



# **Seafood Risk Assessment**

## **New Zealand Oreo Dory Fishery**

Prepared for the OpenSeas Programme

**OpenSeas<sup>NZ</sup>**

## New Zealand Oreo Dory Fishery

### Unit/s of Assessment:

Product Name/s:	<i>Smooth oreo, black oreo</i>
Species:	<i>Pseudocyttus maculatus</i> <i>Alloctytus niger &amp; Alloctytus verrucosus</i>
Stock:	SSO3A, BOE3A, SSO4
Gear type:	Trawl
Year of Assessment:	2017

## Fishery Overview

This summary is adapted from MPI (2017):



Figure 1: Management areas for the New Zealand Oreo Dory fishery.

Commercial fisheries occur for black oreo (BOE) and smooth oreo (SSO). Oreos are managed as a species group (OEO), which also includes spiky oreo (SOR), although spiky dory are not assessed here. The Chatham Rise (OEO 3A and OEO 4) is the main fishing area, but other fisheries occur off Southland on the east coast of the South Island (OEO 1/OEO 3A), and on the Pukaki Rise, Macquarie Ridge, and Bounty Plateau (OEO 6). In the past oreo catch has been taken as bycatch of the more valuable orange roughy fisheries but target fisheries are now much more common in most areas for smooth or black oreo.

Black and smooth oreo have been found within a 600 m to 1500 m depth range. Spawning occurs from late October to at least December and is widespread on the south Chatham Rise. Mean length at maturity for females, estimated from Chatham Rise trawl surveys (1986–87, 1990, 1991–93) using macroscopic gonad staging, is 34–40 cm TL. They appear to have a pelagic juvenile phase, but little is known about this phase because only about 12 fish less than 21 cm TL have ever been caught. The pelagic phase may last for 4–5 years with lengths of up to 21–26 cm TL. Unvalidated age estimates indicate that black oreo is slow growing and the longest lived with a maximum estimated age of 153 years (45.5 cm TL fish).

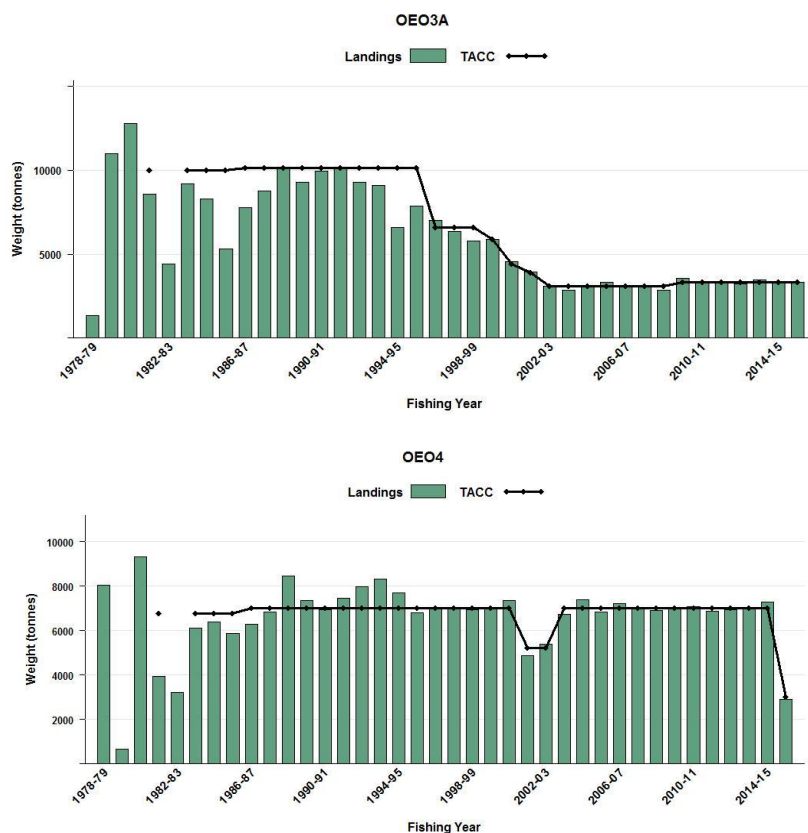


Figure 2: Reported catches in OEO3A and OEO4 in comparison to the TACC between 1987-8 and 2015-16 (MPI, 2017).

## Scoring

Performance Indicator	SSO3A	BOE3A	SSO4
<b>COMPONENT 1</b>			
1A: Stock Status	LOW RISK	PRECAUTIONARY HIGH RISK	MEDIUM RISK
1B: Harvest Strategy	LOW RISK	MEDIUM RISK	MEDIUM RISK
1C: Information and Assessment	LOW RISK	PRECAUTIONARY HIGH RISK	LOW RISK
<b>OVERALL</b>	LOW RISK	HIGH RISK	MEDIUM RISK
<b>COMPONENT 2</b>			
2A: Non-target Species	LOW RISK	LOW RISK	LOW RISK
2B: ETP Species	LOW RISK	LOW RISK	LOW RISK
2C: Habitats	LOW RISK	LOW RISK	LOW RISK
2D: Ecosystems	LOW RISK	LOW RISK	LOW RISK
<b>OVERALL</b>	LOW RISK	LOW RISK	LOW RISK
<b>COMPONENT 3</b>			
3A: Governance and Policy	LOW RISK	LOW RISK	LOW RISK
3B: Fishery-specific Management System	LOW RISK	LOW RISK	LOW RISK
<b>OVERALL</b>	LOW RISK	LOW RISK	LOW RISK

## Summary of main issues

- There is no accepted stock assessment model for BOE3A, albeit standardised CPUE has remained relatively stable at or around the long term average since 2002-03 (to 2011-12).
- The 2014 assessment of SSO4 suggested a decline in biomass and a high likelihood (>90%) that overfishing was occurring. The TACC has since been reduced from 2015-16 to levels which should allow the stock to rebuild to target levels within 30 years.
- The trawl fishery uses gear fished on or near the bottom which is likely to result in some habitat modification.
- The Deepwater Group is leading Fishery Improvement Plans (FIPs) for all three stocks.

## Outlook

### SSO3A

Component	Outlook	Comments
Target species	Improving	Stock projections with the current catch limit of 1400 t show increasing biomass. The DWG FIP aims to strengthen age validation and the stock assessment, as well as undertake management strategy evaluation.
Environmental impact of fishing	Stable	No major changes to existing P2 arrangements are expected.
Management system	Stable	No substantial changes are expected in P3 risk scoring

### BOE3A

Component	Outlook	Comments
Target species	Improving	The DWG FIP aims to strengthen age validation and the stock assessment, as well as undertake management strategy evaluation.
Environmental impact of fishing	Stable	No major changes to existing P2 arrangements are expected.
Management system	Stable	No substantial changes are expected in P3 risk scoring

### SSO4

Component	Outlook	Comments
Target species	Improving	TAC was reduced to 3,150t in 2015-16 which is expected to reverse the decline in biomass and move the stock towards MSY. A non-regulatory limit of 2,000t is applied to smooth oreo. The DWG FIP aims to strengthen age validation and the stock assessment, as well as undertake management strategy evaluation.
Environmental impact of fishing	Stable	No major changes to existing P2 arrangements are expected.
Management system	Stable	No substantial changes are expected in P3 risk scoring

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## Disclaimer

This assessment has been undertaken in a limited timeframe based on publicly available information. Although all reasonable efforts have been made to ensure the quality of the report, neither this company nor the assessment's authors warrant that the information contained in this assessment is free from errors or omissions. To the maximum extent permitted by law, equity or statute, neither this company nor the authors accept any form of liability, it contractual, tortious or otherwise, for the contents of this report or for any consequences arising from misuse or any reliance placed on it.

# 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: 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

##### SSO3A

**LOW RISK**

The most recent assessment of SSO3A was undertaken in 2009 using a CASAL age structured population model employing Bayesian methods (MPI, 2017). Input data included research and observer collected length data, one absolute abundance estimate from a research acoustic survey carried out in 1997, and three relative abundance indices from standardised CPUE analyses.

MPI (2017) report that "total mature biomass for 2008–09 was estimated to be 36% of the initial biomass ( $B_0$ ). Sensitivity case results for the base case using the lower and upper 95% confidence interval value estimates for M gave estimates of current biomass between 26% and 49% of  $B_0$ ." MPI (2017) conclude that the biomass in 2009 was about as likely as not to be at or above the target (40–60%), unlikely (<40% to be below the soft limit and very unlikely (<10%) to be below the hard limit. Biomass was projected to increase in the five years following the most recent assessment under voluntary industry catch limits (within the overall OEO3a TACC) of 1,400t. Accordingly, the stock appears to be highly likely to be above the point of recruitment impairment (PRI) and there is evidence that the stock is likely to be fluctuating at or around the target reference level.

##### BOE3A

**PRECAUTIONARY HIGH RISK**

MPI (2017) reports that the last accepted assessment for black oreo was in 2008. However, new age data collected within each of three model areas suggest that, based on 2013 analyses, assumptions made by this model are incorrect. Specifically, differences in the size distribution between areas now seem likely to be due to differential growth rates, rather than to movement. The model applied in 2008 was therefore considered inadequate and has been withdrawn. MPI (2017) conclude the position of the stock relative to target and limit reference points is unknown. Nevertheless, we note that catch rates of black oreo fluctuated around the long term average from 2002–03 to 2001–12 (MPI, 2017). Accordingly, we have scored this SI precautionary high risk.

We note that work to improve age validation and stock assessment for both main oreo species in OEO3A are planned as part of the Deepwater Group led Fishery Improvement Plans (DWG, 2016a,b).

##### SSO4

**MEDIUM RISK**

For SSO4, biomass and yield estimates 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, 2017). 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. Accordingly, it appears highly likely the smooth oreo stock is above PRI, but likely to be below the target reference point. Based on this, we have scored this SI medium risk.

#### PI SCORE

**LOW RISK – SSO3A**

**MEDIUM RISK – SSO4**

**PRECAUTIONARY HIGH RISK – BOE3A**

### 1B: Harvest Strategy

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

#### (a) Harvest Strategy

The harvest strategy in the commercial OEO fishery 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 and observers;
- Periodic review of stock status and recommended TAC levels through the MPI Working Group process.

In the past, oreo catch has been taken as bycatch of the more valuable orange roughy fisheries but target fisheries are now much more common in most areas for smooth or black oreo (MPI 2017).

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.

### SSO3A

LOW RISK

Biomass of smooth oreo in 2008 was estimated to be close to the target reference point and the stock trajectory has been increasing since the late 1990s (MPI, 2017). Stock projections in the most recent assessment indicated the stock should grow under the current voluntary 1,400t limit. There is evidence that TACs have been adjusted over time in response to the state of the stock (albeit not in recent years) and all of the elements of the harvest strategy appear to work together (albeit they do not appear to have been fully tested). Given the likely current status of the smooth oreo and the most recent stock projections indicating the stock should grow under the current voluntary 1,400t limit there appears to be a reasonable case to indicate the current arrangements will achieve the stock management objectives reflected in Criteria 1A(i) for this stock.

We also note there has been discussion around the appropriateness of continuing to manage both species under a single TACC. MPI (2017) report that "because of differences in biological parameters between the species, it would be appropriate to split the current TACC for black oreo and smooth oreo. The WG noted that separate species catch limits are in place to reduce the risk of over- or under-fishing either smooth oreo or black oreo."

### BOE3A

MEDIUM RISK

There is less evidence that the harvest strategy is responsive to the state of the black oreo stock given the absence of recent reliable assessments. We note that CPUE for black oreo has been stable at or around the long term average since 2002-03 and there is a plausible argument that the harvest strategy (e.g. monitoring, ongoing development of assessment methodologies, observer verification of catch composition, adjustments to TACC where necessary) will achieve the stock management objectives reflected in Criteria 1A(i). Accordingly, we have scored this SI medium risk.

We note that work to improve age validation/stock assessments and undertake management strategy evaluations for both species are planned as part of the Deepwater Group led Fishery Improvement Plans (DWG 2016a,b) which should improve the performance of these stocks against P1 indicators.

### SSO4

MEDIUM RISK

Smooth oreo is the dominant species within the OEO4 QMA, comprising around 85% of the total catch within the TACC each year. The 2014 assessment of smooth oreo in OEO4 suggested a decline in biomass and a high likelihood (>90%) that overfishing was occurring at the previous TAC of 7,000t (MPI, 2015a). The stock assessment also indicated that the exploitation rate was approximately three times higher than the rate that would allow the stock to reach and be maintained at the management target (MPI, 2015a).

Stock projections indicated that the declining biomass trajectory would be halted by reducing the catch limit to 3,000 tonnes or less, and would rebuild to the target level of 40%  $B_0$  within 30 years if the catch limit was reduced to 2,000 tonnes or below (MPI, 2015a). With this in mind, the Minister reduced the 2015-16 OEO4 TAC from 7,000t to 3,150t, with a 150t allowance for other sources of fishing related mortality (Guy, 2015). He also endorsed an industry proposal to adhere to a species-specific limit of 2,000t for smooth oreo, within the overall TACC of 3,000t. Evidence from the 2015-16 fishing year indicates good compliance with the TACC, with catch limited to 2890t (96% of the TACC).

The harvest strategy is demonstrably responsive to the state of the stock and the current management settings aim to move biomass towards the target reference point. Catches are monitored through FishServe and biomass is surveyed periodically through acoustic surveys. The main uncertainty in the context of the MSC standard is the rebuilding timeframe of 30 years, which exceeds the MSC's maximum rebuild timeframe of 20 years for stocks below  $B_{MSY}$ . Given that all of the elements of the harvest strategy appear to work together towards achieving the stock management objectives reflected in criteria 1A(i) we have scored this SI medium risk.

Nevertheless, we note that unless additional evidence is presented that the stock will recover to  $B_{MSY}$  levels within 20 years, the stock may not meet relevant MSC requirements. Work to strengthen performance against P1 indicators is planned as part of a DWG led FIP for the stock (DWG, 2016c).

### (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

Each of the stocks is 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)] 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  $\frac{1}{2} B_{MSY}$  (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.

### SSO3A, SSO4

LOW RISK

For SSO3A and SSO4, the harvest strategy has the main elements needed to ensure that exploitation is reduced as PRI is approached; a sound index of relative biomass, a framework of reference points which trigger action if required, a TACC and voluntary catch limits to control harvest levels. While there is no formal mathematical harvest control rule (HCR) for these stocks, there is a process in place to identify, examine and respond to issues of declines in oreo stocks, and a suite of available tools to implement reductions in



exploitation if needed. Action taken to reduce the OEO4 TACC in 2015 based on the negative stock trajectory of SSO4, despite biomass remaining above the soft limit, 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. ling). To that end, we have scored these UoAs low risk.

## BOE3A

**MEDIUM RISK**

For BOE3A, the framework of obligations under the Fisheries Act and HSS establish a generally understood HCR which is available, and tools exist through the QMS to reduce exploitation as PRI is approached. The main weakness is the absence of regular and reliable assessments of the stock against reference points. Nevertheless, we note the Working Group has accepted CPUE as an index of abundance, which has remained at or around the long term average since 2002-03. We note that work to strengthen the implementation of harvest control rules and undertake management strategy evaluations is planned under the DWG FIP for this stock (DWG, 2016b).

## PI SCORE

**LOW RISK – SSO3A**

**MEDIUM RISK – SSO4, BOE3A**

# 1C: Information and Assessment

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

## (a) Range of information

### SSO3A, SSO4

**LOW RISK**

Although information is incomplete, sufficient information appears to be available on stock structure and productivity and fleet composition to support an effective harvest strategy. For smooth oreo, some stock differentiation was detected through otolith shape and parasite data and otolith microchemistry (MPI, 2017). No regional differences were detected in lateral line scale and otolith settlement zone counts. MPI (2017) concluded that stock boundaries given in previous assessment documents should be retained until more definitive evidence for stock relationships is obtained, i.e., retain the areas OEO 1, OEO 3A, OEO 4, and OEO 6.

There is a sound understanding of the biology of oreo dory, sufficient to support the harvest strategy. There is very good monitoring of catch and effort through the QMS system with VMS and some validation from independent observers. These data were sufficient to develop age-structured models for smooth dory in each region.

## BOE3A

**MEDIUM RISK**

For black oreo, there is very good monitoring of catch and effort through the QMS system with VMS and some validation from independent observers. Pilot studies on stock differentiation have been undertaken with differences between some stocks detected through lateral line scale and pyloric caeca counts, relative abundance of parasites and otolith shape (MPI, 2017). No regional differences were detected in genetic analyses, otolith microchemistry, and settlement zone analyses.

The main weakness appears to be uncertainties in some of the population parameters (e.g., age, growth) in the different areas of BOE3A stock which led to the 2013 assessment being rejected and the withdrawal of the 2008 assessment (MPI, 2017). The absence of a reliable assessment limits capacity to evaluate the position of the stock against reference points and apply HCRs. Accordingly, some, but not sufficient, information appears to be available to support the harvest strategy.

## (b) Monitoring and comprehensiveness

### SSO3A, SSO4

**LOW RISK**

UoA removals are closely monitored through the QMS reporting arrangements, with validation from observers. Catches are estimated by species based on species specific data provided on a sub-set of tows (MPI 2017).

Dumping of unwanted or small fish and accidental loss of fish (lost codends, ripped codends, etc.) were features of oreo fisheries in the early years. These sources of mortality were probably substantial in those early years but are now thought to be relatively small. No estimate of mortality from these sources has been made because of the lack of hard data and because mortality now appears to be small (MPI 2017). There are no catches from recreational or traditional fishers and rates of illegal fishing are unknown (MPI 2017).

Abundance measures are obtained from standardised commercial CPUE, periodic acoustic surveys and formal stock assessments. Assessments to date appear to have been sufficient to apply the harvest control rule (e.g. following evidence of stock decline in SSO4).

## BOE3A

**MEDIUM RISK**

For BOE3A, UoA removals are monitored in the same way as SSO3A/4, with validation of composition through observers. Given the withdrawal of previous stock assessments, abundance is monitored largely through standardised CPUE, with the most recent analysis in 2013 (MPI, 2017).

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

## (a) Stock assessment

**MEDIUM RISK**

### SSO3A

**LOW RISK**

The 2009 assessment used a CASAL age structured population model employing Bayesian methods. Input data included research and observer collected length data, one absolute abundance estimate from a research acoustic survey carried out in 1997 (TAN9713), and three relative abundance indices from standardised catch per unit effort analyses (MPI, 2017). The model estimated status relative to reference points appropriate to the stock and can be estimated. The model was accepted by the Working Group, although MPI (2017) report that the model estimates of uncertainty are unrealistically low. On the basis that the model has been accepted and estimates status relative to agreed reference points which be estimated, we have scored this SI low risk. Nevertheless, we note work is planned to strengthen the SSO3A stock assessment as part of the DWG FIP (DWG, 2016a) which should strengthen confidence in the scoring of this SI.

#### BOE3A

**PRECAUTIONARY HIGH RISK**

A 2013 age-structured CASAL spatial assessment model rejected by the Working Group (MPI, 2017). Doubts over the assumptions made in the previous 2008 model led to its withdrawal. Nevertheless, some indication of stock abundance is available through standardised CPUE (up to 2011-12), which has been accepted as a measure of abundance by the Working Group (MPI, 2017).

#### SSO4

**LOW RISK**

The 2014 assessment used a CASAL age-structured population model with Bayesian estimation, incorporating stochastic recruitment, life history parameters, and catch history up to 2012-13 (MPI, 2017). The model estimated status relative to reference points appropriate to the stock and can be estimated. The model was accepted by the Working Group. Similar to SSO3A, on the basis that the model has been accepted and estimates status relative to agreed reference points which be estimated, we have scored this SI low risk. Nevertheless, we note work is planned to strengthen the SSO3A stock assessment as part of the DWG FIP (DWG, 2016c) which should strengthen confidence in the scoring of this SI.

### (b) Uncertainty and Peer review

#### SSO3A

**MEDIUM RISK**

The 2009 model takes uncertainty into account through a variety of techniques including Markov Chain Monte Carlo (MCMC) simulation and the production of alternative model runs to test sensitivity to different input parameters (e.g. natural mortality) (MPI, 2017). Nevertheless, MPI (2017) note that a range of uncertainties are not included in the model including:

- the assumption that recruitment is deterministic;
- that the acoustic index is assumed to be an absolute estimate of abundance;
- the selectivity in the base case is fixed at the MPD estimate from the preliminary case where all length data is used;
- uncertainty in the estimate of  $M$ .

Accordingly, this SI scores medium risk. The assessment was 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 the MPI Fisheries Assessment Plenary Report (MPI 2017). No quality score for the assessment is given in the Plenary Report (MPI, 2017).

#### BOE3A

**PRECAUTIONARY HIGH RISK**

While the most recent assessment was subject to peer review, the model was rejected by the Working Group.

#### SSO4

**LOW RISK**

Similar to SSO3A, the SSO4 model takes uncertainty into account through a variety of techniques including Markov Chain Monte Carlo (MCMC) simulation and the production of alternative model runs to test sensitivity to different input parameters (MPI, 2017). The Working Group noted a number of factors that influence the interpretation of the 2014 assessment including:

- sensitivity of the acoustic biomass estimate to the low value of the target strength of smooth oreo, and uncertainty in the estimates of  $M$  and growth rates;
- ambiguities in the some of the trawl survey age data;
- uncertainties in the 2012 acoustic survey estimates in which a significant proportion of the biomass was from a mark which was identified as smooth oreo. The species composition of this mark was not able to be verified by trawling. Excluding this mark would reduce the 2012 adult school abundance estimate by 38%, and as a result, reduce the estimate of current spawning stock biomass to 22%  $B_0$ .

Notwithstanding that, the Working group gave the assessment a score of 1, the highest quality score in a four point scale. The next assessment is planned for 2018.

#### PI SCORE

**LOW RISK – SSO3A, SSO4**

**PRECAUTIONARY HIGH RISK – BOE3A**

## 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

LOW RISK

The oreo fishery catches two main species, smooth oreo (*Pseudocyttus maculatus*) and black oreo (*Allocyttus niger*), as well as spiky oreo (*Neocyttus rhomboidalis*), a species caught in much smaller quantities. Anderson (2011) summarised the bycatch of oreo trawl fisheries from 1990–91 to 2008–09 but the data were not presented at the management unit scale. For the recent oreo fishery (since 2002), oreos (mainly black and smooth oreos) accounted for about 92% of the observed catch and about 96% of the total reported catch from the target fishery. The remainder of the (observed) catch was mainly orange roughy (3.5%), hoki (0.6%), and ling (0.3%), plus non-commercial species of deepwater dogfish (1.2%), rattails (1.0%), morid cods (0.1%), and slickheads (0.1%). Most of the remaining 240 or so observed species or species groups each accounted for 0.01% or less of the observed catch during the period.

While no species comprised >5%, orange roughy comprised greater than 2% and due to their biology, are considered a 'less resilient' species. Data on the spatial distribution of the catch for OEO1 (MPI 2017) suggest that OEO1 exists within the boundaries of ORH3B. Data on the spatial distribution of the catch were not available for other regions and were thus assessed from visual comparisons of management area maps provided by MPI (2017). OEO3A is assumed to overlap with ORH3A and ORH3B while area OEO4 appears to fall within ORH3B.

The stock status of orange roughy in ORH3A was assessed as a part of the Mid-East Coast Stock which included ORH2A and ORH2b (MPI 2017). An assessment was conducted for this stock in 2014 and biomass was estimated at 14% of unfished levels. However, recent trends suggested that "*Estimated spawning biomass has been slowly increasing since about 2000*" and projections for the stock stated "*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*" (MPI 2017). In addition, the most recent modelling suggests that exploitation rate in recent years (2013–2014) has been reduced to within the target range to ensure stock recovery to B30% - B40% (MPI, 2017). Thus, while the stock is likely to be below PRI, there is evidence of recovery and there appears to be a demonstrably effective strategy in place to ensure that the UoA does not hinder recovery.

There are two main ORH stocks in ORH3B: the North West Chatham Rise (NWCR) stock and the East and South Chatham Rise (ESCR) stock. An assessment was conducted for the NWCR stock in 2014 (MPI 2017) and biomass was estimated at 37% of unfished levels, suggesting the stock was highly likely to be above PRI. MPI (2017) concluded that overfishing is exceptionally unlikely (<1%) to be occurring. The 2014 assessment of the ESCR stock estimated biomass to be around 30% of unfished levels, suggesting the stock was also likely to be above PRI. MPI (2017) concluded that overfishing is unlikely (<10%) to be occurring.

**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

LOW RISK

The strategy to manage main other species includes:

- Controls 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.

Oreo dory are the dominant species in their habitat, comprising 92% of the total observed catch (Anderson, 2011). The above restrictions can be considered at least a partial strategy to manage main other species within their biological limits. Although orange roughy are only a minor bycatch species of the target oreo fishery, they have TACs to limit exploitation and the current harvest strategies are either maintaining the populations above PRI or are facilitating recovery to biomass levels above PRI.

#### (b) Management strategy evaluation

LOW RISK

Anderson (2011) summarised the bycatch of oreo trawl fisheries from 1990–91 to 2008–09. During this period, the composition of other species catch did not change significantly. Since 2003, trawl effort has reduced considerably to prevent further decline in oreo biomass. This will also have had a positive impact on the populations of main other species. Stock assessment modelling indicating stocks are either above PRI, or recovering (albeit slowly) towards PRI and that fishing intensity is within the target range (for ORH3A) provide evidence that the strategy is being implemented successfully.

#### (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

LOW RISK

The onboard observer program provides species specific data that are used to assess the impact of the fishery on main other species and can be used to detect changes in risks to main other species. Stock assessments are available for the main ORH stocks.

## 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

LOW RISK

The main potential ETP species interactions in the OEO fisheries are with seabirds, marine mammals and protected corals.

#### Seabirds

Between 2002–03 and 2014–15, there were 23 observed captures of all birds in oreo trawl fisheries. Observed captures were of Salvin's albatross (9), Chatham Island albatross (4), sooty shearwater (3), white-chinned petrel (1), short-tailed shearwater (1), grey petrel (1), albatrosses (1), New Zealand white-faced storm petrel (1), Cape petrel (1), and Antipodean albatross (1).

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). 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, 2016b). For all other species, median current rates of fishing related mortality were not expected to hinder the achievement of management targets (i.e. the median risk ratio was <1). There have been no estimated captures of black petrel in oreo trawl fisheries between 2002-03 and 2014-15.

Of the other species taken, only Salvin's albatross has a risk ratio with an upper 95% confidence interval higher than 1 (median risk ratio 0.78; 95% c.i. 0.51 – 1.09). Estimated captures of Salvin's albatross in the period 2012-13 to 2014-15 was 2-3 birds annually, or less than 0.5% of the mean estimated captures across all New Zealand's commercial fisheries (Abraham and Thompson, 2015). Accordingly, the available evidence indicates it is highly likely the trawls involving oreo will hinder recovery of seabird species.

#### Marine mammals

MPI (2017) report that there have been no observed incidental captures of New Zealand sea lions by trawlers targeting oreos from 2002–03 to date, but occasional captures of New Zealand fur seals are observed (which were classified as "Not Threatened" under the New Zealand Threat Classification System in 2010, Baker et al 2010; in MPI, 2016a). Between 2002–03 and 2014–15, there were eight observed captures of New Zealand fur seal in oreo trawl fisheries, with estimated captures 2 or less since 2008-09 (Abraham and Thompson, 2015). Based on this evidence it is highly unlikely that the fishery is impacting on marine mammals.

#### Corals

Bycatch from the oreo fishery includes cold water corals which are fully protected under the Wildlife Act 1953. Interactions with fisheries are monitored through the MPI's Scientific Observer Programme and vessel reporting.

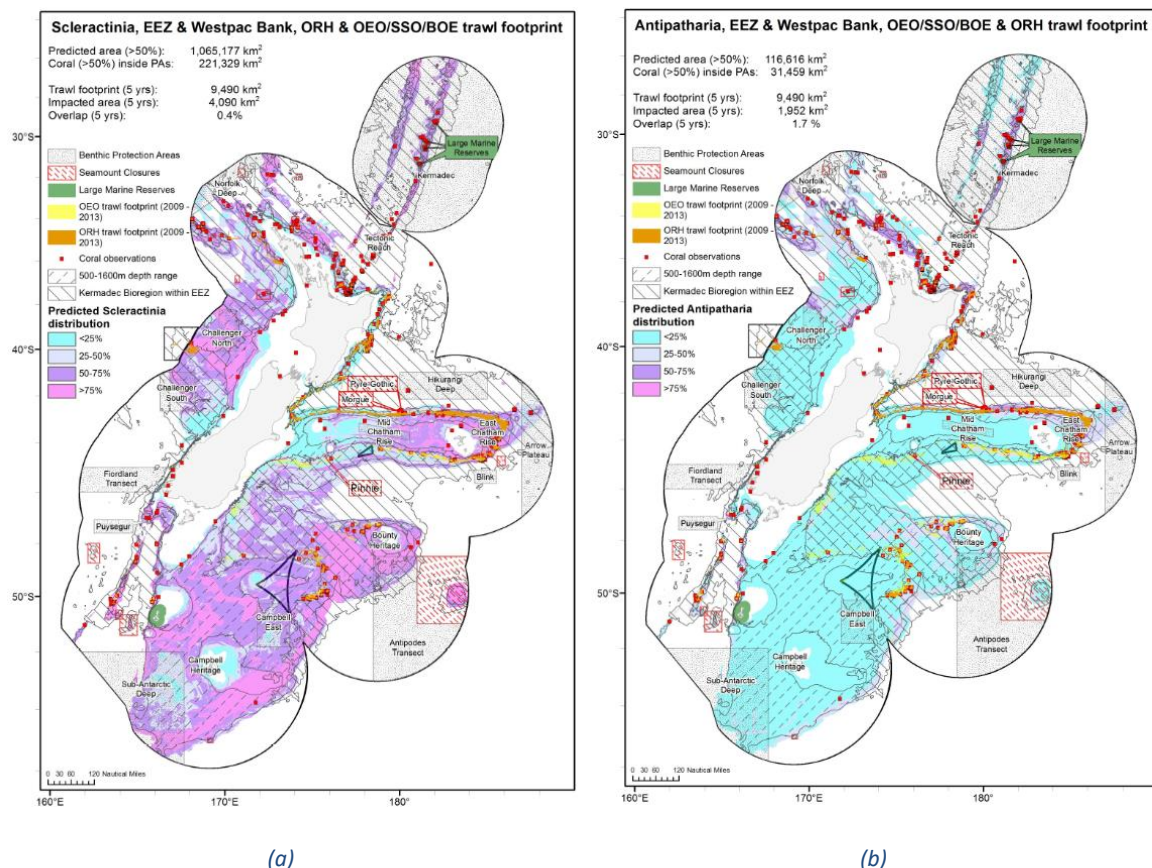


Figure 3: Observed and predicted distributions for coral Orders a) Scleractinia, and b) Antipatharia in relation to the trawl footprint of the deepwater trawl fisheries and the 500-1,600 m depth range in the New Zealand EEZ (Clark et al, 2015).

Clark et al (2015) examined the relationship between the oreo fishery trawl footprint and coral distributions, by overlaying the oreo (OEO/SSO/BOE) trawl footprint from all years (1989-90 to 2012-13) and the last five years (2008-09 to 2012-13) across the observed and predicted coral distributions on a 1 km grid for the New Zealand EEZ (Figure 3). They found that the OEO footprint in the full NZ EEZ covered <22% of the observed distribution and <0.6% of the predicted distribution of the three main protected coral groups (black corals, gorgonian corals, stony corals) taking into account fishing effort across the period 1990-2013 (Table 2). When fishing only in the period 2009-2013 is assessed, the figures reduce to <10.4% and 0.1%. In the ORH3B Chatham Rise area (encompassed by OEO4), the OEO trawl footprint in the NWCR stock area covered <6% and <0.3% of the observed and predicted coral distributions, while the footprint covered <22.1% and <1.9% in the ESCR area taking into account the 1990 – 2013 period.

Table 2: Predicted distributions (>50% probability of occurrence) of protected corals groups within (a) the New Zealand EEZ, (b) the area of the ORH3B NWCR stock and (c) the ORH3B ESCR stock, including proportional occurrence in protected areas (PAs) and overlapping OEO/SSO/BOE fishery trawl footprint (for fishing years 1989/90-2012/13 and 2008/09-2012/13 (from Clark et al, 2015).

NZ EEZ & Westpac	Black corals Antipatharia	Gorgonian corals Alcyonacea	Stony corals Scleractinia
<b>(a)</b>			
<b>OEO/SSO/BOE footprint</b>			
Total 1990-2013 (km <sup>2</sup> )	16614	16614	16614
Overlapping 1990-2013 (km <sup>2</sup> )	586	1267	6402
% Overlap (all years)	0.5	0.6	0.6
Total 2009-2013 (km <sup>2</sup> )	3070	3070	3070
Overlapping 2009-2013 (km <sup>2</sup> )	69.6	297	1569
% Overlap (five-year)	0.1	0.1	0.1

(b)



<b>OEO/SSO/BOE footprint</b>			
Total 1990-2013 (km <sup>2</sup> )	165	165	165
Overlapping 1990-2013 (km <sup>2</sup> )	15	5.8	7.2
% Overlap (all years)	0.3	0.0	0.0
Total 2009-2013 (km <sup>2</sup> )	0	0	0
Overlapping 2009-2013 (km <sup>2</sup> )	0	0	0
% Overlap (five-year)	0.0	0.0	0.0

(c)

<b>OEO/SSO/BOE footprint</b>			
Total 1990-2013 (km <sup>2</sup> )	2269	2269	2269
Overlapping 1990-2013 (km <sup>2</sup> )	16	87	1365
% Overlap (all years)	0.2	0.3	1.9
Total 2009-2013 (km <sup>2</sup> )	705	705	705
Overlapping 2009-2013 (km <sup>2</sup> )	0.8	19.1	372
% Overlap (five-year)	0.0	0.1	0.5

There are no national or international limits set for protected coral interactions, however given the very small proportion of the predicted distribution of each main protected coral group covered by the OEO trawl footprint (<0.6% across the EEZ and <1.9% across the main trawl ground), it is probably reasonable to assume that the OEO fishery is highly likely to not hinder recovery of ETP coral species.

**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 s 15 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;
- research on measures to mitigate the adverse effects of commercial fishing on protected species.

#### **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 3 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 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 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.”

Table 3: 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 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, 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 (Abraham and Thompson, 2015), 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.

#### Marine mammals

All vessels managed under the DWG are required to follow specific operating procedures to reduce the risk of marine mammal captures. Procedures described in the Operating Procedures: Marine Mammals, based on data analyses and expert opinion (DWG, 2014). The measures are largely operational including removing 'stickers' (fish stuck in net), shooting and hauling as fast as possible, steaming away from large (>5) congregations of sea lions and designating a crew member to be on watch during setting and hauling. These measures were sufficient to meet at least the SG80 scoring guideline against equivalent indicators in the most recent hoki MSC re-assessment (Ackroyd et al, 2012).

#### Corals

Cold water corals are fully protected under the Wildlife Act 2010, 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.

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.

### (b) Management strategy implementation

LOW RISK

There is an objective basis of confidence that the above-described strategy will work based on information directly about the fishery and species involved. For seabirds, periodic risk assessments (e.g. Richard and Abraham, in prep; in MPI, 2016a) provide an objective basis for confidence that the strategy will work, and modelling suggests progress has been made on reducing risk for key species (e.g. black petrel) since the introduction of the 2013 NPOA-Seabirds. Regarding protected corals, there is an objective basis for confidence that BPAs as a strategy to limit fisheries interactions with these habitats will work, as effectively enforced closed areas to trawling as a means of protecting sensitive habitat is widely known to be an effective strategy. Targeted research for different ETP species (e.g. seabirds – Richard and Abraham, in prep. in MPI, 2016a; corals – Clark et al, 2015) provides evidence that the strategy is being implemented successfully.

**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

Sufficient information is available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for all ETP species groups. This information includes interactions between the fishery and protected species from observer data and VMS tracks (in relation to coral habitat and BPAs). 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). In addition, analysis and monitoring of the OEO fishery trawl footprint in relation to ETP coral groups is a relevant quantitative proxy for fishery related mortality on these benthic species (Clark et al, 2015).

## PI SCORE

LOW RISK – SSO3A, BOE3A, SSO4

## 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

LOW RISK

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.

It is recognized that when demersal trawl gear touches the bottom, damage may be 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 in this fishery 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 UTFs, leaving substantial areas of many UTFs un-impacted (NIWA 2015b; in MRAG Americas, 2016).

Black et al (2015) examined the extent of the ORH and OEO trawl fishery footprint within the NZ EEZ (Figure 4). They found that the proportion of ORH habitat area swept by bottom trawls for orange roughy and oreos in the most recent five-year period (2008-09 to 2012-13) is 1.2% and over the period 1989-90 to 2007-08 is 6.2%. Based on this MRAG Americas (2016) concluded that “the Orange Roughy fishery in all three UoC areas is highly unlikely (no more than 30% probability) to reduce habitat structure and function to a point where there would be serious or irreversible harm as defined above by MSC. In addition, there is some evidence to this effect.” Given the OEO fishery represents a smaller subset of the trawl footprint, a similar conclusion can reasonably be reached for OEO.

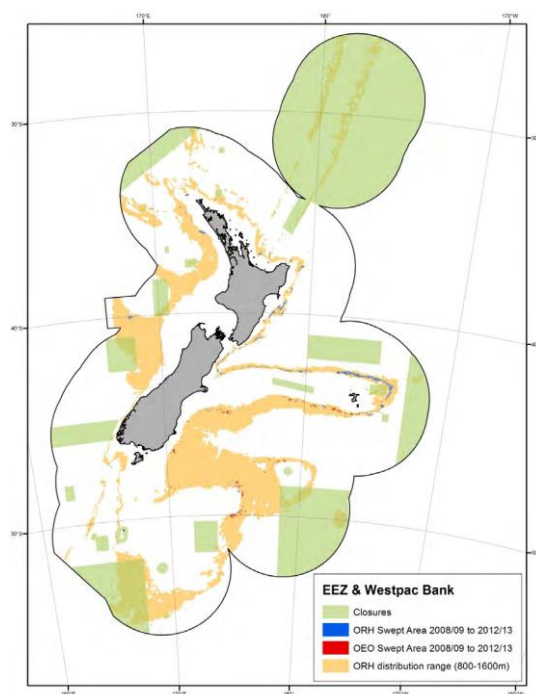


Figure 4: The extent of the ORH and OEO/BOE/SSO targeted trawl footprint during the period 2008-09 to 2012-13 in relation to the ORH habitat area and area closures. (from Black et al, 2015)



**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**

Overall management objectives for the deepwater and middle depth fisheries are set out on the National Fisheries Plan and include “Identify and avoid or minimise adverse effects of deepwater and middle-depths fishing activity on the benthic habitat”. The main measures to manage fisheries impacts on habitat under a range of different legislative tools include:

- (i) the closing of about one third of the New Zealand EEZ to bottom fishing through the designation of Benthic Protection areas (BPAs);
- (ii) the designation of Marine Protected Areas (MPAs);
- (iii) the designation of Marine Reserves; and
- (iv) monitoring vessel position.

MRAG Americas (2016) report that “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 (SR 2007/308). 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; SR 2007/308). 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”. Overall, they conclude that while the NZ benthic impacts strategy is not fully implemented, “the network of MPAs and BPAs, the representativeness of habitat they encompass, and the restrictions on bottom trawling they include within the UoC areas and the bioregion as a whole comprise at least a partial strategy that is expected to achieve the Habitat Outcome 80 level of performance or above.”

**(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. OEO fishing in the UoA areas and elsewhere within the NZ EEZ is fully monitored through VMS and 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 well 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, targeted analysis of the overlap of the OEO trawl footprint with relevant habitats shows a relatively low proportion of coverage.

**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 there is excellent 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 excellent 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 fished and unfished areas (Baird et al., 2013; Clark et al, 2015). Particularly vulnerable habitat types such as seamounts and hydrothermal vents are well mapped and monitored. There is also excellent data on the extent of interaction between the oreo fisheries and the bioregion as a whole with slope habitats (Black et. al., 2015).

**(b) Information and monitoring adequacy**

**LOW RISK**

Sufficient data on trawl footprint within the UoA areas under assessment are available to allow the nature of the impacts of the fishery on UTF and slope habitat types to be identified. There is also reliable information on the spatial extent of the interaction when considering the trawl footprint analysis and trawl tow location information in combination with the habitat mapping described above (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.

**PI SCORE**

**LOW RISK – SSO3A, BOE3A, SSO4**

## 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.

MRAG Americas (2016) reports for NZ orange roughy fisheries undertaking full MSC certification: *“the orange roughy fisheries in the three UoA areas are highly unlikely (<30% likelihood) to disrupt the key elements underlying ecosystem structure and function to a point where there would be serious or irreversible harm, based on evidence from species composition time series and trophic models.*

*There is a body of research on trophic interactions for orange roughy fisheries generally and trophic models have been developed that include orange roughy, and there is no evidence of loss of functional components or species in the ecosystem or significant changes in the composition of orange roughy prey, predators, or competitors based on catch composition in research trawls, fishery-dependant data, and stomach analyses (Dunn 2013). In addition, monitoring of mesopelagic*

*biomass on the Chatham Rise has suggested no significant change between 2001 and 2010 (O’Driscoll et al., 2011). Although this survey is predominantly at depths shallower than orange roughy, it is likely that the mesopelagic resources overlap with the orange roughy distribution depth range.*

*In addition, the low level of by-catch in the fisheries indicates direct ecosystem effects from removals are likely to be small, and the footprint of the orange roughy fishery in the three UoC areas is small relative to the orange roughy distribution area within the bioregion. Also, benthic impact that may damage ecosystem structure and function are restricted to <20% of the fishery management areas, and there are also areas that are currently fully protected from trawl impacts through the BPA approach. This provides evidence that the fishery is highly unlikely to disrupt*

*structure and function to the point of serious harm.”*

Given oreo species are fished at lower levels of intensity and catch, over a smaller area than ORH fisheries, it is reasonable to conclude that OEO 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

The New Zealand Fisheries Act 1996 s 8 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), vulnerable species needs (e.g., National Plan Of Action (NPOA) sharks), ETP management (a host of protected species and related initiatives such as NPOA seabirds, NPOA sharks, the protection of marine mammals, and habitat considerations (e.g. BPAs). Vessel management plans deal specifically with achieving how avoidance and mitigation, and MMOPs control interactions with marine mammals.

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

In the context of the ORH MSC full assessments, MRAG Americas (2016) noted *“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, some ETP 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.*

*Annual review of the Annual Operational Plan for Deepwater Fisheries provides a forum for reviewing the effectiveness 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 (including coral bycatch) allows such review. Orange roughy is not a low trophic level species and the stocks under assessment are at or recovering to target biomass reference levels. Therefore, there is plausible argument that the partial strategy will work, meeting SG 60 and SG80.*

*There is information directly about the fishery pertaining to the impact of orange roughy fishing on ecosystem structure and function such as time series of species/functional group composition, much of the information indicating that this strategy is working is based on theory or comparison with similar fisheries/ecosystems (e.g. Heymanns et. al 2011; Clark et al 1989; O’Driscoll et. al. 2011) to demonstrate that the measures are likely to work and indeed are working to maintain ecosystem structure and function and avoid serious or irreversible harm.”*

Similar outcomes could be expected for OEO fisheries.

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

### (a) Information quality

LOW RISK

The main impacts of the fishery on the ecosystem elements can be inferred from the stock assessments (for key species), QMS catch trends, and observer data that cover the target species, related species, and most levels of the ecosystem. The lack of significant levels of retained and discarded by-catch, limited ETP interactions and potentially limited benthic impacts (based on the trawl foot-prints)

indicate a limited ecosystem impact. There is information on trawl footprint, but the impact of trawling could be improved by a better understanding of risk on coldwater corals. The information is sufficient to broadly understand the key elements of the ecosystem and to detect increased risk to them. Dietary analyses and trophic models provide information to adequately understand the functions of the key elements of the ecosystem (Stevens et al 2011).

## (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 (for most fished species), 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, as summarized by Dunn (2013; in MRAG Americas, 2016) 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 – SSO3A, BOE3A, SSO4

# 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.

These regulations let iwi and hapū 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 Ministry of Primary Industries (responsible for effective fishery management), the Department of Conservation (responsible for conservation issues such as ETP species and MPAs), and Deepwater Group Ltd (DWG) (management within the quota management system) are identified as those involved in the management process. Each has clearly and explicitly defined roles. The MOU between DWG and MPI provide in detail the responsibilities for managing the deepwater fisheries.

## (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.

The majority of commercial quota owners of the species that will be managed through the National Deepwater Plan are represented by DWG. In 2006 MFish and the DWG (on behalf of deepwater quota owners) formed a collaborative partnership to manage New Zealand’s deepwater fisheries. This partnership was given effect through a Memorandum of Understanding (MOU) signed by the Chief

Executive of MFish and the Chair of the DWG. The MOU does not in any way affect section 12 consultation requirements that are set out in the Fisheries Act 1996. Rather, it establishes how we can ensure more efficient and effective engagement with the commercial sector in a more structured and managed forum before the formal consultation phase.

**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, in the National Fisheries Plan for Deepwater and Middle-depth Fisheries (MFish, 2010). These are explicit in requirements and management policy. The Annual Operational Plan outlines the management policy, and the actions required for the currently fishing year. These documents provide clear long-term objectives to guide decision-making, consistent with Components 1 and 2 and the precautionary approach, and are explicit within and required by management policy. Precautionary Approach – in regarding 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; 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

LOW RISK

Fisheries 2030, the National Fisheries Plan, and the Annual Operational plan provide well defined and explicit long and short term objectives.

**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.

#### (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 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, 2015).

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.

Information available suggests that feedback is provided in accordance with the MOU between MPI and the DWG, as well as through other structures established under the National Fisheries Plan, involving planning, consultation, project development, and scientific enquiry, thus responding to important issues in a transparent manner.

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

#### (a) MCS Implementation

**LOW RISK**

The deepwater fisheries management system has documented a comprehensive and effective monitoring, control and surveillance system through 1) a compulsory satellite Vessel Monitoring System (VMS) with an on board an automatic location communicator (ALC); 2) government observers who may be placed on board to observe fishing, any transshipment and transportation, and collect any information on fisheries resources (including catch and effort information) and the effect of fishing on the aquatic environment; and 3) accurate recordkeeping and recording requirements to establish auditable and traceable records to ensure all catches are counted and do not exceed the ACE held by each operator. 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.

#### (b) Sanctions and Compliance

**LOW 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 low risk SG against this SI, sanctions to deal with non-compliance must exist and some evidence must exist that fishers comply with the management system under assessment including, where required, providing information of importance to the effective management of the fishery. 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 (for example, Heron [2016] notes that MPI undertakes about 300 fishing related prosecutions per year with [ordinarily] over 80% or more resulting in convictions). Evidence also exists from compliance monitoring of deepwater fisheries that fishers comply with the management system. In the 2013/4 management year, MPI (2015b) reports 70 compliance inspections were completed covering 24 vessels. Very high rates of compliance were evident across both fishing authorisation and gear requirements, as well as catch and effort reporting (Table 4).

*Table 4: Summary of 2013/14 performance against pre-fishing preparation and fishing documentation regulatory requirements (from MPI, 2015b)*

Inspection detail	# of inspections	# of breaches	Compliance rate
Certificate of registry	43	1*	95%
Fishing gear	25	0	100%
Fishing permit	52	0	100%
SLED	16	0	100%

Inspection detail	# of inspections	# of breaches	Compliance rate
Effort returns	27	0	100%
Landing documents	11	0	100%
Landing return book	23	1	94%

In addition, MPI (2016b) reports that towards the end of the 2013 calendar year, MPI introduced 'interim observer trip reports'. Under these reports, observers rate the performance of vessels against 15 questions 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 the 2014/15 year. The majority of factors were rated A (81%) or B (7%), however over the year, six C ratings were given by observers (less than 1%). Observer coverage in the squid trawl fisheries has been >85% in recent years.

Accordingly, evidence is available for deepwater fisheries that sanctions to deal with non-compliance exist, and are applied if necessary, and that fishers comply with the management system, including providing information of importance to the effective management of the fishery.

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 in some sectors.



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**(c) Systematic non-compliance****LOW RISK**

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The results of compliance inspections in Table 4 together with observer reports (MPI, 2016b) appear to indicate no systematic non-compliance.

**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.

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**(a) Evaluation coverage****LOW RISK**

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The development and implementation of the Fisheries Plan framework – National Deepwater Plan, fishery specific chapters, Annual Operational Plan and Annual Review Report – ensures there is a structured process to ensure the performance of the fishery specific management system against its objectives. There is full stakeholder engagement on the development of all components of the Fisheries Plan framework and all documents are publicly available. The Ministry implements a comprehensive peer-review process for all science research that is used to inform fisheries management decisions.

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

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The fishery management system has internal and external review through the Fisheries 2030, Statements of Intention, the National Deepwater Plan, the Annual Operational Plan and Annual Review Report.

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**PI SCORE****LOW RISK**

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