishing a consistent and transparent framework for decision-making to achieve the objectives of the Fisheries Act 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 associated operational guidelines of the HSS (MPI, 2011) provide suggested methods for calculating or approximating the biological reference points specified in the HSS, a more detailed basis and justification for the metrics specified in the HSS and elaboration on how the HSS should be implemented. The sections on implementation specify the respective roles and responsibilities of fisheries managers, scientists and stakeholders in giving effect to the HSS.

MPI (2008) states that the core standards will not change substantively in the short-term, but are subject to review in a period not exceeding five years, based on the evolution of fisheries plans and fisheries management strategies in New Zealand, and the evolution of international best practice. The Operational Guidelines (MPI, 2011) on the other hand, continually evolve as new data, analyses and insights become available.

4.2.7 Harvest Control Rules

The TACC-setting process must conform to section 13 (2) of the 1996 Fisheries Act, which states:

The Minister shall set a total allowable catch that-
- (a) maintains the stock at or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks; or
- (b) enables the level of any stock whose current level is below that which can produce the maximum sustainable yield 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 yield, having regard to the interdependence of stocks; 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 the maximum sustainable yield 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, having regard to the interdependence of stocks.

MPI (2008) 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 50% B_{MSY} or 20% B_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 25% B_{MSY} or 10% B_0 whichever is higher) below which fisheries should be considered for closure when 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 RPs:

- 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***.

The relationship amongst these RPs and the management actions that should be invoked are illustrated (Figure 32) in the harvest control rule outlined in the Operational Guidelines (MPI, 2011). The example is applicable only for high information stocks where it is possible to estimate biomass relative to B_{MSY} and fishing mortality relative to F_{MSY} (or some other measure of fishing intensity). However, MPI (2011) notes that it can also be adapted to other, lower information situations. When biomass is between the target and the soft limit, management actions to reduce catch are to be taken to prevent stocks declining to the level of the soft limit. Besides TACCs, these could consist of measures such as changes in minimum legal sizes of fish caught (through, for example, increases in the minimum allowable mesh size of fishing nets), and closures of areas with high levels of catches of juveniles. MPI (2011) emphasizes that Figure 32 is primarily for illustrative purposes, to provide an example of one type of control rule that is likely to achieve the requirements of the HSS.

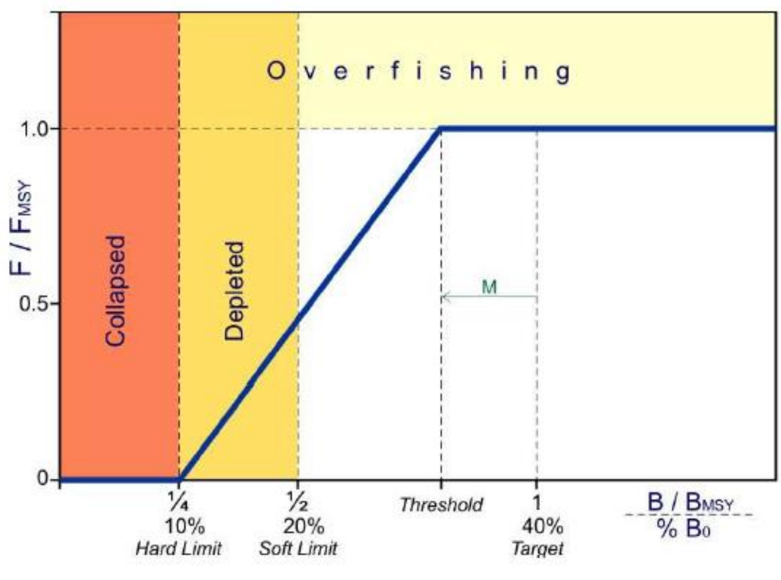


Figure 32. Illustrative example of a harvest strategy control rule that would be in conformance with the Harvest Strategy Standard; *M* is natural mortality (from MPI, 2011)

The requirements of the HSS are outlined in its Implementation Guidelines (MPI, 2011). These outline the MSY-compatible target and limit RPs as noted above, and the actions to be taken if and when stock biomass declines below the target. The latter include formal rebuilding plans when biomass is below 20% B_0 and actions when current biomass is likely to be above soft and hard limits but below targets:

Rebuilding Plans:

1. Science Working Groups (SWGs) will estimate the probability that current and/or projected biomass is below 50% B_{MSY} or 20% B_0, whichever is higher. If this probability is greater than or equal to 50%, SWGs should calculate T_{MIN} where T_{MIN} is the number of years required to rebuild in the absence of fishing.
2. SWGs will work with fisheries managers to define and evaluate alternative rebuilding plans that will rebuild the stock back to the target with a 70% probability within a timeframe ranging from T_{MIN} to 2 * T_{MIN}.
3. The Ministry will provide advice to the Minister on a range of rebuilding plans that satisfy the T_{MIN} to 2 * T_{MIN} time constraint (or an alternative that can be adequately justified), and the specified probability levels.
4. Once a rebuilding plan has been implemented, SWGs will regularly evaluate and report on the performance of the rebuilding plans.
5. The Ministry will provide advice to the Minister on appropriate TACCs to achieve the rebuilding plan.

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

1. SWGs 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:
    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, SWGs 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.

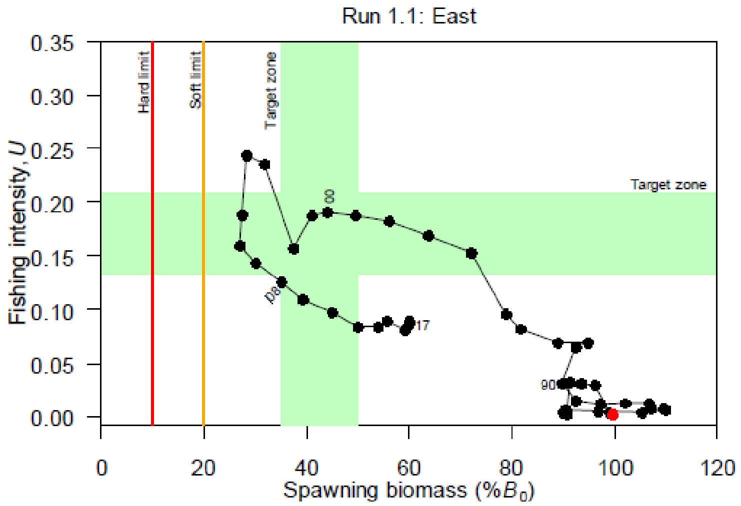
The form of the biomass – fishing mortality relationship is an emergent property of the above HCR and is not a proscribed analytical function. This is consistent with MSC CRv1.3. GCB2.6 which states that the requirement that a HCR reduces exploitation rates as the limit reference point is approached should not always be interpreted as requiring the control rule to deliver an exploitation rate that is a monotonically decreasing function of stock size. Any exploitation rate function may be acceptable so long as it acts to keep the stock above the limit reference point and attempts to maintain the stock at the target reference point. Also, it acts to rebuild the stock if it drops below both the target and the limit RPs.

During the site visit, MPI emphasised that in its consideration of TACC options, it follows the HSS.

The HCRs for hoki, hake and ling are consistent with the HSS and associated Operational Guidelines and consist of the following:

- Assessment by the DWFAWG every 1-3 years to estimate probability of current biomass and/or fishing mortality relative to limit and target reference points (see Stock Assessment - sections 4.2.2, 4.2.3, 4.2.4)
- Conduct of 5-year projections to evaluate Pr(SSB<20% B_0) and median SSB as % B_0; these are done for a base case model and for models which 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 DWFAWG
- Decision by the New Zealand Minister of Fisheries on TAC (and associated TACC) during projection period, consistent with HSS and informed by SWG 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 experience with the hoki HCR is available in the Kobe plot of the most recent Eastern and Western assessments (Figure 33). In both stocks, during the early 2000s, biomass declined which was arrested before it dropped too far below the target range. Since then, biomass has been maintained above the target range.



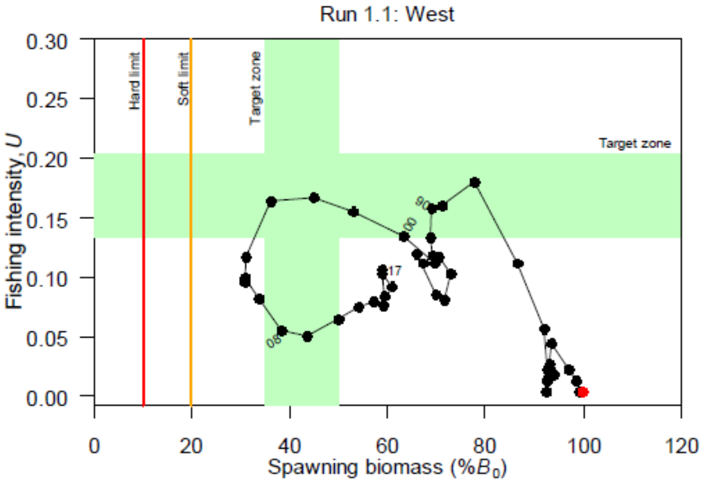


Figure 33. Kobe relationship of fishing intensity (*U*) and spawning biomass (% B_0), for the Eastern (top) and Western (bottom) hoki stock for assessment time period (1972 indicated by red square); red vertical line is 10% B_0 hard limit; yellow line is 20% B_0 soft limit; shaded area represents management target ranges in biomass and fishing intensity since 2009; from MPI (2017a)

The experience with the hake HCRs is available in the Kobe plots of the three stocks. The Kobe plot for the Sub-Antarctic stock (Figure 34) indicates that biomass was well above the target during the 1990s and was arrested from further decline in the late 2000s such that it never dropped below the target.

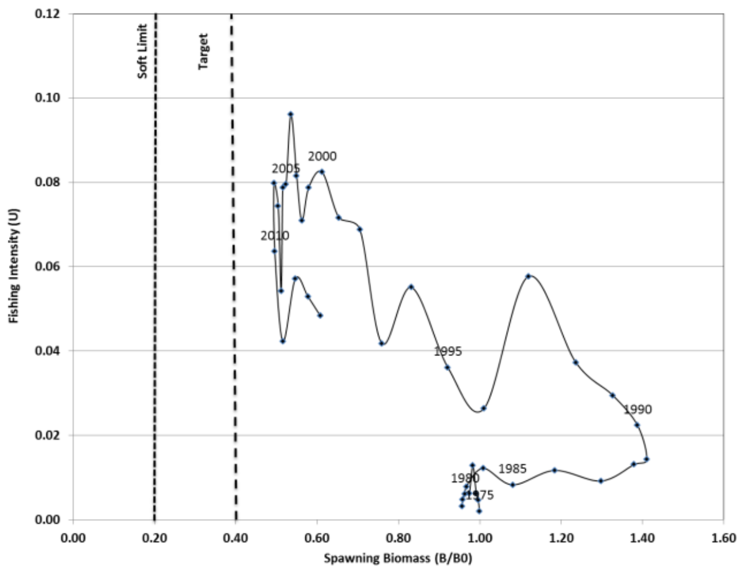


Figure 34. Kobe relationship between fishing intensity (U) and relative spawning biomass (B/B_0) for the Sub-Antarctic Hake (HAK 1) stock for assessment time period; data from T. Bock (pers. comm.).

The Kobe plot for the Chatham Rise (HAK 4) stock exhibits similar behavior as that for the HAK 1 stock, with biomass declining towards the 40% B_0 target in the 1990s and being arrested, in this case at the target, in the late 2000s, before subsequently increasing (Figure 35).

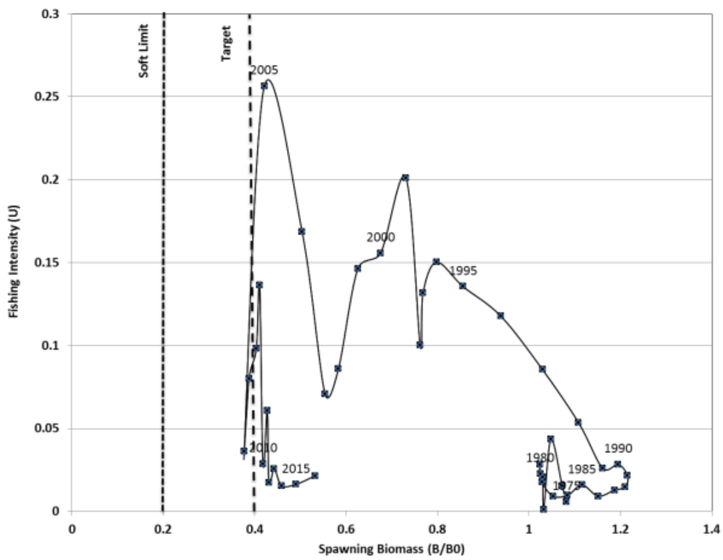
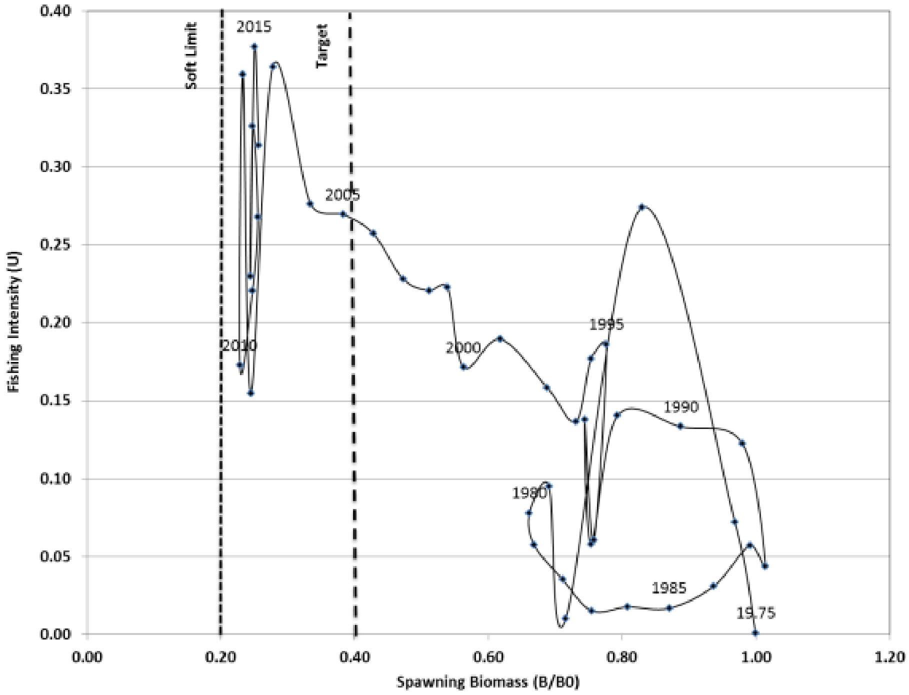


Figure 35. Kobe relationship between fishing intensity (U) and relative spawning biomass (B/B_0) for the Chatham Rise (HAK 4) stock for assessment time period; data from T. Bock (pers. comm.).

The Kobe plots for the WCSI (HAK 7) stock (Figure 36) indicate the HCR has been either successful in recovering biomass from below to above the 40% B_0 target (CPUE model) or not successful (Survey model), although even in this case, the HCR has effectively prevented the stock breaching the Soft Limit. As indicated in the Stock Status section, MPI considers that while the determination of stock status is uncertain, it should be not considered as consistently below the management target (40%B_0) but has taken precautionary action to reduce the risk of stock depletion. During 2017, MPI undertook public consultations (MPI, 2017d) during which it proposed two options (excluding status quo) of a reduction in the TACC under section 13(2) of the Act to maintain HAK 7 at or above a level that can produce MSY. The options differed in terms of the economic and social considerations balanced against the sustainability risk. The proposed change in the TACC was also intended to minimize the probability of the stock dropping below the 20% B_0 Soft Limit in the short term while additional investigation is completed, after which the TACC may be reviewed. Option 1 was developed based upon five-year average catch and would result in a TACC reduction of 41% (from 7,700 to 4,519 t) while option 2 (MPI preferred) was based on 80% probability that the stock remain above the Soft Limit in 2019 assuming optimistic recruitment. This would result in a TACC reduction of 34% (from 7,700 to 5,120 t). The Minister of Fisheries ultimately reduced the TACC to 5,064 t (MPI, 2017e). MPI (2017d) states that future decisions regarding the HAK 7 fishery will be informed by (i) upcoming analysis of fleet wide catch-per-unit-effort (CPUE) data and modelling expected in the 2017/18 fishing year; (ii) a trawl survey in mid-2018; and (iii) a full stock assessment in 2018/19 (brought forward from 2019/2020). These initiatives should assist in reducing the level of uncertainty. Additional management action is likely to be taken based on the updated information.

a. Survey Model



b. CPUE Model

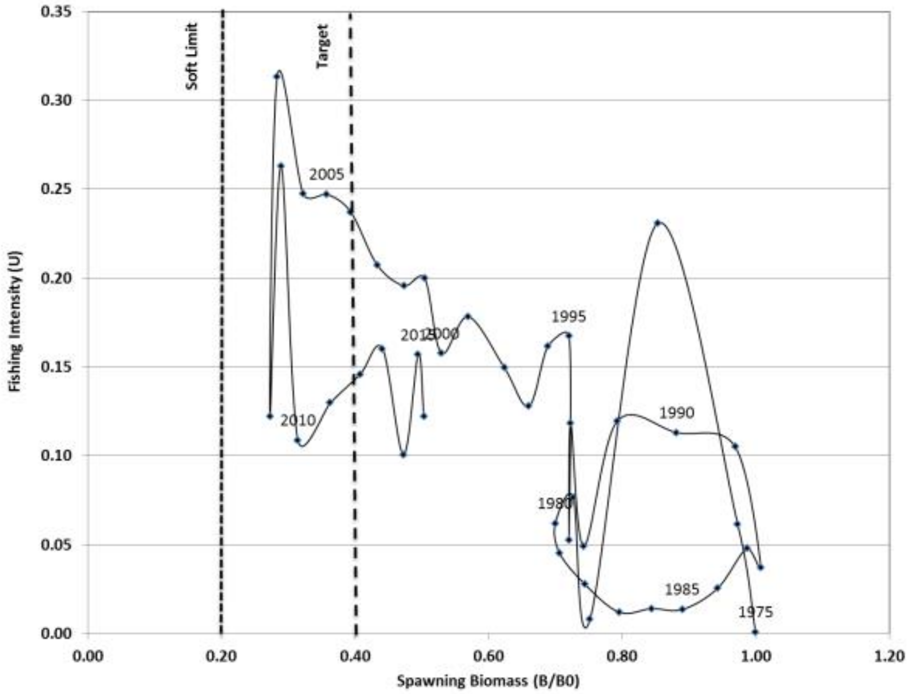


Figure 36. Kobe relationship between fishing intensity (U) and relative spawning biomass (B/B_0) for the WCSI (HAK 7) stock for assessment time period; Top panel: Survey Model; Bottom panel: CPUE Model; data from T. Bock (pers. comm.).

The status of the three ling stocks has been well above the 40% B_0 target for much of the assessment time series and thus the Kobe plots are not informative of the experience with the ling HCRs. However, it is expected that these would display the same properties as the HCRs for hake and hoki if status were to decline towards 20% B_0.

Management Strategy Evaluation

The HSS and its associated Operational Guidelines describe the role of Management Strategy Evaluation (MSE) in the management system. MSE, rather than focusing solely on biological RPs, seeks to take into account the robustness of alternative management procedures and socio-economic implications of management decisions. MSE attempts to model and simulate the whole management process. It makes projections about the state of the fishery resources and other ecosystem parameters for a number of years into the future under a variety of decision-rule options. The management measures and rules that achieve the best results in terms of specified objectives can then be selected and applied. This procedure greatly assists in identifying management strategies that are resilient to uncertainties in scientific understanding. The HSS provides minimum performance standards, or minimum performance measures, for MSEs and does not restrict alternative management objectives, or innovative management strategies, or additional performance measures beyond this. It states that MSEs should be designed to ensure that:

- the probability of achieving the MSY-compatible target or better is at least 50%
- the probability of breaching the soft limit does not exceed 10%, and
- the probability of breaching the hard limit does not exceed 2%

Intertek (2012a) notes that an MSE was used on the hoki stocks to evaluate alternative specifications for the lower and upper ends of the biomass Management Target. However, the study (Langley, 2009; 2011) was limited as it did not explicitly simulate the stock assessment and because the harvest control rules evaluated were necessarily approximations to the implementation of the HCR in practice. During the site visit, the Acoura assessment team asked if there was any further MSE work planned for hoki, to which it was replied that there is a hoki MSE in the Annual Operational Plan for 2017-18 for which the high-level objectives have been established consistent with the HSS (T. Bock, pers. comm.). This was confirmed when the Annual Operational Plan was published in October, 2017 (Table 6). No MSE work is, as yet, planned for hake. An MSE for ling is included in the five-year (medium term) research plan of MPI (MPI, 2017c).

Tools

The tools to control fishing to achieve the objectives of the harvest strategy have not changed since Intertek (2012a; 2014a; 2014b). 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 (http://fs.fish.govt.nz/Page.aspx?pk=81&tk=574). 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 the Maori and recreational sector and an allocation to address other fishing-related mortality such as illegal fishing or accidental loss of fish from nets.

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 (see section 4.4.8 on Compliance and Enforcement). Recent decisions on hoki, hake and ling TACCs illustrate the approach.

For Hoki, adjustment of the TACC options has been 1% of the TACC (MPI, 2013; 2015), a value that can be adjusted depending on the MPI risk profile. For instance, in 2011, the risk profile estimated that up to 3,500 t might be at risk of being unreported. However, both East and West hoki stocks sizes have been above their management target range since about 2010 and the risk to the stock through misreporing has been judged to be small. Thus, the 1% adjustment has not been increased.

In earlier years, before the introduction of higher TACCs in 1991–92, there is some evidence to suggest that hake catches were not always fully reported, particularly in 1988/89 and 1990/1991, although the current level of this misreporting is unknown. MPI had no information to adjust the TACC for misreporting and thus, none was made. There has been area misreporting of catch in the hake fisheries, particularly prior to 2001/02 which has been accounted for the data inputs to the stock assessments (see section 4.2.8 on Information and Monitoring). For instance, during the 2017 HAK 7 consultations, MPI (2017d) stated that there was area misreporting in the hake fishery, in which catches were over-reported from the Chatham Rise and under-reported from HAK 7 but no evidence of this since 2001/02.

For ling (LIN5, LIN6 and LIN7), during the 2013 TACC consultations, potential drivers for misreporting and non-reporting had been identified and thus the allowance for other sources of mortality (i.e. misreporting and non-reporting) was raised from 1% to 2% of the TACC (MPI, 2013).

Each licence 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 licencee'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 licencee 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 licencee's to maintain their catch within their allotted ACEs. During the site visit, the Acoura assessment team was informed that TACC overruns are most frequently due to licensees trading quota shares near the end of a fishing year to cover unexpected bycatch.

The boundaries for some of the stocks do not conform to the management boundaries used by MPI for catch control. In the case of hoki, a TACC is allocated to the HOK 1 management area within which both the Eastern and Western stocks reside. Through an industry agreement, the HOK 1 TACC is apportioned on an annual basis between the two stocks. For instance, in 2015/16, the Eastern and Western stocks were apportioned 60,000 t and 90,000 t of the overall 150,000 t respectively. The allocation is based upon the results of the annual stock assessments. During the site visit, MPI noted that overall, catch of the Western stock has been more variable than that of the Eastern stock, highlighting the need for sub-allocation of the HOK 1 TACC of the two biological stocks. These stock-specific limits operate much as the TACCs do in limiting harvesting.

In 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 (T. Bock, pers. comm.). 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 (T. Bock, pers. comm.). 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.

Linkage between Components of Harvest Strategy

To evaluate the linkage amongst the science advice, TACC setting and harvest regulation, it is important to understand the steps in the management process. The first step in the process is the stock assessment and five-year projections under a range of catch scenarios. The latter can involve the current TACC, recent average catch and catch scenarios which ensure that biomass does not breach the soft limit (Pr >10%) and achieve the target (Pr >= 50%), consistent with the requirements of the HSS. These scenarios are made publically available in an MPI Consultation Document (formally termed Initial Position Paper or IPP), which outline the management options and this rationale and seek stakeholder views and additional management options. After a consultation period of about four weeks), MPI compiles a Decision Document (formally termed Final Advice Paper). This document summarises MPI's and stakeholder's views on the issues being reviewed, and provides final advice and recommendations to the Minister of Fisheries. The Minister's letter, setting out his/her final decision, is subsequently posted on the MPI website. During the site visit, MPI confirmed that while the Minister has the final decision, this is guided by the requirements of the 1996 Fisheries Act and its associated HSS.

Advice, TACCs and reported catch for the hake stocks are provided in Table 26. Catch scenario projections are undertaken by MPI and the TACC changed if needed. TACC changes have not been necessary in recent years for most stocks, although precautionary measures have been taken for HAK 7 in 2017 (MPI, 2017d). As indicated in the Stock Status section, there are two equally plausible determinations of recent HAK 7 stock status – the Survey model indicating B_{2016} = 25.7% B_0 and thus below the target but above the soft limit, and the CPUE model indicating B_{2016} = 50.3% and thus above the target. MPI does not consider that the stock is consistently below the 40%B_0 target (T. Bock, pers. comm.). Notwithstanding this, as part of its 2017 consultation on TACCs, MPI has taken precautionary management action based on the survey-based stock assessment and reduced the TACC (from 7,700 t to 5,064 t) to ensure that the stock does not decline below the soft limit until additional information is collected to provide more certainty in the stock status. MPI, in agreement with industry, has also brought forward the West Coast South Island trawl survey (to 2018) and the next HAK 7 stock assessment by a year (from 2019/2020 to 2018/2019) to provide more certainty on stock status for HAK 7 (MPI, 2017d).

For the Eastern and Western hoki stocks, since 2010/11, TACCs have been set according to the advice and the reported total catch has generally been consistent with the TACCs (Table 27). At times the reported catch is greater than the TACC, this is due to under-caught ACE (Annual Catch Entitlement) being carried forward from the previous year, which is allowed for by the management system (FishServe, 2015). The Eastern and Western catch limits have been set to sum to the TACC, and the stock-specific catch has been consistent with these limits.

For the ling stocks, TACCs have been set consistent with the advice and catch has been within the TACCs (
Table 28).

Table 26. Comparison of hake advice from MPI and stakeholder consultation, TACC set by the Minister and reported catch (t) by fishing year

Fishing Year	HAK 1			HAK 4			HAK 7		
	Advice	TACC	Catch	Advice	TACC	Catch	Advice	TACC	Catch
2007/08	3,701	3,701	2,445	1,800	1,800	865	7,700	7,700	2,620
2008/09	3,701	3,701	3,415	1,800	1,800	856	7,700	7,700	5,954
2009/10	3,701	3,701	2,156	1,800	1,800	208	7,700	7,700	2,352
2010/11	3,701	3,701	1,904	1,800	1,800	179	7,700	7,700	3,754
2011/12	3,701	3,701	1,948	1,800	1,800	161	7,700	7,700	4,459
2012/13	3,701	3,701	2,079	1,800	1,800	177	7,700	7,700	5,434
2013/14	3,701	3,701	1,883	1,800	1,800	168	7,700	7,700	3,642
2014/15	3,701	3,701	1,725	1,800	1,800	304	7,700	7,700	6,219
2015/16	3,701	3,701	1,584	1,800	1,800	274	7,700	7,700	2,864
2016/17	3,701	3,701		1,800	1,800		7,700	7,700	

Table 27. Comparison of hoki advice from MPI and stakeholder consultation, TACC set by the Minister and reported catch (t) by fishing year; catch limit and catch (t) between Eastern and Western stocks as per industry agreement

Fishing Year	HOK 1			East		West	
	Advice	TACC	Catch	Catch Limit	Catch	Catch Limit	Catch
2010/11	120,000	120,000	118,500	60,000	55,000	60,000	61,000
2011/12	130,000	130,000	130,000	60,000	57,000	70,000	70,000
2012/13	130,000	130,000	131,500	60,000	60,000	70,000	71,000
2013/14	150,000	150,000	146,500	60,000	55,000	90,000	88,000
2014/15	160,000	160,000	161,500	60,000	63,000	100,000	94,000
2015/16	150,000	150,000	136,719	60,000	64,700	90,000	93,700
2016/17	150,000	150,000		60,000		90,000	

Table 28. Comparison of ling advice from MPI and stakeholder consultation, TACC set by the Minister and reported catch (t) by fishing year

Fishing Year	Chatham Rise LIN 3 & 4			Sub-Antarctic LIN 5 & 6			WCSI LIN 7		
	Advice	TACC	Catch	Advice	TACC	Catch	Advice	TACC	Catch
2007/08	6,260	6,260	4,616	12,100	12,100	8647	2,225	2,225	2,282
2008/09	6,260	6,260	3,751	12,100	12,100	6209	2,225	2,225	2,223
2009/10	6,260	6,260	3,744	12,100	12,100	5448	2,474	2,474	2,446
2010/11	6,260	6,260	3,237	12,100	12,100	5191	2,474	2,474	2,800
2011/12	6,260	6,260	3,597	12,100	12,100	5696	2,474	2,474	2,771
2012/13	6,260	6,260	3,656	12,100	12,100	6712	2,474	2,474	3,010
2013/14	6,260	6,260	3,815	12,460	12,460	7156	3,080	3,080	3,200
2014/15	6,260	6,260	3,571	12,460	12,460	7039	3,080	3,080	3,343
2015/16	6,260	6,260	3,999	12,460	12,460	6090	3,080	3,080	3,340
2016/17	6,260	6,260		12,460	12,460		3,080	3,080	

4.2.8 Information & Monitoring

This section describes information and monitoring activities conducted on hoki, hake and ling, summarizing those presented in Intertek (2012a; 2014a; 2014b) and noting new activities which have occurred since then. During the site visit, MPI noted that the 10-year rolling research plan provided in the Deepwater Fishery Annual Operational Plan (AOP) will be replaced by a new plan although the planning process per se (scientific prioritization, stakeholder engagement, budgeting, etc.) has not changed. These plans include specific information on, for instance, assessment schedules, fishery and observer sampling, survey activities and upcoming Management Strategy Evaluations (MPI, 2017c). Also, the annual Plenary Reports of the hake, hoki and ling stocks provides not only information on monitoring and assessment activities but also recommendations for future research.

Stock Structure & Distribution

Hoki

Intertek (2012a) summarizes information on hoki stock structure. Hoki are found in both Australian and New Zealand waters and are genetically distinct, suggesting that there is little, if any, dispersal between Australia and New Zealand. Morphometric and ageing studies have found consistent differences between adult hoki taken from the two main dispersed areas (Chatham Rise and Southern Plateau), and from the two main spawning grounds in Cook Strait and the West Coast South Island (WCSI). Spawning occurs during late-June to mid-September. The planktonic eggs and larvae move inshore by advection or upwelling and are widely dispersed north and south with the result that 0+ and 1-year-old fish can be found in most coastal areas of the South Island and parts of the North Island. A major nursery ground for juvenile hoki, aged 2–4 years, is along the Chatham Rise while older fish disperse to deeper water and are widely distributed in both the Sub-Antarctic area and on Chatham Rise. A substantial proportion of hoki move from the Chatham Rise to the Sub-Antarctic area as they approach maturity, with most movement occurring between ages 3 and 7 years. There is thus good information indicating that there are two stocks of hoki. No genetic differences have been detected using selectively neutral markers, but a low exchange rate between the two stocks would reduce genetic differentiation.

For the purposes of stock assessment, the DWFAWG assumes the two spawning groups represent separate stocks: western (off west coasts of the North and South Islands and the area south of New Zealand, including Puysegur, Snares Shelf and the Southern Plateau) and eastern (off east coasts of the North and South Islands, Mernoo Bank, the Chatham Rise, and Cook Strait).

During the site visit, NIWA scientists confirmed that there have not been more recent stock structure studies than those considered by Intertek (2012a), adding that there is no direct evidence of natal fidelity for hoki, and its life history characteristics would indicate that 100% natal fidelity is unlikely (Horn 2011).

Hake

Intertek (2014a) summarizes information on hake stock structure. Data collected by observers on commercial trawlers and on trawl surveys suggest that there are at least three main spawning areas of hake. The best known area is off the West Coast of the South Island, where the season can extend from June to October, with a peak in September. Spawning also occurs to the west of the Chatham Islands during September to January. Spawning on the Campbell Plateau, primarily to the north-east of the Auckland Islands, occurs during September - February with a peak in September–October. Juvenile hake are found in all three areas.

There are differences in hake length frequencies between the west coast and the other areas, and differences in growth parameters between all three areas. There is good evidence, therefore, to suggest that at least three separate stocks exist in the New Zealand EEZ, these being designated the Sub-Antarctic (HAK 1), Chatham Rise (HAK 4) and West Coast South Island (HAK 7) stocks.

During the site visit, NIWA scientists confirmed that there have not been more recent stock structure studies than those considered by Intertek (2014a).

Ling

A review of ling stock structure (reported in Intertek, 2014b) examined a wide range of information from studies of morphometrics, genetics, growth, population age structures, and reproductive biology and behaviour, and indicated that there are at least five ling stocks around New Zealand:

- Chatham Rise (LIN 3 & 4)
- Southern Plateau (Sub-Antarctic stock including the Stewart-Snares shelf and Puysegur Bank) (LIN 5 & 6)
- Bounty Plateau (LIN 6B)
- West Coast South Island (LIN 7WC)
- Cook Strait (LIN 7CK)

Ling in spawning condition have been reported in a number of localities throughout the New Zealand EEZ with the time of spawning varying by area:

- July to November on the Chatham Rise;
- September to December on Campbell Plateau and Puysegur Bank;
- September to February on the Bounty Plateau;
- July to September off west coast South Island and in Cook Strait.

Little is known about the distribution of juveniles until they are about 40 cm total length, when they begin to appear in trawl samples over most of the adult range.

During the site visit, NIWA scientists confirmed that the only significant stock structure work on ling since that reported in Intertek (2014b) was an otolith contour shape analysis (Ladroit et al, 2017). The study undertook two comparisons of otolith shape: one between LIN 4 (Chatham Rise) and the presumed Sub-Antarctic biological stock (LIN 5 and LIN 6 combined), the other between southern (LIN 6) and northern (LIN 5) parts of the Sub-Antarctic area. For the Chatham Rise vs. Sub-Antarctic comparison the average success rate was 77.4%, a level indicative of a differentiation between ling from these two areas. For the north-south Sub-Antarctic comparison, the success rate was 50–55%, strongly indicative of no differentiation. The stock structure indicated by this study is the same as that derived from other sets of biological characteristics and corroborates the stock structure which is the basis of the MPI stock assessments.

There was a study of the temporal and spatial distribution of ling on the Chatham Rise and off the WCSI (Horn, 2015a) examining sex ratios in the ling longline fishery and summer research vessel trawl surveys during 1993 – 2013. The population sex ratio of Chatham Rise ling, both juvenile and adult, as indicated by the survey data, was skewed consistently towards males. There was a marked decline throughout the 1990s in the numbers of large female ling on Chatham Rise which probably contributed to the steep decline in commercial catch rates (CPUE) apparent in the first seven - nine years of the time series. The preferred selectivity of the line fishery for large (and, therefore, often female) fish likely resulted in an increase in the proportion of males in the catch over time as the large females were fished down. Off the WCSI, the trend in the proportion of male ling in trawl fishery targeting hoki was likely due to different levels of fishing in the three strata used to scale sampled length data up to the length distribution for the fishery each year, and inter-annual differences in the temporal and depth distribution of samples. It is suggested that this may have implications for some of the stock and fishery structural assumptions of the WCSI stock assessment.

Stock Productivity

<u>Hoki</u>

Intertek (2012a) and MPI (2017a) summarize information on hoki growth and maturity. Growth is rapid, with juveniles reaching about 27–30 cm TL at the end of their first year. Males mature at 60–65 cm TL at 4–5 years, while females mature at 65–70 cm TL. After the age at maturity, the growth of males and females differs. Males grow up to about 115 cm TL, while females grow to a maximum of 130 cm TL and up to 7 kg weight. Maximum age is about 20–25 years. Hoki from the Eastern stock are smaller on average at all ages than hoki from the Western stock. An ageing protocol has been developed to increase the consistency of hoki age estimation and has been applied to the survey data from 2000 onwards and to catch samples from 2001. New growth and maturity research reported since Intertek (2012a) included an examination of hoki growth and year-class size was discussed during the site visit. There is a good relationship between hoki liver condition and food availability; the year following high food availability, liver condition is high, which may be linked to higher year-class survivorship. These investigations are in their exploratory phase.

Age-specific natural mortality (*M*) is estimated in the base case assessment model and ranges about 0.25 to 0.30. This implies a generation time (T_{GEN}) of 4.5 + 1/0.275 = 8.14 years. During the site visit, it was noted that there is a post-doctorate undertaking research on hake predation on hoki that is in its early stages.

The hoki stock assessments have assumed a Beverton and Holt stock-recruitment relationship with steepness set equal to 0.75. MPI (2017a) notes that annual variations in hoki recruitment have a considerable impact on the fishery and a better understanding of the influence of climate on recruitment patterns would be very useful for the future projections of stock size. However, the link between climate, oceanographic conditions and recruitment is still unknown, and different studies have arrived at different conclusions regarding these links.

Hake

Intertek (2014a) and MPI (2017a) summarize information on hake growth and maturity. New Zealand hake reach a maximum age of at least 25 years. Males, which rarely exceed 100 cm total length (TL), do not grow as large as females, which can grow to 120 cm TL or more. Both sexes reach sexual maturity between 6 and 10 years of age, at lengths of about 67–75 cm TL (males) and 75–85 cm TL (females). Chatham Rise hake reach 50% maturity at about 5.5 years for males and 7 years for females, Sub-Antarctic hake at about 6 years for males and 6.5 years for females, and WCSI hake at about 4.5 years for males and 5 years for females.

Growth parameters have been updated using both the von Bertalanffy and Schnute growth models with the latter fitting the data better. Growth rates were found to be slightly different among the stocks with rates highest on the west coast of the South Island (HAK 7), and lowest in the sub-Antarctic (HAK 1). Sex-specific and time-invariant growth models are input to the stock assessments.

Recent assessment models for all hake stocks have either assumed a constant *M* (Chatham Rise), estimated a constant *M* (WCSI), or have estimated age-dependent *M* (Sub-Antarctic). *M* has been estimated as 0.18 for females, 0.20 for males and 0.19 for both sexes. This approach has not changed in the most recent (2017) assessments.

Using a 50% age of maturity of 6.5, 7.0 and 5.0 for the Sub-Antarctic, Chatham Rise and WCSI stocks respectively and *M* = 0.19, the generation time (T_{GEN}) ranges 11.8 (Sub-Antarctic), 12.3 (Chatham Rise), and 10.3 (WCSI) years respectively.

Stock assessments, which assume a Beverton and Holt stock-recruitment relationship with a steepness of 0.8, indicate that recruitment to the hake stock exhibits very high variability (see Stock Status section). There have been no recent studies on the abiotic factors influencing recruitment strength.

Ling

Intertek (2014b) and MPI (2017a) summarize information on ling growth and maturity. 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, Chatham Rise, Bounty Plateau, Campbell Plateau and Cook Strait) showed that females grew significantly faster and reached a greater size than males in all areas, and that growth rates were significantly different between areas. Ling grow fastest in Cook Strait and slowest on the Campbell Plateau (MPI, 2017a).

The 50% age of maturity varies by stock, being about age 12, 8 and 8.5 for female ling in LIN 3 & 4, LIN 5 & 6 and LIN 7WC respectively (MPI, 2017a). Age-specific maturity ogives are an input to the stock assessments. During the site visit, it was indicated that there have been no more recent growth and maturity studies.

Natural mortality (*M*) has initially been estimated as 0.18 from the equation $M = \log_e 100/\text{maximum age}$, where maximum age is the age to which 1% of the population survives in an unexploited stock (MPI, 2017a). Age-invariant natural mortality is estimated in the stock assessments and varies between stocks. The *M* for Chatham Rise ling appears to be lower than 0.18, while for Cook Strait and west coast South Island the value may be higher than 0.18.

The above estimates of ling *M* and 50% age of maturity imply generation times (T_{GEN}) of 12, 8 and 8.5 + 1/0.18 = 17.6, 13.6 and 14.1 years for the Chatham Rise, Sub-Antarctic and WCSI ling stocks respectively.

The ling stock assessments have assumed a Beverton and Holt stock-recruitment relationship with steepness dependent on the stock, these being 0.84 for the three stocks (LIN 3 & 4, LIN 5 & 6 and LIN 7WC) considered in this assessment (MPI, 2017a). There have been no more recent studies on factors influencing recruitment success.

Fleet Composition and Fishery Removals

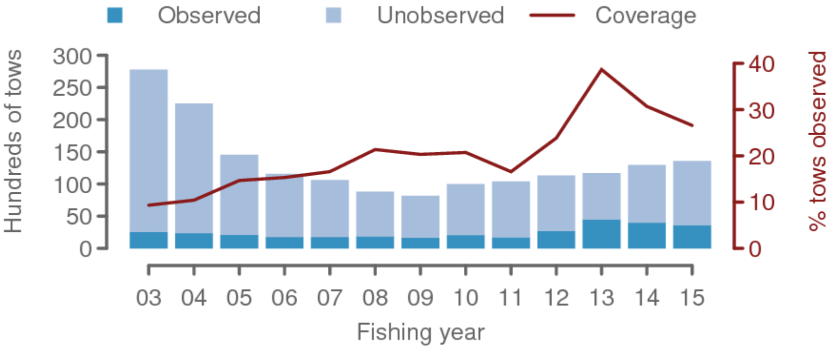
The trawl fishery for hoki, hake and ling is characterised by large catches of the primary target species (hoki) with smaller catches of hake and ling, which are sometimes caught as directed species but more often are bycatch to hoki fishing. For instance, the fishing year 2015 -16, the hoki reported catch was 136.7 kt, while that of hake and ling was 4.7 kt and 14.7 kt respectively. MPI maintains a registry of all licence holders and associated vessel and operational characteristics. The monitoring of the trawl fishery has not changed significantly since Intertek (2012a; 2014a; 2014b). Landing information is required from each registered fishing vessel once all fish and fish product has been landed to a Licensed Fish Receiver (LFR) following each fishing trip. All permit holders are also required to supply a Monthly Harvest Return (MHR) by the 15th of the month following the month the catch was taken. The MHR lists, by fish stock, all fish taken in the month reported. Electronic reporting of the logbook data has been in place for the past decade on vessels >28 m LOA. The reporting regime also requires LFRs to report monthly to MPI all fish species received during that month from each fisher. This is an independent check on all fish landed from all vessels by commercial fishers. The information from these reports is used by MPI to cross-check the information provided by permit holders. During the site visit, MPI Compliance staff described an initiative to develop enhanced surveillance capacity based upon the integration of information from multiple monitoring activities. Implementation of an 'Integrated Electronic Monitoring and Reporting System' has been underway for a number of years, with an update on progress provided to the assessment team. Renamed the 'Digital Monitoring' program, electronic reporting has now been implemented on all trawl vessels >28m LOA. In late 2017, the Minister of Fisheries announced a delay in the introduction of cameras on commercial fishing vessels to allow for further consultation on the proposal to ensure effective implementation. No decision as yet has been made on the date of implementation of this video surveillance. Further audits will need to keep informed of these developments.

MPI (2017a) notes instances of illegal and unreported catch of the three species. In the years just prior to the introduction of the EEZ, when large catches of hoki were first reported, and following the increases of the TACC in the mid-1980s, it is likely that high catch rates of hoki on the WCSI resulted in burst bags, loss of catch and some mortality, and were of a sufficient level to result in the introduction of a code of practice to minimise losses in this way. Observer observations during 2000/01 – 2006/07 indicates that fish lost during landing accounted for only a small fraction (0–14.5%) of the total fish discards each year in the hoki, hake and ling trawl fishery.

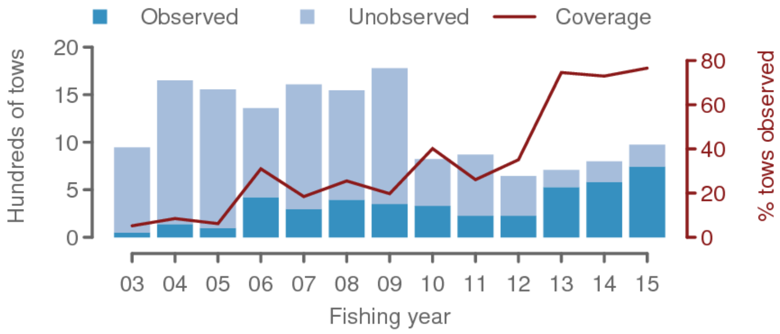
The catch data inputs to the stock assessments have often, but not always, been adjusted to address under-reporting but this has mostly been done for hoki and hake rather than ling. For example, before the introduction of higher TACCs in 1991–92, there is some evidence to suggest that catches of hake were not always fully reported, particularly in HAK 7. Hake catches in this area during 1988/89 – 1990/91 were adjusted to address this. Dunn (2003) found that area misreporting between the WCSI and the Chatham Rise fisheries occurred during 1994/95 – 2000/01. It was estimated that between 16 and 23% (700–1000 t annually) of WCSI landings were misreported as deriving from Chatham Rise, predominantly in June, July, and September. Levels of misreporting before 1994/95 and after 2000/01, and between WCSI and Sub-Antarctic, were estimated as negligible, and there is no evidence of significant misreporting since 2001/02 (Ballara, 2013). It is believed that up to the mid-1990s, some ling bycatch (in the order of 250 – 400 t) from the west coast hoki fishery was not reported. Overall, these levels of illegal and unreported catch have not been considered significant (see recent adjustment in TACC; section 4.2.7 on Harvest Control Rules).

The MPI scientific observer programme provides information on the fishery's catch volume and age/size composition on an on-going basis and represents a significant component of the management of the fishery and assessments of the stocks. During 2002/03 – 2014/15, observer coverage of the hoki trawl fishery ranged 9 – 30%. During the same period, observer coverage of hake and ling directed fishing ranged 5 – 77% and 3 – 23% respectively (Figure 37). In all three cases, there has been an increasing temporal trend in observer coverage. During the site visit, NIWA scientists noted that the Western hoki stock had been relatively over-sampled compared to the Eastern hoki stock due to the need to deploy observers to address a number of objectives. Also, to sample small boats operating in the Cook Strait, a port sampling programme has been re-instated as of 2015 due to the logistic difficulties of obtaining observer coverage of these vessels. The monitoring data of the HAK 7 and HAK 1 hake stocks was considered good while that on the HAK 4 hake stock was more variable. For the WCSI ling stock, during 2009-2011, sampling data had not been collected by the observers but this issue has since been rectified. Overall, observer coverage of the hoki/hake/ling trawl fishery continues to be good.

A: Observer coverage in all NZ hoki fisheries



B. Observer coverage in all NZ hake fisheries



C. Observer coverage in all NZ ling fisheries

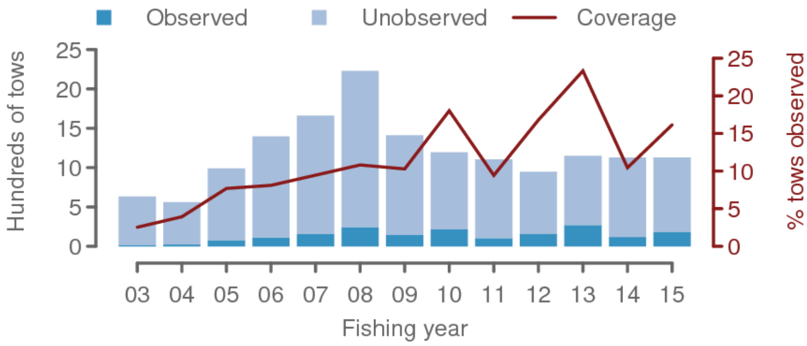


Figure 37. Number of tows and percent of tows observed in the hoki / hake / ling trawl fishery by fishing year during 2002/03 – 2014/15; from https://psc.dragonfly.co.nz/2016v1/

Recreational fishing for hoki, hake and ling is negligible and quantitative estimates of the level of customary non-commercial take of these species are not available but are thought to be low or nil.

Stock Abundance

Stratified-random bottom trawl and acoustic surveys have been conducted on the Chatham Rise (January), in the Sub-Antarctic area (April-May and Nov-Dec) and on the West Coast South Island (March-April and August) since 1988 and provide the main age and size-specific abundance indices for the hoki, hake and ling stock assessments. The sampling design and operation of these surveys is described in reports produced for each survey (e.g. Stevens et al, 2017 for Chatham Rise, Bagley et al, 2014 for Sub-Antarctic, and O'Driscoll et al, 2014a for WCSI). For hake and ling, the trawl component of these surveys provides the indices of abundance. For hoki, whether acoustic and / or trawl indices are used in an assessment is survey series-specific. For instance, the acoustic component of the WCSI winter survey is considered to be appropriate for hoki but less so its trawl component.

Since Intertek (2012a, 2014a; 2014b), the overall intensity of the survey programme has reduced due to a perceived need by MPI to reallocate resources to less well understood fisheries, which has increased the uncertainty in these abundance indices. The Chatham Rise (January) and Sub-Antarctic (Nov-Dec) surveys have been conducted biannually since 2014 and 2011 respectively while WCSI survey (trawl component) has been conducted tri-annually since 2013. The acoustic surveys (WCSI and Cook Strait) are targeted on hoki spawners with only the Cook Strait survey conducted in 2016. The uncertainties in these surveys have been studied over a number of years and are generally well understood.

Reviews are conducted to improve survey performance as required. For instance, in 2014, there was a review of the trawl and acoustic components of the WCSI survey to inform future survey design (O'Driscoll et al, 2014b). The current acoustic survey area and timing is appropriate for hoki but while the fit of the assessment model to the survey index was good, it was not particularly influential due to its high CV, a major source of uncertainty of acoustic estimates of hoki being species identification in mixed layers. A recommendation was made to increase the level of sample trawling in the southern areas to allow for more detailed species identification by survey stratum. The review concluded that while the trawl survey component of the survey provides fisheries-independent estimates of abundance for hake, ling, and associated middle depth species, the trawl estimates from the northern area of the survey do not appear to be providing reliable indices of hoki abundance. The trawl abundance estimates of hake and ling, on the other hand, appear to be of high quality, with relatively good precision (CVs less than 20%). It further noted that to allow comparability with results from the 2000 – 2013 surveys, the trawl survey component needs to be carried out from RV *Tangaroa*. If an alternative vessel and/or gear is used for the trawl component, then this would have a different catchability coefficient and would represent the start of a new time-series, unless inter-calibration experiments are carried out. There is no specific vessel requirement for the acoustic survey component. The report made a number of recommendations to improve the overall utility of the WCSI survey to stock assessments.

In 2010, deepwater strata (800 – 1300 m) were added to the Chatham Rise surveys to better cover the stock range of hake and other species (Stevens et al, 2017). In 2016, 16% of the survey's hake biomass came from the deepwater strata. These strata contained only a small proportion of the total survey relative biomass for hake, hoki, and ling, confirming that the core survey area is appropriate for these species. Regarding the Sub-Antarctic trawl survey, it was confirmed (T. Bock, pers. comm.) that the survey covers the distributional range of hake. For the WCSI trawl survey, as the survey is designed to provide biomass indices for hake and ling, the survey was extended slightly into deeper water in 2015 to ensure adequate coverage of the species' distributions (T. Bock, pers. comm.).

The sampling CVs of these surveys are considered low and during the stock assessment process are increased to better represent the contribution of these data to stock status determination (see Stock Assessment section).

Table 29. Bottom trawl survey biomass indices for hoki (A: 000s t), hake (B-D: t) and ling (E: t); where indicated, years are fishing years (e.g. 1990 = 1989/90); - no data; from MPI (2017a)

A. Hoki

Year	Acoustic survey WCSI winter WCacous	Trawl survey Sub-Antarctic December SAsumbio	Trawl survey Sub-Antarctic April SAautbio	Trawl survey Chatham Rise January CRsumbio	Acoustic survey Cook Strait winter CSacous
1988	**266**	-	-	-	-
1989	**165**	-	-	-	-
1990	**169**	-	-	-	-
1991	**227**	-	-	-	**88**
1992	**229**	80	68	120	-
1993	**380**	87	-	186	**283**
1994	-	100	-	146	**278**
1995	-	-	-	120	**194**
1996	-	-	89	153	**92**
1997	**445**	-	-	158	**141**
1998	-	-	68	87	**80**
1999	-	-	-	109	**114**
2000	**263**	-	-	72	-
2001	-	56	-	60	**102**
2002	-	38	-	74	**145**
2003	-	40	-	53	**104**
2004	-	14	-	53	-
2005	-	18	-	85	**59**
2006	-	21	-	99	**60**
2007	-	14	-	70	**104**
2008	-	46	-	77	**82**
2009	-	47	-	144	**166**
2010	-	65	-	98	-
2011	-	-	-	94	**141**
2012	**283**	46	-	88	-
2013	**233**	56	-	124	**168**
2014	-	-	-	102	-
2015	-	31	-	-	204*
2016	-	-	-	115*	-

B. Sub-Antarctic Hake (HAK 1)

Fishing Year	Vessel	Nov–Dec series [1]		Apr–May series [2]		Sep series [2]	
		Biomass (t)	CV	Biomass (t)	CV	Biomass (t)	CV
1989*	*Amaltal Explorer*	2 660	0.21				
1992	*Tangaroa*	5 686	0.43	5 028	0.15	3 760	0.15
1993	*Tangaroa*	1 944	0.12	3 221	0.14		
1994	*Tangaroa*	2 567	0.12				
1996	*Tangaroa*			2 026	0.12		
1998	*Tangaroa*			2 554	0.18		
2001	*Tangaroa*	2 657	0.16				
2002	*Tangaroa*	2 170	0.20				
2003	*Tangaroa*	1 777	0.16				
2004	*Tangaroa*	1 672	0.23				
2005	*Tangaroa*	1 694	0.21				
2006	*Tangaroa*	1 459	0.17				
2007	*Tangaroa*	1 530	0.17				
2008	*Tangaroa*	2 470	0.15				
2009	*Tangaroa*	2 162	0.17				
2010	*Tangaroa*	1 442	0.20				
2012	*Tangaroa*	2 004	0.23				
2013	*Tangaroa*	1 943	0.25				
2015*	*Tangaroa*	1 477	0.25				
2017*	*Tangaroa*	1 000	0.25				

* Not used in the reported assessment.
Notes: (1) Series based on indices from 300–800 m core strata, including the 800–1000 m strata in Puysegur, but excluding Bounty Platform, (2) Series based on the biomass indices from 300–800 m core strata, excluding the 800–1000 m strata in Puysegur and the Bounty Platform.

C. Chatham Rise Hake (HAK 4)

Year	Vessel	Biomass (t)	CV
1989*	*Amaltal Explorer*	3 576	0.19
1992	*Tangaroa*	4 180	0.15
1993	*Tangaroa*	2 950	0.17
1994	*Tangaroa*	3 353	0.10
1995	*Tangaroa*	3 303	0.23
1996	*Tangaroa*	2 457	0.13
1997	*Tangaroa*	2 811	0.17
1998	*Tangaroa*	2 873	0.18
1999	*Tangaroa*	2 302	0.12
2000	*Tangaroa*	2 090	0.09
2001	*Tangaroa*	1 589	0.13
2002	*Tangaroa*	1 567	0.15
2003	*Tangaroa*	890	0.16
2004	*Tangaroa*	1 547	0.17
2005	*Tangaroa*	1 049	0.18
2006	*Tangaroa*	1 384	0.19
2007	*Tangaroa*	1 820	0.12
2008	*Tangaroa*	1 257	0.13
2009	*Tangaroa*	2 419	0.21
2010	*Tangaroa*	1 700	0.25
2011	*Tangaroa*	1 099	0.15
2012	*Tangaroa*	1 292	0.15
2013	*Tangaroa*	1 877	0.15
2014	*Tangaroa*	1 377	0.15
2016	*Tangaroa*	1 299	0.14

E. West Coast South Island Hake (HAK 7)

Year	Vessel	Biomass (t)	CV
2000	*Tangaroa*	803	0.13
2012	*Tangaroa*	583	0.12
2013	*Tangaroa*	331	0.17
2016	*Tangaroa*	221	0.24

F. Ling

Fishstock	Area	Vessel	Trip code	Date	Biomass	
LIN 3	ECSI (winter)	*Kaharoa*	KAH9105*	May–Jun 1991	1 009	35
			KAH9205*	May–Jun 1992	525	17
			KAH9306*	May–Jun 1993	651	27
			KAH9406*	May–Jun 1994	488	19
			KAH9606*	May–Jun 1996	488	21
			KAH0705*	May–Jun 2007	283	17
			KAH0806*	May–Jun 2008	351	22
			KAH0905*	May–Jun 2009	262	19
			KAH1207*	May–Jun 2012	265	21
LIN 3 & 4	Chatham Rise	*Tangaroa*	TAN9106	Jan–Feb 1992	8 930	5.8
			TAN9212	Jan–Feb 1993	9 360	7.9
			TAN9401	Jan 1994	10 130	6.5
			TAN9501	Jan 1995	7 360	7.9
			TAN9601	Jan 1996	8 420	8.2
			TAN9701	Jan 1997	8 540	9.8
			TAN9801	Jan 1998	7 310	8.0
			TAN9901	Jan 1999	10 310	16.1
			TAN0001	Jan 2000	8 350	7.8
			TAN0101	Jan 2001	9 350	7.5
			TAN0201	Jan 2002	9 440	7.8
			TAN0301	Jan 2003	7 260	9.9
			TAN0401	Jan 2004	8 250	6.0
			TAN0501	Jan 2005	8 930	9.4
			TAN0601	Jan 2006	9 300	7.4
			TAN0701	Jan 2007	7 800	7.2
			TAN0801	Jan 2008	7 500	6.8
			TAN0901	Jan 2009	10 620	11.5
			TAN1001	Jan 2010	8 850	10.0
			TAN1101	Jan 2011	7 030	13.8
			TAN1201	Jan 2012	8 098	7.4
			TAN1301	Jan 2013	8 714	10.1
			TAN1401	Jan 2014	7 489	7.2
			TAN1601	Jan 2016	10 201	7.2
LIN 5 & 6	Southern Plateau	*Amaltal Explorer*	AEX8902*	Oct–Nov 1989	17 490	14.2
			AEX9002*	Nov–Dec 1990	15 850	7.5
LIN 5 & 6	Southern Plateau (summer)	*Tangaroa*	TAN9105	Nov–Dec 1991	24 090	6.8
			TAN9211	Nov–Dec 1992	21 370	6.2
			TAN9310	Nov–Dec 1993	29 750	11.5
			TAN0012	Dec 2000	33 020	6.9
			TAN0118	Dec 2001	25 060	6.5
			TAN0219	Dec 2002	25 630	10.0
			TAN0317	Nov–Dec 2003	22 170	9.7
			TAN0414	Nov–Dec 2004	23 770	12.2
			TAN0515	Nov–Dec 2005	19 700	9.0
			TAN0617	Nov–Dec 2006	19 640	12.0
			TAN0714	Nov–Dec 2007	26 492	8.0
			TAN0813	Nov–Dec 2008	22 840	9.5
			TAN0911	Nov–Dec 2009	22 710	9.6
			TAN1117	Nov–Dec 2011	23 178	11.8
			TAN1215	Nov–Dec 2012	27 010	11.3
			TAN1412*	Nov–Dec 2014	30 010	7.7
			TAN1614*	Nov-Dec 2016	26 656	16.0

LIN 5 & 6	Southern Plateau (autumn)	*Tangaroa*	TAN9204	Mar–Apr 1992	42 330	5.8
			TAN9304	Apr–May 1993	37 550	5.4
			TAN9605	Mar–Apr 1996	32 130	7.8
			TAN9805	Apr–May 1998	30 780	8.8
LIN 7WC	WCSI	*Tangaroa*	TAN0007	Aug 2000	1 861	17.3
			TAN1210	Aug 2012	2 169	14.8
			TAN1308	Aug 2013	2 000	18.4
			TAN1608	Aug 2016	1 635	12.7
LIN 7WC	WCSI	*Kaharoa*	KAH9204*	Mar–Apr 1992	280	19
			KAH9404*	Mar–Apr 1994	261	20
			KAH9504*	Mar–Apr 1995	373	16
			KAH9701*	Mar–Apr 1997	151	30
			KAH0004*	Mar–Apr 2000	95	46
			KAH0304*	Mar–Apr 2003	150	33
			KAH0503*	Mar–Apr 2005	274	37
			KAH0704*	Mar–Apr 2007	180	27
			KAH0904*	Mar–Apr 2009	291	37
			KAH1104*	Mar–Apr 2011	234	43
			KAH1305*	Mar–Apr 2013	405	44
			KAH1503*	Mar–Apr 2015	472	53

* Not used in the reported assessment.

Standardized commercial catch rate (CPUE) indices are used in the hake and ling stock assessments (Table 30). Issues with each of these indices are discussed by the DWFAWG and noted as appropriate in the plenary reports. An issue with the HAK 7 stock is that the survey and CPUE indices provide alternate views of stock status, the source of which has not yet been determined (see Stock Assessment section). As with the survey indices, the CVs of these indices are considered low and during the stock assessment process are increased to better represent the contribution of these data to stock status determination (see Stock Assessment section).

Table 30. Commercial fishery CPUE indices and associated CVs; hake indices for trawl fishery; LIN-specific ling indices for trawl and longline where year = calendar year, sp = spawning fishery, nsp = non-spawning fishery; from MPI (2017a)

A. West Coast South Island Hake (HAK 7)

Year	Index	CV
2000–01	0.95	0.04
2001–02	2.13	0.04
2002–03	0.94	0.07
2003–04	0.98	0.04
2004–05	0.80	0.04
2005–06	1.00	0.04
2006–07	0.71	0.06
2007–08	0.44	0.05
2008–09	0.36	0.06
2009–10	0.72	0.06
2010–11	1.18	0.05
2011–12	1.24	0.04
2012–13	1.35	0.03
2013–14	1.03	0.03
2014–15	1.15	0.03

B. Ling

	LIN 2 line		LIN 3&4 line		LIN 5&6 line (sp)		LIN 5&6 line (nsp)	
Year	CPUE	CV	CPUE	CV	CPUE	CV	CPUE	CV
1991	–	–	1.67	0.06	1.39	0.17	0.67	0.12
1992	1.64	0.09	2.43	0.06	1.81	0.14	1.07	0.09
1993	1.40	0.08	1.73	0.05	1.78	0.11	1	0.10
1994	1.55	0.09	1.65	0.05	1.48	0.11	0.76	0.09
1995	1.54	0.07	1.68	0.05	1.48	0.17	1.10	0.08
1996	1.34	0.07	1.31	0.05	1.40	0.11	0.85	0.09
1997	1.29	0.07	0.88	0.04	1.22	0.11	0.96	0.06
1998	1.27	0.07	0.90	0.05	1.10	0.11	0.90	0.07
1999	1.13	0.07	0.80	0.04	1.25	0.10	0.64	0.05
2000	0.80	0.07	0.93	0.05	1.32	0.10	0.74	0.07
2001	0.60	0.08	0.93	0.04	1.27	0.09	0.90	0.08
2002	0.97	0.08	0.77	0.04	1.58	0.10	0.77	0.10
2003	0.88	0.07	0.85	0.05	1.14	0.12	0.60	0.12
2004	1.07	0.07	0.81	0.04	1.04	0.09	0.57	0.09
2005	1.00	0.08	0.85	0.04	1.47	0.12	0.52	0.13
2006	0.88	0.07	0.74	0.05	1.30	0.12	0.60	0.14
2007	0.95	0.07	0.81	0.04	1.39	0.11	0.74	0.26
2008	0.85	0.07	1.04	0.04	1.05	0.14	0.87	0.13
2009	0.89	0.08	0.73	0.04	2.09	0.19	0.76	0.13
2010	0.90	0.07	0.84	0.04	0.69	0.19	0.91	0.09
2011	0.82	0.06	0.65	0.04	1.04	0.15	0.58	0.09
2012	0.56	0.07	0.79	0.05	1.13	0.15	0.73	0.08
2013	0.65	0.08	0.80	0.07	–	–	–	–

	LIN 7WC line		LIN 7CK line		LIN 7CK trawl		LIN 7WC trawl	
Year	CPUE	CV	–	–	CPUE	CV	CPUE	CV
1987	–	–	–	–	–	–	0.58	0.07
1988	–	–	–	–	–	–	1.01	0.06
1989	–	–			–	–	1.43	0.07
1990	0.87	0.07	1.29	0.15	–	–	1.37	0.06
1991	1.04	0.06	1.44	0.13	–	–	0.88	0.07
1992	1.23	0.05	1.43	0.11	–	–	0.95	0.08
1993	0.88	0.05	1.11	0.11	–	–	1.10	0.07
1994	0.86	0.05	0.90	0.11	1.25	0.05	0.94	0.06
1995	0.87	0.05	0.83	0.12	1.16	0.04	1.29	0.07
1996	0.65	0.04	0.97	0.13	1.12	0.04	1.71	0.05
1997	0.77	0.05	1.32	0.18	1.00	0.04	1.62	0.06
1998	0.89	0.04	0.83	0.15	1.01	0.04	1.32	0.05
1999	0.92	0.05	1.54	0.18	1.02	0.03	1.60	0.04
2000	0.94	0.05	1.45	0.19	1.27	0.04	1.22	0.04
2001	1.09	0.05	1.27	0.18	1.46	0.04	0.98	0.04
2002	1.02	0.05	2.04	0.11	1.27	0.05	1.22	0.04
2003	1.08	0.04	1.66	0.10	1.27	0.04	0.70	0.05
2004	1.08	0.05	1.45	0.09	1.13	0.04	1.21	0.04
2005	0.81	0.04	1.16	0.10	1.18	0.04	0.83	0.04
2006	0.81	0.05	0.97	0.15	1.10	0.05	0.77	0.04
2007	1.08	0.04	0.70	0.12	0.73	0.06	0.57	0.06
2008	1.10	0.05	0.82	0.22	0.90	0.06	0.57	0.06
2009	1.09	0.05	0.60	0.28	0.44	0.07	0.54	0.06
2010	1.33	0.04	0.35	0.30	0.44	0.07	0.75	0.06
2011	1.15	0.05	0.22	0.30	0.23	0.09	1.10	0.05
2012	1.18	0.05					0.88	0.05
2013	1.32	0.05					0.98	0.03
2014	1.23	0.05					0.94	0.03
2015	1.06	0.05					1.09	0.03
2016	1.03	0.06					1.32	0.03

Other Data

Beyond the UoC fishery, there are additional deepwater trawl fleets, for which sampling and monitoring is conducted in an identical manner as described above.

4.2.9 Stock Assessment

Hoki

Annual assessments of the Eastern and Western hoki stocks have been conducted since that (2011) used by Intertek (2012a) with the most recent conducted in 2017 (McKenzie, 2017). The hoki assessment modelling approach (Bayesian SCAA in two phases – MPD and MCMC) has not changed significantly since Intertek (2012a). . These assessments use catch history, proportion-at-age, and a variety of survey data from the 1970s – present (see Information and

Monitoring section) in a sexed, single stock and area (East and West separately) Bayesian Statistical Catch-At-Age (SCAA) modeling framework (implemented by the NIWA stock assessment program CASAL, Bull et al, 2012). This approach explicitly considers process error in the surveys and observation error in the catch and survey inputs.

In general, the hoki base case model is the most elaborate of the groundfish considered in this report and includes:

- Six 'fisheries' based on spatial and temporal considerations; six selectivity ogives (four for the eastern and western spawning and non-spawning fisheries and one each for the trawl surveys in areas CR and SA) and three migration ogives (Whome, Espmg, and Wspmg).
- 17 age groups & age 17+ group
- Four areas [Chatham Rise (CR), West Coast South Island (WC), Sub-Antarctic (SA), and Cook Strait (CS)], and two stocks [east (E), and west (W)] which do not mix as adults.
- Recruitment estimated as deviations around assumed Beverton and Holt stock-recruitment relationship (steepness assumed as 0.75 with sex ratio assumed as 0.5
- Starting population numbers at age initialized assuming equilibrium age structure at an unfished equilibrium biomass (B_0)
- Annual cycle dividing fishing year into five steps, and included four types of migration
- Cohort equation to estimate population numbers by year-class
- Spawning rather than maturity ogive
- Age and sex-specific natural mortality estimated
- Maximum exploitation rate assumed (0.5).

The objective function consists of priors on all (fixed) parameters, likelihood functions for the catch proportions at age (multinomial) and abundance indices (lognormal), and penalty functions to constrain the model so that parameter combinations that did not allow historical catch to be taken are strongly penalised. Additional 'process' error, assumed to arise from differences between model simplifications and real-world variation, is estimated separately for the catch proportions (as per Francis (2011) and survey data and added to their observation error. MPI (2017a) discusses this process error in detail, the treatment of which has not changed since Intertek (2014a).

For the hoki stock models, prior distributions were assumed for all parameters and bounds imposed for parameters with non-uniform distributions (Table 31). Catchability parameters were calculated by O'Driscoll et al (2002; 2016); for other parameters, they were set at the 0.001 and 0.999 quantiles of their distributions. Prior distributions for all other parameters were assumed to be uniform, with bounds that were either natural (e.g., 0,1 for proportion migrating at age), wide enough so as not to affect point estimation, or, for some ogive parameters, deliberately set to constrain the ogive to a plausible shape. Most of these priors are the same as those used in the 2011 assessment used by Intertek (2012a).

Table 31. Prior distributions for key parameters; parameters are bounds for uniform; mean (in natural space) and CV for lognormal; and mean and SD for normal and beta; from MPI (2017a)

Parameter	Description	Distribution	Values		Reference
log_B$_0$_total	$\log(B_{0,E} + B_{0,W})$	uniform	11.6	16.2	
pE (= B$_0$_prop_stock1)	proportion unfished stock in E	beta(0.1,0.6)[1]	0.344	0.072	Smith (2004)
recruitment[E].YCS	year-class strengths (E)	lognormal	1	0.95	Francis (2004a)
recruitment[W].YCS	year-class strengths (W)	lognormal	1	0.95	Francis (2004a)
q[CSacous].q	catchability, CSacous	lognormal	0.55	0.90	O'
q[WCacous].q	catchability, WCacous	lognormal	0.39	0.77	O'Driscoll et al (2016)
q[CRsum].q	catchability, CRsumbio	lognormal	0.15	0.65	O'Driscoll et al (2002)
q[SAsum].q	catchability, SAsumbio	lognormal	0.17	0.61	O'Driscoll et al (2002)
q[SAaut].q	catchability, SAautbio	lognormal	0.17	0.61	O'Driscoll et al (2002)
selectivity[Wspsl].shift_a	allows annual shifting of Wspsl	normal	0	0.25	Francis (2006)
natural_mortality.all[2]	M	lognormal	0.298	0.153	Smith (2004)
natural_mortality[3]	M_{male} & M_{female}, ages 5–9 only	lognormal	0.182	0.509	Cordue (2006)

[1] This is a beta distribution, transformed to have its range from 0.1 to 0.6, rather than the usual 0 to 1.
[2] Used only in runs where M was independent of age and sex
[3] Used only in runs where M varied with age and sex

An external review of the hoki assessment was conducted by Butterworth et al (2014) which did not raise any major issues and overall concluded that the results from the assessment model were satisfactory and robust in regard to resource status and trends. The review made twenty-six recommendations pertaining to the data (CPUE and surveys), model structure, and assessment specifications (diagnostics, data weighting, priors, growth, selectivity, spawning and homing migration, natural mortality, recruitment, projections). The client was asked to provide the Acoura team with the response to these recommendations (available from Acoura). This indicated that 11 of the recommendations have been addressed, both through specific discussions during the annual assessments and through model modifications which occur on an on-going basis. Fifteen of the recommendations are outstanding. Four of these are to be considered when NIWA adopts the new CASAL2 package which is to occur in the near future. The new package will incorporate a number of features which will allow more extensive model exploration (e.g. alternative MCMC algorithms) than currently is the case with CASAL. The remaining 11 recommendations are either data collection / resourcing dependent (7) or considered low priority (4). Overall, it is evident that MPI and NIWA have given serious consideration to the recommendations of Butterworth et al (2014).

A model run of the 2017 assessment with 0.2 process error (pe) assumed for the Chatham Rise and Sub-Antarctic trawl survey series, and a single catchability parameter (q), did not fit the most recent Sub-Antarctic biomass indices with unacceptable residuals. When this pe is estimated, a lower value (0.15) is determined for the Chatham Rise survey while a higher one (0.38) for the Sub-Antarctic trawl survey, resulting in higher uncertainty in the biomass estimates for the Western stock. The DWFAWG agreed that this run would be the base case for 2017.

The SAsumbio survey data indicated large annual changes in numbers-at-age that could not be explained by changes in abundance, suggestive of a change in survey catchability. Previous assessments had included a time varying survey q. In the 2016 and the most recent 2017 assessment, one survey q parameter was assumed for the time series but the higher estimated process error (pe) can now account for the annual variation in the observations, effectively down-weighting the Sub-Antarctic trawl survey data relative to other data sources in the model.

In the 2016 assessment, the problem of the lack of old fish in both fishery-based and survey-based observations was dealt with by allowing M (natural mortality) to be age-dependent. Also, natal fidelity was assumed, and the weighting of CRsumbio and SAsumbio trawl data determined by their estimated pe. These features were kept in the 2017 base model. The sensitivity model runs tested the sensitivity of the base model to the pe on CRsumbio and

SAsumbio trawl data (model 1.15), and the western stock biomass indices (models 1.16 and 1.17). Other sensitivity runs conducted included assumptions about natal fidelity but still assuming adult fidelity, and domed spawning selectivity (Table 32). During the site visit, NIWA scientists noted that these sensitivity runs are similar to ones conducted in previous assessments (confirmed by Acoura assessment team) and generally related to uncertainty on natal fidelity, hoki either not observed or unaccounted mortality and Sub-Antarctic survey pe. While retrospective analyses are not generally conducted, as noted above, Intertek (2012a) undertook this analysis based upon the time series of surveys available at the time and noted the presence of a retrospective pattern. It is evident from the deliberations of the DWFAWG on whether or not hoki are dying due to some unobserved process or avoiding the survey gear that assessments are attempting to address this issue.

Table 32. Characteristics for hoki model runs, including sensitivities to the base run 1.1; from MPI (2017a)

Run	Main assumptions
	natal fidelity
1.1 - base case	*M* is age-dependent
	single q for Sub-Antarctic trawl series
	process error of CRsumbio and SAsumbio estimated
1.15	as 1.1 but process error fixed at 0.20 for CRsumbio and SAsumbio
1.16	as 1.1 but drop SAsumbio
1.17	as 1.1 but drop WCacous

Hake

The most recent assessments of the Chatham Rise (HAK 4) and WCSI (HAK 7) hake stocks were conducted in 2017 with the previous ones (2012 and 2013 respectively) used by Intertek (2014a). The most recent assessment of the Sub-Antarctic stock (HAK 1) was conducted in 2014, with the previous one (2011) used by Intertek (2014a). The assessment modelling approach in all these assessments has not changed significantly since Intertek (2014a). As with hoki, these assessments use catch history, proportion-at-age, and a variety of survey and CPUE data from the mid-1970s – present (see Information and Monitoring section) in a sexed (HAK 1) or un-sexed (HAK 4 & HAK 7), single stock and area Bayesian Statistical Catch-At-Age (SCAA) modeling framework (implemented by the NIWA stock assessment program CASAL, Bull et al, 2012). Assessments of the HAK 1 and HAK 4 stocks have benefited from long time series of survey data which is not the case with HAK 7 where only four years (2000, 2012, 2013 and 2016) of survey data are available. Thus, the HAK 7 assessments have had to rely on the longer time series of CPUE data (annual since 2000). In common with stock assessments for most whitefish fisheries, the key outputs from the assessments are unfished spawning biomass, B_0, for each stock, current spawning biomass for each stock, the selectivity patterns for the fisheries and the surveys, and the time-trajectories of spawning stock biomass, fishing mortality and recruitment by stock. The model structure is fully described in MPI (2017a) with details also in Intertek (2014a) and will not be repeated here. In general, the hake base case models include:

- 30 age groups & age 30+ group
- Recruitment estimated as deviations around assumed Beverton and Holt stock-recruitment relationship (steepness assumed as 0.8 and changed from 0.9 of Intertek (2014a)) with sex ratio assumed as 0.5

- Starting population numbers at age initialized assuming equilibrium age structure at an unfished equilibrium biomass (B_0)
- Annual cycle of fishing, recruitment, spawning and natural mortality
- Cohort equation to estimate population numbers by year-class
- Growth as empirical size at age matrix
- Inclusion of ageing error
- Natural mortality fixed (0.2); estimated in sensitivity runs
- Year-invariant trawl survey-specific selectivity-at-age (double-normal) estimated
- Year-invariant fishery selectivity at age (double-normal) estimated

The objective function consists of priors on all (fixed) parameters, likelihood functions for the catch proportions at age (multinomial) and abundance indices (lognormal), and penalty functions to constrain the model so that parameter combinations that did not allow historical catch to be taken are strongly penalised. Additional 'process' error, assumed to arise from differences between model simplifications and real world variation, is estimated separately for the catch proportions (as per Francis (2011) and survey data and added to their observation error. MPI (2017a) discusses this process error in detail, the treatment of which has not changed since Intertek (2014a).

For all hake stock models, the priors (Table 33) for B_0 and year-class strengths were intended to be relatively uninformative with wide bounds. The prior for the survey *q* was informative. Priors for selectivity parameters were assumed to be uniform (except for survey in Chatham Rise). The derivation of these has not changed since the assessments used by Intertek (2014a).

Table 33. Priors for key distributions (when estimated) for hake stock assessments; parameters are mean (in natural space) and CV for lognormal; from MPI (2017a)

A. Sub-Antarctic (HAK 1) stock

Parameter description	Distribution	Parameters		Bounds	
B_0	Uniform-log	–	–	5 000	350 000
Year class strengths	Lognormal	1.0	1.1	0.01	100
Trawl survey *q*	Lognormal	0.16	0.79	0.01	0.4
CPUE *q*	Uniform-log	–	–	1e-8	1e-3
Selectivities	Uniform	–	–	0	20–200*
M (x_0, y_0, y_1, y_2)	Uniform	–	–	3, 0.01, 0.01, 0.01	15, 0.6, 1.0, 1.0

* A range of maximum values was used for the upper bound

B. Chatham Rise (HAK 4) stock

Parameter description	Distribution	Parameters		Bounds	
B_0	Uniform-log	–	–	10 000	250 000
Year class strengths	Lognormal	1.0	1.1	0.01	100
Trawl survey *q*	Lognormal	0.16	0.79	0.01	0.4
Selectivity (fishery)	Uniform	–	–	1	25–200*
Selectivity (survey, *a1*)	Normal-by-stdev	8	1	1	25
Selectivity (survey, *aL*, *aR*)	Normal-by-stdev	10	500	1	50–200*

* A range of maximum values was used for the upper bound

C. WCSI (HAK 7) stock

Parameter description	Distribution	Parameters		Bounds	
B_0	Uniform-log	–	–	5 000	250 000
Year class strengths	Lognormal	1.0	1.1	0.01	100
Trawl survey *q*	Lognormal	0.09	0.79	0.01	0.25
CPUE *q*	Uniform-log	–	–	1e-8	1e-3
Selectivities	Uniform	–	–	0	20–200*
M (x_0, y_0, y_1, y_2)	Uniform	–	–	3, 0.01, 0.01, 0.01	15, 0.6, 1.0, 1.0

* A range of maximum values was used for the upper bound

Estimation of the parameters and associated uncertainty occurs in two phases. The first 'exploratory' phase is conducted on a range of candidate models as an optimization and is used to identify the mode of the joint posterior distribution (MPD). During this phase, model fit diagnostics (e.g. residual analyses) are examined and a base case model along with additional 'sensitivity' models which bracket the main uncertainties are identified. During the site visit, it was queried whether or not retrospective analyses are conducted during this phase. NIWA scientists indicated that due to the nature of these SCAA models, with a variety of data sources of varying time period length, retrospective analyses are not an effective diagnostic tool. In the second phase, the full posterior distribution of the parameters of all models is characterized using Markov Chain Monte Carlo (MCMC) methods based upon the Metropolis-Hastings algorithm and tests for chain convergence. This allows interpretation of stock status indicators in probabilistic terms relative to reference points e.g. Pr($B_{current}$ > 40% B_0).

Horn (2015b) provides the model fits for the 2014 Sub-Antarctic (HAK 1) hake stock assessment. The previous assessment (2011) had removed sex from the model partition to alleviate problems caused by inconsistencies in sex ratios in the age-specific data. It was established that sex in or out of the partition, and sexed or unsexed selectivity, had little impact on biomass or stock status. However, when selectivity was estimated by sex, the ogives varied markedly between sexes, and models with sexed observations exhibited trends in the fits to these data. The model that best avoided undesirable fitting trends and produced the most credible selectivity ogives and trawl survey catchabilities was one with sex in the partition, but with unsexed observations, unsexed selectivity, and estimation of age-specific dependent *M*. Sensitivity models were run to investigate the effects of down-weighting the catch-at-age data, fixing *M*, estimating *M* as a constant rather than an age-dependent ogive, and including a trawl fishery CPUE series. The runs including trawl CPUE and estimating *M* as a constant both give higher current stock status, while less weight on the ageing data and a fixed *M* at age give slightly lower current stock status. MPI (2017a) noted that none of the tested sensitivity runs were considered to be better models than the base run, and some were clearly worse.

Horn (2017) provides the model fits for the 2017 Chatham Rise (HAK 4) and WCSI (HAK 7) hake assessments. As with the Sub-Antarctic (HAK 1) hake assessment, these too have been updated to a model without sex in the partition to alleviate problems caused by inconsistencies in sex ratios in the age-specific data. In the Chatham Rise assessment, the model (base) which best fit the catch and survey data included a strong prior (normal) on the age of full selectivity to the survey. Sensitivity models were run to investigate the effects of estimating a constant *M*, including the CPUE series, and removing constraints on the survey selectivity ogive. Stock status from these three models was not markedly different to that of the base case.

For the Sub-Antarctic and Chatham Rise models, a base case could be identified by the DWFAWG which could inform the stock projections and thus management decision. In the case of the WCSI model, with the addition of the 2016 data to the survey time series, it became apparent that there is a conflict between the trends in the CPUE and survey indices. To determine the uncertainty caused by this discrepancy, the DWFAWG explored a number of models (CPUE and trawl survey index included, only CPUE index and only survey index) including a sensitivity analysis to the survey index model investigating the effect of estimating a constant *M*, the results of which were little different to those of the survey model. In both the CPUE index only and Survey index only models, estimated biomass declined throughout the late 1970s owing to relatively high catch levels, then increased through the mid-1980s concurrent with a marked decline in catch. Biomass then steadily declined from 1988 to around 2010 owing to higher levels of exploitation and the recruitment of year-classes that were generally of below-average strength. The trends of the two models diverge from around 2010 when stock status in both was estimated to be about 25–30% of B_0. The survey model indicates that biomass has stopped declining and has modestly recovered but remains below $B_{40\%}$, while the CPUE model indicates that biomass has more rapidly recovered to above $B_{40\%}$. Estimated current biomass from the Survey model was 26% B_0. For both models, projections to 2021 indicate that biomass is expected to increase assuming average recruitment and catch similar to recent levels.

MPI (2017a) indicates that the DWFAWG could not identify a WCSI base case model because the two relative abundance series exhibited conflicting trends in the most recent five years but were considered to be equally plausible. Horn (2017) states that it is important to consider whether one series can be justified as being more plausible than the other. It is generally held that when a fishery-independent series (e.g., a trawl survey) is available, then the model should fit to it in preference to a CPUE series, which is subject to greater potential biases. However, relatively few years of trawl survey data are available (four), which affords considerable influence of each survey point in the analysis (compare CPUE and Survey data fits in Figure 38). Also, the areal coverage of the trawl survey series is relatively sparse and does not survey the entire area off WCSI where hake are known to be abundant, a problem recently addressed by increased coverage of deep strata in the survey (G. Tingley, pers. comm.). The CPUE series is also not without problems: it was truncated (at 2001) because earlier data were considered unreliable and biased, and there may still be biases in the series since 2001. In particular, changes in fishing technology, specific fisher behaviour to target or avoid hake, and in the commercial (economic) desirability of hake are not captured in the QMS effort statistics, and so cannot be standardised for in a CPUE model.

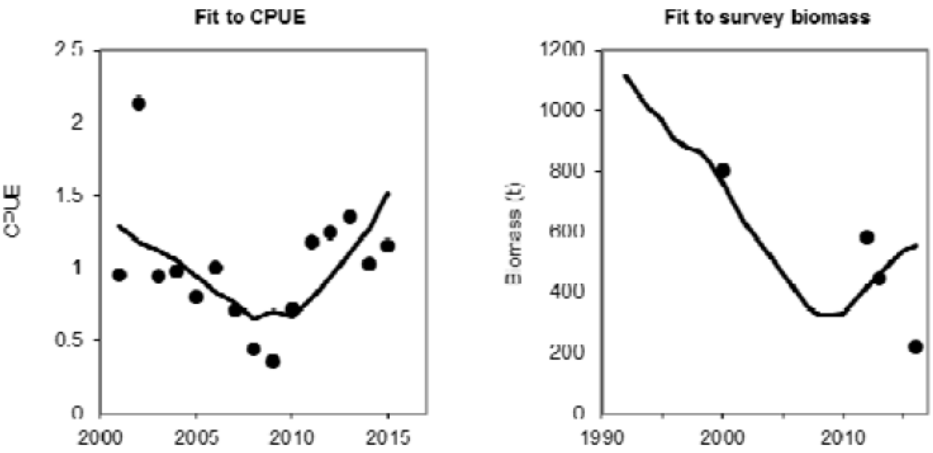


Figure 38. Fits to trawl fishery CPUE (left panel) and trawl survey (right panel) data in model 1 (CPUE and Survey index included) of 2017 WCSI (HAK 7) hake assessment; from Horn (2017)

Consequently, estimates of biomass were produced for two WCSI models: the 'Survey' model which included all the research survey biomass estimates and catch-at-age data, but excluding the CPUE data, and the 'CPUE' model which included the CPUE series but excluded all the survey data. Both models were brought through to the projection stage and the consequences of assuming one model or the other identified under a range of harvest options (see Harvest Strategy section - 4.2.6).

Ling

The most recent stock assessments of the Chatham Rise (LIN 3 & 4) and Sub-Antarctic (LIN 5 & 6) ling stocks were conducted in 2015. Intertek (2014b) used the previous assessments (2012) of both stocks. The most recent assessment of the WCSI (LIN 7WC) stock was conducted in 2017, with the previous one (2013) used by Intertek (2014b). The assessment modelling approach (Bayesian SCAA in two phases – MPD and MCMC) in all ling assessments has not changed significantly since Intertek (2014b) and is as summarized for hake and hoki. In general, the ling base case models includes:

- 3 to 25 or 28 (LIN 7WC) age groups with the last a plus group
- Recruitment estimated as deviations around assumed Beverton and Holt stock-recruitment relationship (steepness assumed as 0.84) with sex ratio assumed as 0.5
- Starting population numbers at age estimated
- Annual cycle of fishing, recruitment, spawning and natural mortality
- Cohort equation to estimate population numbers by year-class
- Growth model input
- Ageing error included
- Sex-specific but age-invariant natural mortality estimated; LIN 7WC not by sex
- Maximum exploitation rate assumed (0.6)
- Year-invariant trawl survey sex-specific selectivity-at-age (double-normal) estimated; LIN 7WC not by sex
- Year-invariant fishery selectivity at age (double-normal or logistic) for trawl (by sex) and line fisheries separately estimated; LIN 7WC not by sex.

The objective function consists of priors on all (fixed) parameters, likelihood functions for the catch proportions at age (multinomial) and abundance indices (lognormal), and penalty functions to constrain the model so that parameter combinations that did not allow historical catch to be taken are strongly penalised. Additional ‘process’ error, assumed to arise from differences between model simplifications and real world variation, is estimated separately for the catch proportions (as per Francis (2011) and survey data and added to their observation error. MPI (2017a) discusses this process error in detail, the treatment of which has not changed since Intertek (2014a).

For all ling stock models, most priors (

Table 34) were intended to be uninformative, and were specified with wide bounds. One exception was an informative prior for the trawl survey q (see MPI, 2017 for derivation). The other exception was the normal prior on proportions male (p_male) in the Chatham Rise and Sub-Antarctic models. Priors for all selectivity parameters were assumed to be uniform. Penalty functions were used to constrain the model so that any combination of parameters that did not allow the historical catch to be taken was strongly penalised. A penalty was applied to the estimates of year-class strengths to encourage estimates that averaged to one. The derivation of these has not changed since the assessments used by Intertek (2014b).

Table 34. Priors for key distributions (when estimated) for ling stock assessments; parameters are mean (in natural space) and CV for lognormal; from MPI (2017a) and McGregor (2015)

A. Chatham Rise (LIN 3 & 4) stock

Parameter description	Distribution	Parameters		Bounds	
B_0	Uniform-log	–	–	30 000	500 000
Year class strengths	Lognormal	1.0	0.70	0.01	100
Trawl survey *q*	Lognormal	0.13	0.70	0.02	0.3
CPUE *q*	Uniform-log	–	–	1e-8	1e-3
Selectivities	Uniform	–	–	0	20–200
M	Uniform	–	–	0.01	0.6
p_male	Normal	0.5	0.15	0.1	0.9

B. Sub-Antarctic (LIN 5 & 6) stock

Parameter description	Distribution	Parameters		Bounds	
B_0	Uniform-log	–	–	50 000	800 000
Year class strengths	Lognormal	1.0	0.70	0.01	100
Trawl survey *q*	Lognormal	0.13	0.70	0.02	0.3
CPUE *q*	Uniform-log	–	–	1e-8	1e-3
Selectivities	Uniform	–	–	0	20–200*
M (x_0, y_0, y_1, y_2)	Uniform	–	–	3, 0.01, 0.01, 0.01	15, 0.6, 1.0, 1.0

* A range of maximum values were used for the upper bound

C. WCSI (LIN 7WC) stock

Parameter description	Distribution	Parameters		Bounds	
B_0	uniform-log	–	–	10 000	500 000
Year class strengths	lognormal	1.0	0.7	0.01	100
Tangaroa survey *q*	lognormal	0.043	0.70	0.01	0.2
CPUE *q*	uniform-log	–	–	1e-8	1e-3
Selectivities	uniform	–	–	0	30–200*
M	normal	0.20	0.025	0.1	0.3

* A range of maximum values was used for the upper bound.

In the Chatham Rise (LIN 3 & 4) assessment (McGregor, 2015), while the fits to the biomass indices, catch-at-age and catch-at-length data, were all fairly good, and almost indistinguishable between model runs, the models that included the longline CPUE had difficulty converging. There was a conflict between the line fishery CPUE and the trawl survey biomass index, where the line fishery biomass index declined between 1991 and 1997, but the trawl survey index remained relatively flat throughout. To remove this conflict, the base case model used all the observational data except the line fishery CPUE. The trawl survey biomass index was preferred in the base case as these data were fishery independent, and there was evidence that the longline fishery *q* had changed over time as very large fish were removed from the population. Sensitivity runs (Longline) included the line fishery CPUE, excluded the trawl survey biomass series, included both biomass indices (All), tested logistic, rather than double normal, selectivity ogives for trawl survey and fishery (Selectivity), and estimated a separate natural mortality for each sex (M).

Roberts (2016) provides the model fits to the Sub-Antarctic (LIN 5 & 6) data, indicating that the fits the compositional data were reasonably good, as were the fits to the summer and autumn trawl indices. A reference model was produced in addition to the base case to test the impact of nuisance survey qs in the former (free qs used in base model). Four other sensitivities were investigated: (1) estimating constant *M* with respect to age, (2) logistic selectivity ogive for longline spawn, (3) halved multinomial weightings associated with age composition estimates, and (4) fitted to spawning and non-spawning longline fishery CPUE. These models all produced estimates of stock status that were little different to those from the reported models.

For the WCSI (LIN 7WC) assessment, three alternative models were conducted, assuming different CPUE indices and *M* assumptions (MPI, 2017a). There was no accepted ‘base’ case; rather the three model runs were chosen to represent the key alternative assumptions, and the range of model outcomes. The alternative CPUE indices were a ‘combined’ index, where CPUE was estimated as the product of the probability of catching ling and, when ling were caught, the catch, or a ‘lognormal’ index, in which only the positive ling catch data were used. In the case of the lognormal CPUE index, the runs either estimated *M*, or assumed it to be fixed at 0.18. The model fit to the trawl survey biomass series was good, but to the CPUE series (both lognormal and combined indices) was poor. Notwithstanding this, all models estimated recent trawl and longline fishing pressure to be stable and a period of higher recruitment around 1990, and in several years since 2001. The Combined CPUE model run indicated a biomass decline until 1992, followed by fluctuating but stable biomass until 2016, whereas the Lognormal CPUE model runs both indicated slow overall biomass declines. While all runs were indicative of a B_0 greater than about 60,000 t, the upper bound on B_0 was highly uncertain and largely dependent on the weight assigned to the trawl survey proportions-at-age, and the prior on *M*.

Peer Review

The stock assessment peer review process has not significantly changed since Intertek (2012a; 2014a; 2014b) and is described in the introductory section of the annual Plenary Report. The compilation of an assessment is contracted out by MPI and in recent years, a team of NIWA scientists has prepared most stock assessments, a review of which is initially conducted within NIWA. The input data and then the assessment are presented to MPI’s Deepwater Working Group (DWFAWG), which reviews the input data and draft assessment and provides observations and recommendations to the assessment team on its analysis. The DWFAWG is open to all interested stakeholders and regularly attended by NGOs, recreational sector, industry, etc. Meeting proceedings and working papers are made available on MPI’s website to those who have registered as members to the group. The DWFAWG meets during Jan – May to review hoki, hake, and ling assessments which include fishery and survey data up to the end of the previous year (e.g. February 2017 hoki assessment included data up until fishing year Oct 2015 – Sept 2016). The Plenary meeting is held in June, the consensus summary of which is made publically available in a Plenary Report (e.g. MPI, 2017a), which provides the key findings of the assessment. The more detailed technical descriptions of the assessments are subsequently published (September) in a NZ Fisheries Assessment Report (FAR) (e.g. McKenzie, 2017) (Table 35).

Table 35. Annual Schedule of hoki, hake and ling Science Working Groups and Management process; from T. Bock (pers. comm.)

	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Hoki, Hake, Ling					Fishing Year											Fishing Year			
(usual process)							Working Groups			Plenary (1 June)			FAR publication						

The Plenary Report is considered by MPI in its development of harvest options for the Minister of Fisheries (see Section 3). During this process, stakeholders may provide input on harvest options additional to those provided by the DWFAWG. During the site visit, it was noted that during this process, MPI interacts closely with the relevant stock assessment scientists to undertake the appropriate stock projections and related analyses.

The schedule of stock assessments varies by species. Hake stocks are assessed on a three-year repeating cycle (HAK 4 – HAK 7 – HAK 1) although the latest Chatham Rise (HAK 4) and WCSI (HAK 7) assessments were conducted in 2017 (Table 36). Given the conflicting Survey and CPUE models of the HAK 7 stock, MPI, in agreement with industry has brought forward the WCSI trawl survey and next HAK 7 stock assessment by a year to provide more certainty on HAK 7 stock status

Assessments of the eastern and western hoki stocks have been conducted annually until 2017 and continuing to 2018. As of 2019, given the relative healthy state of the stocks, full assessments will be conducted biannually (i.e. 2019, 2021, 2023, etc) with annual updates (which include data up to most recent year in most recent model formulation without detailed model explorations) in between.

Ling assessments are also to be conducted on a roughly three-year cycle with those of the Chatham Rise (LIN 3 & 4) and Sub-Antarctic (LIN 5 & 6) stocks conducted in the same year while that of the WCSI (LIN 7WC) stock conducted two years later. The most recent ling assessments were conducted in 2015 (LIN 3 & 4 and LIN 5 & 6) and 2017 (LIN 7WC).

During the site visit, it was indicated that during years between full assessments, catch and survey data are monitored and if there is indication of a change in stock status, a full analysis can be initiated, either at the request of industry or solely by MPI (T. Bock, pers. Comm.).

Table 36. Schedule of hake, hoki and ling assessments by stock since 2003; italics indicate assessments used in Intertek (2012a; 2014a; 2014b)

	Hake			Hoki		Ling		
	Chatham Rise (HAK4)	**Sub-Antarctic (HAK1)**	**West Coast South Island (HAK7)**	**Eastern**	**Western**	**Chatham Rise (LIN 3 & 4)**	**Sub-Antarctic (LIN 5 & 6)**	**West Coast South Island (LIN 7WC)**
2003				SCAA (Bayesian)	SCAA (Bayesian)			
2004				SCAA (Bayesian)	SCAA (Bayesian)			
2005				SCAA (Bayesian)	SCAA (Bayesian)			
2006				SCAA (Bayesian)	SCAA (Bayesian)			
2007		SCAA (Bayesian)		SCAA (Bayesian)	SCAA (Bayesian)	SCAA (Bayesian)	SCAA (Bayesian)	
2008				SCAA (Bayesian)	SCAA (Bayesian)			SCAA (Bayesian)
2009	SCAA (Bayesian)			SCAA (Bayesian)	SCAA (Bayesian)			
2010			SCAA (Bayesian)	SCAA (Bayesian)	SCAA (Bayesian)			
2011		*SCAA (Bayesian)*		*SCAA (Bayesian)*	*SCAA (Bayesian)*			
2012	*SCAA (Bayesian)*			SCAA (Bayesian)	SCAA (Bayesian)	*SCAA (Bayesian)*	*SCAA (Bayesian)*	
2013			*SCAA (Bayesian)*	SCAA (Bayesian)	SCAA (Bayesian)			*SCAA (Bayesian)*
2014		SCAA (Bayesian)		SCAA (Bayesian)	SCAA (Bayesian)			
2015				SCAA (Bayesian)	SCAA (Bayesian)	SCAA (Bayesian)	SCAA (Bayesian)	
2016				SCAA (Bayesian)	SCAA (Bayesian)			
2017	SCAA (Bayesian)		SCAA (Bayesian)	SCAA (Bayesian)	SCAA (Bayesian)			SCAA (Bayesian)

Reviews in which assessment scientists from outside New Zealand are engaged have been conducted, the first one for hoki being in 1999 (Quinn and Sullivan, 1999). The most recent external review of the hoki assessment was conducted by Butterworth et al (2014).

No formal external reviews have been conducted of the hake and ling stock assessments. However, there is a Stock Assessment Methods Working Group which considers technical issues of the assessment models and has participation of international experts who have been influential in assessment and related improvements. The Plenary Meetings also frequently include international experts.

4.3 Principle 2

Principle 2 of the MSC Standard states: "*Fishing operations should be managed to maintain the structure, productivity, function and diversity of the ecosystem on which the fishery depends.*" (MSC 2013a).

4.3.1 Background

Following the format for a reduced reassessment, it is noted that a thorough introduction to the New Zealand marine environment is provided in the previous certification report for the New Zealand hoki fishery (Intertek 2012a). Readers are encouraged to refer to that report (specifically Section 3.4) for additional background information.

4.3.2 Retained and bycatch species

Under the CR v.1.3 (MSC 2013a), retained species are those that are "*retained by the fishery (usually because they are commercially valuable or because they are required to be retained by management rules)*", while bycatch species are "*Organisms that have been taken incidentally and are not retained (usually because they have no commercial value)*". However, in common with most other fisheries, it is not necessarily the case that all individuals of a particular species are either retained or discarded in the New Zealand hoki, hake and ling trawl fishery – some individuals of each species may be retained, while others of the same species may be discarded. Therefore, while the classification of a species as 'retained' or 'discarded' may be somewhat arbitrary, it has been carried out for the purposes of the reassessment of the fishery on the basis of the observer data showing the most common fate for each species (as indicated in Table 37).

For retained species, a 'main' designation may be given, which allows for "*consideration of the weight, value or vulnerability of species caught. For instance, a species that comprises less than 5% of the total catch by weight may normally be considered to be a minor species (i.e., not 'main') in the catch, unless it is of high value to the fisher or of particular vulnerability, or if the total catch of the fishery is large, in which case even 5% may be a considerable catch. A species that normally comprises 20% or more of the total catch by weight would almost always be considered a 'main' retained species*" (GCB3.5.2 MSC 2013b). Near identical guidance is provided for 'main' bycatch species (GCB3.8.2).

It is noted that some elasmobranchs (e.g., sharks and skates) and deepwater fish species that are relatively slow growing, late to mature, and long lived, may be considered to be 'of particular vulnerability' according to the MSC requirements, although the MSC provides no guidance in CR v.1.3 (MSC 2013a, MSC 2013b) as to what percentage of the catch should be used in considering such species as 'main'. The MSC's CR v2.0 requirements do, though, provide a 2% threshold for considering 'less resilient' species to be 'main' (MSC 2014, SA 3.4.2). The New Zealand hoki, hake and ling trawl fishery Reassessment Team was guided by this approach in determining 'main' or 'minor' species.

CB3.5.1 (MSC 2013a) requires that hake and ling are considered as P2 retained species in scoring UoCs 1-2 (hoki), that hoki and ling are considered as P2 retained species in scoring UoCs 3-5 (hake), and that hoki and hake are considered as P2 retained species in scoring UoCs 6-10 (ling). In all cases, these species were scored as 'main' retained species on the basis that during the most recent five-year period for which fleet-adjusted observer data were available, there was at least one year when each species comprised ≥5% of the total catch in the fishery (Table 37). There were no other main retained or main bycatch species in the catch, and species (other than ETP species) comprising ≤0.1% of the catch are considered to be negligible components and are not considered further, here or in scoring (Table 37).

Table 37. Observer data adjusted to the whole fleet showing catches in the hoki, hake and ling trawl fishery, 2009-2013 (Ballara & O'Driscoll 2015).

Species		Plenary stocks (MPI 2017d)	% discard (1990-2013)	2009 (t)	2010 (t)	2011 (t)	2012 (t)	2013 (t)	5 Year Mean (t)	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)	5 Year Mean (%)
Hoki	*Macruronus novaezelandiae*	2 (1E,1W)	0.5	83,036	100,968	110,972	123,312	125,173	108,692	73.00	78.48	81.53	83.35	79.68	79.51
Ling	*Genypterus blacodes*	9 (1,2,CS,3,4 , 5,6,6B,7)	0.1	5,979	5,286	5,609	5,711	8,183	6,154	5.26	4.11	4.12	3.86	5.21	4.50
Hake	*Merluccius australis*	3 (1,4,7)	0.1	9,057	3,846	4,859	5,317	6,118	5,839	7.96	2.99	3.57	3.59	3.89	4.27
Javelin fish	*Lepidorhynchus denticulatus*	1 (n/a)	17.1	4,010	4,760	2,890	2,090	3,250	3,400	3.53	3.70	2.12	1.41	2.07	2.49
Rattails	Macrouridae	1 (n/a)	18.0	3,210	3,760	2,480	2,170	3,200	2,964	2.82	2.92	1.82	1.47	2.04	2.17
Silver warehou	*Seriolella punctata*	3 (1,3,4)	0.2	1,300	2,710	2,310	2,010	2,480	2,162	1.14	2.11	1.70	1.36	1.58	1.58
Spiny dogfish	*Squalus acanthias*	6 (1,3,4,5,7,8)	69.1	1,230	1,280	1,340	2,140	1,360	1,470	1.08	0.99	0.98	1.45	0.87	1.08
White warehou	*Seriolella caerulea*	5 (2,3,4,5B,7)	0.0	700	740	710	580	580	662	0.62	0.58	0.52	0.39	0.37	0.48
Ribaldo	*Mora moro*	7 (1,2,3,4, 5,6,7)	0.7	920	290	380	290	410	458	0.81	0.23	0.28	0.20	0.26	0.34
Pale ghost shark	*Hydrolagus bemisi*	3 (1,5,7)	0.1	450	460	430	430	490	452	0.40	0.36	0.32	0.29	0.31	0.33
Sea perch	*Helicolenus* spp.	7 (1,2,3,4, 5,6,7)	1.5	260	430	470	300	500	392	0.23	0.33	0.35	0.20	0.32	0.29
Black oreo	*Allocyttus niger*	3 (3a,4,6)	3.5	80	400	20	560	580	328	0.07	0.31	0.01	0.38	0.37	0.24

Species		Plenary stocks (MPI 2017d)	% discard (1990-2013)	2009 (t)	2010 (t)	2011 (t)	2012 (t)	2013 (t)	5 Year Mean (t)	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)	5 Year Mean (%)
Lookdown dory	*Cyttus traversi*	2 (1,3)	3.7	250	270	300	270	470	312	0.22	0.21	0.22	0.18	0.30	0.23
Shovelnose spiny dogfish	*Deania calcea*	1 (n/a)	58.0	360	200	260	130	290	248	0.32	0.16	0.19	0.09	0.18	0.18
Arrow Squid	*Nototodarus sloanii / N. gouldi*	2 (1T,6T)	2.1	100	200	290	220	320	226	0.09	0.16	0.21	0.15	0.20	0.17
Dark ghost shark	*Hydrolagus novaezealandiae*	6 (1,2,3,4,5,6,7,8,9)	1.0	90	260	120	270	160	180	0.08	0.20	0.09	0.18	0.10	0.13
Giant stargazer	*Kathetostoma* spp.	7 (1,2,3, 4,5,7,8)	0.0	140	220	170	150	210	178	0.12	0.17	0.12	0.10	0.13	0.13
Frostfish	*Lepidopus caudatus*	8 (1,2,3,4, 5,7,8,9)	16.1	240	80	100	160	290	174	0.21	0.06	0.07	0.11	0.18	0.13
Smooth skate	*Dipturus innominatus*	4 (1,3,7,8)	9.5	130	150	180	130	240	166	0.11	0.12	0.13	0.09	0.15	0.12
Baxters lantern dogfish	*Etmopterus baxteri*	1 (n/a)	10.7	80	220	100	120	230	150	0.07	0.17	0.07	0.08	0.15	0.11
Basking shark	*Cetorhinus maximus*	n/a	99.9	0	0	20	0	10	6	0.00	0.00	0.01	0.00	0.01	0.00
94 other species comprising annual mean ≤0.1%			n/a	2,120	2,120	2,100	1,580	2,550	2,094	1.86	1.65	1.54	1.07	1.62	1.53
Total				113,742	128,650	136,110	147,940	157,094	136,707	100.00	100.00	100.00	100.00	100.00	100.00

Key: Target species (also main retained in alternative UoCs), Minor retained species, Minor bycatch species, ETP species, Negligible species

4.3.2.1 Main retained species

Hoki (main retained in UoCs 3-5 (hake) and 6-10 (ling))

Hoki stock status is described fully in Section 4.2.2.1 of this report. In summary, the Eastern stock (UoC 1) is estimated to be 60% B_0 and it is virtually certain (> 99% probability) to be at or above the lower end of the target range (35% B_0) and likely (> 60%) to be at or above the upper end of the target range (50% B_0). B_{2017} of the Western stock (UoC 2) is estimated to be 59% B_0 and very likely (> 90% probability) to be at or above the lower end of the target range and likely (> 60%) to be at or above the upper end of the target range. Both stocks have been at or above the target range since at least 2010 (Figure 7).

Hake (main retained in UoCs 1-2 (hoki) and 6-10 (ling))

Hake stock status is described fully in Section 4.2.3.1 of this report. In summary, MPI (2017a) determined that stock status for the Sub Antarctic HAK 1 stock (UoC 3) was very likely (> 90%) to be at or above the target, exceptionally unlikely (< 1%) to be below both the soft and hard limits (Figure 11). For the Chatham Rise HAK 4 stock (UoC 4), B_{2016} was estimated at about 48% of B_0 (95 % CI 40.0 – 59.1) and likely (Pr > 60%) to be at or above the target (Table 16). Two assessment models have been employed for the West Coast South Island HAK 7 stock (UoC 5); B_{2016} is estimated to be either 26% of B_0 (Survey model) or 50% of B_0 (CPUE model), and either very unlikely (< 10%) to be at or above the target (survey model) or very likely (> 90%) to be at or above the target (CPUE model) (Figure 19). As noted in Section 4.2.3.1, MPI (2017a) considers that the Survey and CPUE models are equally plausible and thus the stock is either below or well above the 40% B_0 target. The trends in exploitation rate (U) in the other hake assessments, combined with recent depressed market interest for hake, suggest that the CPUE model may be more likely. While MPI is taking precautionary management action based upon the Survey model results, acknowledging the potential for the stock being below the management target (40% B_0), it does not consider that the stock is consistently below this target (T. Bock pers. comm.).

Ling (main retained in UoCs 1-2 (hoki) and 3-5 (hake))

Ling stock status is described fully in Section 4.2.4.1 of this report. In summary, for the Chatham Rise LIN 3 and 4 stock (UoCs 6 and 7), B_{2014} was estimated to be about 57% B_0 and very likely (> 90%) to be above the target and exceptionally unlikely (< 1%) to be below either the soft or hard limit (Figure 23) (MPI 2017a). The Sub Antarctic LIN 5 and 6 stock (UoCs 8 and 9) has exhibited an upturn during the last 15 years (Figure 27), and B_{2014} was estimated to be 86% B_0 and virtually certain (> 99%) to be above the target, and exceptionally unlikely (< 1%) to be below either the soft or hard limit (MPI 2017a). B_{2017} for the West Coast South Island LIN 7 stock (UoC 10) ranges 54 – 79% B_0 for the three models employed, with the lower 95% CI ranging 39 – 61% B_0 and very likely (Pr>90%) to be at or above the target.

4.3.2.1 Minor retained species

Ballara & O'Driscoll (2015) reported on the comparison of trends in individual species bycatch in the hoki, hake, and ling trawl fishery with relevant trawl surveys in the Sub-Antarctic, on the Chatham Rise and off the West Coast South Island (WCSI); these surveys overlap substantially with the depth range and the spatial extent of the hoki, hake, and ling trawl fishery. Annual relative biomass estimates were also calculated for the principle bycatch species in each survey time-series and summarised for 1991 to 2009 in the sub-Antarctic (Bagley et al. 2013) and 1992 to 2010 on the Chatham Rise (O'Driscoll et al. 2011).

Unless otherwise indicated, for minor retained and minor bycatch species, the information summarised below is as reported by Ballara & O'Driscoll (2015). It is noted that these authors quoted O'Driscoll et al. 2014b for data from the West Coast South Island (WCSI), but the correct reference for this WCSI report is (now) O'Driscoll et al. 2015.

Javelin fish (minor retained – 2.49%)

Javelin fish was the most common bycatch species by weight in the hoki, hake and ling trawl fishery for the recent period. This species was reported as being very well estimated in the Sub-Antarctic and Chatham Rise surveys; relative biomass showed no clear trend in the Sub-Antarctic survey time-series, but increased in the Chatham Rise surveys. The WCSI trawl survey showed no trend in biomass (O'Driscoll et al. 2015). Bycatch rates by fishing year and area showed variable trends with high increasing bycatch rates on the Chatham Rise, and increasing bycatch rates for WCSI for bottom trawls and for the Sub-Antarctic, with very low bycatch rates in Cook Strait.

Javelin fish is not a QMS species.

Rattails (minor retained – 2.17%)

Rattails were the second most abundant bycatch species group by weight in the fishery. Bycatch rates by fishing year and area showed variable trends with high increasing bycatch rates on the Chatham Rise, and increasing bycatch rates for WCSI for bottom trawls and for the Sub-Antarctic, with very low bycatch rates in Cook Strait and for WCSI midwater trawls.

Rattails are not a QMS group.

Silver warehou (minor retained – 1.58%)

Silver warehou was reported as being poorly estimated in the Sub-Antarctic and Chatham Rise surveys; relative biomass showed a decrease then increase in the Sub-Antarctic survey time-series, but increased in the Chatham Rise surveys. The WCSI trawl survey showed an increasing trend in biomass (O'Driscoll et al. 2015). Bycatch rates by fishing year and area showed variable trends with higher bycatch rates for WCSI midwater trawls in the 1990s, WCSI bottom trawls in most years, and on the Chatham Rise from 2004, and very low bycatch rates in Cook Strait.

Silver warehou is a QMS species; stock structure is unknown and there are no reference points. MCY cannot be estimated (MPI 2017a).

White warehou (minor retained – 0.48%)

White warehou was reported as being moderately well estimated in both the Sub-Antarctic and Chatham Rise surveys with relative biomass showing no clear trend for both time-series. There was no summary information for the WCSI survey. Bycatch rates by fishing year and area were variable with higher bycatch rates in the Sub-Antarctic and Puysegur regions from 2005.

White warehou is a QMS species; there are thought to be three stocks in the New Zealand EEZ but there are no reference points. MCY cannot be estimated (MPI 2017a).

Ribaldo (minor retained – 0.34%)

Ribaldo was reported as being very well estimated in both the Sub-Antarctic surveys and the Chatham Rise survey areas and relative biomass has showed no clear trend in either time-series, with the Chatham Rise trend matching well for both data sources. Ribaldo showed a decreasing trend in biomass on the WCSI (O'Driscoll et al. 2015). Bycatch rates by fishing year and area were variable with higher bycatch rates for WCSI bottom tows from 2000.

Ribaldo is a QMS species; stock structure is unknown and default target, soft and hard limit reference points (40%B_0, 20%B_0 and 10%B_0, respectively) apply, but B_0 is unknown and MCY cannot be estimated (MPI 2017a).

Pale ghost shark (minor retained – 0.33%)

Pale ghost shark was reported as being very well estimated in the Sub-Antarctic and Chatham Rise surveys and relative biomass showed no clear trend in either time-series. There was no summary information for the WCSI survey (O'Driscoll et al. 2015). Bycatch rates by fishing year and area were variable with higher bycatch rates in the Sub-Antarctic and on the Chatham Rise in most years.

Pale ghost shark is a QMS species; there are thought to be three stocks in the New Zealand EEZ, and default target, soft and hard limit reference points (40%B_0, 20%B_0 and 10%B_0, respectively) apply, but B_0 is unknown and MCY cannot be estimated (MPI 2017a).

Sea perch (minor retained – 0.29%)

Sea perch was reported as being poorly estimated in the Sub-Antarctic surveys but very well estimated in the Chatham Rise surveys; relative biomass showed no clear trend in the sub-Antarctic time-series, but increased in the Chatham Rise time-series, with the Chatham Rise trend matching well for both data sources. Sea perch showed no trend in biomass on the WCSI (O'Driscoll et al. 2015). Bycatch rates by fishing year and area were variable with higher bycatch rates for Chatham Rise and WCSI bottom tows.

Sea perch is a QMS species. There is no information on stock structure and there are no reference points. MCY cannot be estimated (MPI 2017a).

Black oreo (minor retained – 0.24%)

Black oreo was reported as being poorly estimated in the Sub-Antarctic surveys but moderately well estimated in the Chatham Rise surveys; relative biomass showed no clear trend in the Sub-Antarctic time-series, but increased and then decreased in the Chatham Rise time-series. There is no summary information for black oreo for the WCSI survey (O'Driscoll et al. 2015). Bycatch rates were variable and higher in the Chatham Rise.

Black oreo is a QMS species. Detailed investigations of stock structure have been undertaken but the results have not been conclusive. Stock assessments have been undertaken in FMAs 3A (2008 and 2013 – rejected), 4 (2009 – inconclusive) and 6 (2009 and 2013 – not accepted). Default target, soft and hard limit reference points (40%B_0, 20%B_0 and 10%B_0, respectively) apply, but B_0 is unknown and MCY cannot be estimated (MPI 2017a).

Lookdown dory (minor retained – 0.23%)

Lookdown dory was reported as being well estimated in the Sub-Antarctic surveys and very well estimated in the Chatham Rise surveys; relative biomass increased then decreased in the sub-Antarctic time-series, but showed no clear trend in the Chatham Rise time-series. Lookdown dory showed a variable trend in biomass on the WCSI, although was higher in 2013 (O'Driscoll et al. 2015). Bycatch rates by fishing year and area were variable with higher bycatch rates for Chatham Rise and WCSI bottom tows.

Lookdown dory is a QMS species; stock structure is not known. Default target, soft and hard limit reference points (40%B_0, 20%B_0 and 10%B_0, respectively) apply, but B_0 is unknown and MCY cannot be estimated (MPI 2017a).

Arrow squid (minor retained – 0.17%)

Arrow squid species were reported as being poorly estimated in the Sub-Antarctic survey area but well estimated in the Chatham Rise surveys; relative biomass showed no clear trend in the Sub-Antarctic time-series, but decreased and then increased in the Chatham Rise time-series. There is no summary information for arrow squid for the WCSI survey (O'Driscoll et al. 2015). Bycatch rates by fishing year and area were variable and showed higher bycatch rates for WCSI bottom tows, the Sub-Antarctic and Puysegur.

Arrow squid is a QMS species.

Dark ghost shark (minor retained – 0.13%)

Dark ghost shark was reported as being poorly estimated in the Sub-Antarctic surveys but very well estimated in the Chatham Rise surveys; relative biomass showed no clear trend in the sub-Antarctic time-series, but increased in the Chatham Rise time-series. Dark ghost shark showed no trend in biomass on the WCSI (O'Driscoll et al. 2015). Bycatch rates by fishing year and area were variable and generally showed higher bycatch rates for Sub-Antarctic and Chatham Rise.

Pale ghost shark is a QMS species; there are thought to be three stocks in the New Zealand EEZ, and default target, soft and hard limit reference points (40%B_0, 20%B_0 and 10%B_0, respectively) apply, but B_0 is unknown and MCY has not been estimated as input data are too uncertain (MPI 2017a).

Giant stargazer (minor retained – 0.13%)

Ballara & O'Driscoll (2015) did not report on giant stargazer, but the WCSI survey showed that core area abundance has changed little from 74 t (CV = 27.3%) in 2000 to 92 t (CV = 21.8%) in 2013 (O'Driscoll et al. 2015). Bagley et al. (2013) also reported no change in biomass trend for the Sub-Antarctic, while O'Driscoll et al. (2011) also reported no change in biomass trend for the Chatham Rise.

Giant stargazer is a QMS species. Stock structure is not known, but a fully quantitative stock assessment has been undertaken for the WCSI component, where a target reference point of B_{MSY} is applied. Reference points based on B_{MSY} proxies are in place for FMAs 3 and 5, but there are no reference points in FMA 4 (MPI 2017a).

Frostfish (minor retained – 0.13%)

Frostfish was poorly estimated in the Chatham Rise surveys, and biomass showed no clear trend. There is no summary information for frostfish for the Sub-Antarctic or WCSI surveys. Bycatch rates for frostfish were low in all areas except for WCSI midwater tows up to 2009.

Frostfish is a QMS species, but stock structure is uncertain and there are no reference points. MCY cannot be estimated (MPI 2017a).

Smooth skate (minor retained – 0.12%)

Ballara & O'Driscoll (2015) did not report on smooth skate, but the WCSI survey showed that core area abundance has changed little from 186 t (CV = 28%) in 2000 to 228 t (CV = 19.6%) in 2013 (O'Driscoll et al. 2015). Bagley et al. (2013) reported that biomass for smooth skate was poorly estimated in the Sub-Antarctic survey, such that no biomass trend could be determined, while O'Driscoll et al. (2011)) reported an increasing biomass trend for the Chatham Rise.

Smooth skate is a QMS species; stock structure is uncertain and there are no reference points. MCY cannot be estimated (MPI 2017a).

Baxter's lantern dogfish (minor retained – 0.11%)

Ballara & O'Driscoll (2015) did not report on Baxter's lantern dogfish, and neither did the WCSI survey. Bagley et al. (2013) reported that biomass in the Sub-Antarctic survey showed an increasing biomass trend, while O'Driscoll et al. (2011) reported no change in the biomass trend for the Chatham Rise.

Baxter's lantern dogfish is not a QMS species.

4.3.3 Minor bycatch species

Spiny dogfish (minor bycatch – 1.08%)

Spiny dogfish was reported as being well estimated in the survey area of the Sub-Antarctic survey and very well estimated in the Chatham Rise surveys; relative biomass showed no clear trend in the Sub-Antarctic survey time-series, but increased in the Chatham Rise surveys. The WCSI trawl survey showed a variable trend in biomass with higher biomass in the 2012 and 2013 surveys (O'Driscoll et al. 2015). Bycatch rates by fishing year and area showed increasing then decreasing bycatch rates in Cook Strait. Higher bycatch rates were seen on the WCSI for both bottom and midwater tows during the 1990s, for WCSI bottom tows in 2012 and 2013, and for the Sub-Antarctic from 2002.

Spiny dogfish is a QMS species. No specific research has been conducted on stock structure. There are no reference points and MCY cannot be estimated (MPI 2017a).

Shovelnose spiny dogfish (minor bycatch – 0.18%)

Shovelnose dogfish was reported as being well estimated Sub-Antarctic surveys and Chatham Rise surveys; relative biomass has showed no clear trend in the Chatham Rise time-series, but decreased then increased in the Sub-Antarctic time-series. Shovelnose dogfish showed a trend in biomass on the WCSI (O'Driscoll et al. 2015). Bycatch rates by fishing year and area were variable and showed higher bycatch rates on the Chatham Rise and in Puysegur in most years. Ford et al. (2015) noted that this species is globally widespread, pregnant females were rarely caught, and it occurs in waters up to 1500m, at which depth there is little fishing in New Zealand waters.

Shovelnose spiny dogfish is not a QMS species.

4.3.4 Endangered, threatened or protected (ETP) species

Following the format for a reduced reassessment, it is noted that an introduction to ETP species is provided in the previous certification report for the New Zealand hoki fishery (Intertek 2012a). Readers are encouraged to refer to that report (specifically Sections 3.4.2.2 to 3.4.2.5) for additional background information.

Under the CR v.1.3 (MSC 2013a), ETP species are those that are "*recognised by national legislation and/or binding international agreements to which the jurisdictions controlling the fishery under assessment are party. Species listed under Appendix I of CITES shall be considered ETP species for the purposes of the MSC assessment, unless it can be shown that the particular stock of the CITES listed species impacted by the fishery under assessment is not endangered*."

Basking shark

Seven species of shark are afforded absolute protection under the New Zealand Wildlife Act 1953 (Ford et al. 2015), but the only species of these six that has been recorded from the hoki, hake and ling trawl fishery in recent years is the basking shark. The legislation means it is not illegal to incidentally catch basking shark, but any animals must be returned immediately and the capture reported on a Non-fish/Protected Species Catch Return (NFPSCR).

DOC (undated) provides an overview of the biology of basking sharks in New Zealand waters, while Francis & Sutton (2012) provided an overview of factors affecting bycatch of basking shark in New Zealand fisheries. This latter document was updated by Francis (2017). In comparison to recent years, greater numbers of basking shark were caught in New Zealand waters historically, mainly by the Japanese fleet, with a peak in bycatch in 1988-1991. Reasons for the high catch rates by Japanese trawlers are unknown, but may relate to targeting of the sharks for their liver oil and fins, or a high abundance of sharks in the late 1980s and early 1990s (Francis & Sutton 2012).

The size of the basking shark population in New Zealand waters is not known, but basking sharks are known to make long migrations, including traversing tropical regions, and an analysis with relatively large sample sizes (including 38 New Zealand specimens) has identified only weak and non-significant population structuring at ocean basin scales (Lieber et al. in review, reported in Francis 2017), such that individuals observed around New Zealand are very likely to be part of a wider population. Depending on the assumptions made regarding the relationship between effective population size and actual population size, the global population of basking sharks may be estimated at between about 18,200 and 82,000 individual basking sharks (DOC undated).

As shown in Table 38, the majority of the basking shark catches in the hoki, hake and ling trawl fishery in recent years have come from the Southland-Auckland Islands region, although other fisheries have caught more basking shark in this area in this period. In this case, depth fished and headline heights of the gear appear to be important (Francis 2017).

Table 38. Reported basking shark catches, effort and catch per unit effort (CPUE, basking sharks per 1,000 tows) by target species in three fishery regions, 2011-2016 (adapted from Francis 2017)

Fishery	East Coast			West Coast			Southland-Auckland Islands		
	Sharks	Effort	CPUE	Sharks	Effort	CPUE	Sharks	Effort	CPUE
Hake	0	16	0.00	3	3,260	0.92	5	741	6.75
Hoki	4	13,737	0.29	1	23,115	0.04	6	8,312	0.72
Ling	0	3,953	0.00	0	1,832	0.00	2	5,292	0.38

New Zealand has adopted an updated National Plan of Action (NPOA) on sharks (MPI 2013), and this specifies a range of goals and five-year objectives that are intended to "maintain the biodiversity and long-term viability of all New Zealand's shark populations". In support of the adoption of the NPOA, DWG introduced Operational Procedures relating to the handling, reporting and avoidance of shark catches in general, but with a specific section on handling basking sharks (DWG 2014). DWG also manages a trigger system, whereby catches are reported with the circumstances of the capture, and other vessels working nearby are alerted to the event, with the possibility that a hotspot closure is implemented to reduce the risk of further catches. However, the success of this approach may be difficult to determine given the low and variable catch rate of the sharks (Francis 2017).

A qualitative (level 1) risk assessment of the impact of commercial fishing on New Zealand Chondrichthyans, including basking sharks, was also undertaken in response to the NPOA (Ford et al. 2015). This indicated that basking shark is at some risk from fishing impacts (score = 13.5). However, of the eleven shark species managed under the QMS, only blue shark (score = 12) was considered to be at lower risk than basking shark (scoring range for the remainder of the QMS shark species = porbeagle shark (15) to rough skate (21).

Protected corals

Most corals in New Zealand waters are protected under Wildlife Act 1953. As for basking shark, the legislation means it is not illegal to incidentally catch corals, but any corals that are taken must be returned immediately and the capture reported on a NFPSCR. DOC (undated-b) lists the protected coral groups specifically as follows (noting it is understood that 'Gorgonacea' is no longer scientifically valid, and 'Alcyonacea' is now the accepted name for that Order):

- Black corals (all species in the order Antipatharia)
- Gorgonian corals (all species in the order Gorgonacea)
- Stony corals (all species in the order Scleractinia)

- Hydrocorals (all species in the family Stylasteridae).

A considerable body of research has been amassed on the biology and distribution of deep-sea coral species around New Zealand, and the potential impact of fishing activities, including reports by Consalvey *et al*. 2006, Baird *et al*. 2013 and Anderson *et al*. 2014.

Baird et al. (2013) used predictive models and coral occurrence data from research sampling and commercial fishing trips where observers were carried to map the distribution of corals. Their dataset contained 7731 records, of which 10% were black corals, 33% were gorgonians, 46% were stony corals, and 11% were hydrocorals. Coral records from the four orders were distributed throughout New Zealand waters, although differences by area and depth were evident at the family and genus level.

Baird et al. (2013) concluded: "*The areas where the environmental conditions were most suited to the coral groups were generally in deeper waters where the seafloor had steep slopes. Most of the known coral distributions were within the areas predicted by the models to have suitable environment; however, some deepwater and steep relief areas where corals were known to exist were not identified by the predicted distribution. ... Generally the areas predicted to have the greatest probability of conditions suitable for corals were outside the main fisheries areas, except for some deepwater fisheries that occurred on areas of steeper relief. The fisheries that pose the most risk to protected corals are the deepwater trawl fisheries for species such as orange roughy, oreo species, black cardinalfish, and alfonsino.*"

Relatively few observers report interactions with protected coral species in the hoki, hake and ling trawl fishery (Table 39, adapted from Baird et al. 2013), and total coral bycatch is typically less than 100 kg per year (MPI data, T. Bock pers comms).

Table 39. Number of observer reports of catches of protected corals (all species) in fisheries targeting different species (adapted from Baird et al. 2013).

	Fishery Management Area (FMA)									
Target Fishery	1	2	3	4	5	6	7	9	10	All
Hake	0	0	4	0	9	3	18	0	0	34
Hoki	2	1	140	45	21	15	3	0	0	227
Ling	0	0	18	9	0	5	0	0	0	32
% of all observer reports noting coral catches that are from hoki, hake and ling fishery	0.6	1.3	56.1	5.8	19.7	2.8	95.5	0.0	0.0	9.4

To mitigate adverse effects of trawling on benthic habitats and communities, the New Zealand Government has implemented a programme of spatial management; in 2000, 18 seamount closures were established, which include 12 large seamount features more than 1,000 m high and covering 2% (81,000 km^2) of the New Zealand EEZ, over which all trawling and dredging is prohibited. In 2006, industry proposed that an additional 31% of the EEZ be protected within benthic protection areas (BPAs), where no bottom trawling or dredging would be permitted; after a consultation process, 10 active hydrothermal features and 35 other topographic features (covering 30% (1.1 million km^2) of the EEZ) were given protection as BPAs in 2007. Trawling within 100 m of the seabed is prohibited in the BPAs, and any vessel conducting midwater trawling in these areas must carry an approved net monitoring system and two observers, and notify the observers of the intention to commence midwater trawling operations prior to commencement.

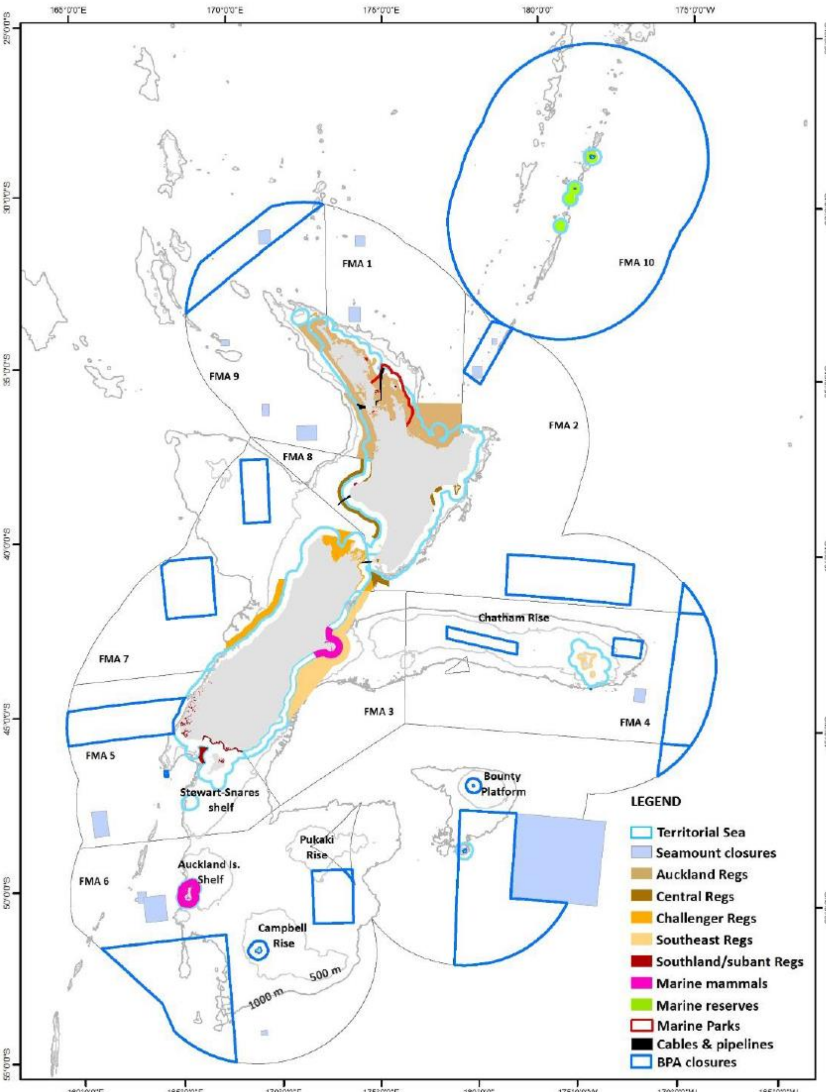


Figure 39. Map of the major spatial restrictions to trawling and the Fishery Management Areas (FMAs) within the New Zealand EEZ (from MPI 2016, adapted from Baird & Wood 2010).

Figure 40 (hoki only) and Figure 41 (all tier 1 and tier 2 species) show that hoki is the dominant trawl fishery in terms of swept area in some zones, but also that the swept area for bottom trawl fisheries has declined steadily over time from a peak in the mid-late 1990s to the current level. The Assessment Team considers it important that almost all fishing also occurs in areas that have previously been trawled, with no notable extensions to the hoki, hake or ling fishing grounds in recent years (Black & Tilney 2017).

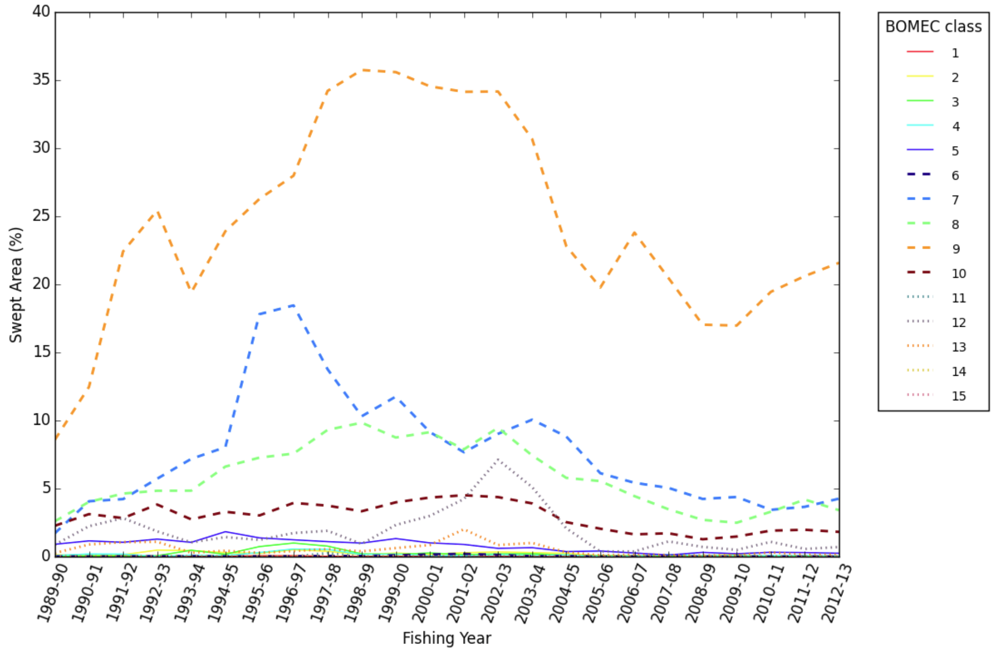


Figure 40. Swept area for trawls targeting hoki in the New Zealand EEZ and Territorial Sea (as a percentage of the BOMEC zone) as a function of time (1989/90 to 2012/13) (from Black & Tilney 2017).

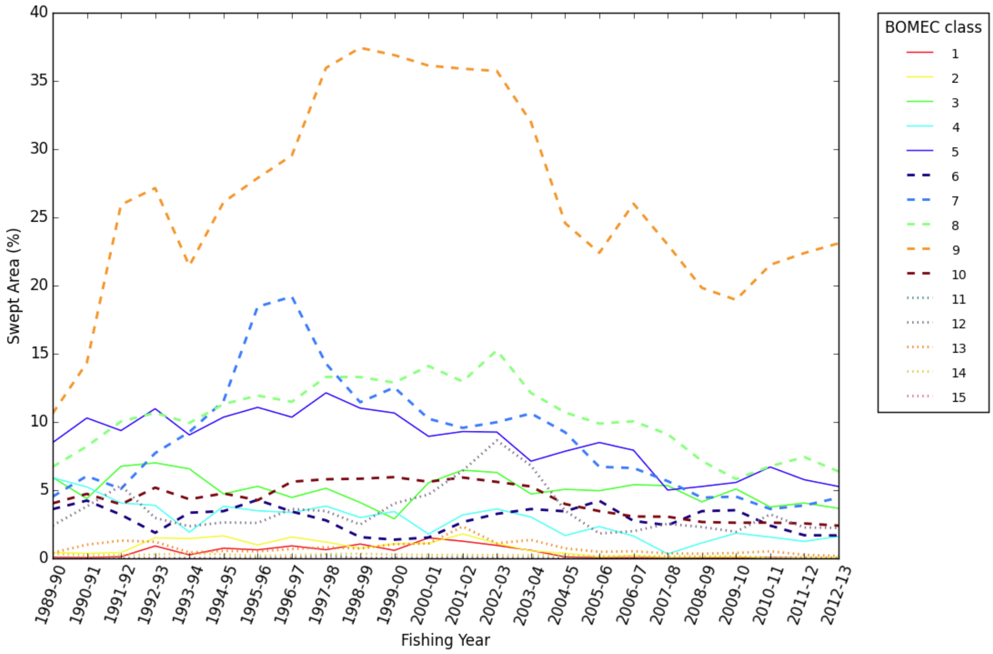


Figure 41. Swept area for trawls targeting all tier 1 and tier 2 species in the EEZ and TS (as a percentage of the BOMEC zone) as a function of time (1989/90 to 2012/13) (from Black & Tilney 2017).

Marine mammals

There are a wide variety of marine mammals present in the waters around New Zealand, and all are designated as protected species under the Marine Mammals Protection Act and the Fisheries Act. The hoki, hake and ling trawl fishery is known to interact rarely or never with most species, however, the fishery does interact with some species, including New Zealand sea lion (estimated mean = 0.62 captures annually, 2002/03 – 2014/15) and common dolphin (estimated mean =1.45 captures annually, 2002/03 – 2014/15) (data from https://psc.dragonfly.co.nz/2017v1/).

The fishery does, though, interact with New Zealand fur seals, and this species has been the main focus of marine mammal management and mitigation in the fishery. MPI 2016 provides a thorough overview of the issues including that New Zealand fur seals are listed as 'Least Concern' and 'Not Threatened', with the population trend increasing.

The hoki-directed part of the hoki, hake and ling trawl fishery is responsible for the majority (2002/03 – 2014/15 = 87.9%) of the interactions with New Zealand fur seals (Figure 42), with the hake and ling-directed parts of the fishery accounting for much smaller proportions of the total over the same period (hake = 5.5%, ling = 6.7%). Over the same 2002/03 – 2014/15 period, the hoki, hake and ling trawl fishery has accounted an average of 54.2% of the estimated total number of incidental captures of fur seals in New Zealand trawl fisheries (catch data from https://psc.dragonfly.co.nz/2017v1/).

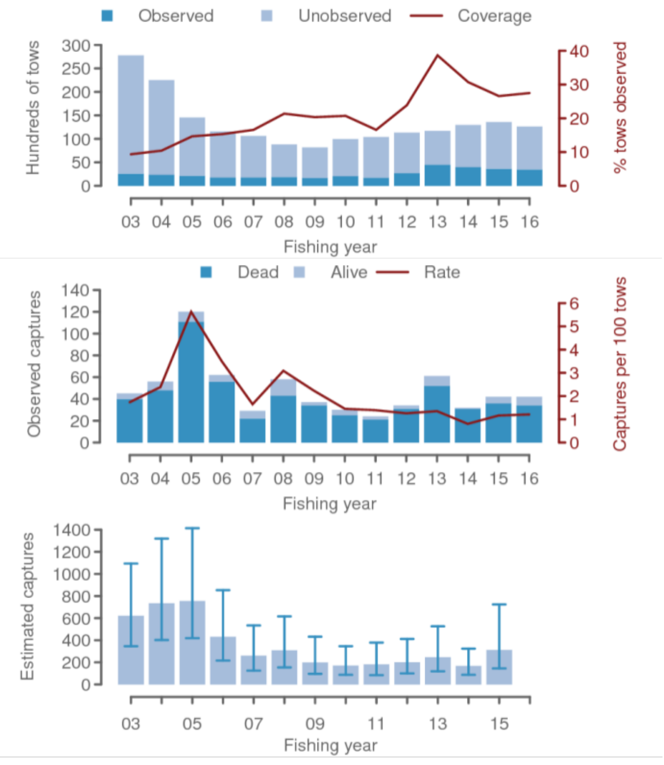


Figure 42. For the hoki trawl fishery, effort and observer coverage (top panel), observed captures and capture rate of New Zealand fur seals (middle panel), and estimated total captures of New Zealand fur seals (bottom panel) for 2003-2016 (Data downloaded from https://psc.dragonfly.co.nz/2017v1/).

It is noted that, since 2005, there has been a downward, then relatively flat trend in estimated capture rates and annual estimated New Zealand fur seal captures in the hoki trawl fishery (Figure 42).

Under the National Deepwater Plan, the objective most relevant for management of New Zealand fur seals is Management Objective 2.5: "*Manage deepwater and middle-depth fisheries to avoid or minimise adverse effects on the long term viability of endangered, threatened and protected species.*"

In this regard, Deepwater Group has issued Marine Mammal Operational Procedures (MMOPs – DWG 2014b) to reduce the risk of marine mammal captures. The MMOPs are currently applied to trawlers greater than 28 m LOA, are supported by annual training and an Environmental Liaison Officer is available 24/7 to assist as required. They include a number of mitigation measures, such as managing offal discharge, refraining from shooting the gear when New Zealand fur seals are congregating around the vessel and the introduction of "trigger" points – if two fur seals are captured within 24 hours or five fur seals are captured over 7 days then the following procedure is triggered:

1. Advise vessel manager,
2. Record capture event including location of capture in ship's log,
3. Ensure gear failures are addressed with the gear either on board or at a depth >50m,
4. Report capture to Deepwater Group either directly or via shore management.

MPI 2016 notes that the major focus of the MMOPs is to reduce the time gear is at or near the surface when it poses the greatest risk. MPI, via observers, monitors and audits vessel performance against this procedure. Research into methods to minimise or mitigate New Zealand fur seal captures in commercial fisheries has focused on fisheries in which the species is more likely to be captured, but finding ways to mitigate captures has proved difficult because the animals are free swimming, can easily dive to the depths of the net when it is being deployed, hauled, or brought to the surface during a turn, and are known to actively and deliberately enter nets to feed.

Nevertheless, the most recent threat assessment for New Zealand marine mammals (Baker et al. 2016) classified New Zealand fur seals as 'Not threatened', on the basis that it is a resident native species with a large, stable population.

Seabirds

In assessing the impact of the hoki, hake and ling trawl fishery on seabirds, the Assessment Team was cognizant of the stakeholder submission from Forest and Bird (see Appendix 3. Stakeholder Submissions). Stakeholder input is exceptionally useful to the assessment process and sharpens the Assessment Team's focus. In this regard, we sought the latest risk assessment and catch data available, including catch data from the 2016 year (which may not have been available when the Forest and Bird submission was prepared), and carefully considered both the impact of the fishery and the approach taken to manage impacts.

Since the hoki, hake and ling trawl fisheries were last certified, there has been further intensive focus on seabird research, including on interactions with New Zealand fisheries, and further efforts to avoid, remedy or minimise fishery impacts. MPI 2016 provides a thorough review of the status of knowledge.

New data on interactions between the different New Zealand fisheries continue to be collected and analysed, including for the hoki, hake and ling trawl fishery. Estimated captures of all seabirds (based on models using observer data) are presented for hoki tows (Figure 43), hake tows (Figure 44) and ling tows (Figure 45). We note that the 2016 data show a decline in total captures in hoki-directed tows, after a period when captures trended upwards slowly. We also note that the data are recorded at the species level, but are not presented in this way in this report (but see Abrahams & Richard 2017 for more details).

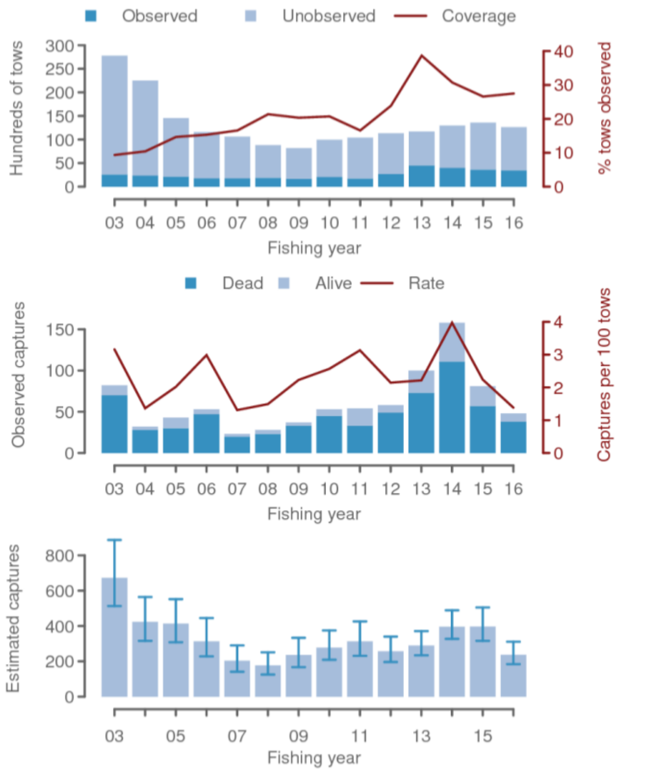


Figure 43. For the hoki trawl fishery, effort and observer coverage (top panel), observed captures and capture rate of all birds (middle panel), and estimated total captures of all birds (bottom panel) for 2003-2016 (Data downloaded from https://psc.dragonfly.co.nz/2017v1/).

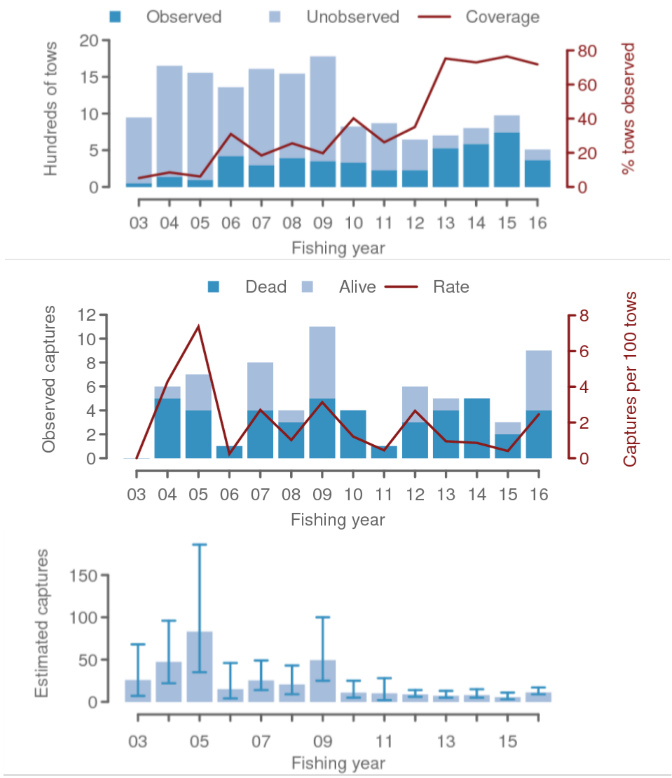


Figure 44. For the hake trawl fishery, effort and observer coverage (top panel), observed captures and capture rate of all birds (middle panel), and estimated total captures of all birds (bottom panel) for 2003-2016 (Data downloaded from https://psc.dragonfly.co.nz/2017v1/).

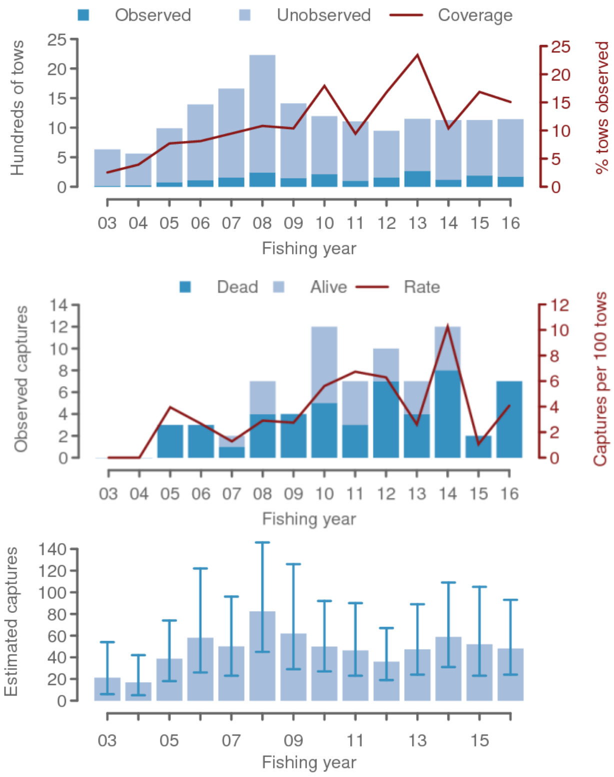


Figure 45. For the ling trawl fishery, effort and observer coverage (top panel), observed captures and capture rate of all birds (middle panel), and estimated total captures of all birds (bottom panel) for 2003-2016 (Data downloaded from https://psc.dragonfly.co.nz/2017v1/).

DOC is developing a seabird threat framework to better understand and manage at-sea threats to seabirds, and a database of demographic parameters has been prepared that supports a tool to assess the impact of changes in parameters on population growth rates; this has been tested on the 12 New Zealand albatross taxa (Abraham et al. 2016).

A seabird risk assessment process has also been undertaken over recent years to identify the risks posed to 70 seabird taxa by trawl, longline and set net fisheries within New Zealand's territorial sea and EEZ (e.g., Richard & Abraham 2013, Richard & Abraham 2015). Results of the most recent iteration of the risk assessment are presented in Richard et al. 2017. Changes to the risk assessment have been incorporated over time (for example, in response to recommendations from a review workshop – Walker et al. 2015), and the most recent version incorporated modifications to the methodology and changes to the structural assumptions and underlying data, including:

1. Applying a revised correction factor as the previous was found to be biologically implausible,
2. Applying a constraint on the fatalities calculated based on observed survival rates,
3. Including live release survival, allowing change in vulnerability over time where there is enough data,
4. Updating seabird demographic data, based on input from seabird experts and reviewed by the AEWG.

The risk assessment calculates a 'risk ratio', which is an estimate of the total fisheries related mortality of each seabird species across New Zealand trawl, longline and set net fisheries relative to their Population Sustainability Threshold (PST), which is an adaptation of the Potential Biological Removals (PBR) metric developed for the US Marine Mammal Protection Act and estimates the level of human-induced mortality a population can incur while meeting the long-term goal for seabird populations of remaining above half their carrying capacity, in the presence of environmental variability (Richard et al. 2017). As noted in MPI 2016, the combination of the use of the total population size, the allometric modelling of adult survival and age at first reproduction, and the use of different corrections for the calculation of PST led to significant changes to the estimated risk ratio between the previous and most recent versions of the risk assessment.

Richard et al. 2017 determined that only the black petrel was classified as 'very high risk', with a median risk ratio of greater than 1 (i.e., median catches exceeded the PST) or an upper 95% confidence interval (c.i.) limit greater than 2. Seven species were classified as 'high risk' because they have a risk ratio with a median above 0.3 or with the upper 95% c.i. limit above 1 (including Salvin's albatross and Southern Buller's albatross), and four species were classified as 'medium risk' because they had a median risk above 0.1 or an upper c.i. limit above 0.3 (Table 40).

The hoki, hake and ling trawl fishery is responsible for some captures of seabird species classified as very high, high or medium risk (Table 40). With respect to black petrel (the only species classified as very high risk), it is noted that this species is most commonly found off the North Island, with very little overlap with the fishery (Abraham et al. 2015).

Table 40. Median risk ratio and 95% confidence intervals for seabird species rated very high, high or medium risk from fishing in New Zealand waters, and estimated mean annual captures of these seabirds in the hoki, hake and ling trawl fishery and in all New Zealand trawl, longline (LL) and set net (SN) fisheries (adapted from Richard et al. 2017).

Species	Median risk ratio	95% confidence interval	Risk Classification	Estimated annual captures in trawl + LL + SN	Estimated annual catches in HHL trawl	HHL trawl (%)
Black petrel	1.15	0.51 – 2.03	Very High	468	4	0.85
Salvin's albatross	0.78	0.51 – 1.09	High	2780	492	17.70
Flesh-footed shearwater	0.67	0.39 – 1.15	High	987	15	1.52
Westland petrel	0.48	0.18 – 1.19	High	180	30	16.67
Southern Buller's albatross	0.39	0.22 – 0.66	High	528	209	39.58
Chatham Island albatross	0.36	0.18 – 0.66	High	155	8	5.16
NZ white-capped albatross	0.35	0.21 – 0.58	High	3830	562	14.67
Gibson's albatross	0.34	0.19 – 0.59	High	166	1	0.60
Northern Buller's albatross	0.25	0.14 – 0.41	Medium	397	54	13.60
Antipodean albatross	0.20	0.11 – 0.36	Medium	74	0	0.00
Yellow-eyed penguin	0.18	0.07 – 0.45	Medium	23	0	0.00
Otago shag	0.14	0.07 – 0.28	Medium	41	0	0.00
Northern giant petrel	0.14	0.03 – 0.47	Medium	47	13	27.66

Table 40 indicates that the hoki, hake and ling trawl fishery accounts for small or very small amounts of the total mortality of species other than Salvin's albatross (17.70%), Westland petrel (16.67%), southern Buller's albatross (39.58%), New Zealand white-capped albatross (14.67%), northern Buller's albatross (13.60%) and northern giant petrel (27.66%).

The results of the latest risk assessment modelling undertaken by Richard et al. 2017 indicate that, for these six species, the mean annual potential fatalities (APFs) associated with the hoki, hake and ling trawl fishery comprises a small percentage of the estimated mean PSTs. The highest relative mean APF is for southern Buller's albatross, calculated as an APF of 209 animals from a PST of 1,370 animals (= 15.3%). The upper 95% C.I. of the APFs are also substantially less than the lower 95% C.I. of the PSTs (see Table 41, below).

Table 41. Estimated Population Sustainability Threshold (PST) for Salvin's albatross, Westland petrel, southern Buller's albatross, NZ white-capped albatross, northern Buller's albatross and northern giant petrel, and annual potential fatalities (APFs) for each species associated with the components of the HHL trawl fishery

Species	Estimated PST values (95 % C.I.) (From Table G32, Richard et al. 2017)	Mean APF for the Hoki trawl fishery (95% C.I.) (From Table G-27, Richard et al. 2017)	Mean APF for the Hake trawl fishery (95% C.I.) (From Table G-27, Richard et al. 2017)	Mean APF for the Ling trawl fishery (95% C.I.) (From Table G-27, Richard et al. 2017)	Mean APF for the HHL trawl fishery (95% C.I.) (From Table G-27, Richard et al. 2017)
Salvin's albatross	3,600 (2,710 - 4,940)	437 (268 - 674)	15 (7 - 27)	40 (22 - 60)	492 (297 - 761)
Westland petrel	350 (234 - 520)	25 (8 - 52)	3 (0 - 9)	2 (0 - 8)	30 (8 - 69)
Southern Buller's albatross	1,370 (901 – 2,160)	195 (118 - 299)	8 (2 - 17)	6 (2 - 14)	209 (122 - 330)
NZ white-capped albatross	10,900 (7,630 – 15,800)	451 (311 - 624)	49 (29 - 72)	62 (37 - 93)	562 (377 - 789)
Northern Buller's albatross	1,630 (1,050 – 2,570)	54 (29 - 86)	0 (0 - 1)	0 (0 - 1)	54 (29 - 88)
Northern giant petrel	336 (159 - 805)	11 (1 - 27)	1 (0 - 2)	1 (0 - 3)	13 (1 - 32)

The operational approach to managing and mitigating risk to seabirds is based around the requirement to use seabird scaring devices (bird bafflers, paired streamer lines and/or warp deflectors – NZG 2010), and implementation of seabird mitigation measures as specified in vessel-specific Vessel Management Plans (VMPs) for trawl vessels.

DWG 2015 sets out the obligations for deepwater vessel, which include requirements around maintaining a fish waste control system, deployment of bafflers and/or tori lines, removal of all stickers (fish trapped in net meshes), minimising the time the gear is at the surface when shooting and hauling, and a requirement to report all interactions on NFPSCRs, and to alert DWG if a trigger point is hit (3 x dead large birds (albatross or mollyhawk) or 5 x dead any bird within any 24 hour period, or 10 birds alive and/or dead within any 7-day period). Implementation is supported through crew training and MPI observers monitor vessel adherence to VMPs and reporting seabird interaction data.

4.3.5 Habitats

Following the format for a reduced reassessment, it is noted that an introduction to habitats, fishery impacts and habitat management is provided in the previous certification report for the New Zealand hoki fishery (Intertek 2012a). Readers are encouraged to refer to that report (specifically Section 3.4.1) for additional background information.

There are several important considerations when assessing the habitat outcome component; normative text indicates the following (MSC 2013a):

"CB 3.1.2: *The team shall consider each P2 species within only one of the Retained species, Bycatch species or ETP species components.*"

In this regard, it is noted that protected coral species are scored as ETP species, and so these species are not also considered directly in the Habitat PIs. Nevertheless, community structure and function, towards which these species contribute, is considered within the Habitat PIs.

> CB3.14.3: *The team shall consider the full extent of the habitats when assessing the status of habitats and the impacts of fishing, and not just the part of the habitats that overlap with the fishery.*"

In this regard, and on the basis of the information available to the Assessment Team, it is the impact of the hoki, hake and ling trawl fishery on relevant benthic habitats within the New Zealand EEZ that has been considered in scoring.

MSC guidance then notes (MSC 2013b):

> GCB3.14.1 "*While the productivity and regenerative ability of biogenic habitats would affect their resilience under fishing, and may be useful surrogates for consideration of status and reversibility, it is the ecological function of the habitat and the ecosystem services that it provides that is the intent of assessment.*"

As reported in Section 4.3.4 of this report for protected coral species, there is an ongoing, annual review process to determine the swept area of the main New Zealand trawl fisheries. This review process is based on tow-by-tow data submitted on trawl catch, effort and processing returns (TCEPRs). These data have then been compared against habitat types as classified under the Marine Environmental Classification (MEC) system (Snelder et al. 2006), and then more recently against habitat types classified under the Benthic-Optimised Marine Environmental Classification (BOMEC) system (Leathwick et al. 2012), to determine the area swept of each habitat type (e.g., Black & Tilney 2017).

It is noted that whilst the MEC and BOMEC systems were developed in New Zealand specifically to enable the identification of broad-scale spatial patterns in marine ecosystems, the use of the MEC in assessing potential fishing impacts on benthic habitats was not universally accepted (MPI 2016). Concerns have also been identified with using the BOMEC system in this way, as reported by Ford et al. (2016):

- The BOMEC, although the best tool available for assessing benthic impacts at a New Zealand-wide scale, should not be interpreted as a map of benthic habitats and has limited explanatory power (Bowden et al. 2011).
- Analyses in inshore habitats and fisheries have shown poor correlation between the sensitivity of fauna and predicted environmental classes from BOMEC (Baird et al. 2015).
- The 2014 ICES symposium, "Effects of fishing on benthic fauna and habitats" in Norway highlighted the need for good data coverage to produce reliable species distribution models, and doubt has been expressed by experts that enough data is available across a range of taxa to support these models.
- There were few detections of live stony coral thickets/reefs in locations modelled to support these in the South Pacific Regional Fisheries Management Organisation (SPRFMO) area (Clark et al. 2015b)., and a formal test of the utility of these has shown that large-scale regional models perform poorly when applied to localised areas where there are limited underlying data (Anderson et al. 2016).

These concerns were cited as part of the rationale for a review of approaches to assess trawl and dredge impacts on New Zealand habitats that was undertaken at an expert workshop in

2015 (Ford et al. 2016). Further work has been undertaken since that time (e.g., as reported in MPI 2016, through field validation and development work on new predictive models under MPI project ZBD2016-011 (e.g., Bowden et al. 2017), and a benthic risk assessment process developed under MPI project BEN2014-01); however, no new approach has yet been agreed on. Updates on any new approach would be expected during the course of a further certification period for the Hoki, Hake and Ling trawl fishery.

The effect of bottom trawling in the deep sea (i.e., in waters over 200 m depth) can be profound, in particular because the species living in the deep sea are typically slow growing and long-lived, meaning that recovery after fishing may be extremely slow. The absence of storm-induced natural perturbation at depths beyond the continental shelf can also mean that recovery of sediment structure post-trawling takes longer than in shallow water. In New Zealand, sediment redistribution can occur as a result of frequent earthquakes, and the results can be catastrophic where mudslides occur (e.g., http://www.radionz.co.nz/news/national/325429/earthquake-caused-'catastrophic'-underwater-mudslides), but the Assessment Team is not aware of any research showing the implications for habitats and seabed communities in general. Where they are found, habitat structuring, emergent epifaunal species (e.g., corals, sea fans and sea pens) are susceptible to physical impacts from trawling, with the possibility of crushing, shearing or total removal. At the wider scale, bottom trawling can result in reductions in abundance and biomass, diversity, structure and distribution of benthic communities (see Clark et al. 2015 and MPI 2016 for reviews).

However, whilst generalisations regarding impacts from trawling may be made, care should be taken in inferring specific impacts because the type, configuration and weight of the gear, its mode and intensity of operation, as well as the slope, rugosity, sediment type, community type and physical regime (e.g., water currents) at a site are important determinants of impacts and subsequent recovery rate (Eigaard et al. 2014, Clark et al. 2015).

Spatial management measures are an effective tool used to minimise the impacts of fishing on habitats. As noted above, BPAs within New Zealand's EEZ protect approximately 1.1 million square km (30%) of the seabed to bottom trawling and dredging (Figure 39). Although not legislated, almost all fishing in the hoki, hake and ling trawl fishery occurs within the footprint of areas that have previously been trawled (including any locations that are newly fished), with no notable extensions to the fishing grounds for these species in recent years (Black & Tilney 2017).

It was also noted earlier in this report that the swept area for deepwater bottom trawl fisheries has declined over time, from a peak in the mid-late 1990s to the current level. In this regard, while hoki-directed trawls have accounted for approximately one third of all tows undertaken in New Zealand deepwater fisheries, hake and ling directed trawls each comprised less than 2% of the tows undertaken (Table 42).

Black & Tilney also noted that the swept area for the hoki fishery from 1989/90 to 2012/13 comprised "*a little over 10% of the total preferred habitat for hoki (i.e., in the over 0% probability of capture areas)*", while Ford (2017) noted that the temporal data "*show a very stable, and increasingly concentrated deepwater footprint that tends to fluctuate in extent over time mainly due to changes in hoki catch*". This is demonstrated through considering Figure 46, which shows the number of contacted (trawled) cells in each year from 1989/90 to 2012/13 for all New Zealand Tier 1 and Tier 2 deepwater fisheries, together with Figure 47, which shows the number of years since each cell has been trawled by the hoki fishery.

Table 42. Number of tows targeting different deepwater species, submitted on TCEPRs from 1989/90-2012/13 and used in estimating swept area for the New Zealand EEZ (adapted from Black & Tilney 2017)

Target Species	Tows	%
Hoki	351,849	36.65
Squid	159,802	16.65
Orange roughy	105,465	10.99
Scampi	103,044	10.73
Oreo	48,798	5.08
Jack mackerel	46,722	4.87
Barracouta	43,638	4.55
Hake	14,943	1.56
Southern blue whiting	14,714	1.53
Silver warehou	14,168	1.48
Ling	13,940	1.45
Alfonsino	13,798	1.44
Gemfish	13,379	1.39
Black cardinal fish	11,566	1.20
10 other species	4,223	0.44
Total	960,049	100.00

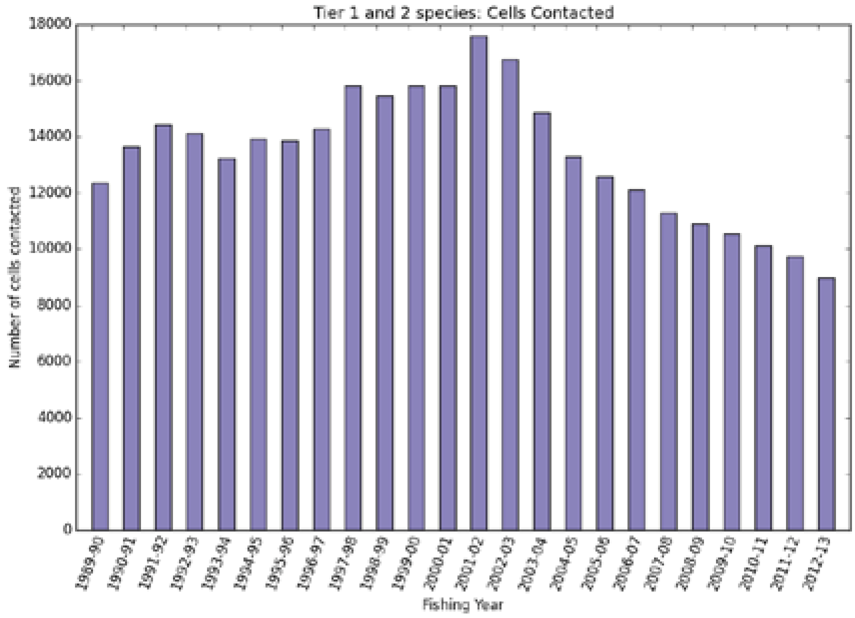


Figure 46. The number of contacted (trawled) cells for all Tier 1 and Tier 2 deepwater species from 1989/90 to 2012/13 (from Black & Tilney 2017).

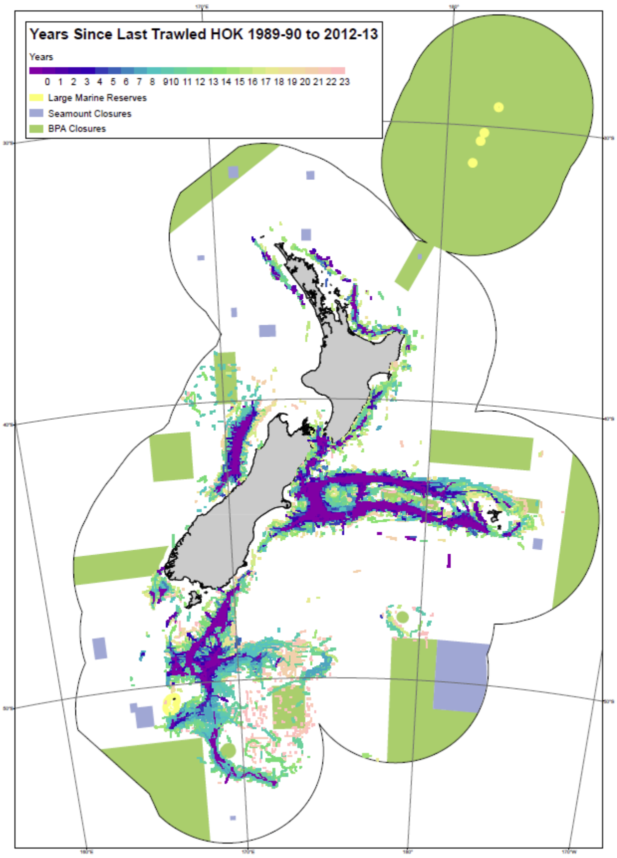


Figure 47. The number of years since 2012/13 that each cell has last been trawled by trawls targeting hoki. Areas closed to trawling are also shown (from Black & Tilney 2017).

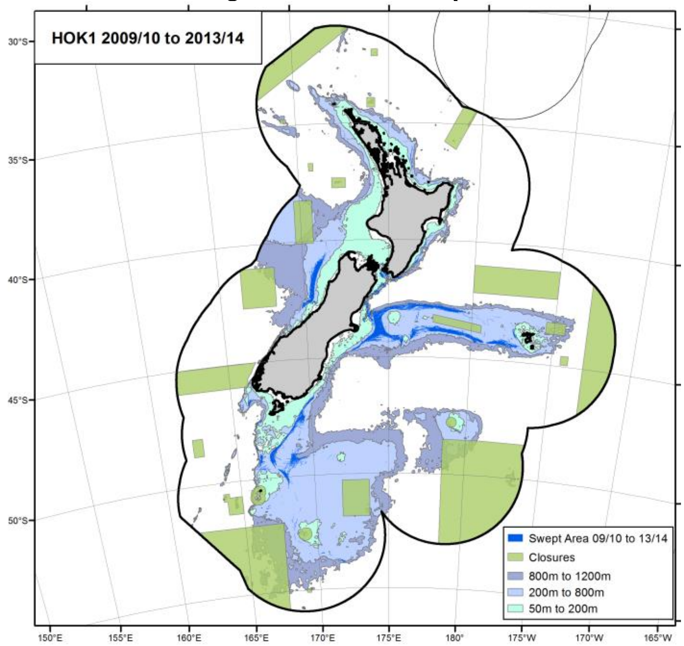


Figure 48. Trawl footprint for the Hoki trawl fishery (UoCs 1 and 2) from 2009/10 to 2013/14 (from Black 2016).

Figure 48 shows the hoki fishery trawl footprint for the most recent five years of data available (2009/10-2013/14). Black (2016) provides similar figures for each hake and ling FMA, but these have not been reproduced, here. Swept area by depth is provided for each fishery in Table 43, however.

Table 43. Area of habitat and swept area by depth for the three target fisheries (all UoCs together) for 2009/10 to 2013/14 (adapted from Black 2016).

		Hoki (All UoCs)		Hake (All UoCs)		Ling (All UoCs)			
Depth Range (m)	Total Area of Habitat in HOK 1 (km2)	Swept Area (km2)	Swept Area (%)	Swept Area (km2)	Swept Area (%)	Depth Range (m)	Total Area of Habitat in LIN 2-7 (km2)	Swept Area (km2)	Swept Area (%)
50-200	202,878	808	0.40	205	0.10	50-300	190,155	257	0.14
200-800	597,415	46,036	7.71	6,721	1.13	300-600	319,104	1053	0.33
800-1200	366,741	1,263	0.34	154	0.04	600-1000	368,562	191	0.05

4.3.6 Ecosystem

Following the format for a reduced reassessment, it is noted that an introduction to ecosystem features influencing or affected by the fishery is provided in the previous certification report for the New Zealand hoki fishery (Intertek 2012a). Readers are encouraged to refer to that report (specifically Section 3.4.1) for additional background information. The scoring text for PI 2.5.1 also goes in to considerable detail which is not repeated here.

When assessing the ecosystem component; normative text indicates the following (MSC 2013a):

"CB3.17.2 *The team should interpret serious or irreversible harm in relation to the capacity of the ecosystem to deliver ecosystem services.*"

(Where examples of 'serious or irreversible harm in relation to the capacity of the ecosystem to deliver ecosystem services' are provided in Guidance (MSC 2013b) as including trophic cascade, severely truncated size composition, gross changes in biodiversity, and change in genetic diversity).

"CB3.17.3 *The team should note that "key" ecosystem elements are the features of an ecosystem considered as being most crucial to giving the ecosystem its characteristic nature and dynamics, and are considered relative to the scale and intensity of the fishery. They are features most crucial to maintaining the integrity of its structure and functions and the key determinants of the ecosystem resilience and productivity*."

MPI (2016) provides a thorough review of the status of research into New Zealand deep water ecosystems. Research is reportedly most advanced in the Chatham Rise region, where modelling of the foodweb has been underway since 2006, the most recent version being Pinkerton (2013). Middle trophic level groups, especially small demersal fishes and mesozooplankton, were determined to have some of the highest trophic importance amongst consumers, but mesopelagic fishes, hoki, and arthropods (benthic prawns and shrimps) also had high trophic importance (Pinkerton 2013). These patterns of trophic importance were considered robust to uncertainties in the model parameterisation and balancing (Pinkerton 2014).

MPI (2016) also noted that there has been much work on developing indicators for New Zealand's marine environment. Tuck et al. (2014) considered the utility of a suite of indicators relevant to deepwater fisheries. Food web indicators which would be useful to understand changes in deep water fish communities that arise from environmental/ecosystem forcing included the following:

- Mesopelagic fish biomass
- Crustacean zooplankton biomass and distribution
- Mesopelagic fish community

Deep water fishery-specific indicators were also considered, including the following:

- Total removals (nationally, by region or target fishery)
- Target species biomass
- Species distribution
- Total fish biomass
- Community diversity
- Proportion of large fish
- Mean trophic level.

With respect to ecosystem outcomes, 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. 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 bentho-pelagic) 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. Horn & Dunn 2010 then examined whether there was evidence of change in the diet of hoki, hake or ling on the Chatham Rise between 1990 and 2009. They concluded that it appeared likely that the importance of fish (primarily myctophids) as a prey item for hoki had increased slightly but steadily between 1990 and 2009, while the importance of euphausiids had declined. In contrast, there were no obvious between-year trends in the diets of hake or ling over the same period.

In concluding the section on trophic and ecosystem-level effects, MPI 2016 stated: “*Time series monitoring of fish communities and middle trophic level species (mesozooplankton, mesopelagics, hyperbenthics) are crucial for understanding and monitoring for trophic and ecosystem level effects, and the best current sources of these data are trawl surveys to the Chatham Rise, and Subantarctic plateau.*”

For the most recent assessment of the hoki fishery (Intertek 2012a), it was noted that hoki dominates the demersal fish community of the upper slope (200-800 m), especially around New Zealand’s South Island (Francis et al. 2002. For the 2012 assessment, hoki was considered a key ecological component of the systems it inhabits (as reviewed in Pinkerton 2011). In the context of the assessed hoki, hake and ling trawl fishery, and on the basis of the relative scale of removals for the different species, it is considered appropriate to assess a) hoki as prey, predator and competitor, and b) trophic structure as the key ecosystem elements within the New Zealand deepwater ecosystem.

Hake and ling both comprise much smaller components of the ecosystem and of the overall fishery, and are not considered to be key ecosystem elements.

4.4 Principle 3

4.4.1 Management System

The UoAs for the hoki, hake and ling fisheries fall within a single jurisdiction and occur within New Zealand's EEZ.

The management system consists of a structured public-private partnership consisting of agreements between MPI and DWG, with a high level of stakeholder involvement. This overall structure forms the basis for the operation of these fisheries in terms of goals and objectives, fishing rights, planning, consultations, decision-making, monitoring and enforcement, and regulation.

As this fishery is eligible for a reduced reassessment (FCR v2 S 7.24.6), this section aims to highlight any changes since Intertek 2012 (hoki) and Intertek 2014 (hake and ling).

4.4.2 Legal and Customary Framework

There has been no significant change in the legal or customary framework.

The Legislative Framework includes:

a) The Fisheries Act 1996. The most pertinent sections being:
   - Part 2 Purpose & Principles which provides for utilisation while ensuring sustainability and stipulates Environmental and Information Principles
   - S11A Fisheries Plans
   - S12 Consultation Requirements
   - S13 Setting TACs
   - Part 4 The QMS system
   - Part 7 The Dispute Resolution process

b) The Fisheries (Commercial Fishing) Regulations 2001 which provides for:
   - Fishing gear restrictions
   - Authorising seabird mitigation measures
   - Ban on shark finning

c) Fisheries (Reporting) Regulations 2001 (2017 from 1 Oct)
   These stipulate requirements for:
   - Catch Effort Returns
   - Catch Landing Returns
   - Non-fish and Protected Species,
   - Monthly Harvest Returns
   - LFR (Licenced Fish Receiver) Reporting

There are a number of other relevant regulations for example BPAs (Benthic Protection Areas) and 46m exclusion zones. Again, there have been no changes since Intertek (2012, 2014).

The Customary Framework includes:

a) The Treaty of Waitangi (Fisheries Claims) Settlement Act 1992
b) The Maori Fisheries Act 2004

Non-legislative Policy/Standards includes

a) Research and Science Information Standard for New Zealand Fisheries (2011)
b) Harvest Strategy Standard for new Zealand fisheries (2008)

c) National Plan of Action – Seabirds (2013)
d) National Plan of Action – Sharks (2013)

4.4.3 Consultation

There has been no major change in the way the MPI consults since Intertek (2012, 2014). There have been changes to the names of the consultation documents (see Harvest Strategy section - 4.2.6) but not to the substance of consultation.

Section 12 of the Fisheries Act 1996, includes a range of specific consultation obligations that are required of MPI including, who must be consulted.

It also requires that the Minister of Fisheries shall give consulted parties reasons in writing for his/her decision relating to fishing and the effects of fishing on the aquatic environment.

There are also a number of less formal consultation opportunities and mechanisms including:

- Environmental Engagement Forum/Fish Plan Advisory Group
- Seabird Advisory Group
- Shark Advisory Group

4.4.4 Objectives for the fishery

Long-term fishery and environmental objectives are included within both NZ fisheries and environmental legislation and thus guide decision-making. The long-term objectives for these fisheries have not changed since Intertek (2012, 2014).

Fisheries 2030, 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 sets out high-level Management Objectives for all of New Zealand's deepwater fisheries. This is then supported by species-specific Fisheries Plans that describes Operational Objectives for the hoki, hake and ling fisheries in New Zealand.

The short-term objectives for the specific fishery are updated and reviewed annually.

These objectives drive annual work plans, which are set out in the Annual Operational Plan for the deepwater fisheries (e.g. MPI, 2016). The progress against the actions and objectives in the Annual Operational Plan are reviewed and presented in the Annual Review Report (e.g. MPI, 2017), produced at the end of each year.

The DWG-MPI Memorandum of Understanding (MOU) (DWG-MFish, 2010) further lays out specific objectives for implementing the National Deepwater Plan. These plans also link to the research plan.

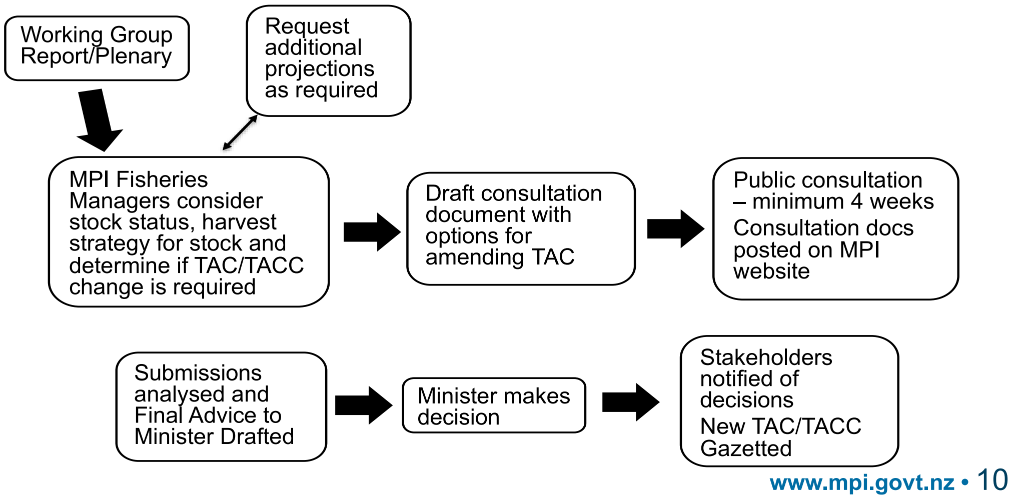
Table 44. Management objectives from the National Deepwater plan (MFish, 2010)

Use Outcome	MO 1.1	Enable economically viable deepwater and middle-depth fisheries in New Zealand over the long-term
	MO 1.2	Ensure there is consistency and certainty of management measures and processes in the deepwater and middle depths fisheries
	MO 1.3	Ensure the deepwater and middle-depths fisheries resources are managed so as to provide for the reasonably foreseeable needs of future generations
	MO 1.4	Ensure effective management of deepwater and middle-depth fisheries is achieved through the availability of appropriate, accurate and robust information
	MO 1.5	Ensure the management of New Zealand's deepwater and middle-depth fisheries are recognised as being consistent with or exceeding national and international best practice
	MO 1.6	Ensure New Zealand's deepwater and middle-depth fisheries are transparently managed
	MO 1.7	Ensure the management of New Zealand's deepwater and middle-depth fisheries meets the Crown's obligations to Maori.
Environmental Outcome	MO 2.1	Ensure deepwater and middle-depth fish stocks and key bycatch fish stocks are managed to an agreed harvest strategy
	MO 2.2	Maintain the genetic diversity of deepwater and middle-depth target and bycatch species
	MO 2.3	Protect habitats of particular significance for fisheries management
	MO 2.4	Identify and avoid or minimise adverse effects of deepwater and middle-depth fisheries on incidental bycatch species
	MO 2.5	Manage deepwater and middle-depth fisheries to avoid or minimise adverse effects on the long- term viability of endangered, threatened and protected species
	MO 2.6	Manage deepwater and middle-depth fisheries to avoid or minimise adverse effects on biological diversity
	MO 2.7	Identify and avoid or minimise adverse effects of deepwater and middle-depths fishing activity on the benthic habitat.

4.4.5 Decision making process

There has been no change in decision-making processes since Intertek (2012, 2014). Decision-making processes are continuously reviewed to ensure that the "best" and precautionary decisions are made by MPI with input and participation from stakeholders and interested parties.

The decision-making process which is undertaken to determine stock status, harvest strategies and annual TACs is shown below in Figure 49.



4.4.6 Figure 49. Decision-making process (MPI 2016)Management Plans

The Fisheries Planning process has not changed since 2010. The management of New Zealand's deepwater fisheries has been implemented through the National Fisheries Plan for Deepwater and Middle-depth Fisheries (National Deepwater Plan), which collectively consists of the three parts shown in Figure 50.

Part 1A was approved by the Minister of Fisheries in 2010. Public consultation on a revised Part 1 A closed in August 2017, and the feedback received is currently being reviewed by MPI before finalising the revised version. The fisheries specific chapters for hoki, hake and ling were completed in in 2010, 2013 and 2013 respectively

The National Deepwater Plan (2010) was reviewed in 2016/17, culminating in a revised National Deepwater Plan being published in 2017. Implementation of the updated National Deepwater Plan for the 2017/18 fishing year will include the core activities listed below:

- Implement National Deepwater Plan including fisheries-specific plans
- Implement Management Objectives within the National Deepwater Plan
- Compile the Annual Review Report for 2017/18
- Develop the Annual Operational Plan for 2018/19

Figure 50. The National Deepwater Plan structure highlighting the long-term cycle of Part 1A and 1B, and the annual cycle of the operational plan and review report. This document relates to Part 2 highlighted in green. (MPI 2017e)

4.4.7 Research Plan

MPI is no longer operating under the 10 Year Research Programme for Deepwater Fisheries. A Medium-Term Research Plan for deepwater fisheries is in place (2018/19 – 2022/23) and MPI is in the process of forming a Research Panel of pre-qualified providers to deliver projects in five different categories:

- Surveys
- Stock Assessments & Monitoring
- Informing Management (e.g. Management Strategy Evaluations (MSEs) & survey design)
- Aquatic Environment research specific to Deepwater Fisheries
- Vessel platforms for surveys.

4.4.8 Compliance and Enforcement

There have been a few changes to compliance and enforcement since Intertek (2012, 2014).

MPI Compliance has continued to monitor the hoki, hake and ling fisheries for a number of years and has undertaken detailed analysis of the fishing activity of vessels operating in the fisheries.

The analysis of the hoki, hake and ling fisheries has, in the past, identified areas of potential compliance risk and MPI Compliance has worked with MPI Fisheries Management and industry to address these risks and to apply appropriate interventions.

MPI Compliance and Fisheries Management meet with the Deepwater Compliance group and discuss any matters of interest or concern arising from the monitoring and analysis. A meeting then takes place with industry where MPI Compliance provides a brief on the issues or risks identified and, if necessary, makes it clear that certain practices need to be changed or eliminated where those practices create a real or perceived risk of non-compliant behaviour. There have been no major issues of non-compliance in the hoki, hake and ling fisheries in recent years (pers. comm. Gary Orr).

This approach has worked well with all companies actively engaged in the process and prepared to work with both MPI Compliance and Fisheries Management to achieve enhanced compliance.

A report by Simmons *et al*. (2016) (researchers associated with the University of Auckland), undertook a historical reconstruction of New Zealand catch statistics between 1950 and 2010 based on their view that the FAO records are incomplete due to the omission of significant amounts of 'invisible' (i.e. unreported) landings in industrial fisheries, of fish that are discarded at sea, and of fish taken by recreational and customary fishers.

Their report concludes the total catch from New Zealand waters to have been 2.1 times greater than that reported to FAO since 1986 (when the Quota Management System (QMS) was introduced). They allege that unreported industrial catch and discards account for the vast majority of the discrepancy that they estimate to have existed.

During the site visit the assessment team discussed the findings of this report with MPI Compliance. MPI Compliance advised they are of the view that the Simmons *et al.* (2016) report considerably over-estimates the scale of under-reporting. Historically, under-reporting in the hoki, hake and ling trawl fishery is estimated to have been in the order of 5-10%, but is much less now in the MSC-certified fisheries and that these amounts were addressed within the official New Zealand catch statistics, stock assessments, and management decisions. The associated uncertainties between reported catches and estimated fishing mortalities is accounted for in stock assessments and in the setting of total allowable catches. MPI had contacted Dr. Simmons to discuss his team's catch reconstruction methodology but they had not responded and thus MPI could not determine the source, extent or reliability of the discrepancy estimated.

The assessment team were also informed that Seafood New Zealand (SNZ), acting on behalf of the New Zealand seafood industry (including DWG), had also contacted the authors requesting details on their methodologies and data. To date, the authors have declined to do so. SNZ has lodged a complaint with the Ombudsman on the basis that this information is subject to access under the Official Information Act. The Ombudsman is currently investigating the University of Auckland's apparent lack of compliance.

The client provided the assessment team with their own analysis of the dataset upon which Simmons *et al.* are understood to have based their report, and compared these data with MPI's official catch records for key deepwater species. This report, Tilney *et al.* (2017), demonstrates that, since 1986, the catch reconstruction for the key deep water commercial species is, on average, 17% higher than MPI's official catch record and considers that the assertion by Simmons *et al*. that catches were 2.1 times greater than that reported to the FAO are incorrect, do not reflect the true position or management of New Zealand deep water fisheries and, in particular the MSC certified fisheries.

The Tilney *et al.* report notes that, since 1986, catches of QMS species have been progressively more closely monitored and are considered to be substantially and increasingly reliable, due to the combination of MPI observers, robust documentation requirements and audit processes, along with a harsh penalty regime for non-compliance. The authors conclude that the proposition that large volumes of unreported catch might exist in the deepwater fisheries is untenable and there have been relatively high levels of observer coverage independently monitoring catches since 1986; noting that, MPI has contracted NIWA to routinely analyse these records to estimate the levels of non-retained catch. For the trawl fisheries under consideration, this is assessed to have been between 0.6% and 5.5% of the total catch with much of the catch returned to sea being, reported, as is required by law.

Tilney *et al.* also notes that if catches from these fisheries had in fact been substantially higher in the early years than were reported, their stocks would have had to be more productive than is currently estimated. They conclude that this is not compatible with what is known about the population dynamics and productivity of these deepwater stocks and is not consistent with the stock assessments based on fisheries-independent research data.

During the course of this re-assessment the MSC Assessment Team discussed the Simmons *et al*. (2016) and Tilney *et al.* (2017) report with the MRAG surveillance audit team, which conducted the first annual audit of MSC certified New Zealand Orange Roughy. The teams noted and agreed that Simmons *et al.* (2016) has not been peer reviewed, reaches conclusions that do not appear to be supported by the data presented, and needs to be subjected to further scrutiny before the findings can be accepted as valid.

In the last few years MPI Compliance has undergone a significant refinement of its service delivery model and now has a dedicated Fisheries Compliance Manager so as to provide greater accountability, consistency of decision-making and management of risk in the fisheries sector. The MPI Compliance team is supported by the Compliance Investigations group who undertakes investigations where the non-compliance is significant and/or complex.

MPI is introducing a new digital system for tracking, monitoring and reporting of commercial fishing. It is made up of geospatial position reporting (GPR), electronic reporting through e-logbooks, and electronic monitoring (cameras).

This Digital Monitoring program, electronic reporting has now been implemented on all trawl vessels >28m LOA. In late 2017, the Minister of Fisheries announced a delay in the introduction of cameras on commercial fishing vessels to allow for further consultation on the proposal to ensure effective implementation. No decision as yet has been made on the date of implementation of this video surveillance.

It should be noted that the deepwater fleet have already implemented position reporting since 1994 and electronic reporting since 2010. These data are transmitted to MPI to monitor fishing activity.

The new system will provide MPI faster (daily) access to catch and location data, coupled with electronic monitoring, which will provide greater opportunity to target compliance risk, and as a consequence further reduce the potential for unreported catch and area misreporting.

4.4.9 Monitoring of Performance.

The Annual Review Report for Deepwater Fisheries provides a record of the annual reviews of the fisheries, including for hoki, hake and ling.

Part 1 of the Annual Review Report describes the progress that has been made towards meeting the five-year management priorities set out in the Annual Operational Plan. Achievement of these annual management priorities aims to contribute towards meeting the five year, high level Management Objectives and Operational Objectives set out in Part 1 of the National Deepwater Plan.

Part 2 of the Annual Review Report provides detail on MPI work that is relevant to deepwater fisheries management and is planned by financial year. It includes the planning and contracting of fisheries and conservation research projects, planning observer coverage on the deepwater fleet and the cost recovery regime. Progress made during the financial year is detailed.

Part 3 of the Annual Review Report reports on the combined environmental impacts of deepwater fishing, and on the deepwater fleet's adherence to the non-regulatory management measures that were in place for the fishing year.

The Annual Operational Plan is reviewed annually and reported in the Annual Review Report. MPI conducts an extensive review of the performance of the deepwater fisheries that incorporates consultations with industry and other stakeholders. Parts of the management system, specifically science and enforcement, undergo external review.

MPI's Aquatic Environment Biodiversity Annual Review and Fisheries Assessment Plenary reports also provide comprehensive annual performance reports.

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 described in CR v1.3 GCB4.11 and concluded that there was an appropriate management system in place for the ongoing sustainable management of the fisheries.

5 Evaluation Procedure

5.1 Harmonised fishery assessment

The MSC has detailed an approach to addressing the assessment of overlapping fisheries, where 'overlapping fisheries' are defined as "*Two or more fisheries which require assessment of some, or all, of the same aspects of MSC Principles 1, 2 and/or 3 within their respective units of certification*" (MSC 2013).

The MSC specifies the following (MSC 2013):

"CI3.2.3 CABs shall coordinate their assessments where a fishery under assessment overlaps with a certified fishery to make sure that key assessment products and outcomes are harmonised.

> *CI3.2.3.1 Where an assessment overlaps with a certified fishery or fishery in assessment that a CAB has already scored, the team shall base their assessment on the rationale and scores detailed for the previously scored fishery.*
>
> *CI3.2.3.2 To achieve harmonisation, CABs shall undertake the following key activities:*
> - *a. The use of complementary assessment trees.*
> - *b. The sharing of fishery information.*
> - *c. The achievement of consistent conclusions with respect to evaluation, scoring and conditions.*
>
> *CI3.2.3.3 The team shall explain and justify any difference in the scores in the scoring rationale for relevant PIs."*

The New Zealand Deepwater Group Hoki, Hake and Ling Trawl Fishery overlaps with a number of other MSC certified fisheries in terms of:

- Principle 1 - The New Zealand EEZ Ling Longline Fishery[2]
- Principle 2 - The New Zealand Southern Blue Whiting Trawl Fishery[3]
- Principle 3 - The New Zealand EEZ Ling Longline Fishery
  - The New Zealand Southern Blue Whiting Trawl Fishery
  - The New Zealand Orange Roughy Fisheries[4]

The New Zealand EEZ Ling Longline Fishery is being re-assessed at the same time as the New Zealand Deepwater Group Hoki, Hake and Ling Trawl Fishery and by the same assessment team. In so doing, the Principle 1 ling component of both fisheries has been harmonised and so the outcomes are the same.

The New Zealand Southern Blue Whiting Trawl Fishery is also being re-assessed at the same time as the New Zealand Deepwater Group Hoki, Hake and Ling Trawl Fishery and by the same assessment team. In so doing, the Principle 2 habitat component - has been harmonised.

The "Governance and Policy" component of Principle 3 (the PIs pre-fixed with 3.1), i.e. focusing on the high-level context of the fishery management system within the UoAs are the same for all the MSC certified and "in re-assessment" fisheries and have been harmonised. The "Fishery specific management system" (the PIs pre-fixed with 3.2) are not usually subject to harmonisation owing to their fishery specific nature, however, in this instance, as part of

[2] https://fisheries.msc.org/en/fisheries/new-zealand-eez-ling-trawl-and-longline/@@assessments
[3] https://fisheries.msc.org/en/fisheries/new-zealand-southern-blue-whiting-trawl/@@assessments
[4] https://fisheries.msc.org/en/fisheries/new-zealand-orange-roughy/@@assessments

harmonizing their assessments and audits of the New Zealand MSC-certified deep water fisheries (hoki, hake, ling, and southern blue whiting – Acoura, and orange roughy – MRAG Americas) both CABs discussed the findings of the Independent Quality Assurance Review Report Deepwater Fisheries Management conducted by Independent Quality Assurance New Zealand for MPI. The teams agreed that the Review met the requirements of PI 3.2.5 scoring issue b (CR v1.3). The agreed scoring rationale is presented in Appendix 1 in the Evaluation Table for PI 3.2.5 - Management Performance Evaluation.

5.2 Previous assessments

The hoki, hake and ling trawl fisheries have previously been separately assessed and certified against the MSC standard:

Table 45: A table showing the certification dates for the separate fishery specific assessments

Fishery	Certified		
Hoki	16 November 2001	31 October 2007	25 September 2012
Hake	16 September 2014		
Ling	16 September 2014		

Since 2001, there have been many improvements in the management of the fishery. There are now well-defined and documented processes for most of the operations. The amount of data available to evaluate consistency with the MSC Criteria is also a significant strength.

The strong communication and ongoing liaison between the client, Deepwater Group (DWG), and their operators is an important factor.

In recent years, the client has supported a shift away from prescriptive regulatory fisheries management to a strong focus on more collaborative fisheries management, including industry implementation of operational plans which are monitored and audited by government.

There is a partnership approach to fisheries management between the DWG and the Ministry of Primary Industries (previously the Ministry of Fisheries), underpinned by a Memorandum of Understanding. The two parties have developed a single joint-management framework with agreed strategic and operational priorities and workplans.

The relationship between the DWG and eNGOs has improved during the period of certification. A key factor to this has been the improved transparency to information and management of the fishery by the DWG.

Through the Environmental Engagement Forum, MPI engages with stakeholders including eNGOs on environmental issues relating to management of deepwater fisheries.

Table 46. Summary of Previous Assessment Conditions

NB. The fisheries were assessed at different times and so separate assessments for each were undertaken. Only the hoki fishery had a condition.

Condition	PI	Year closed	Justification
Improve management of habitat impacts of the hoki fishery, such that by the end of third surveillance audit, it can be shown that the fishery is highly unlikely (i.e. there should be no more than a 30% probability) to reduce habitat structure and function to a point where there would be serious or irreversible harm.	2.4.1	Year 1	With the extent of habitats remaining outside the areas in which hoki is bottom trawled, the ongoing contraction of the cumulative bottom trawl footprint including in the most heavily trawled habitat types, and the ecosystem function apparent from Chatham Rise trawl surveys, it is reasonable to conclude that currently the fishery meets SG80 of PI 2.4.1 and is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. However, information used to draw this conclusion is largely inferential or deductive in nature; there are still significant gaps in knowledge that would increase confidence in this conclusion. This PI has been rescored due to additional guidance from MSC which has clarified the meaning of the 'full range of a habitat', and the spatial extent of habitats to be considered as a region or bioregion when scoring this PI. The interpretation of a region is a large area that could be larger than the BOMEC habitat classes. **SG 60** is met as the fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. **SG 80** is met as the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. **SG 100** is partially met as there is some evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. PI 2.4.1 Score = 90

5.3 Assessment Methodologies

This combined re-assessment of the hoki, hake and ling trawl fishery has been carried out using the MSC Certification Requirements version 1.3 and version 1 of the MSC Reduced Re-Assessment Reporting Template.

No changes were made to the Appendix 1 evaluation tables.

5.4 Evaluation Processes & Techniques

5.4.1 Site Visit

The site visit took place in Wellington, New Zealand, between 17th and 21st July 2016. Meetings were held at the Seafood New Zealand Offices, Eagle Technology House, 135 Victoria Street, Wellington. The following tables provide the site visit itinerary:

Table 47. Site visit itinerary.

Assessment team meeting		
Date	**Participant**	**Organisation**
16th July 2016	Paul Knapman	Acoura
	Bob O'Boyle	Acoura
	Rob Blyth Skyrme	Acoura
	Jo Akroyd	Acoura

Opening meeting		
Date	**Participant**	**Organisation**
17th July 2016	Paul Knapman	Acoura
	Bob O'Boyle	Acoura
	Rob Blyth Skyrme	Acoura
	Jo Akroyd	Acoura
	George Clement	DWG
	Sharleen Gargiulo	DWG
	Geoff Tingley	Gingerfish - consultant to DWG
	Tiffany Bock	MPI
	Bill Holden	MSC

Meeting with NIWA & MPI		
Date	**Participant**	**Organisation**
18th July 2016	Paul Knapman	Acoura
	Bob O'Boyle	Acoura
	Rob Blyth Skyrme	Acoura
	Jo Akroyd	Acoura
	Rosemary Hurst	NIWA
	Andy McKenzie	NIWA
	Richard O'Driscoll	NIWA
	Peter Horn	NIWA
	Lyndsey Holland	MPI
	Tiffany Bock	MPI
	George Clement	DWG
	Sharleen Gargiulo	DWG
	Richard Wells	DWG
	Geoff Tingley	Gingerfish - consultant to DWG
	Bill Holden	MSC

Meeting with NIWA & MPI		
Date	**Participant**	**Organisation**
19th July 2016	Paul Knapman	Acoura
	Bob O'Boyle	Acoura
	Rob Blyth Skyrme	Acoura
	Jo Akroyd	Acoura
	Jim Roberts	NIWA
	Owen Anderson	NIWA
	Greg Lydon	MPI
	Ben Sharp	MPI
	Lyndsey Holland	MPI
	Jen Matthews	MPI
	Nathan Walker	MPI
	Tiffany Bock	MPI
	George Clement	DWG
	Sharleen Gargiulo	DWG
	Richard Wells	DWG
	Geoff Tingley	Gingerfish - consultant to DWG
	Bill Holden	MSC

Meeting with MPI		
Date	**Participant**	**Organisation**
20th July 2016	Paul Knapman	Acoura
	Bob O'Boyle	Acoura
	Rob Blyth Skyrme	Acoura
	Jo Akroyd	Acoura
	Lyndsey Holland	MPI
	Rob Tinkler	MPI
	Tiffany Bock	MPI
	George Clement	DWG
	Sharleen Gargiulo	DWG
	Geoff Tingley	Gingerfish - consultant to DWG
	Bill Holden	MSC

Meeting with MPI		
Date	**Participant**	**Organisation**
21st July 2016	Paul Knapman	Acoura
	Bob O'Boyle	Acoura
	Rob Blyth Skyrme	Acoura
	Jo Akroyd	Acoura
	Gary Orr	MPI
	Simon McDonald	MPI
	Tiffany Bock	MPI
	Sharleen Gargiulo	DWG
	Geoff Tingley	Gingerfish - consultant to DWG
	Bill Holden	MSC

Meeting with Forest & Bird – via Skype		
Date	**Participant**	**Organisation**
21st July 2016	Paul Knapman	Acoura
	Bob O'Boyle	Acoura
	Rob Blyth Skyrme	Acoura
	Jo Akroyd	Acoura
	Karen Baird	Forest & Bird

5.4.2 Consultations

A total of 21 stakeholder organisations and individuals having relevant interest in the assessment were identified and consulted during this re-assessment process. The interest of others was solicited through the postings on the MSC website.

Table 47. above shows the people that participated in the site visit. As well as speaking with the assessment team Forest and Bird followed up with a written submission. This is appended at Appendix 3. Stakeholder Submissions.

5.4.3 Evaluation Techniques

Several sources of information provided the basis of the conclusions of this assessment, including a review of information and references provided by the client prior to the site visit, information and data sourced during site visit meetings held with stakeholders involved with the fishery, and review of literature and information provided following site visit meetings.

The MSC Principles and Criteria set out the requirements for sustainable fishing. These Principles and Criteria have subsequently been used to develop a standardized, default assessment tree (within the MSC Certification Requirements), including Performance Indicators (PIs) and Scoring Issues (SIs), by the MSC and its advisory boards, which have been used in the assessment of this fishery.

Each SI may be scored at three scoring guideposts (SGs), which define the level of performance that is required to achieve 100, 80 (the passing score), and 60 scores; 100 represents a theoretically ideal level of performance and 60 a measurable shortfall. If a fishery does not meet the minimum SG 60 level of performance for any SI, the fishery would fail its assessment.

For each PI, the performance of the fishery is evaluated, and a score issued. In order for the fishery to achieve certification, an overall weighted average score of 80 is necessary for each of the three Principles and no SI should score less than 60. Scores are issued using a minimum increment of five. Average scores for each Principle are rounded to one decimal place.

Following the review and synthesis of information available, the assessment team discussed each individual SI to assess whether the evidence is present to assess the level of performance that the fishery achieved. Justification of the scoring is provided in the scoring table presented in Appendix 1. Scores were agreed by consensus between the assessment team.

The elements that were scored for each PI under Principle 1 and 2 are listed in the tables below (scores allocated for each PI were entered into the MSC Fishery Assessment Scoring Worksheet in order to attain the overall Principle scores; these scores are shown in Section 7 of this report).

With respect to scoring, it is noted that some ‘elements’ were assessed as comprising several species or groups. For example, ‘minor retained species’ were assessed as one group because it includes 15 species in 60 separate management units, and ‘protected corals’ contain four separate groups (black corals, Gorgonian corals, stony corals and hydro corals). Scoring was undertaken on this basis for these groups as it would be impractical to separate them for the purposes of the assessment. Scoring was based on the least well-performing part of the element where grouping was undertaken.

Table 48. Scoring elements for UoC 1 (HOK 1E)

Component	Scoring elements	Main / Minor	Data-deficient (Yes or No)
P1 – Target species	Hoki (*Macruronus novaezelandiae*)	N/A	No
P2 – Retained species	Hake (*Merluccius australis*) – HAK 4	Main	No
	Ling (*Genypterus blacodes*) – LIN 3	Main	No
	Ling (*Genypterus blacodes*) – LIN 4	Main	No
	15 fish species (various stocks)	Minor	No
P2 – By catch species	Spiny dogfish (*Squalus acanthias*)	Minor	No
	Shovelnose spiny dogfish (*Deania calcea*)	Minor	No
P2 – ETP species	Basking shark (*Cetorhinus maximus*)	N/A	No
	Protected corals	N/A	No
	New Zealand fur seal (*Arctocephalus forsteri*)	N/A	No
	Seabirds (various species)	N/A	No
P2 – Habitat	Upper and mid-slope sands	Minor	No
	Upper and mid-slope muds	Main	No
	Boulder/bedrock outcroppings with emergent fauna	Minor	No
P2 – Ecosystem	Hoki as prey, predator and competitor	N/A	No
	Deepwater trophic structure	N/A	No

Table 49. Scoring elements for UoC 2 (HOK 1W)

Component	Scoring elements	Main / Minor	Data-deficient (Yes or No)
P1 – Target species	Hoki (*Macruronus novaezelandiae*)	N/A	No
P2 – Retained species	Hake (*Merluccius australis*) – HAK 1	Main	No
	Hake (*Merluccius australis*) – HAK 7	Main	No
	Ling (*Genypterus blacodes*) – LIN 5	Main	No
	Ling (*Genypterus blacodes*) – LIN 6	Main	No
	Ling (*Genypterus blacodes*) – LIN 7	Main	No
	15 fish species (various stocks)	Minor	No
P2 – By catch species	Spiny dogfish (*Squalus acanthias*)	Minor	No
	Shovelnose spiny dogfish (*Deania calcea*)	Minor	No
P2 – ETP species	Basking shark (*Cetorhinus maximus*)	N/A	No
	Protected corals	N/A	No
	New Zealand fur seal (*Arctocephalus forsteri*)	N/A	No
	Seabirds (various species)	N/A	No
P2 – Habitat	Upper and mid-slope sands	Minor	No
	Upper and mid-slope muds	Main	No
	Boulder/bedrock outcroppings with emergent fauna	Minor	No
P2 – Ecosystem	Hoki as prey, predator and competitor	N/A	No
	Deepwater trophic structure	N/A	No

Table 50. Scoring elements for UoCs 3 – 5 (HAK 1, HAK 4, HAK 7)

Component	Scoring elements	Main / Minor	Data-deficient (Yes or No)
P1 – Target species	Hake (*Merluccius australis*)	N/A	No
P2 – Retained species	Hoki (*Macruronus novaezelandiae*) – HOK 1E	Main	No
	Hoki (*Macruronus novaezelandiae*) – HOK 1W	Main	No
	Ling (*Genypterus blacodes*) – LIN 3	Main	No

Component	Scoring elements	Main / Minor	Data-deficient (Yes or No)
	Ling (*Genypterus blacodes*) – LIN 4	Main	No
	Ling (*Genypterus blacodes*) – LIN 5	Main	No
	Ling (*Genypterus blacodes*) – LIN 6	Main	No
	Ling (*Genypterus blacodes*) – LIN 7	Main	No
	15 fish species (various stocks)	Minor	No
P2 – By catch species	Spiny dogfish (*Squalus acanthias*)	Minor	No
	Shovelnose spiny dogfish (*Deania calcea*)	Minor	No
P2 – ETP species	Basking shark (*Cetorhinus maximus*)	N/A	No
	Protected corals	N/A	No
	New Zealand fur seal (*Arctocephalus forsteri*)	N/A	No
	Seabirds (various species)	N/A	No
P2 – Habitat	Upper and mid-slope sands	Minor	No
	Upper and mid-slope muds	Main	No
	Boulder/bedrock outcroppings with emergent fauna	Minor	No
P2 – Ecosystem	Hoki as prey, predator and competitor	N/A	No
	Deepwater trophic structure	N/A	No

Table 51. Scoring elements for UoCs 6-9 (LIN 3, LIN 4, LIN 5, LIN 6)

Component	Scoring elements	Main / Minor	Data-deficient (Yes or No)
P1 – Target species	Ling (*Genypterus blacodes*)	N/A	No
P2 – Retained species	Hoki (*Macruronus novaezelandiae*) – HOK 1E	Main	No
	Hake (*Merluccius australis*) – HAK 1	Main	No
	Hake (*Merluccius australis*) – HAK 4	Main	No
	15 fish species (various stocks)	Minor	No
P2 – By catch species	Spiny dogfish (*Squalus acanthias*)	Minor	No
	Shovelnose spiny dogfish (*Deania calcea*)	Minor	No
P2 – ETP species	Basking shark (*Cetorhinus maximus*)	N/A	No
	Protected corals	N/A	No
	New Zealand fur seal (*Arctocephalus forsteri*)	N/A	No
	Seabirds (various species)	N/A	No
P2 – Habitat	Upper and mid-slope sands	Minor	No
	Upper and mid-slope muds	Main	No
	Boulder/bedrock outcroppings with emergent fauna	Minor	No
P2 – Ecosystem	Hoki as prey, predator and competitor	N/A	No
	Deepwater trophic structure	N/A	No

Table 52. Scoring elements for UoC 10 (Lin 7)

Component	Scoring elements	Main / Minor	Data-deficient (Yes or No)
P1 – Target species	Hake (*Merluccius australis*)	N/A	No
P2 – Retained species	Hoki (*Macruronus novaezelandiae*) – HOK 1W	Main	No
	Hake (*Merluccius australis*) – HAK 7	Main	No
	15 fish species (various stocks)	Minor	No
P2 – By catch species	Spiny dogfish (*Squalus acanthias*)	Minor	No
	Shovelnose spiny dogfish (*Deania calcea*)	Minor	No
P2 – ETP species	Basking shark (*Cetorhinus maximus*)	N/A	No

Component	Scoring elements	Main / Minor	Data-deficient (Yes or No)
	Protected corals	N/A	No
	New Zealand fur seal (*Arctocephalus forsteri*)	N/A	No
	Seabirds (various species)	N/A	No
P2 – Habitat	Upper and mid-slope sands	Minor	No
	Upper and mid-slope muds	Main	No
	Boulder/bedrock outcroppings with emergent fauna	Minor	No
P2 – Ecosystem	Hoki as prey, predator and competitor	N/A	No
	Deepwater trophic structure	N/A	No

6 Traceability

6.1 Eligibility Date

All of the fisheries have a valid MSC certificate. The certificate expiry dates for the three species in this re-assessment are:

- Hoki Trawl Fishery 1st September 2017
- Hake Trawl Fishery 15 September 2019
- Ling Trawl Fishery 15 September 2019

A variation request to extend the validity of the hoki certificate to 1st June 2018 was granted by the MSC[5]. This means the eligibility date for this re-assessment is 1st June 2018 or the re-certification date (whichever comes first).
The hoki certificate was further extended by a variation request till the 12th September 2018, to allow an extension of the objection period to complete.

6.2 Traceability Within the Fishery

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 vessels 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.

Table 53. The ports of landing where the listed species were landed in 2015/16. (pers. comm. T Bock, MPI)

Hoki	Hake	Ling
Nelson	Timaru	Nelson
Timaru	Nelson	Timaru
Picton	Dunedin	Dunedin
Lyttelton	Lyttleton	Bluff
Dunedin	Bluff	Lyttelton
Greymouth	Greymouth	Greymouth
Wellington	Westport	Napier
Bluff	Picton	Jackson Bay
Westport		Picton
Tauranga		Wellington
Napier		Westport
Gisborne		Kaikoura
Greywater		Careys Bay
Auckland		Christchurch
Paremata		Waitangi
Kaikoura		South Bay
Onehunga		
Whangarei		

[5] https://fisheries.msc.org/en/fisheries/new-zealand-hoki/@@assessments

6.2.1 Tracking and Tracing

Clear traceability and tracking is in place, there are procedures and audits regularly carried out. Procedures that are in place include "when fish product is brought on to a factory site that is not from a MSC fishery or not from a site with a chain of custody certification for (a) reprocessing, or (b) future sale, it must be brought on to inventory with the appropriate quality status and a logistic status. The narrative will read "Not MSC certified". This will prevent its movement without proper control." (DWG, Quality Manual).

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. This drives the need for all vessels to be able to mark, 'ring-fence' and inventory product or products on a regular basis. This is coupled with the fact that all vessels produce a wide range of species and products, all of which are needed to be marked by date, area of capture and numerous other information, and able to be sorted on arrival in port and inventoried for market and export purposes. Both physical and electronic inventory management is inherent in the systems that these vessels operate

6.2.2 Vessels Fishing Outside the UoCs

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.

6.2.3 At Sea Processing

At-sea processing occurs on all the major factory ships participating in this fishery. At-sea processing includes the sorting, heading and gutting, filleting, freezing, reduction to surimi and packaging of hoki, hake and ling.

There are two levels of process technology in the fleet:

1. Fully integrated weighing labelling systems which barcode every carton on production and before storage in the ship's hold. This data is downloaded on arrival, reconciled on landing figures and thus final inventory is arrived at. This system allows the tagging of product lines which is non-certified so that it is barcoded as non-certified and trackable and separable ever after simply by scanning. Onshore systems in load-out audit exports.
2. The rest of the fleet practice standard practice where all product (by carton) is labelled as per MPI and NZFSA requirements. The outer markings are used to separate and inventory all product on landing.

Under MPI regulations every container in which fish is packaged on a licenced fish receiver's premise shall be marked with species name, date, licenced fish receivers name, processed state, area fished. Therefore, the risk of substitution is considered to be well managed and therefore negligible.

6.2.4 Transhipping

Transhipping is rare and has not occurred in the fishery in recent years (pers. comm. Richard Wells). However, if it did occur there is legislation in place to ensure the potential traceability risks associated with any transhipping are minimal.

Section 110, of the Fisheries Act states:
Fish taken in New Zealand fisheries waters must be landed in New Zealand—
(1) No person shall land, at any place outside New Zealand, any fish... taken in New Zealand fisheries waters unless... has the prior approval of the chief executive and is in accordance with any conditions imposed...

(2) For the purposes of subsection (1) of this section, fish, aquatic life, or seaweed shall be deemed to have been landed at a place outside New Zealand if—

(a) It is transported beyond the outer limits of the exclusive economic zone by the vessel that took it; or

(b) It is taken... and transferred to a vessel and then transported... beyond the outer limits of the exclusive economic zone without having been lawfully purchased or acquired by a licensed fish receiver in New Zealand before transportation; or

(c) It is transhipped... to another vessel.

(3) The conditions that may be imposed on any approval granted under subsection (1) of this section include conditions relating to one or more of the following:

- *(a) The vessel that will take the fish, aquatic life, or seaweed:*
- *(b) Any vessel, which will receive the fish, aquatic life, or seaweed:*
- *(c) The manner and conditions under which the storage, transportation, transhipment, recording, reporting, landing, and disposal of the fish, aquatic life, or seaweed will take place.*

If transhipment takes place then traceability is not compromised due to checks including records and labelling, that is in place.

6.2.5 Eligibility to Enter Further Chains of Custody

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.

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 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 (see Table 53)

The assessment team has determined that the systems in place for tracking and tracing are sufficient and fish and fish products from the fishery may enter into further certified chains of custody and be eligible to carry the MSC ecolabel.

The eligible parties to use the fisheries certificate are shareholders of the Deepwater Group. DWG 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 DWG shareholder. Those not a part of the DWG are required to have a certificate sharing agreement.

The following table summarises traceability factors within the fishery.

Table 54. Traceability factors within the fishery:

Traceability Factor	Description of risk factor, if present.
Potential for non-certified gear/s to be used within the fishery	The only other gear used to catch ling is long-line. The DWG ling longline fishery is currently MSC certified and is subject to a separate MSC re-assessment. The at-sea tracking and tracing systems described above ensure that the potential for non-certified gears to be used within the fishery to be negligible.
Potential for vessels from the UoC to fish outside the UoC or in different geographical areas (on the same trips or different trips)	Potential in LIN 2 and LIN 7 but vessels must legally report which area the fish has been caught from. All vessels are equipped with VMS, there is a high level of observer coverage, and there is extensive record keeping required to verify this. Very unlikely in LIN 1 given geographical (i.e. distance) constraints.
Potential for vessels outside of the UoC or client group fishing the same stock	DWG represents quota owners who own the majority (~90%) of the allowable catch for each of the UoCs. For those not a part of the DWG, they are required to have a certificate sharing agreement.
Risks of mixing between certified and non-certified catch during storage, transport, or handling activities (including transport at sea and on land, points of landing, and sales at auction)	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).
Risks of mixing between certified and non-certified catch during processing activities (at-sea and/or before subsequent Chain of Custody)	See above.
Risks of mixing between certified and non-certified catch during transhipment	No transhipments have occurred in New Zealand waters in recent years and any transhipment requires the presence of fisheries officers or government observers.
Any other risks of substitution between fish from the UoC (certified catch) and fish from outside this unit (non-certified catch) before subsequent Chain of Custody is required	No additional risks were identified. There are relatively small gains but big penalties, which provides sufficient incentive to comply with regulations. New Zealand's geographic isolation means all fish is New Zealand caught, and there is aerial surveillance to monitor that there is no unreported and unlicensed fishing (i.e. IUU incursions into the New Zealand EEZ) occurring.

6.3 Eligibility of Inseparable or Practicably Inseparable (IPI) stock(s) to Enter Further Chains of Custody

There are no IPI stocks in the fishery.

7 Evaluation Results

7.1 Principle Level Scores

The preliminary scores for the three Principles for each UoC and the scores for the thirty Performance Indicators that were scored are provided below.

Table 55. Principle scores

UoC 1 = Hoki (HOK 1 East)
UoC 2 = Hoki (HOK 1 West)
UoC 3 = Hake (HAK 1 Sub-Antarctic)
UoC 4 = Hake (HAK 4 Chatham Rise)
UoC 5 = Hake (HAK 7 West Coast South Island)
UoC 6 = Ling (LIN 3 Chatham Rise)
UoC 7 = Ling (LIN 4 Chatham Rise)
UoC 8 = Ling (LIN 5 Sub-Antarctic)
UoC 9 = Ling (LIN 6 Sub-Antarctic)
UoC 10 = Ling (Lin 7 West Coast South Island)

	UoC 1	UoC 2	UoC 3	UoC 4	UoC 5	UoC 6	UoC 7	UoC 8	UoC 9	UoC 10
Principle	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**
Principle 1 – Target Species	95.0	95.0	90.6	90.6	85.0	90.6	90.6	90.6	90.6	90.6
Principle 2 – Ecosystem	85.3	85.3	86.3	86.3	86.3	86.3	86.3	86.3	86.3	86.3
Principle 3 – Management System	97.3	97.3	97.3	97.3	97.3	97.3	97.3	97.3	97.3	97.3

7.2 Summary of Scores

Table 56. Performance Indicator scores

UoC 1 = Hoki (HOK 1 - East)
UoC 2 = Hoki (HOK 1 – West)
UoC 3 = Hake (HAK 1 Sub-Antarctic)
UoC 4 = Hake (HAK 4 Chatham Rise)
UoC 5 = Hake (HAK 7 West Coast South Island)
UoC 6 = Ling (LIN 3 Chatham Rise)
UoC 7 = Ling (LIN 4 Chatham Rise)
UoC 8 = Ling (LIN 5 Sub-Antarctic)
UoC 9 = Ling (LIN 6 Sub-Antarctic)
UoC 10= Ling (Lin 7 West Coast South Island)

Principle	Component	Performance Indicator (PI)		UoC 1 Score	UoC 2 Score	UoC 3 Score	UoC 4 Score	UoC 5 Score	UoC 6 Score	UoC 7 Score	UoC 8 Score	UoC 9 Score	UoC10 Score
1	Outcome	1.1.1	Stock status	100	100	100	100	100	100	100	100	100	100
		1.1.2	Reference points	90	90	80	80	80	80	80	80	80	80
		1.1.3	Stock rebuilding	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Management	1.2.1	Harvest strategy	95	95	95	95	95	95	95	95	95	95
		1.2.2	Harvest control rules & tools	100	100	90	90	90	90	90	90	90	90
		1.2.3	Information & monitoring	90	90	90	90	90	90	90	90	90	90
		1.2.4	Assessment of stock status	95	95	90	90	90	90	90	90	90	90
2	Retained species	2.1.1	Outcome	85	85	85	85	85	85	85	85	85	85
		2.1.2	Management	85	85	85	85	85	85	85	85	85	85
		2.1.3	Information	85	85	85	85	85	85	85	85	85	85
	Bycatch species	2.2.1	Outcome	80	80	80	80	80	80	80	80	80	80
		2.2.2	Management	80	80	80	80	80	80	80	80	80	80
		2.2.3	Information	85	85	85	85	85	85	85	85	85	85
	ETP species	2.3.1	Outcome	85	85	85	85	85	85	85	85	85	85
		2.3.2	Management	90	90	90	90	90	90	90	90	90	90

Principle	Component	Performance Indicator (PI)		UoC 1 Score	UoC 2 Score	UoC 3 Score	UoC 4 Score	UoC 5 Score	UoC 6 Score	UoC 7 Score	UoC 8 Score	UoC 9 Score	UoC10 Score
		2.3.3	Information	85	85	85	85	85	85	85	85	85	85
	Habitats	2.4.1	Outcome	90	90	100	100	100	100	100	100	100	100
		2.4.2	Management	80	80	80	80	80	80	80	80	80	80
		2.4.3	Information	80	80	80	80	80	80	80	80	80	80
	Ecosystem	2.5.1	Outcome	90	90	95	95	95	95	95	95	95	95
		2.5.2	Management	90	90	90	90	90	90	90	90	90	90
		2.5.3	Information	90	90	90	90	90	90	90	90	90	90
3	Governance and policy	3.1.1	Legal & 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
		3.1.4	Incentives for sustainable fishing	90	90	90	90	90	90	90	90	90	90
	Fishery specific management system	3.2.1	Fishery specific objectives	100	100	100	100	100	100	100	100	100	100
		3.2.2	Decision making processes	95	95	95	95	95	95	95	95	95	95
		3.2.3	Compliance & enforcement	100	100	100	100	100	100	100	100	100	100
		3.2.4	Research plan	100	100	100	100	100	100	100	100	100	100
		3.2.5	Management performance evaluation	90	90	90	90	90	90	90	90	90	90

7.3 Summary of Conditions

No conditions were set during this re-assessment of the New Zealand Hoki, Hake and Ling Trawl Fishery.

7.4 Recommendations

None.

7.5 Determination, Formal Conclusion and Agreement

Following this assessment team's work, and review by stakeholders and peer-reviewers, the determination will be presented to Acoura's decision making entity that this fishery has passed its assessment and should be certified.

Acoura's decision making entity confirms that the fishery is re-certified.

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Marine Mammals Protection Act 1978

Marine Reserves Act 1971

Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 No 121

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Appendices

Appendix 1 - Scoring and Rationales

Evaluation Table for PI 1.1.1 – Stock status

PI 1.1.1		The stock is at a level which 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 where recruitment would be impaired (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.
	HAK 1 Met?	Y	Y	Y
	HAK 4 Met?	Y	Y	Y
	HAK 7 Met?	Y	Y	N
	HOK 1(E) Met?	Y	Y	Y
	HOK 1(W) Met?	Y	Y	Y
	LIN 3 & 4 Met?	Y	Y	Y
	LIN 5 & 6 Met?	Y	Y	Y
	LIN 7WC Met?	Y	Y	Y
	Justification	HAK 1: The most recent assessment (2014) estimates that 2014 spawning stock biomass is well above the limit reference point (20% B_0) with the lower 95% credible interval for the most pessimistic model exceeding the limit reference point (95% CI 37.2 – 77.5 B_0). Projections from all the models suggested that biomass will remain the same or increase slightly between 2014 and 2019. It appears extremely unlikely (i.e., less than 1%) that B_{2019} will be lower than the 20% B_0 soft limit. SIa meets SG100 and the lower standards of SG60 and SG80. HAK 4: The most recent assessment (2017) estimates that 2016 spawning stock biomass is well above the limit reference point (20% B_0) with the lower 95% credible interval for the most pessimistic (base case) model exceeding the limit reference point (95% CI 40.0 – 59.1 B_0). Base case model projections to 2021 assuming a future annual catch similar to recent levels (400 t) will allow further stock rebuilding with B_{2021} being 48.3% (95% CI 48.9 – 83.4 B_0). SIa meets SG100 and the lower standards of SG60 and SG80. HAK 7: The most recent assessment (2017) deemed two models (survey & CPUE) equally plausible. The survey model estimates that 2016 spawning stock biomass (25.7% B_0) is above the limit reference point (20% B_0) with the lower 95% credible interval just below the limit reference point (95% CI 19.1 – 36.5 B_0). The CPUE model estimates that 2016 spawning stock biomass (50.3% B_0) is above the limit reference point (20% B_0) with the lower 95% credible interval above the limit reference point (95% CI 34.6 – 73.6 B_0). Projections to 2012 are highly dependent on recruitment and catch assumptions with those based on current catch (4,100 t) indicating modest change in stock status with the Survey model projections being more		

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
		pessimistic. Given the results of the two models, it is highly likely (80%) that biomass is currently above the limit reference point. SIa scores SG60 and 80. However, given the conflict in status between the two models and the results of the projections to 2021, this can't be stated with greater certainty. SIa does not meet SG100. HOK 1(E): The most recent assessment (2017) estimates that 2016 spawning stock biomass (60% B_0) is well above the limit reference point (20% B_0) with the lower 95% credible interval for the base case model exceeding the limit reference point (95% CI 44 – 79% B_0). Five-year projections suggest that the probability that Eastern stock biomass will be below the soft limit at the end of the five-year projection period (2022) is negligible. SIa meets SG60, 80 and 100. HOK 1(W): The most recent assessment (2017) estimates that 2016 spawning stock biomass (59% B_0) is well above the limit reference point (20% B_0) with the lower 95% credible interval for the base case model exceeding the limit reference point (95% CI 40 - 84% B_0). Five-year projections suggest that the probability that Western stock biomass will be below the soft limit at the end of the five-year projection period (2022) is negligible. SIa meets SG60, 80 and 100. LIN 3 & 4: The most recent assessment (2015) estimates that 2014 spawning stock biomass is well above the limit reference point (20% B_0) with the lower 95% credible interval for the most pessimistic (longline) model exceeding the limit reference point (95% CI 30 - 51 B_0). Projections from the base case model suggest that biomass will remain the same at current catch levels until at least 2019. SIa meets SG60, 80 & 100. LIN 5 & 6: The most recent assessment (2015) estimates that 2014 spawning stock biomass is well above the limit reference point (20% B_0) with the lower 95% credible interval for the most pessimistic (base case) model exceeding the limit reference point (95% CI 69 – 103% B_0). Projections from the base case model suggest that biomass will remain the same at current catch levels until at least 2019. SIa meets SG60, 80 and 100. LIN 7WC: The most recent assessment (2017) estimates that 2017 spawning stock biomass is well above the limit reference point (20% B_0) with the lower 95% credible interval for the most pessimistic (lognormal CPUE & M = 0.18) model exceeding the limit reference point (95% CI 39 - 74% B_0). Projections from all models at similar to recent catch suggest that biomass will remain the same at current catch levels until at least 2022. SIa meets SG60, 80 and 100.		
b	Stock status in relation to achievement of 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.
	HAK 1 Met?		Y	Y
	HAK 4 Met?		Y	Y

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
	HAK 7 Met?		Y	N
	HOK 1(E) Met?		Y	Y
	HOK 1(W) Met?		Y	Y
	LIN 3 & 4 Met?		Y	Y
	LIN 5 & 6 Met?		Y	Y
	LIN 7WC Met?		Y	Y
	Justification	HAK 1: The fishery is managed so that projections based on a fixed TACC indicate a low probability of stock biomass falling below limit reference point (20% B_0) and fluctuating around the target reference point (40% B_0). The stock has experienced above average 2005 – 2007 year-classes. Biomass declined from virgin levels in the 1990s but remained above the 40% B_0 target and has increased since 2010. Median biomass has never dropped below the target. The most recent assessment (2014) estimates that the lower 95% credible interval of 2014 biomass (60.4% B_0) for the base case model exceeds the target reference point (95% CI 43.6 – 77.6 B_0). Projections of the base case model to 2019 based on catch similar to recent levels (2,000 t) indicate that B_{2019} is expected to be above the target with a high degree of certainty (95% CI 41.8 – 90.5%). SIb meets SG80 and 100. HAK 4: The fishery is managed so that projections based on a fixed TACC indicate a low probability of stock biomass falling below limit reference point (20% B_0) and fluctuating around the target reference point (40% B_0). The stock has experienced above average 2002, 2010 and 2011 year-classes. Biomass declined from virgin levels in the 1990s, dipped below the 40% B_0 target in the mid-2000s and has increased since and has been above the target over the past two years. The most recent assessment (2017) estimates that the lower 95% credible interval of 2016 median biomass (48.2% B_0) for the base case model exceeds the target reference point (95% CI 40.0 – 59.1% B_0) and likely (Pr > 60%) at or above the target. Projections of the base case model to 2021 based on catch similar to recent levels (400 t) will allow further stock rebuilding with B_{2021} being 48.3% (95% CI 48.9 – 83.4 B_0). SIb meets SG80 and 100. HAK 7: The fishery is managed so that projections based on a fixed TACC indicate a low probability of stock biomass falling below limit reference point (20% B_0) and fluctuating around the target reference point (40% B_0). The stock has experienced average to below average strength year-classes during 1993 - 2009. The two models (survey and CPUE) conducted in the 2017 stock assessment span a range of stock status which includes the management target (40%B_0) in the most recent year. The Survey model estimates that 2016 biomass (25.7% B_0) is below the target reference point (95% CI 19.1 – 36.5% B_0). The CPUE model estimates that 2016 biomass (50.3% B_0) is above the target reference point (95% CI 34.6 – 73.6% B_0). If 2016 biomass were in the middle of the range of stock status uncertainty, it would be at 38%B_0 or within 5% of the 40%B_0 target. For both models, projections to 2021 indicate that biomass is expected to increase assuming average recruitment and catch similar to recent levels. Given the uncertainty in the point estimates of 2016 biomass, MPI is using the lower of the two estimates to drive precautionary action, but it noted that the DWFAWG considered that the two potential outputs (26%B_0 vs 50%B_0) to be equally plausible and therefore, it shouldn't be considered that the stock is consistently below the target reference point.		

PI 1.1.1	The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue	SG 60	SG 80	SG 100
	There are issues in each dataset which are to be explored in a full assessment brought forward from 2019/2020 to 2018/2019. Compared to the CPUE data, the survey data are spatially sparse. There are standardization issues with the CPUE data. Notwithstanding this, the trends in exploitation (U) in the other hake assessments, combined with recent depressed market interest for hake, are more consistent with the U trend in the CPUE model. Based upon these findings, it is possible to state that the stock is at or fluctuating around the target but not with a high degree of certainty. SIb meets SG80 but not SG100. HOK 1(E): The fishery is managed so that projections based on a fixed TACC indicate a low probability of the stock biomass falling below limit the reference point (20% B_0) and fluctuating at or within the target range (35 - 50% B_0). The stock was characterized by a few very strong year-classes in the 1980-1990s followed by a period of below average recruitment until about 2010. Since the mid-2000s, exploitation has declined below the management target range and has remained below this for about one generation. Biomass declined from virgin levels in the 1990s and fell below the target range in the mid-2000s. It has since increased and has remained above this range over the last three or so years. The most recent assessment (2017) estimates that the lower 95% credible interval of 2016 biomass (60% B_0) for the base case model exceeds the target range (95% CI 44 – 79% B_0) and it is virtually certain (> 99% probability) to be at or above the lower end of the target range (35% B_0) and likely (> 60%) to be at or above the upper end of the target range (50% B_0). Projections of the base case model to 2022 based on the current catch limit (60,000 t) indicates that biomass is likely to increase slightly over the next 5 years and to remain within or above the 35–50% B_0 target range by the end of the projection period (2022). SIb meets SG80 and 100. HOK 1(W): The fishery is managed so that projections based on a fixed TACC indicate a low probability of the stock biomass falling below the limit reference point (20% B_0) and fluctuating at or within the target range (35 - 50% B_0). Following the 1995–2001 period of poor recruitment, recruitment was just below average during 2002–2009, below average in 2010 and 2012 and 2013 and 2015, and well above average in 2011 and 2014. Since the mid-2000s, exploitation has declined below the management target range and has remained below this for about 1.6 generations. Biomass declined from virgin levels in the 1990s and fell below the target range in the mid-2000s. It has since increased above this range and has remained there over the last three or so years. The most recent assessment (2017) estimates that the lower 95% credible interval of 2016 biomass (59% B_0) for the base case model exceeds the target range (95% CI 40 - 84% B_0) and very likely (> 90% probability) to be at or above the lower end of the target range and likely (> 60%) to be at or above the upper end of the target range. Projections of the base case model to 2022 based on the current catch limit (90,000 t) indicates that biomass is likely to increase slightly over the next 5 years and to remain within or above the 35–50% B_0 target range by the end of the projection period (2022). SIb meets SG80 and 100. LIN 3&4: The fishery is managed so that projections based on a fixed TACC indicate a low probability of stock biomass falling below limit reference point (20% B_0) and fluctuating around the target reference point (40% B_0). Recruitment since the early 1990s has been fluctuating slightly around the long-term average. Biomass declined from virgin levels in the 1970s – 1980s but never dipped below the 40% B_0 target. Since the early 2000s, biomass has modestly increased and has remained above the target. The most recent assessment (2015) estimates that the lower 95% credible interval of 2014 biomass (57% B_0) for the base case model exceeds the target reference point		

PI 1.1.1	The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue	SG 60	SG 80	SG 100
	(95% CI 45 - 71% B_0) and very likely (> 90%) to be above the target. Projections of the base case model to 2019 based on catch similar to recent levels (3,564 t) indicate that B_{2019} is expected to be 59% B_0 (95% CI 45 – 75% B_0). SIb meets SG80 and 100. LIN 5&6: The fishery is managed so that projections based on a fixed TACC indicate a low probability of stock biomass falling below limit reference point (20% B_0) and fluctuating around the target reference point (40% B_0). Recruitment was generally weak during 1982 - 1992, strong during 1993 - 1996, and has been average since then. Biomass has declined modestly from virgin levels over the long-term but has never dropped below the 40% B_0 target. Since the early 2000s, biomass has modestly increased. The most recent assessment (2015) estimates that the lower 95% credible interval of 2014 biomass (86% B_0) for the base case model exceeds the target reference point (95% CI 69 - 103% B_0) and virtually certain (> 99%) to be above the target. Projections of the base case model to 2019 based on catch similar to recent levels (5,700 t) indicate that B_{2019} is expected to be 91% B_0 (95% CI 69-118% B_0). SIb meets SG80 and 100. LIN 7WC: The fishery is managed so that projections based on a fixed TACC indicate a low probability of stock biomass falling below limit reference point (20% B_0) and fluctuating around the target reference point (40% B_0). Recruitment was strong in 1990 and for several years since 2001. Median biomass has declined from virgin levels over the long-term but has never dropped below the 40% B_0 target. The most recent assessment (2017) estimates that the lower 95% credible interval of 2017 biomass (79% B_0) for the Combined CPUE and sensitivity models generally exceeds is or is close to the target reference point (39 – 61% B_0) and very likely (Pr>90%) to be at or above the target. Projections of all models to 2022 based on catch similar to recent levels (about 3,000 t) indicate that biomass is likely to remain the same with B_{2022} expected to range 54 – 79% B_0. SIb meets SG80 and 100.		
References	MPI (2017a; 2017e)		

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)	All stocks: Spawning Biomass Soft Limit	20% B_0	HAK 1: B_{2019} (Base); 65.5% B_0 (3.3 x soft limit) HAK 4: B_{2016} (Base); 48.2% B_0 (2.4 x soft limit) HAK 7: B_{2016} (RV & CPUE); >25.7% B_0 (>1.3 x soft limit) HAK 7: B_{2016} (CPUE); 50.3% B_0 (2.5 x soft limit) HOK 1(E): B_{2016} (Base); 60% B_0 (3.0 x soft limit) HOK 1(W): B_{2016} (Base); 59% B_0 (3.0 x soft limit) LIN 3&4: B_{2019} (Base); 51% B_0 (2.6 x soft limit) LIN 5&6: B_{2019} (Base); 91% B_0 (4.6 x soft limit) LIN 7WC: B_{2017} (COM); 79% B_0 (4 x soft limit)

PI 1.1.1	The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue	SG 60	SG 80	SG 100
Reference point used in scoring stock relative to MSY (SIb)	Hake & Ling: Spawning Biomass Target (proxy B_{MSY})	40% B_0	HAK 1: B_{2019} (Base); 65.5% B_0 (1.6 x target) HAK 4: B_{2016} (Base); 48.2% B_0 (1.2 x target) HAK 7: B_{2016} (RV & CPUE); >40% B_0 (>1.0 x target) HAK 7: B_{2016} (CPUE); 50.3% B_0 (1.3 x target) LIN 3&4: B_{2016} (Base); 51% B_0 (1.3 x target) LIN 5&6: B_{2016} (Base); 91% B_0 (2.3 x target) LIN 7WC B_{2017} (COM); 79% B_0 (2 x target)
Reference point used in scoring stock relative to MSY (SIb)	Hoki: Spawning Biomass Target (B_{MSY} compatible)	35 – 50% B_0	HOK 1(E): B_{2016} (Base); 60% B_0 (1.7 x lower tar) HOK 1(W): B_{2016} (Base); 59% B_0 (1.7 x lower tar)
HAK 1 OVERALL PERFORMANCE INDICATOR SCOR E:			**100**
HAK 4 OVERALL PERFORMANCE INDICATOR SCORE:			**100**
HAK 7 OVERALL PERFORMANCE INDICATOR SCORE:			**80**
HOK 1(E) OVERALL PERFORMANCE INDICATOR SCORE:			**100**
HOK 1(W) OVERALL PERFORMANCE INDICATOR SCORE:			**100**
LIN 3 OVERALL PERFORMANCE INDICATOR SCORE:			**100**
LIN 4 OVERALL PERFORMANCE INDICATOR SCORE:			**100**
LIN 5 OVERALL PERFORMANCE INDICATOR SCORE:			**100**
LIN 6 OVERALL PERFORMANCE INDICATOR SCORE:			**100**
LIN 7 OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			**n/a**

Evaluation Table for PI 1.1.2 – Reference Points

<table>
<tr><th colspan="2">PI 1.1.2</th><th colspan="3">Limit and target reference points are appropriate for the stock</th></tr>
<tr><td colspan="2">SI</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="5">a</td><td>Guidepost</td><td>Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.</td><td>Reference points are appropriate for the stock and can be estimated.</td><td></td></tr>
<tr><td>HAK Met?</td><td>Y</td><td>Y</td><td></td></tr>
<tr><td>HOK Met?</td><td>Y</td><td>Y</td><td></td></tr>
<tr><td>LIN Met?</td><td>Y</td><td>Y</td><td></td></tr>
<tr><td>Justification</td><td colspan="3">Hake and Ling: All reference points are based on estimates of the unexploited biomass (B_0) and are based on review and consideration of the estimation of proxy reference points elsewhere in the world. The New Zealand Harvest Strategy Standard (HSS) outlines the theoretical and biological basis of the reference points. The limit reference point on which this assessment is based (the soft limit of 20% B_0) is 50% of the Management Target (40% B_0). Both the soft limit and the target are consistent with the MSC defaults. SIa meets SG60.

Hake and Ling: As per the HSS, there is a soft limit reference point at 20% of the unexploited biomass, and a target reference point set at the HSS B_{MSY} proxy default of 40% B_0. The target exploitation is that to achieve the target biomass over the long-term. Stock assessments are used to estimate the unexploited biomass using statistical catch-at-age models, available information on the population dynamics and biomass surveys. Thus, these reference points can be estimated and are updated as new information becomes available. SIa meets SG80.

Hoki: All reference points are based on estimates of the unexploited biomass (B_0) and are based on review and consideration of the estimation of proxy reference points elsewhere in the world. The HSS outlines the theoretical and biological basis of the reference points. The limit reference point on which this assessment is based (the soft limit of 20% B_0) is 57% (35% B_0) and 40% (50%B_0) of the lower and upper range of the Management Target respectively. Both the limit and the target are consistent with the MSC guidelines. SIa meets SG60.

Hoki: As per the HSS, there are hard and soft limit reference points at 10% and 20% respectively of the unexploited biomass, and a target reference point range of 35 – 50% B_0 determined based upon an MSE. The target exploitation is that to achieve the target biomass range over the long-term. Stock assessments are used to estimate the unexploited biomass using statistical catch-at-age models, available information on the population dynamics and biomass surveys. Thus, these reference points can be estimated and are updated as new information becomes available. SIa meets SG80.</td></tr>
<tr><td rowspan="3">b</td><td>Guidepost</td><td></td><td>The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.</td><td>The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of precautionary issues.</td></tr>
<tr><td>HAK Met?</td><td></td><td>Y</td><td>N</td></tr>
<tr><td>HOK Met?</td><td></td><td>Y</td><td>N</td></tr>
</table>

	LIN Met?		Y	N
	Justification	All Stocks: The soft rather than hard limit reference point is treated in scoring this PI. The soft limit reference point is set by the New Zealand management system at a level above the point where reproductive capacity is impaired, based on population dynamics; it is consistent with MSC guidance (default 20% B_0). The hake, hoki and ling assessments use a stock-recruitment relationship with an assumed steepness = 0.80, 0.75 and 0.84 respectively, implying that expected biomass at the soft limit (20% B_0) will maintain recruitment at 75 – 84% of that at virgin levels for the three species. Research on B_{MSY} and related proxy RPs indicates that at steepness in the range of 0.75 – 0.84, B_{MSY}/B_0 ratios can be expected to be less than 0.4, implying that limit RPs based upon the HSS defaults are conservative. SIb meets SG80. All Stocks: While well justified, the soft limit (20% B_0) is a proxy that is applied to all stocks in lieu of stock-specific analyses supporting an alternative limit. There is no evidence that they were selected to be deliberately precautionary; the limit reference point does not take account of the uncertainty in estimating B_0 or current biomass. Stock assessments indicate that recruitment to the stocks exhibits very high variability. There have been no recent studies on the abiotic factors influencing recruitment strength. Research would be required on factors affecting recruitment before this or an alternative limit reference point might be justified based on relevant precautionary issues. SIb does not meet SG100.		
c	**Guidepost**		The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, or a higher level, and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.
	HAK Met?		Y	N
	HOK Met?		Y	Y
	LIN Met?		Y	N
	Justification	Hake and Ling: The target reference point is defined as 40% B_0, based on the HSS and is consistent with CR1.3 guidance for a B_{MSY} proxy. The risk that the hake and ling stocks would fall below the limit reference point if the stocks are kept around this target is low. At steepness ranging 0.80 – 0.84, it is expected that B_{MSY} would be a lower fraction of B_0 (25% - 30% B_0), than the HSS target default of 40% B_0. The intent of management is to maintain the stock at high productive levels, which is consistent with targets at or above B_{MSY}. The target biomass is achieved by applying a relatively constant exploitation rate (0.2) as a proxy for $F_{MSY,}$ which has demonstrably been maintained. SIc meets SG80. Hake and Ling: While well justified, the target (40% B_0) is a proxy that is applied to all stocks in lieu of stock-specific analyses supporting an alternative target. There is no evidence that the target was selected to be deliberately precautionary; the target reference point does not take account of the uncertainty in estimating B_0 or current biomass. Also, there has been no explicit examination of the target reference point, taking into account the ecological role of hake and ling in the ecosystem. While the current target is highly likely to be precautionary, this cannot be said with a high degree of certainty. Further justification for a target reference point based on a		

		defined level of precaution and the ecological role of the stocks is required. SIc does not meet SG100. Hoki: The target reference point for hoki changed from the HSS 40% B_0 default to the currently used Management Target range of 35% - 50% B_0 in 2009. The choice of the new target reference point was informed by MSE simulations which determined that the new target range is consistent with maintaining the stock above B_{MSY} calculated under deterministic considerations (24% B_0 for the Eastern stock and 25% B_0 for the Western stock). SIc meets SG80. Hoki: The target reference point range (35% - 50% B_0) is higher than the deterministic estimates of B_{MSY} for the Eastern and Western stocks (24% - 25% B_0) because the latter are based on the assumption of perfect information about the fishery and stocks and because targeting a deterministic B_{MSY} would lead to an undesirably high probability of breaching the soft limit. The target reference point range is thus precautionary as it reduces the risk of the stock dropping below the soft and hard limit reference points. SIc meets SG100.		
d	**Guidepost**		For key low trophic level stocks, the target reference point takes into account the ecological role of the stock.	
	Met?		NA	
	Justification	Hoki, hake and ling are not low trophic level (LTL) species. None are in MSC CR v1.3, Box CB1. The diet of these species is not predominantly plankton and none have the biological characteristics of LTL species identified in CR1.3.		
References		Haddon (2001), MPI (2008; 2011), Langley, 2009; 2011), Punt et al (2014)		

HAK 1 OVERALL PERFORMANCE INDICATOR SCORE	**80**
HAK 4 OVERALL PERFORMANCE INDICATOR SCORE	**80**
HAK 7 OVERALL PERFORMANCE INDICATOR SCORE	**80**
HOK 1(E) OVERALL PERFORMANCE INDICATOR SCORE	**90**
HOK 1(W) OVERALL PERFORMANCE INDICATOR SCORE	**90**
LIN 3 OVERALL PERFORMANCE INDICATOR SCORE	**80**
LIN 4 OVERALL PERFORMANCE INDICATOR SCORE	**80**
LIN 5 OVERALL PERFORMANCE INDICATOR SCORE	**80**
LIN 6 OVERALL PERFORMANCE INDICATOR SCORE	**80**
LIN 7 OVERALL PERFORMANCE INDICATOR SCORE	**80**
CONDITION NUMBER	**n/a**

Evaluation Table for PI 1.1.3 – Stock rebuilding

Not scored as PI 1.1.1 SG80 is met.

Evaluation Table for PI 1.2.1 – Harvest strategy

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
SI		SG 60	SG 80	SG 100
a	Guidepost	The harvest strategy is expected to achieve stock management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points.
	HAK Met?	Y	Y	Y
	HOK Met?	Y	Y	Y
	LIN Met?	Y	Y	Y
	Justification	All Stocks: The harvest strategy is guided by the HSS and is consistent with the MSC standard. The strategy 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 and includes the definition of (a) a target level about which a fishery or stock should fluctuate, (b) a soft limit that triggers a requirement for a formal, time-constrained rebuilding plan, and (c) a hard limit below which fisheries should be considered for closure. The harvest strategy involves collecting fishery-dependent and – independent data, analysing those data using a stock assessment model, assessing stock status relative to agreed reference points, conducting projections under alternative TACCs, and setting a TACC (and other regulations) which is consistent with the Fisheries Act 1996. The strategy has all the characteristics of a system which is expected to achieve stock management objectives as reflected in the target and limit reference points. SIa meets SG60. The four elements of the harvest strategy (monitoring, assessment, projections, and decision making consistent with the Fisheries Act 1996) are integrated and linked. The harvest control rule is an emergent property of strategy rather than being based on a mathematical algorithm, which provides the Minister with flexibility on how best to satisfy the requirements of the Act. The harvest strategy is responsive to the state of the stock, can respond to the variable recruitment characteristic of the stocks of deepwater fishery, particularly hake and hoki, and the elements of the harvest strategy work together towards achieving management objectives, as reflected in the target and limit reference points. SIa meets SG80 The harvest strategy, which is guided by the HSS, requires the definition of (a) a target level about which a fishery or stock should fluctuate, (b) a soft limit that triggers a requirement for a formal, time-constrained rebuilding plan, and (c) a hard limit below which fisheries should be considered for closure. The formal rebuilding plan when a stock is depleted to be below the soft limit (or fishery closure if the stock is estimated to be below the hard limit) contrasts with the MSC guidelines for PI 1.1.3 which consider a stock to be depleted when it is consistently below the target reference point. Rather, under the HSS, management must implement controls to ensure that the stock attains and is maintained at its target and avoids its limit. How this is to be achieved for stocks between the target and soft limit is not explicitly prescribed by the HSS as an algorithm with flexibility to achieve strategic objectives. Management decisions on the hake, hoki and ling stocks, as summarized by their Kobe plots, illustrate the management actions taken when the stock was projected to drop below the target and soft limit, indicating that the harvest strategy will react		

		before a stock drops below the limit reference point. Stock assessments report stock status relative to the reference points and quantify the implications of future TACC levels. The harvest strategy is therefore responsive to the state of the stock and is designed to achieve stock management objectives, as reflected by the target and limit reference points. SIa meets SG100		
b	**Guidepost**	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	HAK Met?	Y	Y	N
	HOK Met?	Y	Y	N
	LIN Met?	Y	Y	N
	Justification	All Stocks: The harvest strategy is based upon the HSS which in turn was formulated based on international best practice and articulates successful implementations of management systems. It is published and is in the public domain. The HSS provides plausible argument that the strategy is likely to work. The time series of biomass and exploitation rate of the various stocks, as illustrated by the Kobe plots, provide experience that the strategy is likely to work. SIb meets SG60. The harvest strategies of the three species have not undergone formal testing, although an MSE was used to evaluate hoki harvest strategies which mimicked to a large degree its harvest strategy, and reported estimated probabilities of, for example, dropping below the limit reference point. Rather, evidence for the effectiveness of the harvest strategies is provided by the stock assessments. Stock assessments are conducted on a multi-annual cycle (three year for hake and link; annually for hoki) and provide management with 5-year projections guided by the requirements of the HSS. Between assessments, fishery and survey data are updated and if issues arise, management responds to these. The strategy of each stock allows management to respond to both rare recruitment events as well as changes in the fishery. The Kobe plots of the hake, hoki, and ling stocks provide evidence which indicates that their strategies are achieving their objectives. For hoki, in the 1990s, biomass was in decline and by the early 2000s, dropping below the target range. The TACCs were significantly reduced which in turn significantly reduced exploitation to below the U target range. Consequently, biomass increased to above the biomass target range. Similar trends are observed in the hake stocks and likely would be in the ling stocks although, in this case, status has never dropped below the 40% B_0 target. SIb meets SG80. While there is evidence that the harvest strategies of the three species are achieving their objectives, they have not undergone formal testing. While the HSS recognizes the value of MSE to evaluate harvest strategies, no MSEs have been undertaken for hake and ling, although one for ling is included in the current five-year research plan for MPI. MSE has only been used to limited extent for hoki but it did not fully explore a range of likely uncertainties (such as time-varying fishery selectivity and natural mortality, a wide range of trends in recruitment, etc.). While a new MSE is planned for hoki, it is premature to conclude that its harvest strategy has been fully evaluated. SIb does not meet SG100.		
c	**Guidepost**	Monitoring is in place that is expected to determine whether the		

		harvest strategy is working.		
	HAK Met?	Y		
	HOK Met?	Y		
	LIN Met?	Y		
	Justification	All Stocks: Fishery-dependent and -independent data are available to monitor trends in abundance as well as the age- and sex-structure of the stocks and their removals. These data are included in stock assessments, which are conducted on a multi-annual cycle based upon the life-cycle characteristics and perceived harvesting risks to each stock. These assessments evaluate, in probabilistic terms, the degree to which strategic objectives are being achieved. Considerable planning on data collection (e.g. fishery and surveys) and assessment activity is undertaken to determine the appropriate level of monitoring given the risks to each stock. Between assessments, fishery and survey indices are updated each year and if issues arise, assessments can be conducted on an as-needed basis. SIc meets SG60.		
d	**Guidepost**			The harvest strategy is periodically reviewed and improved as necessary.
	HAK Met?			Y
	HOK Met?			Y
	LIN Met?			Y
	Justification	All Stocks: The HSS was published in 2008, and represents the current configuration of the harvest strategy. There is a process of strategy review through the sustainability round, the results of which appear in MPI and other reports. The guidelines for applying the HSS were revised in 2011. The major changes relate to metrics for quantifying fishing intensity as well as to the roles and responsibilities of science working groups and fisheries managers. Stock-specific harvest strategies evolve over time (i.e. development of MSY-based target reference points rather than the HSS default proxies for hoki), demonstrating that harvest strategies are reviewed periodically and revised. The HSS recognizes the value of MSE to evaluate harvest strategies and one is currently planned for hoki and ling. There is clear evidence that there is an intention to improve the harvest strategy and the decision-making process, and improvements from reviews are being implemented. SId meets SG100.		
e	**Guidepost**	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?	NA	NA	NA
	Justification	Hake, hoki and ling are not shark species.		
References		Intertek (2012a; 2012b; 2014a; 2014b), MPI (2008; 2011; 2016; 2017a)		
HAK 1 OVERALL PERFORMANCE INDICATOR SCORE				**95**
HAK 4 OVERALL PERFORMANCE INDICATOR SCORE				**95**

HAK 7 OVERALL PERFORMANCE INDICATOR SCORE	**95**
HOK 1(E) OVERALL PERFORMANCE INDICATOR SCORE	**95**
HOK 1(W) OVERALL PERFORMANCE INDICATOR SCORE	**95**
LIN 3 OVERALL PERFORMANCE INDICATOR SCORE	**95**
LIN 4 OVERALL PERFORMANCE INDICATOR SCORE	**95**
LIN 5 OVERALL PERFORMANCE INDICATOR SCORE	**95**
LIN 6 OVERALL PERFORMANCE INDICATOR SCORE	**95**
LIN 7 OVERALL PERFORMANCE INDICATOR SCORE	**95**
CONDITION NUMBER	n/a

Evaluation Table for PI 1.2.2 – Harvest control rules and tools

PI 1.2.2		There are well defined and effective harvest control rules in place		
SI		SG 60	SG 80	SG 100
a	Guidepost	Generally understood harvest rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.	Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.	
	HAK Met?	Y	Y	
	HOK Met?	Y	Y	
	LIN Met?	Y	Y	
	Justification	All Stocks: In the New Zealand management system, the harvest control rule (HCR) emerges from the management actions and responses determined by the results of a series of stock projections under a range of catch assumptions, guided by the biological reference points. The harvest control rule is not a mathematical algorithm which determines TACCs as a function of stock status relative to limit and target reference points but rather is a consequence of the requirements of the Fisheries Act 1996 and the HSS (Ministry of Fisheries 2008). The harvest control rule is thus composed of comparing estimated stock status with the limit (i.e. soft limit) and target reference points, implementing a rebuilding plan if the stock is assessed to be below the soft limit, considering the fishery for closure if the stock is below the hard limit, and implementing management actions based on five-year projections which assess future stock status in relation to the limit and target reference points given assumptions regarding future recruitment, TACCs and catch limits. Thus, the harvest control rules are generally understood and consistent with the harvest strategy and will act to reduce the exploitation rate as the limit reference point is approached. SIa meets SG60. The HSS states that the probability of breaching the soft limit should not exceed 10% and that the probability of achieving the MSY-compatible target or better should be no less than 50%. It stipulates that below the soft limit, a formal rebuilding plan to achieve target biomass within a specified period is required. The HSS thus states the need for action to reduce exploitation when stock status is below the target and although a mathematical algorithm is not specified on how precisely the exploitation rate is to be reduced below the target, an exploitation rate function emerges from implementation of the HSS which acts to keep the stock above the limit and to maintain the stock at the target, consistent with MSC CR v1.3 GCB2.6. A “well-defined” harvest control rule should be transparent and testable. The harvest control rule is transparent, in that it will be clear whether it is being observed or not. Scientific advice is clearly stated in relation to the requirements of the HSS and therefore it is possible to determine whether or not this advice is being taken and adequate reason given for alternative actions. Any reason for not adhering to the harvest control rule can be readily evaluated against the HSS and MSC requirements. The harvest control rule is testable and is being tested with careful consideration of how the rules as outlined in the HSS will work in the New Zealand management system and agreement that these will enable the New Zealand fishery to maintain stock sizes at acceptable levels, consistent with HSS and MSC principles. The response to the determination of HAK 7 stock status is a case in point. MPI has responded to the state of the stock and is taking precautionary action to reduce exploitation to maintain biomass at the 40%B_0 target and minimize the risk of breaching the 20% Soft Limit. In		

		this case, MPI does not consider that stock status is below the 20% Soft Limit and therefore a formal rebuilding plan is not required. SIa meets SG80.		
b	**Guidepost**		The selection of the harvest control rules takes into account the main uncertainties.	The design of the harvest control rules takes into account a wide range of uncertainties.
	HAK Met?		Y	N
	HOK Met?		Y	Y
	LIN Met?		Y	N
	Justification	All Stocks: The uncertainties are identified in the assessments and their impact on the short-term projections examined as scenarios for future catch in the sensitivity analyses. Management decisions on quotas and other actions take account of these uncertainties. Uncertainties which have been accounted for and/or explored include: alternate stock indices (e.g. HAK 7), the unfished average biomass level (B_0), natural mortality rate, selectivity, recruitment (e.g. source of infrequently occurring strong year-classes), age composition, and acoustic survey catchability and observation error. Stock assessments also take account of sample error and a “process error”, which is added to weight the stock abundance indices more appropriately and thus account for errors that cannot be estimated. The results of the projections are expressed in terms of probabilities of failing to achieve the strategic objectives of the HSS. In the case of HAK 7, the stock projections were based on the more pessimistic survey model to be more precautionary until the uncertainties in the assessment can be reduced. SIb meets SG80. Hake and Ling: The design of the harvest control rule can accommodate a wide range of uncertainties and many have indeed been examined in the projections through the sensitivity analyses. However, a systematic examination of the spectrum of uncertainties would benefit from an MSE, none of which have been as yet undertaken for the hake and ling stocks. An MSE is planned for ling within the current 5-year research plan for MPI. Completion of these MSEswould ensure that the examination of the uncertainties is comprehensive. SIb does not meet SG100. Hoki: The design of the harvest control rule can accommodate a wide range of uncertainties and many have indeed been examined in the projections through the sensitivity analyses. Examination of the spectrum of uncertainties benefited from the MSE conducted during 2009 and 2011 and will benefit from that currently being planned. These ensure that the examination of the uncertainties is comprehensive. SIb meets SG100.		
c	**Guidepost**	There is some evidence that tools used to implement harvest control rules 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 harvest control rules.	Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.
	HAK Met?	Y	Y	Y
	HOK Met?	Y	Y	Y
	LIN Met?	Y	Y	Y
	Justification	All Stocks: The main tools used to implement the harvest control rules are the TACC and ACE of the QMS. The estimated catch is frequently less than the TACC, although overruns can occur. Discarding can occur but only to a limited degree as discarding is legal but needs to be recorded by a scientific observer and counted		

		against the vessel quota. Catch overages can also occur when a species is a bycatch to the main targeted species. The QMS is an incentive-based system designed to encourage good behavior (i.e. maintaining catch within the TACC) and penalizing bad behavior (i.e. penalizing catch above the TACC through an additional tax or deemed value). Quota holders can address catch over their allotted ACE through purchasing unfished ACE from other quota holders. Further, allowance for 'other sources of mortality' including catch misreporting is included in the TACC-setting process. SIc meets SG80. Hake and Ling: A complication with judging the effectiveness of the QMS for these stocks is that they are caught primarily as bycatch to the hoki fishery. For many of these stocks, catch has been well below the TACCs and not acting as a constraint to fishing. This is the case with all three hake stocks and three of the five ling management areas. In LIN 5 and LIN 7, while there has been catch overages, catch since 2010/11 has largely been constrained by the TACCs. Another issue with the ling stocks is the need to allocate stock-specific science advise to LIN management areas, which requires an analysis based upon the biological distribution of the stocks in the management area. Notwithstanding these issues, evidence from the fisheries indicates that the QMS is an effective control of catches. SIc meets SG100. Hoki: Intertek (2012a) states that there were issues in the QMS for hoki but these have been resolved but indicated that further years of evidence were required to conclude that the control methods in place were sufficient to clearly show that catches can be constrained east-west as intended. Since 2010/11, not only have the overall hoki catch been closely tracking the HOK 1 TACCs but the catch of the eastern and western stocks has been closely tracking the stock-specific, industry-agreed catch limits. This indicates that the QMS is an effective control of catches. SIc meets SG100.
References		Intertek (2012a; 2012b; 2014a; 2014b), MPI (2008; 2011; 2016; 2017a; 2017c, 2017d, 2017e)

HAK 1 OVERALL PERFORMANCE INDICATOR SCORE	**90**
HAK 4 OVERALL PERFORMANCE INDICATOR SCORE	**90**
HAK 7 OVERALL PERFORMANCE INDICATOR SCORE	**90**
HOK 1(E) OVERALL PERFORMANCE INDICATOR SCORE	**100**
HOK 1(W) OVERALL PERFORMANCE INDICATOR SCORE	**100**
LIN 3 OVERALL PERFORMANCE INDICATOR SCORE	**90**
LIN 4 OVERALL PERFORMANCE INDICATOR SCORE	**90**
LIN 5 OVERALL PERFORMANCE INDICATOR SCORE	**90**
LIN 6 OVERALL PERFORMANCE INDICATOR SCORE	**90**
LIN 7 OVERALL PERFORMANCE INDICATOR SCORE	**90**
CONDITION NUMBER	n/a

Evaluation Table for 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			
	Guidepost	**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 is 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.
	HAK Met?	Y	Y	N
	HOK Met?	Y	Y	N
	LIN Met?	Y	Y	N
	Justification	All Stocks: The plenary and assessments reports of hake, hoki and ling (e.g. MPI, 2017a) summarize information on stock structure and biology, while the assessments estimates movement rates (in case of hoki), fleet selectivity patterns, natural mortality and other stock and fishery dynamical parameters. Thus, there is some relevant information related to stock structure, stock productivity and fleet composition available to support the harvest strategy. SIa meets SG60. Hake: There is good evidence to suggest that at least three separate hake stocks exist in the New Zealand EEZ. Based on a review of information on **stock structure**, Intertek (2014a) concluded that while available information is clearly sufficient to support the stock hypothesis, there is not a full understanding of whether the differences between the stocks are genetic or not. There have been no more recent studies. **Growth** is described by von Bertalanffy and Schnute growth models with sex-specific and time-invariant growth models input to the stock assessments. Otolith ageing has been validated. Recent assessments either assume stock-specific **natural mortality** or estimate it in the model. Stock assessments, which assume a Beverton and Holt stock-recruitment relationship with a steepness of 0.8, indicate that **recruitment** to the hake stock exhibits very high variability. There have been no recent studies on the abiotic factors influencing recruitment strength. There is good information on **fleet composition** and while there is fine-scale data on **CPUE**, it is generally not used in stock assessments due to the availability of survey information, although due to the sparcity of survey data, CPUE is an important index in the HAK 7 assessment. Sufficient data are all available to obtain good estimates of stock abundance from the assessment. Information on all vessels is held through a registry and licence system. Vessel activity is monitored through VMS and an observer programme. A variety of **other data** sources (diet, environmental conditions, etc.) are also available for use in assessments and other analyses. Thus, relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy. SIa meets SG80. Hoki: Available data (primarily morphological) indicates that there are two hoki stocks (Eastern and Western). Since Intertek (2012a) reviewed information on hoki **stock structure**, there have not been more recent stock structure studies. Growth is described by sex-specific von Bertalanffy **growth** models input to the		

PI 1.2.3		Relevant information is collected to support the harvest strategy		
		stock assessments. New growth and maturity research since Intertek (2012a) have described a potential relationship between hoki growth and year-class size although it is preliminary. Otolith ageing has been validated. Age-specific **natural mortality** is estimated in the assessment model. There is currently research on hake predation on hoki that it is in its early stages. Hoki stock assessments assume a Beverton and Holt stock-**recruitment** relationship with steepness set equal to 0.75. While climate is known to be important to year-class strength, the mechanisms are still unknown. There is good information on **fleet composition** and while there is fine-scale data on **CPUE**, it is generally not used in stock assessments due to the availability of survey information. Sufficient data are all available to obtain good estimates of stock abundance from the assessment. Information on all vessels is held through a registry and licence system. Vessel activity is monitored through VMS and an observer programme. A variety of **other data** sources (diet, environmental conditions, etc.) are also available for use in assessments and other analyses. Thus, relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy. SIa meets SG80. Ling: Based on a wide array of information, there are at least five ling stocks around New Zealand, managed over eight management areas. Since Intertek (2014b), otolith contour shape analysis has confirmed this **stock structure**. Growth is described by von Bertalanffy models and input to the stock assessments. A **growth** study of ling from five areas has described growth patterns across the stocks. Otolith ageing has been validated. Age-invariant **natural mortality** is estimated in the stock assessments and varies amongst stocks. Ling stock assessments assume a Beverton and Holt stock-**recruitment** relationship with steepness dependent on the stock, these being 0.84 for the three stocks. There is good information on **fleet composition** and there is fine-scale data on **CPUE** which is used in some of the stock assessments. Sufficient data are all available to obtain good estimates of stock abundance from the assessment. Information on all vessels is held through a registry and licence system. Vessel activity is monitored through VMS and an observer programme. A variety of **other data** sources (diet, environmental conditions, etc.) are also available for use in assessments and other analyses. Thus, relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy. SIa meets SG80. All Stocks: While there is considerable information on the biology of hake, hoki and ling, data gaps remain. In all three stocks, questions remain on the characterization of stock structure (e.g. genetic) and movements. The biotic and abiotic drivers of productivity, particularly recruitment, remain to be elucidated. It cannot be concluded that the range of information available is comprehensive. SIa does not meet SG100.		
b	Monitoring			
	Guidepost	Stock abundance and UoA removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and UoA removals are **regularly monitored at a level of accuracy and coverage consistent with the harvest control rule**, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	**All information** required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent **uncertainties** in the information [data] and the robustness of assessment and management to this uncertainty.
	HAK1 Met?	Y	Y	Y

PI 1.2.3		Relevant information is collected to support the harvest strategy		
	HAK 4 Met?	Y	Y	Y
	HAK 7 Met?	Y	Y	N
	HOK 1(E) Met?	Y	Y	Y
	HOK 1(W) Met?	Y	Y	Y
	LIN 3 & 4 Met?	Y	Y	Y
	LIN 5 & 6 Met?	Y	Y	Y
	LIN 7WC Met?	Y	Y	Y
	Justification	All Stocks: The monitoring of the hake, hoki and ling trawl fishery has not changed significantly since Intertek (2012a; 2014a; 2014b). Landing information is required from each registered fishing vessel once all fish and fish product has been landed following each fishing trip. A new initiative to develop enhanced surveillance capacity based upon the integration of information from multiple monitoring activities will be rolled out over a number of years, with the first stages of implementation to take place during 2017 – 2019. Renamed the 'Digital Monitoring' program, electronic reporting has now been implemented on all trawl vessels >28m LOA. In late 2017, the Minister of Fisheries announced a delay in the introduction of cameras on commercial fishing vessels to allow for further consultation on the proposal to ensure effective implementation. No decision as yet has been made on the date of implementation of this video surveillance. MPI (2017a) notes instances of illegal and unreported catch of the three species. Overall, illegal and unreported catch are not considered significant. Observers provide information on the fishery's catch volume and composition on an on-going basis. During 2002/03 – 2014/15, observer coverage of the hoki trawl fishery ranged 9.3 – 30.7%. During the same period, observer coverage of hake and ling directed fishing ranged 5.2 – 76.6% and 2.5 – 23.3% respectively. In all three cases, there has been an increasing temporal trend in observer coverage. While there are some sampling issues (e.g. lack of observer sampling of WCSI ling during 2009-2011 and need for port sampling in Cook Strait), observer coverage of the hoki/hake/ling trawl fishery continues to be good. Stratified-random bottom trawl–acoustic surveys have been conducted on the Chatham Rise (January), in the Sub-Antarctic area (April-May and Nov-Dec) and on the West Coast South Island (March-April and August) since 1988 and provide the main age and size-specific abundance indices for the hoki, hake and ling stock assessments. The sampling design and operation of these surveys is described in reports produced for each survey. For hake and ling, the trawl component of these surveys provides the indices of abundance. For hoki, whether acoustic and / or trawl indices are used in an assessment is survey series-specific. For instance, the acoustic component of the WCSI winter survey is considered to be appropriate for hoki but less so its trawl component. Since Intertek (2012a, 2014a; 2014b), the overall intensity of the survey programme has reduced due to a perceived need by MPI to reallocate		

PI 1.2.3		Relevant information is collected to support the harvest strategy
		resources to less well understood fisheries, which has increased the uncertainty in these abundance indices. The Chatham Rise (January) and Sub-Antarctic (Nov-Dec) surveys have been conducted biannually since 2014 while WCSI survey (trawl component) has been conducted triannually since 2013. The acoustic surveys (WCSI and Cook Strait) are targeted on hoki spawners with only the Cook Strait survey conducted in 2016. The uncertainties in these surveys have been studied over a number of years and are generally well understood, e.g. 2014 review of the trawl and acoustic components of the WCSI survey to inform future survey design. Improvements are made to surveys as deemed necessary (e.g. addition of deepwater strata to Chatham Rise surveys to better cover the stock range of hake and other species. The sampling CVs of these surveys are considered low (e.g. 10 – 25%) and during the stock assessment process are increased to better represent the contribution of these data to stock status determination. Standardized commercial catch rate (CPUE) indices are also used in the hake and ling stock assessments. Issues with each of these indices are discussed by the DWFAWG and noted as appropriate in the plenary reports. As with the survey indices, the CVs of these indices are considered low and during the stock assessment process are increased to better represent the contribution of these data to stock status determination. SIb meets SG60 and SG80. HAK 1 & 4: The uncertainties in trawl surveys have been studied over a number of years and are generally well understood. The relatively low sampling CVs are adjusted upwards in the assessment to compensate for error related to the observation process. During assessments, robustness of the assessment to these indices (survey and CPUE) are explored through sensitivity runs. Trends in the multiple indices are generally consistent and if not, are understood, the consequences of which are examined in sensitivity runs. Thus, all information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the data and the robustness of the assessment and management to this uncertainty. SIb meets SG100. HAK 7: The uncertainties in trawl surveys have been studied over a number of years and are generally well understood. The relatively low sampling CVs are adjusted upwards during the assessment to compensate for error related to the observation process. During assessments, robustness of the assessment to these indices (survey and CPUE) are explored through sensitivity runs. However, the HAK 7 survey trawl index consists of only four years of data and consequently, the assessment also relies on a CPUE index covering a longer-time period. The trends in the two indices offer different perspectives of stock status for reasons as yet not fully understood. While stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule, and while the sources of uncertainty are understood, the information cannot be said to have a high degree of certainty. SIb does not meet SG100. HOK: The uncertainties in trawl surveys have been studied over a number of years and are generally well understood. The relatively low sampling CVs are adjusted upwards during the assessment to compensate for error related to the observation process. During assessments, robustness of the assessment to these indices (survey and CPUE) are explored through sensitivity runs. Trends in the multiple indices are generally consistent and if not, are understood, the consequences of which are examined in sensitivity runs. Thus, all information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the data and the robustness of the assessment and management to this uncertainty. SIb meets SG100.

PI 1.2.3		Relevant information is collected to support the harvest strategy		
		LIN: The uncertainties in trawl surveys have been studied over a number of years and are generally well understood. The relatively low sampling CVs are adjusted upwards during the assessment process to compensate for process error related to the observation methodology. During assessments, robustness of the assessment to these indices (survey and CPUE) are explored through sensitivity runs. Thus, all information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the data and the robustness of the assessment and management to this uncertainty. SIb meets SG100.		
c	Comprehensiveness of information			
	Guidepost		There is good information on all other fishery removals from the stock.	
	HAK Met?		Y	
	HOK Met?		Y	
	LIN Met?		Y	
	Justification	All Stocks: Other than ling, catches by gears other than midwater and bottom trawl are negligible. The landed catches by Maori for customary purposes and by recreational fishers are considered to be negligible. Catches by all commercial fishing sectors (including non-hoki fisheries) are counted against the TACC. The level of illegal and unreported catch is thought to be low. Corrections were applied to catches for this detected misreporting. Scientific observers have also reported discards of undersize fish and accidental loss from torn or burst codends. Overall, non-recorded mortality is very likely to be small compared to the reported catch and should not affect the stock assessment and scientific advice. Thus, there is good information on all fishery removals from the hake, hoki and ling stocks. SIc meets SG80.		
References		Bagley et al, (2014), Horn (2011; 2015a); Intertek (2012a; 2014a; 2014b); Ladroit et al (2017); MPI (2017a; 2017c); O'Driscoll et al (2014b); Simmonds et al (2016); Stevens et al, 2017), Tilney et al (2017)		

HAK 1 OVERALL PERFORMANCE INDICATOR SCORE:	**90**
HAK 4 OVERALL PERFORMANCE INDICATOR SCORE:	**90**
HAK 7 OVERALL PERFORMANCE INDICATOR SCORE:	**80**
HOK 1(E) OVERALL PERFORMANCE INDICATOR SCORE:	**90**
HOK 1(W) OVERALL PERFORMANCE INDICATOR SCORE:	**90**
LIN 3 OVERALL PERFORMANCE INDICATOR SCORE:	**90**
LIN 4 OVERALL PERFORMANCE INDICATOR SCORE:	**90**
LIN 5 OVERALL PERFORMANCE INDICATOR SCORE:	**90**
LIN 6 OVERALL PERFORMANCE INDICATOR SCORE:	**90**
LIN 7 OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	**n/a**

Evaluation Table for PI 1.2.4 – Assessment of stock status

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring issue		SG 60	SG 80	SG 100
a	**Guidepost**		The assessment is appropriate for the stock and for the harvest control rule.	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.
	HAK 1 Met?		Y	Y
	HAK 4 Met?		Y	Y
	HAK 7 Met?		Y	N
	HOK 1(E) Met?		Y	Y
	HOK 1(W) Met?		Y	Y
	LIN 3 &4 Met?		Y	Y
	LIN 5 & 6 Met?		Y	Y
	LIN 7WC Met?		Y	Y
		All stocks: The assessment modelling approach in the hake, hoki and ling assessments has not changed significantly since Intertek (2012a; 2014a; 2014b). These assessments use catch history, proportion-at-age, and a variety of survey and CPUE data from the mid-1970s – present in a Bayesian Statistical Catch-At-Age (SCAA) modeling framework (implemented by the NIWA stock assessment program CASAL). The structure of each of the assessments has endeavoured to best take account the major features of the stock`s biology and fishery. In general, the assessments of the hoki stocks are the most elaborate, followed by ling and hake. Assessments can be unsexed (HAK 4 & HAK 7) or sexed (HAK 1, hoki and ling). Recruitment is estimated as deviations around an assumed Beverton and Holt stock-recruitment relationship with assumed steepness (0.80, 0.75 and 0.84 for hake, hoki and ling respectively). Natural mortality can either be fixed or estimated. In common with stock assessments for most whitefish fisheries, the key outputs from the assessments are unfished spawning biomass, B_0, for each stock, current spawning biomass for each stock, the selectivity patterns for the fisheries and the surveys, and the time-trajectories of spawning stock biomass, fishing mortality and recruitment by stock. The consequences (i.e. stock status relative to reference points) of catch scenarios are explored through five-year projections for both a base case and sensitivity runs which bracket the main uncertainties. SIa meets SG80. HAK 1 & HAK 4: Sex-specific processes can be a major feature of a stock. The 2011 assessment had removed sex from the model partition to alleviate problems caused by inconsistencies in sex ratios in the age-specific data. In the 2014 assessment, it was established that sex in or out of the partition, and sexed or unsexed selectivity, had little impact on biomass or stock status. However, when selectivity was estimated by sex, the ogives varied markedly between sexes and unrealistic, and models with sexed observations exhibited trends in the fits to these data. The model that best avoided undesirable fitting trends and produced the most credible selectivity ogives and trawl survey catchabilities was one with sex in the partition, but with unsexed observations, unsexed selectivity, and estimation of age-specific dependent *M*. This illustrates that the assessment has		

		endeavoured to take account of this major feature of stock biology. SIa meets SG100. HAK 7: There is a conflict between the survey and CPUE trends which caused MPI to consider two equally plausible models to determine stock status. Relatively few years of trawl survey data are available (four), which affords considerable influence of each survey point in the analysis (compare CPUE and Survey data fits in Figure 38). Also, the areal coverage of the trawl survey series is relatively sparse and does not survey the entire area off WCSI where hake are known to be abundant. The CPUE series was truncated (at 2001) because earlier data were considered unreliable and biased, and there may still be biases in the series since 2001. In particular, changes in fishing technology, specific fisher behaviour to target or avoid hake, and in the commercial (economic) desirability of hake are not captured in the QMS effort statistics, and so cannot be standardised for in a CPUE model. For the next assessment (brought forward from 2019/2020 to 2018/2020), further analyses of the CPUE data will be conducted along with consideration of data from a trawl survey to be conducted in 2018. The process(es) which are causing the difference in the survey and CPUE trends are not currently fully understood which indicates that some major feature of the stock, the fishery and its monitoring is not being taken into account in the models. Until this situation is resolved, perhaps during the next assessment, SIa does not meet SG100. HOK: The assessment model takes account of most of the types of features included in world's best stock assessments including annual cycle of fishing, recruitment, spawning and natural mortality, sex-specific dimorphic growth, movement, and spatial structure (split into interacting Eastern and Western stocks) as well as time-varying selectivity. This illustrates that the assessment has endeavoured to take account of the major features of stock and fishery biology. SIa meets SG100. LIN: Although not as elaborate as the hoki model, the ling assessment models take account of the important features including annual cycle of fishing, recruitment, spawning and natural mortality and particularly sex-specific dimorphic growth. This illustrates that the assessments have endeavoured to take account of the major features of stock and fishery biology. SIa meets SG100.		
b	**Guidepost**	The assessment estimates stock status relative to reference points.		
	HAK Met?	Y		
	HOK Met?	Y		
	LIN Met?	Y		
	Justification	HAK: The stock assessments provide estimates of spawning biomass relative to (a) the hard (10%B_0) and soft (20%B_0) limits, (b) where it has been estimated/reported (for some stocks) estimates of B_{MSY} under the assumption of deterministic dynamics, and (c) the Management Target (40%B_0). They also provide estimates of exploitation or fishing intensity relative to that corresponding to the Management Target. SIb meets SG60. HOK: The stock assessments provide estimates of spawning biomass relative to (a) the hard (10%B_0) and soft (20%B_0) limits, (b) B_{MSY} under the assumption of deterministic dynamics, and (c) the Management Target (35% - 50% B_0). They also provide estimates of exploitation or fishing intensity relative to those corresponding to the upper and lower ends of the Management Target. SIb meets SG60. LIN: The stock assessments provide estimates of spawning biomass relative to (a) the hard (10%B_0) and soft (20%B_0) limits, (b) where it has been estimated/reported (for some stocks) estimates of B_{MSY} under the assumption of deterministic dynamics, and (c) the Management Target (40%B_0). They also		

		provide estimates of exploitation or fishing intensity relative to that corresponding to the Management Target. SIb meets SG60.		
c	**Guidepost**	The assessment identifies major sources of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.
	HAK Met?	Y	Y	Y
	HOK Met?	Y	Y	Y
	LIN Met?	Y	Y	Y
	Justification	All Stocks: Stock assessments use a Bayesian Statistical Catch-At-Age (SCAA) modeling framework (implemented by the NIWA stock assessment program CASAL). Priors are defined for all model parameters which provide the expected uncertainty in each. Many of these are intentionally uninformative but those on survey catchability can be informative. The objective function also includes likelihoods for the catch proportions at age (multinomial) and abundance indices (lognormal), and penalty functions to constrain the model so that parameter combinations that did not allow historical catch to be taken are strongly penalised. Estimation of the parameters and associated uncertainty occurs in two phases. The first ‘exploratory’ phase is conducted on a range of candidate models as an optimization and is used to identify the mode of the joint posterior distribution (MPD). During this phase, additional ‘process’ error, assumed to arise from differences between model simplifications and real world variation, is estimated separately for the catch proportions and survey data (estimated to be zero) and added to their observation error. This provides a better weighting of the uncertainty in these datasets during the optimization. Model fit diagnostics (e.g. residual analyses) are examined and a base case model along with additional ‘sensitivity’ models which bracket the main uncertainties are identified. The uncertainties vary by assessment but typically include whether or not to include particular datasets (e.g. survey vs CPUE) and whether or not fish are dying (e.g. higher *M*) or not available to fishery and / or survey (e.g. domed selectivity). Retrospective analyses are typically not undertaken given the diverse temporal range of input data used. In the second phase, the full posterior distribution of the parameters of all models is characterized using Markov Chain Monte Carlo (MCMC) methods based upon the Metropolis-Hastings algorithm and tests for chain convergence. Thus, stock assessments identify major sources of uncertainty and take uncertainty into account. SIc meets SG60 and 80. All Stocks: The full posterior distribution of the parameters of all models characterized using MCMC allows interpretation of stock status indicators in probabilistic terms relative to hard, soft and target reference points e.g. Pr($B_{current}$ > 40% B_0). The base case and sensitivity models are brought through the projection process to inform management decisions on the impacts of the uncertainties. The projections include probability intervals for future stock size, and the probability of dropping below reference points for each catch scenario. Thus, stock assessments takes uncertainty into account and evaluate stock status relative to reference points in a probabilistic way. SIc meets SG100.		
d	**Guidepost**			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	HAK Met?			N

	HOK Met?			N
	LIN Met?			N
	Justification	All Stocks: The Bayesian Statistical Catch-At-Age (SCAA) modeling framework has been applied extensively on the New Zealand stocks. Stock assessments involve a fair degree of exploration of alternative stock and fishery dynamical processes, which ultimately produce the base case and sensitivity models considered in the projections. However, all these explorations occur within the Bayesian SCAA framework. There has been little exploration of alternative approaches (e.g. State Space which consider process error more comprehensively). In 2009 & 2011, an MSE on hoki focused on the HCR, not the assessment. The hoki MSE currently underway may be more comprehensive. No MSEs have been conducted on the hake and ling stocks. Simulation studies exploring estimation performance of the Bayesian SCAA approach as applied to hake, hoki and ling, are not available. Thus, it cannot be concluded that the assessment has been fully tested and alternative assessment approaches are rigorously explored. SId does not meet SG100.		
e	**Guidepost**		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	HAK Met?		Y	N
	HOK Met?		Y	Y
	LIN Met?		Y	N
	Justification	All Stocks: The stock assessment peer review process has not significantly changed since Intertek (2012a; 2014a; 2014b). The compilation of an assessment is contracted out by MPI and in recent years, a team of NIWA scientists has prepared most stock assessments, a review of which is initially conducted within NIWA. The assessment is then presented to MPI's Deepwater Working Group (DWFAWG), which reviews the draft assessment and provides observations and recommendations to the assessment team on its analysis. The DWFAWG is open to all interested parties. The consensus summary of the meeting is made publically available in a Plenary Report with more detailed technical descriptions subsequently published in a NZ Fisheries Assessment Report. SIe meets SG80. HAK & LIN: There has been no external review of hake and ling assessments. SIe does not meet SG100. HOK: A first external review of the hoki assessment was conducted in 1999. The most recent external review of the hoki assessment was conducted in 2014 with a number of its recommendations either included in subsequent stock assessments or under consideration. SIe meets SG100.		
References		Bull et al (2012); Butterworth et al (2014); Francis (2011); Horn (2015b; 2017); Intertek (2012a; 2014a; 2014b); MPI (2017a; 2017e); O'Driscoll et al (2002; 2016); McKenzie (2017); McGregor (2015); Quinn and Sullivan (1999); Roberts (2015)		

HAK 1 OVERALL PERFORMANCE INDICATOR SCORE	**90**
HAK 4 OVERALL PERFORMANCE INDICATOR SCORE	**90**
HAK 7 OVERALL PERFORMANCE INDICATOR SCORE	**85**
HOK 1(E) OVERALL PERFORMANCE INDICATOR SCORE	**95**
HOK 1(W) OVERALL PERFORMANCE INDICATOR SCORE	**95**
LIN 3 OVERALL PERFORMANCE INDICATOR SCORE	**90**
LIN 4 OVERALL PERFORMANCE INDICATOR SCORE	**90**

LIN 5 OVERALL PERFORMANCE INDICATOR SCORE	**90**
LIN 6 OVERALL PERFORMANCE INDICATOR SCORE	**90**
LIN 7 OVERALL PERFORMANCE INDICATOR SCORE	**90**
CONDITION NUMBER (if relevant):	**n/a**

Evaluation Table for PI 2.1.1 – Retained species outcome

PI 2.1.1		The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Main retained species are likely to be within biologically based limits (if not, go to scoring issue c below).	Main retained species are highly likely to be within biologically based limits (if not, go to scoring issue c below).	There is a high degree of certainty that retained species are within biologically based limits and fluctuating around their target reference points.
	Hoki UoC 1 Met?	Y – Hake and ling as main retained species Y – All minor species meet SG60 by default	Y – Hake and ling as main retained species Y – All minor species meet SG80 by default	Y – HAK 4, LIN 3, LIN 4 N – All minor retained species
	Hoki UoC 2 Met?	Y – Hake and ling as main retained species Y – All minor species meet SG60 by default	Y – Hake and ling as main retained species Y – All minor species meet SG80 by default	Y – HAK 1, LIN 5, LIN 6, LIN 7 N – HAK 7 and all minor retained species
	Hake UoCs Met?	Y – Hoki and ling as main retained species Y – All minor species meet SG60 by default	Y – Hoki and ling as main retained species Y – All minor species meet SG80 by default	Y – HOK 1E, HOK 1W, LIN 3, LIN 4, LIN 5, LIN 6, LIN 7 N – All minor species
	Ling UoCs 6-9 Met?	Y – Hoki and hake as main retained species Y – All minor species meet SG60 by default	Y – Hoki and hake as main retained species Y – All minor species meet SG80 by default	Y – HOK 1E, HAK 1, HAK 4 N – All minor species
	Ling UoC 10 (LIN 7) Met?	Y – Hoki and hake as main retained species Y – All minor species meet SG60 by default	Y – Hoki and hake as main retained species Y – All minor species meet SG80 by default	Y – HOK 1W N – HAK 7 and all minor species
	Justification	With respect to retained species, MSC guidance states "'Main' allows consideration of the weight, value or vulnerability of species caught. For instance, a retained species that comprises less than 5% of the total catch by weight may normally be considered to be a minor retained species (i.e., not 'main') in the catch, unless it is of high value to the fisher or of particular vulnerability." (GCB3.5.2, MSC 2013b). CB3.5.1 (MSC 2013a) then requires that hake and ling are considered as P2 retained species in scoring UoCs 1-2 (hoki), that hoki and ling are considered as P2 retained species in scoring UoCs 3-5 (hake), and that hoki and hake are considered as P2 retained species in scoring UoCs 6-10 (ling). In all cases, these species were scored as 'main' retained species on the basis that during the most recent five-year period for which fleet-adjusted observer data were available, there was at least one year when each species comprised ≥5% of the total catch in the fishery (Table 37). There were no other main retained species in the catch for any UoC, but a variety of other species is taken in the fishery, with all such species that are retained and comprising >0.1% being considered as 'minor' retained species. Species (other than ETP species) comprising ≤0.1% of the catch are considered to be negligible components and are not considered further (Table 37). Hoki (UoCs 1 and 2) Only hake and ling are main retained species for the Hoki UoCs (1 and 2). For these species, the SG60 and SG80 requirements for PI 2.1.1 SIa closely align with the SG60 and SG80 requirements for scoring them as Principle 1 target species at PI 1.1.1 SIa. In the evaluation table at PI 1.1.1, it was demonstrated that all hake		

<table>
<tr><th colspan="2">PI 2.1.1</th><th colspan="3">The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species</th></tr>
<tr><td></td><td></td><td colspan="3">and ling stocks were at least highly likely to be above the limit reference point, so these stocks also meet SG60 and SG80, here.

For hake and ling as main retained species, the SG100 requirements for PI 2.1.1 SIa then closely align with the SG100 requirements for scoring at PI 1.1.1. SIb. In the evaluation table at PI 1.1.1 Sib, only the HAK 7 stock was scored at SG80, which is within the HOK 1W (UoC 2) management area; all other Principle 1 hake and ling stocks were scored at SG100. The same scoring for hake and ling as main retained species is applied, here.

Minor species are not scored until the SG100 level of performance, so SG60 and SG80 are met for all minor species. An age-structured model was run for giant stargazer in STA 7 in 2008, and at that time it was possible to confirm that the stock was highly unlikely (<10%) to be below the soft limit (20%B_0) (MPI 2017a). Most other retained species are managed under the QMS, and survey data from the Chatham Rise, Sub-Antarctic and WCSI suggest that the stocks are not being adversely affected by the fishery (Ballara & O'Driscoll 2015, and see Section 4.3.2.1). Nevertheless, it is not possible to say that "There is a high degree of certainty that retained species are within biologically based limits and fluctuating around their target reference points", so SG100 is not met for any minor retained species.

<u>Hake (UoCs 3, 4 and 5)</u>
Only hoki and ling are main retained species for the Hake UoCs (3, 4, 5). As demonstrated by the scoring of hoki and ling stocks as target species in PI 1.1.1, these stocks all meet the SG60, SG80 and SG100 requirements for PI 2.1.1 SIa, also. It is not possible to say that any minor species meets SG100, however.

<u>Ling (UoCs 6, 7, 8, 9, and 10)</u>
Only hoki and hake are main retained species for the Ling UoCs (6, 7, 8, 9, 10). As demonstrated by the scoring of hoki and hake stocks as target species in PI 1.1.1, all except the HAK 7 stock meet the SG60, SG80 and SG100 requirements for PI 2.1.1 SIa; HAK 7 aligns with LIN 7 (UoC 10), and HAK 7 nevertheless meets the SG60 and SG80 requirements for this SI. It is also assumed that the HOK 1W fishery mostly occurs in the same area as LIN 7 In common with the other UoCs, it is not possible to say that any minor species meets SG100.</td></tr>
<tr><td rowspan="3">b</td><td>Guidepost</td><td></td><td></td><td>Target reference points are defined for retained species.</td></tr>
<tr><td>Met?</td><td></td><td></td><td>Y – All main retained species
N – All minor species except stargazer.</td></tr>
<tr><td>Justification</td><td colspan="3">All main retained species are assessed and managed against defined reference points (see PI 1.1.1 scoring); all main retained species meet SG100.
Reference points are provided for some minor retained species as QMS species, but only for stargazer are anything other than default values (target = 40%B_0, soft limit = 20%B_0 and hard limit = 10%B_0, respectively) provided. However, these default values do not appear to be functional because B_0 is unknown for all stocks other than stargazer in STA 7. Because stargazer comprises a very minor element of the fishery, it is not thought appropriate to award a higher score overall. SG100 is not met for minor species.</td></tr>
</table>

<table>
<tr><td colspan="2">PI 2.1.1</td><td colspan="3">The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td>If main retained species are outside the limits there are measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.</td><td>If main retained species are outside the limits there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding.</td><td></td></tr>
<tr><td>Met?</td><td>N/A</td><td>N/A</td><td></td></tr>
<tr><td>Justification</td><td colspan="3">All main retained species are within biologically-based limits, so this SI is not scored.</td></tr>
<tr><td rowspan="3">d</td><td>Guidepost</td><td>If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.</td><td></td><td></td></tr>
<tr><td>Met?</td><td>N/A – All main retained species
Y – All minor species</td><td></td><td></td></tr>
<tr><td>Justification</td><td colspan="3">The status of hoki, hake and ling is known in sufficient detail in all cases that this SI is not scored for main retained species.
With very few exceptions, minor species are managed within the QMS, with controlled quotas and monitoring of catches. Survey data from the Chatham Rise, Sub-Antarctic and WCSI suggest that the stocks are not being adversely affected by the fishery (Section 4.3.2.1). SG60 is met for minor species.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Ballara & O’Driscoll 2015, MPI 2017d, MSC 2013a, MSC 2013b</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE (All UoCs):</td><td>85</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td>N/A</td></tr>
</table>

UoC 1 (HOK 1E) – PI 2.1.1 Scoring calculation

Species	Main / Minor	SIa (60, 80, 100)	SIb (100 only)	SIc (60, 80 only)	SId (60 only)	Element score	PI Score
Hake (HAK 4)	Main	100	100	N/A	N/A	100	85
Ling (LIN 3)	Main	100	100	N/A	N/A	100	
Ling (LIN 4)	Main	100	100	N/A	N/A	100	
15 Minor Species (various stocks)	Minor	80	Do not meet 100 so default 80	N/A	60	80 (x 15)	

UoC 2 (HOK 1W) – PI 2.1.1 Scoring calculation

Species	Main / Minor	SIa (60, 80, 100)	SIb (100 only)	SIc (60, 80 only)	SId (60 only)	Element score	PI Score
Hake (HAK 1)	Main	100	100	N/A	N/A	100	85
Hake (HAK 7)	Main	80	100	N/A	N/A	90	
Ling (LIN 5)	Main	100	100	N/A	N/A	100	
Ling (LIN 6)	Main	100	100	N/A	N/A	100	
Ling (LIN 7)	Main	100	100	N/A	N/A	100	
15 Minor Species (various stocks)	Minor	80	Do not meet 100 so default 80	N/A	60	80 (x 15)	

UoCs 3-5 (Hake UoCs) – PI 2.1.1 Scoring calculation

Species	Main / Minor	SIa (60, 80, 100)	SIb (100 only)	SIc (60, 80 only)	SId (60 only)	Element score	PI Score
Hoki (HOK 1E)	Main	100	100	N/A	N/A	100	85
Hoki (HOK 1W)	Main	100	100	N/A	N/A	90	
Ling (LIN 3)	Main	100	100	N/A	N/A	100	
Ling (LIN 4)	Main	100	100	N/A	N/A	100	
Ling (LIN 5)	Main	100	100	N/A	N/A	100	
Ling (LIN 6)	Main	100	100	N/A	N/A	100	
Ling (LIN 7)	Main	100	100	N/A	N/A	100	
15 Minor Species (various stocks)	Minor	80	Do not meet 100 so default 80	N/A	60	80 (x 15)	

UoC 6-9 (LIN 3-6) – PI 2.1.1 Scoring calculation

Species	Main / Minor	SIa (60, 80, 100)	SIb (100 only)	SIc (60, 80 only)	SId (60 only)	Element score	PI Score
Hoki (HOK 1E)	Main	100	100	N/A	N/A	100	85
Hake (HAK 1)	Main	100	100	N/A	N/A	100	
Hake (HAK 4)	Main	100	100	N/A	N/A	100	
15 Minor Species (various stocks)	Minor	80	Do not meet 100 so default 80	N/A	60	80 (x 15)	

UoC 10 (LIN 7) – PI 2.1.1 Scoring calculation

Species	Main / Minor	SIa (60, 80, 100)	SIb (100 only)	SIc (60, 80 only)	SId (60 only)	Element score	PI Score
Hoki (HOK 1W)	Main	100	100	N/A	N/A	100	85
Hake (HAK 7)	Main	80	100	N/A	N/A	90	
15 Minor Species (various stocks)	Minor	80	Do not meet 100 so default 80	N/A	60	80 (x15)	

Evaluation Table for PI 2.1.2 – Retained species management

<table>
<tr><th colspan="2">PI 2.1.2</th><th colspan="3">There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</th></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>There are measures in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.</td><td>There is a partial strategy in place, if necessary, that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.</td><td>There is a strategy in place for managing retained species.</td></tr>
<tr><td>Met?</td><td>Y – All main retained species
Y – All minor species meet SG80 by default</td><td>Y – All main retained species
Y – All minor species meet SG80 by default</td><td>Y – All main retained species
N – All minor species</td></tr>
<tr><td>Justification</td><td colspan="3">CB3.5.1 (MSC 2013a) requires that hake and ling are considered as P2 retained species in scoring UoCs 1-2 (hoki), that hoki and ling are considered as P2 retained species in scoring UoCs 3-5 (hake), and that hoki and hake are considered as P2 retained species in scoring UoCs 6-10 (ling). In all cases they were assumed to be main retained species. There were no other main retained species in the catch for any UoC, but a variety of other species is taken in the fishery, with all such species that are retained and comprising >0.1% being considered as ‘minor’ retained species. Species (other than ETP species) comprising ≤0.1% of the catch are considered to be negligible components and are not considered further (Table 37).

For hoki, hake and ling, as main retained species that are also Principle 1 target species, the requirements for PI 2.1.2 SIa are closely aligned with those of PI 1.2.1 SIa. There, it was demonstrated that the harvest strategy for these species is guided by the HSS, which 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 and includes the definition of (a) a target level about which a fishery or stock should fluctuate, (b) a soft limit that triggers a requirement for a formal, time-constrained rebuilding plan, and (c) a hard limit below which fisheries should be considered for closure. The harvest strategy involves collecting fishery-dependent and – independent data, analysing those data using a stock assessment model, assessing stock status relative to agreed reference points, conducting projections under alternative TACCs, and setting a TACC (and other regulations) which is consistent with the Fisheries Act 1996. The elements of the strategy work together towards achieving management objectives, as reflected in the target and limit reference points. SG60 and SG80 are clearly met because the management approach is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. SG100 is also met because, together, the measures in place for main retained species clearly comprise a strategy.

Minor species attain the SG60 and SG80 level of performance by default for this SI, so the question is then whether or not minor species attain SG100. The vast majority of the minor retained species are managed through the QMS, which sets a TAC and TACC for stock within the QMS. There are currently 100 fish species and 636 individual stocks in the QMS (Fishserve 2015). Each stock has catch shares</td></tr>
</table>

PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species		
		issued as property rights, and fishers must balance their catches against their own annual catch entitlement (ACE) for each stock. If a fisher does not hold sufficient ACE for the fish caught then they must purchase additional ACE from other ACE holders, or suffer a stock-specific deemed value penalty that increases as the level of over-catch increases (Fishserve 2018). In support of setting the TAC and TACC, fisher-independent surveys are undertaken on the Chatham Rise, Sub-Antarctic and the WCSI; data collected allow biomass estimates, CPUE and/or mean length comparisons to be undertaken over time (Ballara & O'Driscoll 2015). Changes may be made to the TACC if these indicators suggest a fishing-related decline in stock status. Together, these measures comprise a partial strategy for minor species, but SG100 is not met without more information on the biological status of minor species (i.e., in order to determine if unacceptable impacts were occurring – GCB3.3, MSC 2013b).		
b	Guidepost	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
	Met?	Y – All main retained species Y – All minor species meet SG80 by default	Y – All main retained species Y – All minor species meet SG80 by default	Y – All main retained species N – All minor species
	Justification	For the main retained species (hoki, hake, ling), there is clearly objective basis for confidence that the management approach will work, as it comprises the key elements of catch monitoring, stock assessment, status review, predetermined management triggers and the implementation of new measures as appropriate. SG60 and SG80 are met. The harvest strategies for each species have not undergone formal testing, although an MSE was used to evaluate hoki harvest strategies (see scoring for PI 1.2.1). Nevertheless, evidence for the effectiveness of the harvest strategies is provided by the stock assessments for each stock. These are conducted on a multi-annual cycle (three year for hake and ling; annually for hoki) and provide management with 5-year projections guided by the requirements of the HSS. Between assessments, fishery and survey data are updated and if issues arise, management responds to these. For Principle 2, main retained species, this is sufficient to determine that testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved – SG100 is met. For minor species, a partial strategy is not necessary (see SIa), so SG80 is met by default for this SI. In the absence of a strategy, SG100 cannot be met.		
c	Guidepost		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y – All main retained species Y – All minor species meet SG80 by default	Y – All main retained species N – All minor species

<table>
<tr><th colspan="2">PI 2.1.2</th><th colspan="3">There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</th></tr>
<tr><td></td><td>Justification</td><td colspan="3">For main retained species, there is clear evidence that the strategy is being implemented successfully – catch data are collected routinely, stock assessment are undertaken and assess each stock against reference points, and TACs are set with regard to the reference points to maintain stocks at healthy levels (see scoring for PI 1.1.1, SIa); SG80 and SG100 are met.

For minor species, a partial strategy is not necessary (see SIa), so SG80 is met by default for this SI. In the absence of a strategy, SG100 cannot be met.</td></tr>
<tr><td rowspan="3">d</td><td>Guidepost</td><td></td><td></td><td>There is some evidence that the strategy is achieving its overall objective.</td></tr>
<tr><td>Met?</td><td></td><td></td><td>Y – All main retained species
N – All minor species</td></tr>
<tr><td>Justification</td><td colspan="3">For main retained species (hoki, hake and ling), there is clear evidence that the strategy is achieving its overall objective, specifically through the consistent maintenance of stocks at healthy levels, as evidenced through the scoring of PI 1.1.1 SIb.

For minor species, in the absence of a strategy, SG100 cannot be met.</td></tr>
<tr><td rowspan="3">e</td><td>Guidepost</td><td>It is likely that shark finning is not taking place.</td><td>It is highly likely that shark finning is not taking place.</td><td>There is a high degree of certainty that shark finning is not taking place.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">Hoki, hake and ling are not shark species, and this SI is not relevant for these main retained species.

Javelin fish, rattails, pale ghost shark and dark ghost shark are chondrichthyan (chimaerid) species that are retained in the hoki, hake and ling trawl fishery in small to very small quantities (Table 37). Since 1st October 2014, it has been illegal in New Zealand for commercial fishers to remove the fins from any shark and discard the body at sea (MPI 2014), which is monitored by MPI Compliance and observers. The Assessment Team is not aware of any prosecutions for contraventions of this law in the hoki, hake and ling trawl fishery. SG100 is met for these species. For other minor retained species that are not sharks/chimaerids, this SI is not relevant.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Ballara & O'Driscoll 2015, Fishserve 2015, Fishserve 2018, MPI 2014, MSC 2013a, MSC 2013b.</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>85</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td>N/A</td></tr>
</table>

<u>All UoCs – PI 2.1.2 Scoring calculation</u>

Species	Main / Minor	SIa (60, 80, 100)	SIb (60, 80, 100)	SIc (80, 100 only)	SId (100 only)	SIe (60, 80, 100)	Element score	PI Score
Hoki stocks (2)	Main	100	100	100	100	N/A	100	85
Hake stocks (3)	Main	100	100	100	100	N/A	100	
Ling stocks (5)	Main	100	100	100	100	N/A	100	
4 Minor shark/chimaerid species (various stocks)	Minor	80	80	80	Do not meet 100 so default 80	100	85 (x 4)	
11 Minor non-shark species (various stocks)	Minor	80	80	80	Do not meet 100 so default 80	N/A	80 (x 11)	

Evaluation Table for PI 2.1.3 – Retained species information

PI 2.1.3		**Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Qualitative information is available on the amount of main retained species taken by the fishery.	Qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery.	Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.
	Met?	Y – All main retained species Y – All minor species meet SG80 by default	Y – All main retained species Y – All minor species meet SG80 by default	Y – All main retained species N – All minor species
	Justification	CB3.5.1 (MSC 2013a) requires that hake and ling are considered as P2 retained species in scoring UoCs 1-2 (hoki), that hoki and ling are considered as P2 retained species in scoring UoCs 3-5 (hake), and that hoki and hake are considered as P2 retained species in scoring UoCs 6-10 (ling). There were no other main retained species in the catch for any UoC, but a variety of other species is taken in the fishery, with all such species that are retained and comprising >0.1% being considered as 'minor' retained species. Species (other than ETP species) comprising ≤0.1% of the catch are considered to be negligible components and are not considered further (Table 37). For all species, catch data (including allowed discards) are required to be reported via logbook, and catches are independently monitored through observer data. Approximately 20-40% of all tows in the hoki, hake and ling trawl fishery have been observed in the five years up to 2015 (Figure 37). These data are quantitative, and accurate and verifiable; for all species, SG60 and SG80 are fully met, and the first part of SG100 ("*Accurate and verifiable information is available on the catch of all retained species*") is also met. For main retained species (hoki, hake and ling), stock assessments are conducted and catches accounted for in the modelling, so the second part of SG100 ("*Accurate and verifiable information is available on ..... the consequences for the status of affected populations*") is also met for these species. For minor retained species (15 species managed as 60 plenary stocks – see Table 37), there are no up to date age-structured assessments of status (MPI 2017a). Fishery-independent survey data are collected from the Chatham Rise, Sub-Antarctic, WCSI and the ECSI, and the data collected allow biomass estimates, CPUE and/or mean length/age comparisons to be undertaken over time (Ballara & O'Driscoll 2015). However, it is not clear that the trawl survey or CPUE series data employed for the assessments of minor species status (where undertaken) allow the consequences for the status of affected populations to be determined accurately and in a verifiable manner. As such, SG100 is not fully met (CR27.10.6, MSC 2013a) for minor retained species.		
b	**Guidepost**	Information is adequate to qualitatively assess outcome status with respect to biologically based limits.	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with a high degree of certainty.
	Met?	Y – All main retained species Y – All minor species	Y – All main retained species Y – All minor species	Y – All main retained species except HAK 7

PI 2.1.3		Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species		
				N – HAK 7 and all minor retained species
	Justification	For main retained species (hoki, hake and ling) except HAK 7, stock assessments are conducted routinely and catches accounted for in the modelling. Status is assessed against biologically-based reference points. SG60, SG80 and SG100 are met for these stocks of main retained species. For HAK 7, as noted in PI 1.2.4, there is a conflict between the survey and CPUE trends, indicating that some major feature of the stock, the fishery and/or its monitoring is not fully understood. This element meets SG60 and SG80, but not SG100. For minor species, fisher-independent surveys are undertaken on the Chatham Rise, Sub-Antarctic, WCSI and the ECSI. The status of some minor retained species is not assessed formally (MPI 2017d), but data collected allow biomass estimates, CPUE and/or mean length/age comparisons to be undertaken over time (Ballara & O'Driscoll 2015). The typically low or very low catch levels in the fishery, and general stability of survey catches in recent years demonstrates that SG60 and SG80 are met, but SG100 is not met for these species. Formal stock assessments would be required in order to achieve a higher score.		
c	Guidepost	Information is adequate to support measures to manage main retained species.	Information is adequate to support a partial strategy to manage main retained species.	Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	Y – All main retained species Y – All minor species meet SG80 by default	Y – All main retained species Y – All minor species meet SG80 by default	Y – All main retained species except HAK 7 N – HAK 7 and all minor retained species
	Justification	For all species, catch data (including allowed discards) are required to be reported via trawl catch, effort and processing returns (TCEPRs), and catches are independently monitored through observer data. Approximately 20-40% of all tows in the hoki, hake and ling trawl fishery have been observed in the five years up to 2015 (Figure 37). VMS data are also collected routinely and may be cross-validated against the TCEPRs, and fisher-independent surveys are undertaken on the Chatham Rise, Sub-Antarctic WCSI and the ECSI; these survey data allow biomass estimates, CPUE and/or mean length comparisons to be undertaken over time (Ballara & O'Driscoll 2015). For main species (hoki, hake and ling) except HAK 7, these catch, survey and VMS data are clearly adequate to support a strategy to manage retained species (so meeting SG60 and SG80, as well as the first part of SG100). Stock assessment are then conducted routinely, so allowing the second part of SG100 ("*Information is adequate to .... evaluate with a high degree of certainty whether the strategy is achieving its objective*") to also be met. For HAK 7, as noted in PI 1.2.4, there is a conflict between the survey and CPUE trends, indicating that some major feature of the stock, the fishery and/or its monitoring is not fully understood. SG60 and SG80 are clearly met for this SI, but until this conflict is resolved, it is not possible to confirm that SG100 is also met for this stock. For minor species, a partial strategy is not necessary (see PI 2.1.2, SIa), so SG60 and SG80 are met by default for this SI. While some of the minor species are assessed through analyses of survey or CPUE series trends, these assessments		

<table>
<tr><td colspan="2">PI 2.1.3</td><td colspan="3">Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species</td></tr>
<tr><td></td><td></td><td colspan="3">do not allow status (i.e., whether the strategy is achieving its objective) to be evaluated with a high degree of certainty; SG100 is not met for minor species.</td></tr>
<tr><td rowspan="3">d</td><td>Guidepost</td><td></td><td>Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator score or the operation of the fishery or the effectiveness of the strategy)</td><td>Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.</td></tr>
<tr><td>Met?</td><td></td><td>Y – All main retained species
Y – All minor species</td><td>Y – All main retained species
Y – All minor species</td></tr>
<tr><td>Justification</td><td colspan="3">For all species, catch data (including allowed discards) are required to be reported via TCEPRs, and all vessels are monitored with VMS. Sufficient data continue to be collected to detect any increase in risk level, so SG80 is met.

Catches of all species are also independently monitored by observers. Approximately 20-40% of all tows in the hoki, hake and ling trawl fishery have been observed in the five years up to 2015 (Figure 37). Monitoring is therefore conducted in sufficient detail to assess ongoing mortalities to all retained species – SG100 is also met.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Ballara & O'Driscoll 2015, MPI 2017d, MSC 2013a, MSC 2013b</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE (Al UoCs):</td><td>85</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td>N/A</td></tr>
</table>

UoC 1 (HOK 1E) – PI 2.1.3 Scoring calculation

Species	Main / Minor	SIa (60, 80, 100)	SIb (60, 80, 100)	SIc (60, 80, 100)	SId (80, 100 only)	Element score	PI Score
Hake (HAK 4)	Main	100	100	100	100	100	85
Ling (LIN 3)	Main	100	100	100	100	100	
Ling (LIN 4)	Main	100	100	100	100	100	
15 Minor Species (various stocks)	Minor	80	80	80	100	85 (x 15)	

UoC 2 (HOK 1W) – PI 2.1.3 Scoring calculation

Species	Main / Minor	SIa (60, 80, 100)	SIb (60, 80, 100)	SIc (60, 80, 100)	SId (80, 100 only)	Element score	PI Score
Hake (HAK 1)	Main	100	100	100	100	100	85
Hake (HAK 7)	Main	100	80	80	100	100	
Ling (LIN 5)	Main	100	100	100	100	100	
Ling (LIN 6)	Main	100	100	100	100	100	
Ling (LIN &)	Main	100	100	100	100	100	
15 Minor Species (various stocks)	Minor	80	80	80	100	85	

UoCs 3-5 (Hake UoCs) – PI 2.1.3 Scoring calculation

Species	Main / Minor	SIa (60, 80, 100)	SIb (60, 80, 100)	SIc (60, 80, 100)	SId (80, 100 only)	Element score	PI Score
Hoki (HOK 1E)	Main	100	100	100	100	100	85
Hoki (HOK 1W))	Main	100	100	100	100	100	
Ling (LIN 3)	Main	100	100	100	100	100	
Ling (LIN 4)	Main	100	100	100	100	100	
Ling (LIN 5)	Main	100	100	100	100	100	
Ling (LIN 6)	Main	100	100	100	100	100	
Ling (LIN &)	Main	100	100	100	100	100	
15 Minor Species (various stocks)	Minor	80	80	80	100	85 (x 15)	

<u>UoCs 6-9 (LIN 3-6) – PI 2.1.3 Scoring calculation</u>

Species	Main / Minor	SIa (60, 80, 100)	SIb (60, 80, 100)	SIc (60, 80, 100)	SId (80, 100 only)	Element score	PI Score
Hoki (HOK 1E)	Main	100	100	100	100	100	85
Hake (HAK 1)	Main	100	100	100	100	100	
Hake (HAK 4)	Main	100	100	100	100	100	
15 Minor Species (various stocks)	Minor	80	80	80	100	85 (x 15)	

<u>UoC 10 (LIN 7) – PI 2.1.3 Scoring calculation</u>

Species	Main / Minor	SIa (60, 80, 100)	SIb (60, 80, 100)	SIc (60, 80, 100)	SId (80, 100 only)	Element score	PI Score
Hoki (HOK 1W)	Main	100	100	100	100	100	85
Hake (HAK 7)	Main	100	100	100	100	100	
15 Minor Species (various stocks)	Minor	80	80	80	100	85 (x 15)	

Evaluation Table for PI 2.2.1 – Bycatch species outcome

PI 2.2.1		The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Main bycatch species are likely to be within biologically based limits (if not, go to scoring issue b below).	Main bycatch species are highly likely to be within biologically based limits (if not, go to scoring issue b below).	There is a high degree of certainty that bycatch species are within biologically based limits.
	Met?	No main bycatch species in fishery Y – All minor species meet SG80 by default	No main bycatch species in fishery Y – All minor species meet SG80 by default	No main bycatch species in fishery N – All minor species
	Justification	With respect to bycatch species, MSC guidance states "*'Main' for this PI allows consideration of the catch size or vulnerability of species caught. For instance, a species that comprises less than 5% of the total catch by weight may normally be considered to be a minor species (i.e., not 'main') in the catch, unless it is of particular vulnerability or if the total catch of the fishery is large, in which case even 5% may be a considerable catch.*" (GCB3.8.2, MSC 2013b). Based on these criteria, there are no main bycatch species in the hoki, hake and ling trawl fishery. Spiny dogfish and shovelnose spiny dogfish are the only species assessed as minor bycatch species, comprising 1.08% and 0.18% of the catch, respectively (Table 37). Species (other than ETP species) comprising ≤0.1% of the catch are considered to be negligible components and are not considered further (Table 37). Minor species meet SG60 and SG80 by default for this SI. There is not a high degree of certainty that spiny dogfish or shovelnose spiny dogfish are within biologically based limits, so SG100 is not met.		
b	**Guidepost**	If main bycatch species are outside biologically based limits there are mitigation measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding.	If main bycatch species are outside biologically based limits there is a partial strategy of demonstrably effective mitigation measures in place such that the fishery does not hinder recovery and rebuilding.	
	Met?	N/A	N/A	
	Justification	There are no main bycatch species in the catch of the hoki, hake and ling trawl fishery. This SI is not relevant.		

PI 2.2.1		The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups		
c	Guidepost	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the bycatch species to be outside biologically based limits or hindering recovery.		
	Met?	N/A – spiny dogfish Y – Shovelnose spiny dogfish		
	Justification	Spiny dogfish is managed through the QMS, and sufficient information is available (i.e., that trawl survey estimates of abundance are all at or above the long-term average – MPI 2017a) that the Assessment Team does not consider that this SI should be scored for this species. Shovelnose spiny dogfish was reported as being well estimated in Sub-Antarctic surveys and Chatham Rise surveys; relative biomass has showed no clear trend in the Chatham Rise time-series, but decreased then increased in the Sub-Antarctic time-series (Ballara & O'Driscoll 2015). This species showed a declining trend in core area abundance in the WCSI survey (O'Driscoll et al. 2015). However, Ford et al. (2015) noted that this species is globally widespread, pregnant females were rarely caught, and it occurs in waters up to 1500m, at which depth there is little fishing in New Zealand waters. The Assessment Team concludes that there are measures or practices in place that are expected to result in the fishery not causing shovelnose spiny dogfish to be outside biologically based limits or hindering recovery; this SG60 requirement is met.		
References		Ballara & O'Driscoll 2015, Ford et al. 2015, O'Driscoll et al. 2015, MSC 2013b		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				N/A

<u>All UoCs – PI 2.2.1 Scoring calculation</u>

Species	Main / Minor	SIa (60, 80, 100)	SIb (60, 80 only)	SIc (60 only)	Element score	PI Score
Spiny dogfish	Minor	Default 80	N/A	N/A	80	80
Shovelnose spiny dogfish	Minor	Default 80	N/A	60	80	

Evaluation Table for PI 2.2.2 – Bycatch species management

PI 2.2.2		There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	There are measures in place, if necessary, that are expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a partial strategy in place, if necessary, that is expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a strategy in place for managing and minimizing bycatch.
	Met?	No main bycatch species in fishery Y – All minor species meet SG80 by default	No main bycatch species in fishery Y – All minor species meet SG80 by default	No main bycatch species in fishery N – All minor species
	Justification	There are no main bycatch species in the hoki, hake and ling trawl fishery. Spiny dogfish and shovelnose spiny dogfish are the only species assessed as minor bycatch species, comprising 1.08% and 0.18% of the catch, respectively (Table 37). Minor species attain the SG80 level of performance by default for this SI, so the question is then whether or not minor species attain SG100. As for minor retained species, however, it is considered that more information on the biological status of minor bycatch species would be needed (i.e., in order to determine if unacceptable impacts were occurring – GCB3.3, MSC 2013b) in order to meet SG100.		
b	**Guidepost**	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
	Met?	No main bycatch species in fishery Y – All minor species meet SG80 by default	No main bycatch species in fishery Y – All minor species meet SG80 by default	No main bycatch species in fishery N – All minor species
	Justification	For minor species, a partial strategy is not necessary (see SIa), so SG60 and SG80 is met by default for this SI. In the absence of a strategy, SG100 cannot be met.		
c	**Guidepost**		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.

PI 2.2.2		There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations		
	Met?		No main bycatch species in fishery Y – All minor species meet SG80 by default	No main bycatch species in fishery N – All minor species
	Justification	For minor species, a partial strategy is not necessary (see SIa), so SG60 and SG80 is met by default for this SI. In the absence of a strategy, SG100 cannot be met.		
d	Guidepost			There is some evidence that the strategy is achieving its overall objective.
	Met?			No main bycatch species in fishery N – All minor species
	Justification	For minor species, in the absence of a strategy, SG100 cannot be met.		
References		None		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				N/A

PI 2.2.2 Scoring calculation

Species	Main / Minor	SIa (60, 80, 100)	SIb (60, 80, 100)	SIc (80, 100 only)	SId (100 only)	Element score	PI Score
Spiny dogfish	Minor	Default 80	Default 80	Default 80	Do not meet 100 so default	80	80
Shovelnose spiny dogfish	Minor	Default 80	Default 80	Default 80	Do not meet 100 so default	80	

Evaluation Table for PI 2.2.3 – Bycatch species information

PI 2.2.3		**Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Qualitative information is available on the amount of main bycatch species taken by the fishery.	Qualitative information and some quantitative information are available on the amount of main bycatch species taken by the fishery.	Accurate and verifiable information is available on the catch of all bycatch species and the consequences for the status of affected populations.
	Met?	No main bycatch species in fishery Y – All minor species meet SG80 by default	No main bycatch species in fishery Y – All minor species meet SG80 by default	No main bycatch species in fishery N – All minor species
	Justification	There are no main bycatch species in the hoki, hake and ling trawl fishery. Spiny dogfish and shovelnose spiny dogfish are the only species assessed as minor bycatch species, comprising 1.08% and 0.18% of the catch, respectively (Table 37). For all species, catch data (including allowed discards) are required to be reported via logbook, and catches are independently monitored through observer data. Approximately 20-40% of all tows in the hoki, hake and ling trawl fishery have been observed in the five years up to 2015 (Figure 37). These data are quantitative, and accurate and verifiable; for all species, SG60 and SG80 are fully met, and the first part of SG100 ("*Accurate and verifiable information is available on the catch of all bycatch species*") is also met. For minor bycatch species (two species managed as seven stocks – see Table 37), there are no up to date stock assessments (MPI 2017d). Fishery-independent survey data are collected from the Chatham Rise, Sub-Antarctic and the WCSI, and the data collected allow biomass estimates, CPUE and/or mean length comparisons to be undertaken over time (Ballara & O'Driscoll 2015). However, it is not clear that, with catch data, these allow the consequences for the status of affected populations to be determined accurately and in a verifiable manner. As such, SG100 is not fully met (CR27.10.6, MSC 2013a) for minor bycatch species.		
b	**Guidepost**	Information is adequate to broadly understand outcome status with respect to biologically based limits	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with respect to biologically based limits with a high degree of certainty.
	Met?	No main bycatch species Y – All minor species	No main bycatch species Y – All minor species	No main bycatch species N – All minor bycatch species
	Justification	For minor species, fisher-independent surveys are undertaken on the Chatham Rise, Sub-Antarctic and the WCSI. The status of minor bycatch species is not assessed formally (MPI 2017d), but data collected allow biomass estimates, CPUE and/or mean length comparisons to be undertaken over time (Ballara & O'Driscoll 2015). The typically low or very low catch levels in the fishery, and general variability of survey catches in recent years demonstrates that SG60 and SG80 are met, but SG100 is not met for these species. There are no formal stock assessments so the fishery does not meet SG100.		

PI 2.2.3		Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch		
c	Guidepost	Information is adequate to support measures to manage bycatch.	Information is adequate to support a partial strategy to manage main bycatch species.	Information is adequate to support a strategy to manage bycatch species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	No main bycatch species Y – All minor species meet SG80 by default	No main bycatch species Y – All minor species meet SG80 by default	No main bycatch species N – All minor bycatch species
	Justification	For minor species, a partial strategy is not necessary (see PI 2.1.2, SIa), so SG80 is met by default for this SI. In the absence of a stock assessment, however, SG100 is not met for minor species.		
d	Guidepost		Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectively of the strategy).	Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.
	Met?		No main bycatch species Y – All minor species	No main bycatch species Y – All minor species
	Justification	For all species, catch data (including allowed discards) are required to be reported via TCEPRs, and all vessels are monitored with VMS. Sufficient data continue to be collected to detect any increase in risk level, so SG80 is met. Catches of all species are also independently monitored by observers. Approximately 20-40% of all tows in the hoki, hake and ling trawl fishery have been observed in the five years up to 2015 (Figure 37). Monitoring is therefore conducted in sufficient detail to assess ongoing mortalities to all bycatch species – SG100 is also met.		
References		Ballara & O'Driscoll 2015, MPI 2017d, MSC 2013a		
OVERALL PERFORMANCE INDICATOR SCORE:				**85**
CONDITION NUMBER (if relevant):				**N/A**

PI 2.2.3 Scoring calculation

Species	Main / Minor	SIa (60, 80, 100)	SIb (60, 80, 100)	SIc (60, 80, 100)	SId (80, 100 only)	Element score	PI Score
Spiny dogfish	Minor	Default 80	80	Default 80	100	85	85
Shovelnose spiny dogfish	Minor	Default 80	80	Default 80	100	85	

Evaluation Table for PI 2.3.1 – ETP species outcome

PI 2.3.1		**The fishery meets national and international requirements for the protection of ETP species The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Known effects of the fishery are likely to be within limits of national and international requirements for protection of ETP species.	The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species.	There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species.
	Met?	N/A	N/A	N/A
	Justification	Under the CR v.1.3 (MSC 2013a), ETP species retained species are those that are "*recognised by national legislation and/or binding international agreements to which the jurisdictions controlling the fishery under assessment are party. Species listed under Appendix I of CITES shall be considered ETP species for the purposes of the MSC assessment, unless it can be shown that the particular stock of the CITES listed species impacted by the fishery under assessment is not endangered*." For the hoki, hake and ling trawl Fishery, relevant ETP species are those protected under the New Zealand Wildlife Act 1953, the Marine Mammals Protection Act 1978 and the Fisheries Act 1996. These are basking shark, protected coral species (black corals, gorgonian corals, stony corals and hydrocorals), seabirds and marine mammals. It is noted that the hoki, hake and ling trawl fishery Assessment Team did not score this SI because there are no limits set for the protection and rebuilding of ETP species (CB3.11.14, MSC 2013a). This is in contrast to the recently certified orange roughy fishery assessment, where this SI was scored (MRAG-Americas 2016). That report stated "*New Zealand does not set quantitative limits on the interactions of the orange roughy fisheries [with ETP species], but has strong policies and strategies for minimizing interactions with marine mammals and seabirds*." Therefore, this is not harmonised, but scoring here is considered correct with respect to MSC requirements on assessing ETP species.		
b	**Guidepost**	Known direct effects are unlikely to create unacceptable impacts to ETP species.	Direct effects are highly unlikely to create unacceptable impacts to ETP species.	There is a high degree of confidence that there are no significant detrimental direct effects of the fishery on ETP species.
	Met?	Y – Basking shark Y – Protected corals Y – Marine mammals Y – Seabirds	Y – Basking shark Y – Protected corals Y – Marine mammals Y – Seabirds	N – Basking shark N – Protected corals N – Marine mammals Y – Seabirds
	Justification	<u>Basking shark</u> Basking sharks are taken in small numbers in the hoki, hake and ling trawl fishery (mean for the period 2011-2016 = 3.5 basking sharks per year – Table 38), but in common with other trawl fisheries, more captures have occurred in the Southland-Auckland Islands region (i.e., the southern part of Fishery Management Area (FMA) 3, as well as FMA 5 and the western part of FMA 6) than in other areas. The size of the basking shark population in New Zealand waters is not known, but basking sharks are known to make long migrations, including traversing tropical regions, and an analysis with relatively large sample sizes (including 38 New Zealand specimens) has identified only weak and non-significant population structuring at ocean basin scales (Lieber et al. in review, reported in Francis 2017).		

PI 2.3.1		**The fishery meets national and international requirements for the protection of ETP species The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species**
		Depending on the assumptions made regarding the relationship between effective population size and actual population size, the global population of basking sharks may be estimated at between about 18,200 and 82,000 individual basking sharks (DOC undated-a). A qualitative (level 1) risk assessment of the impact of commercial fishing on New Zealand Chondrichthyans indicated that basking shark is at some risk from fishing impacts (score = 13.5). However, of the eleven shark species managed under the QMS, only blue shark (score = 12) was considered to be at lower risk than basking shark (scoring range for the remainder of the QMS shark species = porbeagle shark (15) to rough skate (21) (Ford et al. 2015). Given the results of the risk assessment, the extensive migrations of this species and the limited component of the New Zealand catch that is attributed to the hoki, hake and ling trawl fishery, it is considered that direct effects are highly unlikely to create unacceptable impacts to ETP species; both SG60 and SG80 are met. The possibility that fishing has been the cause of the decline in basking shark observations from a peak in 1988-1991 means that a higher score is not achieved. <u>Protected corals</u> Most corals in New Zealand waters are protected under Wildlife Act 1953. As for basking shark, the legislation means it is not illegal to incidentally catch corals, but any corals that are taken must be returned immediately and the capture reported. A considerable body of research has been amassed on the biology and distribution of deep-sea coral species around New Zealand, and the potential impact of fishing activities on these species, including reports by Consalvey et al. 2006, Baird et al. 2013 and Anderson et al. 2014. Table 39 (adapted from Baird et al. 2013) shows that relatively few observer reports of interactions with protected coral species have been generated from the Hoki, Hake and Ling trawl fishery, and concluded that "*Generally the areas predicted to have the greatest probability of conditions suitable for corals were outside the main fisheries areas, except for some deepwater fisheries that occurred on areas of steeper relief. The fisheries that pose the most risk to protected corals are the deepwater trawl fisheries for species such as orange roughy, oreo species, black cardinalfish, and alfonsino.*" Anderson et al. (2014) looked at trawl footprints in total rather than for the individual fisheries, but these authors noted that there was substantial overlap of fishing with the distribution of several protected coral species, most notably around the Chatham Rise. Nevertheless, they also noted that, across the study area as a whole (i.e., the majority of the area within the New Zealand EEZ), large areas of each species' predicted habitat distribution lies outside of the trawl footprint, especially around the sub-Antarctic Plateaux. Given the occurrence of suitable habitat outside the fished area, and the limited records of protected coral species in the observer data, it is considered that direct effects are highly unlikely to create unacceptable impacts to ETP species; both SG60 and SG80 are met. There remains some uncertainty in actual (versus predicted) distribution of protected corals, which precludes a higher score. <u>Marine mammals</u> There are a wide variety of marine mammals present in the waters around New Zealand, and all are designated as protected species under the Marine Mammals Protection Act and the Fisheries Act. However, the hoki, hake and ling trawl fishery is considered to not interact or to interact in only a negligible manner with all

PI 2.3.1		The fishery meets national and international requirements for the protection of ETP species The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species
		species other than New Zealand fur seals. The impact of the fishery on this species is therefore assessed, here. The hoki-directed part of the hoki, hake and ling trawl fishery is responsible for the majority (2002/03 – 2014/15 = 87.9%) of the interactions with New Zealand fur seals (Figure 42), with the hake and ling-directed parts of the fishery accounting for much smaller proportions of the total over the same period (hake = 5.5%, ling = 6.7%). Over the same 2002/03 – 2014/15 period, the hoki, hake and ling trawl fishery has accounted an average of 54.2% (395 animals) of the estimated mean total take of 707 fur seals in New Zealand trawl fisheries (catch data from https://psc.dragonfly.co.nz/2017v1/). However, since 2005, there has been a downward, then relatively flat trend in estimated capture rates and annual estimated New Zealand fur seal captures in trawl fisheries (Figure 42). In the last five years, captures of New Zealand fur seals in the hoki, hake and ling trawl fishery have been estimated to average 248 animals, annually (catch data from https://psc.dragonfly.co.nz/2017v1/). It is noted that the colony observations over recent years have generally indicated a trend of increasing population size, and the most recent threat assessment for New Zealand marine mammals (Baker et al. 2016) classified New Zealand fur seals as 'Not threatened', on the basis that it is a resident native species with a large, stable population. In this regard, it is considered that SG60 and SG80 are met for this species. Nevertheless, some of the population data are quite old and there may be differential effects of the fishery between colonies. As such, SG100 is not met. Seabirds A seabird risk assessment process has been undertaken to identify the risks posed to 70 seabird taxa by trawl, longline and set net fisheries within New Zealand's territorial Sea and EEZ (e.g., Richard & Abraham 2013, Richard & Abraham 2015, Richard et al. 2017). The risk assessment calculates a 'risk ratio', which is an estimate of the total fisheries-related mortality across New Zealand trawl, longline and set net fisheries relative to the Population Sustainability Threshold (PST), which is an adaptation of the Potential Biological Removals (PBR) metric developed for the US Marine Mammal Protection Act. PST is based on the total number of breeding pairs, and includes uncertainty in all demographic parameters explicitly; it estimates the level of human-induced mortality a population can incur while meeting the long-term goal for seabird populations of remaining above half their carrying capacity, in the presence of environmental variability (Richard et al. 2017). As noted by MPI 2016, the combination of the use of the total population size, the allometric modelling of adult survival and age at first reproduction, and the use of different corrections for the calculation of PST led to significant changes to the estimated risk ratio for each species between the 2015 and latest version (i.e., Richard et al. 2017). Results of the most recent iteration of the risk assessment show that only black petrel is classified as 'very high risk', with a median risk ratio of greater than 1 (i.e., median catches exceeded the PST) or an upper 95% confidence limit greater than 2. Seven species were classified as 'high risk' because they have a risk ratio with a median above 0.3 or with the upper 95% confidence limit above 1, and four species were classified as 'medium risk' because they had a median risk above 0.1 or an upper confidence limit above 0.3 (Table 40). With respect to black petrel (the only species classified as very high risk), it is noted that this species is most commonly found off the North Island, with very little overlap with the fishery (Abraham et al. 2015). The hoki, hake and ling trawl fishery also accounts for small or very small amounts of the total fisheries-related mortality of

<table>
<tr><th colspan="2">PI 2.3.1</th><th colspan="3">The fishery meets national and international requirements for the protection of ETP species
The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species</th></tr>
<tr><td></td><td></td><td colspan="3">species other than Salvin's albatross (17.70%), Westland petrel (16.67%), southern Buller's albatross (39.58%), New Zealand white-capped albatross (14.67%), northern Buller's albatross (13.60%) and northern giant petrel (27.66%) (Richard et al. 2017, and Table 40).

The latest seabird risk assessment undertaken by Richard et al. 2017 also calculates a fishery-specific Annual Potential Fatality (APF) for each New Zealand fishery with sufficient observer data available (including the hoki, hake and ling trawl fisheries). The modelling uses estimates of incidental capture derived from observer data and fishing effort data for the period 2006-07 to 2014-15, and incorporates cryptic multipliers to account for net entanglement and surface and aerial warp strikes. Results indicate that, for the six seabird species listed above, the mean annual potential fatalities (APFs) associated with the hoki, hake and ling trawl fishery comprises a small percentage of those species estimated mean PST.

For the hoki, hake and ling trawl fishery, the highest relative mean APF is for southern Buller's albatross, calculated as an APF of 209 animals from a PST of 1,370 animals (= 15.3%). The upper 95% C.I. of the APFs are also substantially less than the lower 95% C.I. of the PSTs (see Table 41). In essence, seabirds are taken in the fishery but the risk to any seabird population is low (e.g., for southern Buller's albatross, the mean APF would have to increase by 6.5 times before it exceeded the mean PST.

It is concluded that there is a high degree of confidence that there are no significant detrimental direct effects of the fishery on seabirds; SG60, SG80 and SG100 are met.</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td></td><td>Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.</td><td>There is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.</td></tr>
<tr><td>Met?</td><td></td><td>Y – Basking shark
Y – Protected corals
Y – Marine mammals
Y – Seabirds</td><td>N – Basking shark
N – Protected corals
N – Marine mammals
N – Seabirds</td></tr>
<tr><td>Justification</td><td colspan="3">Indirect effects are considered to be impacts on behaviours, feeding efficiency, essential habitats or other aspects of ETP species' life histories.

The Expert Panel at the 2010 Ecological Risk Assessment considered the indirect ecological impacts of the hoki fishery. Indirect effects were considered qualitatively. The Panel did not identify any moderate or major indirect effects of this fishery on ETP species (Boyd 2011). However, given the qualitative nature of this assessment, there cannot be a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species. For all species, SG80 is met, but not SG100.

It is noted that there is clearly an ongoing interest in understanding the potential for indirect effects on ETP species; the issue is listed specifically in the DOC strategic statement (DOC 2015), and in parts of the DOC Marine Conservation Services Programme for 2017-18 (DOC 2017).</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Anderson et al. 2014, Baird et al. 2013, Baker et al. 2016, Boyd 2011, Consalvey et al. 2006, DOC undated-a, DOC 2015, DOC 2017, Ford et al. 2015, Francis 2017, MPI 2016, MRAG-Americas 2016, MSC 2013a, Richard & Abraham 2013, Richard & Abraham 2015, Richard et al. 2017.</td></tr>
</table>

PI 2.3.1	The fishery meets national and international requirements for the protection of ETP species The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species

OVERALL PERFORMANCE INDICATOR SCORE:	**85**
CONDITION NUMBER (if relevant):	**N/A**

PI 2.3.1 Scoring calculation

Element	SIa (60, 80, 100)	SIb (60, 80, 100)	SIc (80, 100 only)	Element score	PI Score
Basking shark	N/A	80	80	80	85
Protected corals	N/A	80	80	80	
Marine mammals	N/A	80	80	80	
Seabirds	N/A	100	80	90	

Evaluation Table for PI 2.3.2 Alternate – ETP species management

PI 2.3.2A		There is a strategy in place for managing ETP species that is designed to ensure the fishery does not hinder the recovery of ETP species.		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	There are measures in place that are expected to ensure the fishery does not hinder the recovery of ETP species.	There is a partial strategy in place that is expected to ensure the fishery does not hinder the recovery of ETP species.	There is a strategy in place for managing ETP species, to ensure the fishery does not hinder the recovery of ETP species.
	Met?	Y – Basking shark Y – Protected corals Y – Marine mammals Y – Seabirds	Y – Basking shark Y – Protected corals Y – Marine mammals Y – Seabirds	N – Basking shark N – Protected corals Y – Marine mammals Y – Seabirds
	Justification	Because there are no limits set for the protection and rebuilding of ETP species, PI 2.3.2 Alternate is scored. Consistent with the Fisheries Act 1996, the Wildlife Act 1953 and the Marine Mammals Protect Act 1978, strategic objectives for the monitoring, management and avoidance or minimisation of fisheries impacts on ETP species are established (DOC 2015), and a variety of research programmes have been put in place to deliver these objectives (e.g., DOC 2017), including through higher level plans such as National Plans of Action (e.g., MPI 2013a, MPI 2013b). <u>Basking shark</u> Basking shark is protected under Wildlife Act 1953; it is not illegal to incidentally catch basking sharks, but any that are taken must be returned immediately and the capture reported through the NFPSCRs. New Zealand also ratified the CMS in 2000, acknowledging the importance of conserving migratory species, and agreeing to take action to protect such species wherever appropriate and possible. In 2015, New Zealand also signed the UNEP/CMS MoU on the Conservation of Migratory Sharks (Sharks MoU), which covers basking shark. New Zealand has adopted an updated National Plan of Action (NPOA) on sharks (MPI 2013a), and this specifies a range of goals and five-year objectives that are intended to "maintain the biodiversity and long-term viability of all New Zealand's shark populations". A level 1 risk assessment has been conducted to help identify risk issues (Ford et al. 2015), and two reviews of commercial fishery interactions have been conducted, most recently by Francis 2017. In support of the adoption of the NPOA, DWG introduced Operational Procedures relating to the handling, reporting and avoidance of shark catches in general, but with a specific section on handling basking sharks in a manner that is safe and minimises the risk of damage to the shark (DWG 2014a). DWG also manages a trigger system, implemented in 2013, whereby basking shark catches are reported with the circumstances of the capture, and other vessels working nearby are alerted to the event, with the possibility that a hotspot closure is implemented to reduce the risk of further catches. The success of this approach may be difficult to determine given the low and variable catch rate of the sharks (Francis 2017), but three triggers were reported for basking shark during the 2015/16 fishing year (MPI 2017e). Overall, for basking shark, these measures are together considered to comprise a partial strategy, and SG60 and SG80 are met. <u>Protected corals</u> Most corals in New Zealand waters are protected under Wildlife Act 1953. As for basking shark, the legislation means it is not illegal to incidentally catch corals, but any corals that are taken must be returned immediately and the capture reported through the NFPSCRs.		

PI 2.3.2A		There is a strategy in place for managing ETP species that is designed to ensure the fishery does not hinder the recovery of ETP species.
		A network of benthic protection areas (BPAs) was designated in 2007, protecting approximately 1.1 million square km (32%) of the seabed within the New Zealand EEZ to bottom trawling and dredging. These BPAs include 12 large seamounts more than 1,000 m high and covering 81,000 square km. Trawling within 100 m of the seabed is prohibited in these areas, and any vessel conducting midwater trawling in these areas must carry an approved net monitoring system and two observers, and notify the observers of the intention to midwater trawl prior to commencing operations (MPI 2016). MPI 2010b notes that the management approach to address effects of deepwater trawl activity on benthic habitats has "*focused on 'avoiding' effects, rather than remedying or mitigating them (as per the requirements under the Fisheries Act to avoid, remedy or mitigate).*" Vessel activity is also monitored closely, and reviews of the trawl footprint are conducted annually (MPI 2017e). Almost all trawling in the hoki, hake and ling trawl fishery occurs within the existing footprint of the fishery (Black & Tilney 2017), which also minimises further impacts. The mapping of benthic habitats, protection of large areas of habitat, and annual monitoring and review of the trawl footprint comprises a partial strategy for managing protected coral species, to ensure the fishery does not hinder their recovery. SG60 and SG80 are met for these species. There is nothing to prevent the fishery expanding in to other areas if the stocks moved and/or commercially viable concentrations of hoki, hake or ling were identified elsewhere, however. Given the potential for impact and the slow recovery of these species, this prevents the fishery meeting SG100 for this SI. <u>Marine mammals</u> The hoki, hake and ling trawl fishery is considered to not interact or to interact in only a negligible manner with all species other than New Zealand fur seals. The impact of the fishery on this species is therefore assessed, here. Under the National Deepwater Plan (Ministry of Fisheries 2010), the objective most relevant for management of New Zealand fur seals is Management Objective 2.5: "*Manage deepwater and middle-depth fisheries to avoid or minimise adverse effects on the long term viability of endangered, threatened and protected species.*" In this regard, DWG has issued Marine Mammal Operational Procedures (MMOPs – DWG 2014b) to reduce the risk of marine mammal captures. The MMOPs are currently applied to trawlers greater than 28 m LOA and are supported by annual training conducted by DWG. They include a number of mitigation measures, such as managing offal discharge, refraining from shooting the gear when New Zealand fur seals are congregating around the vessel and the introduction of 'trigger' points – if two fur seals are captured within 24 hours or five fur seals are captured over 7 days then the following procedure is triggered: 1. Advise vessel manager, 2. Record capture event including location of capture in ship's log, 3. Ensure gear failures are addressed with the gear either on board or at a depth >50m, 4. Report capture to Deepwater Group either directly or via shore management. MPI 2016 notes that the major focus of the MMOPs is to reduce the time gear is at or near the surface when it poses the greatest risk. MPI, via observers, monitors and audits vessel performance against this procedure. Research into methods to minimise or mitigate New Zealand fur seal captures in commercial fisheries has focused on fisheries in which the species is more likely to be captured, but finding ways to mitigate captures has proved difficult because the animals are free swimming, can easily dive to the depths of the net when it is being deployed,

PI 2.3.2A		There is a strategy in place for managing ETP species that is designed to ensure the fishery does not hinder the recovery of ETP species.

		hauled, or brought to the surface during a turn, and are known to actively and deliberately enter nets to feed.
		
		There is also a risk assessment and ongoing data collation and review process (e.g., Baker et al. 2016, Abraham & Berkenbusch 2017), while marine mammal interactions are reported on routinely through the Aquatic Environment and Biodiversity Annual Review Series (e.g., MPI 2016).
		
		There is considered to be a strategy in place for managing marine mammals, to ensure the fishery does not hinder the recovery of ETP species. SG60, SG80 and SG100 are met.
		
		<u>Seabirds</u>
		The long-term objective of the National Plan of Action Seabirds (MPI 2013b) is that "*New Zealand seabirds thrive without pressure from fishing related mortalities, New Zealand fishers avoid or mitigate against seabird captures and New Zealand fisheries are globally recognised as seabird friendly*." Subsidiary objectives then include that fisheries implement best practice mitigation measures to reduce and where practicable eliminate the incidental mortality of seabirds, that incidental mortality of seabirds in New Zealand is at or below a level that allows for maintenance at a favourable status or recovery to a more favourable conservation status, and that research is undertaken to test and refine mitigation methods, and to improve understanding of seabird biology, demography and ecology.
		
		MPI 2017g details the approach taken to avoid or mitigate seabird interactions in deepwater fisheries; these include:
		
		• Mandatory use of seabird scaring devices (bird bafflers, paired streamer lines and/or warp deflectors – NZG 2010), and implementation of seabird mitigation measures
		• Implementation of best practice seabird mitigation measures through vessel-specific Vessel Management Plans (VMPs) for trawl vessels, including:
		  o Adherence to the VMP and to the Deepwater Group Seabird Risk Mitigation Operational Procedure (DWG 2015),
		  o Requirement to maintain a fish waste control system, with no continuous discharge while towing, and no discharge when shooting or hauling
		  o Deployment of bafflers and/or tori lines
		  o Removal of all stickers (fish trapped in net meshes) as practicable prior to shooting, and minimising the time the gear is at the surface when shooting and hauling.
		  o Requirement to report all captures of protected species via NFPSCRs, and to alert DWG if trigger point are hit within any 24 hour period (3 x large birds (albatross or mollymawk) or 5 x any bird).
		• An annual crew training and vessel outreach programme,
		• Ongoing exploration of new or improved mitigation methods, and
		• MPI observers monitoring vessel adherence to VMPs and reporting seabird interaction data.
		
		Also, DWG has an active role in briefing skippers, training crews and managing the trigger point alert system, and reviewing trigger alerts to identify issues that may have led to the trigger alert, and solutions to minimise the risk of the same issues arising again (DWG 2015).

<table>
<tr><th colspan="2">PI 2.3.2A</th><th colspan="3">There is a strategy in place for managing ETP species that is designed to ensure the fishery does not hinder the recovery of ETP species.</th></tr>
<tr><td></td><td></td><td colspan="3">There is also a risk assessment and ongoing data collation and review process (e.g., Richard & Abraham 2015, Abraham & Richard 2017, Richard et al. 2017), while seabird interactions are also reported on routinely through the Aquatic Environment and Biodiversity Annual Review Series (e.g., MPI 2016).

There is clearly a strategy in place for managing seabirds, to ensure the fishery does not hinder the recovery of ETP species. SG60, SG80 and SG100 are met.

We note that the Forest and Bird submission (Appendix 3. Stakeholder Submissions) highlights a slowly increasing trend in overall seabird captures in the period up to 2015 for the hoki fishery, and comments from the VMP Operational Procedures (1st October 2014) that indicated there was room for improvement in vessel performance with respect to the use of mitigation measures. In this regard, we note that the 2016 capture data indicate a much reduced catch of seabirds overall (Figure 43), and that the May 2015 version of the VMP reflects a more comprehensive approach to ensuring mitigation is implemented as required.

We highlight that we would expect any future assessment or audit team to continue to review progress of the fishery with respect to protected species captures and the effectiveness of management measures, routinely.</td></tr>
<tr><td rowspan="3">b</td><td>Guidepost</td><td>The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).</td><td>There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved.</td><td>The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports high confidence that the strategy will work.</td></tr>
<tr><td>Met?</td><td>Y – Basking shark
Y – Protected corals
Y – Marine mammals
Y – Seabirds</td><td>Y – Basking shark
Y – Protected corals
Y – Marine mammals
Y - Seabirds</td><td>N – Basking shark
N – Protected corals
Y – Marine mammals
Y - Seabirds</td></tr>
<tr><td>Justification</td><td colspan="3">For all species, there is some objective basis for confidence that the partial strategy in place will work, based on information directly about the fishery and/or species involved; this includes through review of evidence and risks (e.g., basking sharks – Ford et al. 2015, Francis 2017; protected corals - Baird et al. 2013, Anderson et al. 2014, Richard & Abraham 2015, Abraham & Richard 2017, Richard et al. 2017) and of operational performance (e.g., MPI 2016, MPI 2017e). SG60 and SG80 are met.

In the absence of a strategy (i.e., basking shark, protected corals), SG100 cannot be met, here.

For marine mammals and seabirds, the strategies are based on information directly about the fishery and/or species involved, and testing supports high confidence that the strategies will work (e.g., MPI 2016, Baker et al. 2016, Abraham & Berkenbusch 2017, Abraham & Richard 2017, Richard et al. 2017); SG100 is met.</td></tr>
<tr><td rowspan="2">c</td><td>Guidepost</td><td></td><td>There is some evidence that the partial strategy is being implemented successfully.</td><td>There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring.</td></tr>
<tr><td>Met?</td><td></td><td>Y – Basking shark
Y – Protected corals</td><td>N – Basking shark
N – Protected corals</td></tr>
</table>

<table>
<tr><td colspan="2">PI 2.3.2A</td><td colspan="2">There is a strategy in place for managing ETP species that is designed to ensure the fishery does not hinder the recovery of ETP species.</td></tr>
<tr><td></td><td></td><td>Y – Marine mammals
Y – Seabirds</td><td>Y – Marine Mammals
N – Seabirds</td></tr>
<tr><td></td><td>Justification</td><td colspan="2">For all species, there is clear evidence that the partial strategy or strategy is being implemented successfully, specifically through the monitoring and reporting (both from independent observers and through the requirement to notify catches on NFPSCRs), and through the review process that is undertaken routinely (e.g., MPI 2016, MPI 2017e, Richard & Abraham 2015, Abraham & Richard 2017); SG80 is met.

In the absence of a strategy (i.e., basking shark, protected corals), SG100 cannot be met, here.

For New Zealand fur seals, there is evidence that mitigation measures have been effective, in that the most recent five years of data show a reduction in the number of fur seals taken in the fishery and a reduction in the rate of capture (i.e., the number of fur seals captured per tow) (Figure 42). While there is not high confidence in the population data, colony observations over recent years have generally indicated a trend of increasing population size (MPI 2016), and this indicates that the decline in captures does demonstrate an improvement in fishery performance; as such, SG100 is also met for fur seals.

For seabirds, the data show a recent decline in the rate of capture of seabirds overall (focusing on the hoki fishery as the major part of the fishery - Figure 43), reflecting a renewed focus on ensuring that effective mitigation is implemented (e.g., DWG 2015). While the decline in numbers of seabird captures overall is welcome, the improvement covers the most recent year, only, and so it is not possible to say there is ‘clear evidence’ that ‘intended changes are occurring’. As such, SG100 is not met.</td></tr>
<tr><td colspan="2">References</td><td colspan="2">Abraham & Berkenbusch 2017, Abraham & Richard 2017, Anderson et al. 2014, Baker et al. 2016, Baird et al. 2013, Black & Tilney 2017, DWG 2014a, DWG 2014b, DWG 2015, Ford et al. 2015, Francis 2017, Ministry of Fisheries 2010, MPI 2013a, MPI 2013b, MPI 2016, MPI 2017e, MPI 2017g, NZG 2010, Richard & Abraham 2015, Richard et al. 2017.</td></tr>
<tr><td colspan="3">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>90</td></tr>
<tr><td colspan="3">CONDITION NUMBER (if relevant):</td><td>N/A</td></tr>
<tr><td colspan="3">RECOMMENDATION NUMBER</td><td>1</td></tr>
</table>

PI 2.3.2A Scoring calculation

Element	SIa (60, 80, 100)	SIb (60, 80, 100)	SIc (80, 100 only)	Element score	PI Score
Basking shark	80	80	80	80	90
Protected corals	80	80	80	80	
Marine mammals	100	100	100	100	
Seabirds	100	100	80	95	

Evaluation Table for PI 2.3.3 – ETP species information

<table>
<tr><td colspan="2">PI 2.3.3</td><td colspan="3">Relevant information is collected to support the management of fishery impacts on ETP species, including:
Information for the development of the management strategy;
Information to assess the effectiveness of the management strategy; and
Information to determine the outcome status of ETP species.</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>Information is sufficient to qualitatively estimate the fishery related mortality of ETP species.</td><td>Sufficient information is available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species.</td><td>Information is sufficient to quantitatively estimate outcome status of ETP species with a high degree of certainty.</td></tr>
<tr><td>Met?</td><td>Y – Basking shark
Y – Protected corals
Y – Marine mammals
Y – Seabirds</td><td>Y – Basking shark
Y – Protected corals
Y – Marine mammals
Y – Seabirds</td><td>N – Basking shark
N – Protected corals
N – Marine mammals
N – Seabirds</td></tr>
<tr><td>Justification</td><td colspan="3">New Zealand fisheries are required to report all captures of ETP species through the NFPSCRs, and these data may be verified through the observer programme (for 2011-2015, observer coverage levels have varied between about 20-40% – hoki, 30-75% – hake, and 10-25% – ling: Figure 37).

Data on protected species interactions are collated and reported routinely (e.g., MPI 2016), and research is undertaken to determine the fisheries impacts on ETP species based on these quantitative data (e.g., Francis 2017, Baird et al. 2013, Abraham & Berkenbusch 2017, Abraham & Richard 2017, Richard et al. 2017). SG60 and SG80 are met.

It is not clear that the information on population status for basking shark or protected corals is sufficient to estimate their outcome status with a high degree of certainty, so SG100 is not met.

For both seabirds and marine mammals (New Zealand fur seal), the data being collected from the fishery are of high quality, but uncertainties associated with cryptic mortality (seabirds) and population demography (seabirds and fur seals) remain, so that it is not possible to quantitatively estimate outcome status of these species with a high degree of certainty (MPI 2016). SG100 is not met for either seabirds or New Zealand fur seals.</td></tr>
<tr><td rowspan="3">b</td><td>Guidepost</td><td>Information is adequate to broadly understand the impact of the fishery on ETP species.</td><td>Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species.</td><td>Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.</td></tr>
<tr><td>Met?</td><td>Y – Basking shark
Y – Protected corals
Y – Marine mammals
Y – Seabirds</td><td>Y – Basking shark
Y – Protected corals
Y – Marine mammals
Y – Seabirds</td><td>N – Basking shark
N – Protected corals
N – Marine mammals
N – Seabirds</td></tr>
<tr><td>Justification</td><td colspan="3">In all cases, there is sufficient information to determine whether the hoki, hake and ling trawl fishery may be a threat to protection and recovery of ETP species. For basking shark, a level 1 risk assessment (Ford et al. 2015) and a review of interactions and population information (Francis 2017) have been undertaken. For protected corals, reviews of evidence and risks have also been undertaken (Baird et al. 2013, Anderson et al. 2014), and a continuing, annual review process is established to determine ongoing performance (e.g. MPI 2017e). For marine mammals, there is an ongoing threat assessment and capture review (e.g., Baker</td></tr>
</table>

<table>
<tr><td colspan="2">PI 2.3.3</td><td colspan="3">Relevant information is collected to support the management of fishery impacts on ETP species, including:
Information for the development of the management strategy;
Information to assess the effectiveness of the management strategy; and
Information to determine the outcome status of ETP species.</td></tr>
<tr><td></td><td></td><td colspan="3">et al. 2016, MPI 2016, Abraham & Berkenbusch 2017), while for seabirds, there is an ongoing risk assessment and review process to determine impacts and effects (e.g., Richard & Abraham 2015, Richard et al. 2017, Abraham and Richard et al. 2017).

In all cases therefore, information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species; SG60 and SG80 are met. However, SG100 is not met because it is not clear that accurate and verifiable information is available on the consequences for the status of all ETP species.</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td>Information is adequate to support measures to manage the impacts on ETP species.</td><td>Information is sufficient to measure trends and support a full strategy to manage impacts on ETP species.</td><td>Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.</td></tr>
<tr><td>Met?</td><td>Y – Basking shark
Y – Protected corals
Y – Marine mammals
Y – Seabirds</td><td>Y – Basking shark
Y – Protected corals
Y – Marine mammals
Y – Seabirds</td><td>N – Basking shark
N – Protected corals
Y – Marine mammals
Y – Seabirds</td></tr>
<tr><td>Justification</td><td colspan="3">Data on vessel activity and captures of ETP species are collected and collated routinely for all vessels operating in the hoki, hake and ling trawl fishery through the submission of NFPSCRs and verified through the observer programme. This information is sufficient to measure trends and support a full strategy to manage impacts on all ETP species; SG60 and SG80 are met.

Insufficient information is available on the population status for basking shark or protected corals to evaluate with a high degree of certainty whether a strategy is achieving its objectives, so SG100 is not met for these species.

For marine mammals and seabirds, there is very good information on interactions with trawl vessels, collected over a long time period which, together with information on demography that is available, is considered adequate to support comprehensive strategies to manage impacts, and evaluate whether the strategy (i.e., for marine mammals to “Manage deepwater and middle-depth fisheries to avoid or minimise adverse effects on the long term viability of endangered, threatened and protected species.” – Ministry of Fisheries 2010, and for seabirds that “New Zealand seabirds thrive without pressure from fishing related mortalities, New Zealand fishers avoid or mitigate against seabird captures” – MPI 2013b) are achieving their objectives. SG100 is met for both marine mammals and seabirds.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Abraham & Berkenbusch 2017, Abraham & Richard 2017, Anderson et al. 2014, Baird et al. 2013, Baker et al. 2016, Ford et al. 2015, Francis 2017, Ministry of Fisheries 2010, MPI 2013b, MPI 2016, MPI 2017e, Richard et al. 2017</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>85</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td>N/A</td></tr>
</table>

PI 2.3.3 Scoring calculation

Element	SIa (60, 80, 100)	SIb (60, 80, 100)	SIc (60, 80, 100)	Element score	PI Score
Basking shark	80	80	80	80	85
Protected corals	80	80	80	80	
Marine mammals	80	80	100	85	
Seabirds	80	80	100	85	

Evaluation Table for PI 2.4.1 – Habitat outcome

<table>
<tr><td colspan="2">PI 2.4.1</td><td colspan="3">The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.</td><td>The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.</td><td>There is evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.</td></tr>
<tr><td>Met?</td><td>Y – Hoki UoCs (1,2)
Y – Hake UoCs (3,4,5)
Y – Ling UoCs (6,7,8,9,10)</td><td>Y – Hoki UoCs (1,2)
Y – Hake UoCs (3,4,5)
Y – Ling UoCs (6,7,8,9,10)</td><td>P – Hoki UoCs (1,2)
Y – Hake UoCs (3,4,5)
Y – Ling UoCs (6,7,8,9,10)</td></tr>
<tr><td>Justification</td><td colspan="3">For the assessment of the hoki, hake and ling trawl fishery, main habitats (scoring elements) are considered to be upper and mid-slope sands and upper and mid-slope muds within the New Zealand EEZ, with boulder/bedrock outcroppings with emergent fauna within the New Zealand EEZ as the minor habitats (noting that protected corals are scored as ETP Species in PI 2.1.3 – 2.3.3).

With respect to assessing habitat impacts from a fishery, the MSC provides the following normative text (MSC 2013a):

CB3.14.3: The team shall consider the full extent of the habitats when assessing the status of habitats and the impacts of fishing, and not just the part of the habitats that overlap with the fishery.”

The effect of bottom trawling on benthic habitats in the deep sea (i.e., in waters over 200 m depth) can be profound, in particular because emergent epifaunal species (e.g., corals, sponges, seapens) found there are typically vulnerable to physical impacts, with the possibility of crushing, shearing or total removal, but also because such species are typically slow growing and long-lived, such that recovery may be extremely slow. At the wider scale, the effect of fishing can result in reductions in abundance and biomass, diversity, community structure and distribution. However, whilst generalisations regarding impacts from trawling may be made, care should be taken in inferring specific impacts because the type, configuration and weight of the gear, its mode and intensity of operation, as well as the slope, rugosity, sediment type and community type of a site are important determinants of impacts (see Clark et al. 2015 and MPI 2016 for reviews).

In the period 1989/90-2012/13, fishing activity undertaken as part of the hoki, hake and ling trawl fishery has accounted for approximately 40% of the total of all fishing activity in New Zealand deepwater fisheries, with hake-directed and ling-directed trawling each accounting for less than 2% of the total (Table 42). The footprint of the fished area has declined since a peak in the mid to late 1990s, however (Figure 46), and almost all fishing in the hoki, hake and ling trawl fishery occurs now within the footprint of areas that have previously been trawled (including any locations that are newly fished), with no notable extensions to the fishing grounds for these species in recent years (Black & Tilney 2017). Trawling within the existing trawl footprint is not a legislated requirement, but the effect is to limit the potential for new impacts to occur. Repeated trawling in the increasingly concentrated deepwater footprint (see Figure 46 and Figure 47) also provides circumstantial evidence that deep sea habitats are still functioning in support of fish communities after more than 30 years of trawling.

Black & Tilney 2017 also noted that the swept area for the hoki fishery from 1989/90 to 2012/13 comprised “a little over 10% of the total preferred habitat for hoki (i.e., in the over 0% probability of capture areas)”. In the most recent five-year period for which the data have been analysed (2009/10-2013/14), the swept area of</td></tr>
</table>

PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function
		the hoki-directed fishery extended over approximately 7.7% of the 200-800 m depth zone within the HOK 1 management area, while the hake-directed fishery extended over approximately 1.1% of the same 200-800 m depth zone. The ling-directed fishery extended over just 0.3% of the 300-600 m depth zone within the LIN 2-7 management area (Black 2016, and Table 43); fishing in other depth zones was essentially trivial in all three cases (Table 43). Importantly, approximately 32% of the benthic habitat within the New Zealand EEZ is protected from bottom trawling through the designation of benthic protection areas (BPAs); bottom trawling is banned in these locations. In summary, UoCs 3,4,5 for hake and UoCs 6,7,8,9,10 for ling meet SG60, SG80 and SG100 in full ("*There is evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm*.") because of their very small footprints relative to the area of habitat available in different depth zones. The hoki UoCs (1,2) are considered to meet SG60 and SG80 in full, and to partially meet SG100 (score = 90), in that "*There is* **<u>some</u>** *evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.*" In essence, the hoki fishery footprint has contracted over time and covered only 7.7% of the 200-800m depth zone in the most recent five-year period. There is potential for recovery to be occurring in previously fished areas, but there is insufficient information on these recovery rates relative to structure and function to be confident that SG100 is met.
References		Black 2016, Black & Tilney 2017, Clark et al. 2015, MSC 2013a

OVERALL PERFORMANCE INDICATOR SCORE: UoCs 1 & 2 (Hoki)	**90**
OVERALL PERFORMANCE INDICATOR SCORE: UoCs 3,4,5 (Hake)	**100**
OVERALL PERFORMANCE INDICATOR SCORE: UoCs 6,7,8,9,10 (Ling)	**100**
CONDITION NUMBER (if relevant):	**N/A**

<u>UoCs 1 & 2 (HOK 1E & 1W) – PI 2.4.1 Scoring calculation</u>

Element	SIa (60, 80, 100)	Element score	PI Score
Upper and mid-slope sands	90	90	90
Upper and mid-slope muds	90	90	
Boulder/bedrock outcroppings with emergent fauna	90	90	

<u>UoCs 3-10 (Hake UoCs and Ling UoCs) – PI 2.4.1 Scoring calculation</u>

Element	SIa (60, 80, 100)	Element score	PI Score
Upper and mid-slope sands	100	100	100
Upper and mid-slope muds	100	100	
Boulder/bedrock outcroppings with emergent fauna	100	100	

Evaluation Table for PI 2.4.2 – Habitat management

<table>
<tr><td colspan="2">PI 2.4.2</td><td colspan="3">There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>There are measures in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.</td><td>There is a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.</td><td>There is a strategy in place for managing the impact of the fishery on habitat types.</td></tr>
<tr><td>Met?</td><td>Y – All UoCs</td><td>Y – All UoCs</td><td>N – All UoCs</td></tr>
<tr><td>Justification</td><td colspan="3">For the assessment of the hoki, hake and ling trawl fishery, main habitats (scoring elements) are considered to be upper and mid-slope sands and upper and mid-slope muds, with boulder/bedrock outcroppings with emergent fauna as minor habitats (noting that protected corals are scored as ETP species in PI 2.1.3 – 2.3.3).

The approach to managing fishing impacts on New Zealand deep water benthic habitats is based on the following:
• Preventing fishing in a significant proportion (32%) of the New Zealand EEZ through the designation of benthic protection areas (BPAs) (MPI 2016),
• Limiting fishing activity in areas that are fished by setting annual TACCs for individual species and bringing most bycatch species into the QMS, with steadily higher ‘deemed values’ for any fish caught in excess of an individual’s ACE (Fishserve 2018),
• Monitoring activity with a good level of observer coverage (Figure 37),
• Requiring vessels to submit TCEPRs on a tow-by-tow basis,
• Collating and reporting tow information annually to determine the footprint of the New Zealand deepwater fleet as a whole, and for fisheries targeting Tier 1 species (e.g., Black 2016, Black & Tilney 2017), and
• Continuing to gather data on species and habitats across the New Zealand EEZ (e.g., Bowden et al. 2017)
• Continuing to develop predictive models to map the benthic environment in areas that have not yet been surveyed (e.g., Leathwick et al. 2012, Baird et al. 2013, Ford et al. 2016).

Together, these components comprise a partial strategy that is expected to achieve the Habitat Outcome 80 level of performance or above – SG60 and SG80 are met.

The hoki, hake and ling trawl fishery operates within an increasingly concentrated spatial footprint (Ford 2017, and see Figure 46 and Figure 47), but with the exception of the BPAs and the constraints of each fisher’s own knowledge and experience of the fishing grounds, there is nothing to prevent the fishery expanding in to other areas if the stocks moved and commercially viable concentrations of hoki, hake or ling were identified elsewhere. Given the potential for impact and the slow recovery of deepwater benthic habitats, this prevents the fishery meeting SG100 for this SI.</td></tr>
<tr><td rowspan="2">b</td><td>Guidepost</td><td>The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).</td><td>There is some objective basis for confidence that the partial strategy will work, based on information directly about the fishery and/or habitats involved.</td><td>Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or habitats involved.</td></tr>
<tr><td>Met?</td><td>Y – All UoCs</td><td>Y – All UoCs</td><td>N – All UoCs</td></tr>
</table>

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types		
	Justification	The designation of protected areas to prevent fishing impacts in deep water sites is well established internationally (e.g., FAO 2009), while the economics of fishing invariably means that it is in the interest of the industry to be as efficient as possible by progressively minimising fishing time (and therefore the fishing footprint) in catching the allocated TACC. Detailed monitoring and review of spatial data is a feature of effective habitat management, while the ongoing collection and review of habitat data supports the overall management approach. There is clearly some objective basis for confidence that the partial strategy will work, based on information directly about the fishery and/or habitats involved; SG60 and SG80 are met. In the absence of a 'strategy', SG100 cannot be met.		
c	Guidepost		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y – All UoCs	N – All UoCs
	Justification	All of the measures that comprise the partial strategy as detailed in SIa are clearly being implemented successfully, SG80 is met. In the absence of a 'strategy', SG100 cannot be met.		
d	Guidepost			There is some evidence that the strategy is achieving its objective.
	Met?			N – all UoCs
	Justification	In the absence of a 'strategy', this SG100 requirement cannot be met.		
References		Baird et al. 2013, Black 2016, Black & Tilney 2017, Bowden et al. 2017, FAO 2009, Fishserve 2018, Ford et al. 2016 Ford 2017, Leathwick et al. 2012, MPI 2016.		
OVERALL PERFORMANCE INDICATOR SCORE: (All UoCs)				80
CONDITION NUMBER (if relevant):				N/A

Evaluation Table for PI 2.4.3 – Habitat information

PI 2.4.3		**Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	There is basic understanding of the types and distribution of main habitats in the area of the fishery.	The nature, distribution and vulnerability of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery.	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.
	Met?	Y – All UoCs	Y – All UoCs	N – All UoCs
	Justification	For the assessment of the hoki, hake and ling trawl fishery, main habitats (scoring elements) are considered to be upper and mid-slope sands and upper and mid-slope muds, with boulder/bedrock outcroppings with emergent fauna as minor habitats (noting that protected corals are scored as ETP Species in PI 2.1.3 – 2.3.3). Increasingly complex habitat mapping based on modelling with ground-truthing has been undertaken in New Zealand waters (MPI 2016, and e.g., Snelder et al. 2006, Leathwick et al. 2012), and particular attention has been paid to the distribution of vulnerable species (e.g., Baird et al. 2013). Data on benthic habitats continue to be collected through observers and TCEPRs submitted from commercial fishing trips, but also through specific benthic surveys undertaken to improve the information underlying the habitat models (e.g., Bowden et al. 2017). Habitat and environmental information is also reviewed and consideration given to the best way to interpret and present the data, with specific focus on understanding benthic impacts from fishing (e.g., Ford et al. 2016). It is clear that the nature, distribution and vulnerability of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery; SG60 and SG80 are met. Predictive modelling with interpolation between survey points is a standard and well-accepted approach to mapping seabed habitats. The work undertaken to characterise New Zealand's deep sea marine habitats is commendable and of high quality, but it is apparent that there remain questions over the accuracy and/or reliability of some outputs (e.g., Ford et al. 2016), and so it is not clear that SG100 is met.		
b	**Guidepost**	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.	Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.	The physical impacts of the gear on the habitat types have been quantified fully.
	Met?	Y – All UoCs	Y – All UoCs	N – All UoCs

<table>
<tr><td colspan="2">PI 2.4.3</td><td colspan="3">Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types</td></tr>
<tr><td></td><td>Justification</td><td colspan="3">Studies have been undertaken to assess the impact of trawling on deepwater habitats (see Clark et al. 2015 and MPI 2016 for reviews), and a very considerable body of research on fishing impacts is available from shallower waters from which to draw inference.

Information on all deepwater trawling is reported on a tow-by-tow basis through the TCEPRs, and the trawl footprint of the New Zealand fleet, and of fisheries targeting Tier 1 species, is calculated and summarised annually (e.g., Anderson 2014, Black 2016, Black & Tilney 2017).

It is clear that sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear; SG60 and SG80 are met.

SG100 requires that the physical impacts of the gear on the habitat types have been quantified fully. This is a very challenging requirement for deep water fisheries, in part because recovery of benthic communities can take a long time (so understanding and quantifying impacts may take a considerable period), but also because the deep sea is a difficult environment in which to conduct research. This requirement is not met.</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td></td><td>Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).</td><td>Changes in habitat distributions over time are measured.</td></tr>
<tr><td>Met?</td><td></td><td>Y – All UoCs</td><td>N – All UoCs</td></tr>
<tr><td>Justification</td><td colspan="3">All deepwater vessels are monitored through VMS, and tow-by-tow data, including on the start and finish location of each trawl, are submitted on TCEPRs. These tow location data are collated and analysed annually to produce the trawl footprints of each fishery and of the New Zealand deepwater fleet in total. It is clear that sufficient data continue to be collected to detect any increase in risk to habitat; SG80 is met.

New data on the location of structure forming coral habitats are collected routinely, and there is an ongoing programme to refine existing maps of the seabed (e.g., Ford et al. 2016, Bowden et al. 2017). However, it is not possible to conclude for the deepwater zone that changes in habitat distributions over time are measured. As such, SG100 is not met.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Anderson 2014, Baird et al. 2013, Black 2016, Black & Tilney 2017, Bowden et al. 2017, Clark et al. 2015, Ford et al. 2016, Leathwick et al. 2012, MPI 2016, Snelder et al. 2006.</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE: (All UoCs)</td><td>80</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td>N/A</td></tr>
</table>

Evaluation Table for PI 2.5.1 – Ecosystem outcome

<table>
<tr><td colspan="2">PI 2.5.1</td><td colspan="3">The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>The fishery is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.</td><td>The fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.</td><td>There is evidence that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.</td></tr>
<tr><td>Met?</td><td>Y – Hoki UoCs (1,2)
Y – Hake UoCs (3,4,5)
Y – Ling UoCs (6,7,8,9,10)</td><td>Y – Hoki UoCs (1,2)
Y – Hake UoCs (3,4,5)
Y – Ling UoCs (6,7,8,9,10)</td><td>N – Hoki UoCs (1,2)
P – Hake UoCs (3,4,5)
P – Ling UoCs (6,7,8,9,10)</td></tr>
<tr><td>Justification</td><td colspan="3">When assessing the ecosystem component; normative text indicates the following (MSC 2013a):

"CB3.17.3 The team should note that "key" ecosystem elements are the features of an ecosystem considered as being most crucial to giving the ecosystem its characteristic nature and dynamics, and are considered relative to the scale and intensity of the fishery. They are features most crucial to maintaining the integrity of its structure and functions and the key determinants of the ecosystem resilience and productivity."

In the context of the assessed hoki, hake and ling trawl fishery, and on the basis of the relative scale of removals for the different species, it is considered appropriate to assess a) hoki as prey, predator and competitor, and b) trophic structure as the key ecosystem elements within the New Zealand deepwater ecosystem. Hake and ling both comprise much smaller components of the ecosystem and are not considered as key ecosystem elements.

As noted in the Principle 1 scoring, the hoki Eastern and Western stocks are both performing well, and are likely (>60%) to be at or above the upper end of the target range (50% B_0). Both stocks scored 100 for PI 1.1.1 (stock status). For hoki as a key element, there is evidence that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. All UoCs meet SG100.

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 (see Section 4.3.6), but none that meet the MSC's definition of 'serious or irreversible'. 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 bentho-pelagic) 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. Horn & Dunn 2010 examined whether there was evidence of change in the diet of hoki, hake or ling on the Chatham Rise between 1990 and 2009. They concluded it appeared likely that the importance of fish (primarily myctophids) as a prey item for hoki had increased slightly but steadily between 1990 and 2009, while the importance of euphausiids had declined. In contrast,</td></tr>
</table>

PI 2.5.1		The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function	
		there were no obvious between-year trends in the diets of hake or ling over the same period. Given the status of the ecosystem indicators, it is considered that all UoCs are highly unlikely to disrupt trophic structure to a point where there would be a serious or irreversible harm; SG60 and SG80 are met. SG100 is not met at this time, because the Tuck et al. 2009 review is now a little dated (the most recent data used in their analyses are from 2007), and there remain unanswered questions over the cause of some changes in New Zealand's deepwater environments (MPI 2016).	
References		MSC 2013a, MPI 2016, Tuck et al. 2009.	
OVERALL PERFORMANCE INDICATOR SCORE: UoCs 1 & 2 (Hoki)			**90**
OVERALL PERFORMANCE INDICATOR SCORE: UoCs 3,4,5 (Hake)			**95**
OVERALL PERFORMANCE INDICATOR SCORE: UoCs 6,7,8,9,10 (Ling)			**95**
CONDITION NUMBER (if relevant):			**N/A**

<u>All UoCs – PI 2.5.1 Scoring calculation</u>

Element	SIa (60, 80, 100)	Element score	PI Score
Hoki	100	100	90
New Zealand deep water trophic structure	80	80	

Evaluation Table for PI 2.5.2 – Ecosystem management

<table>
<tr><th colspan="2">PI 2.5.2</th><th colspan="3">There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function</th></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>There are measures in place, if necessary.</td><td>There is a partial strategy in place, if necessary.</td><td>There is a strategy that consists of a plan, in place.</td></tr>
<tr><td>Met?</td><td>Y – All UoCs</td><td>Y – All UoCs</td><td>Y – All UoCs</td></tr>
<tr><td>Justification</td><td colspan="3">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), retained and bycatch species (as described in PI 2.1.2 and PI 2.2.2), ETP species (as described in PI 2.3.2), and habitats (as described in PI 2.4.2).

The management of ecosystem impacts is based around a well-structured, legislative, policy and operational framework. The overall structure includes at least the following:
• • The Fisheries Act
• The Wildlife Act
• The Harvest Strategy Standard for New Zealand Fisheries (Ministry of Fisheries 2008)
• The National Fisheries Plan for Deepwater and Middle-depth Fisheries (Ministry of Fisheries 2010)
• The Conservation Services Programme Strategic Statement (DOC 2015)
• National Plans of Action for sharks, seabirds (MPI 2013a, MPI 2013b)
• 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 (MPI 2017g)
• The Conservation Services Programme annual plan 2017/18 (DOC 2017)
• Deepwater group operational procedures for sharks, seabirds (DWG 2014)

And data are collected, collated and reviewed regularly to inform the ongoing delivery of sustainable fisheries. For example:
• • The Annual Review Report for Deepwater Fisheries for 2015/16 (MPI 2017e)
• Fish species (e.g., MPI 2017a, Ballara & O’Driscoll 2015)
• ETP species (e.g., Baird 2013, Anderson 2014)
• Habitats (e.g., Black 2016m, Black & Tilney 2017, Bowden et al. 2017)
• Ecosystem considerations (e.g., Tuck et al. 2009, Stevens 2011, Tuck et al. 2014, Ford et al. 2016, MPI 2016).

In summary, while a document titled ‘ecosystem management strategy’ has not been produced for the hoki, hake and ling trawl fishery, there is considered to be a strategy in place. SG60, SG80 and SG100 are met.</td></tr>
</table>

<table>
<tr><th colspan="2">PI 2.5.2</th><th colspan="3">There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function</th></tr>
<tr><td rowspan="3">b</td><td>Guidepost</td><td>The measures take into account potential impacts of the fishery on key elements of the ecosystem.</td><td>The partial strategy takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.</td><td>The strategy, which consists of a plan, contains measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem.

This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm.</td></tr>
<tr><td>Met?</td><td>Y – All UoCs</td><td>Y – All UoCs</td><td>N – All UoCs</td></tr>
<tr><td>Justification</td><td colspan="3">As noted in SIa, data are collected, collated and reviewed regularly to inform the ongoing delivery of sustainable fisheries. The strategy addresses all of the main impacts of the fishery and is demonstrably achieving the ecosystem outcome 80 level of performance. SG60 and SG80 are met.

It is not clear that the overall focus on structure and function is particularly strong in the WCSI and Sub-Antarctic regions, where ecosystem modelling is further behind that of the Chatham Rise. There is also a question regarding the adequacy of information on the status of mid-trophic level species, which are important components of the food web (Pinkerton 2013, MPI 2016). As such, it is not possible to state that the SG100 requirement that "The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem" is met.</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td>The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).</td><td>The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).</td><td>The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved.</td></tr>
<tr><td>Met?</td><td>Y – All UoCs</td><td>Y – All UoCs</td><td>Y – All UoCs</td></tr>
<tr><td>Justification</td><td colspan="3">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 species and habitats). These components are being actively managed (see PIs 2.1.2, PI 2.2.2, PI 2.3.2 and PI 2.4.2). The Aquatic Environment and Biodiversity Annual Review (MPI 2016) 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) provides a rich source of information through which to investigate the efficacy of strategies and plans in place. SG60, SG80 and SG100 are met.</td></tr>
</table>

PI 2.5.2		There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function		
d	Guidepost		There is some evidence that the measures comprising the partial strategy are being implemented successfully.	There is evidence that the measures are being implemented successfully.
	Met?		Y – All UoCs	Y – All UoCs
	Justification	All of the measures that comprise the partial strategy as detailed in SIa are clearly being implemented successfully, SG80 and SG100 are met.		
References		Anderson 2014, Baird 2013, Ballara & O'Driscoll 2015, Black 2016, Black & Tilney 2017, Bowden et al. 2017, DOC 2015, DOC 2017, DWG 2014, Ministry of Fisheries 2008, Ministry of Fisheries 2010, Ford et al. 2016, MPI 2011b, MPI 2013a, MPI 2013b, MPI 2016, MPI 2017a, MPI 2017e, Stevens 2011, Tuck et al. 2009, Tuck et al. 2014		
OVERALL PERFORMANCE INDICATOR SCORE:				**90**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation Table for PI 2.5.3 – Ecosystem infomation

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Information is adequate to identify the key elements of the ecosystem (e.g., trophic structure and function, community composition, productivity pattern and biodiversity).	Information is adequate to broadly understand the key elements of the ecosystem.	
	Met?	Y – All UoCs	Y – All UoCs	
	Justification	In the context of the assessed hoki, hake and ling trawl fishery, and on the basis of the relative scale of removals for the different species, it is considered appropriate to assess a) hoki as prey, predator and competitor, and b) trophic structure as the key ecosystem elements within the New Zealand deepwater ecosystem. Hake and ling both comprise much smaller components of the ecosystem and are not considered as key ecosystem elements. MPI (2016) 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 Pinkerton (2013). Middle trophic level groups, especially small demersal fishes and mesozooplankton, were determined to have some of the highest trophic importance amongst consumers, but mesopelagic fishes, hoki, and arthropods (benthic prawns and shrimps) also had high trophic importance (Pinkerton 2013). These patterns of trophic importance were robust to uncertainties in the model parameterisation and balancing (Pinkerton 2014). Research in to hoki ecology and status over time has been extensive, as detailed throughout the Principle 1 sections of this report. Information is adequate to broadly understand the key elements of the ecosystem – SG60 and SG80 are met.		
b	**Guidepost**	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, and have not been investigated in detail.	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information and some have been investigated in detail.	Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and have been investigated in detail.
	Met?	Y – All UoCs	Y – All Us	Y – All UoCs
	Justification	Main interactions between the hoki, hake and ling trawl fishery and hoki can be inferred from existing information and have been investigated in detail (e.g., Langley 2009, Langley 2011, Horn 2011, Butterworth et al. 2014, MPA 2017a). SG60, SG80 and SG100 are met for all UoCs. With respect to trophic structure, modelling of the foodweb in the Chatham Rise region has been underway since 2006, with Pinkerton (2013) being the most recent version. Modelling is not as advanced in other deepwater regions. However, Tuck et al. 2009 provided an ecosystem-focused review of data from the Chatham Rise and Sub-Antarctic trawl surveys. Their analyses showed 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		

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem		
		demersal (rather than bentho-pelagic) 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. Horn & Dunn 2010 concluded that it was likely that the importance of fish (primarily myctophids) as a prey item for hoki on the Chatham Rise had increased slightly but steadily between 1990 and 2009, while the importance of euphausiids had declined. In contrast, there were no obvious between-year trends in the diets of hake or ling over the same period. It is considered that main interactions between the fishery and trophic structure can be inferred from existing information, and have been investigated in detail SG60, SG80 and SG100 are met for this element, also.		
c	Guidepost		The main functions of the Components (i.e., target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known.	The impacts of the fishery on target, Bycatch, Retained and ETP species are identified and the main functions of these Components in the ecosystem are understood.
	Met?		Y – All UoCs	Y – All UoCs
	Justification	The main functions of hoki, hake, ling and minor retained and bycatch species as predators and prey species 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 2013, Stevens et al. 2011). The main functions of the ETP species that are vulnerable to capture in the hoki, hake and ling trawl fishery are also considered to be understood. There is also increasing information available on the importance of structuring communities (e.g., corals, seafans and seapens), to deep water ecosystems (e.g., FAO 2009). Together, this information means that the fishery meets SG80 and the second part of SG100 ("the main functions of these Components in the ecosystem are understood") for this SI. There is also information on the impacts of the fishery on these components, with observer coverage at good levels (Figure 37), the submission of TCEPRs at a tow-by-tow basis, and the collation and presentation of trawl footprint data over time (e.g., Black & Tilney 2017). The first part of SG100 ("The impacts of the fishery on target, Bycatch, Retained and ETP species are identified") is also met for this SI.		
d	Guidepost		Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.	Sufficient information is available on the impacts of the fishery on the Components and elements to allow the main consequences for the ecosystem to be inferred.
	Met?		Y – All UoCs	N – All UoCs

<table>
<tr><th colspan="2">PI 2.5.3</th><th colspan="3">There is adequate knowledge of the impacts of the fishery on the ecosystem</th></tr>
<tr><td></td><td>Justification</td><td colspan="3">The assessment of the hoki and other stocks (MPI 2017a) provides an important insight to the impact of the hoki, hake and ling trawl fishery on these species, and particularly on hoki as a key ecosystem element. Information is also collected and collated from observers and from TCEPRs that, with appropriate analyses, show the fishery is not significantly adversely impacting ETP species, Some information is also available on the impact of towed gears on benthic structuring communities (see Clark et al. 2016 and MPI 2016 for reviews), and predictive models of the distribution of habitats and protected coral species have been constructed and compared with the trawl footprint of the fisheries (e.g., Leathwick 2012, Baird et al. 2013, Anderson et al. 2014, Black et al. 2016).

It is considered that sufficient information is available on the impacts of the fishery on the components of the New Zealand deepwater ecosystem to allow the main consequences to be inferred. As such, the fishery scores 80 for this SI. It is not clear that sufficient information is available on all elements, however, so SG100 is not met.</td></tr>
<tr><td rowspan="3">e</td><td>Guidepost</td><td></td><td>Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).</td><td>Information is sufficient to support the development of strategies to manage ecosystem impacts.</td></tr>
<tr><td>Met?</td><td></td><td>Y – All Us</td><td>N – All UoCs</td></tr>
<tr><td>Justification</td><td colspan="3">There is an ongoing scientific survey programme for the three main areas covered by the hoki, hake and ling trawl fishery – Chatham Rise, Sub-Antarctic and the WCSI. These data are fishery independent and are considered “crucial for understanding and monitoring for trophic and ecosystem level effects” (MPI 2016).

All deepwater vessels are also monitored through VMS, and tow-by-tow data, including on catches and the start and finish location of each trawl, are submitted on TCEPRs. These data are collated and analysed annually to produce catch summaries and the trawl footprints of each fishery and of the New Zealand deepwater fleet in total. It is clear that sufficient data continue to be collected to detect any increase in risk level; SG80 is met.

With respect to whether information is sufficient to support the development of strategies to manage ecosystem impacts, it is noted that of the 43 potential ecosystem indicators identified by Tuck et al. 2014, it was considered that information on only eight indicators was insufficient to allow the indicator to be operationalised (in 2014). However, of those eight indicators, six were food web indicators for the mid-trophic level group that Pinkerton (2013) identified as having some of the highest trophic importance amongst consumers. MPI (2016) identified that there is information on this mid-trophic level group in the scientific trawl surveys; while this appears to be insufficient to monitor ecosystem impacts, though, SG100 is not met.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Anderson et al. 2014, Baird et al. 2013, Black et al. 2016, Black & Tilney 2017, Clark et al. 2016, FAO 2009, Leathwick 2012, MPI 2016, MPI 2017a, Pinkerton 2013, Stevens et al. 2011, Tuck et al 2009, Tuck et al. 2014</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>90</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td>N/A</td></tr>
</table>

Evaluation Table for PI 3.1.1 - Legal and/or Customary Framework

PI 3.1.1		**The management system exists within an appropriate legal and/or customary framework which ensures that it:** • **Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and** • **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	**Guidepost**	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 which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	Y	Y	Y
	Justification	MPI is responsible for the utilisation of New Zealand's fisheries resources while ensuring sustainability in accordance with its governing legislation - the Fisheries Act 1996. Under the Fisheries Act, sustainability means: (a) maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations (which addresses P1) and (b) avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment (which addresses P2). Utilisation means conserving, using, enhancing, and developing fisheries resources to enable people to provide for their social, economic, and cultural well-being. 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. MPI provides management, licensing (where applicable) research and compliance and education services for commercial, recreational and customary fishing. MPI assists the Minister for Primary Industries in the administration of the relevant Acts. The Government's commitment to wide consultation and engagement is set out in Section 12 of the Act. MPI is required to consult with those classes of persons having an interest (including, but not limited to, Maori, environmental, commercial and recreational interests) in the stock or the effects of fishing on the aquatic environment in the area concerned. MPI do this in a number of ways, e.g. through regular meetings of working groups. These meetings are open to everyone, and consider fish stocks and the effects of fishing on the aquatic environment. 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 (DoC 2016). MPI and DWG coordinate with DoC in management of the fisheries.		

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: • Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and • 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.		
		New Zealand is a member of the South Pacific Regional Fisheries Management Organization (SPRFMO), which has Conservation Management Measures (CMM) binding on members. CMM 2.03 specifically deals with international requirements for bottom fishing in the SPRFMO area. There is an effective national and international legal system and binding procedures governing cooperation with other parties that deliver management outcomes consistent with MSC Principles 1 and 2. This SI meets SG60, SG80 and SG100.		
b	Guidepost	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 fishery.	The management system incorporates or 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.
	Met?	Y	Y	Y
	Justification	The Fisheries Act provides opportunities to negotiate and resolve disputes. The Minister may appoint a Dispute Commissioner to manage the process but the Minister makes the final determination. The consultation process attempts 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 the issue has gone to litigation and the Court has made a decision. The Memorandum of Understanding between DWG and MPI has encouraged better working relationships and avoided the need for litigation between the Ministry and the industry. 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 be effective. This meets the SG60, SG80, and SG100.		
d	Guidepost	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.
	Met?	Y	Y	Y

<table>
<tr><td>PI 3.1.1</td><td colspan="2">The management system exists within an appropriate legal and/or customary framework which ensures that it:
Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and
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.</td></tr>
<tr><td></td><td>Justification</td><td>MPI is responsible for the administration of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992, which implements the 1992 Fisheries Deed of Settlement under which historical Treaty of Waitangi claims relating to commercial fisheries have been fully and finally settled. The Ministry is also responsible for the Maori Fisheries Act 2004, which provides that the Crown allocates 20% of quota for any new quota management stocks brought into the QMS to the Treaty of Waitangi Fisheries commission. For non-commercial fisheries, the Kaimoana Customary Fishing Regulations 1998 and the Fisheries (South Island Customary Fishing) Regulations 1998 strengthen some of the rights of Tangata Whenua to manage their fisheries.

These regulations let iwi and hapü manage their non-commercial fishing in a way that best fits their local practices, without having a major effect on the fishing rights of others. When the government sets the total catch limits for fisheries each year, it allows for this customary use of fisheries before allocating commercial quotas. The management system therefore 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. This meets the SG60, SG80, and SG100.</td></tr>
<tr><td colspan="2">References</td><td>Fisheries Act 1996
DWG 2010
Treaty of Waitangi (Fisheries Claims) Settlement Act 1992
Deed of Settlement 1992
Maori Fisheries Act 2004
Customary Fisheries Regulations 1998
Fisheries 2030
MRAG-Americas 2016
Intertek 2012
Intertek 2014
Intertek 2014a
DOC 2017
SPRFMO 2016</td></tr>
</table>

OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation Table for PI 3.1.2 – Consultation, Roles and Responsibilties

<table>
<tr><td colspan="2">PI 3.1.2</td><td colspan="3">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</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are generally understood.</td><td>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.</td><td>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.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">MPI is the Government agency responsible for the utilisation and sustainable management of the fisheries resources. The role of the MPI, working with other government agencies, is to advise on and implement government policy in the following areas of core responsibility:
a) ensuring sustainability of fish stocks and the protection of the aquatic environment;
b) meeting international and Deed of Settlement obligations;
c) providing for maximum value to be realised;
d) facilitating sustainable development; and
e) ensuring integrity of management systems.
MPI is charged with consistently monitoring the fishery resource, and making timely and appropriate policy advice on all aspects of fisheries management to the Government. The Ministry is also responsible for carrying out the Government's policies to manage and conserve fisheries, and to actively encourage compliance of fisheries regulations by all fishers. The Department of Conservation (DOC) is the central government organisation charged with conserving the natural and historical heritage of New Zealand. The department is responsible for marine reserves, seabirds, and for marine mammals such as dolphins, whales, sea lions and fur seals.
DWG is a non-profit organisation, and is the commercial stakeholder organisation responsible for the majority of deepwater and middle-depth fisheries. It is working in partnership with the MPI and other interest groups to ensure New Zealand gains the maximum economic yields from its deepwater fisheries resources managed within a long-term, sustainable framework. The vast majority of quota owners are represented through the DWG. The MPI and DWG signed a Memorandum of Understanding (MOU) in 2006, which sets out how DWG and MPI are to work collaboratively to improve the management of deepwater fisheries. The MOU was updated in 2008 and 2010. ENGOs and other stakeholders have an important role in participating and contributing to management processes. Therefore, organisations and individuals involved in the management process have been identified and their functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction. This meets the SG60, SG80, and SG100.</td></tr>
</table>

<table>
<tr><th colspan="2">PI 3.1.2</th><th colspan="3">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</th></tr>
<tr><td rowspan="3">b</td><td>Guidepost</td><td>The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.</td><td>The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.</td><td>The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information and explains how it is used or not used.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">Section 12 of the 1996 Act includes a range of specific consultation requirements. MPI is required to consult with those classes of persons having an interest (including, but not limited to, Maori, environmental, commercial and recreational interests) in the stock or the effects of fishing on the aquatic environment in the area concerned; Section 12 only relates to certain sections of the 1996 Act.

However, there are other sections of the 1996 Act that require the Minister or MPI Chief Executive to consult with stakeholders before making a decision. MPI has a well-defined process for stakeholder consultation. The consultation process:

• sets out best practice process for how MPI will meet its obligations under Section 12 of the Fisheries Act 1996 and for other decisions requiring consultation with fisheries stakeholders;
• helps to ensure a consistent approach across all MPI business groups when consulting with fisheries stakeholders; and
• sets out minimum performance measures where appropriate, e.g., a minimum period for stakeholder consultation.

The consultation process standard includes the following:

• identification of stakeholders “having an “interest” for consultation purposes;
• a timeframe for consultation;
• notification of decision to stakeholders; and
• monitoring, review and oversight.

Within this process, it is necessary to identify who has an interest; and who are representative of those having an interest. MPI must provide an initial consultation plan and the manner of consultation, including the timeframe for the consultation and the decision. MPI must distribute the decision, and subsequently review the process to assure that the consultation met all requirements.

When management changes are proposed to meet sustainability requirements (such as a change to a TAC/TACC), MPI prepares a discussion document that provides the Ministry’s initial proposals for issues needing decision and a range of management options. These proposals occur on an annual basis. At a more general level, MPI works closely with other government agencies and in partnership with stakeholders in addressing complex resource management issues, including developing and implementing policy settings and regulatory regimes for fisheries, aquaculture and forestry to support increased sustainable resource use, which requires ongoing consultations. A record of all consultations is documented at http://www.mpi.govt.nz/news-and-resources/consultations/, which includes summaries of the basis for decisions, and comments from all participating stakeholders. Information in letters, emails, and in Final Advice papers for</td></tr>
</table>

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		
		management actions demonstrates the consideration of stakeholder input and use or non-use of that information. The letters, emails, and Final Advice address the issues raised by stakeholders. MPI has provided further information on consultation in a letter annexed to stakeholder comments, including planned consultation on the Deepwater Management Plan. Explanations on how information is used or not used are conveyed by letters, emails and in Final Advice papers is evidence that consultation occurs on a regular basis and that information provided by stakeholders is often taken into account. The management system therefore includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates the consideration of the information and explains how it is used or not used.		
c	Guidepost		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?		Y	Y
	Justification	MPI has a well-defined process for stakeholder consultation. The consultation process: • sets out best practice process for how MPI will meet its obligations under Section 12 of the Fisheries Act 1996 and for other decisions requiring consultation with fisheries stakeholders; • helps to ensure a consistent approach across all MPI business groups when consulting with fisheries stakeholders; and • sets out minimum performance measures where appropriate, e.g., a minimum period for stakeholder consultation. The consultation process standard includes the following: • identification of stakeholders having an “interest” for consultation purposes; • a time frame for consultation; • notification of decision to stakeholders; and • monitoring, review and oversight. There is evidence of the MPI seeking stakeholder views throughout the year using, for example, the Initial Position Paper process, the Working Group, and fisheries planning meetings. As part of the consultation process, stakeholders are given the opportunity to provide feedback on the delivery of the process itself. The feedback is evaluated and used to fine tune future consultation processes. Stakeholders are encouraged to be involved. MPI have also set up an Environmental Engagement forum. The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective management. MPI have also set up an Environmental Engagement forum. This meets the SG80 and SG100.		
References		Fisheries Act 1996 DWG 2010 MFish 2010 MPI 2017f MRAG-Americas 2016		

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**	
	Intertek 2012 Hoki Intertek 2014 Hake Intertek 2014a Ling	
OVERALL PERFORMANCE INDICATOR SCORE:		**100**
CONDITION NUMBER (if relevant):		**N/A**

Evaluation Table for PI 3.1.3 – Long Term Objectives

<table>
<tr><th colspan="2">PI 3.1.3</th><th colspan="3">The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach</th></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guide post</td><td>Long-term objectives to guide decision-making, consistent with the MSC Principles and Criteria and the precautionary approach, are implicit within management policy</td><td>Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach are explicit within management policy.</td><td>Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within and required by management policy.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">Long-term fishery and environmental objectives are included within both New Zealand fisheries and environmental legislation and these guide decision-making. In regard to information principles, Section 10 of Fisheries Act states: “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:

(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;

(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.”

Fisheries 2030 sets the strategic direction for the management and use of New Zealand’s fisheries resources. One of the principles guiding Fisheries 2030 is the “Precautionary approach: particular care will be taken to ensure environmental sustainability where information is uncertain unreliable or inadequate.”

The National Fisheries Plan for Deepwater and Middle-depth Fisheries (the National Deepwater Plan) establishes the 5-year enabling framework for the management of New Zealand’s deepwater fisheries. It is further divided into two parts. Part 1A details the overall strategic direction for New Zealand’s deepwater fisheries. Specifically, it describes:

(a) the wider strategic context that Fisheries Plans are part of, including Fisheries 2030

(b) the nature and status of the management objectives that will apply across all deepwater fisheries; and

(c) how the National Deepwater Plan will be implemented and how stakeholders will be engaged during the implementation phase.

Part 1A of the National Deepwater Plan has been approved by the Minister of Fisheries under Section 11A of the Fisheries Act 1996. This means that it must be considered each time the Minister makes decisions or recommendations concerning regulation or control of fishing or any sustainability measures relating to the stocks managed through this plan.

Part 1B of the National Deepwater Plan comprises the fishery-specific chapters of the National Deepwater Plan that provides greater detail on how deepwater fisheries will be managed at the fishery level, in line with the management objectives. To date, fishery specific chapters have been completed for the hake, hoki, orange roughy, southern blue whiting, and ling fisheries. The fishery-specific chapters describe the</td></tr>
</table>

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach
		operational objectives for each target fishery and their key bycatch species, as well as how performance against both the management and operational objectives will be assessed at the fishery level. These chapters also describe any agreed harvest strategy for the relevant species. On an annual basis, the National Deepwater Plan is implemented through the Annual Operational Plan that describes management actions to be taken during the financial year for which it applies, and the management services required to deliver the management actions. The Annual Operational Plan also clearly demonstrates how these management actions contribute to the long-term objectives in the National Deepwater Plan. The annual review of performance and delivery of objectives is provided in MPI's annual reports. Therefore, clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach are explicit within and required by management policy, thus, meeting the SG60, SG60, and SG100.
References		Fisheries Act 1996 MFish 2010 MPI 2011b MPI 2011c MPI 2011d MPI 2016 MRAG-Americas 2016 Intertek 2012 Intertek 2014 Intertek 2014a

OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation Table for PI 3.1.4 – Incentives for Sustainable Fishing

<table>
<tr><th colspan="2">PI 3.1.4</th><th colspan="3">The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing</th></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.</td><td>The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and seeks to ensure that perverse incentives do not arise.</td><td>The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and explicitly considers incentives in a regular review of management policy or procedures to ensure they do not contribute to unsustainable fishing practices.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>P</td></tr>
<tr><td>Justification</td><td colspan="3">Incentives: The QMS and the use of ITQs provides stability and security for quota owners and hence incentives for sustainable utilisation (Fisheries Act). The management system also includes customary provisions (e.g., Maori Fisheries Act 2004 and Treaty of Waitangi (Fisheries Claims) Settlement Act 1992).

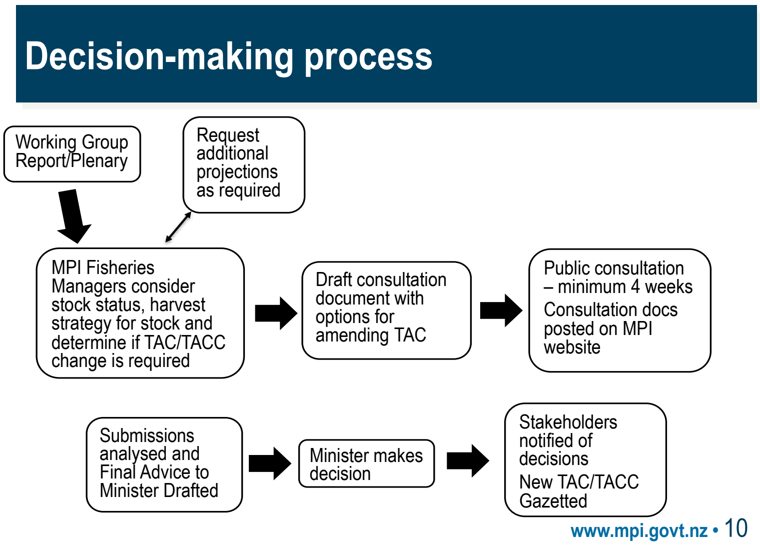
Subsidies: There are no subsidies in the New Zealand deepwater fishery. The management system has explicit mechanisms to facilitate regular review of management policy or procedures (Fisheries Act). Under Section 13 of the Fisheries Act 1996, the Minister of Fisheries is required to take social, cultural and economic factors into account as well as the status of the stocks and all environmental considerations when setting a TAC for a fishery. There are regular reviews of the QMS and MPI management policy and procedures to ensure they contribute to sustainable fishing. Other strategies that contribute to sustainable fishing are also regularly reviewed, e.g. deemed values and the harvest strategy. DWG uses a trigger level management approach – 12 seabird interactions in a week, for example, which requires reporting and then actions to be taken to mitigate risk.

However, there do not appear to be explicit incentives and encouragement not to catch marine mammals and protected species, i.e. there is no positive feedback for those not catching these species. The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and seeks to ensure that perverse incentives do not arise, thus meeting the SG 60 and 80. However, the management system does not explicitly consider incentives in a regular review of management policy or procedures to ensure they do not contribute to unsustainable fishing practices. As such, the fishery only partially meets the SG100 level of performance.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Fisheries Act 1996
Maori Fisheries Act 2004
Treaty of Waitangi Settlement Act 1992
MRAG 2016
Intertek 2012 Hoki
Intertek 2014 Hake
Intertek 2014 Ling</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>90</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td>N/A</td></tr>
</table>

Evaluation Table for PI 3.2.1 – Fishery Specific Objectives

PI 3.2.1		The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Objectives, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery's management system	Short and long-term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.	Well defined and measurable short and long-term objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
	Met?	Y	Y	Y
	Justification	Fisheries 2030, the National Fisheries Plan for Deepwater and Middle-depth Fisheries and the Annual Operational Plan set out explicit short and long-term objectives. The DWG MFish MoU commits the industry to align long-term objectives of the National Deepwater Plan with the specific fishery activities. The management system conducts annual review of objectives. The annual review report demonstrates how mpi is achieving its objectives. The National Fisheries Plan for Deepwater and Middle-depth Fisheries, Part 1B-Hoki, sets out the specific objectives and performance criteria for the hoki fishery and key bycatch fisheries. The Plan's hake chapter sets the operational objectives and performance criteria for all hake fisheries. This chapter also addresses the management of environmental effects caused by fishing for hake. The Plan's ling chapter sets the operational objectives and performance criteria for the ling fishery and key related fisheries. Specifically, it addresses the management of the target and bycatch species and stocks. These are then specified within the annual Operating Plans for each fishery. These are fishery specific, subject to annual review and are measurable. The National Plans of Action for sharks and seabirds, both revised and published in 2013, provide additional examples of management objectives (relating to some ETP species) that are applicable to the assessed fisheries and consistent with MSC Principle 2. Therefore, well defined and measurable long-term objectives which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2 are explicit within the fishery's management system, meeting the SG60. 80 and 100.		
References		DWG 2010 MFish 2010 MPI 2011b MPI 2011c MPI 2011d MPI 2013 MPI 2016 MPI 2017e		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation Table for 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 under assessment.		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	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?	Y	Y	
	Justification	The Fisheries Act (specifically Sections 10, 11, and 12) clearly lays out the requirements for decision-making, and requires that all decisions be based on the best available information (Section 10). The DWG-MFish MOU, the Annual Operations Plans, and the Review of Management Controls for hoki, hake and ling implement the decisions made. MPI prepares an Initial Position Paper (IPP) that provides the Ministry's proposals for issues needing a decision. Subsequently, the Ministry will provide a Final Advice Paper (FAP) to the Minister for Primary Industries. The FAP summarizes the Ministry's and stakeholder's views on proposals and make recommendations to the Minister. A copy of the FAP and the Minister's letter setting out his final decisions are posted on the MPI website as soon as these become available.  Therefore, there are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives, meeting the SG60 and SG80.		

<table>
<tr><th colspan="2">PI 3.2.2</th><th colspan="3">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 under assessment.</th></tr>
<tr><td rowspan="3">b</td><td>Guidepost</td><td>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.</td><td>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.</td><td>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.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">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”). The MPI ensures that the Minister is provided with analysed alternatives for consideration before making any decisions (information is both from within and outside the Ministry (stakeholders, science). The decision-making process is formalised, involving planning, consultation, project development, and scientific enquiry. The IPP/FAP process highlights the extent of consultation, engagement and transparency of the decision-making process. Submissions received on the Review of Sustainability Measures and other management Controls for Deepwater Fisheries are taken into account. Thus, 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. This meets the SG60 and SG80.

Although management decision-making can be shown to respond to serious and important issues, a large number of ‘issues’ may be identified during research and monitoring. Management does not respond formally to all of these. However, responses may be informal or through discussion at various fora, such as working groups. All issues are addressed through such mechanisms, although this may not be to the satisfaction of all stakeholders. The assessment team does not have full evidence that 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. Therefore, the SG100 is not met.</td></tr>
<tr><td rowspan="2">c</td><td>Guidepost</td><td></td><td>Decision-making processes use the precautionary approach and are based on best available information.</td><td></td></tr>
<tr><td>Met?</td><td></td><td>Y</td><td></td></tr>
</table>

<table>
<tr><td colspan="2">PI 3.2.2</td><td colspan="3">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 under assessment.</td></tr>
<tr><td></td><td>Justification</td><td colspan="3">The Fisheries Act requires that MPI must follow the precautionary approach.

Section 10 of the Fisheries Act Information principles states:

“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: (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: (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.”

As an example of implementation of the precautionary approach, the TACC for hoki has been revised several times in recent years. In another deepwater fishery – orange roughy - areas have been completely closed to fishing to allow for rebuilding stocks. All deepwater fisheries are subject to no fishing in benthic-protected areas.

Therefore, decision-making processes use the precautionary approach and are based on best available information. The SG80 is met.</td></tr>
<tr><td>d</td><td>Guidepost</td><td>Some information on fishery performance and management action is generally available on request to stakeholders.</td><td>Information on fishery 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.</td><td>Formal reporting to all interested stakeholders provides comprehensive information on fishery performance and management actions and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.</td></tr>
<tr><td></td><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
<tr><td></td><td>Justification</td><td colspan="3">MPI and DWG provide a wide range of formal reporting that provides comprehensive information to stakeholders. For the purposes of this MSC assessment, the DWG has gathered a wide range of documents with links to the original reports which are all available on the DWG website. The documents ranging from the Fisheries Act, to plenary reports, to long and short-term goals and objectives are publicly available (e.g., National Fisheries Plan, Annual Operational Plan, Statements of Intent, Initial Position Papers, press releases and reports). MPI provides formal reports consistent with formalised reporting and consultation processes such as the IPP/FAP process, the Stakeholder Consultation Process Standard or the National Fisheries Plan for Deepwater and Middle-Depth Fisheries and the annual Operating Plan for Deepwater Fisheries that are always provided to stakeholders.

Therefore, formal reporting to all interested stakeholders provides comprehensive information on fishery performance and management actions and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity, thereby meeting the SG60, SG80, and SG100.</td></tr>
</table>

<table>
<tr><td colspan="2">PI 3.2.2</td><td colspan="3">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 under assessment.</td></tr>
<tr><td rowspan="3">e</td><td>Guidepost</td><td>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 for the fishery.</td><td>The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.</td><td>The management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">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.

In 1998, the Minister of Fisheries published 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.

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 these requirements are open to legal challenge. However, legal challenges are uncommon in the fisheries, in part because of the collaborative decision-making. 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.

Therefore, the management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges, meeting the SG60, SG80, and SG100.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Fisheries Act 1996
DWG 2010</td></tr>
</table>

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 under assessment.**	
	MFish 2010 National Plan Deepwater and Middle depth fisheries MFish 2011 Statement of Intent Annual Review report for Deepwater Fisheries for 2015/16. 2017 www.mpi.govt.nz	
OVERALL PERFORMANCE INDICATOR SCORE:		**95**
CONDITION NUMBER (if relevant):		**N/A**

Evaluation Table for PI 3.2.3 – Compliance and Enforcement

<table>
<tr><td colspan="2">PI 3.2.3</td><td colspan="3">Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>Monitoring, control and surveillance mechanisms exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective.</td><td>A monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.</td><td>A comprehensive monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">The New Zealand deep-water management system has a documented, comprehensive and effective monitoring, control and surveillance system through:

1) A compulsory satellite Vessel Monitoring System (VMS) with an on-board automatic location communicator (ALC);

2) Government observers who may be placed on board to observe fishing, any transshipment/transportation, and collect any information on hoki, hake and ling fisheries resources (including catch, effort and biological information) and the effects of fishing on the aquatic environment; and

3) Accurate record keeping 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. Other measures include:

• fishing permit requirements;
• requirement to hold ACE to cover all target and bycatch species caught, or alternatively, to pay deemed values;
• fishing permit and fishing vessel registers;
• vessel and gear marking requirements;
• fishing gear and method restrictions;
• vessel inspections;
• control of landings (e.g. requirement to land only to licensed fish receivers);
• auditing of licensed fish receivers;
• control of transhipment;
• monitored unloads of fish;
• information management and intelligence analysis;
• analysis of catch and effort reporting and comparison with VMS, observer, landing and trade data to confirm accuracy;
• boarding and inspection by fishery officers at sea; and
• aerial and surface surveillance.

MPI has a sophisticated fishery outreach programme of informed and assisted compliance, in which Enforcement agents work with the industry in a proactive way to ensure understanding of regulations and to prevent infractions (Gary Orr, MPI Compliance Directorate, pers. comm. 2017). In combination, with at-sea and air surveillance supported by the New Zealand Defence Force vessel activity is monitored and verified to ensure compliance with regulations and industry-agreed codes of practice. The high level of surveillance is considered to contribute to a high level of compliance.</td></tr>
</table>

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with		
		A comprehensive monitoring, control and surveillance system has been implemented in the fishery and it has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules, thereby meeting the SG60, SG80, and SG100.		
b	Guidepost	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence.
	Met?	Y	Y	Y
	Justification	Under the Fisheries Act, in proceedings for an offence against this Act, it is not necessary for the prosecution to prove that the defendant intended to commit the offence; rather, the defendant must show the contravention was due to the act or default of another person, or to an accident or to some other cause beyond the defendant's control; and the defendant took reasonable precautions and exercised due diligence to avoid the contravention. Upon conviction, the Fisheries Act allows for sanctions that may include prison time, fines from $250 to $500,000, and forfeiture of quota, vessels, and other property. As only several major companies own quota, severe sanctions could put them out of business. The industry, with its investment in the fishery, has a strong incentive to maintain its cooperative role through compliance with legal requirements. MPI uses, 'informed and assisted compliance' to help minimize infractions. ACE and Deemed Value systems provide an incentive to stay within the TACs. While overruns are allowed, there are strong financial dis-incentives to avoid overruns. This is described in the Tools subsection of Harvest Strategy. Most fishermen follow the regulations; some engage in opportunistic non-compliance that is usually easily detected by enforcement agents, and a few will actively seek advantage with illegal fishing (Gary Orr, MPI Compliance Directorate, pers. comm. 2017). Checking and feedback of minor infractions hold the second group in line; but only severe sanctions, up to loss of fishing permits and vessels, will deter the last group. Enforcement personnel report that compliance is high in the deepwater fisheries. The hoki, hake and ling fisheries are subject to an extensive range of regularity measures. Area misreporting and discarding have been known to occur in the past but there has been no recent concerns. The Ministry strives to minimise the opportunity for these and other types of offence through careful risk analysis of the hoki, hake and ling fisheries and with input from the industry. Information sharing with industry allows the Ministry to focus compliance efforts on current risks. These are thought to provide an effective deterrence. There have been no major non-compliances since the fishery has been MSC certified. Therefore, sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence. The SG60, SG80 and SG100 are met.		
c	Guidepost	Fishers are generally thought to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.	There is a high degree of confidence that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.
	Met?	Y	Y	Y

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with		
	Justification	The industry complies with reporting requirements, traceable documentation, effective surveillance, landing and reconciliation of catch against ACE, catch documentation audits, and checks against past catch. Kazmierow et al. (2010) surveyed fishermen on compliance decision-making, and found generally good compliance. The MPI has devolved responsibility for obtaining scientific information to the industry, as demonstrated in the operational plans, and the industry-ministry MOU. The DWG provides information necessary for the management of the fishery on the premise that better information can reduce uncertainty and improve fisheries management (Gary Orr, MPI Compliance Directorate, pers. comm. 2017). Together, these actions are considered to provide a high degree of confidence that the fishermen comply with the management system and provide substantial amounts of information of importance to the effective management of the fishery. The SG60, SG80 and SG 100 are met.		
d	Guidepost		There is no evidence of systematic non-compliance.	
	Met?		Y	
	Justification	The high level with which the hoki, hake and ling fisheries meet their mandatory reporting requirements, combined with, the high level (20-40%) of observer coverage, and ongoing monitoring by enforcement agents, demonstrates no evidence of systematic non-compliance. This meets the SG80.		
References		Kazmierow et al. (2010) Fisheries Act 2016 www.mpi.govt.nz. Compliance Information		
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER (if relevant):				N/A

Evaluation Table for PI 3.2.4 – Research Plan

PI 3.2.4		The fishery has a research plan that addresses the information needs of management		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Research is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2.	A research plan provides the management system with a strategic approach to research and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.	A comprehensive research plan provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.
	Met?	Y	Y	Y
	Justification	The National Fisheries Plan Parts 1A and 1B, MPI's annual operational plans for the deepwater fisheries, the Conservation Services Programme annual plans, and the fishery assessment plenaries provide documentation of a comprehensive research plan that provides reliable and timely information. Working groups with stakeholder membership contribute to the research plans. The previously operating 10-year research plan for deepwater fisheries is no longer in place. A medium-term research plan for deepwater fisheries is in place. MPI is in the process of forming a research panel of pre-qualified providers to deliver projects in five different categories: 1. Surveys 2. Stock assessments and monitoring 3. Informing management (e.g. MSEs, survey design etc.) 4. Aquatic environment research specific to deepwater fisheries 5. Vessel platforms for surveys. Wide-area trawl surveys are scheduled for the Chatham Rise (2019/20 and 2021/22), Sub Antarctic (2018/19 and 2020/21) and West Coast South Island (2018/19 and 2021/22) and a Cook Strait hoki acoustic survey is scheduled to be completed every two years (2019/20 and 2021/22). A research plan for stock assessments for the three species is as below		

	2018/19	2019/20	2020/21	2021/22	2022/23
HOK 1	Full assessment		Full assessment		Full assessment

	2018/19	2019/20	2020/21	2021/22	2022/23
HAK 1			Full assessment		
HAK 4		Full assessment			Full assessment
HAK 7	Full assessment			Full assessment	

PI 3.2.4		The fishery has a research plan that addresses the information needs of management		

	2018/19	2019/20	2020/21	2021/22	2022/23
LIN 2					
LIN CS					
LIN 3/4	Full assessment			Full assessment	
LIN 5/6			Full assessment		
LIN 6B					
LIN 7		Full assessment			Full assessment

Note that the WCSI hake (HAK7) has been brought forward.

The research plan identifies outstanding research issues for each of the species, including hoki, hake and ling, for consideration in the additional research component. The research plan identifies research for benthic environments, ETP species, bycatch and discards, and ecosystem functions and trophic interactions. DOC provides further research on protected species

. Therefore, a comprehensive research plan exists with a coherent and strategic approach to research across Principles 1, 2, and 3 that provides reliable and timely information sufficient to meet the objectives consistent with MSC Principle 1 and 2. This meets the SG60, SG80 and SG100.

b	Guidepost	Research results are available to interested parties.	Research results are disseminated to all interested parties in a timely fashion.	Research plan and results are disseminated to all interested parties in a timely fashion and are widely and publicly available.
	Met?	Y	Y	Y
	Justification	The public posting of plenaries and annual operational plans demonstrate the wide and timely distribution of information research results. Stakeholders participating in the research planning and review receive results of the research. For the purposes of this assessment, the DWG has gathered a wide range of documents with links to the original reports on its website. Therefore, a research plan and results are disseminated to all interested parties in a timely fashion and are widely and publicly available. This meets the SG60, SG80, and SG100.		
References		Fisheries 2030 National Fisheries Plan for Deepwater and Middle depth Fisheries 2010 DoC Conservation Services Programme 2016 DoC Conservation services Programme and Annual Plan 2016		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation Table for PI 3.2.5 - Management Performance Evaluation

PI 3.2.5		There is a system of 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	**Guidepost**	The fishery has in place mechanisms to evaluate some parts of the management system.	The fishery has in place mechanisms to evaluate key parts of the management system	The fishery has in place mechanisms to evaluate all parts of the management system.
	Met?	Y	Y	Y
	Justification	The Annual Review Report for Deepwater Fisheries 2015/2016 (MPI 2017e) provides a record of the annual reviews of the fisheries, including for hoki, hake and ling. **Part 3A:** describes the progress made on management actions in 2015/16. **Part 3B:** reviews, observer coverage, deepwater research and compliance. **Part 3C:** reviews general environmental reporting and adherence to non-regulatory management measures, e.g., environmental reporting, seabirds, marine mammals, elasmobranchs, Tier 3 species and benthic interactions. **Appendix 1**: provides summaries of each of the NZ deepwater fisheries including sections on hoki, hake and ling. Evaluations include landings, catch limits and allowances, reference points and current status, deemed value rates, environmental indicators, observer coverage, economic indicators, reporting procedures and operational procedures. The annual review report evaluates the development and implementation of the Fisheries Plan framework, i.e. National Deepwater Plan with fishery specific chapters and Annual Operational Plan for the fisheries. This review encompasses all of the management system. Therefore, the fishery has in place mechanisms to evaluate all parts of the management system, meeting the SG60, SG80, and SG100.		
b	**Guidepost**	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.
	Met?	Y	Y	N
	Justification	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. MPI 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 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 described in CR v1.3 GCB4.11 and CR v2.0 GSA4.10. Therefore, this scoring issue meets the SG80. Evidence of regular external review has not been provided, thereby precluding the SG100.		
References		MFish 2010 MPI 2017e MPI 2017f IQANZ 2018		

PI 3.2.5	**There is a system of 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**	
OVERALL PERFORMANCE INDICATOR SCORE:		**90**
CONDITION NUMBER (if relevant):		**N/A**

Appendix 1.3 Conditions

There are no conditions of certification.

Appendix 2. Peer Review Reports

Summary of Peer Reviewer Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	**Yes**	**CAB Response**
Justification: The background information sections of this report have been written, correctly, as updates to the previous certification reports of the fishery, but now uniting hoki, hake and ling in a single trawl fishery. This procedure makes a lot of sense, given the dominance of the client in these fisheries and the fact that all three species are generally taken together, even if the directed target is usually the biggest stock(s), hoki. I consulted the previous assessments (and audit reports) in conducting this peer review, but could find nowhere where the required evidence for this certification conclusion was wanting. I agree too with the evidence provided for the various elements applied to each "fishery", as well as (generally) the overall conclusion of certification without conditions. The latter is adequately and fully supported by the contents of the report.		Thank you for your comment.

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCR 7.11.1 and sub-clauses]	**N/A**	**CAB Response**
Justification: No conditions have been raised by the assessors and I do not consider that any are necessary		Thank you for your comment.

If included:

Do you think the client action plan is sufficient to close the conditions raised? [Reference FCR 7.11.2-7.11.3 and sub-clauses]	**Not included**	**CAB Response**
Justification: None needed		Thank you for your comment.

Table 57 For reports using one of the default assessment trees:

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.1.1	Yes	Yes	N/A	Apart from one element (HAK 7), for which it is considered that there is not a high degree of certainty that the stock is above the point of recruitment impairment (although it is highly likely that it is), SIa and SIb correctly score 100 across the board. The assessment models and the projections all generate confidence in this conclusion, and the clear written justifications are exemplary.	Thank you for this comment.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.1.2	Yes	Partially	N/A	The justification provided for SIa is plausible and complete, as is that for Sib, where there is insufficient evidence that uncertainty in estimating B_0 is being taken into account, so SG100 is not met. However, although I can understand where the argument is coming from that the target (40% B_0) is really only a proxy that it lacks clear evidence of being deliberately precautionary, using the fact that there are occasionally large recruitments (for hake and ling) as part of the justification for not meeting SG100 is unconvincing to me. Many fish species suffer wild fluctuations in recruitment strength and that is why **precautionary** proxies tend to be set. I would prefer that the experts revisit this justification and beef it up a little without using such a random basis for justification when in fact fluctuating recruitment is the norm for fish stocks and that does not stop other stocks from achieving SG100.	Re SIc (hake and ling), it is acknowledged that many stocks experience large fluctuations in recruitment and should not, in itself, prevent scoring at SG100. However, the main issue with the 40% B_0 target proxy is that there has been no explicit evaluation of its precautionary properties. Further, there has been no evaluation of the target reference point with regards to the ecological role of hake and ling in the ecosystem. The text of the scoring rationale has been enhanced to better justify the scoring.

Performance Indicator	**Has all available relevant information been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
1.2.1	Yes	Yes	N/A	Fully justified for all SIs. However, as it is the lack of a formal MSE exploring possible uncertainties that is used to justify not awarding a score of 100 for Sib (and remember that there are other means of testing strategies other than a MSE), is not this an opportunity for making a recommendation that something like this be done during the period of this certification?	Thank for this comment. Re SIb, MPI uses five-year research plans to schedule projects such as MSEs, based upon examination of priorities and available resources. As noted in section 4.2.7, MSEs are currently planned for hoki and ling and will require significant effort to complete. In the opinion of the team, a recommendation for an MSE on hake is not necessary.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.2.2	Yes	Partially	N/A	Pretty well justified, but the issue of a lack of formal testing for hake and ling (notably probing uncertainties) and especially the fact that a MSE for those stocks has not been done again raises the concern about the basis for the statement that I mention in 1.1.2 above. It further supports the suggestion I put of making a recommendation for MSE or something similar to be done during the period of this certification (as mentioned in 1.2.1 above).	RE SIb, the issue at SG100 is how comprehensive the examination of uncertainties has been. MSEs are currently planned for hoki and ling which will allow examination of a wide range of uncertainties. While stated in section 4.2.7, this may not have been clear in the scoring rationale of both PI 1.2.1 and 1.2.2. Edits have thus been made to the scoring rationales to make this clear. It is important to note that MPI uses its 5-year research plan to prioritize significant projects such as MSEs given priorities and available resources. In the team's opinion, a recommendation for a hake MSE is not required.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.2.3	Yes	Yes	N/A	New Zealand fisheries research is ultra-comprehensive in world terms, and that statement applies too to associated research (abiotic, genetic in terms of stock structure, etc). Given that fact, and while I accept the scoring and the justification provided, one has to wonder whether this fishery or indeed any fishery under potential certification would ever be able to achieve an SG100 score for SIa. HAK 7 does justify a lesser score for Sib than the other elements too.	Thank you for this comment. Re SIa, the characterization of stock structure and movement as well as the causes of recruitment fluctuations are particular challenges in these fisheries, justifying the SIa score. Re SIb, it is clear that the survey provides a well studied index of abundance. However, the as-yet not understood differing trend between this and the CPUE index is a cause for concern which attracts the lower score for HAK7.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.2.4	Yes	Yes	N/A	Fair scoring, although I am not that sure that the mere fact that survey and cpue indices for the HAK 7 assessment can lead to the conclusion that major features of the stock, its fishery and its monitoring are not well understood. Under SIe too, the definition of "external" in terms of outside review is the way I would understand it, i.e. that external means completely external to the country and management agency. In my opinion, the scoring is right, as only hoki regularly has a fully external review of the assessment.	Thank you for this comment. Re SIa (HAK7), the process(es) which are causing the conflicting trends in the survey and CPUE indices resulted in two equally plausible assessment models being used by MPI to determine stock status. These process(es) are not fully understood which indicates that some major feature of the stock, the fishery and its monitoring is not being taken into account in the models. The scoring rationale has been edited to better reflect this.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.1.1	Yes	Yes	N/A	Very well justified, and I agree with the scoring for all main retained species and for the minor species (generally met at SG80 by default) and HAK 7. This is always a complicated justification and scoring where a large number of species are taken and generally retained. The assessor has done well in justifying the scores.	Thank you for this comment.
2.1.2	Yes	Yes	N/A	As in 2.1.1 above, the complicating issue here is less as to whether the strategy for main retained species is successfully implemented so as to avert serious or irrevesrsible harm to them (it is obviously doing so), but whether the stategy is similarly successful for the many minor retained species taken in the fishery. For those species, much less is known, so the default SG80 score applies. Again, good and clear justification according to the evidence is provided.	Thank you for this comment.
2.1.3	Yes	Yes	N/A	In terms of information, my comments would be similar to those made for 2.1.2 above. Too little is known about minor retained species generally to be able to svcore above the default SG80.	Thank you for this comment.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.2.1	Yes	Yes	N/A	There are no main bycatch species in the fishery, but the provided justification relating to minor species (meeting SGs 60 and 80 by default) and for dogfish species is fair.	Thank you for this comment.
2.2.2	Yes	Yes	N/A	Same comment as above, given that there are no main bycatch species and that minor species can only score up to 80 for each SI by default.	Thank you for this comment.
2.2.3	Yes	Yes	N/A	Data on bycatch in the fishery are good and well provided, and the scoring reflects the situation as understood.	Thank you for this comment.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.3.1	Yes	Yes	N/A	ETP species impacts are not problematic in this fishery and the background material as well as the scoring reflect that situation. That they are being considered in managing the fishery is obvious, although only seabirds of the ETP species potentially encountered can be said to generate a high degree of certainty that the effects of the fishery are within limits of national and international requirements for their protection (basking sharks, corals and fur seals are occasionally encountered but only indirectly considered in the management.	Thank you for this comment. Please note that the introductory section for seabirds and the rationale for PI 2.3.1 SIb were updated to reflect the new data identified in Richard et al. 2017. The score has not changed, however.
2.3.2	Yes	Yes	N/A	There is a (partial) strategy in place for managing ETP species designed to ensure that the fishery does not hinder the recovery of ETP species, when encountered, although the evidence of its success is generally wanting, except poerhaps for fur seals.	Thank you for this comment.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.3.3	Yes	Yes	N/A	The information level on ETP species is generally no more than just adequate to support a strategy of minimising negative impacts, although it is better for marine mammals and seabirds. I support the scoring and justification provided.	Thank you for this comment.
2.4.1	Yes	Yes	N/A	With any bottom trawl fishery, there is potential for seabed contact and hence impact on habitat function, but in New Zealand, such trawling is already banned in about one-third of potential seabed areas. Evidence is also provided that the hoki fishery only targets about 10% of the possible seabed (hake and ling much less), so the national strategy and operational activities already provide a lot of protection to the habitat. I therefore beilieve that the scoring of and justification for each SI as given is correct, with only hoki (because of the extent of the fishery) not definitely scoring a full SG100.	Thank you for this comment.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.4.2	Yes	Yes	N/A	There is not a fixed strategy in place and operationalised such that this PI can be scored at 100, but the evidence provided is for a partial strategy, so the scoring is correct.	Thank you for this comment.
2.4.3	Yes	Yes	N/A	Monitoring of habitat information is correctly scored as able to determine the nature of any impact (SG80), but not to quantify that impact, so SG100 cannot be met, as eloquently explained in the scoring justification.	Thank you for this comment.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.5.1	Yes	Partially	N/A	In terms of defining key ecosystem components of the NZ deepwater system, the report provides justification for two: (1) hoki (but not hake or ling) as prey, predator and competitor, and (2) overall trophic structure. I tend to agree with that conclusion. The reason given that the hoki components do not score SG100 is the datedness of the scientific basis (nine years old) of the only adequate peer-reviewed analysis. Hake and ling components score better (i.e. partial at SG100) simply because they form smaller components of the ecosystem and are not defined as key. I find that justification to be somewhat difficult to defend, however, given that the stocks are largely taken together with hoki. To me, the scoring of all three stocks against trophic structure should be the same. i.e. 80, with an overall score for all three elements as 90 (the hoki key ecosystem component scores 100).	Thank you for the comment. We have adopted this suggested change – all UoCs now score 90.

Performance Indicator	**Has all available relevant information been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
2.5.2	Yes	Yes	N/A	The management of ecosystem impacts is based around a well-structured, legislative, policy and operational framework. There is therefore a strategy in place. The argument presented is that this PI only fails to achieve SG100 across the board because there are outstanding questions about the adequacy of information on the status of mid-trophic level species. I can buy that argument and therefore support the scoring and the justification presented.	Thank you for this comment.
2.5.3	Yes	Yes	N/A	The team assert that the information base for determining fishery impacts on the ecosystem is generally good, but not to cover ALL elements identified in the assessment. The score and justification propvided is sound, and I agree with both.	Thank you for this comment.
3.1.1	Yes	Yes	N/A	In terms of the legal and customary framework within which the fishery is operating, New Zealand has an exemplary system, so the score (100) and the evidence provided is supported fully. The manner in which the justification for the full-house score is presented is sound.	Thank you

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
3.1.2	Yes	Yes	N/A	Similarly, the (opportunites for) consultation, the roles and the responsibilities are clear and exemplary in New Zealand, so the score of 100 is justified by the evidence provided.	Thank you
3.1.3	Yes	Yes	N/A	The long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach are clearly explicit within and required by New Zealand management policy, so it is unsurprising that the score and justification again support SG 100 being met.	Thank you
3.1.4	Yes	Yes	N/A	New Zealand's fisheries policy and strategy seems from the justification presented to provide economic and social incentives for sustainable fishing, although those incentives may bot be stated explicitly. Further, there are no subsidies that could contribute to the development of unsustainable fishing practices. The SG100 score is not met apparently on the basis that the incentives are not stated explicitly. That is a fair conclusion.	Thank you

Performance Indicator	**Has all available relevant information been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
3.2.1	Yes	Yes	N/A	The report states that there are within the fishery's management system well-defined and measurable short- and long-term objectives that are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2. These are explicitly outlined, so the score for this can only be 100.	Thank you
3.2.2	Yes	Yes	N/A	As far as decision-making is concerned, the assessment team affirms that it could not find evidence that the decision-making processes associated with this fishery respond to all issues identified in appropriate research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and to take account of the wider implications of the decisions. That seems to me to be justified according to the evidence given, so the overall score of 95 is supported.	Thank you

Performance Indicator	**Has all available relevant information been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
3.2.3	Yes	Yes	N/A	Evidence is provided in the report of an exemplary compliance and enforcement system in New Zealand, with appropriate sanctions, such that there is confidence across the board that there is little or no non-compliance with regulations. Score and justification are supported.	Thank you
3.2.4	Yes	Partially	N/A	The written justification for this PI score (Sis a and b) in terms of a research plan focuses on fisheries (including assessments) and their operations. From what I can see it is the Conservation Programme that addresses other aspects of the ecosystem, i.e. the P2-supportive research, which is important in informing management about other aspects of the environment. Therefore, more needs to be described in the scoring justification about those aspects of the NZ research plan for the score of 100 to be fully warranted.	Thank you for this observation. Text has been added in the justification to explain MPI's research plan includes Principle 2 aspects eg benthic environments, ETP species, bycatch and discards, ecosystem functions and trophic interactions. The conservation programme provides further work on ETP species. This should justify a score of 100

Performance Indicator	**Has all available relevant information been used to score this Indicator? (Yes/No)**	**Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)**	**Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)**	**Justification** Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
3.2.5	Yes	Yes	N/A	The team could not find proof of regular external review of the NZ system of monitoring and evaluating the performance of the fishery-specific management system against its objectives. Therefore, SG100 could not be met for SIb. I agree with the team's view.	Thank you

General Comments on the Peer Review Draft Report:

Thank you for the opportunity to review this generally well written and well-supported certification assessment report. I use the word “generally” because the report shows evidence of careful initial structuring and presentation but subsequent poor attention to detail prior to release for review (split headings and text, split tables, probably caused by central formatting to style). Please check through the whole text carefully and eliminate these annoying formatting errors. I found very few typos or grammatical howlers, which was gratifying, and the only issue I had was a constant need to refer back to earlier certification assessments to obtain some of the necessary background information I required to review the report adequately.

The report is necessarily complicated with the presence of so many elements, and although this did not impinge upon the clarity and ease of understanding of the P2 and P3 sections, it added difficulty to my evaluation of the P1 component. Succinctly, I found the P2 and P3 background sections to read rather more easily than the P1 section. I stress, however, that all three sections contain everything they need in terms of being able to meet and support MSC standards. Very well done to all.

Appendix 3. Stakeholder Submissions

Stakeholder submission received at the site visit

Forest & Bird

Forest & Bird
GIVING NATURE A VOICE

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MSC Assessment Team
NZ Deepwater Group - Hoki, Hake, Ling and Southern Blue Whiting; NZ-4-2R
29 July 2017

Introduction

In this submission, I will discuss our concerns about ongoing and increasing levels of bycatch in the Hoki fishery, in particular due to the high risk to the critically endangered Salvin's albatross. Also, the long line fishery for Ling for the same reasons.

Salvin's albatross.

Salvin's albatross (*Thalassarche salvini)*breed primarily on the Bounty Islands in the NZ subantarctic Islands and is endemic to NZ. It is our second most abundant albatross after the white –capped albatross. It migrates across the Pacific to the Humboldt Current off South America after breeding. The population size is around 40,000 breeding pairs on the Bounty Islands and Western Chain of the Snares Islands around 1100-1200 pairs. An estimated decline of 10% in the main population on the Bounty islands between 2004 and 2011 resulted in their designation as critically endangered in the NZ Threat Classification in 2013.. It has retained this status in the most recent assessment in 2016, as overall population trend is still unknown. The small population on the Western Chain appears to be stable (Sagar et al 2014) The population trend on the main island is unknown. In addition, recent tracking data show that the two populations are segregated at sea during incubation and chick rearing (Thompson et al 2014). The Bounty Islands group appear to use the area around the Bounty Islands and to the north on the Chatham Rise, While Snares Islands birds occupy the southern area. (See Fig 3.). This may be important as the captures by both Hoki Trawl and Ling Longline are around the Bounty Islands and the Chatham Rise where these birds feed. (see Figures 1 and 2 below)

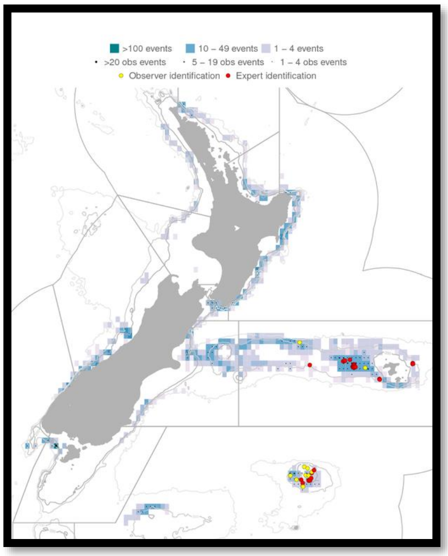


Fig 1. Ling longline bycatch of Salvin's albatross between 2002 and 2015 (from Dragonfly website) https://psc.dragonfly.co.nz/2016v1/draft/explore/

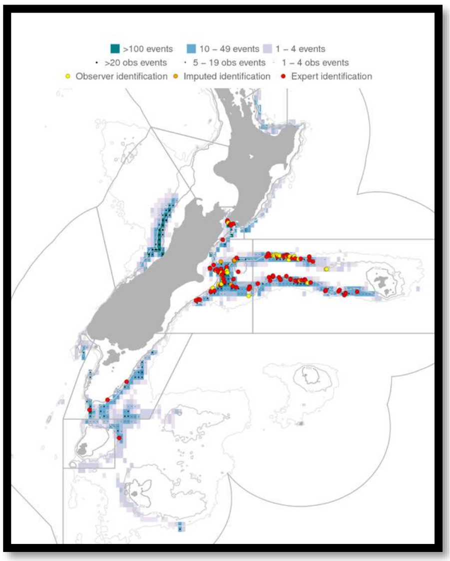


Fig 2. Hoki trawl bycatch of Salvin's albatross between 2002 and 2015

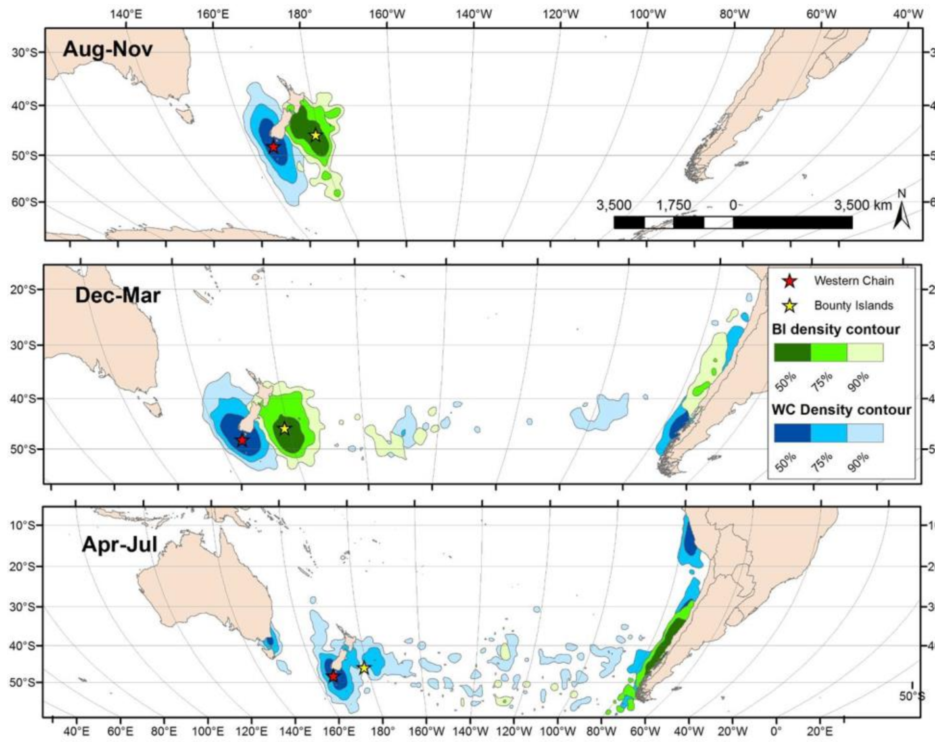


Fig 3 (after Thompson *et al* 2014, Fig 6) Comparison of kernel density plots, showing the 90, 75 and 50% probability contours, for Salvin's albatross at the Bounty Islands (BI) in green at the Western Chain (WC) in blue. Upper panel corresponds to 'incubation', middle panel to 'chick-rearing' and the lower panel to 'non-breeding' distributions

Risk Assessment

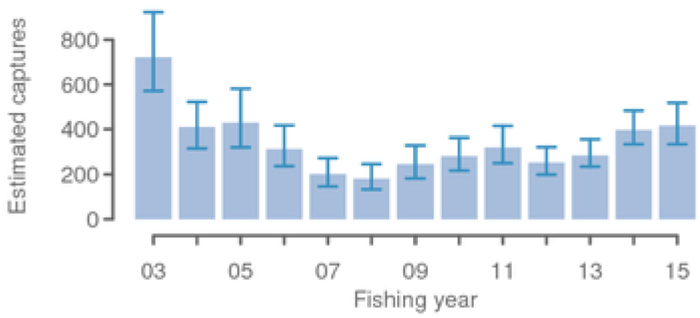
The most recent published risk assessment (Richards and Abraham 2015) shows that the estimated annual potential fatalities for trawl fisheries overall contributed to an assessment of very high risk for white –capped albatross, Salvin's albatross and southern Buller's albatross (Table 9, page 30). The latest Annual Operating Plan for Deepwater fisheries (page 19) says that Deepwater fisheries overall contribute 45% of the risk to Salvin's Albatrosses and 70% of the risk for Southern Buller's albatross. As Salvin's albatross has been assessed as critically endangered this submission focuses on this species, to assist the MSC assessment team in making a judgement on the requirement of outcome 2.1.1 of principle 2. I will return to this outcome later in these notes.

Within the overall trawl risk, the risk from hoki trawl on its own has been assessed as high to two species of albatross Salvin's and Buller's. (Appendix 5, page 59, Richards and Abrahams).

For small Ling long line the situation is the same with it alone having contributed high risk to Salvin's albatross, but also Chatham Island albatross. (NZ threat level, at risk, naturally uncommon)

Essentially these assessments suggest that the contribution to albatross deaths of Salvin's and Southern Buller's albatrosses by Hoki trawl and Ling longline fisheries is more that the population can sustain and is likely to be preventing their recovery to a better conservation status. For species that are already critically endangered such as the Salvin's albatross this situation requires urgent action.

The estimated capture of all birds from observed data in the hoki fishery as indicated on the Dragonfly web site, has continued to increase over the last few years, when it should be declining if effective management interventions were being implemented.



Estimated capture of all birds in hoki trawl fisheries (Dragonfly web site https://psc.dragonfly.co.nz/2016v1/released/birds/hoki-trawl/all-vessels/eez/2014-15/

Management Issues

There are significant problems with the implementation of the National Plan of Action for Seabirds 2013.

The planning system for the implementation was set out in paragraph 85, page 20. National Fisheries Plans were meant to be aligned to the 2013 NPOA-S setting out objectives and targets to address five year objectives. Then the Annual Operating Plans would set out actions and services that would meet these objectives. This has not happened and the Deepwater Fish Plan has only just been produced and does not set specific actions and targets as required.

The Annual Operating Plan (AOP) 2016/17 for the first time has set some targets, see page 20-22 of the AOP. Table 6 shows the targets and for Hoki it is a 15% reduction over 3 years. This is disappointingly unambitious and indicates that the managers do not expect to be able to improve the situation for Hoki.

The VMP Operational Procedures (http://deepwatergroup.org/wp-content/uploads/2014/10/VMP-Operational-Procedures-2014-15.pdf) give some indications about some of the likely issues and recognises that there were marked increases in mollymawk bycatch in 2012 and 2013 (now extended to 2014/15)

Net captures in the hoki fishery may have increased over the years and become now the main cause of death for seabirds, although warp strikes are also still occurring.

Improvements are needed in:

- Management of offal has been ‘below par’ although some vessels have meal plants, some do not. My view is that offal discharge should be discouraged at any time not just when setting and hauling, although is still the priority. Meal plans should become mandatory in trawl fisheries which pose high risks.
- Tori lines are not always used and bird bafflers may not be as effective as tori lines. Tori lines should be deployed at all times
- There may be options for limiting the fishery in areas of high risk when birds (Salvin’s and Southern Buller’s albatrosses) are breeding, something that should be investigated. (time/area closures)

More effort is needed in characterising the nature of bycatch so that new mitigation ideas can be developed. This has not yet happened.

Salvin’s albatross are especially at risk from Ling Longline fishing, although Chatham and Southern Bullers are also at risk. A wide range of albatrosses are caught in this fishery. Observer coverage is generally low and sometimes very low so that numerical targets for bycatch reduction are not set. However the target that has been set is very poor – for large vessels – no significant increase and for small vessels, no reduction target. There is nowhere that I can find an analysis of what the likely factors are that are continuing to contribute to unacceptable seabird bycatch risk in this fishery. For example is it poor implementation of existing mitigation or is the mitigation just not working? This is a key question of the problem is going to be addressed.

There is a lack of detail in the Fish Plan and in the AOP on mitigation requirements and areas that need to be improved. What improvements and what regulations are being considered and how is that expected to make improvements. Objectives and expected outcomes are unclear. For example how many more VMPs are required in these fisheries – what would be the target? 100 % of vessels?

Principle 2 outcomes and performance for MSC assessment.

To keep this analysis simple I want to focus on Salvin’s albatross as the one that is critically endangered, but other albatrosses recovery are also potentially hindered by both fisheries. With critically endangered species you would want to ensure that bycatch was not causing irreversible harm or hindering the recovery of the retained species (Outcome 2.1.1). It is my contention based on the risk assessment bycatch rates are “not likely to be within biologically based limits” as per Outcome 2.1.1 and hence c. recovery and rebuilding is required. My assessment of the alternative scenarios in table CN3.5 is that there are not measures in place that would be expected that either fishery would not continue to hinder recovery of the Salvin's albatross in particular. The targets in the AOP (2016/17) would not achieve that for either fishery and there are no long term – five year plans as you would expect to have in the five-year fish plan. I believe that there continues to be inadequate consideration of the situation and even scoring the fisheries at SG 60 would be a stretch.

A requirement for action plans for these two fisheries would be a suitable outcome of this MSC assessment process.

Karen Baird

References:

Sagar, Paul; Charteris, Matt and Scofield, Paul 2014. Salvin's albatross population size and survival at the Snares Western Chain. Department of Conservation report DOC15502

Thompson, D; Sagar, P; Torres, L and Charteris, M 2014. Salvin's albatrosses at the Bounty Islands: at-sea distribution. Department of Conservation report

Richard, Y and Abraham, E.R. 2015. Assessment of the risk from commercial fisheries to New Zealand seabirds, 2006-07 to 2012-13

National Plan of Action – 2013 to reduce the incidental catch of seabirds in New Zealand. Ministry of Primary Industry April 2013

Annual Operational Plan for Deepwater Fisheries for 2016/17. June 2016. MPI Technical Paper no 2016/46

Stakeholder submissions received at PCDR

Forest & Bird

Contact Information Make sure you submit your full contact details at the first phase you participate in within a specific assessment process. Subsequent participation will only require your name unless these details change.			
Contact Name	*First* Karen	*Last* Baird	
Title	Ms		
On behalf of (organisation, company, government agency, etc.) – *if applicable*			
Organisation	*Please enter the legal or registered name of your organisation or company.* Royal Forest & Bird Society of New Zealand		
Department	Conservation Advocacy		
Position	*Please indicate your position or function within your organisation or company.* Marine Advocate (Seabirds)		
Description	*Please provide a short description of your organisation.*		
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Assessment Details	
Fishery	New Zealand Deepwater Group hake, hoki, ling and southern blue whiting fishery
CAB	fisheries@acoura.com

• **SECTION 4** • Return to Page 4

Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
☐ Public review of the draft assessment report[4] Opportunity to review and comment on the draft report, including the draft scoring of the fishery.	New Zealand Deepwater Group hake, hoki, ling and southern blue whiting fishery	22/5/18	Karen Baird for Forest & Bird

☐ I wish to comment on the evaluation of the fishery against specific Performance Indicators.
A table with these indicators and the scores and rationales provided by CABs can be found in Appendix 1 of the draft assessment report.

Nature of comment *(Please insert one or more of these codes in the second column of the table below for each PI.)*

1. I do not believe all the relevant information[5] available has been used to score this performance indicator *(please provide details and rationale)*.
2. I do not believe the information and/or rationale used to score this performance indicator is adequate to support the given score[7] *(please provide details and rationale)*.
3. I do not believe the condition set for this performance indicator is adequate to improve the fishery's performance to the SG80 level[8] *(please provide details and rationale)*.
4. Other *(please specify)*

Performance Indicator	Nature of Comment Indicate relevant code(s) from list above.	Justification Please support your comment by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.
PI2.3.2A *PI 2.3.3*	*1,2,3,4* *1.2.3.4*	*The CAB gave a score of 90 for 2.3.2A. The guidepost asks that there is evidence that a strategy is in place for managing ETP species that is designed to ensure the fishery does not hinder the recovery of ETP species. We do not believe this to be the case.* 1. *The National Plan of Action for Seabirds itself is not a strategy for the recovery of seabirds in this fishery. The effectiveness of the plan over the 4 years of its existence has been very limited. One of the key issues discovered recently is that* ***best practice mitigation measures*** *have not been identified for any fishery including trawling. There are regulations, but no agreement about what constitutes best practice. This is critically important as one of the objectives requires for all vessels to be shown to be implementing current best practice mitigation measures relevant to their fishery.* 2. *Aside from the risk assessment which itself has some key flaws, there are some key objectives in the plan which have been ignored by the CAB in pursuing only a risk based approach (which I will come back to later). The first practical objective 74i) is to "where practicable* ***eliminate the incidental mortality of seabirds"*** *this is in direct conflict with the Risk Based approach, however the purpose of the risk assessment is not to set limits as the CAB seem to believe but to identify priorities. Fisheries should be demonstrating continuous improvement in bycatch rates e.g objective 75 (i) c "capture rates are reducing in all NZ fisheries in accordance with reduction targets in the relevant planning documents for those fisheries" Capture rates or targets have never been set in any planning documents as was required and without these there is no incentive.* 3. *Despite the welcome decline in seabird bycatch rate in 2016 it has now gone up again this year (2017) according to preliminary Dragonfly data statistics (you will need to ask to see these, Fisheries NZ (MPI) can give you access to this data). This indicates an* ***ongoing increasing trend*** *as a result of the lack of effective measures in place, let alone a strategy. (ie Sg60,80 or 100). Given that best practice itself has not been established it is unclear how effective the VMPs are likely to be. The CAB does not appear to assess what the major drivers of bycatch in this fishery are, identifying bird bafflers, paired streamer lines and/or warp deflectors as sufficient. This shows a lack of understanding or inquiry into what the drivers towards increasing bycatch are. Looking at the Dragonfly data base it is clearly net captures. What best practice mitigation is being applied here to manage this issue? Poor management of offal is ongoing (does the CAB have good data from the fishing industry on how this is managed? How much offal goes over the side in total providing a huge incentive for seabirds? (See also recently published paper on the overlap of Westland petrels with the hoki fishery on the West Coast.) The Agreement for the Conservation of Albatrosses and Petrels (ACAP) provides advice on best practice in international fisheries. See attached latest advice. For pelagic trawl gear, net binding together with weights in the net belly are best practice.* 4. *CAB gave a score of 85 under PI 2.3.3.However CAB should be asking why ACAP best practice is not being applied here. Until there is agreement on what constitutes best practice in NZ there is a question over whether it is being met and whether this fishery is meeting MSC requirements of any of the goalposts.* ***Our belief is that it doesn't meet any of these.***

Performance Indicator	Nature of Comment Indicate relevant code(s) from list above.	Justification Please support your comment by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.
		Cont'd
		5. Returning to the issue of the Risk Assessment. We have two major concerns over the risk assessment process that has been adopted. The first is that instead of being a guide as to where the most effort should be placed it is being used as a limit, including in this case. Also, the risk assessment currently being used does not take into account the conservation status of the seabirds. This would require the inclusion of a 'recovery factor' to "allow" for the more rapid recovery of those species. The Risk Assessment deliberately excludes this and provides for a recovery factor of 1 to cover all species. It is disappointing that the CAB would consider that the ongoing contribution of deaths of Salvin's albatross a critically endangered species is insufficient to require any action. 11 of the 14 Salvin's albatrosses caught in 2016/17 (latest data) were caught in the net. Given there is no net mitigation being applied in the VMP's these captures will continue and we cannot expect the bycatch rates to come down continuously. If effort is made on net captures then all seabird captures would start to reduce. *6. I want to touch on the issue of offal and discards discharge again as this is a major driver of net captures. Forest & Bird has recently been made aware of the potential scale of illegal discarding in the hoki fishery. In 2005 a reliable estimate of the level of high grading was produced "A length based analysis of highgrading in the in the NZ WCSI hoki fishery" (unpublished MAF report) but the results were never incorporated into later stock assessments. For example in 2006 the stock assessment concluded "there may be some dumping of small fish" (Plenary Report) and then in 2011 the stock assessment stated that "no information is available about illegal catch," (Plenary Report) despite MAF investigations quantifying illegal discarding. This is all information held by MPI and may have been shared with the industry body seeking recertification: Forest & Bird requests that you seek documentation from Fisheries NZ on the risk and scale of illegal discarding in the hoki fishery, both of the target species and non-target species.*
	Lack of Conditions	*7. Finally, we are concerned that there are no conditions applied to provide increased incentives to protect seabirds. This appears to be a complete failure of the MSC process. As a minimum MSC should require an Action Plan to be produced to focus on bycatch reduction. It should require an assessment of ACAP Best Practice options for net capture mitigation and a requirement that these methods be trialled in the hoki fishery.*

Forest and Bird also submitted a copy of 'ACAP Summary advice for reducing impact of pelagic and demersal trawl gear on seabirds (available here and Waugh et al., 2018, available here..

CAB Response

F& B point: The CAB gave a score of 90 for 2.3.2A. The guidepost asks that there is evidence that a strategy is in place for managing ETP species that is designed to ensure the fishery does not hinder the recovery of ETP species. We do not believe this to be the case.

1. The National Plan of Action for Seabirds itself is not a strategy for the recovery of seabirds in this fishery. The effectiveness of the plan over the 4 years of its existence has been very limited. One of the key issues discovered recently is that **best practice mitigation measures** have not been identified for any fishery including trawling. There are regulations, but no agreement about what constitutes best practice. This is critically important as one of the objectives requires for all vessels to be shown to be implementing current best practice mitigation measures relevant to their fishery.

CAB response: The requirements for PI 2.3.2 SIa at SG100 is that "There is a strategy in place for managing ETP species, to ensure the fishery does not hinder the recovery of ETP species." The requirement in this case is therefore not that ETP species are recovered, but that there is a strategy in place to avoid hindering recovery.

The MSC defines a strategy (MSC 2014, P.134) as:

"A **'strategy'** represents a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity and cultural context of the fishery and should contain mechanisms for the modification fishing practices in the light of the identification of unacceptable impacts."

In this regard, while the NPOA for seabirds does not itself comprise the strategy for recovery of seabirds in the fishery, it does provide a structure for the overall strategy to ensure the hoki, hake and ling trawl fishery does not hinder recovery. The overall approach is detailed in the scoring text of PI 2.3.2 SIa at P. 200 of the assessment report. The Assessment Team believe that the fishery clearly meets the SG100 requirements of a 'strategy' as specified in the MSC Certification Requirements.

F&B Point:

2. Aside from the risk assessment which itself has some key flaws, there are some key objectives in the plan which have been ignored by the CAB in pursuing only a risk based approach (which I will come back to later). The first practical objective 74i) is to "where practicable eliminate the incidental mortality of seabirds" this is in direct conflict with the Risk Based approach, however the purpose of the risk assessment is not to set limits as the CAB seem to believe but to identify priorities. Fisheries should be demonstrating continuous improvement in bycatch rates e.g. objective 75 (i) c "capture rates are reducing in all NZ fisheries in accordance with reduction targets in the relevant planning documents for those fisheries" Capture rates or targets have never been set in any planning documents as was required and without these there is no incentive.

CAB Response: The CAB does not believe that the risk assessment is undertaken to set mortality limits; we state (e.g., P. 101 and P. 196 of the assessment report) that the seabird risk assessment has been undertaken to "identify the risks posed to 70 seabird taxa by trawl, longline and set net fisheries within New Zealand's territorial Sea and EEZ (e.g., Richard & Abraham 2013, Richard & Abraham 2015, Richard et al. 2017)."

We also note that the full text of NPOA objective 74i) states "All New Zealand fishers implement current best practice mitigation measures relevant to their fishery and aim through continuous improvement **to reduce and where practicable** [our emphasis] eliminate the incidental mortality of seabirds." As noted in the assessment report, captures of seabirds in the hoki, hake and ling trawl fishery represent a small to negligible proportion of the total captures of any seabird species ranked as very high, high or medium risk. Nevertheless, representations provided to the team during the site visit by MPI scientists, as well as information that is publicly available and presented in the report, left the Assessment Team in no doubt that the efforts to minimise capture of seabirds in the fishery are strenuous and continuous improvement is being sought. Improvement (i.e., a decline) in the overall capture rate of seabirds has been observed in the fishery recently from 2014 to 2016, with the 2016 rate equivalent to the lowest in the time series.

F&B Point:

3. Despite the welcome decline in seabird bycatch rate in 2016 it has now gone up again this year (2017) according to preliminary Dragonfly data statistics (you will need to ask to see these, Fisheries NZ (MPI) can give you access to this data). This indicates an ongoing increasing trend as a result of the lack of effective measures in place, let alone a strategy. (i.e. Sg60,80 or 100). Given that best practice itself has not been established it is unclear how effective the VMPs are likely to be. The CAB does not appear to assess what the major drivers of bycatch in this fishery are, identifying bird bafflers, paired streamer lines and/or warp deflectors as sufficient. This shows a lack of understanding or inquiry into what the drivers towards increasing bycatch are. Looking at the Dragonfly data base it is clearly net captures. What best practice mitigation is being applied here to manage this issue? Poor management of offal is ongoing (does the CAB have good data from the fishing industry on how this is managed? How much offal goes over the side in total providing a huge incentive for seabirds? (See also recently published paper on the overlap of Westland petrels with the hoki fishery on the West Coast.) The Agreement for the Conservation of Albatrosses and Petrels (ACAP) provides advice on best practice in international fisheries. See attached latest advice. For pelagic trawl gear, net binding together with weights in the net belly are best practice.

CAB Response: We have not seen the preliminary 2017 data and typically cannot rely on preliminary data (which may be subject to revision) in any case to draw conclusions. The most recent data that are publicly available (i.e., Figure 43) show that there was an improvement (i.e., a decline) in the overall capture rate of seabirds in the fishery from 2014 to 2016, with the 2016 rate equivalent to the lowest in the time series. New data will be reviewed at the 1st surveillance audit subject to certification.

Information provided to the Assessment Team and presented in the scoring rationale for PI 2.3.2 SIa demonstrates that the approach to seabird impact mitigation fully meets the MSC's definition of a strategy. The CAB heard during the site visit that there is an active, ongoing reporting process for seabird interactions, and that the data produced (including on the fishing scenarios that led to bird interactions) are reviewed continuously. The Assessment Team heard that during the site visit that there is concern about bird interactions at the surface, and that industry is working to develop approaches to mitigate risk.

In this regard, offal management is clearly a priority issue for the DWG, with the operational procedures requiring in particular that continuous discharge is eliminated, and that fish waste is not discharged during hauling and shooting of the gear (DWG 2015). As noted in the assessment report, DWG has an active role in briefing skippers and training crews in best practice, as well as managing the trigger point alert system and reviewing trigger alerts to both identify issues that may have led to the trigger alert and solutions to minimise the risk of the same issues arising again.

Overall, we see no option other than to score the fishery at 100, here, for having a strategy in place.

F&B Point:

4. CAB gave a score of 85 under PI 2.3.3.However CAB should be asking why ACAP best practice is not being applied here. Until there is agreement on what constitutes best practice in NZ there is a question over whether it is being met and whether this fishery is meeting MSC requirements of any of the goalposts. Our belief is that it doesn't meet any of these.

CAB Response: We note that the gear employed in the fishery is a demersal trawl or a semi- pelagic trawl. However, a review of the ACAP recommendations indicates that almost everything that is recommended is being done in the hoki, hake and ling trawl fishery, including offal management, net cleaning, no use of net monitoring cables, use of bird scaring devices, and minimising the time the gear is on the surface. There is also an ongoing effort to review the causes of interactions and investigate options to reduce impacts. Our belief is therefore that, with respect to seabird management, the fishery is operating at a level which clearly meets the MSC requirements.

F&B Point:

5. Returning to the issue of the Risk Assessment. We have two major concerns over the risk assessment process that has been adopted. The first is that instead of being a guide as to where the most effort should be placed it is being used as a limit, including in this case. Also, the risk assessment currently being used does not take into account the conservation status of the seabirds. This would require the inclusion of a 'recovery factor' to "allow" for the more rapid recovery of those species. The Risk Assessment deliberately excludes this and provides for a recovery factor of 1 to cover all species. It is disappointing that the CAB would consider that the ongoing contribution of deaths of Salvin's albatross a critically endangered species is insufficient to require any action. 11 of the 14 Salvin's albatrosses caught in 2016/17 (latest data) were caught in the net. Given there is no net mitigation being applied in the VMP's these captures will continue and we cannot expect the bycatch rates to come down continuously. If effort is made on net captures then all seabird captures would start to reduce.

CAB Response: Please note that Table 40 and Table 41 of the hoki, hake and ling trawl fishery assessment report has been updated with information from Richard et al. 2017. These data indicate that the hoki, hake and ling trawl fishery accounts for small or very small amounts of the total mortality of species other than Salvin's albatross (17.70%), Westland petrel (16.67%), southern Buller's albatross (39.58%), New Zealand white-capped albatross (14.67%), northern Buller's albatross (13.60%) and northern giant petrel (27.66%). However, these annual catches represent a small (maximum 15.3%) of the mean Population Sustainability Threshold for each species (please see updated Table 41). The scoring text for PI 2.3.1 has also been updated to reflect these data.

The CAB understands that the risk assessment process is being used to direct attention to particular New Zealand fisheries and areas, and therefore to help focus management and mitigation efforts. Further, the information available to the team and presented in the report indicates that the hoki, hake and ling trawl fishery is working to minimise impacts using the best available information, with efforts ongoing currently to address net captures. While the bycatch data collected over years show that the hoki, hake and ling trawl fishery does impact individuals of some seabird populations, including Salvin's albatross, the most recent version of the seabird risk assessment (Richard et al. 2017) indicates that the fishery does not result in significant detrimental effects to the populations of these species. For Salvin albatross, for example, the relative risk from the fishery, calculated as annual potential fatalities (APF mean

= 437 animals) relative to the population sustainability threshold (PST mean = 3,600 animals) = 12.1%). For Salvin's albatross, therefore, the mean APF would have to increase by more than 8 times before it exceeded the mean PST. The upper 95% C.I. of the APF is also substantially less than the lower 95% C.I. of the PST (see Table 41).

We note that Richard et al 2017 states:

"*Survey data of Salvin's albatross populations indicate different potential trends at different colonies. At Bounty Islands, where most of the population breeds, survey data indicate decreases in the annual number of breeding pairs, including a 30% decrease between 1997 and 2011 at Proclamation Island, and a 13% decrease between 2004 and 2011 at Depot Island (Sagar et al. 2015a). In contrast, recent aerial surveys across the Bounty Islands group indicated an increase from 31 786 to 39 995 annual breeding pairs between 2010 and 2013, including a doubling of the number of annual breeding pairs at Proclamation Island since the earlier survey (Baker et al. 2014). At Snares Islands (the Western Chain), ground counts indicated a stable population of Salvin's albatross between 2008 and 2014 (Sagar et al. 2015b)*."

F&B Point:

6. I want to touch on the issue of offal and discards discharge again as this is a major driver of net captures. Forest & Bird has recently been made aware of the potential scale of illegal discarding in the hoki fishery. In 2005 a reliable estimate of the level of high grading was produced "A length based analysis of highgrading in the in the NZ WCSI hoki fishery" (unpublished MAF report[6]) but the results were never incorporated into later stock assessments. For example in 2006 the stock assessment concluded "there may be some dumping of small fish" (Plenary Report) and then in 2011 the stock assessment stated that "no information is available about illegal catch," (Plenary Report) despite MAF investigations quantifying illegal discarding. This is all information held by MPI and may have been shared with the industry body seeking recertification: Forest & Bird requests that you seek documentation from Fisheries NZ on the risk and scale of illegal discarding in the hoki fishery, both of the target species and non-target species.

CAB Response: As part of New Zealand fisheries management, MPI Compliance regularly undertakes risk profiles to assess potential for misreporting and other inaccuracies and uses the findings to inform policy changes.
The law requires all vessel operators to self-report their catches. These reports are audited by MPI using a number of verification tools including at- sea observers, risk profiling and retrospective discrepancy analyses.

The assessors requested information from MPI during the full assessment concerning estimates of the likely difference in the reported and actual catches of hoki, southern blue whiting and other quota and non-quota species for the period that was being profiled in 2011.

NZ Fisheries response was that the risk profile documents focus on possible areas and or mechanisms that can lead to under-reporting. The reports are intended to identify risk areas rather than quantify the possible under-reporting and therefore the differences in the report are indicative only.

MPI estimates total catch of non-quota species across the deepwater fleet annually through a research project. Data is taken from observed trips and is scaled up to reflect total catch. The reports also estimate discards of both quota and non-quota species.

[6] Official report available here.

The stock assessment for hoki is currently completed using commercial catch for the catch history and does not explicitly include any consideration of potential under-reporting resulting from the risks and issues identified in the risk profile reports. As with all New Zealand deepwater assessments, the catch history is taken as recorded, but with adjustments from time to time to address identified problems (documented in FR).

MPI considers that the indicative volume of the potential under-reporting is negligible compared to the total volume of catch in the hoki fishery (maximum of 3% with 'pessimistic' assumptions), noting that over-reporting of catches also occurs, as well as subsequent redeclaration of catch records, and does not consider this would have any significant impact on the stock status or sustainability of the hoki fishery.

In addition, MPI recently completed a research project which explored effects on the stock assessments for hoki, hake, and ling of a range of catch history assumptions. The stock assessments were run using catch histories based on those derived from Sea Around Us databases, and found there to be little impact on the estimates of stock status. The final report can be found here: https://www.mpi.govt.nz/dmsdocument/29378-far-201814-stock-assessments-of-hoki-hake-and-ling-using-alterative-catch-histories, MPI is also intending to consider the implications of under-reporting in future stock assessments either directly or by sensitivity analysis noting that recent actions have reduced the potential for this to occur. This is not expected to change the outcomes of the stock assessments in terms of stock status.

It should be noted that when setting the TACC, an allowance is provided for "other sources of mortality". For hoki, the allowance for 'other sources of fishing mortality' in 2011 was set at 1,200 t, with the TACC set at 120,000 t. The risk profile estimated that up to 3,500 t might be at risk of being unreported. This estimate was not intended to quantify the actual amount of underreporting to rather to identify a potential risk. Further, it does not take into consideration any over-reported catch or any subsequent redeclared catch. Both hoki stock sizes are been estimated to have been well above their management target range since 2010. The quantities of hoki assessed to potentially be 'at risk' are, too small to materially affect the sustainability of either hoki stock (see FR for further details).

F&B Point:

7. Finally, we are concerned that there are no conditions applied to provide increased incentives to protect seabirds. This appears to be a complete failure of the MSC process. As a minimum MSC should require an Action Plan to be produced to focus on bycatch reduction. It should require an assessment of ACAP Best Practice options for net capture mitigation and a requirement that these methods be trialled in the hoki fishery.

CAB Response: A condition of certification can only be set where a score of ≥ 60 to < 80 is given for a Scoring Issue (SI); if a fishery meets SG80 or above then conditions cannot be set. No scores of < 80 were awarded in Principle 2, and so no conditions were set.

NABU International Foundation for Nature

Contact Information Make sure you submit your full contact details at the first phase you participate in within a specific assessment process. Subsequent participation will only require your name unless these details change.		
Contact Name	Barbara	Maas
Title	Dr.	
On behalf of (organisation, company, government agency, etc.) – *if applicable*		
Organisation	NABU International Foundation for Nature	
Department	Species Conservation	
Position	Head of Species Conservation	
Description	NABU International is a non-profit NGO based in Germany. It is dedicated to nature and species conservation around the world. In New Zealand, NABU International lobbies for the endangered Maui's and hector's Dolphins. We have strong interest in participating in the process towards sustainable fishery practices and have also participated in stakeholder events based in Berlin, Germany	
Mailing Address, Country	Charitéstr. 3, 10117, Berlin, Germany	

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Assessment Details	
Fishery	New Zealand Hoki
CAB	Acoura Marine

• **SECTION 4** • RETURN TO PAGE 4

Assessment Stage		Fishery	Date	Name of Individual/Organisation Providing Comments
x	**Public review of the draft assessment report[5]** **Opportunity to review and comment on the draft report, including the draft scoring of the fishery.**	**New Zealand Hoki**	**26.05.2018**	**Barbara Maas / NABU International Foundation for Nature**

x I wish to comment on the evaluation of the fishery against specific Performance Indicators.

A table with these indicators and the scores and rationales provided by CABs can be found in Appendix 1 of the draft assessment report.

Nature of comment *(Please insert one or more of these codes in the second column of the table below for each PI.)*

1. I do not believe all the relevant information[6] available has been used to score this performance indicator *(please provide details and rationale).*
2. I do not believe the information and/or rationale used to score this performance indicator is adequate to support the given score[7] *(please provide details and rationale).*
3. I do not believe the condition set for this performance indicator is adequate to improve the fishery's performance to the SG80 level[8] *(please provide details and rationale).*
4. Other *(please specify)*

Performance Indicator	Nature of Comment Indicate relevant code(s) from list above.	Justification Please support your comment by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.
PI 1.1.1 - Stock status	1	Several reports provide information of massive underreporting and illegal catch in the Hoki fishery. Without reliable data, projections and indications in regard to the stock status are meaningless. (See attachment) The scoring should therefore be significantly reduced.
PI 1.2.1 – Harvest strategy	1	There is evidence of significant misreporting with regard to fish dumping, high-grading, under-reporting of catches and non-reporting of illegal catches. Without functional monitoring a harvest strategy is without effect. (See attachment) The scoring should therefore be significantly reduced.
PI 1.2.2 – Harvest control rules and tools	1	According to MPI's Bronto Report and other sources the harvest control rules and tools need to be reformed drastically to be effective. (See attachment) The scoring should therefore be significantly reduced.
PI 1.2.3 – Information and monitoring, page 166	1	"The draft report states that "Electronic reporting and video monitoring on small vessels (<28 m) will be gradually introduced over an extended period." Last year, the previous NZ government had announced plans to install video cameras on fishing vessels, saying it would protect the sustainability of fish stocks and act as a deterrent against illegal activity, like fish dumping. MPI Fisheries spokesman Gerry Brownlee had said that the rollout of cameras was needed to deal with well-publicised problems in the sector. However, earlier this year, news emerged that these plans may be abandoned as a result of industry opposition. There are therefore no current plans to install video monitoring across the NZ fleet, including hoki vessels to address these problems. The fishing industry subsequently petitioned the government to prevent public access to videos and images of fish being discarded and seabirds and marine mammals being caught by fishing boats. Amongst the reasons cited were commercial sensitivity, privacy and a reputational risk to the industry, MPI and New Zealand's clean, green image. In a letter to the Ministry for Primary Industries (MPI) the Deepwater Group, Fisheries Inshore New Zealand, the Paua Industry Council, Seafood New Zealand and the New Zealand Rock Lobster Industry Council on July 4, 2017 asked the government to change the law so that the Official Information Act could not be used by to make such information publicly available. One of the five industry heads who signed the letter said there needed to be an exemption so the footage was never made public. "Ensuring New Zealand had a good reputation for ethically caught fish was up to the industry, not the government," he said. In his response of 15th September 2017, the Minster's stated that "At this stage there is nothing to suggest that the risks associated with privacy or commercial sensitivity arising from GPR & ER are significantly different from those already being managed under the existing MPI data management processes. An initial consideration of the potential harms of releasing of GPR & ER data has not identified issues that cannot be addressed under the existing framework of the Official Information Act (OIA) and MPI's processes for handling OIA requests" When video monitoring was made compulsory in Australia, reported bycatch increased seven-fold. As of 26th May 2018, no formal decision on the matter has been communicated. (See: Attachment, page 1 ff.) The scoring should therefore be significantly reduced.

Performance Indicator	Nature of Comment Indicate relevant code(s) from list above.	Justification Please support your comment by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.
PI 1.2.4 – Assessment of stock status	1	Fundamental assumptions about the status of the stock are likely to be based on incorrect information as a result of misreported catch. (See attachment) The scoring should therefore be significantly reduced.
PI 2.2.1 – Bycatch species outcome	1,2	Illegal discarding (returning of fish to the sea) is of particular concern in the hoki fishery. Hoki fishery bycatch species are especially vulnerable to this type of offending. Fishers may also deliberately discard smaller, damaged or less valuable fish of a particular species to maximise their economic return. (See attachment) The scoring should therefore be significantly reduced.
PI 2.2.2 – Bycatch species management	1,2	Illegal discarding (returning of fish to the sea) is of particular concern in the hoki fishery. Hoki fishery bycatch species are especially vulnerable to this type of offending. Fishers may also deliberately discard smaller, damaged or less valuable fish of a particular species to maximise their economic return. (See Attachment) The scoring should therefore be significantly reduced.
PI 2.3.1 – ETP species outcome	1,2	The scoring for this indicator will have to be reduced to at least 60 requiring a condition aimed at improved monitoring and recording of bycatch rate and the impact on multiple vulnerable species. Observer coverage is universally inadequate, including for Hector's and Maui dolphins, basking sharks, fur seals, sea birds and other species. (See Attachment) The scoring should therefore be significantly reduced.
PI 2.3.2 Alternate – ETP species management	1, 2	The scoring for this indicator will have to be reduced to at least 60 requiring a condition aimed at improved monitoring and recording of bycatch rate and the impact on multiple vulnerable species. Observer coverage is universally inadequate, including for Hector's and Maui dolphins, basking sharks, fur seals, sea birds and other species) (See attachment) The scoring should therefore be significantly reduced.
PI 2.3.3 – ETP species information	1, 2	The scoring for this indicator will have to be reduced to at least 60 requiring a condition aimed at improved monitoring and recording of bycatch rate and the impact on multiple vulnerable species. Observer coverage is universally inadequate, including for Hector's and Maui dolphins, basking sharks, fur seals, sea birds and other species (See Attachment) The scoring should therefore be significantly reduced.
PI 2.3.3 – ETP species information, page 255	2	Reviewer: "The information level on ETP species is generally no more than just adequate to support a strategy of minimising negative impacts, although it is better for marine mammals and seabirds. I support the scoring and justification provided." We note that there is no strategy for minimizing negative impact on marine mammals in New Zealand. This is evidence by declining populations of marine mammals, including Hector's and Maui dolphins (e.g., Cook et al. 2018). Bycatch of some 200 fur seals per annum (MPI 2017), for example appears to be simply accepted as collateral. (See attachment) The scoring should therefore be significantly reduced.

Performance Indicator	Nature of Comment Indicate relevant code(s) from list above.	Justification Please support your comment by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.
PI 2.4.1 – Habitat outcome, page 255	2	Reviewer: "With any bottom trawl fishery, there is potential for seabed contact and hence impact on habitat function, but in New Zealand, such trawling is already banned in about one-third of potential seabed areas." Bottom-trawling is the most destructive fishing technique undertaken in the world's oceans. This assertion fails to take account of that some of the areas covered by the bottom trawl exclusion zones across the NZ EEZ are already fished out. These so-called Benthic Protected Areas also tend to coincide with areas that have never been subject to bottom trawling because they are too deep or the seabed is simply too rough (rocks, corals etc.) Furthermore, many sensitive and vulnerable areas are not included in the bottom trawl exclusion zones. The statement also fails to recognise that partial areal protection does not equate to ecosystem protection. Scientists have shown that some of the species affected are extremely slow growing and would take hundreds or even thousands of years to recover from the damage. (See attachment) The scoring should therefore be significantly reduced.
PI 2.4.1 – Habitat outcome, page 255	2	Reviewer: "Evidence is also provided that the hoki fishery only targets about 10% of the possible seabed (hake and ling much less), so the national strategy and operational activities already provide a lot of protection to the habitat. I therefore believe that the scoring of and justification for each SI as given is correct, with only hoki (because of the extent of the fishery) not definitely scoring a full SG100." Trawling for hoki takes is limited to 10% of New Zealand's EEZ because that is the area where hoki occurs. The remainder of the seabed is trawled for other species, including orange roughy, red cod, flatfish, etc, etc. The scoring should therefore be significantly reduced.
PI 3.1.3 – Long Term Objectives	1	The mentioned reports raise issues in regard to management policies in place. The lack information, due to misreporting and low observer coverage is not consistent with MSC principles and criteria. (See Attachment) The scoring should therefore be significantly reduced.
PI 3.1.4 – Incentives for Sustainable Fishing	1	Bremner et al. (2009) found clear evidence of violations of these legal requirements in the New Zealand's hoki fishery. They reported on unreported fish dumping (discards), high-grading and other forms of mis-reporting and under-reporting of catches in the hoki fishery and found that "the catches reported by unobserved vessels contain large elements of fiction" (Bremner et al. 2009). According to the mentioned reports the management system does not provide enough economic and social incentives for sustainable fishing. (See attachment) The scoring should therefore be significantly reduced.
PI 3.2.2 – Decision Making Processes	1	The information of the mentioned reports was accessible for decision makers for years. The management system's decision-making processes did not result in any measures or strategies to overcome misreporting, discarding, high-grading, etc. (See attachment) The scoring should therefore be significantly reduced.
PI 3.2.3 – Compliance and Enforcement	1,2	The information presented in our comment, including a series of MPI compliance reports highlight severe problems in this regard. A high rating of around 60 is far more realistic, taking into consideration the level of misinformation and misreporting. (See attachment) The scoring should therefore be significantly reduced.

Performance Indicator	Nature of Comment Indicate relevant code(s) from list above.	Justification Please support your comment by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.
PI 3.2.5 - Management Performance Evaluation	1,2	Considering the information provided in our comments, the effectiveness of the management system must be considered unreliable. (See attachment) The scoring should therefore be significantly reduced.

Comment		Nature of Comment	Justification Please attach additional pages if necessary.
x	I wish to provide general comments about the assessment of this fishery against the MSC Fisheries Standard.	1, 2	Several reports should have been considered for the re-assessment of the hoki fishery, namely Bremner et al. 2009, Simmons et al 2016, Heron 2016, Simmons et al 2017, MPI Bronto Report. Please find our detailed stakeholder comments for the 2018 MSC Sustainable Fisheries Certification attached to this document. Please note, that the stakeholder template displays only a share of our remarks and comments. We kindly ask you to consult the attached document for further specification.

STAKEHOLDER COMMENTS

2018 MSC Sustainable Fisheries Certification

New Zealand Hoki, Hake & Ling Trawl Fishery

NABU International Foundation for Nature

INTRODUCTION

The concerns and issues we raise are indicative of the poor quality of fisheries management in New Zealand in general and the hoki fishery in particular. Although most of our comments relate to the lack of sustainability in the latter, some of the observations presented also relate to the ling and hake fishery.

Data on ecological impacts are inadequate for most NZ fisheries (McKoy 2006). For decades, government reports recommending increased observer coverage have been disregarded. Current coverage is only 8.4% (Ministry of Primary Industries 2016) and <1% in most inshore fisheries (Clemens-Seely & Hjorvarsdottir 2016). An independent review of the MPI's handling of illegal fish dumping and dolphin by-catch (Heron 2016) demonstrated industry capture of the regulator and revealed other serious problems (see also Pala 2017). Widespread illegal dumping and misreporting have distorted catch statistics for decades. (Francis & Annala 1993, Simmons et al. 2016, Slooten et al. 2017) Mounting evidence on the environmental effects of the hoki fishery on biodiversity, endangered species, seafloor habitats (e.g., Clark & Rowden 2009) and the very ecosystem on which both fish and fisheries depend have been ignored. As a result, New Zealand's fishery is increasingly losing credibility in the light of revelation after revelation of systemic malpractice, which threatens to also cast a shadow over the MSC.

ILLEGAL AND UNSUSTAINABLE FISHING PRACTICES IN THE NZ HOKI FISHERY

PI 1.2.3 Relevant information is collected to support the harvest strategy (p 166)

"The draft assessment report states that "Overall, illegal and unreported catch are not considered significant. Observers provide information on the fishery's catch volume and composition on an ongoing basis. During 2002/03 – 2014/15, observer coverage of the hoki trawl fishery ranged 9.3 – 30.7%. During the same period, observer coverage of hake and ling directed fishing ranged 5.2 – 76.6% and 2.5 – 23.3% respectively."

According to new research published this May in the journal Fisheries Research, globally, industrial and artisanal fisheries caught 5.6 billion tonnes of fish in the past 65 years (Cashion et al. 2018). Industrial fishing vessels wasted more than 750 million tons of fish. Sixty percent of this waste was due to bottom trawlers and amounts to 437 million tons of seafood worth US$560 billion.

New Zealand legislation requires that all fish caught is reported and that all fish species subject to the Quota Management System (QMS), including hoki, is landed. If QMS fish are likely to survive, they can be returned to sea and do not need to be landed, but they must be reported. Documented misreporting in the country's fishery, however, go back to at least to 1996, when Annala noted that the ratio of bycatch to target catch landed by large NZ fishing vessels was higher when observers were on-board.

Anderson (2004) used observer data to estimate the total annual bycatch in the New Zealand scampi fishery from 1990 to 2001, which he compared to catch records from commercial fishing returns. The commercial catch records amounted to just 12-25% of the totals calculated from observer data. The total annual bycatch estimates based on observer data ranged from about 3,200-6,800 tonnes. This compared to 511-1,475 tonnes from the commercial catch records.

Bremner et al. (2009) found clear evidence of violations of legal fishing regulations in the New Zealand hoki fishery. They reported on unreported fish dumping (discards), high-grading and other forms of mis-reporting and under-reporting of catches and concluded that "the catches reported by unobserved vessels contain large elements of fiction" (Bremner et al. 2009).

Bremner and colleagues used data from government-observed trawl vessels in the New Zealand hoki fishery to predict catches on unobserved vessels. They then compared these predictions with the catches reported by unobserved vessels, which revealed significant differences to the catches on vessels carrying observers. In doing so they uncovered clear evidence of quota-induced misreporting in the WCSI hoki fishery, which affected both quota and non-quota species. (Bremner 2009)

The authors emphasize the importance of effective enforcement and make reference to the success of the introduction of transferrable fishing quota in British Columbia groundfish fishery, which benefited from 100 percent observer coverage. "Where enforcement is not sufficiently effective to ensure over-quota fish are reported, the incentive is for the firm to misreport. Unreported discarding can be seen as a special case of misreporting. Undeclared landings or trans-shipments, under-reporting of landing weights and mislabelling of species may be profitable alternatives."

Bremner et al. agree with Rijnsdorp et al. (2007) conclusion that misreporting is greatly exacerbated by the introduction of quota management systems to mixed fisheries. The authors also identify differences in species reporting by hoki vessels with and without on-board fishmeal plants, and suggests that species misreporting is more widespread in the former and difficult to detect down to species level. This issue of filleting vessels disguising their catch raised by Bremner et al. in 2009 was highlighted again in 2012 in the Bronto Report (see below).

According to the authors, one of the serious effects of species misreporting is the distortion of catch statistics. Distorted catch statistics in turn generate inaccuracies in biological stock assessments [Chen 2007], and eventually result in unsustainable total allowable catch settings for the bycatch species. In some circumstances, this can become self-reinforcing. Over-reporting non-ITQ catch can lead to unrealistic allocation of quota, should these species be brought under ITQ management at a later date, because allocations are based on past catch history. Under-reporting ITQ catch will also lead to distorted market signals (Chavez & Salgado 2005), biased stock assessments and most significantly, inappropriate management actions. Both over- and under-reporting therefore undermine the legitimacy of the management system and the fishery's sustainability. In extreme cases, such as the Atlantic cod fishery in Canada, under-reporting and reliance on catch/effort data provided by the industry rather than fisheries-independent surveys, can result in fisheries collapse (Myers et al. 1997, Walters & McQuire 1996). Simmons et al. 2017 point out that in New Zealand, "There is money to be made or saved by dumping catches for which ACE is unavailable or too expensive, from poaching and falsifying catch returns. These behaviours have seriously distorted New Zealand's catch data for decades."

It is unfortunate that neither the hoki stock assessments (2011-2017), all post-2009 MSC hoki assessments reports, nor the current draft MSC public comment report take account of the information on unreported bycatch in the hoki fishery raised by Bremner and colleagues.

SIMMONS ET AL. 2016

In May 2016 the University of Auckland Business School announced the findings of research led by Dr Glenn Simmons into New Zealand fishery catches (Simmons et al. 2016). The findings suggested the total amount of marine fish caught in New Zealand waters between 1950 and 2010 is 2.7 times greater than official statistics suggest. Unreported commercial catch and discarded fish account for most of this difference. Fish of little or no perceived economic value have been routinely dumped at sea and not reported. The reconstructed estimate for 1950-2013 revealed an estimated 24.7 million tonnes of unreported fish, compared to 15.3 million tonnes reported. Fish discards made up 57% of total unreported catches from foreign and New Zealand flagged vessels, with unreported landings of the recreational, industrial, artisanal and subsistence sectors contributing 2%, 25%, 16% and 0.1%, respectively.

Some of the findings of Simmons et al.'s study about illegal catches in the New Zealand fishery

- New Zealand's reconstructed marine catch totalled 38.1 million tonnes between 1950 and 2010, which is 2.7 times the 14 million tonnes reported to the FAO.
- Since the Quota Management System (QMS) was introduced in 1986, the total catch is conservatively estimated to be 2.1 times that reported to the FAO.
- Unreported commercial catch and discards account for the vast majority of the discrepancy.
- Recreational and customary catch was 0.51 million tonnes, or 1.3 percent
- Only an estimated 42.5 percent of industrial catch by New Zealand flagged vessels was reported.
- 42 percent of the industrial catch was caught by foreign-flagged vessels, which dominated the catching of hoki, squid, jack mackerels, barracoota and southern blue whiting – some of the most misreported and discarded species.
- The extended reconstructed estimate for 1950-2013 is 40 million tonnes, comprised of 19 million tonnes nationally reported, 5.8 million tonnes of invisible unreported landings, 14.7 million tonnes of unreported dumped commercial catch, and 549,000 tonnes of customary and recreational catches.

The authors identified a long list of compliance problems including fish dumping, under reporting, high grading, low grading, discrepancies in tray weights and conversion factors, invisible landings (not reported or underreported, documented but not reported to the FAO). Official data from 2004-2006 suggested that the problem was widespread, especially in the West Coast hoki fishery. With regard to hoki, the authors refer to plenary reports (Ministry for Primary Industries 2013c, 2013a, 2013b, 2013e, 2013d) which highlighted that the catches of a number of fish species, including hoki, had not been fully reported. Low value, damaged and under-size fish had also been dumped routinely and not reported. For example, FAO data show that 143,394 tonnes of hoki were landed in 1992, while national statistics show landings of 215,000 tonnes. We refer to Simmons et al. for further relevant examples.

The report presents compelling evidence from foreign charter vessels (FCVs) where crews were forced to engage in dumping or face severe punishment. Interviews with 200 crew from 19 vessels operating between 1998-2013 all confirmed that dumping was standard and daily practice on all vessels they had worked on. These activities were actively hidden from observers with a small number of sample bycatch baskets kept behind.

This is illustrated by some observer statements:

Foreign charter vessel observer statements from Simmons et al. 2016

"I witnessed major illegal dumping and told the observer manager. He said, if under 15 tonnes not much we can do about it. It just went into a black hole...you don't stick your head up above the parapet, definitely not. We're told what happens at sea stays at sea. We're told if we ever say anything we will never work in this country again (Interviewee, 1)."

"No-one wants to rock the boat (Interviewee, 9)."

"Misreporting goes in our diaries and reports. We are often interviewed by compliance officers which resulted in prosecutions, but they have barely scratched the surface of what really goes on across the industry (Interviewee, 59)."

"I was on many Korean and Ukrainians FCVs during the 2000s. The dumping was out of control and despite warning the officers they did not alter their practice."

"On the Chatham Rise fishing for orange roughy, after 10 minutes of towing we had caught about 70 tonnes, but not good to catch this much as by the time they got to the end of the bag, the fish had decomposed. Captain offered me money to look the other way. He said how much do you want, name your price? Wanted me to agree to changing the catch records (Interviewee, 202)."

New Zealand vessel observer statements from Simmons et al. 2016

"Have to dump as no quota. Can be half a tonne a day, that's crazy! If we landed it, it would be a disaster. We are dumping a lot, cause so much snapper out there. Catching a lot of small stuff. It all goes over the side. Big snapper put into a fish case and dumped at night so no one sees. The annoying part is the time it takes to knife the swim bladder so they don't float (Interviewee, 164)."

"Dumping is very bad, it's done under the radar, especially on trawlers. Ninety %t of the time we dumped (Interviewee, 193)."

"can be 100% of the catch" (Interviewee, 194)

"We landed a big bag of snapper and didn't know what to do with it as no quota. So got a relative to take it to sell it through the black market. Better than dumping it (Interviewee, 218)."

"The way the QMS operates we are criminals, even though we are just trying to make an honest living. There's a lot of dumping going on but what do they expect (Interviewee, 221)."

The authors explain how the Quota Management System (QMS), despite good intentions and its international reputation as a success story, undermines sustainable fisheries management by inadvertently incentivising misreporting and dumping. They conclude that "The future sustainability and certification of fisheries will depend on how the government addresses the under-reporting problems, which have long been a cause of concern."

We concur with Bremner et al. 2009, Simmons et al. 2016 and others that 24-hour surveillance and observer coverage provides the only intervention known to guard against these problems (see also Burns & Kerr 2009).

MPI COMPLIANCE REPORTS AND INDEPENDENT REVIEW

On 18 May 2016 a New Zealand news network reported obtaining information that New Zealand fishing boats had been illegally dumping quota fish. The revelations were based on official reports into MPI operations that had been carried out in 2012 and 2013. As a result of criticism of MPI's decisions not to prosecute offenders identified in the reports, the Ministry for Primary Industries (MPI) Director-General commissioned Queen's Counsel and former Solicitor General Michael Heron to carry out an independent review of these fisheries compliance operations (code named Hippocamp, Achilles and Overdue) and MPI's subsequent decisions. The issues raised in the three reports and the outcome of the independent review that followed are presented below because of their direct relevance to the assessment of the hoki fishery.

OPERATION HIPPOCAMP

In May 2011 MPI (then called MFish) planned Operation Hippocamp to investigate commercial inshore finfish dumping in the eastern and southern finfish fishery. The briefing paper records the investigator's summary of the current state of MFish's knowledge of the issue: "Observer information shows that when a MAF observer is on-board a commercial vessel it tends to report much more small fish and by-catch as taken in its returns. Observed vessels also tend to report much higher levels of non-fish by-catch than vessels without observers on-board. Direct evidence from crew on-board vessels suggests that when observers are on duty, unwanted and low value by-catch is retained and reported. They say this type of catch is often routinely dumped and not reported when there is no observer on-board. There has been limited observer coverage in the inshore fishery but when there has been it has confirmed dumping as an issue in this fishery." "Dumping and high-grading of quota species generally occurs when there are economic incentives to dispose of fish species with a low value compared with other catch. The value of a species can be affected by quality, size, market or association with overfishing penalty. If a fisher has limited ACE for a species, then small or damaged fish that fetches a low price may be dumped in favour of higher value fish of that species. If ACE has been exhausted and an over fishing penalty will be incurred, then a species may be dumped in favour of another species."

OPERATION OVERDUE

MFish conducted an operation in respect to four commercial fishing vessels in early 2003. Fish from two vessels was inspected and the investigation suggested that the catch landing record had understated the weight. Approximately 3,900 cartons of hake, hoki, ling and black oreo dory were seized. The weights showed underreporting in the catch landing return of between 0.6% to 1.93% depending on the species and the vessel. The investigator noted that this amount may seem "quite small" but if it extended across all vessels, annually it would amount to hundreds of tonnes of unreported hoki alone. The investigator noted that the problem had been around for a considerable period of time and dated back to 1996 with this particular company.

OPERATION ACHILLES

In November 2012 MPI installed monitoring cameras on commercial set net vessels as part of a programme designed to monitor and study the incidental capture of Hectors dolphins. Six vessels participated in the operation. When the resulting footage was reviewed, it revealed discarding of quota fish by five of the six vessels and of two endangered Hector's dolphins, only one of which had been reported. During the examination of footage from one boat, numerous quota species were also seen being discarded. A more extensive examination of the set net hauls between November 2012 and February 2013 was undertaken.

There appeared to be consistent and deliberate discard of quota fish, in particular elephant fish, red gurnard and rough skate. The investigator then commissioned the examination of the footage from the other five vessels and found that the same activities were identified on four of the five vessels.

A senior MPI fisheries manager stated during discussions of this matter to a colleague: "As you are aware discarding is a systemic failure of the current system and something we have not been able to get on top of from day 1 of the QMS. FM [Fisheries Management] can't quantify the tonnages involved but we suspect they are significant to the point that they are impacting on stocks. We estimate that if we found the golden bullet to stop discarding, we would probably put over half of the inshore fleet out of business overnight through lack of ACE availability to cover by-catch." "As you are aware I have spent the last 5 months considering discards and see this as the single biggest issue we face in our wild stock fisheries." (Heron 2016)

No prosecutions were brought, in part because the non-prosecution option would be "less damaging to MPI and more constructive in changing fishers' behaviours".

Queen's Counsel Michael Heron's comments about Operation Achilles

"My inquiries confirmed that there was a direction from senior management in 2009 to ignore discarding and misreporting of quota fish detected on one of the vessels involved in the summer dolphin observer programme. The direction was given by the then National Manager Fisheries Compliance and it resulted in no action being taken on any of the other 42 vessels involved in the programme despite discarding allegedly being witnessed in about half of them. This in turn had a flow on effect that resulted in offending that was detected by observers involved in inshore dolphin programmes not being followed up or actioned. The direction given was confirmed to me by a number of people"

"Notwithstanding the direction, an investigator was assigned the 2009 observer report of discarding and commenced an investigation of it. That investigation was later halted upon confirmation of the direction by the same person. Whatever the intention behind the direction, it created the impression in Compliance at least that they ought not investigate or prosecute in circumstances where observers were on-board vessels for the purpose of observing marine mammal interaction. This was at the same time as MPI was aware that gathering evidence in relation to discarding was difficult in the inshore fishery because of the limited observer coverage. MPI was also aware that there was a need to resolve the problem of discarding."

"In my view the lack of timely and accurate documentation of the prosecution decision was regrettable."

"The investigator and compliance personnel were correct to determine that there was sufficient evidence to prosecute. They were ultimately right to focus upon whether prosecution was in the public interest."

"In my view the decision and in particular the decision process was flawed primarily because it was influenced by factors which were not relevant."

"The prosecution decision was affected by considerations which were not relevant under the Guidelines. In particular, potential embarrassment to MPI or officials was an irrelevant consideration. Earlier conduct of MFish and MPI created hurdles to the prosecution which should not have been present. That conduct was inappropriate or at least unhelpful. The decision process was confused, not well documented and not well communicated. The follow-up actions do not seem to have been thoroughly completed. The decision to warn was meant to be combined with "drawing a clear line in the sand". That does not seem to have been achieved. Some steps have been taken but the situation as to discards remains confused."

"It is often referred to in MPI documents that the Ministry has been aware of the issue of discarding of quota fish since the commencement of the QMS. That appears correct to me. Support for that comes from numerous sources within and outside MPI. One only needs to refer to the Simmons report and the Ministry's Plenary Report (and equivalents) for each year for evidence that the discarding issue features prominently in the Ministry's thinking. MFish and MPI have attempted to grapple with the issue but unsuccessfully."

"Both industry and MPI have repeatedly acknowledged the problem but have not been able to develop and implement a solution… For now, however, the law remains and appears to be regularly disobeyed."

Queen's Counsel Michael Heron's general comments about the three compliance reports

"The issue of discards was again highlighted by Operations Hippocamp and more clearly by Operation Achilles. It is a problem that has been recognised since the beginning of the QMS. MFish and MPI have not grappled effectively with aspects of the problem and either enforced the law or acted to change it. The non-enforcement of the law in a case such as Achilles is unsatisfactory but primarily due to conduct outside of the Compliance directorate. MPI may wish to consider a review of the relationship between Fisheries Management and Compliance in terms of the planning of Fisheries Management operations (such as observers or cameras) and the interrelationship with potential Compliance operations. In turn, review is required of follow-up from Compliance operations back to Fisheries Management efforts."

"The issues raised in the Simmons report have long been recognised by MFish/MPI and industry. A coherent rationale to the rules around discards is not obvious. The fisheries management system is under review at present and provides an opportunity examine this. In the meantime, it is incumbent on commercial fishing to improve their performance and comply with the current law."

In September 2016 Ministry for Primary Industries Director-General stated that he accepts the findings of the independent review conducted by Queen's Counsel Michael Heron.

QUALITY OF EVIDENCE

The most recent MSC hoki draft assessment report fails to recognise both the insights and wealth of data presented by Simmons and colleagues (2016) that has clear relevance for the sustainability of New Zealand fishery in general and the hoki fishery in particular. The assessors refer to the authors as "researchers associated with the University of Auckland" and cast doubt on the validity of Simmons et al.'s study by asserting that it has not been subject to peer-review and that its methodology is ambiguous (see page 212). They continue by referring to Tilney et al. (2017) who dismiss Simmons et al.'s study and findings as unsound.

We consider this presentation and assessment of Simmons et al.'s work both inaccurate and misleading. The study is co-authored by eight academics from three universities, including the University of Auckland in New Zealand, Oxford University in the UK, and the University of British Columbia in Canada. They were among 400 researchers from around the world who collaborated on a 15-year global project led by Prof Daniel Pauly, the world's foremost fishery scientists, at the Institute for the Oceans and Fisheries, University of British Columbia. The methodology employed by the international team of scientists, including Dr Simmons, is clearly set out in Pauly & Zeller (2015), The Catch Reconstruction: concepts, methods and data sources. The resulting findings were published in the prestigious and peer reviewed journal Nature Communications (Pauly & Zeller 2016) and found that global catches peaked at 130 million tonnes in 1996, which is 51 per cent higher than the FAO figure of 86 million tonnes. The study also identified a sharp decline from this peak at more than three times the rate suggested by FAO figures.

Simmons et al.'s results are published by the Institute for the Oceans and Fisheries on the University of British Columbia and are described by Prof Pauly as the best estimate to date. In contrast, the alleged rebuttal by Tilney et al. 2017, on which the assessors rely so heavily, is entitled "Briefing note to Acoura Marine MSC assessors", has not been subject to peer review and remains unpublished and therefore inaccessible. It's authors, Tilney, Clement and Gargiulo are listed as staff of the New Zealand based fisheries lobby group, Clement and Associates Ltd. According to its website, Clement and Associates Ltd. is focussed "on helping clients add value to their seafood and related businesses through innovative solutions and the creative use of information and technology." Because Tilney et al.'s work is not accessible, it is impossible to comment on the arguments it put forward. However, it lacks both independence and the academic pedigree of the study presented by Simmons and colleagues and therefore does not warrant such prominence in an MSC draft assessment.

OPERATION BRONTO

In 2004, the New Zealand ministry of fisheries embarked on series of investigations into compliance among the country's hoki fishery. The first, Operation Mini, was followed in 2005 by Operation Maxi, an extensive profiling of the New Zealand's West Coast South Island hoki fishery (WCSI), where the largest volume of hoki is caught. Operation Maxi was to quantify the amount of small and damaged hoki caught and establish whether vessel operators were illegally highgrading and discarding unwanted smaller fish and damaged hoki - least valuable part of the catch - to maximise profit.

In 2011, a task force was to develop a risk profile of the 2011 West Coast South Island (WCSI) and East Coast South Island (ECSI) hoki fisheries. "Operation Bronto" profiled the 2010- 2011 WCSI hoki fishery and involved gathering, examining and analysing data relevant to the hoki fishery and its associated bycatch species. Its findings were set out in a report in entitled '2011 Compliance Risk Profile of the West Coast/East Coast South Island Hoki Fisheries' (MPI 2012). Operation Bronto was carried out by fisheries officers during 43 in-port inspections, 20 at sea vessel inspections and 11 vessel trips carrying official observers. The results of the investigation were completed in 2012.

The Bronto Report was were made public in 2018 in response to Official Information Act requests in 2016 and 2017. Prior to that they had been shared with fishing industry representatives. In a news article that appeared on Radio New Zealand on 24th May 2018, MPI's head of compliance, Gary Orr, said that instead of prosecuting the offences, "We briefed quota holders and vessel captains and then we sat down with individual companies and said these are the behaviours we're seeing, these create a compliance risk, you need to change your behaviours, if you don't change those behaviours then you're going to attract greater attention from us." The fact that this information was intentionally withheld by the industry and so did not inform the MSC certification process earlier, is deeply disappointing and does nothing to advance either sustainability or consumer confidence.

The problems identified by the Bronto Report include fisheries reporting, fishing practices, vessel electronic weighing and recording systems, carton weights, reporting of fish meal, vessel specific conversion factors, vessel processing specifications and undefined states, additional states and products, highgrading of hoki in both the WCSI & ECSI hoki fisheries, misreporting of bycatch, misreporting of target species to circumvent the Deep Water Group Hoki Fishery Operational procedures for Hoki Management Areas (HMAs), set up to protect areas with high numbers of juvenile hoki. The report revealed that some of New Zealand's biggest fishing companies, including [redacted], had been under-reporting their catch by hundreds of tonnes.

Discarding is of particular concern in the hoki fishery and is prohibited under s 72 of the Fisheries Act 1996. There is no legal size limit for hoki and as such it is not a species which can legally be returned to the sea. However, discarding allows fishers to increase their economic return by avoiding Quota Management

System related expenses such as purchase of annual catch entitlement (ACE) or payment of deemed values. Fishers can increase their financial return by deliberately discarding small, damaged or less valuable fish. This practice is known as highgrading. Hoki fishery bycatch species are especially vulnerable to this type of offending.

Discarding of hoki, bycatch species and misreported catch were two of the significant compliance issues identified in Operation Bronto. Total unreported hoki greenweight was estimated at between 3,414 and 3,555 tonnes – the equivalent of 5.6 to 5.9 percent of the HOK1W subarea TACC. Because not all compliance issues raised in Operation Bronto could be quantified, the authors consider this a conservative estimate.

Fishers were also found to report incorrect weights, quantities, species, or landed states. The main reason behind this type of offence is minimising ACE and related deemed value expenses.

The 2006 stock assessment states that there may be some dumping of small fish, but the level was unknown. In 2005 "A length-based analysis of highgrading in the NZ WCSI hoki fishery" (unpublished report), provided a reliable estimate of the level of discarding, but was never incorporated in later hoki stock assessments. The 2011 stock assessment simply states that "no information is available about illegal catch". It was noted that under "other sources of fishing mortality" there may have been some discarding of small fish due to the prevalence of small hoki on the west coast of the South Island in recent years.

Highgrading refers to sorting the catch of a marketable fish species by a desired attribute (usually length or weight) and discarding the unwanted or less profitable fish to maximize profit (Anderson, 1994).

Operation Maxi found evidence of vessels highgrading hoki. The amount of small hoki (<55 cm total length) illegally discarded during the 2005 WCSI hoki fishery is estimated at between 596 and 1806 tonnes. The estimated range reflects the difference between estimates based on vessels' processing specifications and estimates based on Fishery Officer landing observations. These weights equate to 1.8% and 5.6% of the total hoki catch taken by factory vessels larger than 46 metres.

Operation Bronto states that young fish aged 1-3 years old are most at risk of highgrading. The report emphasizes the added risk of removing young fish from the population as it can harm future recruitment and the sustainability of this fishery, which, after a period of overfishing, large annual changes in the numbers of juveniles and quota reductions is currently rebuilding.

Bronto report: The WCSI Hoki Fishery

Fishing practices & processes

- Fish lost from burst bags is either unreported or are under-estimated.
- Long tows or soaking the net can result in a large proportion of damaged fish that are unsuitable for processing. This hoki may be illegally discarded and/or mealed without being unreported.
- The disposal of large volumes of unwanted fish via a discard chute without being recorded. This practice also risks attracting seabirds and so raising the risk of incidental capture.
- Macerators shred whole fish and were introduced to help mitigate the killing of sea birds. Vessels fitted with macerators can discard fish with little risk of detection. It is impossible to determine if discharged macerated material contains illegally discarded whole fish.
- A number of vessels operating electronic weighing and labelling systems may not be reporting the net weight of fish accurately or have robust systems in place to determine greenweight. The report flags

some New Zealand's largest fishing companies, including [redacted] in connection with related compliance risks.

- In the 2010-11 fishing year [redacted] processed up to 78,000 tonnes of fish greenweight. If the average percentage difference was 1% across all product lines processed by [redacted]'s that fell below the 2.01% threshold, approximately 780 tonnes of fish greenweight would not have been reported during the 2010-11 fishing year.
- Catch greenweight should be reported accurately. "The methodology [redacted] uses to calculate and report greenweight is obscure."

Misreporting

- Vessels carried out and documented glaze weight tests at sea. Although the glaze test results indicated less than the two percent threshold, some vessels nevertheless deducted the full two percent glaze weight to reduce their reported catch. Additional concerns related to vessels deducting two percent for glaze even though no glaze had been applied.

- The total under-reported greenweight was estimated at 281,743 kg (132,245kg for fillet vessels and 149,498 kg for Limited Processing Fishing Vessels (LPFVs). Over-packing but underreporting catch is cited as an ongoing problem that will remain undetected in the absence of carton weight checks.

The Table below indicates total under-reported hoki catch permit holder and associated vessels.

Fishing Company	Vessel	Estimated under-reported Greenweight (kg)
[redacted]		37,699
		21,647
		59,346
		20,564
		28,602
		49,166
		8,199
		8,199
		15,340
		15,340
		7,891
		8,163
		1,023
		26,960
		45,939
		89,976
		12,456
		12,456
		13,998
		914
		23,521
		38,433
		8,827
		8,827
Grand Total		**281,743**

Table xxx: Summary of hoki under-reported by permit holder and vessel. Data from Operation Bronto 2011

- Some vessels are unable to achieve their Vessel Specific Conversion Factors (VSCFs), leading to inaccurate reporting of hoki catches, mostly but not only during the spawn time. Vessels may work harder to achieve lower VSCF during testing periods but then revert to 'normal' practice where the true Conversion Factor

(CF) may lie somewhere in-between the official CF and the VSCF. The total unreported hoki greenweight resulting from the use of VSCFs is estimated at 592,167 kg by three [redacted] fillet vessels; and between 202,369 kg and 343,635 kgsby two [redacted] fillet vessels. In one vessel, this resulted in a shortfall of 151,178kg in hoki greenweight between the amount reported and observer derived figures or a difference of 9% of hoki reported for the trip.

- Vessels reported 'B' grade hoki as a way of disguising that small and/or damaged fish had been illegally discarded and unreported. Product was subsequently relabelled as "A" grade after reprocessing offshore as it met the "A" grade rather than the "B" grade specification.

Highgrading

- The results of a hoki length-based analysis found that the landings of hoki reported by LPFVs contained an unexpectedly small proportion of small hoki, leading to an underreporting of at least 559 tonnes of small hoki – the equivalent of about 30% of the small fish they caught. The authors explain that due to the assumption that all the net damaged hoki that are turned into meal or green block are small, the true underreported amount is likely to be higher

- Comparing the amount of fish meal reported as produced from offal with the amount of offal available as a by-product of processing on fillet Vessels with meal plants revealed "unrealistically high" amounts of fish meal in most cases, indicating the mealing of unreported catch. Two vessels reported significantly less whole hoki to meal on non-observed trips than when carrying MAF observers, suggesting that in the absence of observers some hoki are mealed without being reported. The authors estimate that at least 1,541 tonnes of hoki catch were not reported during the 2011 season (At least 559 t for LPFVs and at least 982 t for fillet vessels).

- The authors explain that highgrading is most likely to occur in fisheries with a wide price difference between large and small fish; where the proportion of large fish expected in future catches is high; the cost of additional fishing effort is low; and the fishery is managed under a system of individual limits on landings. They conclude that the WCSI hoki fishery exhibits all these characteristics.

- The number of small hoki caught and seen by MAF observers does not match the number of small hoki being landed by the LPFVs and the amount of offal meal produced by most of the vessels filleting at sea is significantly higher than expected. This suggests that the greenweight of hoki being removed from this fishery is being systematically understated. The authors also draw attention to the fact that Operation Maxi, which looked at the prevalence of highgrading in this fishery in 2005, discovered the same result.

Bycatch

- A study of unreported bycatch in the WCSI hoki fishery conducted in 2005 by Bremner et al. (2009) showed that the reported catch of unobserved vessels was different to the observed catch of similar vessels in the fishery. For that season 18% of the catch by weight was related to incidental bycatch. The study provided evidence of the misreporting of both quota and non-quota species. Species misreporting was found to be widespread amongst the vessels with meal plants but was not solely limited to this group.

- For the 2011 season, many species that MAF observers recorded as being caught were quite different to what the fleet as a whole reported catching. Comparing ling heads to body ratios indicated greenweight underreporting, suggesting that unwanted ling bodies were discarded and/or mealed unreported, while the heads, for which there is a market, were retained.

- While factory vessels operating in the WCSI hoki fishery were good at reporting landings, they were poor at reporting catches. To improve fisheries management, the authors suggest the use of more reliable observer data rather than data provided by the industry. "With respect to QMS species poor reporting of catches is more problematic. The catch limits and the economic instruments intended to ensure they are not exceeded are supposed to apply to catches and not landings and will be ineffective if catches are misreported. There are some major issues that need to be addressed – issues that in some cases have been evident for several decades."

- The poor reporting of shark bycatch which may in part be due to confusion over coding. According to Bronto, "Reporting of the various shark species seems to be chaotic, and we seem to have made little progress toward achieving the goals of the International Plan of Action. "

- Catches of less 40 kg (one carton weight) per day of marketable fish bycatch, including ling are routinely discarded when observers are not present.

- Hake and ribaldo are not reported correctly. In 1989, 1990 and 1991, hake catch was reported as a percentage of estimated catch as 78%, 56% and 75% respectively. The report explains that more recently, the level of such misreporting has not been estimated and is therefore unknown. Because the two species are not easily confused, this under-reporting is thought to be intentional. Hake is an inevitable and valuable bycatch in the hoki fishery. It is also a target species in its own right. The authors explain that in order for the QMS to work, vessels likely to catch hake as hoki bycatch should ensure they own sufficient quota to cover their expected catch. However, discarding hake catches becomes an attractive if illegal alternative in circumstances where enforcement is weak, when the likely availability or market price of hake is uncertain, or when the market price of ACE threatens the profit derived from landing bycaught hake. In these circumstances the Quota Management System fails to constrain catches and maximizes neither sustainability nor utilization.

- Many minor bycatch species are not accurately reported. Although the quantity of unreported fish on each tow is likely to be small, the collective impact is significant. Citing the Fisheries Assessment Plenary Document the report states that annual reported catch of Alfonsino (BYX7) is typically around 20 tonnes, so an under-reported bycatch of five tonnes by the factory vessels in the West Coast South Island hoki fishery is comparatively large.

- Results from Operation Maxi showed that some bycatch species outside the quota management system are over-reported. This over-reporting was characteristic of vessels with on-board fish meal plants and may be motivated by species misreporting.

- The Bronto report states that eels often go unreported even by vessels with observer presence. The report poignantly states that "It is as if the eels themselves and the regulatory requirement to report them are both invisible."

Bronto Report: ECSI Hoki Fishery

During the 2010/11 fishing year, 24,769 tonnes of hoki were caught in or adjacent to the ECSI Hoki Management Areas (HMAs). This represents 67.5% of the hoki caught in the entire ECSI hoki fishery. The majority of fishing effort occurred in areas where juvenile hoki abundance is high.

Highgrading

- Young hoki (defined here as less than or equal to 66 cm overall length) comprises a high proportion of hoki catch on the ECSI and Chatham Rise. Observer data indicate that it is not possible to consistently avoid catching small hoki in the western Rise statistical areas that encapsulate the Hoki Management Areas.

- Vessels consistently fish in areas where small hoki cannot be avoided.

- Some vessels are land less small hoki than expected.

- Significant quantities of small hoki are being illegally discarded.

Fishing in Hoki Management Areas

- Many vessels fishing for hoki on the east coast of the South Island preferentially exploit rather than avoid the Hoki Management Areas. Fishing trips which systematically concentrate on these areas occur repeatedly.

  Reporting other species such as Silver warehou (SWA) to cover targeting of hoki within Hoki Management Areas (HMAs) is common. Vessels "targeting" SWA in the Canterbury Banks HMA caught nearly as much hoki as vessels explicitly targeting HOK.

- Fishing patterns indicative of area misreporting or "trucking" were evident.

- Although the industry acknowledges the importance of Hoki Management Areas to the sustainability of the fishery, violations of the Hoki Fishery Operational Procedures are frequent, unrestrained and involve vessels operated by most of New Zealand's deepwater fishing companies, including [redacted]

  - An observer trip report from 2011 for [redacted] states:

    "The vessel had a copy of the Deep Water Group Hoki Fishery Operational procedures on board. Key personnel were aware of its contents. The vessel completed 10 tows within the Mernoo and Canterbury Banks Hoki Management Areas. Whilst fishing within the HMA the vessel declared SWA as the target species. Catch composition from tows within the HMA was 85% HOK, 2% SWA and 13% other ITQ and non ITQ species. The percentage of HOK < 55cm from these tows averaged 23%. One tow caught within the HMA was 27t total green weight. The percentage of HOK< 55cm in this tow was 55%. From this tow 14.5t green weight of small and damaged HOK was processed into fish meal and 10t green weight of HOK was processed into frozen product.

    "Misreporting of target species.... In the observer's opinion the vessel was misreporting the target species to circumvent the Deep Water Group Hoki Fishery Operational procedures in order to target juvenile HOK. This practice is widespread throughout the domestic and foreign charter fleet".

  - Fisheries analyst [redacted] makes the following observations regarding [redacted] fishing vessel [redacted]

    "a preliminary examination of activity has shown that at least four tows (and very likely more) were conducted within the HOK management areas. Two days where these tows took place (were) the 6th and the 9th of December 2011. The four tows that have at this stage been identified as being inside the HOK Management areas list SWA as the target species for the activity, as the voluntary agreement prohibits vessels from directly targeting HOK in the HMA's. However on each of these tows HOK makes up between 86% and 96% of the estimated catch, and whilst WWA does appear in the estimated catch data in nominal quantities in three of these tows, SWA does not appear in the estimated catch data for any of these tows."

  - In 363 (84%) of 431 tows targeting either hoki or silver warehou, where some hoki catch was reported, the estimated catch of hoki exceeded the estimated catch of silver warehou - often by a substantial margin. According to Bronto, the common practice of reporting the target species as silver warehou provides a means of exploiting a loophole in the Hoki Fishery Operational Procedures.

- The requirements for vessels to indicate their intention to fish in the HMAs and to report both their entry and exit are frequently ignored. Many vessels fishing for hoki on the east coast of the South Island focus the majority of their fishing effort in the HMA and so are preferentially targeting rather than avoiding these areas. The authors therefore deem the effectiveness of the HMAs as a sustainability management tool questionable.

- Voluntary compliance and stakeholder administration appears to be ineffectual. Given appropriate regulation, the Ministry has the tools to monitor and if necessary enforce compliance in the Hoki Management Areas. The acknowledged risks to the sustainability of hoki fisheries due to uncontrolled fishing in these areas require effective action.

OTHER BYCATCH

Problems discussed thus far have dealt with undeclared catches and fish dumping. The following section will briefly touch on bycatch of marine mammals, seabirds and shark species, many of which are threatened with extinction. The decline of e.g., New Zealand sea lions, yellow-eyed penguins, Hector's and Maui dolphins and endangered seabirds such as albatrosses has been linked to commercial fisheries bycatch. The full extent of this bycatch in New Zealand waters is largely unknown due to a poor observer coverage.

It is not illegal to catch marine mammals and seabirds but failure to report a bycatch incident can result in a fine of up to $10,000. Since November 2015 only one prosecution involving the capture of a protected species has resulted in a penalty of 300 hours of community work.

DOLPHIN BYCATCH IN THE NEW ZEALAND HOKI TRAWL FISHERY

The section on marine mammal bycatch (starting on page 97 of the Acoura draft assessment report) omits any information on dusky dolphins. Information provided by MPI to the US National Oceanic and Atmospheric Administration indicates the incidental capture of one dusky dolphin in the east coast South Island hoki fishery in 2013. These data originate from a year with comparatively high observer coverage (26%). During most other years, observer coverage was well below 20% (5-17%), which is too low to obtain robust bycatch estimates.

The total number of dusky dolphins caught in trawling is listed as four. One in 2006 in a "Jack Mackerel" trawl. One in 2013 in a "hoki" trawl. Two in 2015 in a "barracouta" trawl. All individuals were caught in the same general area off Banks Peninsula, an area that coincides with the distribution of the endangered Hector's dolphin. Given this overlap and culture of misreporting in the fishery, it seems unlikely that Hector's dolphin deaths did not occur. Neither dusky nor Hector's dolphins have a beak, so it is even possible that Hector's dolphins are reported as duskies. The incentive to do so is considerable.

One reported dusky dolphin capture in a hoki trawl in 2013 was observed in one out of 712 observed tows. This equates to a capture rate of 0.14 dusky dolphins per tow. Multiplying the total number of tows that year (2737) with the 0.14 catch rate, provides an estimated total of 383 dusky dolphins killed in the hoki fishery in 2013. Existing data are therefore inadequate to even infer sustainable fishing with regard to dolphin and other marine mammals and bird bycatch.

Inadequate observer coverage for all except very common species

Observed bycatch for species like Hector's and dusky dolphins, for example, is either 0, 1 or 2 in any given year. This makes it impossible to estimate the total number of dolphins caught which is necessary to determine whether bycatch levels are sustainable. This is particularly important in the case of endangered species such as New Zealand sea lions and Hector's and Maui dolphins. Observer coverage needs to be substantially improved to obtain meaningful and reliable information about the sustainability of bycatch in these species. Keeping observer coverage low for most observer programmes inevitably results in poor bycatch records and estimates. As is demonstrated in the draft assessment report, this absence of this information is then used to demonstrate low levels of bycatch and inferred sustainability. However, the absence of evidence is not evidence for absence.

This relationship between observer coverage and bycatch level is well known. As observer coverage rises, so do bycatch levels. Figure 37 on page 69 in the Acoura draft assessment report illustrates this perfectly. The spike in observer coverage in 2013 corresponds with an observed dusky dolphin capture and the subsequent reduction in observer coverage after 2013.

In the Cook Strait, which separates New Zealand's North and South Islands, hoki nets risk killing Hector's and Maui dolphins. The latter have suffered a precipitous decline of more than 98 percent to some 50 individuals (Cooke et al. 2018) as a result of fishing-related mortality over the past 50 years (Currey 2012, Davies 2008). Of four common dolphins reported caught in hoki nets between 2013 and 2016 (1 in 2013, 1 in 2014 and 2 in 2016), three were caught in the Cook Strait. This area is also a high-risk area for Hector's & Maui dolphins. The maps shown on page 106 of the draft assessment report illustrate that hoki trawlers operate very close to shore in the north-eastern South Island Cook Strait and the south-eastern North Island, north of Banks Peninsula, Kaikoura and up the east coast of the North Island. They also fish very close to shore off the middle of the west coast of the South Island. Trawling on the east coast of the South Island is prohibited only to two nautical miles offshore. On the west coast of the North Island trawling is permitted right up to the coast without any geographical restrictions. Besides coinciding with their habitat of many other endangered marine mammals and birds, there is therefore a large areal overlap between the hoki and ling fisheries with the habitat of endangered Hector's and, in the Cook strait, the critically endangered Maui dolphins. This video of a hoki trawler operating in the Cook Strait in the very close to dusky dolphins, pinnipeds as well as scores of seabirds poignantly illustrates the risks (https://www.youtube.com/watch?v=6wGqLQndCH8&t=11s).

The Draft report claims „The size of the basking shark population in New Zealand waters is not known… Depending on the assumptions made regarding the relationship between effective population size and actual population size, the global population of basking sharks may be estimated at between about 18,200 and 82,000 individual basking sharks (DOC undated)." This is an incorrect citation of the referenced literature which states: "A genetic study has estimated the global effective population of size (an estimate of the number of reproductive individuals) of basking sharks at only 8,200. Research across a wide range of species suggests a median ratio of effective population size to actual (or census) population size of 0.1, this gives an estimate of global population size of about 82,000. However, recent research suggests that a ratio of 0.45 is more appropriate for large sharks, meaning the global population could be little more than 18,200 basking sharks."

Basking sharks are slow to reach late sexual maturity, have a long gestation and give birth to only a few young. Therefore, as noted in the referenced literature, the lower ratio needs to be applied when estimating population size. Hoelzel et al. (2006) examined the mitochondrial DNA of basking sharks and concluded that the estimate for the effective global population of basking sharks was very low with a population size of 8,200 individuals. A population numbering some 18,200 animals is also much more realistic in view of the decreased observations of basking sharks reported elsewhere and the lag of huge aggregations as had been reported before the 2000s.

The animals are a global migratory species, found in 47 range states across the world's temperate oceans. At such a small global population this species is at a heightened risk of extinction, and even the killing of a few animals per year by this fishery in NZ may have a negative impact on the global population of basking sharks or hinder their recovery.

In New Zealand incidental mortality of basking sharks occurs in gill net fisheries for rig and school shark, and in middle-depth and deepwater trawl fisheries for barracuda, squid and hoki. Reported sightings of basking sharks around New Zealand have been infrequent since the mid-1990s and few large aggregations have been seen over the same period. A summer aerial survey conducted around Banks Peninsula in 2009/10 and 2010/11 failed to find any basking sharks, whereas a similar survey conducted from 1990 to 1997 never went two years in a row without sighting basking sharks.

As with other species, the true number of basking sharks killed in the hoki fishery is highly uncertain due to low observer coverage (less than 20% over the last 10 years (see figure 42 of PCDR on page 98).

Low observer coverage has been shown to lead to significant underestimates of bycatch as a result of underreporting (e.g., Burns & Kerr 2016). The true extent of incidental take for marine mammals, seabirds, sharks and indeed fish species in this fishery is therefore likely to be much higher. A reliable assessment of the sustainability of New Zealand's hoki fishery will prove impossible until this lack of information has been addressed.

PI 2.3.1 - 2.3.3 ETP species outcome, ETP species management and ETP species information do not warrant the awarded scoring of 80 for basking sharks and other marine mammals listed in the report. They should be reduced at least to 60 and require a condition aimed at improved monitoring and recording of bycatch rate and the impact on the population of these vulnerable and decreasing species.

Performance indicator 2.3.3, page 255
Reviewer: The information level on ETP species is generally no more than just adequate to support a strategy of minimising negative impacts, although it is better for marine mammals and seabirds. I support the scoring and justification provided.

We note that there are no government policies or a strategy on how the environmental effects of fishing on the marine environment are to be managed or for minimizing the negative impact on marine mammals in New Zealand. This is evidence by declining populations of marine mammals, including Hector's and Maui dolphins (e.g., Cook et al. 2018). Bycatch of some 200 fur seals per annum (MPI communication to NOAA 2017), for example appears to be simply accepted as collateral.

Performance indicator 2.4.1, page 255
Reviewer : With any bottom trawl fishery, there is potential for seabed contact and hence impact on habitat function, but in New Zealand, such trawling is already banned in about one-third of potential seabed areas."

Bottom-trawling is the most destructive fishing technique undertaken in the world's oceans. The reviewer's assertion fails to recognize that some of the areas covered by the bottom trawl exclusion zones across the NZ EEZ are already fished out. Other so-called Benthic Protected Areas also tend to coincide with areas that have never been subject to bottom trawling because they are too deep or the seabed is simply too rough (rocks, corals etc.). Furthermore, many sensitive and vulnerable areas are not included in the bottom trawl exclusion zones. The statement also fails to recognise that partial areal protection does not equate to ecosystem protection. Scientists have shown that some of the species affected by this fishing method are extremely slow growing and can take hundreds or even thousands of years to recover from the damage.

Performance indicator 2.4.1, page 255
Reviewer: Evidence is also provided that the hoki fishery only targets about 10% of the possible seabed (hake and ling much less), so the national strategy and operational activities already provide a lot of protection to the habitat. I therefore beilieve that the scoring of and justification for each SI as given is correct, with only hoki (because of the extent of the fishery) not definitely scoring a full SG100.

Trawling for hoki takes is limited to 10% of New Zealand's EEZ because that is the area where hoki occurs. The remainder of the seabed is trawled for other species, including orange roughy, red cod, flatfish, etc, etc.

PI 1.2.3. Page 166
"The draft report states that "Electronic reporting and video monitoring on small vessels (<28 m) will be gradually introduced over an extended period."

Last year, the previous NZ government had announced plans to install video cameras on fishing vessels, stating this would protect the sustainability of fish stocks and act as a deterrent against illegal activity, such as fish dumping. MPI Fisheries spokesman Gerry Brownlee had said that the rollout of cameras was needed to deal with well-publicised problems in the sector. However, earlier this year, news emerged that these plans may be abandoned. There are therefore no current plans to install video monitoring across the NZ fleet, including hoki vessels to hep address illegal fishing practices.

CONTROL AND CONFLICT OF INTEREST

The company FishServe has been under contract with the Ministry for Primary Industries for 20 years. It provides quota management system data, collects revenue, issues permits, manages public registers, and responds to official information requests.

FishServe's website states "FishServe is the trading name of a privately owned company called Commercial Fisheries Services (CFS). CFS is a wholly owned subsidiary of Seafood New Zealand (SNZ). FishServe provides administrative services to the New Zealand commercial fishing industry to support the 1996 Fisheries Act."

FishServe contracted and devolved services
Allocation of new species into the QMS
Collection of Revenue on behalf of the Crown
Fishing Permit issue
Management of Permit and Vessel Registers
Management of ACE & Quota Share Registers
Processing of Fishing Returns
Registration of ACE Transfers
Registration of Caveats & Mortgages over Quota Shares
Registration of Quota Share Transfers
Vessel Registrations

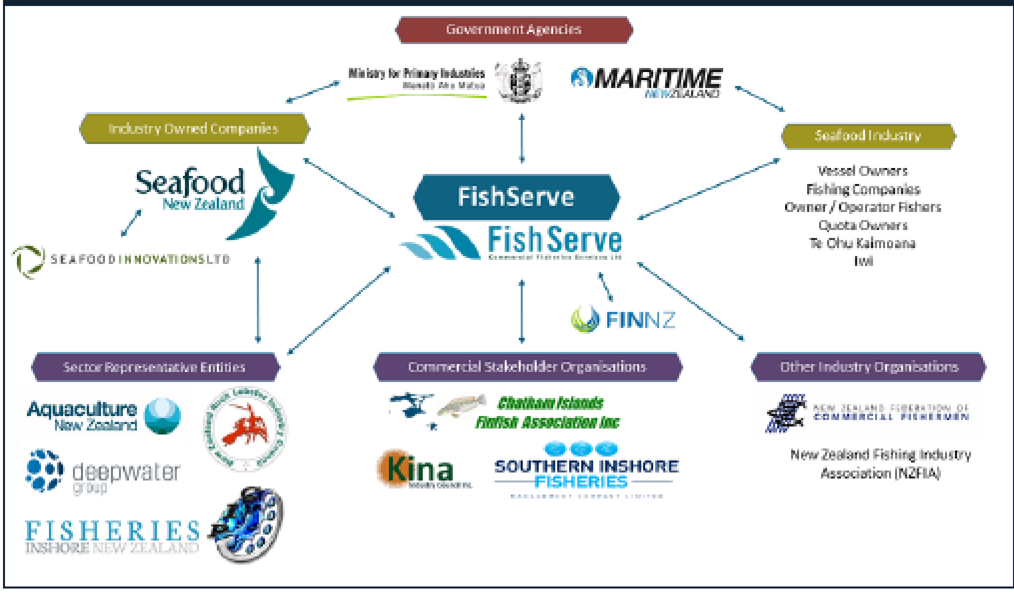
Source: https://www.fishserve.co.nz/About

The website states that "Contracted services are services that FishServe has a contract with the Ministry for Primary Industries to deliver. The Crown maintains responsibility for these services, but does not need to deliver the services themselves. Devolved services are services that the Crown has determined it does not need to be responsible for. The Minister has the authority to approve an approved service delivery organisation (ASDO) to deliver these services. FishServe has been appointed as the ASDO and is accountable for these services."

FishServe is linked with Trident, Seafood New Zealand, the Deepwater Group, Fisheries Inshore New Zealand and the New Zealand Federation of Commercial Fishermen and others.

Our Relationships

FishServe's relationship with the commercial fishing industry is illustrated in the following diagram:



Seafood New Zealand	**Seafood New Zealand works closely with the seafood industry primarily through five sector-specific entities: Aquaculture New Zealand, Deepwater Group, Fisheries Inshore NZ, NZ Rock Lobster Industry Council, and Paua Industry Council. It has a focus on key strategic initiatives and promotes sustainable, nutritious and responsibly-caught seafood.** **FishServe is a wholly owned subsidiary of Seafood New Zealand**
Seafood Innovations Ltd	**Seafood Innovations Ltd (SIL) is a subsidiary of Seafood New Zealand. SIL was established to encourage and provide funding support for research and development within the seafood industry, with the aim of adding value to the sector.**
FishServe Innovations New Zealand	**FishServe Innovations New Zealand (FINNZ), established in 2003, is an IT services company owned by FishServe. FINNZ provides a blend of business analysis, software development and business-process-outsourcing services to**

	organisations operating in the public sector For more information about FINNZ please click here.
Ministry for Primary Industries	The Ministry for Primary Industries (MPI) is tasked with maximising export opportunities for New Zealand's primary industries, improving sector productivity, increasing sustainability of resources, and protecting New Zealand from biological risk. FishServe provides both contracted and devolved services from MPI to the fishing industry.
Maritime NZ	Maritime NZ is the national regulatory, compliance and response agency for the safety, security and environmental protection of coastal and inland waterways. They are governed by a five-member board appointed by the Minister of Transport under the Maritime Transport Act 1994. FishServe uses Maritime NZ services to confirm MSA numbers for vessel registrations and shares information with Maritime NZ via the commercial fishing vessel register.
Seafood Industry	FishServe provides administrative services to the New Zealand commercial fishing industry. FishServe clients are the entities involved in the industry including vessel owners, fishing companies, owner/operator fishers, Quota owners, Te Ohu Kaimoana and Iwi.
Stakeholder Representative Entities (SREs)	Stakeholder Representative Entities are sector based organisations that represent and manage the specific affairs of a particular species. There are five main sector organisations: • Aquaculture New Zealand • Deepwater Group Limited • NZ Rock Lobster Industry Council Ltd • Paua Industry Council Ltd • Fisheries Inshore New Zealand FishServe provides company administrative services to SREs along with some value-add services such as ACE shelving, sub-area reporting and data collection.
Commercial Stakeholder Organisations (CSOs)	Commercial Stakeholder Organisations (CSOs) are companies or associations owned by rights-holders that represent the interests of those rights-holders. In effect, this means CSOs can represent and manage the specific affairs of a particular fishery, a geographic area, a specific fish stock or a group of stocks. FishServe provides company administrative services to CSOs.

Other Industry Organisations	**There are a number of other industry organisations that represent various fishing entities, such as;** • **New Zealand Federation of Commercial Fishermen** • **New Zealand Fishing Industry Association** **FishServe provides company administrative services to these other industry organisations.**

Source: https://www.fishserve.co.nz/About

This means that, in order to prosecute fishing companies for legal breaches, the government regulator, MPI, has to rely on data collected and provided by a company owned by the fishing companies themselves – clear conflict of interest.

PI 1.2.3. Page 166
"The draft report states that "Electronic reporting and video monitoring on small vessels (<28 m) will be gradually introduced over an extended period."
Last year, the previous NZ government had announced plans to install video cameras on fishing vessels, saying it would protect the sustainability of fish stocks and act as a deterrent against illegal activity, like fish dumping. MPI Fisheries spokesman Gerry Brownlee had said that the rollout of cameras was needed to deal with well-publicised problems in the sector. However, earlier this year, news emerged that these plans may be abandoned as a result of industry opposition. There are therefore no current plans to install video monitoring across the NZ fleet, including hoki vessels to address these problems.

The fishing industry subsequently petitioned the government to prevent public access to videos and images of fish being discarded and seabirds and marine mammals being caught by fishing boats. Amongst the reasons cited were commercial sensitivity, privacy and a reputational risk to the industry, MPI and New Zealand's clean, green image. In a letter to the Ministry for Primary Industries (MPI) the Deepwater Group, Fisheries Inshore New Zealand, the Paua Industry Council, Seafood New Zealand and the New Zealand Rock Lobster Industry Council on July 4, 2017 asked the government to change the law so that the Official Information Act could not be used by to make such information publicly available. One of the five industry heads who signed the letter said there needed to be an exemption so the footage was never made public. "Ensuring New Zealand had a good reputation for ethically caught fish was up to the industry, not the government," he said.

In his response of 15th September 2017, the Minster's stated that "At this stage there is nothing to suggest that the risks associated with privacy or commercial sensitivity arising from GPR & ER are significantly different from those already being managed under the existing MPI data management processes. An initial consideration of the potential harms of releasing of GPR & ER data has not identified issues that cannot be addressed under the existing framework of the Official Information Act (OIA) and MPI's processes for handling OIA requests"

When video monitoring was made compulsory in Australia, reported bycatch increased seven-fold. As of 26th May 2018, no formal decision on the matter has been communicated.

REVIEWER CONFLICT OF INTEREST

We would also like highlight a potential reviewer bias and lack of independence among at least one member of the Expert Team. Page 18 of the draft assessment report states that Jo Akroyd had been employed by the New Zealand Ministry of Fisheries (now MPI) for 20 years. During this time, she "was awarded a Commemoration Medal in 1990 in recognition of her pioneering work in establishing New Zealand's fisheries quota management system," QMS. It stands to reason that Ms Akroyd is therefore more invested in a positive evaluation of the New Zealand fishery under the QMS than an independent reviewer.

CONCLUSION

The New Zealand's hoki fishery is a far cry from being the posterchild for sustainable fisheries management it is portrait as. The issues raised in our comments and elsewhere indicate significant and longstanding illegal and unsustainable activities in the New Zealand hoki fishery.

To quote Metuzals et al. (2006), ''If misreporting is ignored, and catch data are worthless, what you have is an uncontrolled fishery.'' The current system of fisheries management in New Zealand provides powerful incentives to misreport catches. Revising the QMS to remove these incentives and end the financial rewards of misreporting is a priority. Until this happens and observer coverage is raised to facilitate robust bycatch estimates, the current unsatisfactory state of affairs will continue.

It is of grave concern that the issues raised by Bremner 2009, Simmons et al. 2016, Slooten et al. 2017, MPI's compliance reports (Achilles, Hippocamp, Overdue and Bronto), as well as the recent independent review of MPI's conduct by Queen's Counsel Michael Heron's have been ignored or dismissed by the MSC assessors and so have not informed the certification process. In the case of the MSC hoki draft assessment report, failure to do so clearly undermines the robustness and credibility of its conclusions and the validity of the MSC hoki certification itself.

It is particularly damaging to the credibility and reputation of the New Zealand hoki fishery and by proxy, the MSC itself, that clear evidence of significant wrong-doing has been kept hidden for many years (e.g., Bronto report). Fish consumers around the world have been deliberately misled about the environmental credentials of the hoki on their plate, while being fed an illusion of beautiful fish harvested sustainably in a natural paradise. The bitter reality behind this curtain of duplicity is therefore all the harder to swallow.

The picture of fisheries and hoki management in New Zealand that emerges from the various strands of evidence presented here and elsewhere is less than complimentary. However, besides providing an uncomfortable reality check, it also has to potential to trigger a much-needed transformation towards genuine sustainability. Maintaining the defunct and destructive *status quo* does a disservice to New Zealand's marine environment, its citizens and future generations, and ultimately the fishing industry itself. It is our sincere hope that rather than reward lip service, the MSC will embrace its mandate and act as a catalyst for change.

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CAB Response

Performance Indicator	Nature of Comment Indicate relevant code(s) from list above.	Justification Please support your comment by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	CAB Response
PI 1.1.1 - Stock status	1	Several reports provide information of massive underreporting and illegal catch in the Hoki fishery. Without reliable data, projections and indications in regard to the stock status are meaningless. (See attachment) The scoring should therefore be significantly reduced.	Stock status is based upon assessments which include the hoki's catch history. The stock assessment teams consider whether or not adjustments in the catch time series need to be undertaken to address issues with misreporting. This has not been deemed necessary in recent assessments, a decision supported by the MPI compliance risk profiling which has indicated that catch misreporting is not a significant issue. Recent analyses undertaken by NIWA which conducted stock assessments with alternative catch histories based upon Simmons et al (2016) determined that there was little impact of these on the determination of stock status. No change in the scoring is deemed necessary.
PI 1.2.1 – Harvest strategy	1	There is evidence of significant misreporting with regard to fish dumping, high-grading, under-reporting of catches and non-reporting of illegal catches. Without functional monitoring a harvest strategy is without effect. (See attachment) The scoring should therefore be significantly reduced.	Through MPI's compliance risk profiling, there is on-going monitoring of potential catch misreporting, which is used in TACC setting to determine the allocation for 'other sources of mortality'. These risk profiles have indicated that catch misreporting is not a serious issue in the hoki fishery. For instance, the allowance for 'other sources of fishing mortality' in 2011 was set at 1,200 t, while the TACC was set at 120,000 t. The risk profile estimated that up to 3,500 t of hoki might be at risk of being unreported. This estimate was not intended to quantify the actual amount of under-reporting, rather it identifies potential risks. Further, it does not

			account for any over-reported catch or any subsequent catch redeclarations. Both hoki stock sizes are estimated to have been well above their management target range since 2010. The quantities of hoki assessed to potentially be 'at risk' are considered too small to materially affect the sustainability of either hoki stock. Thus, there is a mechanism in place to evaluate the potential risks of catch misreporting which are taken into account in the harvest strategy. No change in the scoring is deemed necessary.
PI 1.2.2 – Harvest control rules and tools	**1**	**According to MPI's Bronto Report and other sources the harvest control rules and tools need to be reformed drastically to be effective. (See attachment)** **The scoring should therefore be significantly reduced.**	**Through MPI's compliance risk profiling, there is on-going monitoring of potential catch misreporting, which is used in TACC setting to determine the allocation for 'other sources of mortality'. These risk profiles have indicated that catch misreporting is not a serious issue in the hoki fishery. For instance, the allowance for 'other sources of fishing mortality' in 2011 was set at 1,200 t, while the TACC was set at 120,000 t. The risk profile estimated that up to 3,500 t of hoki might be at risk of being unreported. This estimate was not intended to quantify the actual amount of under-reporting, rather it identifies potential risks. Further, it does not account for any over-reported catch or any subsequent catch redeclarations. Both hoki stock sizes are estimated to have been well above their management target range since 2010. The quantities of hoki assessed to potentially be 'at risk' are considered too small to materially affect the sustainability of either hoki stock. Thus, there is a mechanism in place to evaluate the potential risks of catch misreporting which are taken into account in the harvest strategy and thus harvest control rule. No change in the scoring is deemed necessary.**

PI 1.2.3 – Information and monitoring, page 166	**1**	**"The draft report states that "Electronic reporting and video monitoring on small vessels (<28 m) will be gradually introduced over an extended period." Last year, the previous NZ government had announced plans to install video cameras on fishing vessels, saying it would protect the sustainability of fish stocks and act as a deterrent against illegal activity, like fish dumping. MPI Fisheries spokesman Gerry Brownlee had said that the rollout of cameras was needed to deal with well-publicised problems in the sector. However, earlier this year, news emerged that these plans may be abandoned as a result of industry opposition. There are therefore no current plans to install video monitoring across the NZ fleet, including hoki vessels to address these problems. The fishing industry subsequently petitioned the government to prevent public access to videos and images of fish being discarded and seabirds and marine mammals being caught by fishing boats. Amongst the reasons cited were commercial sensitivity, privacy and a reputational risk to the industry, MPI and New Zealand's clean, green image. In a letter to the Ministry for Primary Industries (MPI) the Deepwater Group, Fisheries Inshore New Zealand, the Paua Industry Council, Seafood New Zealand and the New Zealand Rock Lobster Industry Council on July 4, 2017 asked the government to change the law so that the Official Information Act could not be used by to make such information publicly available. One of the five industry heads who signed the letter said there needed to be an exemption so the footage was never made public. "Ensuring New Zealand had a good reputation for ethically caught fish was up to the industry, not the government," he said.**	**The initiative to introduce video monitoring into the hoki fishery is underway, with current consideration being given to the requirements of its effective implementation. This will be an additional source of compliance monitoring which will enhance current catch reporting. Notwithstanding this, based upon on-going MPI compliance risk profiling, catch misreporting is not considered a significant issue. Stock assessment teams consider whether or not adjustments in the catch time series need to be undertaken to address issues with misreporting but this has not been deemed necessary in recent assessments. Recent analyses undertaken by NIWA which conducted stock assessments with alternative catch histories based upon Simmons et al (2016) determined that there was little impact of these on the determination of stock status. No change in the scoring is deemed necessary.**

		In his response of 15th September 2017, the Minster's stated that "At this stage there is nothing to suggest that the risks associated with privacy or commercial sensitivity arising from GPR & ER are significantly different from those already being managed under the existing MPI data management processes. An initial consideration of the potential harms of releasing of GPR & ER data has not identified issues that cannot be addressed under the existing framework of the Official Information Act (OIA) and MPI's processes for handling OIA requests" **When video monitoring was made compulsory in Australia, reported bycatch increased seven-fold. As of 26th May 2018, no formal decision on the matter has been communicated.** **(See: Attachment, page 1 ff.)** **The scoring should therefore be significantly reduced.**	
PI 1.2.4 – Assessment of stock status	**1**	**Fundamental assumptions about the status of the stock are likely to be based on incorrect information as a result of misreported catch. (See attachment)** **The scoring should therefore be significantly reduced.**	**Stock assessment teams consider whether or not adjustments in the catch time series need to be undertaken to address issues with misreporting. This has not been deemed necessary in recent assessments, a decision supported by the findings of MPI compliance risk profiling which has indicated that catch misreporting is not a significant issue. Further, recent analyses undertaken by NIWA which conducted stock assessments with alternative catch histories based upon Simmons et al (2016) determined that there was little impact of these on the determination of stock status. No change in the scoring is deemed necessary**
PI 2.2.1 – Bycatch species outcome	**1,2**	**Illegal discarding (returning of fish to the sea) is of particular concern in the hoki fishery. Hoki fishery bycatch species are especially vulnerable to this type of offending. Fishers may also deliberately discard smaller, damaged or less valuable**	**As indicated in responses to comments against P1 and P3, recent MPI compliance risk profiling has indicated that catch misreporting is not a significant issue in the hoki, hake and ling trawl fishery. All deepwater activities fishing activities are**

		fish of a particular species to maximise their economic return. (See attachment) The scoring should therefore be significantly reduced.	**closely monitored and audited. Where non-conforming behaviours are identified, remedial actions are undertaken including prosecution.** **We are not aware of any particular reason why '*hoki fishery bycatch species are especially vulnerable to illegal discarding*'. We note that MPI compliance operates a Voluntary, Assisted, Directed and Enforced (VADE) compliance operating model; this was described in the assessment report. The Assessment Team has made no changes to scoring.**
PI 2.2.2 – Bycatch species management	**1,2**	**Illegal discarding (returning of fish to the sea) is of particular concern in the hoki fishery. Hoki fishery bycatch species are especially vulnerable to this type of offending. Fishers may also deliberately discard smaller, damaged or less valuable fish of a particular species to maximise their economic return. (See Attachment) The scoring should therefore be significantly reduced.**	**This is the same comment as for PI 2.2.1 Bycatch species outcome, above, and our response is the same.**
PI 2.3.1 – ETP species outcome	**1,2**	**The scoring for this indicator will have to be reduced to at least 60 requiring a condition aimed at improved monitoring and recording of bycatch rate and the impact on multiple vulnerable species.** **Observer coverage is universally inadequate, including for Hector's and Maui dolphins, basking sharks, fur seals, sea birds and other species. (See Attachment) The scoring should therefore be significantly reduced.**	**We have commented in detail against the P2 narrative comments provided by NABU, below. Although there is no guidance in v1.3 of the MSC CR, v2.0 of the MSC CR (MSC 2014) states in GSA3.6.3:** **"There is not a single optimum level of observer coverage that covers all fisheries and species caught/killed. Generally, for species that are highly variable, clumped in distribution and/or relatively rare, higher levels of observer coverage are needed (Wolfaardt, 2011). For more normal species, observer coverage rates above 20% provide only diminishing returns and small incremental improvements in the CV of catch estimates (Lawson, 2006)."**

			Observer coverage in the hoki, hake and ling trawl fishery has averaged 24.5% for the last 10 years, and 30.3% for the last five years (see Table 58, below). The Assessment Team does not agree that this level of coverage is 'universally inadequate', and no change to scoring has been undertaken.
PI 2.3.2 Alternate – ETP species management	**1, 2**	**The scoring for this indicator will have to be reduced to at least 60 requiring a condition aimed at improved monitoring and recording of bycatch rate and the impact on multiple vulnerable species.** **Observer coverage is universally inadequate, including for Hector's and Maui dolphins, basking sharks, fur seals, sea birds and other species) (See attachment)** **The scoring should therefore be significantly reduced.**	**This is the same comment as for PI 2.3.1 ETP, above, and our response is the same.**
PI 2.3.3 – ETP species information	**1, 2**	**The scoring for this indicator will have to be reduced to at least 60 requiring a condition aimed at improved monitoring and recording of bycatch rate and the impact on multiple vulnerable species.** **Observer coverage is universally inadequate, including for Hector's and Maui dolphins, basking sharks, fur seals, sea birds and other species (See Attachment) The scoring should therefore be significantly reduced.**	**This is the same comment as for PI 2.3.1 ETP, above, and our response is the same.**
PI 2.3.3 – ETP species information, page 255	**2**	**Reviewer: "The information level on ETP species is generally no more than just adequate to support a strategy of minimising negative impacts, although it is better for marine mammals and seabirds. I support the scoring and justification provided."** **We note that there is no strategy for minimizing negative impact on marine**	**We are in no way responsible for comments provided by the Peer Reviewer, who was completely independent of the CAB and Assessment Team. The Assessment Team provided a rationale and scoring for PI 2.3.3, and in this case the Peer Reviewer's comment simply indicates agreement with the Team's position.**

		mammals in New Zealand. This is evidence by declining populations of marine mammals, including Hector's and Maui dolphins (e.g., Cook et al. 2018). Bycatch of some 200 fur seals per annum (MPI 2017), for example appears to be simply accepted as collateral. (See attachment) The scoring should therefore be significantly reduced.	We note that the MSC requirements for Principle 2 are specific to the fishery under assessment, and in this regard we are satisfied that there is a strategy for seabirds and marine mammals in place in the hoki, hake and ling fishery. No change to scoring has been made.
PI 2.4.1 – Habitat ɔutcome, page 255	2	Reviewer: "With any bottom trawl fishery, here is potential for seabed contact and hence mpact on habitat function, but in New Zealand, ɩuch trawling is already banned in about one-hird of potential seabed areas." Bottom-trawling is the most destructive ishing technique undertaken in the world's ɔceans. This assertion fails to take account of hat some of the areas covered by the bottom rawl exclusion zones across the NZ EEZ are ılready fished out. These so-called Benthic ᑭrotected Areas also tend to coincide with ıreas that have never been subject to bottom rawling because they are too deep or the ɩeabed is simply too rough (rocks, corals etc.) ᖴurthermore, many sensitive and vulnerable ıreas are not included in the bottom trawl ɛxclusion zones. The statement also fails to ecognise that partial areal protection does not ɛquate to ecosystem protection. Scientists ıave shown that some of the species affected ıre extremely slow growing and would take ıundreds or even thousands of years to ecover from the damage. (See attachment) The scoring should therefore be significantly educed.	We are in no way responsible for comments provided by the Peer Reviewer, who was completely independent of the CAB and Assessment Team. The Assessment Team provided a rationale and scoring for PI 2.4.1, and in this case the Peer Reviewer's comment simply indicates agreement with the Team's position. We note the characterisation of bottom-trawling as a destructive technique, but have evidenced the approach taken in New Zealand to manage impacts in the scoring rationale. No change to scoring has been made.

PI 2.4.1 – Habitat outcome, page 255	**2**	**Reviewer: "Evidence is also provided that the hoki fishery only targets about 10% of the possible seabed (hake and ling much less), so the national strategy and operational activities already provide a lot of protection to the habitat. I therefore believe that the scoring of and justification for each SI as given is correct, with only hoki (because of the extent of the fishery) not definitely scoring a full SG100."** **Trawling for hoki takes is limited to 10% of New Zealand's EEZ because that is the area where hoki occurs. The remainder of the seabed is trawled for other species, including orange roughy, red cod, flatfish, etc, etc. The scoring should therefore be significantly reduced.**	**We are in no way responsible for comments provided by the Peer Reviewer, who was completely independent of the CAB and Assessment Team. The Assessment Team provided a rationale and scoring for PI 2.4.1, and in this case the Peer Reviewer's comment simply indicates agreement with the Team's position.** **We note that the MSC requirements for Principle 2 are specific to the fishery under assessment, and we are therefore required to not consider other fisheries.** **No change to scoring has been made.**
PI 3.1.3 – Long Term Objectives	**1**	**The mentioned reports raise issues in regard to management policies in place. The lack information, due to misreporting and low observer coverage is not consistent with MSC principles and criteria. (See Attachment) The scoring should therefore be significantly reduced.**	**This is about clear long-term objectives to guide decision making that are consistent with MSC Fisheries standard and incorporates the precautionary approach.** **Long-term fishery and environmental objectives are included within both New Zealand fisheries and environmental legislation and these guide decision-making.** **Fisheries 2030 sets the strategic direction for the management and use of New Zealand's fisheries resources. One of the principles guiding Fisheries 2030 is the "Precautionary approach: particular care will be taken to ensure environmental sustainability where information is uncertain unreliable or inadequate."**

			The National Fisheries Plan for Deepwater and Middle-depth Fisheries (the National Deepwater Plan) establishes the 5-year enabling framework for the management of New Zealand's deepwater fisheries. It is further divided into two parts. Part 1A details the overall strategic direction for New Zealand's deepwater fisheries. It must be considered each time the Minister makes decisions or recommendations concerning regulation or control of fishing or any sustainability measures relating to the stocks managed through this plan. Part 1B of the National Deepwater Plan comprises the fishery-specific chapters of the National Deepwater Plan that provides greater detail on how deepwater fisheries will be managed at the fishery level, in line with the management objectives. The assessment team considers that the SG 100 is met
PI 3.1.4 – Incentives for Sustainable Fishing	**1**	**Bremner et al. (2009) found clear evidence of violations of these legal requirements in the New Zealand's hoki fishery. They reported on unreported fish dumping (discards), high-grading and other forms of mis-reporting and underreporting of catches in the hoki fishery and found that "the catches reported by unobserved vessels contain large elements of fiction" (Bremner et al. 2009).** **According to the mentioned reports the management system does not provide enough economic and social incentives for sustainable fishing. (See attachment)**	**There has been many improvements in Fisheries Compliance in the 9 years since the Bremner report. These have been discussed above.** **The QMS and the use of ITQs provides stability and security for quota owners and hence incentives for sustainable utilisation (Fisheries Act). The management system also includes customary provisions (e.g., Maori Fisheries Act 2004 and Treaty of Waitangi (Fisheries Claims) Settlement Act 1992).** **There are no subsidies in the New Zealand deepwater fishery. The management system has explicit mechanisms to facilitate regular review of management policy or procedures**

		The scoring should therefore be significantly reduced.	(Fisheries Act). Under Section 13 of the Fisheries Act 1996, the Minister of Fisheries is required to take social, cultural and economic factors into account as well as the status of the stocks and all environmental considerations when setting a TAC for a fishery. There are regular reviews of the QMS and MPI management policy and procedures to ensure they contribute to sustainable fishing. Other strategies that contribute to sustainable fishing are also regularly reviewed, e.g. deemed values and the harvest strategy. The assessment team considers the original score remains.
PI 3.2.2 – Decision Making Processes	1	The information of the mentioned reports was accessible for decision makers for years. The management system's decision-making processes did not result in any measures or strategies to overcome misreporting, discarding, highgrading, etc. (See attachment) The scoring should therefore be significantly reduced.	As described above the management decision making processes have resulted in many actions and changes to overcome any misreporting and high grading The Fisheries Act (specifically Sections 10, 11, and 12) clearly lays out the requirements for decision-making, and requires that all decisions be based on the best available information (Section 10). The assessment team considers the original score is appropriate.
PI 3.2.3 – Compliance and Enforcement	1,2	The information presented in our comment, including a series of MPI compliance reports highlight severe problems in this regard. A high rating of around 60 is far more realistic, taking into consideration the level of misinformation and misreporting. (See attachment) The scoring should therefore be significantly reduced.	As part of NZ fisheries management MPI Compliance regularly undertakes risk profiles to assess the potential for misreporting and other inaccuracies and uses the findings to inform policy changes. Industry works with MPI to support full compliance. All deepwater fishing activities are closely monitored and audited. Where non-conforming behaviours are identified remedial actions are undertaken including prosecutions and convictions. In NZ MPI Compliance operate a Voluntary, Assisted, Directed and Enforced (VADE) compliance operating model. This was described in the assessment report. This

			mode provides a stepped sequence of actions to ensure compliance. The assessment team considers the score assigned is still met.
PI 3.2.5 - Management Performance Evaluation	**1,2**	**Considering the information provided in our comments, the effectiveness of the management system must be considered unreliable. (See attachment) The scoring should therefore be significantly reduced.**	**This PI is to ensure that there are mechanisms in place to evaluate the management system (SIa) and that the management system is subject to internal and external reviews(SIb). The Annual Review Report for Deepwater Fisheries 2015/2016 (MPI 2017e) provides a record of the annual reviews of the fisheries, including for hoki, hake ling and southern blue whiting. The annual review report evaluates the development and implementation of the Fisheries Plan framework, i.e. National Deepwater Plan with fishery specific chapters and Annual Operational Plan for the fisheries. This review encompasses all of the management system. The annual review report evaluates the development and implementation of the Fisheries Plan framework, i.e. National Deepwater Plan with fishery specific chapters and Annual Operational Plan for the fisheries. This review encompasses all of the management system. The assessment team considers the original scores assigned are appropriate.**

Illegal and unsustainable fishing practices in the NZ hoki fishery and **MPI Compliance reports and independent review**

NABU have carried out a review and made comment on a number of reports notably
- Bremner et al, 2009 – which concerns hoki prior to 2009.
- Simmons et al., 2016 – covering all New Zealand fisheries 1950-2010.

MPI compliance reports
- Achilles Operation, 2012 concerning set net vessels
- Hippocamp Operation, 2011 concerning inshore vessels
- Overdue Operation, 2003 concerning hoki
- Bronto, 2011 concerning WCSI hoki risk profile and

an independent report
- Heron independent review of Achilles (inshore)

Of particular concern are
- illegal and unsustainable fishing practices
- misreporting
- dumping / high grading
- bycatch issues
- MPI approach to compliance and
- lack of prosecutions

Several of these reports concern fisheries other than those being assessed (hoki, hake ling and southern blue whiting) and most are several years old.

These reports were also reviewed by the assessors and taken into account. What is most important is how the fishery is operating today and if compliance issues were identified in the past, there is evidence of appropriate measures working to minimize or eliminate the issues.

In 2010, the then Ministry of Fisheries (now MPI or Fisheries New Zealand) began a new approach to monitoring compliance in the deep-water and middle-depth fisheries. The approach was based on proactive profiling of specific fisheries rather than the reactive investigation-driven approach of the past.

The four components of profiling comprise i) an initial desktop exercise to compile available data, ii) a detailed data and information collection programme primarily involving observers and fishery officers, iii) an analytical phase which analyses all available data to inform the report and iv) an outcomes phase using the VADE model.[7]

The hoki fisheries on the West Coast of the South Island and Chatham Rise were the first to be profiled. The main focus of data collection related to issues that could impact the accuracy of reported greenweight. The Risk Profile operations assess the likelihood and consequence of potentially non-compliant behaviours. Compliance Risk Profiles in themselves are non-evidential. They inform MPI and industry of potential risks and cue information needs to inform follow-up compliance investigations (e.g. by Fisheries Officers or at-sea observers). Risk Profiles can also identify issues that instead of enforcement action see changes to the policy settings (e.g. changes to the conversion factor or to product specifications/prescribed cuts).

The 2011 hoki risk profile identified compliance risks indicating potential issues regarding catch reporting, incorrect reporting of carton weights, incorrect application of conversion

[7] VADE means voluntary, assisted, directed, enforced

factors into fish meal and processed products, and incorrect reporting of target and bycatch species; 44 recommendations were made. MPI Compliance has estimated that, if the purported non-compliance was systemic across the fishery, then potentially around 3,500 tonnes (3% of the TACC) of hoki might have been unreported. This estimate is indicative only and does not account for potential over-reported catches or subsequent redeclaration of catches.

MPI have reported on the recommendations and subsequent actions. This is available online on MPIs website.

The 44 recommendations were categorized into five groups
1. On-board practices (14)
2. Suggestions for changes to reporting and recordkeeping obligations (6)
3. Fishing practices (3)
4. Fisheries management processes (13)
5. Compliance processes (8)

1. Recommendations relating to on-board practices (14)
This group of recommendations related to a series of fleet-wide, on-board practices, most of which have the ability to impact the accuracy of greenweight reporting of all species, not just hoki. For this reason, this group of recommendations has been the subject of ongoing follow-up and monitoring ever since the report was completed.

Some of this group of recommendations were generic while others related to how an individual vessel or company dealt with or approached specific issues. Follow-up activity took place either with individual companies or collectively with vessel operators.

Glaze deduction (recommendations 6 and 23)
Before frozen product is packed, it is frequently glazed to prevent freezer burn. The process involves applying water to product after the initial freezing process (e.g. plate freezers) but before the product is packed and stored in the hold. Some of the water freezes on contact with the frozen fish and acts as a protective layer.

The consequence of applying glaze is that it adds additional weight to the product. At the time the assessment report was written, it was common practice for companies to apply a standard 2% glaze deduction. That is, 2% was deducted from the average container weight regardless of how much glaze was actually applied.

Since 2012, MPI has worked with vessel operators to ensure that they have robust on-board practices for testing and documenting how much glaze is applied. MPI observers undertake independent glaze testing and monitor vessel's glaze testing processes. Glaze records are available to Fishery Officers on request.

A standard 2% deduction is no longer acceptable and any deduction from glaze must be evidence-based. For the vessels that have Compliance Plans (foreign-owned vessels), audits of those plans have confirmed that permit holders are maintaining records to support any glaze deduction.

Fish to meal quantification (recommendations 22 and 40)
Most factory vessels have on-board fish meal plants, which provide a means of obtaining value from both unwanted and damaged fish and the remaining parts of processed fish (heads, frames, skins etc). On these vessels, there are several different parts of the factory that can provide a source of fish that goes to meal.

Since 2011, MPI has worked with vessel operators to ensure that they have identified all sources of fish to meal and that they have developed robust, auditable processes for documenting how fish to meal is quantified for each of those sources. MPI observers routinely monitor adherence to vessel processes.

Accuracy of product weight (recommendations 7, 9, 10, 11, 13)
All fishers are required to report the weight of fish as greenweight (the weight of fish before any processing commences and before any part is removed). Fishers are allowed to do this retrospectively by multiplying the weight of processed fish by a conversion factor.[8]

The issue of having strong product weight processes both at-sea and on land is critical as a small amount of under-reporting on a per-unit basis can translate to several tonnes per trip. This is particularly relevant in circumstances when a fishing vessel produces several thousand containers of a particular product type during a trip.

Since 2011, MPI has worked with vessel operators to ensure that both at-sea weighing systems and on-land quality control processes are such that product weights are determined as accurately as possible. Additionally, MPI observers routinely undertake independent product weight testing at sea, while Fishery Officers audit product weights during routine inspections.

Discarding (recommendations 8, 12, 38 and 42)
The recommendations relating to discarding primarily related to vessels that were foreign charter vessels. Since 2012, all such vessels have been subject to mandatory observer coverage requirements, and a high proportion of these foreign vessels have left New Zealand waters.[9]

One recommendation related to an incident on a specific vessel. The outcome of that recommendation was a change to a landing report to report an increased quantity of fish accidentally lost at sea.

Product labelling (recommendation 24)
This recommendation related to the accuracy of product labelling i.e. that product labelled as containing a particular grade must contain fish of that grade. Vessel operators have been reminded of this obligation regularly ever since the report was released.

2. Recommendations relating to reporting and recordkeeping obligations (6)
The 2011 report made several recommendations (numbers 1, 14, 15, 16, 18 and 26) relating to vessel operators' reporting and recordkeeping obligations. Most of these recommendations were not specific to the hoki fishery and reflected the desire of the report's authors for enhancements to the reporting and recordkeeping obligations that applied at the time. The recommendations did not highlight any areas where the information required to be recorded by fishers was inadequate for management purposes.
No changes to reporting or recordkeeping regulations were progressed as a direct result of the recommendations. However, some issues were followed up directly with vessel operators. Outcomes of the follow up included clarification of reporting obligations and arrangements to make additional information available to MPI on request.

3. Recommendations directed at fisheries management (13)

[8] A conversion factor is a number that a particular fish processed to a specific state must be multiplied by to derive greenweight.
[9] In 2016 an amendment to the Fisheries Act 1996 came into force that required all foreign-charter vessels to become New Zealand flagged. As long as the vessels remained foreign-owned, the mandatory observer coverage requirement continues to apply.

A number of recommendations were directed at fisheries management and covered a range of topics, many of which were not specific to the hoki fishery.

Hoki management areas (recommendations 3, 20, 21 and 44)
Hoki Management Areas (HMAs) are a Deepwater Group initiative to manage and monitor fishing effort in defined areas where there is a relatively high abundance of juvenile hoki. Within HMAs, operators of trawlers >28m in length are to refrain from targeting hoki. Since 2009, MPI has been auditing vessel performance against the HMA Operational Procedures and providing quarterly reports to the Deepwater Group.

The HMA Operational Procedures are a voluntary fishing industry initiative, as opposed to a regulatory measure under the Fisheries Act 1996. This means that although MPI Compliance may choose to monitor adherence to the Operational Procedures, no directed or enforced action can be taken if fishers are found to be breaching the Operational Procedures.

At the time the report was released, MPI Fisheries Management was satisfied that the existing processes relating to monitoring fishing effort in HMAs were fit for purpose. Quarterly reports continue to be provided to the Deepwater Group, which undertakes follow-up action if a vessel operator is behaving in a way that is inconsistent with the HMA Operational Procedures.

Vessel specific conversion factors (recommendation 17)
The Fisheries Act 1996 provides for conversion factors to be issued on a vessel-specific basis. The provision is most often used by the hoki fillet vessel fleet.

Although not a direct outcome of the 2011 Hoki Risk Profile Report, the process by which vessel specific conversion factors are managed was amended in 2015. Key changes to the process include:

i) MPI observers are tasked with undertaking conversion factor testing any time they are on a vessel for which the operator has been issued a vessel specific conversion factor certificate. Previously, testing was only carried out on dedicated conversion factor sampling trips, which may not have been representative of processing; and
ii) Vessel operators must account for all trimmings, which reduces the incentive to trim more lightly during conversion factor testing

Other topics in this category of recommendations included:

- Considering adding hoki to Schedule 5A of the Fisheries Act 1996 meaning that the provisions allowing annual catch entitlement (ACE) to effectively be carried forward from one fishing year to the next would not apply (*recommendation 25*).

  This recommendation was not considered by MPI Fisheries Management as hoki did not meet the policy criteria for addition to this schedule i.e. hoki is not a high-value, single-species fishery.

- Species identification / use of generic shark codes (*recommendations 29 and 30*)

  Vessel operators have been reminded by the vessel owners and fishing companies of the obligation to ensure accurate species reporting regularly ever since the report was released. The issue of reporting of shark species, and trying to reduce the use of generic species codes, has been included in the Deepwater Fisheries Management's Annual Operational Plan since 2011/12

- Direct access to observer data (*recommendation 34*)

  Observer data has always been available to staff within MPI Fisheries Management and compliance on request or, more recently, directly via a database access tool.

- Discrepancy reporting (*recommendation 35*)

  Although not a direct outcome of the report, there has been ongoing development of automated discrepancy reports since a new reporting tool became available in 2012.

- Mobile LFR status should not be applicable to fishing vessels (*recommendation 36*)

  No action was taken to give effect to the recommendation that fishing vessels should not be given mobile Licensed Fish Receiver status. No vessels known to fish for hoki currently have mobile LFR status.

- The allowance within the Total Allowable Catch for other sources of fishing-related mortality should be commensurate with estimates of highgrading for the West Coast South Island hoki fishery (*recommendation 37*)

  Within the Total Allowable Catch (TAC), the Minister of Fisheries includes an allowance for all other sources of fishing-related mortality (OSFRM). This allowance is intended to provide for fish mortality that is not reported including loss due to burst nets or intentional discarding.

  For hoki, the approach taken since 2004 has been to set this allowance at 1% of the total allowable commercial catch (TACC). This means that under the TACC of 150,000 tonnes that was set on 1 October 2015, the OSFRM was set at 1,500 tonnes.

  MPI Fisheries Management accepts the desirability for a more informed OSFRM allowance to be included within the TAC and will be actively considering how best to give effect to this principle during future TAC reviews.

  - Develop fact sheet on highgrading (*recommendation 43*)

  Vessel operators have been regularly reminded of the obligation to report all fish they catch ever since the report was released.

4. Recommendations relating to fishing practices (3)
The report contained three recommendations regarding the development of codes of practice: development of a West Coast South Island (WCSI) HMA (*recommendation 2*); a reduction on long tows (*recommendation 4*); and reducing the practice of "soaking nets" (*recommendation 5*)[10].

The development of a WCSI HMA was never progressed as the area is generally a spawning area, and therefore is not recognised as being an area with high abundance of juvenile hoki.

[10] The term "soaking nets" refers to the practice of lifting the trawl net off the bottom and away from fish, and towing the net until such time as sufficient factory space becomes available to process the catch.

Regarding the other two recommendations, these fishing practices are not, in themselves, inconsistent with regulations and are not a compliance risk. They may, however, lead to compliance risks as, for example, long tows may result in higher quantities of damaged fish and soaking nets implies that the vessel is catching fish at a higher rate than it can process. In both examples, the compliance risk is that damaged fish, or fish that is in poor condition after spending an extended period of time in the pounds, will be illegally discarded. Vessel operators have been regularly reminded of the need to ensure fishing strategies minimise damage to hoki ever since the report was released.

5. Recommendations relating to compliance processes

The report contained 8 recommendations (*numbers 19, 27, 28, 31, 32, 33, 39 and 41*) that related to business processes within MPI Compliance.

No specific training for Fishery Officers on identification of non-compliance with fillet state definitions was undertaken (*recommendation 19*). Although not a direct outcome of the 2011 Hoki Risk Profile Report, the changes to the vessel specific conversion factor process (as outlined in the earlier discussion on recommendation 17) meant that operators of fillet vessels could pack fillets in any form they wished, provided all parts of a fillet were accounted for.

Recommendations 27 and 28 related to aspects of the functionality of an electronic catch effort reporting tool that was never developed.

Recommendation 31 related to accurate reporting of fish going to meal. One component of this recommendation, developing techniques for quantitative speciation of fish to meal, has been investigated but has proven problematic. The other component of the recommendation, engagement with vessel operators has been progressed, with operators being requested to document and submit vessel procedures relating to the quantification and reporting of whole and processed fish to meal. Currently, procedures are periodically verified and audited by Observers and Fishery Officers.

Inshore and "fresher" vessels have not been included in the hoki profiles (*recommendation 32*), however some monitoring of the inshore fleet has occurred since 2012 and future monitoring has been planned.

Vessel inspection templates continue to evolve (*recommendation 33*) to ensure information is gathered in a consistent manner and have been used as a guideline in subsequent hoki inspections since 2012.

Recommendations 39 and 41 related to HMAs and investigating non-compliance with fisheries legislation by vessels fishing in those areas. Any evidence of non-compliance with legislation, including the specific aspects of non-compliance identified in those recommendations, is investigated by MPI regardless of where a vessel is fishing and appropriate action taken where necessary.

As seen above MPI and Fisheries NZ have worked, and intend to continue to work, with vessel operators to identify and highlight areas for improvement in their fishing practices including in the overall area of compliance.

MPI is working with the New Zealand Defence Force to carry out a follow up exercise for the 2018 West Coast South Island hoki fishery. As at 30 June 2018, 11 vessels have been boarded at-sea and inspected.

Additionally, MPI observers on board hoki boats continue to collect data that supports ongoing analyses of conversion factors, adherence to processed state definitions, and adherence with the law.

Many of the issues highlighted by NABU have been discussed above, other issues raised concern observer days and prosecutions

Following a review in 2011 of the operation of foreign vessels operating under charter to New Zealand, at least one MPI observer was placed on all foreign chartered vessels from 1 October 2012. From 1 May 2016, all vessels were required to re-flag to New Zealand, however MPI has continued to place at least one observer on board all foreign owned vessels operating in New Zealand waters. This has resulted in an increase in total observer coverage across a range of deepwater fisheries, in particular those with a high level of fishing effort by foreign owned vessels.

In general, this has resulted in an increase in observer coverage on trawl vessels >28m LOA from around 20% to around 45% of tows observed per year, with up to 100% coverage on vessels deemed to be "high risk".

A summary of prosecutions and convictions (refer Table below) was provided to the assessment team. By MPI. In all cases the vessels were forfeited and none have returned to the fishery.

Vessel (x defendants)	Dates of offending (Year convicted)	Total Fines	Amount of fish illegally discarded **(as per Court's decision)**	Vessel forfeited
Vessel A (3 x defendants)	May to July 2007 (convicted 2009)	$147,500 + costs of $140,111.67	'At least 12 tonnes was discarded but likely much more than this. From the estimates given (and whether it was 12 or 50 tonnes) there was substantial quantities.' (primarily hoki)	Yes.
Vessel B (5 x defendants)	March to June 2011 (convicted 2012)	$524,500	347 tonnes of ITQ fish species (including hoki)	Yes…Vessel owner in memo to Court has agreed to pay $750,000 relief from forfeiture. This is delayed due to a third party currently taking action on behalf of Indonesian crew.
Vessel C (1 x defendant)	December 2010 to October 2011 (convicted 2014)	$127,500	74 tonnes ITQ fish (primarily hoki)	Yes…Vessel owner in memo to Court has agreed to pay $525,000 relief from forfeiture.
Vessel D (2 x defendants)	June 2012 and January 2013	$111,140	120 tonnes of hoki over seven trips	Yes…$145,428.41 paid by company

	(convicted 2014)			as relief from forfeiture
Vessel E (3 x defendants)	2011 (convicted 2015)	$298,500	70-300 tonnes of Barracuda 200-500 tonnes hoki	Yes…Company walked away from vessel. Vessel remained forfeited and was sold for scrap.
	TOTALS	**$1.349 million in fines**	**823,000kgs to 1,391,000kgs of ITQ fish**	

Further, on the Simmons et al (2016) report, MPI commissioned a study by NIWA to examine the implications of the postulated under-reporting of catch. Horn et al. (NZ FAR 2018/14) note that estimated discards (and other forms of catch under-reporting) are but not always taken into account in New Zealand stock assessments. Additional assessments of hoki (HOK1 east and HOK1 west), hake (HAK1, HAK4 andHAK7) and ling (LIN 3&4, LIN 5&6 and LIN 7) stocks were completed using three alternative catch histories (v42, v43 and v44) extracted from SAU databases. The methodology to extrapolate catches to recent years (post-2010) and prorate between stocks and fisheries within stocks is described in Horn et al (2018). The assessment models that were re-run with each of the alternative catch histories were the base case models from the most recently reported assessments of each species-stock. The catch history and the range of years that the model included were the only changes (relative to the base model) that were made in the re-run models.

For hoki, since 2000, the alternative catch histories were generally higher than the catches used in the base model. For hake, the alternative catch histories in SAU versions 43 and 44 were generally higher, but often only slightly so, than the MPI plenary catch history used in the base model. SAU version 42 was much higher (generally by a factor of about 3–4, but sometimes much greater) than the base model catch and was considered unrealistically high. For ling, catches from alternative catch histories v42, v43, and v44 were generally higher (particularly for LIN 3&4) than the base (assessment) estimates, except for the catches in the late 1970s and early 1980s, which were higher in the base models due to the Japanese and Korean longline fisheries operating at the time and are accounted for in the base model assessments (Figure 51).

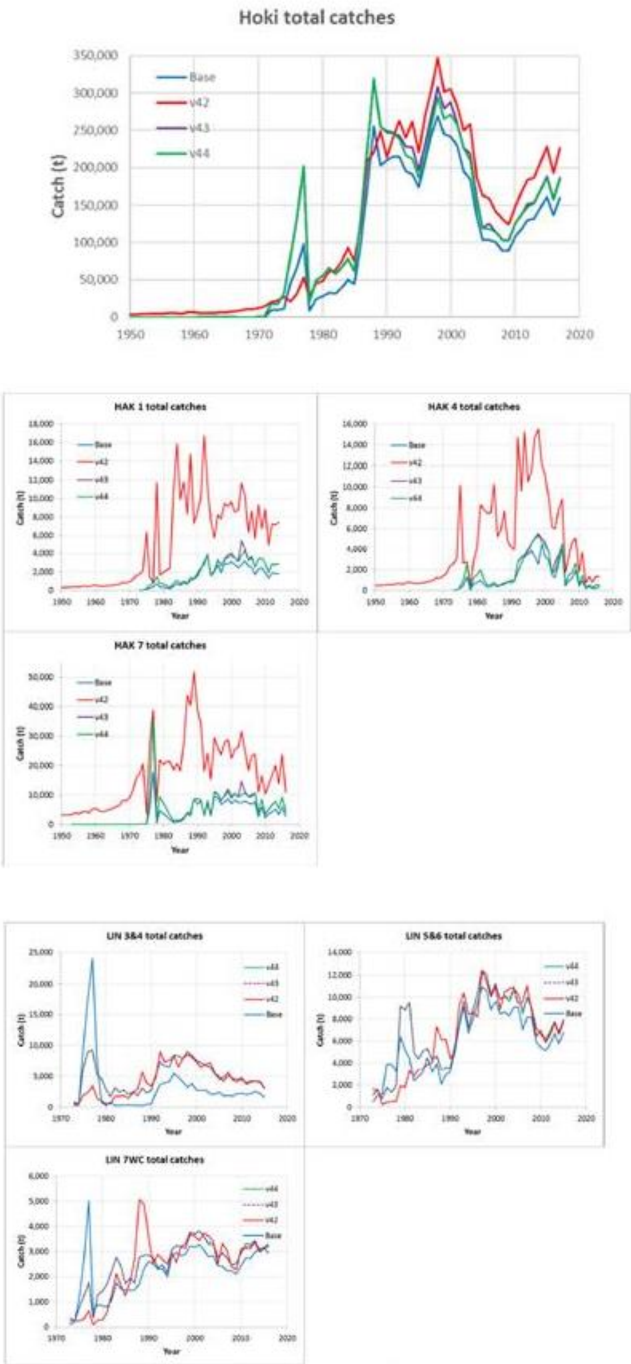

Figure 51 Total catch histories used in the hoki, hake and ling base case stock assessments and in assessments using the three alternative SAU datasets (v42, v43 and v44; from Horn et al 2018.)

Relative to the hoki base model, the estimated virgin and current absolute biomasses and the current fishing intensities were estimated to be slightly higher when using the alternative catch histories; however, the trends in the current $\%B_0$ were virtually identical for the base model and all alternative models. For the base model, the eastern stock current $\%B_0$ was estimated to be 60% B_0, and for the alternative catch histories 58–59% B_0. For the western stock current biomass was estimated to be 59% B_0 for the base model, and for the alternative catch histories 55–57% B_0.

Relative to the hake base models, the estimated virgin and current biomasses were slightly higher when using catch versions 43 and 44, and much higher when using version 42, consistent with the higher alternate catch of this version. The estimates of current stock status (current % B_0) were however more similar to those from the base models, particularly for Chatham Rise hake (HAK 4). Only the current % B0 for Sub-Antarctic hake (HAK 1) with catch version 42 differed from the base model value by more than 5% of B_0. Catch history version 42 is considered to be unrealistically high, due to the resulting extremely low values of q (the estimated catchability coefficient for trawl surveys for hake and other species), which are not credible.

Relative to the ling base models, the estimated virgin and current biomasses tended to be slightly higher when using the alternative catch histories; in the reported model runs B_0 was up to 24% higher, and current biomass was up to 36% higher. However, the estimates of current stock status (current % B_0) were similar to those from the base models.

Overall, the assessed status of hoki, hake and ling using the alternate catch histories was consistent with that of recent MPI assessments.

Other Bycatch Issues

NABU Point: "The decline of e.g., New Zealand sea lions, yellow-eyed penguins, Hector's and Maui dolphins and endangered seabirds such as albatrosses has been linked to commercial fisheries bycatch. The full extent of this bycatch in New Zealand waters is largely unknown due to a poor observer coverage."

CAB response: We note that not all of the species listed are suffering declines, and that the DWG fisheries under reassessment do not necessarily co-occur with these species in any case. Nevertheless, the level of observer coverage in the hoki, hake and ling trawl fishery has fluctuated between about 20% and 40% for almost all of the last 10 years (see Figures 43 - 45 in the assessment report). While we accept that coverage is not comprehensive, the Assessment Team believes it cannot reasonably be described as 'poor'. According to MSC CR V2.0 "*There is not a single optimum level of observer coverage that covers all fisheries and species caught/killed. Generally, for species that are highly variable, clumped in distribution and/or relatively rare, higher levels of observer coverage are needed (Wolfaardt, 2011). For more normal species, observer coverage rates above 20% provide only diminishing returns and small incremental improvements in the CV of catch estimates (Lawson, 2006).*" And CR V1.3 "*CB2.5.4.1 A default rate of 20% shall apply for good onboard observer coverage, but the CAB may accept other rates with sufficient scientific justification*." suggesting the levels described are in line with the MSC guidance, particularly when combined with other justifications as provided in the reports.

NABU Point: Dolphin bycatch in the New Zealand hoki trawl fishery (P.14)

"*Information provided by MPI to the US National Oceanic and Atmospheric Administration indicates the incidental capture of one dusky dolphin in the east coast South Island hoki fishery in 2013. These data originate from a year with comparatively high observer coverage (26%). During most other years, observer coverage was well below 20% (5-17%), which is too low to obtain robust bycatch estimates*."

CAB response: One dusky dolphin was taken in the 2012-2013 season, as reported by independent MPI observers. However, the NABU assertions on observer coverage are incorrect. During the 2012-2013 season, 5,311 tows were observed in the hoki, hake and ling trawl fishery, from a total of 13,532 tows undertaken, at a coverage rate of 39.2%. Further, from the 2006-2007 season to the 2015-2016 season (i.e., the last 10 years for which data are available), observer coverage in the hoki, hake and ling trawl fishery has averaged 24.5% - data from https://psc.dragonfly.co.nz/2017v1/released/explore/, and included in Table 58, below.

Table 58. Tows and observer coverage in the hoki, hake and ling trawl fishery, 2002/03 – 2015/16. Source: https://psc.dragonfly.co.nz/2017v1/released/

Year	All tows	Observed tows	% Observed
2002–03	29,364	2,658	9.1
2003–04	24,736	2,509	10.1
2004–05	17,088	2,303	13.5
2005–06	14,342	2,309	16.1
2006–07	13,875	2,211	15.9
2007–08	12,559	2,512	20.0
2008–09	11,361	2,158	19.0
2009–10	11,980	2,609	21.8
2010–11	12,375	2,055	16.6
2011–12	12,923	3,089	23.9
2012–13	13,532	5,311	39.2
2013–14	14,879	4,677	31.4
2014–15	15,700	4,549	29.0
2015–16	14,291	4,011	28.1
All years	219,005	42,961	21.0
All years not including 2012/13	205,473	37,650	19.6
Last 10 years only	133475	33182	24.5
Last 10 years not including 2012/13	119943	27871	22.9
Last 5 years only	71,325	21,637	30.3
Last 5 years not including 2012/13	57,793	16,326	28.1

NABU Point: "*The total number of dusky dolphins caught in trawling is listed as four. One in 2006 in a "Jack Mackerel" trawl. One in 2013 in a "hoki" trawl. Two in 2015 in a "barracouta" trawl. All individuals were caught in the same general area off Banks Peninsula, an area that coincides with the distribution of the endangered Hector's dolphin. Given this overlap and culture of misreporting in the fishery, it seems unlikely that Hector's dolphin deaths did not occur. Neither dusky nor Hector's dolphins have a beak, so it is even possible that Hector's dolphins are reported as duskies. The incentive to do so is considerable.*"

CAB response: Hector's dolphin is a shallow-water species (usually less than 100 m - http://www.forestandbird.org.nz/what-we-do/campaigns/havens-hectors/hectors-dolphin-factsheet) that lives close to shore. In contrast, for the most recent five years for which data are available, the hoki, hake and ling trawl fishery has operated for 97.8% of the time in water depths that exceed 200 m (Table 43 in the assessment report). Further, the data on interactions are provided by independent MPI observers, for whom there is no incentive to misreport dusky dolphins as Hector's dolphins. We have seen no evidence, and have no reason to believe, that the fishery interacts with Hector's dolphins anything other than extremely infrequently.

NABU Point: "*One reported dusky dolphin capture in a hoki trawl in 2013 was observed in one out of 712 observed tows. This equates to a capture rate of 0.14 dusky dolphins per tow. Multiplying the total number of tows that year (2737) with the 0.14 catch rate, provides an estimated total of 383 dusky dolphins killed in the hoki fishery in 2013. Existing data are therefore inadequate to even infer sustainable fishing with regard to dolphin and other marine mammals and bird bycatch.*"

CAB response: As noted above, during the 2012-2013 season, 5,311 tows were observed in the hoki, hake and ling trawl fishery, at a coverage rate of 39.2%. Further, from the 2006-2007 season to the 2015-2016 season (i.e., the last 10 years for which data are available), observer coverage has averaged 24.5% (Data from https://psc.dragonfly.co.nz/2017v1/released/explore/ and included as Table 58, above).

The calculation by NABU is also incorrect. On the figures given by NABU, a single dusky dolphin capture from 712 observed tows is a capture rate of 0.0014 not 0.14, which when multiplied up to 2,737 tows in total would give an expected capture of 3.83 dolphins in that year, not the 383 stated.

Further, there is only one record of a dusky dolphin capture in the entire observer record for the hoki, hake and ling trawl fishery (covering 42,961 tows since 2002-2003), so the catch rate from observed tows overall in the fishery is actually 0.000023.

NABU Point: Inadequate observer coverage for all except very common species (P.15)

"*Keeping observer coverage low for most observer programmes inevitably results in poor bycatch records and estimates.*"

"*This relationship between observer coverage and bycatch level is well known. As observer coverage rises, so do bycatch levels. Figure 37 on page 69 in the Acoura draft assessment report illustrates this perfectly. The spike in observer coverage in 2013 corresponds with an observed dusky dolphin capture and the subsequent reduction in observer coverage after 2013.*"

CAB response: As noted above, from the 2006-2007 season to the 2015-2016 season (i.e., the last 10 years for which data are available), observer coverage in the hoki, hake and ling trawl fishery has averaged 24.5%, and 30.3% for the last five years (Data from https://psc.dragonfly.co.nz/2017v1/released/explore/, included as Table 58, above).

We also fail to see the 'well known' relationship between observer coverage and bycatch levels. The data show there was a single dusky dolphin capture in 2012-2013 (5,311 observed tows at 39.2% coverage) and zero captures in other years in the observer record since 2002-2003 (37,650 observed tows at an average of 19.6% coverage). We note that observer coverage in the last five years has averaged about 28%, even if the 2012/13 year is excluded (– see Table 58, above). The Assessment Team believes that the independent observer coverage rate is acceptably high and certainly adequate to determine if there is a problem with cetacean bycatch, which there is not.

The assessment team checked with MPI regarding the spike in observer coverage in 2013. Their response states, "*Following a review in 2011 of the operation of foreign vessels operating under charter to New Zealand, at least one MPI observer was placed on all foreign chartered vessels from 1 October 2012. From 1 May 2016, all vessels were required to re-flag to New Zealand, however MPI has continued to place at least one observer on board all foreign owned vessels operating in New Zealand waters. This has resulted in an increase in total coverage across a range of deepwater fisheries, in particular those with a high level of fishing effort by foreign owned vessels.*

In general, this has resulted in an increase in observer coverage on trawl vessels >28m LOA from around 20% to around 45% of tows observed per year."

Overall, we believe the NABU comments on observer coverage and the potential for dolphin bycatch are predicated on incorrect data and/or assumptions, and the Assessment Team has made no changes as a result.

NABU Point: "*On the west coast of the North Island trawling is permitted right up to the coast without geographical restrictions. Besides coinciding with their habitat of many other endangered marine mammals and birds, there is therefore a large areal overlap between the hoki and ling fisheries with the habitat of endangered Hector's and, in the Cook Strait, the critically endangered Maui dolphins*."

CAB response: The assessment team contacted MPI and asked if there is a large areal overlap in the Cook Strait between the hoki and ling fisheries and Hector's and Maui dolphins and whether there had been any recorded incidental catches of these species by the fisheries. Their response is included below:

MPI applies a spatially explicit risk assessment method that depends critically on the accuracy of the estimated overlap between fishing effort and animal distributions. Therefore we have devoted considerable scientific resources to map and understand the spatial distributions of Maui and Hector's dolphins. We can state with high confidence that the overlap between hoki/ ling fisheries in Cook Strait and Hector's / Maui dolphins is negligible or zero. Hector's and Maui dolphins are a shallow-water, coastally associated species, most likely reflecting their clear association with high-turbidity water. High water turbidity is the single variable that most strongly predicts the distribution of the dolphins, including their seasonally variable patterns. Hoki and ling fisheries in Cook Strait occur in water that is far deeper and far clearer than what could be considered Maui and Hector's dolphin habitat.

Maui and Hector's dolphins can only be distinguished by DNA analysis. The closest Maui dolphin recorded to Cook Strait was near Taranaki, around 200 km to the north. Some Hector's dolphins have been recorded on the North Island, and occasional sightings (for which sub-species identity cannot be determined) have been reported near the southern tip of the North Island, but only in shallow coastal locations, not in Cook Strait.

The stakeholder's contention of overlap between deepwater fisheries and Hector's / Maui dolphin distributions may actually be a reference to the occasional dispersal of Hector's dolphins from the South Island to the North Island. The presence of Hector's genetic variants among the North Island Maui dolphin population (where three individual Hector's dolphins have been identified to date using genetic mark-recapture sampling) suggests that this dispersal does occur occasionally, but the route by which it occurs is purely speculative. In any event, three individual animals crossing Cook Strait over several years -- from a population of more than 15,000 animals -- cannot constitute 'high overlap'. The deep and clear water of Cook Strait itself is not suitable habitat for Hector's dolphins."

In summary, again, the Assessment Team believes the NABU comments on observer coverage and the potential for dolphin bycatch are predicated on incorrect data and/or assumptions, and the Assessment Team has made no changes as a result.

NABU Point: "*The Draft report claims „The size of the basking shark population in New Zealand waters is not known… Depending on the assumptions made regarding the relationship between effective population size and actual population size, the global population of basking sharks may be estimated at between about 18,200 and 82,000 individual basking sharks (DOC undated)." This is an incorrect citation of the referenced literature which states: "A genetic study has estimated the global effective population of size (an estimate of the number of reproductive individuals) of basking sharks at only 8,200. Research across a wide range of species suggests a median ratio of effective population size to actual (or census) population size of 0.1, this gives an estimate of global population size of about 82,000. However, recent research suggests that a ratio of 0.45 is more appropriate for large sharks, meaning the global population could be little more than 18,200 basking sharks"*"

CAB response: The Assessment Team considers that the text in the assessment report is not an 'incorrect citation'. We clearly stated: 'Depending on assumptions....", whilst DOC (undated) stated "recent research **suggests** ... meaning the population **could be** little more than 18,200". Further, we have not relied on the larger figure to score the fishery at SG80 for basking shark, in line with the precautionary approach. No changes have been made.

NABU Point: "*As with other species, the true number of basking sharks killed in the hoki fishery is highly uncertain due to low observer coverage (less than 20% over the last 10 years (see figure 42 of PCDR on page 98).*"

CAB response: As noted previously, these are not the correct observer coverage levels for the fishery. From the 2006-2007 season to the 2015-2016 season (i.e., the last 10 years for which data are available), observer coverage in the hoki, hake and ling trawl fishery has averaged 24.5% (Data from https://psc.dragonfly.co.nz/2017v1/released/explore/). This level of coverage, together with the detailed review of the data that is undertaken through the various risk assessment processes for the different groups, means that estimates of impact are not 'highly uncertain'.

NABU Point: "*Low observer coverage has been shown to lead to significant underestimates of bycatch as a result of underreporting (e.g., Burns & Kerr 2016). The true extent of incidental take for marine mammals, seabirds, sharks and indeed fish species in this fishery is therefore likely to be much higher. A reliable assessment of the sustainability of New Zealand's hoki fishery will prove impossible until this lack of information has been addressed.*"

***NABU Point: "PI 2.3.1 - 2.3.3 ETP** species outcome, ETP species management and ETP species information do not warrant the awarded scoring of 80 for basking sharks and other marine mammals listed in the report. They should be reduced at least to 60 and require a condition aimed at improved monitoring and recording of bycatch rate and the impact on the population of these vulnerable and decreasing species."*

CAB response: The Assessment Team accepts that there is some uncertainty in the number of ETP species taken in the hoki, hake and ling trawl fishery. However, observer coverage of 24.5% over the last ten years (30.3% over the last 5 years), has allowed for the risk posed to each species to be determined with good levels of confidence. In fact, the risk assessment process for ETP species within New Zealand waters is one of the most developed globally, with detailed, repeated assessments made over time for the key groups (e.g., sharks – Ford *et al*. 2015 and Francis 2017; marine mammals – Baker *et al.* 2016, Abraham & Berkenbusch 2017; seabirds - Richard & Abraham 2015, Richard et al. 2017), while annual reporting is provided through the Aquatic Environment and Biodiversity Annual Review Series (e.g., MPI 2016) and in MPI's Annual Review Reports for the deepwater fisheries. The Assessment Team is content that data are sufficient to support the scores provided.

NABU Point: Performance Indicator 2.3.3, page 255

"*We note that there are no government policies or a strategy on how the environmental effects of fishing on the marine environment are to be managed or for minimizing the negative impact on marine mammals in New Zealand. This is evidence by declining populations of marine mammals, including Hector's and Maui dolphins (e.g., Cook et al. 2018). Bycatch of some 200 fur seals per annum (MPI communication to NOAA 2017), for example appears to be simply accepted as collateral.*"

CAB response: We have detailed the approach taken to managing impacts on marine mammals in the relevant scoring text for PI 2.3.3. The Assessment Team has no reason to think that the hoki, hake and ling trawl fishery interacts significantly with Hector's or Maui's dolphins based on observer coverage data on bycatch and on the spatial distribution of trawl effort in the deep water fishery relative to the shallow-water distribution of these species.

The Assessment Team is of the opinion that any captures of non-target species are clearly unfortunate and undesirable, but the level of impact in the hoki-hake and ling trawl fishery is sustainable and within acceptable limits defined by the MSC standard, such that a score of at least SG80 is appropriate. The peer reviewer supported the scoring rationale and we have not changed the text.

For ecosystem management (i.e., PI 2.5.2, SIa), we note that the score for the hoki, hake and ling trawl fishery has been reduced to 80, reflecting that the Assessment team considers there to be a partial strategy in place, but not a strategy.

<u>CONTROL AND CONFLICT OF INTEREST</u>

NABU Point: *"…in order to prosecute fishing companies for legal breaches, the government regulator, MPI, has to rely on data collected and provided by a company owned by the fishing companies themselves – clear conflict of interest."*

CAB response: The assessment team contacted MPI with respect to this issue and asked them to confirm what system/processes are in place to ensure confidence that there is no conflict of interest. Their response is included below:

There are two aspects to the arrangements with FishServe, Contracted and Devolved.

Under both arrangements FishServe provides administrative services only.

- ***Contracted Services***

  Section 294(1) of the Fisheries Act 1996 (the Act) provides that the Director-General may perform his or her functions, duties, and powers, by entering into an arrangement or contract with any other agency (Service Delivery Agency (SDA)).

  A range of Fisheries Registry Services have been contracted since 1999. The current contract runs from 1 October 2013 to 30 September 2023. The length of the contract (10 years) was agreed by the parties to provide certainty of tenure to FishServe, given that substantial investment in new technology and other developments through this period was anticipated.

  Under the contracted services, FishServe undertakes activities for MPI and acts under MPI's direction. FishServe is responsible and accountable to MPI for delivery of these services and all decision-making is referred to MPI – removing any risk of conflict of interest from Deepwater Group .

- ***Devolved / Approved Service Delivery Organisation.***

  In October 2001 a range of functions were transferred from the then Chief Executive of the Ministry of Fisheries to a third party, the New Zealand Seafood Industry Council Limited (SeaFIC). Functions included a range of administrative activities, including reporting, developing and issuing of forms, receiving applications, issuing notifications, registrations, and the maintenance of public registers.

  In October 2012 SeaFIC announced a new national industry organisation to front its activities, Seafood New Zealand (SNZ).

  SNZ has two subsidiary companies, Commercial Fisheries Services Ltd (FishServe) and Seafood Innovations Ltd.

In October 2013 FishServe, a wholly owned subsidiary of SNZ, was directly appointed as the Approved Service Delivery Organisation (ASDO).

Under this arrangement, the ASDO undertakes activities on behalf of the Crown. The ASDO is directly responsible, and accountable, to the Minister for the delivery of the services. MPI advises the Minister on those activities to be transferred to (and undertaken by) the ASDO, develops the standards and specifications to be delivered, and ensures audits are in place to measure and monitor delivery of services.

There are five layers of audit to provide assurance that FishServe is delivering functions appropriately. These include:

- ***MPI audit -** MPI conducted a comprehensive audit of FishServe's services in 2013, with a focus on Controls for Catch Effort Data Accuracy. As a result of this audit, a number of recommendations were made on ways to improve the overall control environment, both within FishServe and MPI. These recommendations have been implemented. The next **MPI audit** is scheduled to occur during March 2018, and will cover vessel registration and permitting processes. The status of this audit will be considered at the first annual surveillance for these fisheries.*
- ***Financial audit** - As part of MPI's external audit, Ernst & Young (EY) obtain assurance over the data provided by FishServe, to MPI, through understanding the processes to produce it. Were issues to be identified in the controls in place to produce the data on which the Ministry relies, these would be reported as part of the audit report. No issues were advised, on FishServe data, in the EY 2017 audit report.*
- ***FishServe internal audit -** FishServe conducts internal audits. The parameters, frequency and deliverables of these audits are agreed with MPI, and MPI has full access to the audit reports. A formal external audit of this Quality Assurance Programme was conducted in 2014 and found that the audits were performed to a good standard, the audit approach was methodical and demonstrated good attention to detail. Some areas for improvement were noted and recommendations have been implemented.*
- ***Monthly operating performance report -** FishServe provides monthly performance reports around specific deliverables to MPI.*
- ***Catch Effort auditing -** MPI conducts monthly audits of FishServe's delivery of catch effort services. These audits are both specific and random in nature (they focus on different aspects of the service each time) and are designed to ensure FishServe are delivering services according to agreed standards and specifications. Any anomalies are referred back to FishServe for corrective action.*
- ***Relationship Management** – MPI and FishServe meet regularly both at a senior and operational level, to discuss strategic and delivery issues.*

Given the MPI response, the assessment team consider there are systems and processes are in place to ensure confidence that there is no conflict of interest in MPI using or relying on data collected and provided by FishServe.

NABU Point: PI 1.2.3 Page 166

"*Last year, the previous NZ government had announced plans to install video cameras on fishing vessels, saying it would protect the sustainability of fish stocks and act as a deterrent against illegal activity, like fish dumping. MPI Fisheries spokesman Gerry Brownlee had said that the rollout of cameras was needed to deal with well-publicised. However, earlier this year, news emerged that these plans may be abandoned as a result of industry opposition. There are therefore no current plans to install video monitoring across the NZ fleet, including hoki vessels to address these problems."*

CAB response: The assessment team contacted MPI with respect to this issue asking for an update on the situation. Their response is included below:

> "*Work on the implementation of an 'Integrated Electronic Monitoring and Reporting System' has been ongoing for a number of years and information on progress was provided to the assessment team. The programme has been renamed 'Digital Monitoring', and electronic reporting has now been implemented on all trawl vessels >28m LOA.*
>
> *In late 2017, the Minister of Fisheries announced a delay in the introduction of cameras on commercial fishing vessels to allow for further consultation on the proposal to make sure we 'got it right'. No decisions have been made on any dates for potential implementation of cameras…*
>
> *It is also noted that Gerry Brownlee is a National Party MP, and has nothing to do with MPI or Fisheries New Zealand*."

The report has been edited to reflect this update. No change to scoring is required.

REVIEWER CONFLICT OF INTEREST

NABU Point: *Page 18 of the draft assessment report states Jo Akroyd had been employed by the New Zealand Ministry of Fisheries (now MPI) for 20 years. During this time, she "was awarded a Commemoration Medal in 1990 in recognition of her pioneering work in establishing New Zealand's fisheries quota management system," QMS. It stands to reason that Ms Akroyd is therefore more invested in a positive evaluation of the New Zealand fishery under the QMS than an independent reviewer."*

CAB response. Acoura Marine takes conflict of interest very seriously and has robust conflict of interest reviews and validation procedures that have been audited and accepted by MSC's appointed independent auditors. These are applied to all assessment team members. Acoura Marine was aware of Jo Akroyd's previous association with the Ministry of Fisheries (MPI, Sea food NZ, Ministry of Agriculture and Fisheries) and reviewed her historical work experience. This was almost 30 years ago and while involved in the development of the Quota Management System in the 1980s it has changed significantly since its development. This MSC assessment of the Deepwater Fisheries has not reviewed any judgements or decisions that were made by Jo during her career with the Ministry, nor does she have issues with over-familiarity.

Greenpeace

Contact Information Make sure you submit your full contact details at the first phase you participate in within a specific assessment process. Subsequent participation will only require your name unless these details change.				
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Assessment Details	
Fishery	New Zealand Deepwater Group Hake Hoki Ling and southern blue whiting
CAB	

Comment	Nature of Comment	Justification Please attach additional pages if necessary.
☒ I wish to provide general comments about the assessment of this fishery against the MSC Fisheries Standard.	The fishery fails principle 3, effective management	I have attached my comments at the end of the form

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25 May 2018

RE MSC certification of the New Zealand Hoki fishery

Dear Acoura,

Your organisation is currently assessing the NZ hoki fishery as part of an MSC approval process. This submission is opposing the re-certification of the fishery on the grounds that it is so poorly managed and regulated that it could not possibly meet the criteria for sustainability.

You should be aware that crucial information about the fishery provided by the fishing companies and the Ministry of Primary Industry (MPI) is untrue, and they are well aware that it is untrue.

The evidence for this is the leaked internal reports produced by the compliance division of MPI (into which the Ministry of Fisheries was merged). One of the most important of these internal reports, which we released yesterday, can be found here.

The report, "Compliance Risk Profile of West Coast/East Coast South Island Hoki fishery", published on 21 March 2012 by the Ministry of Fisheries compliance division, makes for sobering reading. It is based on a very large operation called Operation Bronto from 2011. It shows:

- widespread and systematic under-reporting of catch on a massive scale;
- routine fish dumping of juvenile hoki and other quota species;
- the targeting of zones with high concentrations of juvenile fish;
- systematic manipulation of declared carton weights;
- bycatch of sharks, eels, and other fish are routinely under reported or in other cases; fraudulently over reported to cover up the under reporting of quota species; and
- that these activities were carried out by the biggest fishing companies operating in New Zealand.

The report was hidden by MPI and the conclusions and 45 recommendations of the report were not known publicly until Greenpeace released it today. The report tells us the true state of the management and regulation of the New Zealand hoki fishery. It has unleashed a wave of controversy in New Zealand.

The senior officials at MPI are now attempting to defend the indefensible: why were there no enforcement actions in light of this mountain of evidence – no fines; no prosecutions. Their answers are effectively that they don't prosecute the big fishing fleets; they talk to them to attempt to make them change.

This approach is fundamentally unsound. The New Zealand QMS creates strong financial incentives to illegally under-report catch of quota species and to dump low value quota species. These incentives are well understood. The main disincentive to these behaviours is enforcement of the rules by the regulator, resulting in prosecutions with the risk of convictions, fines, jail time and forfeiture of vessels. The regulator, MPI, has now publicly stated that it will not prosecute illegal behaviour by the largest fishing fleets.

That means the under-reporting and dumping will continue because without real fines and punishments fishing companies have financial incentives to break the law and routinely do.

This is not a one-off occurrence. When Greenpeace leaked an earlier enforcement report, Operation Achilles, which showed widespread illegal dumping in the inshore fishery, MPI failed to prosecute in spite of video evidence. MPI argued that they had legal advice that they couldn't prosecute on the evidence available, however that claim turned out to be false: the legal advice never existed. The senior officials at MPI blocked the prosecution in spite of the evidence.

The fishing industry and MPI are now claiming that the under-reporting and dumping exposed in Operation Bronto seven years ago no longer exists. They have provided no evidence to back up this claim. The financial incentives for fishing companies to under-report and dump remain in place. And MPI have made it very clear that there are no serious enforcement disincentives to discourage this behaviour. Hence we can safely assume that things are the same in the New Zealand hoki fishery. And that is completely at odds with the principles of MSC and sustainability.

In closing, it is very clear that MSC Principle 3, Effective Management, can in no way be satisfied for hoki.

Please keep Greenpeace NZ as a stakeholder and an objector informed as to your next steps.

Yours sincerely

Dr Russel Norman

Greenpeace New Zealand Executive Director

Greenpeace also provided a version of the '2011 Compliance Risk Profile of the West Coast/East Coast South Island Hoki Fisheries' report (which they refer to in their submission). The final, official report can be read here.

CAB Response

The leaked reports only became available the day before Greenpeace submitted the comments to the PCDR. Acoura are very careful to verify verbal and documented information; we were not aware of this report's existence. The MSC process actively welcomes and is strengthened by stakeholder involvement – this is a good example. We have reviewed it the information brought to our attention. As noted above, the report provided by Greenpeace is not in it's final, official form.

In 2010, the then Ministry of Fisheries (now MPI or Fisheries New Zealand) began a new approach to monitoring compliance in the deep-water and middle-depth fisheries. The approach was based on proactive profiling of specific fisheries rather than the reactive investigation-driven approach of the past.
The four components of profiling comprise i) an initial desktop exercise to compile available data, ii) a detailed data and information collection programme primarily involving observers and fishery officers, iii) an analytical phase which analyses all available data to inform the report and iv) an outcomes phase using the VADE model.[11]

The hoki fisheries on the West Coast of the South Island and Chatham Rise were the first to be profiled. The main focus of data collection related to issues that could impact the accuracy of reported greenweight.
The Risk Profile operations assess the likelihood and consequence of potentially non-compliant behaviours. Compliance Risk Profiles in themselves are non-evidential. They inform MPI and industry of potential risks and cue information needs to inform follow-up compliance investigations (e.g. by Fisheries Officers or at-sea observers). Risk Profiles can also identify issues that instead of enforcement action see changes to the policy settings (e.g. changes to the conversion factor or to product specifications/prescribed cuts).

The 2011 hoki risk profile identified compliance risks indicating potential issues regarding catch reporting, incorrect reporting of carton weights, incorrect application of conversion factors into fish meal and processed products, and incorrect reporting of target and bycatch species;44 recommendations were made. MPI Compliance has estimated that, if the purported non-compliance was systemic across the fishery, then potentially around 3,500 tonnes (3% of the TACC) of hoki might have been unreported. This estimate is indicative only and does not account for potential over-reported catches or subsequent redeclaration of catches.

MPI have reported on the recommendations and subsequent actions (available here).

The 44 recommendations were categorized into five groups
1. On-board practices (14)
2. Suggestions for changes to reporting and recordkeeping obligations (6)
3. Fishing practices (3)
4. Fisheries management processes (13)
5. Compliance processes (8)

1. Recommendations relating to on-board practices (14)

This group of recommendations related to a series of fleet-wide, on-board practices, most of which have the ability to impact the accuracy of greenweight reporting of all species, not just hoki. For this reason, this group of recommendations has been the subject of ongoing follow-up and monitoring ever since the report was completed.

[11] VADE means voluntary, assisted, directed, enforced

Some of this group of recommendations were generic while others related to how an individual vessel or company dealt with or approached specific issues. Follow-up activity took place either with individual companies or collectively with vessel operators.

Glaze deduction (recommendations 6 and 23)
Before frozen product is packed, it is frequently glazed to prevent freezer burn. The process involves applying water to product after the initial freezing process (e.g. plate freezers) but before the product is packed and stored in the hold. Some of the water freezes on contact with the frozen fish and acts as a protective layer.

The consequence of applying glaze is that it adds additional weight to the product. At the time the assessment report was written, it was common practice for companies to apply a standard 2% glaze deduction. That is, 2% was deducted from the average container weight regardless of how much glaze was actually applied.

Since 2012, MPI has worked with vessel operators to ensure that they have robust on-board practices for testing and documenting how much glaze is applied. Fisheries New Zealand observers undertake independent glaze testing and monitor vessel's glaze testing processes. Glaze records are available to Fishery Officers on request.

A standard 2% deduction is no longer acceptable and any deduction from glaze must be evidence-based. For the vessels that have Compliance Plans (foreign-owned vessels), audits of those plans have confirmed that permit holders are maintaining records to support any glaze deduction.

Fish to meal quantification (recommendations 22 and 40)
Most factory vessels have on-board fish meal plants, which provide a means of obtaining value from both unwanted and damaged fish and the remaining parts of processed fish (heads, frames, skins etc). On these vessels, there are several different parts of the factory that can provide a source of fish that goes to meal.

Since 2011, MPI has worked with vessel operators to ensure that they have identified all sources of fish to meal and that they have developed robust, auditable processes for documenting how fish to meal is quantified for each of those sources. Fisheries New Zealand observers routinely monitor adherence to vessel processes.

Accuracy of product weight (recommendations 7, 9, 10, 11, 13)
All fishers are required to report the weight of fish as greenweight (the weight of fish before any processing commences and before any part is removed). Fishers are allowed to do this retrospectively by multiplying the weight of processed fish by a conversion factor.[12]

The issue of having strong product weight processes both at-sea and on land is critical as a small amount of under-reporting on a per-unit basis can translate to several tonnes per trip. This is particularly relevant in circumstances when a fishing vessel produces several thousand containers of a particular product type during a trip.

Since 2011, MPI has worked with vessel operators to ensure that both at-sea weighing systems and on-land quality control processes are such that product weights are determined as accurately as possible. Additionally, Fisheries New Zealand observers routinely

[12] A conversion factor is a number that a particular fish processed to a specific state must be multiplied by to derive greenweight.

undertake independent product weight testing at sea, while Fishery Officers audit product weights during routine inspections.

Discarding (recommendations 8, 12, 38 and 42)
The recommendations relating to discarding primarily related to vessels that were foreign charter vessels. Since 2012, all such vessels have been subject to mandatory observer coverage requirements, and a high proportion of these foreign vessels have left New Zealand waters.[13]

One recommendation related to an incident on a specific vessel. The outcome of that recommendation was a change to a landing report to reflect an increased quantity of fish accidentally lost at sea.

Product labelling (recommendation 24)
This recommendation related to the accuracy of product labelling i.e. that product labelled as containing a particular grade must contain fish of that grade. Vessel operators have been reminded of this obligation regularly ever since the report was released.

2. Recommendations relating to reporting and recordkeeping obligations (6)
The 2011 report made several recommendations (numbers 1, 14, 15, 16, 18 and 26) relating to vessel operators' reporting and recordkeeping obligations. Most of these recommendations were not specific to the hoki fishery and reflected the desire of the report's authors for enhancements to the reporting and recordkeeping obligations that applied at the time. The recommendations did not highlight any areas where the information required to be recorded by fishers was inadequate for management purposes.
No changes to reporting or recordkeeping regulations were progressed as a direct result of the recommendations. However, some issues were followed up directly with vessel operators. Outcomes of the follow up included clarification of reporting obligations and arrangements to make additional information available to MPI on request.

3. Recommendations directed at fisheries management (13)
A number of recommendations were directed at fisheries management and covered a range of topics, many of which were not specific to the hoki fishery.

Hoki management areas (recommendations 3, 20, 21 and 44)
Hoki Management Areas (HMAs) are a Deepwater Group initiative to manage and monitor fishing effort in defined areas where there is a relatively high abundance of juvenile hoki. Within HMAs, operators of trawlers >28m in length are to refrain from targeting hoki. Since 2009, Fisheries New Zealand has been auditing vessel performance against the HMA Operational Procedures and providing quarterly reports to the Deepwater Group.

The HMA Operational Procedures are a voluntary fishing industry initiative, as opposed to a regulatory measure under the Fisheries Act 1996. This means that although MPI Compliance may choose to monitor adherence to the HMA Operational Procedures, no directed or enforced action can be taken if fishers are found to be breaching the HMA Operational Procedures.

At the time the report was released, MPI Fisheries Management was satisfied that the existing processes relating to monitoring fishing effort in HMAs were fit for purpose. Quarterly reports continue to be provided to the Deepwater Group, which undertakes follow-

[13] In 2016 an amendment to the Fisheries Act 1996 came into force that required all foreign-charter vessels to become New Zealand flagged. As long as the vessels remained foreign-owned, the mandatory observer coverage requirement continues to apply.

up action if a vessel operator is behaving in a way that is inconsistent with the HMA Operational Procedures.

Vessel specific conversion factors (recommendation 17)
The Fisheries Act 1996 provides for conversion factors to be issued on a vessel-specific basis. The provision is most often used by the hoki fillet vessel fleet.

Although not a direct outcome of the 2011 Hoki Risk Profile Report, the process by which vessel specific conversion factors are managed was amended in 2015. Key changes to the process include:

i) Fisheries New Zealand observers are tasked with undertaking conversion factor testing any time they are on a vessel for which the operator has been issued a vessel specific conversion factor certificate. Previously, testing was only carried out on dedicated conversion factor sampling trips, which may not have been representative of processing; and
ii) Vessel operators must account for all trimmings, which reduces the incentive to trim more lightly during conversion factor testing

Other topics in this category of recommendations included:

- Considering adding hoki to Schedule 5A of the Fisheries Act 1996 meaning that the provisions allowing annual catch entitlement (ACE) to effectively be carried forward from one fishing year to the next would not apply (*recommendation 25*).

  This recommendation was not considered by MPI Fisheries Management as hoki did not meet the policy criteria for addition to this schedule i.e. hoki is not a high-value, single-species fishery.

  - Species identification / use of generic shark codes (*recommendations 29 and 30*)

  Vessel operators have been reminded by the vessel owners and fishing companies of the obligation to ensure accurate species reporting regularly ever since the report was released. The issue of reporting of shark species, and trying to reduce the use of generic species codes, has been included in the MPI Deepwater Fisheries Management's Annual Operational Plan since 2011/12

  - Direct access to observer data (*recommendation 34*)

  Observer data has always been available to staff within MPI Fisheries Management and Compliance on request or, more recently, directly via a database access tool.

  - Discrepancy reporting (*recommendation 35*)

  Although not a direct outcome of the report, there has been ongoing development of automated discrepancy reports since a new reporting tool became available in 2012.

  - Mobile LFR status should not be applicable to fishing vessels (*recommendation 36*)

  No action was taken to give effect to the recommendation that fishing vessels should not be given mobile Licensed Fish Receiver (LFR) status. No vessels known to fish for hoki currently have mobile LFR status.

- The allowance within the Total Allowable Catch for other sources of fishing-related mortality should be commensurate with estimates of highgrading for the West Coast South Island hoki fishery (*recommendation 37*)

Within the Total Allowable Catch (TAC), the Minister of Fisheries includes an allowance for all other sources of fishing-related mortality (OSFRM). This allowance is intended to provide for fish mortality that is not reported including loss due to burst nets or intentional discarding.

For hoki, the approach taken since 2004 has been to set this allowance at 1% of the total allowable commercial catch (TACC). This means that under the TACC of 150,000 tonnes that was set on 1 October 2015, the OSFRM was set at 1,500 tonnes.

MPI Fisheries Management accepts the desirability for a more informed OSFRM allowance to be included within the TAC and will be actively considering how best to give effect to this principle during future TAC reviews.

- Develop fact sheet on highgrading (*recommendation 43*)

Vessel operators have been regularly reminded of the obligation to report all fish they catch ever since the report was released.

4. Recommendations relating to fishing practices (3)
The report contained three recommendations regarding the development of codes of practice: development of a West Coast South Island (WCSI) HMA (*recommendation 2*); a reduction on long tows (*recommendation 4*); and reducing the practice of "soaking nets" (*recommendation 5*)[14].

The development of a WCSI HMA was never progressed as the area is generally a spawning area, and therefore is not recognised as being an area with high abundance of juvenile hoki.

Regarding the other two recommendations, these fishing practices are not, in themselves, inconsistent with regulations and are not a compliance risk. They may, however, lead to compliance risks as, for example, long tows may result in higher quantities of damaged fish and soaking nets implies that the vessel is catching fish at a higher rate than it can process. In both examples, the compliance risk is that damaged fish, or fish that is in poor condition after spending an extended period of time in the pounds, will be illegally discarded. Vessel operators have been regularly reminded of the need to ensure fishing strategies minimise damage to hoki ever since the report was released.

5. Recommendations relating to compliance processes
The report contained 8 recommendations (*numbers 19, 27, 28, 31, 32, 33, 39 and 41*) that related to business processes within MPI Compliance.

No specific training for Fishery Officers on identification of non-compliance with fillet state definitions was undertaken (*recommendation 19*). Although not a direct outcome of the 2011 Hoki Risk Profile Report, the changes to the vessel specific conversion factor process (as outlined in the earlier discussion on recommendation 17) meant that operators of fillet

[14] The term "soaking nets" refers to the practice of lifting the trawl net off the bottom and away from fish, and towing the net until such time as sufficient factory space becomes available to process the catch.

vessels could pack fillets in any form they wished, provided all parts of a fillet were accounted for.

Recommendations 27 and 28 related to aspects of the functionality of an electronic catch effort reporting tool that was never developed.

Recommendation 31 related to accurate reporting of fish going to meal. One component of this recommendation, developing techniques for quantitative speciation of fish to meal, has been investigated but has proven problematic. The other component of the recommendation, engagement with vessel operators has been progressed, with operators being requested to document and submit vessel procedures relating to the quantification and reporting of whole and processed fish to meal. Currently, procedures are periodically verified and audited by Observers and Fishery Officers.

Inshore and "fresher" vessels have not been included in the hoki profiles (*recommendation 32*), however some monitoring of the inshore fleet has occurred since 2012 and future monitoring has been planned.

Vessel inspection templates continue to evolve (*recommendation 33*) to ensure information is gathered in a consistent manner and have been used as a guideline in subsequent hoki inspections since 2012.

Recommendations 39 and 41 related to HMAs and investigating non-compliance with fisheries legislation by vessels fishing in those areas. Any evidence of non-compliance with legislation, including the specific aspects of non-compliance identified in those recommendations, is investigated by MPI regardless of where a vessel is fishing and appropriate action taken where necessary.

In reference to Greenpeace's concerns over the lack of prosecutions, a ***summary of prosecutions and convictions*** (please see Table below) was provided to the assessment team by MPI. In all cases the vessels were forfeited and none have returned to the fishery.

Vessel (x defendants)	Dates of offending (Year convicted)	Total Fines	Amount of fish illegally discarded **(as per Court's decision)**	Vessel forfeited
Vessel A (3 x defendants)	May to July 2007 (convicted 2009)	$147,500 + costs of $140,111.67	'At least 12 tonnes was discarded but likely much more than this. From the estimates given (and whether it was 12 or 50 tonnes) there was substantial quantities.' (primarily hoki)	Yes.
Vessel B (5 x defendants)	March to June 2011 (convicted 2012)	$524,500	347 tonnes of ITQ fish species (including hoki)	Yes…Vessel owner in memo to Court has agreed to pay $750,000 relief from forfeiture. This is delayed due to a third party currently taking action on behalf of Indonesian crew.

Vessel C (1 x defendant)	December 2010 to October 2011 (convicted 2014)	$127,500	74 tonnes ITQ fish (primarily hoki)	Yes…Vessel owner in memo to Court has agreed to pay $525,000 relief from forfeiture.
Vessel D (2 x defendants)	June 2012 and January 2013 (convicted 2014)	$111,140	120 tonnes of hoki over seven trips	Yes…$145,428.41 paid by company as relief from forfeiture
Vessel E (3 x defendants)	2011 (convicted 2015)	$298,500	70-300 tonnes of Barracuda 200-500 tonnes hoki	Yes…Company walked away from vessel. Vessel remained forfeited and was sold for scrap.
	TOTALS	**$1.349 million in fines**	**823,000kgs to 1,391,000kgs of ITQ fish**	

MPI is working with the New Zealand Defence Force to carry out a follow up exercise for the 2018 West Coast South Island hoki fishery. As of 30th June 2018, 11 vessels have been boarded at-sea and inspected.
Additionally, Fisheries New Zealand observers on board hoki boats continue to collect data that supports ongoing analyses of conversion factors, adherence to processed state definitions, and adherence with the law.

Greenpeace were also concerned there were financial incentives to illegally under-report catch of quota species and to dump low value species. All catches of species managed under the QMS are required by law to be accurately recorded, reported and landed with a few prescribed exceptions for landings. Deemed values prevent an incentive for dumping. Deemed values are payable for QMS species caught without balancing ACE (Annual Catch Entitlement). Where deemed values are payable for QMS species taken without balancing ACE, the deemed value is set at a level to remove any financial benefit to industry to catch but at a level that will not incentivise what would be illegal discarding. The penalties for discarding QMS species without authorisation are severe, further reducing the incentives to discard.

Following a review in 2011 of the operation of foreign vessels operating under charter to New Zealand in 2011, at least one Fisheries New Zealand observer was placed on all foreign-chartered vessels from 1 October 2012. From 1 May 2016, all vessels were required to re-flag to New Zealand, however Fisheries New Zealand has continued to place at least one observer on board all foreign owned vessels operating in New Zealand waters. This has resulted in an increase in total coverage across a range of deep-water fisheries, in particular those with a high level of fishing effort by foreign owned vessels.
In general, this has resulted in an increase in observer coverage on trawl vessels >28m LOA from around 20% to around 45% of tows observed per year, with up to 100% coverage on vessels deemed to be “high risk”.

In conclusion, the assessment team have reviewed the issues raised by Greenpeace as a result of reading the leaked compliance report. MPI have provided evidence to support their stance that the issues raised by Operation Bronto have been addressed. The evidence above shows the report resulted in a number of recommendations and improvements as well as informed subsequent prosecutions. The review of the present state of compliance within the fishery, show that P3 management requirements according to the MSC standard are met. No changes to the scores are required.

WWF

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Department		
Position	Environmental Campaigns Manager, WWF New Zealand	
Description	WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which people live in harmony with nature, by: • conserving the world's biological diversity • ensuring that the use of renewable natural resources is sustainable • promoting the reduction of pollution and wasteful consumption.	
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Assessment Details	
Fishery	New Zealand Deepwater Group hake, hoki, ling and southern blue whiting
CAB	Acoura

Assessment Stage* Clicking on the section numbers will bring you to the appropriate section for providing input to the respective assessment stage. It is only necessary to complete those sections corresponding to stages where you wish to comment.	
	Fishery announcement and stakeholder identification—go to section 1 Opportunity to indicate that you are a stakeholder and identify other stakeholders.
X	**Defining the assessment tree—go to section 2** Opportunity to review and comment on the assessment tree in relation to the fishery if a modified tree is used.
	Information gathering and stakeholder meetings—go to section 3 Opportunity to engage with and provide information to the CAB about the specific details and impacts of the fishery.
X	**Public review of the draft assessment report—go to section 4** Opportunity to review and comment on the draft report, including the CABs draft scoring of the fishery.
	Annual surveillance—go to section 5 Opportunity to provide information to the CAB about any changes in the fishery since certification and/or the achievements made towards conditions.
* Note, to register an objection following the publication of the Final Report and Determination, please see www.msc.org/get-certified/fisheries/assessment/objections.	

• **SECTION 4** • Return to Page 4

Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
☒ Public review of the draft assessment report[5] **Opportunity to review and comment on the draft report, including the draft scoring of the fishery.**	**New Zealand Deepwater Group hake, hoki, ling and southern blue whiting**	**25 May 2018**	**WWF**

☐ I wish to comment on the evaluation of the fishery against specific Performance Indicators.
A table with these indicators and the scores and rationales provided by CABs can be found in Appendix 1 of the draft assessment report.

Nature of comment *(Please insert one or more of these codes in the second column of the table below for each PI.)*

1. I do not believe all the relevant information[6] available has been used to score this performance indicator *(please provide details and rationale)*.
2. I do not believe the information and/or rationale used to score this performance indicator is adequate to support the given score[7] *(please provide details and rationale)*.
3. I do not believe the condition set for this performance indicator is adequate to improve the fishery's performance to the SG80 level[8] *(please provide details and rationale)*.
4. Other *(please specify)*

Performance Indicator	Nature of Comment Indicate relevant code(s) from list above.	Justification Please support your comment by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.
Example: PI 1.1.2, Stock Rebuilding	**2**	**The CAB gave a score of 80 for this PI. The 80 scoring guidepost asks that there is evidence that rebuilding strategies are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within the timeline specified. However, no timeline has been specified based on previous performance or simulation models.** *[add more rows as needed]*

Comment		Nature of Comment	Justification Please attach additional pages if necessary.
☒	I wish to provide general comments about the assessment of this fishery against the MSC Fisheries Standard.	Other (Process Issues): Fishery assessed against FCRv1.3; assessment delays	Please see attached.

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25 May 2018

WWF's concerns regarding the process for re-assessing hake, hoki and ling

Dear Acoura Assessment Team,

We are writing to express our serious concerns regarding potential procedural errors in the re-assessment of the New Zealand Deepwater Group Hake, Hoki, Ling and Southern Blue Whiting fisheries. These fisheries are significant not only for their economic importance but also because of the impacts they can have on the marine environment, in particular through the use of bottom trawling and through the bycatch of threatened species.

Of greatest concern is that we understand MSC actively intervened in order to enable two of the four fisheries to be re-assessed using the old MSC 1.3 requirements, and not the current, improved MSC 2.0 requirements that should be being applied to all fisheries.

WWF has, as much as possible, been an active stakeholder in the NZ fishery assessments since 2001 and in the early stages of development we invested major resources to constructively work on improvements in the hoki fishery and to uphold a rigorous interpretation and implementation of the MSC standard. We recognised the areas of good performance in these fisheries and welcomed their improvements in practice. However, we also identified limitations in the management and became increasingly frustrated that our comments, especially in relation to Principle 2, were mostly neglected during the last assessments.

We acknowledge that we are raising these concerns partway through the process, but it is not possible for WWF to fully engage in every MSC assessment, surveillance audit and re-assessment. However, ideally, clear procedures and robust systems should not need constant scrutiny. It is therefore both troubling and disappointing to find that the MSC's requirements are not being correctly applied and that the most up to date standard (MSC 2.0) is not being used to re-assess hake and ling.

As a result, necessary improvements in the environmental performance and the commitments of these fisheries will be postponed for another 5 years.

Several variation requests have been granted in regard to the re-assessment of these fisheries that we believe are not consistent with MSC requirements, and which could undermine the integrity of the MSC standard. MSC requirements should be met across all fisheries and only in exceptional and well-justified circumstances should be there any variations. However, we do not believe such exceptional circumstances existed in these recent re-assessment processes.

We provide more detail on these concerns below.

Variation requests Hake and Ling 03/04/2017: Fisheries entered re-assessment under FCR v1.3 and having had only two surveillance audits.

Two of the four fisheries in the combined re-assessment have certificates that are valid until 15th September 2019 (hake and ling) and therefore should be re-assessed applying the MSC 2.0 standard (v2.0 FCR-7.23.7). We therefore do not understand why MSC granted two standard variation requests allowing them to prematurely enter re-assessment shortly before the MSC 2.0 implementation timeframe ended. In order to allow four NZ certified fisheries to go through reassessment at the same time it would have been more consistent that all four fisheries had to apply the MSC 2.0 requirements and not to gift two fisheries additional years to be certified with the outdated standard. There are no exceptional, well-justified circumstances why the hake and ling fisheries should not progress with the same speed as the other fisheries that achieved certification in 2014.

The differences between the MSC 2.0 and MSC 1.3 requirements are not trivial. For example, a new requirement has been introduced for fisheries to regularly review bycatch mitigation measures, and implement them where appropriate, so as to minimise mortalities of unwanted catch or of ETP species (PI2.1.2e, PI 2.2.2 e, PI 2.3.2 e). Also habitat protection requirements were improved in FCRv2.0 and are now more in line with the FAO Guidelines, including definitions of vulnerable marine ecosystems (VMEs) and additional requirements for their protection (SA 3.13.3.2, PI 2.4.1 b, PI 2.4.2d).

MSC 2.0 also requires a cumulative impact analysis of all MSC certified fisheries in the area, including the habitat impacts. We understand that the client has, by bundling the four fisheries together, enabled the CAB to undertake such an analysis but we are concerned that this analysis will not take into account the impacts of the other MSC certified fishery – orange roughy – that crosses over some of the same fisheries management areas as hake, hoki and ling.

We would also like to highlight the non-transparency of the variation requests for hake and ling (variation request 03/04/2017). The CAB explicitly stated that this change (earlier re-assessment) doesn't impact the assessment while in reality it has major consequences for the assessment (i.e. which assessment tree is used). Stakeholders were not informed about this implication.

Variation request New Zealand Deepwater Group Hake, Hoki, Ling and Southern Blue Whiting 16/02/2018: Delay in PCDR

Acoura was not able to finalize the PCDR within the planned timeline. CR procedures relating to v2.0 FCR-7.3.4 state that if the period from full assessment announcement to the receipt of the Public Comment Draft Report by the MSC exceeds 9 months the CAB shall open a new consultation phase and review the outcomes of any scoring of the fishery previously undertaken against the most recent version of the MSC Certification Requirements (7.3.4.3 b). This would have been the correct procedure. However, a variation request was made and granted although there were no exceptional circumstances supporting such request. As justification for the variation request Acoura stated that the team leader had been absorbed into a separate fishery objection procedure that was unplanned and required a heavy burden in workload. And it was not considered appropriate to replace the team member given the expertise required for the reassessment of the Deepwater Fisheries.

Acoura is referring to the re-assessment and objection procedure of the PNA Western and Central Pacific skipjack and yellowfin, un-associated / non FAD set, tuna purse seine fishery. However, the heavy burden in workload and the objection in this certification process were definitely not unforeseeable or exceptional. On the contrary, an extensive and very critical stakeholder submission was provided to the PNA assessment

WWF

team as early as October 2016. The subsequent stakeholder input after the publication of the PCDR in June 2017 was again very critical, detailed and extensive and the stakeholder already complaint that the issues raised during site visit and the previous submission were not appropriately addressed by the assessment team. At this point in time it was already foreseeable that an objection would be raised if the CAB decided to certify this controversial fishery. Additionally, we cannot follow the rationale why the team member's special expertise was irreplaceable in both fisheries, given the fact that the two fisheries (PNA purse seine tuna and NZ deepwater) target different species, impact different ecosystems, utilize different gear types and operate under different management systems.

Insufficient personnel resources and time mismanagement by the CAB cannot be treated as exceptional circumstances.

We would also like to highlight that MSC set the following condition for granting the variation request: "The CAB can confirm the fishery remains in adherence to the MSC requirements". However, two months later the CAB had to acknowledge that one Unit of Assessment does not meet the MSC requirements (variation request 10/04/18).

Variation request New Zealand Deepwater Group Hake, Hoki, Ling and Southern Blue Whiting 10/04/18: Delay in PCDR

Again, Acoura was not able to finalize the PCDR within the planned timeline. The MSC standard dictates that in such a circumstance, the CAB should open a new stakeholder consultation phase and review the scoring outcomes against MSC 2.0.

However, the CAB explained that "due to other commitments the peer reviewer is currently unavailable". This raises the question why it was not possible for the CAB and peer reviewer to agree on a fixed "time window" for review. This should have happened two months ago before the first deadline variation request was submitted to MSC (16/02/2018). Again, insufficient personnel resources and time mismanagement by the CAB cannot be treated as exceptional circumstances.

We hope that you will be able to respond to these concerns, particularly in relation to the application of MSC 2.0, because although WWF may not be able to fully engage with these re-assessments it is vital that the correct standards and procedures are applied in order to maintain the integrity of the MSC.

Yours Sincerely,

Peter Hardstaff

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CAB Response

Variation requests Hake and Ling 03/04/2017

We accept that WWF's suggestion to reassess using V2.0 is a valid option, but we followed procedure according to the MSC implementation timelines and a variation request was given by the MSC. The CR is clear that fisheries entering assessment before the 1st October 2017 can continue to use V1.3.

The MSC process does not allow for consultation during the variation request process. Stakeholders were notified of the posting of the request and MSC's response, and if there are queries we welcome feedback at that point.

Variation request New Zealand Deepwater Group Hake, Hoki, Ling and Southern Blue Whiting 16/02/2018: Delay in PCDR

The objection to the PNA fishery was not upheld, and given the quality and quantity of the work put in we had every reason to believe the fishery would pass without an objection. Whether expected or not, the assessor's experience in both fisheries, regardless of whether they are different types of fisheries, meant removing them and replacing them would have had serious consequences for either fishery assessment. None of these decisions are taken lightly and without careful consideration of the consequences. We plan effectively, though we cannot foresee every situation and occasionally something has to give. Again, we followed procedure and requested a variation request which the MSC accepted.

At the time of the acceptance of this variation, with the information we had available we had no reason to believe the Southern Blue Whiting Unit of Certification (UoC) wasn't meeting the standard. As WWF correctly points out we withdrew the UoC as soon as we became aware of the change.

Variation request New Zealand Deepwater Group Hake, Hoki, Ling and Southern Blue Whiting 10/04/18: Delay in PCDR

It is impossible to agree on a 'fixed time window' for peer review, there are too many considerations for both the nominated peer reviewers and those responsible for the assessment to do so (NB. this should not be an issue in the future with the use of the Peer Review College). We strive to plan as much as possible but on this occasion, there was a clash of commitments and we dealt with this accordingly, again following procedure by submitting a variation which was accepted. We detailed the full circumstances and rationale in the request which were enough for the MSC to accept this as exceptional circumstances.

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SUSTAINABLE FISHERIES

26 May 2018

Public Comment Draft Reports for the New Zealand Hoki, Hake, Ling and Southern Blue Whiting Fisheries

Deepwater Group Ltd (DWG) would like to thank Acoura for their comprehensive re-assessments of New Zealand's hoki, hake, ling and southern blue whiting fisheries.

We offer some suggestions, corrections, and further information on these fisheries.

Ling longline recommendation

Acoura recommended for the ling longline fishery that:

"…a review of the data available from the increased observer coverage of the 2016/17 season is conducted at the earliest possible opportunity, to update the understanding of the fishery with respect to ETP species interactions."

While we support this being undertaken, this does not need to be included as a recommendation, as observer data are routinely reviewed by the Ministry for Primary Industries (MPI) and reported during their Environmental Engagement Forum meetings and in their Annual Review Reports.

Observer data from the 2016-17 season will be reported in MPI's Annual Review Report (ARR) for 2016-17. MPI have advised that this report has recently been completed and will be uploaded to their website in the near future.[1] Analyses of observer data from deep water fisheries are publicly available and are updated annually on the Dragonfly Data Science website.[2]

MPI advised at the Environmental Engagement Forum in April 2018 that they are planning 400 observer days in the ling longline fisheries (LIN3-7) during 2018-19.

Seabirds

Forest & Bird has expressed concerns with Salvin's albatross captures.

It is worth noting that the most recent risk assessment estimates that it would take more than 3,500 mortalities from fishing to adversely affect the Salvin's population. This number is well in excess of the estimated captures from the MSC Certified fisheries and is well in excess of the estimated captures from all New Zealand fisheries.

We understand that Forest & Bird has also raised concerns that best practice mitigation measures have not been identified or applied in New Zealand, that the NPOA-Seabirds has limited effectiveness and that fisheries are not demonstrating continuous improvement in bycatch rates.

New Zealand's NPOA-Seabirds is effective and includes all of the key components as outlined in the FAO Technical Guidelines for best practices to reduce incidental catch of seabirds.[3] These include:

- Mandatory mitigation measures

[1] https://www.mpi.govt.nz/growing-and-harvesting/fisheries/fisheries-management/deepwater-fisheries/
[2] https://data.dragonfly.co.nz/psc/
[3] http://www.fao.org/3/a-i1145e.html

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- Mitigation research, including the improved bird baffler design developed and tested for large trawlers in 2015 and a project which is assessing the factors contributing to net captures
- Education, training and outreach through the Environmental Liaison programme
- A comprehensive observer programme to assess bycatch and to collect data including reporting seabirds released alive, which no other country does
- Catch reduction objectives, including specific capture rate reduction targets developed and agreed for selected deepwater fisheries and included in the 2016-17 Annual Operational Plan (AOP, p.20-22 including Table 6 "Deepwater Capture Rate Reduction Targets")
- Monitoring and reporting of the implementation of the NPOA
- 5-yearly review of the NPOA, which is currently underway and should be completed this year, as well as annual reviews of capture estimates and observer data to assess whether further management or science is required when developing Annual Operational Plans.

The target seabird capture reduction rate for "Middle-depth trawl fisheries (>28m)", which includes hoki, hake, ling and some Tier 2 species, is 2.3 seabird captures per 100 tows (Table 6, p.22 of the AOP). The target is set for the end of the five-year period of the NPOA-Seabirds and based on a three-year rolling average. We don't have to hand the current rate for all "Middle-depth trawl fisheries (>28m)" as defined by this target. However, we can request this information from MPI and, meantime, can provide the rate for the hoki, hake and ling fisheries (>28m) which shows that the rate has been decreasing and averaged 2.48 captures per 100 tows over the last three years, despite an increase in observer coverage and an increase in birds released alive (Figures 1 and 2). Further, estimated captures for these fisheries has been reduced from 679 in 2002-03 to 250 in 2015-16, a 63% reduction. This was during a period of increased observer coverage, increasing the certainty of observation and increasing the focus on observing and on recording these occasional capture events.

The AOP also outlines the planned services for 2016-17 to continue to progress the five-year objectives of the NPOA-Seabirds and to reduce captures further (p.23).

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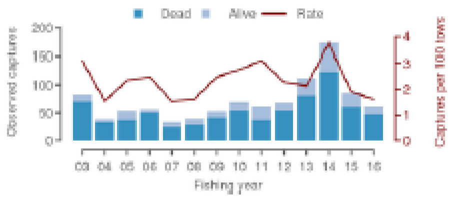

Figure 1 Observed captures of all birds by large (>28m) vessels in the hake, hoki and ling trawl fisheries

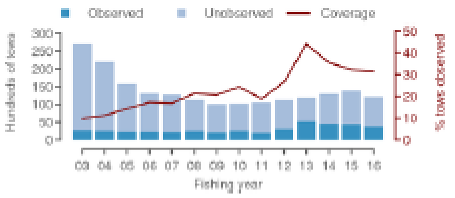

Figure 2 Fishing effort and observations on large (>28m) vessels in the hake, hoki and ling trawl fisheries

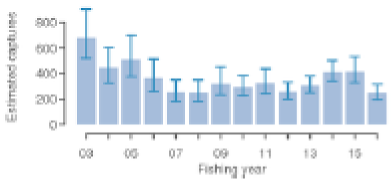

Figure 3 Estimated captures of all birds by large (>28m) vessels in the hake, hoki and ling trawl fisheries

While the AOP specifies plans to implement the NPOA-Seabirds, the ARR reviews progress and performance against the NPOA-Seabirds including in regard offal management and Vessel Management Plans (VMPs). Overall, 160 interim trip reports relating to observed trips on deepwater vessels were completed in the 2015-16 year. Of these 160 trip reports only 1 report gave a 'C' rating because "Offal management was inadequate" (Table 11, p.35 of the ARR). There were 12 trips that required follow up in relation to offal management related issues (Table 21, p.41 of the ARR). The number of trips that required VMP-related reviews has also decreased over time with 31 reviews in 2013-14, 25 in 2014-15 and 17 in 2015-16 (Table 20, p.41), again demonstrating continuous improvement. The amount of offal being released has been significantly curtailed as 66% of the trawl freezer fleet have fish meal plants, compared with only 30% in 2006. All but two of the remainder have offal mincers.

The above matters all serve to demonstrate that there has been continuous improvement in both effective mitigation and in reducing the numbers of seabird captures in these fisheries.

While net captures are proving to be more challenging to mitigate than warp captures, the risk assessment has assessed the levels of captures to not be adverse to seabird populations, using what are considered by experts to be very conservative assumptions (including those for cryptic mortality levels). Net capture records by observers include reports that a large proportion of these birds are now being released alive. In

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2015-16 36% of the 53 observed seabird net captures in the hoki, hake and ling trawl fishery were released alive.

To our knowledge, New Zealand is the only country that reports captures and releases of live seabirds.

The suggested use of 'best practice' binding and weighting of nets are not relevant to captures on hauling gear. Neither are they utilised by any other fishery in the world as their efficacy is dubious, despite being reported as being best practice by parties who, presumably, are working off theory and not of real-world experiences with seabird interactions.

We offer the following comments on the observation on the overlap between the hoki fishery and the foraging range of Westland Petrels:

- The Westland Petrel population has continued to increase in size since the 1970s (Waugh *et al.* 2015 and Waugh *et al.* 2018).
- Fishery activity was strongly correlated with adult survival (Waugh *et al.* 2015 p.147) – 63% of food provided by adults to their chicks was identified as being sourced from fishing vessels (offal and the like) (Ibid p.151).
- There was a rapid increase in petrel numbers in the 1970s and 1980s as fishing activities offshore and adjacent to their nesting sites on the West Coast of the South Island increased (Ibid p.158).
- There are negligible captures of Westland Petrel in the hoki fishery (Waugh *et al.* 2015, p.151; Waugh *et al.* 2018, p. 381).
- There may be substantial benefits to seabirds from their access to near-surface food in close proximity to fishing vessels (Waugh *et al.* 2015, p.158).
- Fisheries observers have recorded very few Westland Petrels caught (Ibid, p.158).
- Since 1970, population growth of Westland Petrel has been most strongly related to the Southern Oscillation Index and not to fishery factors (Waugh *et al.* 2018, p.373).

We understand that ACAP is undertaking a global review of NPOAs for seabirds around the world and that New Zealand's NPOA-Seabirds ranks highly. DWG understands that this paper is not yet published. If you would like further information, we suggest that you discuss this directly with ACAP.

Compliance in the Hoki Fisheries

On 24 May 2018, a confidential internal MPI Compliance report on their 'Operation Bronto' was leaked to the media by Greenpeace. Operation Bronto was a compliance risk profiling exercise that was undertaken in relation to the West Coast South Island hoki fishery in 2011.

The contents of this report, which have not been made publicly available by MPI, need to be considered in the broader context, being but one of a number of processes employed by MPI Compliance to monitor activities and to ensure high levels of compliance in New Zealand's deep water fisheries, including those for hoki.

MPI Compliance has advised: *"The reason we haven't released the full document is because to do so, we would reveal our analytical techniques and compromise our ability to monitor compliance effectively in the future. It isn't a "secret document that was 'hidden' from the public" – it was, as above, a document that outlines a risk profiling exercise. We do not release these documents as a matter of course due to the above. The fact we did this exercise, demonstrates we are proactively monitoring and identifying potential compliance risks."*

MPI Compliance has previously discussed these matters with Acoura's assessors during past certification audits, advising that these risk profiles are common practice, that they form an integral part of good fisheries management, and that they are helping to deliver very high levels of compliance in the deep water fisheries.

In essence, the contents of the information in the leaked report is not new information to Acoura. The following is an excerpt from Acoura's 2016 Hoki Surveillance Report:

"The MPI compliance team completed a compliance risk assessment review in 2011 and updated this in 2012. Since then, there have been four prosecutions all relating to discarding. Senior officers and the company received fines and the vessels were seized. All the vessels involved have left New Zealand and ceased trading. The new foreign charter regulations make it more difficult for foreign vessels to operate, as they must be NZ flagged and subject to NZ legislation. The MPI Compliance Manager reported that the hoki fishery is compliant with fisheries law."

The National Deepwater Fisheries Plan requires regular risk assessments by MPI Compliance of the performance of each of the deepwater fisheries. As part of this, several risk assessments have been undertaken by MPI Compliance on the hoki fisheries including the one in 2011.

The risk assessment process is designed to inform compliance action and to support effective fisheries management. It forms an integral part of MPI's 'VADE' compliance approach, the objective of which is to deliver very high levels of compliance, using a range of effective monitoring and auditing techniques.

VADE stands for 'Voluntary, Assisted, Directed and Enforced'. Informed and assisted measures by MPI Compliance are the first stage of this sequential approach, which, if not effective are followed up by direction to operators on how to act/not act in certain ways. Should that not prove effective, MPI Compliance then collect information for use as an evidential basis for enforcement through prosecution in the Courts. The penalties upon conviction are severe, including automatic forfeiture of vessels.

Vessel operators are all mindful of their legal obligations and of the penalties and work assiduously to ensure that they do not intentionally breach the law and the very complex technical requirements required when processing fish at sea and accounting for product weight against GWT and ACE. There are many complex operational and interpretative challenges, and these are changed by MPI from time to time (e.g. application of the appropriate cuts and conversions of whole fish to products onboard factory trawlers, obtaining and applying Vessel Specific Conversion Factors on a year-round basis during which the condition of fish changes greatly, and assessing product weights when packed in cartons). It is primarily the potential risks in these areas that the 2011 hoki risk profiling exercise was focussed on assessing.

The methodologies used in these compliance risk profiling exercises are designed to identify risks of non-conformance. They do not affirm to an evidential standard non-compliance with legislation. The leaked internal report is not an evidential document. Where concerns of possible non-compliance behaviours are identified these are subsequently referred for corrective action by industry or formal investigation.

In 2012, MPI Compliance met and discussed the key findings from their 2011 hoki risk profile with vessel operators. Remedial actions were set in place by MPI and vessel operators in response, prior to the 2012 hoki season. MPI have advised that this risk profile found no evidence to contemplate prosecutions – but that they would have laid prosecutions if they had found evidence.

MPI Compliance work with a range of stakeholders, including industry, to ensure any potential risk behaviours are changed to give greater confidence that deepwater fishing activities remain fully compliant with the legislative requirements.

This particular risk assessment was undertaken nearly a decade ago – things have moved on a long way since then and many of the vessels identified as 'high risk' at that time no longer operate in New Zealand waters. There is now 45% observer coverage across the deepwater trawl fleet and up to 100% observer coverage in fisheries and on vessels considered to be high risk.

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Since 2011, MPI Compliance has undertaken further risk profiles of the hoki fishery including one in 2012. MPI Compliance has advised that their subsequent assessments confirm that the remedial actions have been effective in changing behaviours and reducing the potential risks in the matters raised in the 2011 report.

MPI routinely provide reports on compliance performance to stakeholders through the Deepwater Compliance Group and the Annual Review Report. The most recent Annual Review Report for 2015-16 notes: *"The 2015 monitoring showed that compliance had continued to improve in both HOK and SBW fisheries"* (p.19).

In addition to these risk profiles, in 2013 MPI introduced 'interim observer trip reports'. These reports are sent to vessel operators within a few days of the completion of an observed trip. Fifteen questions are answered by the observer to provide more immediate feedback to vessel operators on a variety of factors. Questions are answered with a rating of A, B, C or N/A. It is considered that ratings of A and B are acceptable performance.

Overall, 160 interim trip reports relating to observed trips on deepwater vessels were completed in 2015-16. The majority of factors were rated A (81%) or B (7%). During 2015-16, only five C ratings were given by observers (i.e. less than 1%).

Table 1: Summary of 2015-16 interim trip reports where a 'C' rating was given (MPI Annual Review Report for 2015-16, p.35)

Factor	Number of 'C' ratings
Accurate identification of QMS species	1
Offal management was inadequate	1
Process for discarding QMS species	1
No valid system to quantify fish to meal	2

All of the above information demonstrates that appropriate and effective measures are in place to monitor, to detect and to respond to potential risks, to non-compliant activities, and to successfully prosecute where deliberate offending is detected.

The 2011 risk assessment did not determine the actual amounts of hoki that were not being reported, that was not the objective. In assessing the application of conversion factors and the processes then being used to determine carton weights, the exercise assessed the risk that there might be quantities of unreported hoki. The quantum of catch estimated in the report as potentially being at risk was between 3,414 t and 3,555 t. Clearly both MPI Compliance and vessel operators were focussed on changing operating procedures and policies to ensure the actual level was nowhere near this potential level and both moved quickly to ensure this would not be the case.

It is important to recognise, even if real, the quantities of hoki estimated to be at risk in 2011 did not cause any sustainability risk to the hoki stocks. The hoki TACC is set after MPI has included an allowance for "other sources of fishing mortality". In 2010-11 this allowance was set at 1,200 t. In 2010-11, the TACC was set at 120,000 t and the catch was 118,805, some 1,195 t less than the TACC. On this basis there was an inherent built in 'buffer' of some 2,385 t before the level of sustainable catch, as assessed by MPI, would have been reached.

In the event that all of the catch assessed in the 2011 audit as being at risk of not being reported is included, the quantity is too small to materially affect the status of either hoki stock. Both hoki stock sizes have been estimated to be above their management targets since 2010. In 2012 the Eastern and Western stock sizes were estimated to be 47% and 41% B_0 respectively and the 2018 assessment update estimated them to now be 54% and 64% B_0 (see 'Updated stock assessments' below).

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We urge Acoura to obtain further information from MPI Compliance should you have any concerns about either the effectiveness of the current management regime, compliance by vessels operating in the hoki fishery or concerns about the sustainability of either hoki stock under the current fisheries performance.

Corrections

In the hoki, hake and ling trawl PCDR, arrow squid is noted as not being a QMS species (p.92). This is incorrect. Both species of squid (*N. sloanii* and *N. gouldii*) are managed under the QMS species. Information on the arrow squid stocks is outlined in Volume 1 of the Fisheries Assessment Plenary (p.59-73).

There are a few "Error! Reference source not found" within the report that need fixing (e.g. p.43 of the HHL PCDR).

In the hoki, hake and ling trawl compliance section, on p.113 you state *"there have been no major issues of non-compliance in the ling fisheries in recent years (pers. Comm. Garry Orr),"* do you mean for this to also include and refer to the hoki and hake fisheries? We note his name is "Gary" not "Garry".

Updated stock assessments

For your reference, updated stock assessments for hoki and ling have become available since your site visit. We understand that, while this may not need to be incorporated into the current MSC re-assessment, we are signalling this to you as information and may be considered as part of the next surveillance audit.

In 2018, a new stock assessment was undertaken by NIWA for the LIN 5 & 6 (Sub-Antarctic) stock. The base case model estimates the stock to be at 88% B_0 (75-101%). MPI has advised that they will consult on a review of the LIN5 TACC for 2018-19, possibly an increase of 10-20%.

In 2018, updated stock assessments were also undertaken by NIWA for both of the HOK 1 stocks. The base case model estimates the Eastern stock to be 54% B_0 (39-77%) and the Western stock to be 64% B_0 (44-86%). No review of the TACC, or of the catch limits for each stock, is being proposed for 2018-19.

Question on PI 2.5.2

As a matter of interest, we would like to know what further linkages would be required to satisfy SG 100 of PI 2.5.2. You note that the *"individual measures are not sufficiently linked to be considered a strategy"*. The National Deepwater Plan guides deepwater fisheries management with Part 1: the strategic direction, Part 2: the annual operational plans and Part 3: the annual review reports reporting progress and performance.

What further linkages would be required to satisfy SG100?

Regards,

Sharleen Gargiulo
Sustainable Fisheries Manager
Deepwater Group Ltd

Deepwater Group also included a copy of Waugh et al., 2015 and the "MPI update to operators re HOK and SBW 2016", available here and Waugh et al., 2015 available here.

CAB Response

Acoura appreciate the comments on the PCDR.

DWG Point: Ling Longline Recommendation:

While we support this being undertaken, this does not need to be included as a recommendation, as observer data are routinely reviewed by the Ministry for Primary industries (MPI) and reported during their Environmental Engagement Forum meetings and in their annual report.

CAB response. The assessment team contacted MPI asking if they have already or intend to conduct a review as part of a routine process. The following is their response:

> *The final 2016/17 Annual Review (attached) provides the most recent information on observer coverage in deepwater fisheries, including for ling bottom longline. As mentioned in previously emails, the statistics for observer coverage and seabird captures are available on the Protected Species Capture website, however at this stage these are only available to Aquatic Environment Working Group members. We are happy to provide access to that website if desired (noting the need to comply with the Terms of Reference of the Aquatic Environment Working Group).*
>
> *It has also been confirmed that we have planned 400 days for ling bottom longline observer coverage in the 2018/19 financial year. This is intended to provide an increase in coverage of ling bottom longline to approximately 25% of hooks.*

The Assessment Team notes that Recommendations are non-binding but subject to reporting in future audits. We believe that setting a Recommendation is a worthwhile and appropriate approach to facilitate tracking and following-up on important issues. For Recommendation 2, in essence the Assessment Team is keen to understand what the new data show and whether the enhanced coverage levels indicate any changes to risk levels for seabird species. Both Recommendations [1) PI 2.1.3, SIa – bait, and 2) PI 2.3.3 SIa – observer data] are therefore retained.

DWG Point: Seabirds:

CAB Response: The CAB's response to the Forest and Bird stakeholder submission fully addresses the concerns raised.

DWG Point: Compliance in the Hoki fisheries:
CAB Response: This information was provided to the assessment team and is reflected in our report. However it does provide additional useful information which can be incorporated into responses to stakeholders concerns about compliance. The CAB's response to the NABU and Greenpeace stakeholder submission fully addresses the concerns raised.

DWG Point: Corrections
CAB Response: Thank you for these, the corrections have been made.

DWG Point: Updated Stock assessments
CAB Response: Thank you for the notification of the updated stock assessments. These will be considered at the 1st surveillance audit should the fishery be certified.

DWG Point: Question on PI 2.5.2
CAB Response: Thank you for the question. As a CAB, we are not able to give consultation on what is required for a score to be made. Our justifications for the scores given are in the scoring table. Information on scoring justifications and guidance for scoring 2.5.2 are available in CR V1.3.

MSC Technical Oversight

SubID	PageReference	Grade	RequirementVersion	OversightDescription	Pi	CABComment
28762	145-146	Major	FCR-7.10.6.1 v2.0	PI 1.1.1. scoring issue b: HAK 7 UoA: The team presents information relevant to the target reference point (TRP = 40%B0) for the HAK7 stock that shows that two equally plausible stock scenarios exist from two different assessment methods. The estimates of the current stock status from the CPUE method is 50.3% B0 (95% CI 34.6 – 73.6%) and the survey method is 25.7% B0 (95% CI 19.1 – 36.5% B0). Further, in the body of the report, Figure 19 shows that the survey method indicates a continual downward trend in the stock status for the HAK 7 stock. Within Guidance GSA2.2.2, SG80 is suggested to not be met for PI 1.1.1 si b, when there is "a consistent downward trend over recent years to levels below BMSY…..unless accompanied by projections or other information suggesting that the trend will soon be reversed." Given 1) the equal likelihood that the CPUE or survey method provides the actual stock status, and 2) the estimate for the survey method of 25.7%B0 is less than 40%B0 and is accompanied by a consistent downward trend to	1.1.1,	Assessments of the HAK 1 and HAK 4 stocks have benefited from long time series of survey data which is not the case with HAK 7 where only four years (2000, 2012, 2013 and 2016) of survey data are available. Thus, the HAK 7 assessments have had to rely on the longer time series of CPUE data (annual, since 2000). With the addition of the 2016 data to the survey time series, it has become apparent that there is a conflict between the trends in the CPUE and survey indices. In the 2017 assessment, to determine the uncertainty caused by this discrepancy, the DWFAWG conducted two models of stock status, each based on the separate survey and CPUE indices, rather than conducting one model using both indices, which is normal practice. The two models indicate that biomass steadily declined from 1988 to a time series low in 2009 owing to high levels of exploitation and the recruitment of below average year-classes. The trends of the two models then diverge with the survey model indicating that biomass has stopped declining and has modestly recovered but remains below $B_{40\%}$, while the CPUE model indicates that biomass has more rapidly

				this estimate, the rationale does not justify the score.		recovered to above $B_{40\%}$. For both models, projections to 2021 indicate that biomass is expected to increase assuming average recruitment and catch similar to recent levels. Regarding Figure 19, it is thus not correct to state that the 'survey method indicates a continual downward trend in the stock status for the HAK 7 stock". To inform harvest advice, MPI (email to Acoura team of 15 August 2017) considers that the two models span a range of stock status which includes the management target ($40\%B_0$) in the most recent year. Given there is uncertainty in the point estimates of 2016 biomass, MPI is using the lower of the two estimates to drive precautionary action, but it noted that the DWFAWG considered that the two potential outputs ($26\%B_0$ vs $50\%B_0$) to be equally plausible and therefore, it shouldn't be considered that the stock is consistently below the target reference point. The Acoura team notes that if 2016 biomass were in the middle of the range of stock status uncertainty, it would be at $38\%B_0$ or within 5% of the $40\%B_0$ target. The Acoura assessment team considered that this determination of stock status along with the uncertainties in the assessment in its scoring

						consideration. The 2017 assessment highlighted the uncertainty in the trawl survey data, specifically noting that relatively few years of data are available (four), which affords considerable influence of each survey point on the analysis (see Figure 38). Also, the areal coverage of the trawl survey series is relatively sparse and does not survey the entire area off WCSI where hake are known to be abundant. There are also issues with the CPUE series since 2001 relating to changes in fishing technology and in the commercial (economic) desirability of hake that are not captured in the QMS effort statistics, preventing standardization analysis. Notwithstanding this, in all three hake stocks (HAK 1, HAK 4 and HAK 7), due to a decline in market interest, the TACCs have not been caught since at least the mid-2000s. In the HAK 7 fishery, there have also been changes in fishing practices such as gear used, tow duration, and strategies to limit hake bycatch. These imply that recent hake catch rates may be biased downwards. It is interesting to note that the exploitation rates of the HAK 1 and HAK 4 stocks, which were relatively high in the early-mid 2000s, have subsequently declined to relatively low levels due to this declining market interest. Such is the case in the CPUE

						model of the HAK 7 stock but not the survey model where no recent decline in exploitation is estimated. The Acoura team have amended the background text and scoring rationale to better explain the basis of the scoring. Nevertheless, given the stock status determination of MPI and the uncertainties in the assessment, the Acoura team considers that the stock is at or fluctuating around the target, scoring SG80, but not with a high degree of certainty, so not scoring SG100.
28763	171	Major	FCR-7.10.6.1 v2.0	PI 1.2.4. scoring issue a: HAK 7 UoA. When assessing the stock assessment approaches for HAK 7, the assessment team states "The process(es) which are causing the difference in the survey and CPUE trends are not fully understood which indicates that some major feature of the stock, the fishery and its monitoring is not being taken into account in the models." As per PI 1.1.1., the survey method and CPUE method estimate the stock status as 25.7% B0 and 50.3% B0, respectively. Given the discrepancies presented by the team and that both methods are "are equally plausible" and the harvest control rule would act in different ways dependant on the outcome of both methods, the rationale does not justify the score.	1.2.4,	The primary issue being considered in the scoring of SIa is the discrepancy in the CPUE and survey data trends which has emerged since the last (2013) assessment. If these were comparable, both time series would be included in the same model, as is the case with the HAK 4 assessment. MPI (2017a) is concerned that the trawl surveys may not be representative of the total stock, which may be a source of this discrepancy. The Acoura team thus considers that some major feature relevant to the biology of the species requires examination to resolve this issue. It considers that the SG80 score is valid but has edited the scoring rationale to include the concerns of MPI on the survey index.

28764	161-163	Major	FCR-7.10.6.1 v2.0	PI 1.2.2. HAK 7 UoA: scoring issue a: The team states for justifying that scoring issue a is met at SG80, that the "HSS states that the probability of breaching the soft limit should not exceed 10% and that the probability of achieving the MSY-compatible target or better should be no less than 50%." Further that "The HSS thus states the need for action to reduce exploitation when stock status is below the target" and a rebuilding plan needs to be developed when the "probability that stock biomass is below this soft limit is greater than 50% probability" The team states in the assessment report that for the HAK7 stock, based off the survey method, there is a 40-60% chance of being below the soft limit. Further, according to Figure 19, the stock status based off the CPUE method recently approached the soft limit (approx. 2010). Given the TACC has remained unchanged since the late 2000s (Table 26), it is unclear 1) how management has responded to the state of this stock and 2) if, based off the stock status of the survey method, "a formal rebuilding plan to achieve target biomass within a specified period" has been developed for the HAK7 stock.	1.2.2,	MPI considers that the determination of stock status is uncertain but that it should be not considered as consistently below the management target (40%B_0). It has taken precautionary action to reduce the risk of stock depletion. During 2017, MPI undertook public consultations (MPI, 2017d) during which it proposed two options (excluding status quo) of a reduction in the TACC under section 13(2) of the Act to maintain HAK 7 at or above a level that can produce MSY. The options differed in terms of the economic and social considerations balanced against the sustainability risk. The proposed change in the TACC was also intended to minimize the probability of the stock dropping below the 20% B_0 Soft Limit in the short term while additional investigation is completed, after which the TACC may be reviewed. Option 1 was developed based upon five-year average catch and would result in a TACC reduction of 42% (from 7,700 to 4,519 t) while option 2 (MPI preferred) was based on 80% probability that the stock remain above the Soft Limit in 2019 assuming optimistic recruitment. This would result in a TACC reduction of 34% (from 7,700 to 5,120 t). The Minister of Fisheries ultimately reduced the TACC to 5,064 t (MPI, 2017e). MPI (2017d) states that future decisions regarding the HAK 7

				Scoring issue b: As stated in other parts of the report, there appears to be uncertainty in determining the status of the HAK 7 stock that is not accounted for in the HCR. Scoring issue c: The main tool presented by the assessment team for achieving exploitation levels is the implementation of the TACC and Annual Catch Entitlement. However, it is not clear how these have been applied/not applied in the case of the HAK 7 stock given the "equally plausible" scenario that the stock is at 25.7%B0. The team has stated that MPI are taking the precautionary approach and is "proposing a reduction in the TACC" though this seems to not have occurred. Thus, for all scoring issues in respect to HAK 7, the rationale does not justify the score.		fishery will be informed by (i) upcoming analysis of fleet wide catch per unit effort (CPUE) data and modelling expected in the 2017/18 fishing year; (ii) a trawl survey in mid-2018; and (iii) a full stock assessment in 2018/19 (brought forward from 2019/2020). These initiatives should assist in reducing the level of uncertainty. Additional management action is likely to be taken based on the updated information. Re SIa, it is clear that MPI has responded to the state of the stock and is taking precautionary action to reduce exploitation to maintain biomass at the 40%B_0 target and minimize the risk of breaching the 20% Soft Limit. MPI does not consider that stock status is below the 20% Soft Limit and therefore a formal rebuilding plan is not required. Re Sib, it is clear that the uncertainties highlighted in the 2017 stock assessment were taken into account during the 2017 MPI consultations and deliberations through the short-term stock projections based upon the pessimistic survey model. Re SIc, MPI has taken precautionary action by reducing the TACC by 34% (from 7,700 to 5,064 t) to ensure that biomass remains above the 20%B_0 Soft

						Limit with 80% probability by 2019. Further subsequent action will be based upon a full stock assessment to be conducted in 2018/2019 (brought forward from 2019/2020). The Acoura team considers that the actions of MPI and NZ Minister of Fisheries provide evidence that the HCR is appropriate and is being applied as per its stipulations. The 2017 MPI HAK 7 consultation and decision documents were not available during initial drafting of the assessment report and thus were not fully documented in the report, a situation which has been rectified.
28772	N/A	Minor	FCR-7.10.6.1 v2.0	PI 2 (all relevant Sis). General Requirements for Principal 2: ACB3.1.2. The assessment should make a consideration of both observed and unobserved fishing mortality. In this context it's unclear in the relevant rationales (e.g. 2.1.1/2.1.2, 2.2.1/2.2.2; 2.3.1/2.3.2) how unobserved mortality has been considered (e.g. considerations and management of discarded "ghost gear" and mortality relevant to discards where relevant).		For the hoki, hake and ling trawl fishery, there would be no 'discarded' gear, and although trawl sections or panels may be lost if the gear is hung up on a bottom obstruction, typically only small quantities of netting would be lost, and it is unlikely that this would result in ghost fishing in any case due to the relatively thick twine and small mesh size of trawl netting (in comparison to gillnets, the loss of which may result in ghost fishing in some circumstances). It is noted that the loss of an entire trawl net would be a serious issue due to the cost of replacement, and skippers would doubtless make very strenuous efforts to retrieve a trawl if one was lost.

						With respect to mortality relevant to discards, it is noted that the assessment of impacts on retained and discarded species is based on observer data of 'catches', adjusted to the fleet (i.e., Table 37). Therefore, for retained and discarded species it is simply assumed that all catches (whether subsequently retained or discarded) result in mortality – no assumptions have been made that any retained or bycatch species (i.e., those assessed under PI 2.1.1/2.1.2 and PI 2.2.1/2.2.2) would survive if released. The assessment report stated in Section 4.3.2 (P. 86) that "*Under the CR v.1.3 (MSC 2013a), retained species are those that are "retained by the fishery (usually because they are commercially valuable or because they are required to be retained by management rules)", while bycatch species are "Organisms that have been taken incidentally and are not retained (usually because they have no commercial value)". However, in common with most other fisheries, it is not necessarily the case that all individuals of a particular species are either retained or discarded in the New Zealand hoki, hake and ling trawl fishery – some individuals of each species may be retained, while others*

						of the same species may be discarded. Therefore, while the classification of a species as 'retained' or 'discarded' may be somewhat arbitrary, it has been carried out for the purposes of the reassessment of the fishery on the basis of the observer data showing the most common fate for each species." For ETP species (i.e., those assessed under PI 2.3.1/2.3.2), the risk assessment process for seabirds and marine mammals does account for some level of survival when animals are caught and released alive. For example, for seabirds, Richard et al. 2017 estimated the proportion of captures released alive from the observer data, and half of half of the seabirds the live releases were assumed to survive on average.
28773	196	Major	FCR-7.10.6.1 v2.0	PI 2.3.1. Scoring Issue C. Marine Mammals. Score of 80 achieved however it's unclear what how the team as considered the relative impact of the fishery in the context of relevant populations of New Zealand Fur Seals: the team have presented total fishery related mortality rates but have not presented what those rates/trends mean in terms relevant quantitatively described populations.	2.3.1,	The MSC have confirmed that this should be addressed at SIb, not Sic. We respond accordingly. As noted in the assessment report in PI 2.3.1 SIb, the comment for fur seals that "*some of the population data are quite old and there may be differential effects of the fishery between colonies*" is with respect to the fishery not meeting SG100. This must be balanced with the information that "*colony observations over recent years have generally indicated a trend of increasing*

						population size, and the most recent threat assessment for New Zealand marine mammals (Baker et al. 2016) classified New Zealand fur seals as 'Not threatened', on the basis that it is a resident native species with a large, stable population." In essence, the Assessment Team does not have information that allows it to determine the differential impact of the fishery on fur seals from different colonies, but the population is doing well overall, with no indication that the fishery is hindering recovery. This means that the fishery meets SG80 ("*Direct effects are highly unlikely to create unacceptable impacts*") clearly, but not SG100 ("*There is a high degree of confidence that there are no significant detrimental direct effects of the fishery*").
28774	197	Minor	FCR-7.10.6.1 v2.0	PI 2.3.1.Scoring Issue C. All Elements. SG 80 scored however it's unclear from the rationale how indirect effects identified have been considered by the team (or specifically considered through the 2010 Ecological Risk Assessment referenced).	2.3.1,	The Ecological Risk Assessment (ERA) method that was used to assess the direct and indirect effects of the fishery on ecosystem components was a qualitative process (that used the available quantitative information) similar to an MSC 'scale-intensity-consequence-analysis' – SICA). For the ERA, members of an expert panel progressed sequentially through three main steps: (i) the examination of sources of risk; (ii) an assessment of the potential consequences of those

						risks and; (iii) the likelihood of a particular level of consequence occurring from the target fisheries. Scores were given to the potential consequence (six levels from negligible to catastrophic) and to the likelihood of that consequence (remote to likely) using a set of standard tables that describe each level. As noted in the assessment report, the ERA did not identify any moderate or major indirect effects of the fishery on ETP species.
28775	203	Minor	FCR-7.10.6.1 v2.0	PI 2.3.3. Scoring Issue B. Seabirds. SG80 achieved however it's unclear how the team considered impact of species with no or zero interaction data (e.g. Table 8.19 - Gibsons Albatross, Antipodean Albatross etc.)	2.3.3,	Please note, Table 40 in the hoki, hake and ling trawl fishery assessment report (Median risk ratio and 95% confidence limits for seabird species rated very high, high or medium risk) has been replaced with an updated version that now includes information from Richard et al. 2017. This also makes the hoki, hake and ling trawl fishery assessment consistent with those for the ling longline and southern blue whiting fisheries. There are now data for all species considered very high, high or medium risk, and these data show that the hoki, hake and ling trawl fishery accounts for small or very small amounts of the total fisheries-related mortality of species other than Salvin's albatross (17.70%), Westland petrel (16.67%), southern

						Buller's albatross (39.58%), New Zealand white-capped albatross (14.67%), northern Buller's albatross (13.60%) and northern giant petrel (27.66%). When considering these catches against the Population Sustainability Threshold (PST) for each species, however (as now shown in the updated Table 41), the highest relative mean APF is for southern Buller's albatross (209 animals from a PST of 1,370 animals, or 15.3% of the PST). The upper 95% C.I. of the APFs are also substantially less than the lower 95% C.I. of the PSTs. This indicates that there is a high degree of confidence that there are no significant detrimental direct effects of the fishery on seabirds (i.e., SG100 for PI 2.3.1 SIb), and that information is sufficient to determine whether the fishery may be a threat to protection and recovery of seabird species (i.e., SG80 for PI 2.3.3 SIb). We have made changes to the scoring text of PI 2.3.1 specifically to reflect this better, updated information on seabirds.
28776	106, 206	Major	FCR-7.10.6.1 v2.0	PI 2.4.1. Scoring Issue A. It's unclear how assessment team has characterised the habitats in context of CB3.14.3. For example the assessment team has included three	2.4.1,	CB 3.14.3 requires that: "*The team shall consider the full extent of the habitats when assessing the status of habitats and the impacts of fishing, and*

				habitat types (upper and mid-slope sand and muds and boulder/outrcops) in their assessment but it's unclear whether others are impacted. It's also unclear whether habitat classes been aggregated in the context of the assessment.		*not just the part of the habitats that overlap with the fishery*". At the start of the scoring text for PI 2.4.1 SIa, the report stated the following, which has now been revised as follows (in blue underlined): "*For the assessment of the hoki, hake and ling trawl fishery, main habitats (scoring elements) are considered to be upper and mid-slope sands and upper and mid-slope muds within the New Zealand EEZ, with boulder/bedrock outcroppings with emergent fauna within the New Zealand EEZ as the minor habitat (noting that protected corals are scored as ETP Species in PI 2.1.3 – 2.3.3).*" We have also included a scoring calculation for each UoC which shows how element scoring has been undertaken. We believe this addresses the TO comment.
28777	196	Major	FCR-7.10.6.1 v2.0	PI 2.3.1. Scoring Issue A. Seabirds. Direct Effects of the fishery are well documented in the rationale (e.g. specific UoA related mortality) but what's unclear is how the team have considered (SG80) that Fishery related impacts are highly likely to hinder recovery of Salvins Albatross. For example how does the team consider that 13% fishery linked	2.3.1,	Please see response above against 28775, which addresses this point also.

				mortality of Salvins Albatross is not having hindering the recovery of this species?		
28778	128	Guidance	FCR-7.12.2 v2.0	The PCDR states that "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 or to the primary processing facility which initially received the product." It is unclear whether the primary processing facility is the landing point and whether it is intended to be included in the fishery certificate or if such facilities must hold their own CoC certification.		This sentence has been clarified. Mention of the primary processing facility has been removed.

Appendix 4. Surveillance Frequency

Table 4.1: Surveillance level rationale

Year	Surveillance activity	Number of auditors	Rationale
1	Review of Information	1 auditor, off-site	There are no conditions following this re-assessment.

Table 4.2: Timing of surveillance audit

Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
1	September 2019	September 2019	To line up with the anniversary date.

Table 4.3: Fishery Surveillance Program

Surveillance Level	Year 1	Year 2	Year 3	Year 4
Level 1	Review of information audit	Review of information audit	Off-site surveillance audit	On-site surveillance audit & re-assessment site visit

Appendix 5. Objections Process

No objections were received.