Seafood Risk Assessment

New Zealand Bluenose Fishery

Prepared for the OpenSeas Programme

New Zealand Bluenose Fishery	Unit/s of Assessment:	
	Product Name/s:	***Bluenose***
	Species:	*Hyperoglyphe antarctica*
	Stock:	BNS1, BNS2, BNS3
	Gear type:	Bottom longline (BNS1), Demersal Trawl (BNS2, BNS3)
	Year of Assessment:	2017

Fishery Overview

This summary is adapted from MPI (2017):

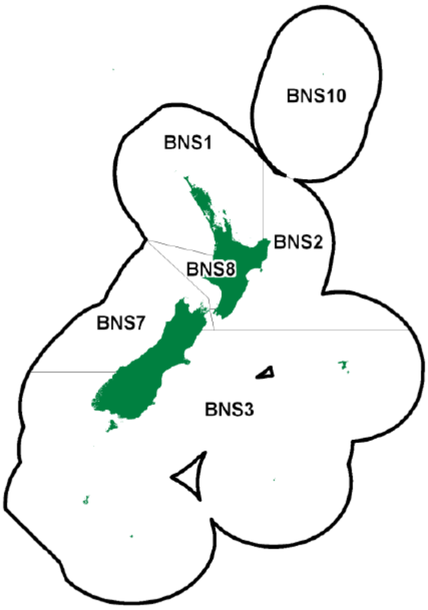

Figure 1: Management areas for the New Zealand bluenose fishery.

Bluenose have been landed since the 1930s, although the target line fishery for bluenose only developed in the late 1970s, with the trawl fishery on the lower east coast of the North Island developing after 1983. The largest domestic bluenose fisheries occur in BNS 1 and 2. Historically, catches in BNS 2 were predominately taken in the target alfonsino and bluenose trawl fisheries, but have been primarily taken by target bottom longline fishing in recent years. There is a target line fishery for bluenose in the Bay of Plenty (BoP) and off Northland (BNS 1).

TACCs were first established for bluenose upon introduction to the QMS in 1986‑87, with TACCs for all bluenose stocks totalling 1350 t. From 1992 to 2009 all bluenose Fishstocks were included, for at least some of the time, in Adaptive Management Programmes (AMPs). As a result of the TACC increases under AMPs, the combined total TACC for all bluenose stocks increased from an initial 1350 t in 1986‑87 to 3233 t by 2004‑05.

Under a rebuild plan following the 2011 stock assessment, there have been further phased reductions to TACCs for bluenose stocks. On 1 October 2011, TACCs were reduced to: 571 (BNS 1), 629 (BNS 2), and 248 (BNS 3); BNS 7 and BNS 8 were not reduced at that time. On 1 October 2012, TACCs were further reduced for all bluenose stocks to: 400 (BNS 1), 438 (BNS 2), 171 (BNS 3), 62 (BNS 7) and 29 (BNS 8). A third phase of TACC reductions was introduced in the 2016-17 fishing year, with the overall TACC reduced to 900t.

Catch performance against the TACC has varied, with the combined TACC being undercaught by an average 9% (average landings 1504 t / year) over 1987‑88 to 1990‑91, over-caught by an average 11% (average landings 2501 t / year) over 1991‑92 to 2000‑01, and under-caught by an average 20% (average landings 2602 t / year) from 2004‑05 to 2007‑08.

Bluenose is targeted by recreational fishers around deep offshore reefs. They are caught using line fishing methods, predominantly on rod and reel with some longline catch.

Three separate 'units of assessment' are assessed in this report:

- BNS 1 – bottom longline;
- BNS 2 – Trawl; and
- BNS 3 – Trawl.

Scoring

Performance Indicator	BNS1 - BLL	BNS2 – Trawl	BNS3 – Trawl
COMPONENT 1			
1A: Stock Status	PRECAUTIONARY HIGH RISK	PRECAUTIONARY HIGH RISK	PRECAUTIONARY HIGH RISK
1B: Harvest Strategy	PRECAUTIONARY HIGH RISK	PRECAUTIONARY HIGH RISK	PRECAUTIONARY HIGH RISK
1C: Information and Assessment	LOW RISK	LOW RISK	LOW RISK
OVERALL	HIGH RISK	HIGH RISK	HIGH RISK
COMPONENT 2			
2A: Non-target Species	PRECAUTIONARY HIGH RISK	PRECAUTIONARY HIGH RISK	PRECAUTIONARY HIGH RISK
2B: ETP Species	HIGH RISK	LOW RISK	LOW RISK
2C: Habitats	LOW RISK	LOW RISK	LOW RISK
2D: Ecosystems	LOW RISK	LOW RISK	LOW RISK
OVERALL	HIGH RISK	MEDIUM RISK	MEDIUM RISK
COMPONENT 3			
3A: Governance and Policy	LOW RISK	LOW RISK	LOW RISK
3B: Fishery-specific Management System	LOW RISK	LOW RISK	LOW RISK
OVERALL	LOW RISK	LOW RISK	LOW RISK

Summary of main issues

- Depending on the estimate of natural mortality used, the bluenose stock is estimated to range from 17-27% B_0.
- Following the 2011 stock assessment, a rebuilding plan was introduced which involved stepped reductions in the TACC. Stock projections at the current TACC of 900t indicate the stock should grow, although the rate of growth depends on estimates of stock recruitment, steepness and natural mortality used.
- The stock status of main bycatch species, including hapuku (longline) and alfonsino (trawl), is unknown.
- The bluenose bottom longline fishery has a bycatch of black petrels. Recent preliminary risk modelling indicates the median risk ratio for black petrels across all New Zealand commercial fisheries is higher than its population sustainability threshold (PST).

Outlook

BNS1 - BLL

Component	Outlook	Comments
Target species	Improving	All stock projections point to an increase in the stock in coming years. Work is underway on a management procedure to guide the rebuilding plan.
Environmental impact of fishing	Uncertain	Estimates of risk to seabird species have been continuously refined over recent years and have generally resulted in lower estimates of overall risk, including to the highest risk species taken in the BNS BLL fishery, black petrel. Additional independent observations of seabird interactions will better inform risk assessments.
Management system	Stable	No major changes are expected to C3 risk scoring

BNS2 – Trawl

Component	Outlook	Comments
Target species	Improving	All stock projections point to an increase in the stock in coming years. Work is underway on a management procedure to guide the rebuilding plan.
Environmental impact of fishing	Stable	No major changes are expected to C2 risk scoring
Management system	Stable	No major changes are expected to C3 risk scoring

BNS3 - Trawl

Component	Outlook	Comments
Target species	Improving	All stock projections point to an increase in the stock in coming years. Work is underway on a management procedure to guide the rebuilding plan.
Environmental impact of fishing	Stable	No major changes are expected to C2 risk scoring
Management system	Stable	No major changes are expected to C3 risk scoring

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Background

This report sets out the results of an assessment against a seafood risk assessment procedure, originally developed for Coles Supermarkets Australia by MRAG Asia Pacific. The aim of the procedure is to allow for the rapid screening of uncertified source fisheries to identify major sustainability problems, and to assist seafood buyers in procuring seafood from fisheries that are relatively well-managed and have lower relative risk to the aquatic environment. While it uses elements from the GSSI benchmarked MSC Fishery Standard version 2.0, the framework is not a duplicate of it nor a substitute for it. The methodology used to apply the framework differs substantially from an MSC Certification. Consequently, any claim made about the rating of the fishery based on this assessment should not make any reference to the MSC or any other third party scheme.

This report is a "live" document that will be reviewed and updated on an annual basis.

Methods

Risk Assessment

Detailed methodology for the risk assessment procedure is found in MRAG AP (2015). The following provides a brief summary of the method as it relates to the information provided in this report.

Assessments are undertaken according to a 'unit of assessment' (UoA). The UoA is a combination of three main components: (i) the target species and stock; (ii) the gear type used by the fishery; and (iii) the management system under which the UoA operates.

Each UoA is assessed against three components:

1. Target fish stocks;
2. Environmental impact of fishing; and
3. Management system.

Each component has a number of performance indicators (PIs). In turn, each PI has associated criteria, scoring issues (SIs) and scoring guideposts (SGs). For each UoA, each PI is assigned one of the following scores, according to how well the fishery performs against the SGs:

- Low risk;
- Medium risk;
- Precautionary high risk; or
- High risk

Scores at the PI level are determined by the aggregate of the SI scores. For example, if there are five SIs in a PI and three of them are scored low risk with two medium risk, the overall PI score is low risk. If three are medium risk and two are low risk, the overall PI score is medium risk. If there are an equal number of low risk and medium risk SI scores, the PI is scored medium risk. If any SI scores precautionary high risk, the PI scores precautionary high risk. If any SI scores high risk, the PI scores high risk.

For this assessment, each component has also been given an overall risk score based on the scores of the PIs. Overall risk scores are either low, medium or high. The overall component risk score is low where the majority of PI risk scores are low. The overall risk score is high where any one PI is scored high risk, or two or more PIs score precautionary high risk. The overall risk score is medium for all other combinations (e.g. equal number of medium/low risk PI scores; majority medium PI scores; one PHR score, others low/medium).

Outlook

For each UoA, an assessment of the future 'outlook' is provided against each component. Assessments are essentially a qualitative judgement of the assessor based on the likely future performance of the fishery against the relevant risk assessment criteria over the short to medium term (0-3 years). Assessments are based on the available information for the UoA and take into account any known management changes. Outlook scores are provided for information only and do not influence current or future risk scoring.

Table 1: Outlook scoring categories.

Outlook score	Guidance
Improving	The performance of the UoA is expected to improve against the relevant risk assessment criteria.
Stable	The performance of the UoA is expected to remain generally stable against the relevant risk assessment criteria.
Uncertain	The likely performance of the UoA against the relevant risk assessment criteria is uncertain.
Declining	The performance of the UoA is expected to decline against the relevant risk assessment criteria.

Information sources

Information to support scoring is obtained from publicly available sources, unless otherwise specified. Scores will be assigned on the basis of the objective evidence available to the assessor. A brief justification is provided to accompany the score for each PI.

Assessors will gather publicly available information as necessary to complete or update a PI. Information sources may include information gathered from the internet, fishery management agencies, scientific organisations or other sources.

Assessment Results

COMPONENT 1: Sustainable target fish stocks

1A: Stock Status

CRITERIA: (i)The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing.

(a) Stock Status **PRECAUTIONARY HIGH RISK**

MPI (2017) reports that bluenose stock boundaries are unknown, but similarity in trends in catch and CPUE across fisheries occurring in each of the five New Zealand BNS QMAs suggests the possibility that there may be a single BNS stock across all these areas, or of some close relationship between stocks in these QMAs.

The first fully quantitative stock assessment modelling for bluenose was carried out in 2011. Models were implemented in the general purpose Bayesian stock assessment program CASAL. This assessment was updated in 2016, using standardised CPUE series and catch histories to 2014‑15 (Bentley 2016; in MPI, 2017). Both assessments assumed a single New Zealand stock of bluenose.

Initial testing indicated that the assessment was sensitive to the assumed catch history, natural mortality, and stock-recruitment steepness. As a result, the working group agreed to present results from a “grid” of 18 model runs in which these three parameters were varied (MPI, 2017).

Estimates of stock size in 2016 ranged from 17‑27% *B_0* (MPI, 2017). Biomass was estimated to have declined continuously from the 1980s to 2011 and then to have either levelled off or increased slightly. Biomass has been below the default 40% B_0 target since around 2000.

The medium risk scoring guidepost against this performance indicator requires that it is “likely that the stock is above the point where recruitment would be impaired (PRI)”. The MSC Certification Requirements v2.0 set a default PRI level of 20% B_0 and defines ‘likely’ in a probabilistic context, requiring that there be at least a 70% probability that the scoring guidepost is met. While model runs with low natural mortality (M=0.06) estimated 2015 biomass at >20% B_0, those with higher natural mortality (M=0.08, 0.10) estimated biomass to be below20% B_0. Although the ‘true’ level of natural mortality is not known with certainty, it is not clear from the most recent model results that there is at least 70% probability of the stock being above 20% B_0. On this basis, the medium risk scoring guidepost is not met. Nevertheless, for at least plausible estimates of M the stock is estimated to be above 20%B_0. Accordingly, we have scored this SI precautionary high risk.

PI SCORE	PRECAUTIONARY HIGH RISK – BNS1, BNS2, BNS3

1B: Harvest Strategy

CRITERIA: (i) There is a robust and precautionary harvest strategy in place.

(a) Harvest Strategy **PRECAUTIONARY HIGH RISK**

The harvest strategy in the commercial bluenose fisheries consists of:

- Catch controls through TACs and ITQs;
- Disincentives to over-catch through application of deemed values;
- Gear restrictions;
- Monitoring through logbooks and catch returns;
- Monitoring through VMS on some vessels; and
- Periodic review of stock status and recommended TAC levels through the MPI Working Group process.

TACs and TACCs are set according to the NZ Harvest Strategy Standard which establishes default target (25% - 45% B_0, depending on the productivity of the stock), soft limit (20% B_0) and hard limit (10% B_0) reference points which guide Ministry advice to the Minister (MFish, 2008; MFish, 2011). Under the Standard, TACs are set at levels that aim to maintain biomass at levels consistent with the Target Reference Point (TRP), a breach of the soft limit triggers a requirement for a formal, time-constrained rebuilding plan and a breach of the hard limits leads to consideration for closure.

MPI (2017) report that “*deterministic projections to 2050 were carried out as part of the 2011 and 2016 assessments, maintaining the 2009–10 ratio between catches from the line and trawl fisheries. For a stock below the soft limit of 20% B_0, the time required for SSB to rebuild to 40% B_0 with no future catch is called T_{min}. Although the point estimates for some runs with low M are above 20% B_0, the time required to rebuild to 40% B_0 was calculated for each run and is denoted as T_{min}. The estimates of T_{min} established using the 2011 assessment range from 10 to 13 years. Catches at the level of the 2015‑16 TACC were predicted (2016 assessment) to cause the stock to increase, but not nearly fast enough to attain the biomass target within the rebuild time frame. The maximum constant catches estimated by the 2016 assessment (and to be implemented in 2016‑17) that allow a rebuild to 40% B_0 within twice the 2011 T_{min} (the maximum rebuilding time under the Harvest Strategy Standard) range from 600‑840 t.*”

Following the 2011 assessment, a rebuilding plan to reduce catches and rebuild the stock to target levels within twice T_{min} was developed (MPI, 2017). The objective of the rebuild is to reach the 40% target by 2031-2037 (within 2 x TMIN from the 2011 assessment) (MPI, 2016a). Two stepped reductions in TACC were implemented and a third was initially put on hold following a substantial increase in the standardised CPUE abundance indices. In the October 2016 round of sustainability measures, the Minister reduced the BNS TACs and TACCs by approximately 20% (overall TAC reduction from 1195 tonnes to 990 tonnes) (Guy, 2016). MPI (2016a) advised that TAC reductions of this level were more likely to put the stock on course to achieving the rebuild than the status quo, however they would need to be supported by further work in the short term to ensure that rebuild objectives are met.

Of the six stock projections undertaken using different combinations of stock recruitment, steepness and natural mortality (with mid-level catch history) at a TACC of 900t, only one achieved the target within the time frame (MPI, 2016a) (Figure 2). Guy (2016) noted that he had "*not taken stronger action this year because I want to provide the opportunity for a management procedure/decision rule to be developed. However, if such a procedure cannot be agreed over the coming year then I will look to review the stock again based on the best available information and make whatever changes are necessary to ensure rebuild of the fishery with the timeframe and targets currently set*."

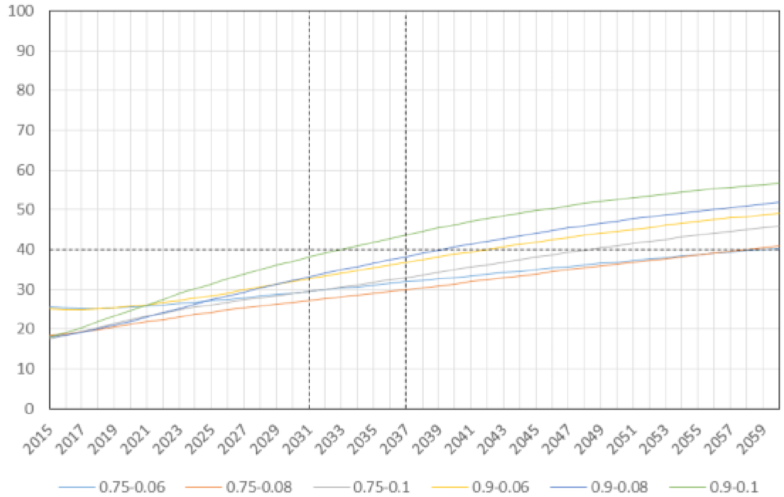


Figure 2: Stock status (%B0) trajectories at 900t TACC under different combinations of stock recruitment steepness, natural mortality, based on the mid-level catch history. (from MPI, 2016a)

On the basis that the majority of stock projections under the 900t TACC do not meet the rebuild target within the required timeframe (or the MSC's maximum rebuilding timeframe of 20 years), the UoAs do not appear to meet the medium risk SG. Nevertheless, the stock trajectory for all projections is upwards with only the timing of rebuild to target levels differing. All projections have the stock exceeding the soft limit (20%B_0) by around 2021. Accordingly, there does not appear to be a serious sustainability problem and we have scored this SI precautionary high risk.

(b) Shark-finning

NA

CRITERIA: (ii) There are well defined and effective harvest control rules (HCRs) and tools in place.

(a) HCR Design and application **LOW RISK**

The bluenose UoAs are covered by the requirements of the *Fisheries Act 1996* to maintain stocks at levels capable of producing MSY or higher [e.g. sub-section 13(2A) states that "*if the Minister considers that the current level of the stock or the level of the stock that can produce the maximum sustainable yield is not able to be estimated reliably using best available information, the Minister must … (c) set a total allowable catch … (ii) that is not inconsistent with the objective of maintaining the stock at or above, or moving the stock towards or above, a level that can produce the maximum sustainable yield*"], and the NZ Harvest Strategy Standard (HSS) which requires QMS stocks to be maintained at or above a target equivalent to B_{MSY}, and above a soft limit equating to ½ B_{MSY} (MFish, 2008). The HSS requires that target and limit biological reference points be set for all QMS fishstocks but is flexible about the means by which this is achieved. The intention is to make best use of available information for each individual stock.

The harvest strategy has the key elements needed to ensure that exploitation is reduced as PRI is approached; a sound and measurable index of relative biomass, a suite of performance measures based on these estimates of relative biomass, and a TAC adjustable annually. While there is no formal mathematical harvest control rule (HCR) for this stock, there is a process in place to identify, examine and respond to issues of declines in the bluenose stock, and a suite of available tools to implement reductions in exploitation if needed. Action taken to reduce the TACs in response to the 2011 stock assessment provides evidence that the management system is willing to reduce exploitation as PRI is approached. Similar measures have been sufficient to meet at least the SG80 mark in full MSC assessments for other NZ deepwater fisheries (e.g. hoki, southern blue whiting). To that end, we have scored these UoAs low risk.

Notwithstanding that, we note that stakeholders have recently begun exploring the use of pre-agreed management procedures as a means of guiding recovery of the bluenose stock to target levels (MPI, 2017). The preferred approach appears to be using a predefined CPUE trajectory with changes made to the total allowable commercial catch (TACC) when the smoothed CPUE index deviates from the defined trajectory. Further development of the management procedure is expected in the coming year and should be considered in future assessments.

PI SCORE	PRECAUTIONARY HIGH RISK – BNS1, BNS2, BNS3

1C: Information and Assessment

CRITERIA: (i) Relevant information is collected to support the harvest strategy.

(a) Range of information LOW RISK

Sufficient information is available on stock structure and productivity and fleet composition to support the harvest strategy. Tagging studies have shown that bluenose are capable of extensive migration and similarities across catch and CPUE trends in different BNS areas suggest the possibility the BNS forms a single stock in New Zealand waters (MPI, 2017). Adjustments to the TAC in recent years have assumed a single stock and have reduced TAC/TACC proportionally.

Notwithstanding some uncertainties (e.g. natural mortality, reproductive biology), there is a sufficient understanding of the biology of bluenose to support the harvest strategy (see summary in MPI, 2017). There is very good monitoring of catch and effort through the QMS system with VMS and some validation from independent observers. The available data are sufficient to support a high quality stock assessment and stock projections to support a rebuilding plan.

(b) Monitoring and comprehensiveness LOW RISK

Commercial removals from the UoA are closely monitored through the QMS reporting arrangements, with some level of validation from observers. Recreational catches are minor compared to commercial catch and are estimated periodically. Most recently, recreational catches were estimated across all BNS stocks using a 'panel survey' method. No quantitative information customary catch is available, though anecdotal information suggests that catch is small.

Historical standardised line and trawl CPUE is used in stock assessments as separate indices of abundance. This information is sufficient to support the HCRs.

CRITERIA: (ii) There is an adequate assessment of the stock status.

(a) Stock assessment LOW RISK

The available stock assessment is appropriate for the stock and estimates stock status relative to reference points that are appropriate to the stock and can be estimated. Assessments use the general purpose Bayesian stock assessment program CASAL and use catch, CPUE (line and trawl), length frequency and age frequency as data inputs. The 2016 stock assessment was rated 'high quality' by the relevant working group (MPI, 2017).

(b) Uncertainty and Peer review LOW RISK

The models consider the uncertainties and MPI (2017) document the main assumptions for all models. The assessments were considered by the MPI Fishery Working Group, including independent scientists, who review the data and the model assumptions before agreeing on accepted models. The results were then published in MPIs Fisheries Assessment Plenary Report (MPI 2017). The assessment process considers the main uncertainties and includes a sufficient review process and as such this SI is scored as low risk.

PI SCORE	LOW RISK – BNS1, BNS2, BNS3

COMPONENT 2: Environmental impact of fishing

2A: Other Species

CRITERIA: (i) The UoA aims to maintain other species above the point where recruitment would be impaired (PRI) and does not hinder recovery of other species if they are below the PRI.

(a) Main other species stock status

The intent of this scoring issue is to examine the impact of the UoA on 'main' other species taken while harvesting the target species. 'Main' is defined as any species which comprises >5% of the total catch (retained species + discards) by weight in the UoA, or >2% if it is a 'less resilient' species. The aim is to maintain other species above the point where recruitment would be impaired and ensure that, for species below PRI, there are effective measures in place to ensure the UoA does not hinder recovery and rebuilding.

BNS1 - BLL PRECAUTIONARY HIGH RISK

Limited information is available publicly on the full catch composition of the bluenose bottom longline fishery. MPI (2017) notes that "*other commercially important species taken when longlining for bluenose are ling, hapuku and bass*." Pierre (2015) indicates that discards in BNS1 range from between 7.7%–8.4% of the total landings of all species, based on unpublished data from MPI. Data provided by Bentley et al (2013) suggests that bluenose account for the majority of the retained catch in bluenose targeted fisheries in the north east of the North Island, with hapuku (*Polyprion oxygeneios*) and bass (*P. americanus*) accounting for 8% and ling accounting for 3% (Figure 3). Assuming the discarded species are made up of a number of species, such that none would individually meet the threshold of 5% of the total catch to be considered 'main', the only main other species group is hapuku/bass.

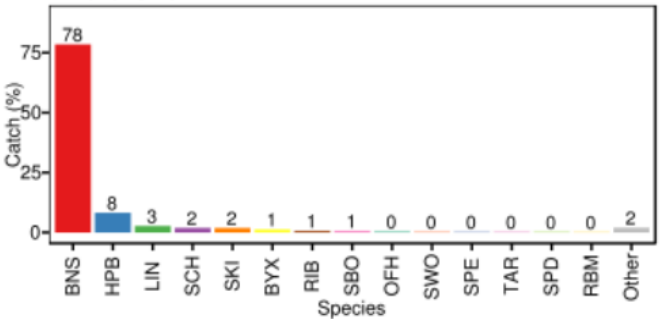


Figure 3: Catch composition from the bottom longline fishery targeting bluenose in BNS 1 (Bentley et al, 2013)

The HPB QMA overlaying BNS 1 is HPB 1. MPI (2017) report that existing data cannot describe the stock structure of New Zealand groper and that electrophoretic studies suggest that separate stocks of hapuku could occur.

There are no estimates of current biomass are available for HPB 1. MPI (2017) reports that it is not known if current catches or the TACCs are sustainable or at levels that will allow the stocks to move towards a size that will support the maximum sustainable yield. Accordingly, we have scored this SI precautionary high risk.

BNS2 – Trawl **PRECAUTIONARY HIGH RISK**

Bentley et al (2013) report that the alfonsino mid-water trawl fishery operates off the central east coast of the North Island, with an associated catch of bluenose. Individual fishing trips may also target orange roughy, hoki and/or cardinal fish and these secondary target species account for a significant proportion of the catch from some trips.

As above, limited quantitative information is available publicly for the BNS 2 trawl fishery. Pierre (2015) reports that discards account for only 0.2%–0.5% and 1.2%–4.8% of the landings from the midwater trawl fishery and bottom trawl fishery respectively for bluenose in BNS2 (based on unpublished data from MPI). Bentley et al (2013) indicate that alfonsino accounts for the highest proportion of the catch in BNS 2 trawl fisheries targeting alfonsino/bluenose, with catches of cardinalfish (*Epigonus telescopus*), orange roughy and hoki also likely to meet the 5% threshold to be considered 'main' other species (Figure 4).

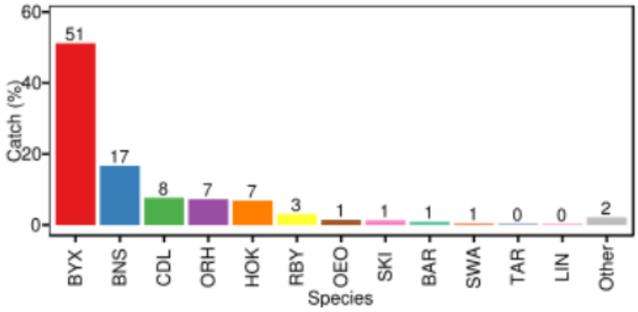


Figure 4: Catch composition from the trawl fishery targeting alfonsino and bluenose in BNS 2 (Bentley et al, 2013)

Alfonsino

MPI (2017) reports that "*no information is available as to whether alfonsino is a single stock in New Zealand fishery waters. Overseas data on alfonsino stock distributions suggest that New Zealand fish could form part of a widely distributed South Pacific stock*." It is not known if the recent catch levels or the current TACCs are sustainable (MPI, 2017).

Cardinalfish

A stock assessment for CDL 2–4 was completed in 2009. The base case estimated B_{2009} to be 12% B0 (MPI, 2017). MPI concludes that the stock is likely (> 60%) to be below the soft limit and about as likely as not (40–60%) to be below the hard limit. CPUE has been flat since 2008.

The TACC was reduced from 2223 t in 3 stages to the level of 440 t in 2010–11. This level was the maximum annual catch required to rebuild the CDL 2 stock to 30%B_0 within the 24 year period specified in the Harvest Strategy Standard (twice T_{min}). Accordingly, while CPUE has been flat since 2008, the management system has measures in place that are expected to ensure the UoA does not hinder recovery and rebuilding.

Orange roughy

The BNS 1 QMA primarily overlaps with the ORH 2A and ORH 2B stocks.

The ORH 2A stock was last assessed in 2003. The biomass in 2003 was estimated at 24% B0. The estimated CAY (370 t) and MAY (410 t) were both greater than the catch limit of 200 t, and this suggested the stock would start to rebuild.

In the Mid East Coast (MEC) stock (ORH 2A south, ORH 2B, ORH 3A), B_{2014} was estimated to be 14% B0. Estimated spawning biomass has been slowly increasing since about 2000 and fishing intensity has been declining (MPI, 2017). At the current catch limit, the stock is projected to increase slowly over the next 5 years but still be below the soft limit in 2019. The minimum rebuild period to reach 30% B0 with 70% probability is estimated to be 21 years with no catch. MPI (2017) conclude it is equally as likely as not that overfishing in occurring.

Hoki

Biomass in 2017 was estimated to be 59%B_0 (MPI, 2017) and highly likely to be above PRI.

BNS3 - Trawl **PRECAUTIONARY HIGH RISK**

Bentley et al (2013) report that BNS 3 fishery around the Chatham Islands primarily targets alfonsino using bottom trawl gear and, to a lesser extent, mid-water trawl gear. The catch is dominated by alfonsino with an associated catch of bluenose. Limited targeting of orange roughy and oreo was also conducted during the qualifying fishing trips and there is an associated catch of both species. No quantitative information on discards was found. Assuming discards represent a small proportion of the overall catch (consistent with the BNS 2 alfonsino/bluenose trawl fishery), the information provided by Bentley et al (2013) suggests that alfonsino, oreos and orange roughy are likely to be considered 'main' other species (Figure 5).

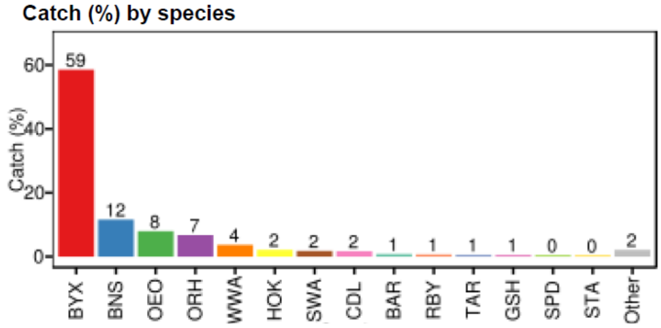


Figure 5: Catch composition from the trawl fishery targeting alfonsino and bluenose in BNS 2 (Bentley et al, 2013)

Alfonsino

As above for BNS 2.

Oreo

MPI (2017) states for black oreo "the 2009 stock assessment of OEO 4 black oreo was inconclusive as assessment models were unable to represent the observer length frequency structure, and were considered unreliable". Therefore, the OEO4 assessment is based on the stock status of smooth oreo only, which comprise around 85% of the total catch (MPI, 2017).

For smooth oreo, biomass and yield estimates for smooth oreo were made using a CASAL age-structured population model with Bayesian estimation, incorporating stochastic recruitment, life history parameters, and catch history up to 2012-13 (MPI, 2017). B_{2013} was estimated at 27% B_0 for the base case model, with a 90% confidence interval between 16 and 41% (MPI, 2016d). Estimated probability of B_{2013} being above the target biomass (40% B_0) was 0.067, and being below the soft (20% B_0) and hard (10% B_0) limit was 0.167 and 0.003, respectively. Given that smooth oreo comprise 85% of the total catch and is >80% likely to be above the soft limit, the stock is highly likely to be above PRI.

Orange roughy

BNS 3 overlaps with ORH 3B. The main overlaps are likely to be with the East and South Chatham Rise (ESCR) stock and North West Chatham Rise (NWCR) stock. Biomass in 2014 was estimated at 37% and 30% of B_0 respectively.

CRITERIA: (ii) There is a strategy in place that is designed to maintain or to not hinder rebuilding of other species; and the UoA regularly reviews and implements

(a) Management strategy in place

The strategy to manage main other species across all BNS stocks includes:

- Control on catch and effort through TACs and ITQs on the target species;
- Gear restrictions;
- Monitoring through logbooks and catch returns;
- Monitoring through VMS and observers
- Periodic assessments of QMS species through the NZ Plenary process.

BNS1 - BLL **PRECAUTIONARY HIGH RISK**

While the measures above could serve to act as an effective strategy to manage impacts on main other species, MPI (2017) report that it is not known if current catches or the TACCs are sustainable for the main bycatch species or at levels that will allow the stocks to move towards a size that will support the maximum sustainable yield. Accordingly, we have scored this SI precautionary high risk.

BNS2 and BNS 3– Trawl **PRECAUTIONARY HIGH RISK**

Alfonsino forms the dominant 'bycatch' in the BNS 2 and BNS 3 fisheries targeting bluenose. MPI (2017) reports that is not known if the recent catch levels or the current TACCs are sustainable (MPI, 2017).

(b) Management strategy evaluation **PRECAUTIONARY HIGH RISK**

It is not known whether the current sustainability measures will work for the dominant main other species in either the BNS 1 longline or BNS 2 and BNS 3 trawl UoAs.

(c) Shark-finning

NA

CRITERIA: (iii) Information on the nature and amount of other species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage other species.

(a) Information **PRECAUTIONARY HIGH RISK**

Limited publicly available information has been found on catch composition for the bluenose longline or trawl fisheries, albeit more detailed information may be available through MPI observer coverage. Qualitative and quantitative information is insufficient to estimate the impact of the UoAs on at least some main other species with respect to status. Catch records are arguably sufficient to detect increased risk and to support measures to manage main other species.

PI SCORE	**PRECAUTIONARY HIGH RISK – BNS1, BNS2, BNS3**

2B: Endangered Threatened and/or Protected (ETP) Species

CRITERIA: (i) The UoA meets national and international requirements for protection of ETP species. The UoA does not hinder recovery of ETP species.

(a) Effects of the UoA on populations/stocks

BNS1 - BLL **HIGH RISK**

The main potential ETP species interactions in the BNS 1 longline fishery are with seabirds and protected corals.

Seabirds

Between 2002–03 and 2014–15, there were 31 observed captures of all birds in bluenose longline fisheries. Observed captures were of black petrel (23), southern Buller's albatross (3), white-chinned petrel (2), Campbell black-browed albatross (2), and wandering albatrosses (1) (Abraham and Thompson, 2015; Figure 6). Observer coverage was relatively low during this period, ranging from 0-2% of hooks set.

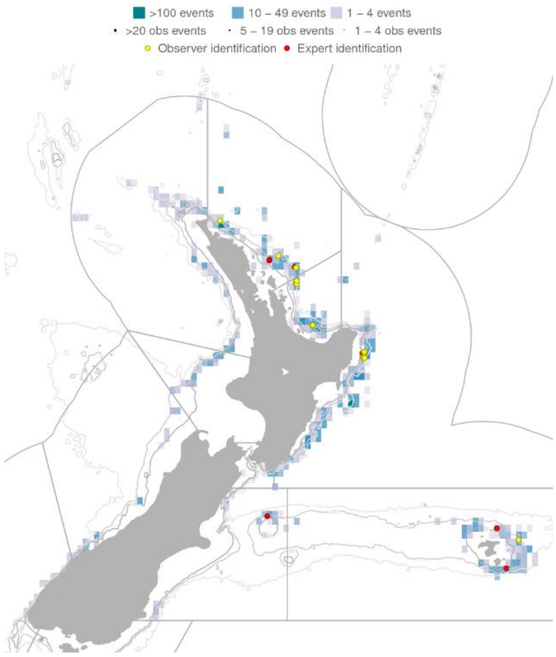


Figure 6: Map of fishing and effort and observed seabird captures in New Zealand bluenose bottom longline fisheries (Source: Abraham and Thompson, 2015).

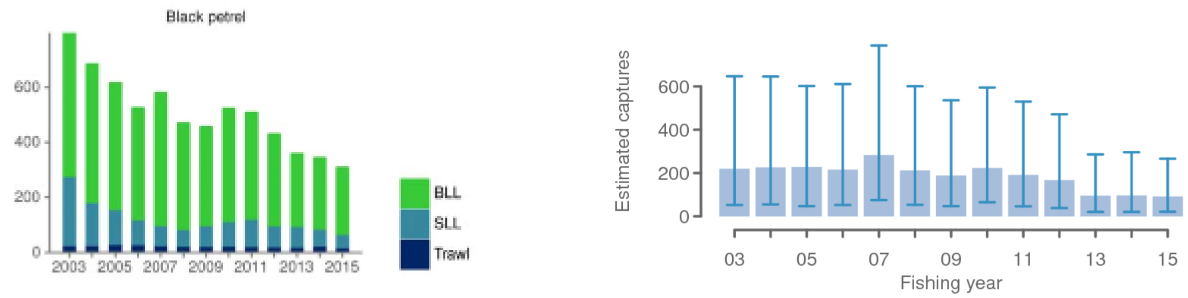
Risks to sea birds associated with New Zealand's commercial fisheries have been assessed through a hierarchical series of risk assessments (e.g. Rowe, 2013, Richard and Abraham, 2013; Richard and Abraham, 2015, Richard and Abraham, in prep.; in MPI, 2016b). The most recent iteration derives for each taxon a risk ratio, which is an estimate of annual potential fatalities (APF) across trawl and longline fisheries relative to the Population Sustainability Threshold, PST (an analogue of the Potential Biological Removals, PBR, approach) (Richard & Abraham in prep; in MPI, 2016b). This index represents the amount of human-induced mortality a population can sustain without compromising its ability to achieve and maintain a population size above its maximum net productivity (MNPL) or to achieve rapid recovery from a depleted state. The management criterion used for developing the seabird risk assessment was that seabird populations should have a 95% probability of being above half the carrying capacity after 200 years, in the presence of ongoing commercial fishing related mortalities, and environmental and demographic stochasticity (Richard & Abraham, 2013).

In the most recent assessment, only one species of seabird, black petrel (1.15), had a median risk ratio higher than 1 (or upper 95% confidence limit higher than 2) taking into account fishing related mortality across all trawl and longline fisheries (Richard and Abraham, in prep., in MPI, 2016a). For all other species, current median rates of fishing related mortality were not expected to hinder the achievement of management targets (i.e. the risk ratio was <1).

Black petrel is listed as Nationally Vulnerable in New Zealand. The most recent quantitative modelling for black petrels concluded that the mean rate of change of the population had not exceeded 2% per year, though the direction of change was uncertain (Bell et al, 2012; in MPI, 2016b).

Bottom longlining accounts for the majority of estimated captures of black petrel across New Zealand commercial fisheries (Figure 7a). Of the bottom longline sectors, the bluenose targeted fishery accounts for the second highest number of estimated captures, behind the snapper bottom longline sector. Between 2002–03 and 2014–15, mean estimated captures in the bluenose bottom longline sector were between 92 and 283, albeit with high uncertainty (Abraham and Thompson, 2015). Estimated captures have generally declined since a peak in 2006-07 (Figure 7b). Overall, the bluenose targeted bottom longlining sector accounted for around 28% of the estimated captures of black petrel in New Zealand fisheries for the three most recent years reported (2012-13 – 2014-15).

The median risk ratio of 1.15 for black petrel has relatively wide 95% confidence intervals, with the lower confidence interval at around half the PST (0.51) and the upper confidence interval at more than twice the PST (2.03). Although the estimated captures for the bluenose bottom longline sector on their own may not exceed a risk ratio of 1, the sector is a substantial contributor to the overall risk score and there is a plausible argument that captures in the sector could be hindering recovery. Accordingly, we have scored this SI high risk. Nevertheless, we note that captures in recent years have declined and there is evidence that relative risk to black petrels has declined since the introduction of the NPOA Seabirds in 2013 (Richard and Abraham, in prep; in MPI, 2016b). Future scoring should take into account any updates to risk assessments.



(a) *(b)*

Figure 7: Estimates captures of black petrel in New Zealand bluenose bottom longline fisheries (Source: Abraham and Thompson, 2015).

Corals

Black corals (all species in the order Antipatharia), Gorgonian corals (all species in the order Gorgonacea), Stony corals (all species in the order Scleractinia), and Hydrocorals (all species in the family Stylasteridae) are protected in New Zealand under the Wildlife Act). Bottom longline fisheries pose a risk to those corals that have a branching or bushy structure. The nature and distribution of protected corals in New Zealand's EEZ, as well as fishery interactions with them, was examined by Baird et al (2013). No protected corals were reported by observers on BNS BLL trips in FMA 1.

BNS2 and BNS3 – Trawl **LOW RISK**

Seabirds

Specific information on seabird interactions in BNS targeted trawls is limited, although these fisheries (and alfonsino targeted trawls) are included in statistics for a group of 'middle depth' trawl fisheries for the purposes of compiling observer information (MPI, 2016b). Observer data for the middle depth trawl fisheries shows that interactions are most frequently reported with sooty shearwaters, white-chinned petrels, white-capped albatross, Salvin's albatross and southern Buller's albatross (Richard and Abraham, in prep; MPI, 2016b). The median risk ratio for each of these species in the most recent seabird risk assessment was less than 1, taking into account APFs across trawl and longline fisheries. The BNS targeted trawl fishery's contribution to overall interactions is likely to be very small in comparison to other larger sectors. Accordingly, we have scored this SI low risk.

Corals

According to Baird et al's (2013) analysis, the only protected corals reported by observers in BNS targeted trawls in FMA 4 were four individuals of the stony coral family Caryophylliidae. Overall this represented ~0.5% of the individuals of this family taken across all trawl and longline fisheries in FMA 4. Accordingly, it is probably highly unlikely that BNS targeted trawl fisheries will hinder recovery. There are no national or international limits set for protected coral interactions.

CRITERIA: (ii) The UoA has in place precautionary management strategies designed to:

- meet national and international requirements; and
- ensure the UoA does not hinder recovery of ETP species.

Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species

(a) Management strategy in place **LOW RISK**

The strategic framework for managing protected species interactions in New Zealand fisheries currently includes:

- Legislation: the Fisheries Act, Wildlife Act, and Marine Mammals Protection Act
- The National Plan of Action—Seabirds (MPI 2013a)
- The National Plan of Action – Sharks (MPI 2013b)
- The Marine Conservation Services Programme

When impacts of fishing are such that they are causing an adverse effect on protected species measures are to be taken pursuant to s15 of the Fisheries Act to avoid, remedy or mitigate that effect. If a Population Management Plan has been approved by the Minister of Conservation under either the Wildlife Act 1953 or the Marine Mammals Protection Act 1978 the Minister responsible for fisheries must give effect to those plans when managing the effects of fishing.

The Department of Conservation and Ministry for Primary Industries also contract research, including:

- population monitoring protected species;
- research relating to fishing effects on protected species; and
- research on measures to mitigate the adverse effects of commercial fishing on protected species.

BNS1 - BLL **PRECAUTIONARY HIGH RISK**

Seabirds

Management measures to mitigate impacts of commercial fisheries on seabirds are included in the NPOA-Seabirds (MPI, 2013a). The measures are given effect through the national fisheries planning process, and vary by vessel type. Table 2 summarises the measures across New Zealand's main commercial fishing gear/vessel types (MPI, 2013a)

Within cells in the table:

- R = regulated;
- SM = required via a self-managed regime (non-regulatory, but required by industry organisation and audited independently by Government);
- V = voluntary with at least some use known;
- Cells blacked out indicate that the measure is not relevant in a particular fishery;
- A year in ( ) indicates the year of implementation;
- Measures annotated with * are part of a vessel-specific seabird risk management plan; and
- Large vessels are those 28m and greater in length.

On bottom longline vessels, offal management is mandatory, as is night setting or line weighting. Streamer lines are mandatory on vessels >7m. A voluntary code of practice is in place for vessels >20m.

Table 2: Mitigation measures in place for New Zealand's fisheries under the National Plan of Action for Seabirds.(MPI, 2013a)

Mitigation Measure	Surface longline		Bottom longline			Trawl		Set net	Notes
	Large-vessel	*Small-vessel*	*Vessels >20m*	*Vessels 7-20m*	*Vessels <7m*	*Large-vessel*	*Small-vessel*		
Net sonde cable prohibition						R (1992)	R (1992)		Net sonde cables are also referred to as third wires
Seabird scaring device	R (Streamer line)	R (Streamer line)	R (Streamer line)	R (Streamer line)		R (2006)	V		On trawlers this is a recognised device which is designed to prevent warp captures and collisions
Additional seabird scaring device			V (second streamer line, gas cannon)			SM (2008)*	V		
Night setting	R (or line weighting)	R (or line weighting)	R (or line weighting)	R (or line weighting)	R (or line weighting)				Longline fleets must use night setting if not line weighting, or vice-versa.
Line weighting	R (or night setting)	R (or night setting)	R (or night setting)	R (or night setting)	R (or night setting)				
Dyed bait	V	V							
Offal management	V	V	R	R	R	SM (2008)*			
Vessel-specific seabird risk management plans						SM (2008)	V		Some vessel-specific seabird risk management plans have been developed for vessels < 28m
Code of Practice	V	V	V			SM (Vessel-specific seabird risk management plans)			

For longline vessels, while it is clear that at least a partial strategy is in place to mitigate the UoAs' impacts on seabirds, and the strategy is expected to work for most seabird species, the evidence is less clear for black petrel. The bluenose bottom longline sector has accounted for around 28% of estimated black petrel captures across New Zealand commercial fisheries in the three most recent reported years, and recent modelling suggests the median risk to black petrels across all New Zealand fisheries is higher that its PST. Nevertheless, there is preliminary evidence that the overall risks to black petrels from New Zealand commercial fisheries have declined since the introduction of the NPOA-Seabirds (Richard and Abraham, in prep. In MPI, 2016b). Modelling also suggest that the overlap of bluenose bottom longline vessels with black petrels (calculated by predicting the number of birds that would have been counted by observers at the location and date of the event) has declined by >75% between 2003–04 and 2012–13 (Abraham et al, 2015). Accordingly, we have scored this SI precautionary high risk.

Corals

Cold water corals are fully protected under the Wildlife Act 1953, and Benthic Protection Areas provide areas off limits to bottom trawl fisheries. Interactions between fisheries and ETP species are monitored through the NZ Observer Programme and vessel reporting, albeit observer coverage in the bluenose bottom longline fishery has been limited.

BNS2 and BNS3 – Trawl **LOW RISK**

Seabirds

On trawl vessels, seabird scaring devices such as paired streamer (tori) lines, bird bafflers and warp deflector have been required on vessels >28 m in length since 2006. These measures are designed to reduce warp strike in order to achieve or maintain a favourable conservation status for albatrosses and petrels, as required by ACAP. Non-regulatory measures include vessel-specific Vessel Management Plans, which describe how fishery waste will be managed to reduce the risk of seabird captures. Offal management plans, vessel specific seabird risk management plans and codes of practice are also implemented via a self-management regime on trawl vessels >28m. The NPOA defines a vessel-specific seabird risk management plan as "*a plan which specifies seabird mitigation devices to be used, operational management requirements to minimise the attraction of seabirds to vessels, and incident response requirements and other techniques or processes in place to minimise risk to seabirds from fishing operations*."

For larger trawl vessels (>28m), the measures outlined in the NPOA-Seabirds together with observer coverage and periodic risk assessments form a strategy to ensure the UoAs do not hinder recovery of ETP species. For smaller trawl vessels (<28m), fewer measures to mitigate seabirds are required and observer coverage has historically been lower. Nevertheless, approximately 25% of the NZ inshore trawl fleet under 28m have developed vessel specific seabird risk plans through CSP managed programmes. These vessels are South Island based where risk is assessed to be greatest e.g. Salvin's and whitecapped albatross. In addition, inshore trawlers in the upper North island have been issued a set of specific guidelines to reduce risk of captures in the trawl net which is reported to be the primary risk of capture to black petrels and flesh footed shearwater.

Risk assessments are updated periodically and there is evidence that new measures have been progressively introduced over time where required. No captures of black petrel were observed in the middle depth trawl fisheries between 2002-03 and 2014-15 (MPI, 2016b), other seabird species have median risk ratios <1. Accordingly, the existing strategy appears likely to ensure the trawl UoAs do not hinder recovery of seabird species.

Corals

Cold water corals are fully protected under the Wildlife Act 1953, and interactions between fisheries and ETP species are monitored through the NZ Observer Programme and vessel reporting.

Overall, policy frameworks and their implementation through a series of measures explicitly designed to manage the impact of fisheries on ETP species comprise a strategy in place for managing the fishery's impact on ETP species, including measures to minimise mortality, which is designed to be highly likely to achieve national and international requirements for the protection of ETP species.

Furthermore, with respect to seabirds and sharks, the respective NPOAs comprise comprehensive strategies in place for managing the fishery's impact on ETP species, including measures to minimise mortality, which is designed to achieve above national and international requirements for the protection of ETP species.

(b) Management strategy implementation

BNS1 - BLL **PRECAUTIONARY HIGH RISK**

The extent to which the bluenose bottom longline sector is contributing to overall black petrel mortalities is uncertain given the very low rate of observer coverage (0-2% between 2002-03 and 2014-15). While the measures in place (offal management, streamer lines, night setting/line weighting) could be considered likely to work, recent modelling indicates the median risk to black petrel across New Zealand fisheries remains above its PST (albeit with considerable uncertainty).

BNS2 and BNS3 – Trawl **LOW RISK**

Risk assessments for seabird species (e.g. Richard and Abraham, in prep. in MPI, 2016b) and analyses of observer reported coral interactions (Baird et al, 2013) provide an objective basis for confidence that the strategy in place will work.

CRITERIA: (iii) Relevant information is collected to support the management of UoA 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.

(a) Information **LOW RISK**

Notwithstanding limited observer coverage in the bottom longline sector, some quantitative information is available which has been able to support risk assessments for key ETP species (e.g. seabirds; Richard and Abraham, in prep. in MPI 2016b) and analysis of likely interactions (e.g. corals; Baird et al, 2013). The MPI protected species bycatch database contains good records and analysis of fisheries interactions by gear, vessel size, and ETP bird, mammal and reptile species across NZ commercial fisheries (MRAG Americas, 2016). Notwithstanding the availability of some quantitative information, uncertainty associated with risk assessments is likely to be reduced with additional independent information. Increased observer coverage was reportedly planned for the snapper and bluenose longline fisheries in 2016[1].

PI SCORE	LOW RISK – BNS2 – Trawl, BNS3 - Trawl
	HIGH RISK – BNS1 - BLL

[1] http://www.doc.govt.nz/our-work/conservation-services-programme/bycatch-bylines-newsletter/issue-21/

2C: Habitats

CRITERIA: (i) The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area(s) covered by the governance body(s) responsible for fisheries management

(a) Habitat status

Examples of "serious or irreversible harm" to habitats include the loss (extinction) of habitat types, depletion of key habitat forming species or associated species to the extent that they meet criteria for high risk of extinction, and significant alteration of habitat cover/mosaic that causes major change in the structure or diversity of the associated species assemblages (MSC, 2014). Further, MSC specifies that if a habitat extends beyond the area fished then the full range of the habitat should be considered when evaluating the effects of the fishery. The 'full range' of a habitat shall include areas that may be spatially disconnected from the area affected by the fishery and may include both pristine areas and areas affected by other fisheries.

BNS1 - BLL **LOW RISK**

In the context of the Ling MSC assessment, Ackroyd and Pilling (2014) report that "*the impacts of demersal longlining on the benthic habitat will be limited to the movement of longlines and anchors across the bottom on shooting and hauling, as well as due to shifting that results from underwater currents. Bottom-set longlines may snag on benthic epifauna, particularly to those corals that have a branching or bushy structure, and irregular objects on the bottom, and may damage or move objects, but may also break and gradually entangle itself around bottom features. The key determinant of the effects of longlines is how far they travel over the seabed during setting and retrieval. In addition to the line and hooks, anchors can be pulled some distance across the seabed before ascending. In general, however, longline fisheries offer the potential to conduct fisheries with less significant habitat damage. Impacts are generally considered to be relatively minor (but certainly not negligible). In turn, cold water corals are known to occasionally be brought up on longlines, although the potential impact is expected to be much lower than trawls, despite the fact that these gears can fish inside BPAs. A recent report on the distribution of coral species … indicated that 'bottom longline fisheries... operate in areas where protected corals are found but the catch from these fisheries is not well understood.' This demonstrates the potential for benthic interactions, but these are expected to be negligible compared to bottom trawling*." On this basis, they judged the longline UoAs met SG80 for the relevant scoring issue.

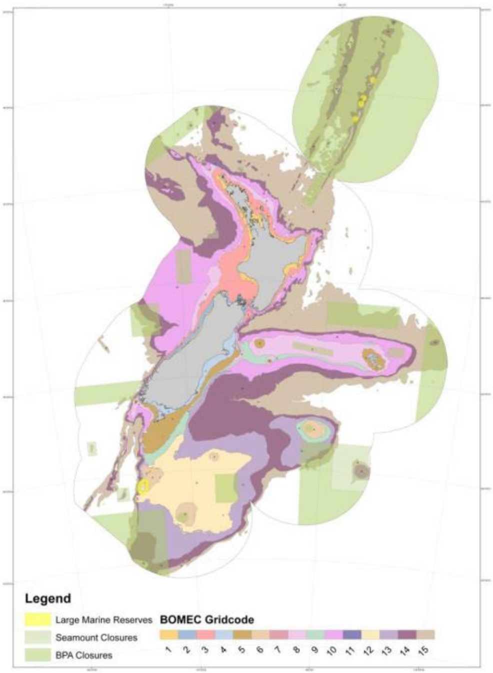
Although the longline fishery in LIN1 (which roughly overlays BNS 1) was not assessed, habitat impacts are expected to be similar. Baird et al (2013) reported that gorgonians and hydrocorals were reported by observers from bluenose sets in 280–450 m.

Given effort in the BNS 1 longline fishery (in terms of hooks set) is less than that for LIN 1, and therefore habitat impacts are likely to be proportionally less, there is a plausible basis to conclude the low risk SG is met. Nevertheless, we note that the evidence base for scoring is limited and would benefit from additional specific analysis of issues such as likely impacts, relative footprint and recovery times of impacted fauna specific to the BNS targeted fishery.

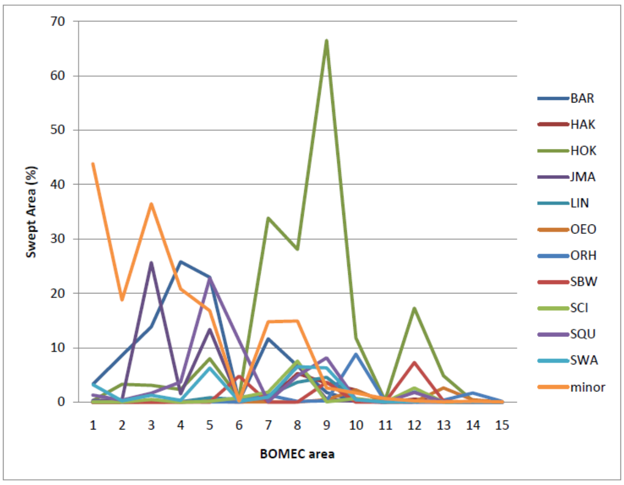
BNS2 and BNS 3 - Trawl **LOW RISK**

It is recognized that when demersal trawl gear touches the bottom, damage is done to the benthic environment and the communities that dwell there. Depending on the type of habitat, type of interaction, its duration and frequency; some areas may receive permanent damage while other areas will be able to recover in relatively short time periods. Damage to some habitats occurs with minimal trawling and will be long lasting due to the nature of the benthic organisms and the depth (e.g. biogenic habitat with vertical relief). Damage will, however, be restricted to areas trawled so that, the extent of any damage will be in proportion to the trawl footprint of the fishery (MRAG Americas, 2016). Nevertheless, there is evidence that coral diversity may be maintained in fished areas, as operational procedures and physical environmental attributes tend to localise trawl footprints. Trawling tends to be restricted to specific areas, e.g., following specific trawl paths on underwater topographical features (UTFs), leaving substantial areas of many UTFs un-impacted (NIWA 2015b; in MRAG Americas, 2016).

Ackroyd and Pilling (2014) report that "currently, the best single tool currently available to evaluate benthic habitat types is the Benthic-Optimised Marine Environment Classification (BOMEC) for New Zealand waters." Black et al (2013) assessed the swept area coverage of bluenose/alfonsino (BNS/BYX) targeted fisheries against the BOMEC areas as part of a group of 89 'minor' species. Importantly, BNS/BYX targeted trawl tows represented only 5% of the 'minor' species trawl tows (and 1.26% of overall deepwater tows) assessed. The highest proportional coverage a BOMEC area for trawls targeted at the 'minor' species grouping between 1989-90 and 2009-10 was 43% in BOMEC area 1, although this is a shallow inshore habitat and unlikely to be subject to significant BNS targeted effort (Figure 8). Of the remaining areas, all were equal to or less than 20% coverage, with exception of BOMEC area 3 at 36%. Given upwards of 60% of the area remained untrawled for the 20 year sample period, and BNS/BYX targeted effort was likely to comprise only a small fraction of overall trawl tows in the area, there is a reasonable basis to conclude it is highly unlikely that habitat structure and function would be reduced to the point of serious or irreversible harm. Accordingly, we have score this SI low risk. We note this is consistent with the scoring of other middle depth trawl fisheries which have undergone full MSC assessment.



(a)



(b)

Figure 8: (a) New Zealand's EEZ and TS showing the 15 BOMEC classification zones and (b) percentage of BOMEC areas swept by trawls for each of the 11 major species for fishing years 1989/90 to 2009/10. (From Black et al, 2013)

CRITERIA: (ii) There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats.

(a) Management strategy in place **LOW RISK**

There are a number of key elements of the approach to managing fisheries impacts on habitat under a range of different legislative tools. These include:

- The closing of about one third of the New Zealand EEZ to bottom fishing though the designation of Benthic Protection areas (BPAs);
- The designation or Marine Protected Areas (MPAs);
- The designation of Marine Reserves;
- Monitoring vessel position;
- Research and analysis of footprints and impacts.

In the New Zealand Territorial Sea (TS) and EEZ there are substantial areas closed to bottom fishing, including marine reserves, marine protected areas (MPAs) and large Benthic Protected Areas (BPAs) and all contribute to protecting the environment generally and from the impact of trawling. These areas are largely based on the analysis of physical and some biological attributes and in total exclude bottom trawling from around 30% of the New Zealand EEZ to minimize benthic impact, safeguard habitats and protect representative marine benthic ecosystems and biodiversity in accordance with s 8(1) of the Fisheries Act 1996 which focuses on avoidance, mitigation or remedy of "*any adverse effects of fishing on the aquatic environment*." Marine reserves are closed to all fishing and BPAs are open only to trawling that does not contact the seabed (any trawling fewer than 100 meters directly above the seabed is prohibited, and trawling above this level has substantial verification requirements including Electronic Net Monitoring Systems). Penalties for violating bottom trawl bans in BPAs include fines of up to NZD 100,000 and criminal charges. To qualify as Marine Protected Areas (MPAs), sites must be under a level of protection that allows their habitats and ecosystems to remain at (or recover to) a healthy state.

The network of MPAs and BPAs, the representativeness of habitat they encompass, and the restrictions on bottom trawling they include within the BNS trawl fishery areas and the bioregion as a whole comprise at least a partial strategy that is expected to achieve the outcome stated in Criteria 2C(i).

Ackroyd and Pilling (2014) note that for longliners, in addition to the partial strategy given by the legislative framework, the further strategy for longliners is an operational one - impacts of demersal longline fishing will be reduced when compared to those of demersal trawls, and any impacts will be highly localised.

(b) Management strategy implementation **LOW RISK**

An objective basis for confidence that the partial strategy will work/is working includes evidence that the restrictions on bottom fishing in MPAs and BPAs are effectively enforced. BNS fishing in the UoA areas and elsewhere within the NZ EEZ is fully monitored through VMS (and some observer coverage) and there have reportedly been no violations since the implementation of closed areas to bottom trawling by vessels targeting deepwater species (MRAG Americas, 2016). In addition, relevant habitats including coral composition and density is mapped, studied and regularly monitored such that the objectives of the Fisheries Act 1996 which focuses on avoidance, mitigation or remedy of "any adverse effects of fishing on the aquatic environment" can be achieved. In addition, there is some evidence to suggest that the BNS trawl footprint is likely to cover a relatively small proportion of each BOMEC area (Black et al, 2013).

CRITERIA: (iii) Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat.

(a) Information quality **LOW RISK**

Within the NZ EEZ and Kermadec Bioregion, benthic habitats have been classified into broad habitat classes within the New Zealand EEZ based on physical, chemical, and biological data, including sediment grain size (BOMEC) (Leathwick et al, 2012). There is good information on the location and features of Underwater Topographical Features (UTFs) available from the Seamounts database managed by NIWA (SEAMOUNT V2 as described by Rowden et al. 2008; in MRAG Americas, 2016). In addition, there is good information on the distribution of protected coral species within these areas broadly, and in the NIWA dataset of protected coral captures (both fisheries dependent and independent) that have been used to model observed and predicted coral distributions across some fished and unfished areas (e.g. Baird et al., 2013; Clark et al, 2015). Particularly vulnerable habitat types such as seamounts and hydrothermal vents are well mapped and monitored.

Ackroyd and Pilling (2014) note for the ling trawl fishery "*habitat mapping data, combined with the results of specimen collections from known trawl locations by fisheries observers, allow the nature, distribution and vulnerability of main habitat types to be known in the fishery, at a level of detail relevant to the scale and intensity of the fishery. Beyond areas of fishing activity, the degree of habitat knowledge at sub-regional scales is patchier. In turn, the footprint of the fishery is well established through VMS records and the TCEPR data, and has been used within risk assessments for key benthic species.*" The same information is broadly available for the BNS targeted fisheries, albeit with less observer coverage, and we have scored this SI low risk.

(b) Information and monitoring adequacy **LOW RISK**

Information on the trawl footprint is available to allow the nature of the main impacts of the fishery on the main habitat types to be identified. Information on the spatial extent of the interaction is available from trawl footprint analysis and habitat mapping (e.g. Baird et al, 2013), although hasn't yet been assessed in the detail of other fisheries operating in the area (e.g. Clark et al, 2015; Black et al, 2015). While the physical impacts of the gear on habitat types have not been fully quantified, there is on-going collection of relevant data from observer, vessel monitoring and research programs providing robust information on trawl footprint and the impact of trawling on slope and UTF habitats for the fisheries. Through the implementation of MPI's benthic impacts/habitats strategy, habitat distributions are monitored on a regular basis with specific studies designed to measure the impacts of fishing and identify new areas potentially in need of protecting based on a fixed set of criteria. A similar suite of information is likely to be available for the ling trawl and longline sectors which scored 80 against equivalent indicators in full MSC assessment (Ackroyd and Pilling, 2014).

PI SCORE	LOW RISK – BNS1 – BLL, BNS2 – Trawl, BNS3 - Trawl

2D: Ecosystems

CRITERIA: (i) The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function.

(i)(a) Ecosystem Status **LOW RISK**

Serious or irreversible harm in the ecosystem context should be interpreted in relation to the capacity of the ecosystem to deliver ecosystem services (MSC, 2014). Examples include trophic cascades, severely truncated size composition of the ecological community, gross changes in species diversity of the ecological community, or changes in genetic diversity of species caused by selective fishing.

Although research into the ecosystem impacts of the bluenose fisheries specifically has been limited, the weight of evidence suggests that the fishery is highly unlikely to result in serious or irreversible harm to key elements of the ecosystem. A number of middle depth and deepwater species (e.g. hoki, orange roughy, ling) taken in similar areas to bluenose have been undergone full MSC assessment and received 80 scores or above against the equivalent indicator. Many of these species are likely to occupy similar trophic positions as bluenose, and are harvested in substantially larger quantities (e.g. hoki). Moreover, general research on potential trophic effects from fisheries in areas where bluenose is harvested do not point to serious or irreversible changes in the ecosystem. For example, the mean trophic index (MTI) of the Chatham Rise demersal fish community showed no long-term change between 1992 and 2014[2]. In this area, changes in MTI are driven by biomass of hoki rather than species such as bluenose. Monitoring of mesopelagic biomass on the Chatham Rise has suggested no significant change between 2001 and 2010 (O'Driscoll et al., 2011). Given BNS are fished at lower levels of intensity and catch, over a smaller area than other fisheries which have received 80 scores in full MSC assessments (e.g. hoki, ORH), it is reasonable to conclude that BNS fisheries are also highly unlikely to result in serious or irreversible harm to the key elements underlying ecosystem structure.

CRITERIA: (ii) There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function.

(a) Management Strategy in place **LOW RISK**

[2] http://www.stats.govt.nz/browse_for_stats/environment/environmental-reporting-series/environmental-indicators/Home/Marine/marine-trophic-index-chatham-rise.aspx (methodology in Pinkerton et al, 2015)

The New Zealand Fisheries Act 1996 s8 provides for "the utilisation of fisheries resources while ensuring sustainability." Ecosystem-based management is achieved through a multi-layered approach that considers fishery management (e.g. QMS), ETP management (protected species and related initiatives such as NPOA seabirds, the protection of marine mammals), and habitat considerations (e.g. MPAs, BPAs). Legislated protection of areas of seabottom to fishing activities, coupled with good quality monitoring of all fisheries removals that might impact on trophic structure and function and management of fishery removals (e.g. through TACCs) represent a partial strategy to restrain impacts from causing serious and irreversible harm to the ecosystem.

(b) Management Strategy implementation **LOW RISK**

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 and retained species, habitat). For example, target species stocks have been actively managed, fish species brought under the QMS structure, and seabird bycatch mitigation measures introduced, to address sustainability concerns specifically, while BPAs have been put in place to protect benthic ecosystems. Detailed monitoring of many aspects of the fishery (e.g. catches of target, retained species, risk to ETP species, habitat interactions) allows for review of performance and identification of ongoing and new issues. Independent monitoring indicating an absence of change in MTI in key fishing areas (e.g. Chatham Rise[3]) provides some evidence that the partial strategy is being implemented successfully.

CRITERIA: (iii) There is adequate knowledge of the impacts of the UoA on the ecosystem.

(a) Information quality **LOW RISK**

Information is adequate to broadly understand the key elements of the ecosystem and to detect increased risks to them. There is information on trawl footprint and dietary analyses (e.g. Stevens et al 2011) provide information on the position of bluenose, and main other species such as alfonsino, in the food web. Monitoring of MTI in some areas provides some capacity to detect increased risk at the broad scale.

(b) Investigations of UoA impacts **LOW RISK**

The main impacts of the fishery on the ecosystem elements such as structure and function can be inferred from the stock assessments, QMS catch trends, observer data, and surveys that cover the target species, related species, as well as specific research related to trawl impacts on habitat structure and function. Some of these impacts have been investigated in detail (e.g. Black et al, 2013; Baird et al, 2013; Pinkerton, 2015; Richard and Abraham, in prep, in MPI, 2016b), and there is ongoing research and data collection aimed at continuing to inform management with the aim of fulfilling the ecosystem objectives stated in the Fisheries Act.

PI SCORE	LOW RISK – BNS1 – BLL, BNS2 – Trawl, BNS3 - Trawl

COMPONENT 3: Effective management

3A: Governance and Policy

CRITERIA: (i) The management system exists within an appropriate and effective legal and/or customary framework which ensures that it:

- Is capable of delivering sustainability in the UoA(s)
- Observes the legal rights
- Created explicitly or established by custom of people dependent on fishing for food or livelihood; and
- Incorporates an appropriate dispute resolution framework.

(a) Compatibility of laws or standards with effective management **LOW RISK**

The 1996 Fisheries Law and subsequent amendments provide a binding legislative and legal framework for delivering the objectives of Components 1 and 2. The law identifies and sets requirements for cooperation among the parties involved in fishing activities.

The legal system transparently deals with resolution of legal disputes, as demonstrated by the protracted negotiations and court cases that settled the Maori claims. The resolution demonstrated that the system is effective and has been tested.

(b) Respect for Rights **LOW RISK**

Ackroyd et al (2017) report that "*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.*

[3] http://www.stats.govt.nz/browse_for_stats/environment/environmental-reporting-series/environmental-indicators/Home/Marine/marine-trophic-index-chatham-rise.aspx

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.

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."

CRITERIA: (ii) 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.

(a) Roles and Responsibilities **LOW RISK**

The Minister responsible for the Fishery Act, the Ministry of Primary Industries (responsible for effective fishery management), the Department of Conservation (responsible for conservation issues such as ETP species and MPAs) are the main government entities involved in the management process. Each has clearly and explicitly defined roles. Stakeholders and independent experts are involved in the fisheries working group process which provides advice to MPI and the Minister.

(b) Consultation Process **LOW RISK**

The Fishery Act requires consultations among stakeholders with an 'interest' in the decision to be made, and the Stakeholder Consultation Process Standard provides guidelines for implementing the consultations. The consultation regularly seeks and accepts information, explains the use and results, and provides opportunity and encouragement for engagement. The Minister of Fisheries 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.

In practice, MPI has a number of forums that provide for interested party participation in the assessment and management of the fishery. All stakeholders are actively encouraged to participate in the meetings or to provide submissions. These forums include specific working groups on management and research issues. Commercial, customary, and environmental fishery interests participate in each of these processes. In addition, interested groups representing environmental and wildlife interests, along with local community interests, are given opportunities to participate in these discussions or provide submissions.

CRITERIA: (iii) The management policy has clear long-term objectives to guide decision making that are consistent with the outcomes expressed in Components 1 and 2, and incorporates the precautionary approach.

(a) Objectives **LOW RISK**

Long-term objectives to guide decision making are set out in the Fisheries Act, in Fisheries 2030 and other supporting documents (e.g. the Harvest Strategy Standard). These documents provide clear long-term objectives to guide decision-making, consistent with the outcomes expressed in Components 1 and 2. The Fisheries Act (s10) also requires the application of a precautionary approach to decision making: "*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; and
d) *The absence of, or any uncertainty in, any information should not be used as a reason for postponing or failing to take any measure to achieve the purpose of this Act."*

Thus, there are clear long-term objectives that guide decision-making, consistent with Components 1 and 2 and the precautionary approach is explicit within management policy.

PI SCORE	**LOW RISK**

3B: Fishery Specific Management System

CRITERIA: (i) The fishery specific management system has clear, specific objectives designed to achieve the outcomes expressed by Components 1 and 2.

(a) Objectives **MEDIUM RISK**

While objectives broadly consistent with Components 1 and 2 are specified in the Act and Fisheries 2030, and are therefore implicit in the fishery specific management system, it is not clear that explicit short and long term objectives for bluenose fisheries are in place at this stage. Accordingly, we have scored this SI medium risk.

CRITERIA: (ii) 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.

(a) Decision making **LOW RISK**

Sections 10, 11, and 12 of the Fisheries Act establish the requirements for the decision-making process, and Section 10 further requires the use of best available information for all decisions. This results in measures and strategies to achieve the fishery-specific objectives. The Fisheries Act requirement for best available information leads to scientific evaluation in advance of decisions. The Fisheries Act further requires consultation 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 feedback process is formalised, involving planning, consultation, project development, and scientific enquiry. The Initial Position Paper/Final Advice Paper process highlights the extent of consultation, engagement and transparency of the decision making process. 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.

(b) Use of the Precautionary approach **LOW RISK**

The precautionary approach must be followed by MPI. 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*."

(c) Accountability and Transparency **LOW RISK**

Information on the fishery's performance is produced annually through the MPI Fisheries Assessment Plenary process and is available on the MPI website. Scientific and other research reports commissioned by MPI are also available on the Ministry website. Information on proposed management changes are published through Initial Position Paper which allow for stakeholders to comment. MPI's Final Advice Paper to the Minister is also publicly available together with a summary of submissions and alternative policy options. Feedback on any actions or lack of action is provided to stakeholders through a variety of forums, as well as directly through published decision letters of the Minister (e.g. Guy, 2016).

Disclosure of information can be requested from the Ministry, under the Official Information Act. Information is released except when it is decreed by the Minister to be commercially sensitive or breaches confidentiality between the parties.

CRITERIA: (iii) Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.

(a) MCS Implementation **LOW RISK**

MPI operates a comprehensive monitoring control and surveillance system including:

- fishing permit requirements;
- 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;
- monitored unloads of fish;
- information management and intelligence analysis;
- analysis of catch and effort reporting and comparison with landing and trade data to confirm accuracy;
- boarding and inspection by fishery officers at sea; and
- aerial and surface surveillance.

In addition, MPI has a 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 (Ackroyd and McLoughlin, 2017). In combination with at-sea and air surveillance supported by the New Zealand joint forces, vessel activity can be monitored and verified to ensure compliance with regulations and with industry-agreed codes of practice.

While statistics on the blue cod fishery specifically were not found, it is clear that the MPI MCS system has demonstrated an ability to enforce relevant management measures. For example, Heron (2016) reports that MPI undertakes about 300 fishing related prosecutions per year with (ordinarily) over 80% or more resulting in convictions.

(b) Sanctions and Compliance **MEDIUM RISK**

For offences against the Fisheries Act 1996 or any of the Fisheries Regulations, the offender has to satisfy a reverse onus and establish that the offence was outside their control, that they took reasonable precautions and exercised due diligence to avoid the contravention, and, where applicable, they returned fish that was unlawfully taken and complied with all recording and reporting requirements. A wide range of sanctions from fines ($250 to 500,000) and imprisonment, forfeiture of catch and potential forfeiture of vessel, to prohibition from participating in fishing in the future constitute an effective deterrent to offenses and lead to industry compliance.

To meet the medium risk SG against this SI, sanctions to deal with non-compliance must exist and fishers must be generally thought to comply with the management system, including providing information of importance to the effective management of the fishery. The low risk SG requires some evidence to demonstrate fishers comply with the management system. In the first instance, it is clear that sanctions to deal with non-compliance exist for a range of offences, and these sanctions are regularly applied by MPI (e.g. Heron, 2016). It is also true that fishers are required by law to submit a range of information of importance to the management of the fishery (e.g. catch-effort returns, which are cross-checked against returns from Licensed Fish Receivers (LFRs). While there is no specific information available on compliance rates in the bluenose UoAs, there is some evidence that fishers are generally compliant with the management system. For example, MPI (2016c) reports that rates of compliance generally amongst the commercial and recreational sectors in the 2015/6 year were 89% and 94% respectively (Table 3). Moreover, Kazmierow et al (2010) concluded there were likely to be relatively high levels of compliance based on interviews with fishers in the South East fin fish fishery. Accordingly, we have scored the fishery medium risk.

Table 3: Compliances rates amongst New Zealand fisheries (from MPI, 2016c).

SERVICE PERFORMANCE MEASURE	ACTUAL 2015/16	STANDARD 2015/16	VARIANCE
Percentage of commercial operators inspected found to be voluntarily compliant	89%	90%	-1%
Percentage of recreational fishers inspected found to be voluntarily compliant	94%	95%	-1%
Percentage of serious offenders do not reoffend within the next year	96%	95%	1%
Percentage of complex investigations completed within legislative requirements	98%	100%	-2%
Percentage of non-complex investigations completed within six months	92%	100%	-8%

Nevertheless, we note there has been considerable debate in recent years about the adequacy of the MPI compliance system, and in particular its response to alleged dumping of QMS species (e.g. Simmons et al, 2016; Heron, 2016). Email correspondence quoted by Heron (2016) suggests there has been a view internally amongst MPI that discarding has been a more general problem amongst inshore fisheries harvesting a diverse mix of species. The fishery would be better placed against this scoring issue if evidence of strong compliance with all laws was available.

(c) Systematic non-compliance

Limited evidence is available in the extent of compliance specifically in the bluenose fisheries.

CRITERIA: (iv) There is a system for monitoring and evaluating the performance of the fishery specific management system against its objectives.
There is effective and timely review of the fishery specific management system.

(a) Evaluation coverage **LOW RISK**

The Fisheries Working Group process and annual Plenary reporting provide mechanisms to evaluate key parts of the management system (e.g. stock assessments; biomass against reference points). Where changes are required to sustainability measures, IPPs/FAPs are prepared to evaluate and present alternative management options. Processes for review are also built into policy and regulatory documents (e.g. NPOAs).

(b) Internal and/or external review **LOW RISK**

The fishery management system has internal and external review through fisheries plenary/working group process.

PI SCORE	LOW RISK

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