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Full Assessment
New Zealand Orange Roughy Fisheries

Public Certification Report
December 2016
Volume 2: Stakeholder Comments; Surveillance Level

Prepared for
Deepwater Group Limited

Prepared by
MRAG Americas, Inc.

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Appendix 3. Stakeholder submissions

Appendix 3.1 Submissions Prior to Site Visit

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5th June 2014

Re: New Zealand Orange Roughy fishery assessment/ Notification of proposed Assessment Team

Dear Dr Trumble,

WWF welcomes your request for feedback on the assessment team for the New Zealand orange roughy assessment.

While we consider all of the team to provide very good expertise on fisheries in general and the MSC assessment process in general, it seems there is no member proposed who complies with the requirements of the MSC fishery Certification Methodology CM3.1 – 2: "Five years or more experience working with the biology and population dynamics of the target or species with similar biology". Given the specialised biology of the slime-head (Trachichthyidae), which are slow-growing and late to mature, resulting in a very low resilience, we feel that it is critical that an expert with specific expertise in this type of fishery is included. It was unclear from the CVs whether that this requirement has been fulfilled. Similarly, the very specific benthic habitat and the fishery induced impacts on this should be considered and require a team member with special expertise on deep sea benthos and seamounts, as well as the respective habitat impacts.

We look forward to your feedback and how to understand how you will address these issues.

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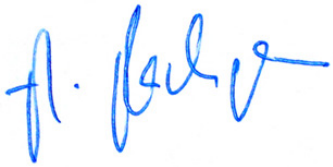
Kind regards,



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13 June 2014

Dr. Annika Mackensen, WWF Smart Gear
Mr. Peter Hardstaff, WWF New Zealand

Sent by email

Dear Dr. Mackensen and Mr. Hardstaff:

Thank you for your comments on the qualifications of the proposed assessment team for New Zealand orange roughy. You had two specific questions on the assessment team: 1) amount of experience with slow growing, late maturing species; and 2) experience with deep sea benthos.

In regards to the first issue, Dr. Andre Punt has orange roughy assessment experience in New Zealand and in Australia in the 1990s and early 2000s and has researched various rockfish species on the US Pacific coast. He conducted orange roughy assessments in New Zealand as a consultant to the New Zealand Fishing Industry Board, and provided advice to the lead CSIRO assessment scientist for orange roughy in Australia during his tenure at CSIRO. Much of his current research pertains to assessment and management of rockfishes, which although not found at the same depths as orange roughy are nevertheless long-lived and slow growing. He has also reviewed many assessments of rockfishes in his role as a member of the Pacific Council SSC. I invite you to visit Dr. Punt's reference list http://fish.washington.edu/people/punt/publications.html to review the expansive research on slow growing, late maturing species and the wide diversity of his research. We consider Dr. Punt as fully qualified to meet the MSC qualifications for "biology and population dynamics of the target or species with similar biology."

For the second issue, Dr. Robert Trumble has extensive experience with marine habitats and evaluating the effects of fishing on marine habitats, including trawling and other fishing gears; evaluating essential fish habitat and habitat areas of particular concern, including tropical and deep water corals, in the US Caribbean and Gulf of Mexico; and providing recommendations for mitigation of adverse habitat impacts. We consider that this experience will transfer to the deep waters of New Zealand, making Dr. Trumble fully qualified to address deep water habitats. In addition, Ms. Amanda Stern-Pirlot worked on numerous evaluation policies as head of policy development for the MSC, including habitat issues and rebuilding timeframes, which will also provide background for understanding impacts of the fishery on sensitive habitats.

MRAG Americas considers that the proposed team as exceptionally strong and qualified for assessing the New Zealand orange roughy fishery. However, to assure complete consideration of all relevant issues, MRAG Americas will propose a peer review with direct deep water benthos experience.

Best regards,

Graeme Parkes, Ph.D.
Vice President

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17th July 2014

Re: New Zealand Orange Roughy fishery assessment/ Use of the MSC Certification Requirements V1.3 and Default Assessment Tree

Dear Dr Trumble,

WWF welcomes your request for feedback on use of the MSC default assessment tree for the New Zealand Orange Roughy Fishery assessment. While we consider the default tree is an appropriate tool to assess most fisheries, we are concerned that some of the default performance indicators are not well-suited to unique aspects of the orange roughy fishery. Our specific concerns are outlined below for PIs 1.1.1, 1.1.2 and 2.4.1.

WWF is also concerned that there may not be sufficient information available to score the fishery according to the conventional MSC process. Based on your pre-assessment report and other published information sources relating to this fishery, it appears there may be data deficiencies for three performance indicators. We would urge the assessment team to reconsider using RBF to score PIs 2.2.1, 2.4.1 and 2.5.1.

Stock status (PI 1.1.1):
Scoring issue (a) of PI 1.1.1 requires the team to assess the stock in relation to the point where recruitment would be impaired. In our view, this is really a matter of comparing two different variables. The first variable is an assertion about our knowledge of current stock size (i.e. biomass

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or $B_{current}$ – a discrete, measurable quantity). The second measurement is an inference about population behavior. It is usually assembled from our knowledge of past recruitment patterns at varying population sizes. Both variables have uncertainty associated with them. Since the stock-recruitment relationship of orange roughy has such significant ramifications for sustainable management of New Zealand stocks, we feel it is important to disentangle these two issues. To this end, we recommend the team introduces another scoring issue under PI 1.1.1 as follows:

Scoring Issues	SG60	SG80	SG100
[NEW]	It is likely that the point where recruitment impairment occurs is known with accuracy for the stock.	It is highly likely that the point where recruitment impairment occurs is known with accuracy for the stock.	There is high degree of certainty that the point where recruitment impairment occurs is known with accuracy for the stock.
a. Stock status	It is likely that the stock is above the point where recruitment would be impaired.	It is highly likely that the stock is above the point where recruitment would be impaired.	There is a high degree of certainty that the stock is above the point where recruitment would be impaired.

Reference points (PI 1.1.2)

We question whether generic target and limit reference points described in the MSC default assessment tree are appropriate for the orange roughy fishery. Orange roughy is a deepwater species with life history attributes (slow growth, late maturation, low fecundity) that favor a low productivity fishery. And there is a high degree of uncertainty attached to most estimates of stock abundance. Target and limit reference points for orange roughy should be set at a level which is appropriate for this species category rather than following practices used for highly productive fisheries. We expect that fishery managers will be transparent in their selection of reference points. They should give explicit justification for why limit reference points (10% and 20% B_o) and target reference points (range: 30 to 40% B_o) were selected for these orange roughy fisheries. The assessment team should then evaluate the appropriateness of reference point based on whether they reflect best practice for this species category. WWF feels this is a minimum entry level (SG60) to show that a fishery meets the MSC environmental standard. To spell this out more clearly, we would propose an editorial change to the SG60 guidepost of scoring issue (a) in PI 1.1.2.

Scoring Issue (a) at SG60: "Generic limit and target reference points are **justified** based on ~~justifiable and reasonable~~ **best** practice appropriate for the species category"

It is also worth noting that the reference points for NZ orange roughy are perhaps more complicated than envisioned in the MSC default tree. The fisheries are managed according to a harvest strategy with two limit reference points: a 'hard' limit at 10% B_0 and a 'soft' limit at 20% B_0. The harvest strategy also specifies a range of biomass target values (from 30% to 40% of B_0) rather than a single trigger value. It is still unclear to us how the team will relate these four reference points to the scoring requirements of PI 1.1.1. However, we would expect the team to adopt a conservative view during their scoring (i.e. the target RP is reached only when biomass exceeds the higher end of the range (i.e. $B_{current} > 40\% B_0$), and the limit RP is exceeded whenever biomass drops below the soft trigger point (i.e. $B_{current} < 20\% B_0$).

Habitat Outcome (PI 2.4.1)

Under PI 2.4.1, MSC requires assessment teams to evaluate fishery impacts to habitats. The NZ orange roughy fishery is a trawl fishery that operates in topologically complex coral reef habitats. By its very nature the fishery has high potential to directly impact on the form and function of benthic habitats. We are concerned that the team will not give adequate consideration to both structure and function (despite the fact that MSC requires all assessment teams to evaluate structure and function, we have seen many assessments where it wasn't done). We feel this situation can be easily avoided by splitting the scoring issue under PI 2.4.1 so that the team can speak directly to the structure and function. This modification will help ensure that the team's scoring rationales for PI 2.4.1 are robust and comprehensive.

PI 2.4.1 Outcome Status	The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function.		
Scoring Issues	SG60	SG80	SG100
a. Habitat status: structure	The fishery is unlikely to reduce habitat **structure** ~~and function~~ to a point where there would be serious or irreversible harm.	The fishery is highly unlikely to reduce habitat **structure** ~~and function~~ to a point where there would be serious or irreversible harm.	There is evidence that the fishery is highly unlikely to reduce habitat **structure** ~~and function~~ to a point where there would be serious or irreversible harm.
b. Habitat status: function	The fishery is unlikely to reduce habitat ~~structure and~~ **function** to a point where there would be serious or irreversible harm.	The fishery is highly unlikely to reduce habitat ~~structure and~~ **function** to a point where there would be serious or irreversible harm.	There is evidence that the fishery is highly unlikely to reduce habitat ~~structure and~~ **function** to a point where there would be serious or irreversible harm.

WWF is also concerned about how the team will apply a definition of "regional or bioregional basis" for their evaluation of impacts to benthic habitats. The pre-assessment report for NZ orange roughy implied that the team would evaluate the extent of habitat damage narrowly (i.e. only tabulated using current practices within the boundaries of select fishery management areas) whereas the fishery would be credited with taking habitat protection measures wherever and whenever they might occur within domestic seas (e.g. reporting UTF protection as the percentage of all EEZ waters closed to trawling). Obviously the team needs to find an internally consistent approach. We suggest the most reasonable scope is to consider all orange roughy fishery impacts to habitats throughout the EEZ of New Zealand – past and present.

Under PI 2.4.1 the team is required to score fishery impacts to habitat structure and function according to quantitative guidelines provided by MSC (CB3.14.5). WWF questions whether there is sufficient information for the assessment team to score PI 2.4.1 quantitatively. For example, the pre-assessment report for NZ orange roughy stated that "there have been no studies investigating whether current trawling frequencies have had adverse effects on the structure and function of benthic communities" (Black et al 2013). Although a recent ecological risk assessment (Boyd 2013) attempted to address this issue, it is still unclear whether conclusions from the workshop are robust and consistent with MSC requirements for risk assessment. We recommend that the assessment team reconsider using RBF to score PI 2.4.1.

Bycatch Species Outcome (PI 2.2.1)

Under PI 2.2.1, the team will be required to evaluate fishery impacts to main bycatch species. The pre-assessment report for NZ orange roughy identified a number of main bycatch species or species groups that would likely need to be evaluated using PSA. These groups were: slickheads (Alepocephalidae; considered as a group), chimaeras (Chimaeridae and Rhinochimaeridae; considered as a group), rattails (Macrouridae; considered as a group) deepwater skates and rays (considered as a group), morid cods (Moridae; primarily Johnson's cod, *Halargyreus johnsonii*), shovelnose dogfish (*Deania calcea*), seal shark (*Dalatias licha*), Baxter's dogfish (*Etmopterus baxteri*), and deepwater dogfish (considered as a group).

The recent ecological risk assessment (Boyd 2013) concluded that risks to these species/groups were low to moderate. However the pre-assessment report for NZ orange roughy said none of the species groups have sufficient information to determine abundance relative to biological limits (PI 2.2.1, scoring issue (a) at SG60). Thus we were surprised to learn that the assessment team does not propose to use RBF for this PI. It is unclear to us how the team has determined that *none* of the bycatch species will be considered 'main' (CB3.8.2) in the assessment. WWF takes issue with that determination on the grounds at least some of these bycatch species/groups are "of particular vulnerability" (GCB3.8.2). For example, Fishbase lists shovelnose dogfish as "high to very high vulnerability" and "very low" resilience (minimum population doubling time > 14 yrs). The orange roughy fishery alone may account for up to 40% of all catch of shovelnose dogfish in quota managed areas each year. WWF suggests the team reconsider using RBF for PI 2.2.1.

Ecosystem Outcome (PI 2.5.1)
Under PI 2.5.1, the team will be required to evaluate fishery impacts to key elements of the ecosystem. The MSC specifies that biodiversity is a key element of ecosystems. Biodiversity surveys have shown convincingly that trawls damage or destroy exposed fauna of deepsea habitats. However the implications of this remain poorly understood (Dunn, 2013).

An ecological risk assessment was recently undertaken for the NZ orange roughy fishery (Boyd 2013). The assessment report suggested that the risk of the fisheries causing serious or irreversible harm to the ecosystem is "low". However Panel Experts disagreed over this conclusion and their final recommendation was that "more information is needed on ecosystem characteristics including the role of species, relationships between species and biodiversity."

Given the above, WWF is concerned that there is not enough information about the New Zealand orange roughy trawl fishery to assess (with the level of certainty required by MSC in CB3.14.6.1) how fishery activities impact upon the biodiversity of the deepsea slope/seamount ecosystem. Therefore we would urge the team to reconsider using RBF for PI 2.5.1.

We look forward to your feedback and hearing how you will respond to these concerns.

Best regards,

Peter Hardstaff
Head of Campaigns
WWF-New Zealand

Dr Annika Mackensen
Fisheries Certification and Livelihoods Manager
WWF Smart Fishing Initiative

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President: Andrew A. Rosenberg, Ph.D.

21 July 2014

Dr Annika Mackensen, WWF Smart Fishing Initiative
Mr. Peter Hardstaff, WWF New Zealand

Dear Dr. Mackensen and Mr. Hardstaff:

Thank you for your letter suggesting changes to the default assessment tree and recommendation for using the risk-based framework (RBF) for the orange roughy assessment.

The assessment team has considered your proposals. With respect to the assessment tree we believe that we can accommodate your concerns regarding the application of P1 and P2 (habitat) to orange roughy within the existing performance indicators. With respect to the RBF, we still do not believe it is necessary for habitat and ecosystem effects. Therefore, we have concluded that changes to the assessment tree or use of the RBF will not improve the results of the assessment. We came to this conclusion for these reasons:

Revising the Assessment Tree

PI 1.1.1. The suggestion for a new scoring issue relates to whether the point at which recruitment would be impaired is known with accuracy. The ability to estimate this parameter is relevant only in the relative rather than an absolute sense, i.e., as a proportion of unfished biomass, which is also a key output of any assessment method. In addition, the need to estimate this parameter accurately (rather than fairly imprecisely) itself depends on stock status. If the stock is close to the target level, the biomass will be above this point of impairment. However, the lower the relative biomass, the greater attention the team will place on the quality of the data on which the point at which recruitment is argued to be impaired. The issue of the ability to estimate limit reference points and their relationship to the point at which recruitment may be impaired is also covered in P1.1.2.

PI 1.1.2. The team is aware of the multiple reference point issue. The pre-assessment report made explicit reference to the hard and soft limits, noting that the hard limit is less than MSC default limit reference point of 20% of B_0 or half of B_{MSY}. We also note in that report that the justification of the target reference point range is missing. The default assessment tree requires us to address the appropriateness of the reference points, to evaluate the limit reference point relative to the point of recruitment impairment, and to evaluate the target reference point relative to B_{MSY}.

We note that the West Coast (US) Groundfish Fishery, which contains long-lived, slow growing rockfish with life histories similar to orange roughy, has received MSC certification using the default assessment tree.

PI 2.4.1. The default tree already requires consideration of impacts to structure AND function of the habitat. The assessment team acknowledges WWF's concern and we understand that we need to be explicit on these two points in our rationales for these fisheries. The tree does not need to be changed to accommodate this.

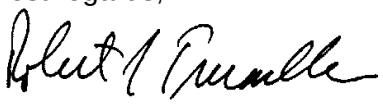
Risk-based Framework

PI 2.2.1. The assessment team pointed out the lack of information for several bycatch species in the pre-assessment. The client has assured us that New Zealand scientists have conducted analyses sufficient to assess all bycatch species with the default assessment tree. We will evaluate these

analyses and draw conclusions as warranted. The Deep Water Group will post the New Zealand analyses on its website.

PI 2.4.1 and 2.5.1. The SICA is the only RBF tool available for these two PIs, and the scoring issues and guideposts contained in the default tree are already essentially risk questions (i.e. the fishery is unlikely to reduce habitat structure and function. CB3.14.6.1 and CB3.17.5.1, for habitats and ecosystems, respectively, explain that it is acceptable for the team to use qualitative analysis and/or expert judgments in scoring a fishery at the SG60 and SG80 levels for these PIs, so long as there's a justification for how the results of the qualitative analysis and/or expert judgments relate back to the quantitative thresholds required. These sections go on to explain that the SICA may be used as a means of obtaining the range of viewpoints and constructing the probability interpretation of the scoring guideposts. The assessment team considers that there is virtually no difference between use of the RBF for these PIs and using the default assessment tree, because in reality, in most cases, there will be a qualitative interpretation leading to judgments about probabilities of serious or irreversible harm. The SICA provides a structured framework for obtaining qualitative information that we may or may not elect to use. Explicitly specifying the use of the RBF for these PIs actually restricts our ability to make use of all available information and construct an appropriate scoring rationale.

Best regards,



Robert J. Trumble, PhD Vice President-Fisheries

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WWF Stakeholder Submission

Comments and Information for the MSC Assessment of New Zealand Orange Roughy Fisheries

30 July 2014

1. Summary

WWF prepared this stakeholder submission to make the assessment team aware of our issues and concerns with the MSC assessment of three New Zealand Orange Roughy Fisheries. At the outset we put forth our questions and expectations about the assessment process. We then present our specific concerns about the sustainability of New Zealand's orange roughy fisheries and link our concerns to relevant MSC performance indicators. Our comments focus primarily on MSC Principle 1 where WWF is concerned about the implementation of the harvest strategy and control rules for orange roughy. In particular, we are concerned that limit and target reference points are not set at levels appropriate to this species to ensure sustainable harvesting from stocks. WWF also provides the assessment team with comments focused on MSC Principle 2 where we are concerned about impacts to bycatch species (e.g. deep water dogfish sharks), protected species such as deep water corals, habitats, and ecosystems. We try to identify and cite key scientific literature so that the assessment team can look more deeply into the issues we raise. WWF believes this submission will help to ensure a balanced, objective, and robust evaluation of fishery performance against the MSC Standard.

2. Background to this Submission

Orange roughy (*Hoplostethus atlanticus*; Trachichthyidae) is a globally distributed deep-sea teleost. Orange roughy have life history traits which are typical of many deep sea species: slow growth; late maturity; low fecundity; and a tendency to form dense aggregations for spawning or feeding. Consequently orange roughy stocks are relatively unproductive, highly susceptible to overfishing and slow to recover from over-exploitation (Branch 2001). Their tendency to aggregate over seamounts and other topologically complex features means that the most common method of harvesting orange roughy (with bottom trawl) has great potential to disrupt biologically diverse and structurally complex deep-sea habitats.

In New Zealand, orange roughy stocks are managed jointly under a memorandum of understanding between the Ministry of Primary Industries (MPI; formerly the Ministry of Fisheries) and Deepwater Group Ltd (DWG), an alliance of New Zealand deepwater fishery shareholders representing > 90% of orange roughy quota owners (Clement et al. 2013). In early 2013, DWG advertised their intentions to put forward four Orange Roughy stocks for certification against the Marine Stewardship Council (MSC) standard for sustainable fishing. WWF is a stakeholder in the MSC assessment of these fisheries.

MRAG Americas completed an MSC fishery pre-assessment of NZ orange roughy for DWG in December 2013 (Punt et al. 2013). The report identified a number of potential barriers to MSC certification of orange roughy. WWF NZ reviewed the MRAG pre-assessment report and also provided further commentary to DWG about potential obstacles to MSC certification as detailed in WWF (2014a; Appendix 1). Note that these two documents were both finished before the authors had access to 2014 stock assessments for orange roughy. In May 2014, MRAG announced the full assessment of NZ orange roughy fisheries against the MSC environmental standard. WWF gave MRAG comments on the suitability of the MSC default assessment tree for NZ orange roughy in July 2014 (WWF 2014b, Appendix 2). Here, we provide MRAG with a stakeholder submission for the MSC assessment of New Zealand orange roughy fisheries. Our purpose is to make the assessment team aware of WWF's concerns with the sustainability of the fisheries.

3. Questions and Expectations

3.1 Recognize Data Deficiencies

Despite that fact that much is known about the directed fisheries for orange roughy in New Zealand waters (Dunn 2013), there are still substantial gaps in our knowledge about stock structure, recruitment and population dynamics. In section 7 of the previous report that WWF submitted to DWG (WWF 2014a), we outlined the main areas where we believe data gaps exist. The identified data deficiencies are:

- There is only a limited understanding of the spatial structure and migration patterns of orange roughy populations in New Zealand waters.
- The difficulties in getting accurate otolith readings create large uncertainties in the age estimates used for stock assessments (although some recent studies in Australia and New Zealand have made progress towards resolving this concern).
- Basic fisheries information is still lacking for New Zealand orange roughy stocks in some of the managed areas adjacent to the proposed Unit of Certification (e.g. in area ORH1).
- Improper data collection methods have been used for stock surveys in some of the managed areas outside the UoC (e.g. biomass surveys in ORH1).
- The robustness of biomass estimates derived from Acoustic Optional Surveys (AOS) is questionable because of:
    - difficulties with error and bias in the acoustic signals;
    - problems isolating orange roughy signal within mixed species groups; and
    - unverified and possibly unreasonable assumptions about fish density in the acoustic "dead zone" near the seafloor.
- There has been a troubling reliance on year class strength (YCS) data to force model outputs for the estimation of stock biomass (worrying given doubts about the accuracy of otolith readings).
- The recent sense of urgency to update stock assessments has contributed to a general willingness of the working group to accept assumptions when fitting data to stock assessment models.
- In general there has been an over-reliance on predictions from stock assessment models which are oversimplified and fail to adequately account for species biology and environmental variability.

These knowledge gaps create uncertainty. They have a direct bearing on management of orange roughy fisheries and, by extension, may compromise the ability of the fishery to demonstrate that it meets the MSC standard. We expect the assessment team to explicitly identify in their assessment report where information gaps undermine their confidence in the performance of the fishery.

3.2 Clarify the Unit of Certification

MSC requires CABs to propose a 'Unit of Certification' which includes a description of the target stock (s), the fishing method or gear, and practice (including vessels) pursuing that stock (MSC CR, 27.4.2). Confirmation of the UoC is a critical step any MSC assessment because it defines the scope of assessment activities for all parties. This is likely to be important for assessment of the NZ orange roughy fisheries.

A description of UoC(s) was not available to us at the time of writing. The MRAG pre-assessment report for NZ orange roughy covered four potential units of certification (Punt et al. 2013). However the certificate sharing confirmation letter from Deepwater Group (DWG 2014) implies that only three units are proposed for MSC certification (Table 1). It appears that MEC has been omitted from full assessment. In addition, there is some uncertainty about how the UoC has been defined for Challenger Plateau (CP). CP and Westpac Bank are considered a single stock that straddles the boundary of New Zealand's Exclusive Economic Zone (EEZ) and international waters (MPI 2013a). If orange roughy catches from a high seas fishery are to be included in the UoC, it will have a number of ramifications for evaluating Principle 2 and 3.

This will entail reviewing a considerable amount of additional information (e.g. Ministry of Fisheries 2008b). We expect the UoCs will be clarified at the upcoming stakeholder meetings. In the meantime we focus our comments on what we presume will be the three UoCs: NWCR, ESCR and CP (exclusive of Westpac Bank).

Table 1. Main NZ orange roughy fish stocks, managed areas and inferred UoC.

Main Fish Stock	Area Name	Pre-Asst	DWG Letter*	UoC
Northwest Chatham Rise (NWCR)	ORH3B NWCR	Yes	Yes	Yes
East and South Chatham Rise (ESCR)	ORH3B ESCR	Yes	Yes	Yes
Challenger Plateau (CP) and Westpac Bank	ORH7A	Yes	Yes	Yes (?)
Mid-East Coast (MEC)	ORH2A south	Yes	No	No (?)
	ORH2B			
	ORH3A			
Northern North Island	ORH1	No	No	No
East Cape	ORH2A north	No	No	No
West Coast South Island	ORH7B	No	No	No

* From DWG letter ORH Certificate Sharing Confirmation, 22 May 2014.

3.3 Define the Regional Basis for Scoring Habitat Impacts

Under PI 2.4.1, assessment teams are asked to consider habitat impacts on a regional or bioregional basis. This means considering "the full extent of the habitats when assessing the status of habitats and the impacts of fishing, and not just the part of the habitats that overlap with the fishery" (CB3.14.3). It is essential that the team choose a meaningful spatial scale for this analysis because it will involve making a quantitative judgement about the likelihood (e.g. 60% or higher) that trawl impacts don't "reduce habitat structure and function to a point where there would be serious or irreversible harm."

How big is the bioregion and how will the team draw lines around it? We are concerned there is potential for some 'gerrymandering' here. Obviously it would not be informative to evaluate habitat impacts at the largest of spatial scales (e.g. a bioregion spanning the whole Pacific Ocean basin) and we recognize that it becomes impractical to consider benthic impacts at the very finest of scales (e.g. at the level of individual coral colonies). So the answer will undoubtedly lie somewhere in the middle. But it is unclear to us whether the assessment team will approach this problem by adopting the fishery management areas (FMAs), the whole NZ EEZ, or some other spatial scale. The boundaries of existing FMAs were not necessarily drawn to depict the spatial distribution of benthic communities and habitats. It might be argued that regional boundaries should be drawn based on natural (i.e. biological) features or processes but we still have very limited knowledge about connectivity among seamounts, hills, canyons and slopes of the deep sea (Clark et al. 2012). We note that the expert panel did not reach consensus on this definition (Boyd 2013) and therefore we cannot offer a specific recommendation. We do, however, expect the assessment team to transparently and consistently apply a fair approach which reflects the "full extent" of habitats as required by MSC and which also reflects New Zealand's conservation objectives as well as fishery management objectives.

3.4 Status of the Ecological Risk Assessment

An assessment of ecological effects of fishing (AEEF) was conducted in 2013 with the stated objective to "inform managers of the ecological risks associated with the target orange roughy fisheries in order that managers can implement programmes that will address the risks" (Boyd 2013). We have the following questions regarding this risk assessment.

1. Will AEEF replace the MSC risk-based framework in the assessment process? i.e., Can the assessment team rely on conclusions of the expert panel when looking at, for example, ecosystem impacts instead of conducting a SICA themselves (CB3.14.6.1)? and
2. If the team does accept AEEF results, how will they interpret areas where no consensus was found among panel experts?

4. Specific Concerns in Relation to Principle 1

4.1 Target Reference Point

WWF's most pressing concern about the fishery surrounds the selection of reference points and whether they are set at a level which is appropriate for orange roughy. In particular, WWF feels strongly that the level of the target reference point (TRP), and consequently the limit reference point (LRP) level, for orange roughy is not precautionary and cannot be justified based on best practice. WWF has previously raised this concern (WWF 2014a,b) and it applies equally to all three UoCs.

Currently, the target reference point for orange roughy is formulated as a 'range' of 30% to 40% of the estimated virgin (unfished) biomass or B_0 (Ministry of Fisheries 2008a, MPI 2011). In practice, however, we believe it can be shown that management applies only the lower, less conservative value as a *de facto* TRP (see discussion below). WWF notes that a TRP of 30% B_0 is unusually low for a deep-sea species which is known to have low productivity levels. It is not precautionary. The decision to set the TRP at this level does not appear to be consistent with New Zealand fishery management policies or rules and in some cases seems to run contrary to them. For example, the Harvest Strategy Standard (Ministry of Fisheries 2008a) indicates that the TRP for low productivity species should be set at 40% B_0 or higher. Operational Guidelines for the Harvest Strategy Standard (MPI 2011) recommends that B_{MSY} proxies of ≥ 45% B_0 should be applied to species with very low productivity rates such as orange roughy. We cannot see how this target is consistent with best practice. Table 2 shows some examples of what WWF views as best practice in setting target reference points for species with low levels of productivity.

Table 2. Examples of best practice in setting target reference points for low productivity species.

Example of Best Practice	TRP	Comment
New Zealand Hoki	45% B_0	Hoki is considered more productive than orange roughy
US West Coast LE Groundfish Trawl Fishery (Medley et al. 2014, PFMC 2014)	40% B_0	LRP = 25% B_0 Long-lived, low productivity rockfishes (*Sebastes* spp.) and other non-flatfish stocks
New Zealand Operational Guidelines, low productivity level	35-50% B_0	Recommended default proxy for B_{MSY}.
New Zealand Operational Guidelines, very low productivity level	> 45% B_0	Recommended default proxy for B_{MSY}.
Australia rebuilding strategy for Harrison's dogfish, *Centrophorus harrisoni* (AMFA 2012)	50% B_0	LRP = 25% B_0 Long-lived, low productivity deep water shark. Bycatch in Australian OR trawl from deep slope and seamount habitats.
MSC Guidance for target reference point, typical productive species	40% B_0	Limit RP should be ½ B_{MSY}
MSC Guidance for target reference point, low productivity species	> 40% B_0	Limit RP should be > ½ B_{MSY}
FAO 2007 Recommendation: Apply a precautionary approach to D/W fisheries	>>	Biological reference points should be set more conservatively for Deep Water species

WWF is unaware of how management has justified the selection of 30% B_0 as the biomass target for orange roughy stocks. We did not find a documented justification for this selection. Although some ministry documents refer to the constant annual yield (CAY) model of Francis (1992), it seems highly unlikely that his work was based on modelling orange roughy stocks since most information on biological parameters for this species have only been determined since 1992. While it is possible that B_{MSY} was analytically determined and found to be much lower for all NZ orange roughy stocks than would normally be expected, this conclusion is certainly not evident in the scientific literature. Further, we would question the robustness of such deterministic estimates of B_{MSY} because they are confounded with assumptions (e.g. the steepness of the stock-recruit relationship curve which remains without validation). Inspection of the harvest strategy standard shows that a threshold (T) may be calculated using the formula T = (1-F)*40% B_0 where F is natural mortality. However since orange roughy natural mortality is estimated to be very low (F=0.045; Doonan 1994) any such threshold limit would be on the order of 39% B_0. It is not clear, therefore, that an orange roughy stock that was maintained at this target reference point would be at a level that is consistent with B_{MSY}. WWF believes it is highly debatable whether any NZ orange roughy stocks would meet the SG 60 level for PI 1.1.2, scoring issue a.

Compounding the issue raised above is the fact that management did not formulate the TRP as a single point but rather as a 'range' of biomass values. The harvest standard gives a target range of 30% to 40% B_0 for orange roughy. However, inspection of the harvest control rule shows that the point which triggers management action (i.e. the close of the rebuilding phase) is 30% B_0. Similarly, the assessment working group considers stocks to be within the target range when they are above 30% B_0. In fact, the group concludes that stocks are "fully rebuilt" when they reach the lower end of that range, with no further management action contemplated. Thus, managers are using the lower end of the range as the effective TRP. It remains unclear what role the more conservative upper bound (40% B_0) may play in the harvest strategy. The function is certainly not evident in the harvest control rule, where no action is specified if biomass exceeds 40% of B_0 (see the harvest control rule presented in Figure 2 of MPI 2013 and Figure 9 of Punt et al. 2013).

4.2 Limit Reference Point

WWF is also concerned about the level at which the limit reference point (LRP) is set. Currently, the harvest strategy for orange roughy provides for two types of LRPs: a 'soft' limit which is set at 20% of B_0 and a 'hard' limit which is set at 10% of B_0 (Ministry of Fisheries 2008, MPI 2011). The harvest strategy triggers a requirement for a formal and time-bounded rebuilding plan when biomass is estimated to be below the soft limit, and contemplates a complete closure of the fishery when the biomass falls below the hard limit (Ministry of Fisheries 2008a). For the purposes of MSC assessment, we will only be considering the soft limit because the 'hard' limit (10% B_0) is clearly inconsistent with MSC definitions and the fishery would not meet the SG60 scoring level if the hard limit were taken as the LRP for the fishery.

MSC suggests that a default limit reference point of ½ B_{MSY} (i.e. 20% B_0) is appropriate for average productivity stocks, but MSC recognizes that the LRP may need to be set higher for stocks with low productivity levels (CB2.3.3). In our opinion, this applies to orange roughy. If the orange roughy targets were set more appropriately to suit a low productivity species (e.g. TRP = 50% B_0), then the default LRP would also be set with more precaution (e.g. LRP = 25% B_0).

In principle, management can introduce a measure of precaution by either raising the level of the TRP or raising the LRP or both. This is the harvest strategy adopted for management of long-lived, low productivity groundfish species of the U.S. West Coast (Medley et al. 2014). Some deep water rockfish species such as splitnose rockfish, *Sebastes diploproa*, cowcod, *S. levis*, and yelloweye rockfish, *S. ruberrimus*, are

exceptionally long-lived, of low productivity, and highly vulnerable to fishing (FishBase). These commercially exploited deep water rockfishes closely analogous to orange roughy in terms of their susceptibility to over-exploitation. Rockfish stocks are managed relative to a precautionary biomass targets (B_{MSY}) of 40% B_0 and against a minimum stock size threshold (MSST) which is set conservatively to 25% B_0 (PFMC 2014, Appendix 3). WWF believes this form of fishery management is consistent with best practice. We can provide the assessment team with more details of the rockfish harvest strategy and control rules upon request.

It remains to be seen whether a LRP of 20% B_0 is set above the level at which there is an appreciable risk of impairing reproductive capacity in orange roughy stocks. This is because of the short timeframe over which stocks have been fished relative to the species' longevity and the uncertainty about the stock-recruit relationship (Tracy and Clark 2005, Dunn 2007). We feel this is a significant source of uncertainty.

4.3 Stock Depletion?

As described in the previous section, WWF believes that the TRP and LRP for orange roughy are not appropriate to species life history characteristics, they are not consistent with best practice, and we feel they do not meet the MSC standard. We are openly sceptical of replacing a numeric biomass target value with a 'range' of biomass values and we suspect that management uses only the lower part of this range (i.e. 30% B_0) as the *de facto* target reference point in practice. We feel that our view is evidenced by the conclusion from the 2014 NWCR stock assessment (MPI 2014a,b) which now considers the NWCR stock "fully rebuilt" despite lacking information as to whether the stock is likely to be at or above the upper end of the management target range (see Table 2).

Table 2. Status of orange roughy stocks in relation to biomass targets based on 2014 stock assessments.

	NWCR	**ESCR**	**CP**
Estimate of current stock biomass (B_{2014})	37% B_0	30% B_0	42% B_0
Stock is below soft limit (B_{2014} < 20% B_0)	Very unlikely (< 10%)	Unlikely (< 40%)	Very unlikely (< 10%)
Stock is at or above lower end of target range (B_{2014} ≥ 30% B_0)	Likely (> 60%)	As likely as not (40-60%)	Very likely (> 90%)
Stock is at or above upper end of target range (B_{2014} ≥ 40% B_0)	[unspec.]	[unspec.]	As likely as not (40-60%)
Conclusion about stock status (relative to the Harvest Strategy Standard)	Stock is fully rebuilt	[unspec.]*	Stock is fully rebuilt
Estimated biomass is above or at MSC default TRP (B_{2014} ≥ 40% B_0)	No	No	Yes

*No conclusion was given about ESCR stock status relative to the harvest strategy standard. However under recent trends it was noted that "The spawning biomass is estimated to have been slowly increasing over the last four years."

At this stage in the assessment process, it is unclear to WWF how the assessment team will interpret the status of NWCR, ESCR and CP stocks, and whether this information will trigger scoring of PI 1.1.3.

4.4 Stock Rebuilding

WWF has concerns about whether rebuilding strategies are implemented in a manner consistent with the MSC standard. For example, it is unclear whether the conclusion that the ESCR stock is now fully rebuilt is aligned with MSC definitions (i.e. PI 1.1.1, scoring issue b, SG80) that the stock is at or fluctuating around its target reference point. Conceivably ESCR status could trigger scoring of PI 1.1.3 because the stock is clearly not fluctuating around its target point (i.e. B_{curr} << TRP; see Figure 22 in MPI 2014a).

Whether or not scoring of PI 1.1.1 is triggered, WWF seriously doubts the assessment team will find that rebuilding timeframes for a depleted stock of orange roughy will meet the MSC standard. In particular, we cannot see how complete stock recovery will be delivered within the default timeframes required by MSC. According to the Operational Guidelines for New Zealand's Harvest Strategy Standard (Ministry of Fisheries 2008a), formal plans must include rebuilding timeframes which are based on the time it would take a stock to rebuild to target levels without any fishing (T_{min}) and the standard allows rebuilding to take up to twice this duration ($2*T_{min}$). From an MSC perspective rebuilding of all stocks to target levels must occur within 30 years (PI 1.1.3: the SG60 level of scoring issue c says "A rebuilding timeframe is specified for the depleted stock that is the shorter of 30 years or 3 times its generation time."). However, orange roughy reach reproductive maturity at ages of approximate 24-31 years, and therefore a single generation time is very likely to exceed 30 years (Tracey and Horn 1999).

4.5 Recruitment and Other Uncertainties

We previously commented (WWF 2014b) that the MSC default tree was inappropriate for orange roughy because scoring issue (a) of PI 1.1.1 does not account for recruitment unknowns. We had asked MRAG to modify the default tree so that it would reflect this uncertainty in two dimensions: uncertainty about stock abundance, and uncertainty about how accurately we know "the point at which recruitment is impaired". Unknowns associated with orange roughy stock-recruitment relationship are frequently cited in scientific literature (Francis and Clark 2005, Dunn 2007) and this issue remains a significant concern for WWF. Despite the conclusion that all three stocks (NWCR, ESCR and CP) are judged to be above their soft limit, we remain unconvinced that 20% B_0 is a sufficiently precautionary limit (PI 1.1.2, issue b). There is no evidence that the hard limit (10% B_0) accurately reflects the point at which recruitment is impaired. We ask the assessment team, when evaluating harvest control rules (PI 1.2.2), to consider this as one of the main uncertainties (scoring issue b).

WWF's view is that reference points must be set high enough to *prevent* recruitment impairment and to have a sustainable fishery. We do not need to know the exact point where recruitment is impaired in orange roughy. Even if we have not seen recruitment failure, we can still utilize the experiences gained elsewhere with overfishing and recovery of stocks that have a similar life history. In actuality, sustainability and the MSC Standard basically requires that we never find the recruitment impairment point. To ensure this, reference points and management actions in place must be soundly based on our experience elsewhere (e.g. PFMC 2014) and even adjusted upwards based on the biology and further unknowns relating to specifically to orange roughy.

WWF notes that there is still much to learn about orange roughy stock structure. The discovery of a new West Spawning Site in ESCR (also called the Rekohu spawning plume) has been taken as evidence that this sub-stock may be rebuilding. The new spawning site was found approximately 25 nautical miles (about 44 km) further to the west in similar depths as the Spawning Plume. It contained females that were on average 2 cm larger than those in the Spawning Plume and had a slightly earlier but overlapping spawning period. There are, however, also doubts about the history of this plume. The implications for stock projections are

therefore also uncertain. There may be the potential for these fish to have been double counted in the acoustic surveys as orange roughy can move about 10 km/day and the surveys started four days apart.

We are also concerned about the fact that the footprint of the orange roughy fishery continues to expand. While the rate of expansion may have slowed in recent years, the general pattern implies that fishermen are searching for new areas in order to maintain high catch rates. This observation suggests that serial overfishing is occurring. Serial overfishing is a rather notorious problem with orange roughy fisheries globally (Norse et al. 2012). Evidence from New Zealand, however, suggests an occurrence over much smaller spatial scales (i.e. individual seamounts, hills, or knolls; Clark 1999, Clark 2009). Continuous expansion of the fishery footprint is undoubtedly a significant issue of concern and it also has implications for benthic habitat impacts.

4.6 Effectiveness of Harvest Control Rules and Tools

Under PI 1.2.2, the assessment team will be required to evaluate the effectiveness of harvest control rules and tools for orange roughy. Given that New Zealand is world renowned for its progressive fisheries management, this might be considered a perfunctory 'tick-box' exercise. However WWF suggests that the comparatively rich history of multi-stock management gives the team a very rare opportunity to bring quantitative evidence to the table. Since about 2000, New Zealand has applied a single harvest control strategy (with attendant control rules and tools) to nine different stocks of orange roughy. These stocks can be thought of as independent replicates when asking the question "How have the HCRs performed?" Francis and Clark (2005) posed this very question. They looked at the status of nine orange roughy stocks following several years of recovery after the 'fishdown phase' of initial exploitation and found that only two stocks (22.2 %) were at or above their biomass target points of 30% B_0. Perhaps the assessment team could revisit the same nine stocks using contemporary datasets to evaluate how successful the harvest control rules have been at maintaining all orange roughy stocks at B_{MSY}? This might give an unbiased and objective appraisal of whether "available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules."

5. Specific Concerns Related to Principle 2

5.1 Impacts to Habitats and Protected Corals

At the outset, WWF considers that the topic of benthic habitat impacts is going to be a central concern in this fishery assessment. However WWF also notes that it is difficult to provide extensive comments at this early stage in the assessment process. This is because:

- We don't know how the assessment team will stratify the different habitat types into separate scoring elements - by UTF vs. slope categories (see Punt et al. 2013), by hard-bottom vs. soft bottom substrates, or according to the MEC (Snelder et al. 2006) or BOMEC categories (Leathwick et al. 2012);

- We don't know which issues will be addressed under the habitat component as opposed to being scored under the ETP component (reef-building deep water corals may be scored in either MSC component because they are also protected species in New Zealand); and

- We don't know which data sets will be used to determine the degree of interaction between trawl gear and benthic mega-fauna – using frequency of bycatch in trawls (Tracey et al. 2011), using trawl

footprints overlaid on coral distribution maps (Baird and Clark 2013) or predicted coral distribution maps (Baird et al. 2012), or by relying on habitat maps giving average densities of major faunal groups in the primary fishing grounds.

Therefore we will focus our comments on a few salient points from the pre-assessment report (Punt et al 2013).

The footprint of the trawl fishery is small: The absolute size of the area swept by trawls is known with some level of confidence (Stewart 2013, Black et al. 2013), the amount of swept area has decreased in the last decade (Tilney 2013) and the total swept area is small in comparison with the NZ EEZ. However we dispute the subjective conclusion that overall impact is therefore small. A more important metric is the proportional area of each habitat type that has been swept by trawls. The data in Black et al. (2013) suggest that swept area may actually be quite large when considered on a cumulative basis within narrow depth strata (e.g. 50.1% of the seafloor within the target depth range on the NWCR over a 20 year period).

Impact is restricted to the trawl footprint: There is no evidence to support this assertion. In fact, it has been suggested that sediment clouds raised by deep water trawling may have indirect impacts upon the adjacent deep-sea benthos (Clark and Anderson 2013). However the existence of a sedimentation effect remains speculative and it is not known over what spatial and temporal scales it may be relevant.

Trawls follow established tow lines: The pre-assessment report suggests that individual tows tend to follow established lines because of operational procedures and vessel positioning needs. Punt et al. (2013) suggested this practice might localize and reduce direct impacts to corals and benthic habitats, as implied in some illustrations of fishing effort at individual seamounts (e.g. tows in the Graveyard Complex; Clark and Anderson 2013). However the 'trodden path' effect is not evident to WWF at larger scales of analysis (e.g. Stewart 2013, Black et al. 2013). WWF feels that this sort of anecdotal evidence needs to be corroborated with quantitative studies.

Fishery footprint continues to expand: The pre-assessment report notes that "…*the fishery continues to expand to new areas (although at a declining rate). Orange roughy tows appear to follow existing tow lines, but by practice, not requirement. It is unclear that a strategy is in place to minimise coral mortality, especially with the possibility of expansion of the trawl area from the fishery, and if the measures follow the approach outlined by the Ministry for Primary Industries leading to appropriate management strategies. Evaluation of whether there is a need to reduce expansion of the fisheries to new trawling areas, and if so, how that would happen would benefit the management of corals".*

WWF feels that the assessment team should take caution to avoid subjectivity in assessing whether a given rate of expansion in trawl footprint is small or large. The nature and extent of trawl impacts are also a consequence of their persistence. The long-term impacts of trawls to deep water benthic habitats will ultimately be influenced by habitat recovery rates. Existing information suggests that habitat recovery takes decades or centuries (Koslow et al. 2001, Clark and Rowden 2009, Williams et al. 2010).

It is worth pointing out that the decline in rate of new swept area over the past decade is likely a result of TACC reductions and area closures owing stock collapse (i.e. it was attributed to measures to protect fish stocks, not habitats). WWF is concerned that as orange roughy stocks are rebuilt and areas are re-opened to fishing or new areas are explored, the total amount of seafloor that is impacted by trawling will begin to increase once more. We ask the assessment team to evaluate whether New Zealand authorities have sufficient measures in place (a strategy or at least a partial strategy) to prevent this from happening. This concern is relevant to scoring PI 2.3.2 (scoring issue a) for corals as an ETP species, also and PI 2.4.2 (scoring issue a) for habitat impacts.

Unregulated expansion of trawl footprint: WWF is also concerned about what appears to be unregulated expansion of trawling into new areas. How do New Zealand's resource management agencies plan for and manage impacts to benthic marine habitats? Are these plans driven primarily by fishery interests? Or is there a system for partitioning the usage of seafloor across different interest groups? It might be helpful to understand which areas are set aside for non-consumptive uses such as benthic protected areas, and which areas are designated for consumptive uses such as bottom trawling, mining, other habitat impactful activities (i.e. analogous to zoning maps in terrestrial systems). We would hope to see management taking a pro-active and holistic view towards habitat and ecosystem usage, and we ask the assessment team to consider these concerns in evaluating management strategies under PI 2.4.2, and possibly under PI 2.5.2.

5.2 Ecosystem Impacts

There is a reasonably broad base of information about New Zealand's deep water ecosystem in which the orange roughy fishery operates. Punt et al. (2013) suggested the key elements of the ecosystem are known such as predator and prey interactions of the target species, and the general characteristics of the ecosystem have been described, at least in broad terms. Some aspects of the ecosystem have also been modeled. For example, Pinkerton (2011) developed a balanced trophic model of the Chatham Rise ecosystem with focus on the role of demersal fishes, while Knight et al. (2011) looked at energetics.

Orange roughy is one of the dominant demersal fish species in deep water ecosystems between 750 and 1200 m depths (MPI 2014 plenary, OR) and there seems to be scientific consensus that current rates of removal will impact upon the ecosystem (Tracey et al. 2012) but it is unclear what those impacts might be and how we will detect them. Dunn (2013) indicated that there should be research on the biodiversity of the ecosystem and monitoring of functional groups or species that are linked to the dynamics and maintenance of ecosystem function. This would allow detection of any increase in risk of interrupting the ecosystem structure and function caused by the fishery.

Notwithstanding the research to date, WWF is concerned about the suggestion that PI 2.5.1 would score ≥ 80. It is unclear to us that there is sufficient information to make a robust inference about the lack of serious or irreversible harm to the key elements of ecosystem structure and function. There was no consensus arising from the ecological risk assessment on this issue (Boyd 2013). WWF sees a fishery that causes measurable and long-lasting impacts to benthic habitats (Koslow et al. 2001, Clark and Rowden 2009, Williams et al. 2010) and those impacts are known to reduce the biodiversity of benthic communities at local spatial scales (at least). Punt et al. 2013 asserted that the footprint of the fishery is small, and by extension therefore the impacts would be small. But this assumes that fishery impacts are randomly distributed across a uniform seafloor when in fact we know that successful fishery activities are very precisely focused (and re-focused) on productive bottom features. Therefore we feel it remains an unsubstantiated assertion that the fishery has no impact on biodiversity of the ecosystem.

We also note that our cumulative experience with orange roughy fisheries is comparatively short in relation to the unusually long generation time of the species. The long term impacts of removals on the broader ecosystem may be difficult to detect or may be misleading at this time. No ecosystem model has been developed yet (as far as we are aware) for the deep water systems of New Zealand. Dunn (2013) suggested that a quantitative model such as ATLANTIS might be an informative tool in this respect.

5.3 Bycatch

WWF believes that the fishery is still lacking key information on at least some of the main bycatch species. At present it does not seem possible to show that all main bycatch species are likely to be within their biologically based limits (PI 2.2.1, scoring issue a). For example, the shovelnose spiny dogfish, *Deania calcea*, is caught in fairly large numbers by the orange roughy fishery (the OR fishery alone may account for up to 40% of all catch of shovelnose dogfish in quota managed areas each year; e.g. Table 5 in Anderson 2013) but the species is not managed under the New Zealand quota management system (Punt et al. 2013). There have been no recent stock assessments of *D. calcea* (Punt et al. 2013). According to FishBase the species has extremely low reproductive capacity and "high to very high vulnerability" and "very low" resilience (minimum population doubling time > 14 yrs). Therefore we do not see evidence that *D. calcea* or other deep water dogfish species are likely to be within biologically based limits (WWF 2014a, 2014b). We ask the assessment team to carefully consider how this situation meets scoring issue a of PI 2.2.1. WWF also asks the team to reconsider whether or not the following species would meet MSC definitions for inclusion as main bycatch species based on their vulnerability to overfishing: pale ghost shark, *Hydrolagus bemisi*, dark ghost shark, *H. novaezealandiae*, and smooth skate, *Dipturus innominatus*.

In addition, WWF has concerns about the management strategy for bycatch species under PI 2.2.2 (see WWF 2014a). WWF question whether existing management arrangements for deep water dogfishes (and other species exhibiting similar life characteristics such as low productivity and high susceptibility to fishing mortality) can be considered a 'partial strategy' that is sufficient to maintain these species within biologically based limits and not hinder recovery (scoring issue a). WWF believes the fishery does not meet the SG80 level for this scoring issue. If introduction into the quota management system (QMS) would resolve the situation as suggested by Punt et al. (2013), then WWF would still need to ask how there can be evidence the strategy is being implemented successfully (PI 2.2.2, scoring issue c).

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7. Appendices

Appendix 1. WWF NZ comments on pre-assessment, 21 January 2014

Appendix 2. WWF comments on default assessment tree, 18 July 2014

Appendix 3. Annual Catch Limits, excerpt from Groundfish SAFE document, PFMC 2014.

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WWF NZ Submission to Deepwater Group

Review of four orange roughy fisheries and issues preventing the fishery from meeting the Marine Stewardship Council (MSC) standard

21st of January 2014

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1. Executive Summary

WWF NZ conducted an analysis of four orange roughy fisheries put forward by the industry (Deepwater Group Ltd.) for MSC pre-assessment to ascertain the current health and status of the stocks, and to identify any issues that may prevent the fisheries from meeting the MSC standard.

In the course of the assessment five performance indicators (1.1.1, 1.1.2, 1.1.3, 1.2.4 (except MEC) and 2.2.1) were identified as having the potential to fall below SG 60 (which would lead to a failed assessment), while there were a further nine performance indicators (two in Principle 1 and seven in Principle 2) that would require conditions of certification.

Principle 1

WWF NZ believes that all roughy stocks are likely to be depleted below target levels, which would impair recruitment and therefore not meet the SG 60 scoring guidepost of the MSC standard.

The target levels currently set for the stocks (30% of B_0) are very low, especially for a long-lived species like orange roughy. In addition, the latest Harvest Strategy Standard document indicates that levels should be higher, a recommendation that has not been adopted.

There are an additional two performance indicators under Principle 1 that would likely lead to conditions for the stocks (PI 1.2.1 and 1.2.2).

Principle 2

WWF NZ believes that only one PI in principle 2 would not reach the SG 60 scoring guidepost as it is not possible to state that species of deepwater dogfish are likely to be within their biologically based limits, given their poor reproductive output.

There are other information gaps and some performance Indicators in Principle 2 that are likely to lead to a conditional pass. However, unlike in Principle 1, none of these information gaps would result in a score that would automatically fail the fishery.

The elements that would represent conditions of certification relate to the need for further or more complete information or evidence regarding environmental impacts, particularly related to impacts on the ecosystem or associated elements of bycatch, habitats or ETP species.

Where appropriate, results from this report are related to the pre-assessment of these fisheries conducted by MRAG Americas Ltd in December 2013.

The implementation of Fisheries Improvement Projects (FIPs) is discussed further in relation to any issues that may prevent the fishery from meeting the MSC standard.

2. Introduction

Orange Roughy is a commercially important species that was first introduced in to the Quota Management System in New Zealand in 1986.The species exhibits typical biological traits which are found in many deep-sea species; late to mature, slow growing, of low fecundity and prone to formation of dense aggregations for spawning and/or feeding. As a result they are relatively unproductive, highly vulnerable to over-fishing and potentially are slow to recover from the effects of over-exploitation. Roughy fisheries were heavily fished during the mid 80s and early 1990s and as a result several stocks in NZ waters are now severely depleted and in poor health.

Management of Orange Roughy stocks in the past has been poor, but since 2009 the New Zealand fishing industry, in particular the DWG (Deepwater Group), has invested heavily in research to assess the status of the stocks in a bid to rebuild these fisheries. In 2013 the industry advertised their intentions to put forward four Orange Roughy stocks (ORH MEC, ORH7A, ORH3B NWCR and ORH3B ESCR) through the Marine Stewardship Council (MSC) certification process.

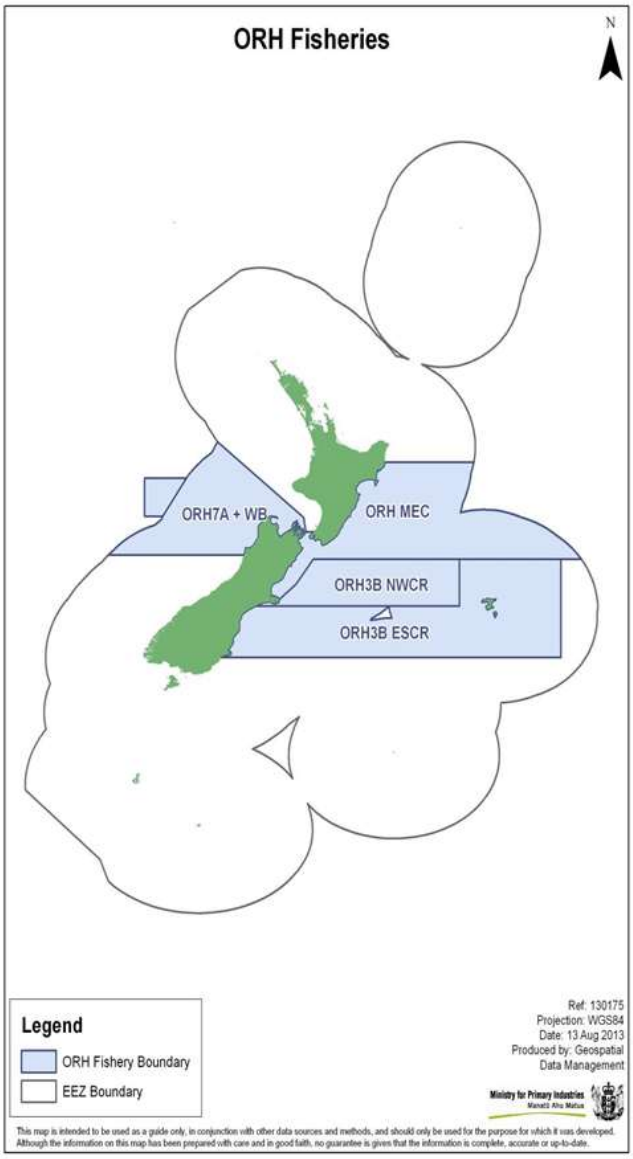
Pre-assessment is the first formal stage of the MSC fishery assessment process and identifies the strengths and weaknesses of the fishery relative to the MSC assessment criteria. The main purpose of a pre-assessment is to obtain a clear understanding of the nature, scale, and intensity of a fishery and to identify any issues that may prevent the fishery from meeting the MSC standard. The results of the official pre-assessment were published in late December 2013 by MRAG Americas, and are referred to extensively throughout this document.

The purpose of this report is for WWF NZ to provide an independent analysis of the current health and status of the four Orange Roughy fisheries mentioned above. Evaluation results are interpreted in line with the MSC scoring guidelines for each Performance Indicator (PI) and where possible corresponding scores from the MRAG pre-assessment report are also mentioned. An additional section covers areas of concern on a more detailed perspective from attendance at the Deepwater Working Group meetings (DWWG) where data and stock assessment models are peer reviewed.

WWF recommends the development of a Fishery Improvement Projects (FIP) to address the issues preventing the orange roughy stocks from meeting the MSC standard. A FIP is defined as a multi-stakeholder effort to improve a fishery. FIPs are unique because they utilize the power of the private sector to incentivize positive changes in the fishery towards sustainability. FIP participants may include stakeholders such as producers, NGOs, fishery or aquaculture managers, government, and members of the supply chain. The ultimate goal of a FIP is to have the fishery performing at a level consistent with an unconditional pass of the MSC standard

3. Overview of the fisheries for certification

Four fishery management areas have been assessed during this limited Principle 1 and Principle 2 assessment (see below).



1. ORH MEC which incorporates the orange roughy ORH2A South, ORH2B and ORH3A quota management areas (QMA),
2. ORH7A, including Westpac Bank which is adjacent to and outside the EEZ. The Westpac Bank and ORH7A management areas are believed to include the same biological stock of orange roughy
3. ORH3B NWCR which is that part of the ORH3B QMA on the northwest Chatham Rise
4. ORH3B ESCR which is that part of the ORH3B QMA on the east and south Chatham Rise. This sub-stock has produced approximately 70% of the total catch from the whole of the ORH3B Quota Management Area.

4. WWF Preliminary evaluation of the fishery

Principle	Component	PI	Performance Indicator	Likely scoring level			
				MEC	NWCR	ESCR	Challenger
1	Outcome	1.1.1	Stock status				
		1.1.2	Reference points				
		1.1.3	Stock rebuilding				
	Management	1.2.1	Harvest Strategy				
		1.2.2	Harvest control rules and tools				
		1.2.3	Information and monitoring				
		1.2.4	Assessment of stock status				
2	Retained species	2.1.1	Outcome				
		2.1.2	Management				
		2.1.3	Information				
	Bycatch species	2.2.1	Outcome				
		2.2.2	Management				
		2.2.3	Information				
	ETP species	2.3.1	Outcome				
		2.3.2	Management				
		2.3.3	Information				
	Habitats	2.4.1	Outcome				
		2.4.2	Management				
		2.4.3	Information				
	Ecosystem	2.5.1	Outcome				
		2.5.2	Management				
		2.5.3	Information				

Key to above table

High risk issue, leading to a fail score	**<60**
Medium risk, raising a condition	**60-79**
Low risk, leading to a pass	**≥80**

Please note the following sections will only focus on the areas which have scoring guidelines of <80.

5. Performance indicators below SG 60

5.1 Stock Status

ORH Mid-East Coast Stock (2A South, 2B, 3A)
The 2013 assessment base case estimated the stock to be at 24% B_0 (range 20-32%). It is unlikely to be above the target (at 30% B_0), as likely as not to be below the Soft Limit (20% B_0) and very unlikely to be below the Hard Limit (10% B_0).

Estimates of B_{MSY} are 23.1% of B_0 from the base case and 21.1% of B_0 for the Haist sensitivity (which estimates year-class strength differently). These estimates, however, are dependent on the assumed values of steepness in the stock-recruit relationship and, as the plenary report acknowledges, management targets need to be higher than these values, in part because of poor knowledge about the stock-recruit relationship. These values are also much lower than the proxies suggested in the Harvest Strategy Standard.

The fishery began in 1983-84 and has been operating for 30 years. For the mid-East Coast stock the age at maturity has been assumed to be the same as the age of vulnerability. The age at 50% vulnerability is estimated to be about 35 years but the estimate from the age-at-the-transition zone in otoliths is younger. This suggests that the effects of past fishing on recruitment, if not already evident, should soon be so. Recruitment has been also been estimated in the assessment to be well below average from the late 1980s through to the mid-1990s.

Given the above, it is quite plausible that the stock is below the point where recruitment would be impaired (though this is not well defined for orange roughy) and therefore WWF NZ believes it would not meet the SG 60 level. The fact that the Operational Guidelines for New Zealand's Harvest Strategy Standard recommends that proxies for B_{MSY} for very low productivity species such as orange roughy are ≥ 45% B_0 adds weight to that argument.

ORH3B North West Chatham Rise
The most recent assessment was in 2006. The biomass was projected to have declined from the 1980s to 2006 and to have reached 11% of unfished levels (95% confidence interval 8-16%). An alternative model produced even lower estimates of biomass.

Catch limits were reduced to 750 t in 2006 but, although the stock size was expected to increase over the next five years at this catch level, industry agreed to avoid fishing this stock in 2010/11, 2011/12 and 2012/13 to provide for more rapid rebuilding.

The current stock size is uncertain but it was estimated to be depleted to a level at which recruitment would have been impaired and it is plausible that the stock is still at a level where this remains the case. If so, WWF NZ believes the stock would not meet the SG 60 level.

The 2012 acoustic survey, however, has produced substantially higher estimates of stock biomass that are above the 30% B_0 target levels. These are yet to be accepted by the Deepwater Working Group as the best estimates of current biomass. If they are accepted, then this stock would meet all the requirements of the SG80 level.

East and South Chatham Rise (ORH3B)
This sub-stock has produced approximately 70% of the total catch from the whole of the ORH3B Quota Management Area. The most recent assessment was in 2013 when the biomass was estimated to be at 25%

of B_0 (range 19-32% B_0). The stock is considered unlikely to be above 30% B_0 (the biomass level that is used as a proxy for B_{MSY}). The stock was also considered unlikely to be below the soft limit of 20% B_0.

The discovery of a new West Spawning Site (also called the Rekohu spawning plume) has been taken as evidence that this sub-stock may be rebuilding. The new spawning site was about 25 nautical miles (about 44 km) further to the west, was in similar depths to the Spawning Plume, contained females that were on average 2cm larger than those in the Spawning Plume and had a slightly earlier but overlapping spawning period. There are, however, also doubts about the history of this plume the implications for stock projections are therefore also uncertain. There may be the potential for these fish to have been double counted in the acoustic surveys. Roughy can move about 10 km/day and surveys started 4 days apart.

Despite the stock being estimated to be above the soft limit, the uncertainty around the stock-recruitment relationship for orange roughy and the uncertainty of the significance of the new Rekohu spawning plume means that it is quite plausible that the stock has been fished down to below the point where recruitment would be impaired. In this case WWF NZ believes the stock would not meet the SG 60 level.

ORH7A, Challenger Plateau including Westpac Bank
The stock was assessed in 2013 and estimated to be 20 or 24% B_0. The stock is considered unlikely to be above 30% B_0 and as likely as not to be below the soft limit of 20% B_0.

Even if the stock is close to the soft limit, the uncertainty around the stock-recruit relationship for orange roughy means that it is quite plausible that the stock has been fished down to below the point where recruitment would be impaired and it's WWF NZ's opinion that the stock would therefore not meet the SG 60 level.

It is worth noting that the MRAG pre-assessment report for this performance indicator gives a conditional pass for the MEC stock (60-79) and states "no recent assessment" for the remaining three stocks, which it also grades as conditional passes by concluding "*although quantitative assessments based on fitting population dynamics models are not available for three out of the fours stocks, the information in the plenary report suggests that all four stocks are currently below 30%B_O and as such are not fluctuating around their target reference points".*

5.2 Reference Points

The same reference points are apparently used for all orange roughy stocks considered here so the score and the rationale are also the same.

a. Appropriateness of reference points
All the reference points are more than generic and are based on justifiable and reasonable practice. They would therefore meet the SG60 requirements. They can also be estimated and the type of reference points are appropriate for the stock, so WWF NZ believes they would meet the SG80 requirements.

b. Level of limit reference point
There are two types of limit reference points used: a 'soft' limit that is set at 20% of B_0 and a 'hard' limit that is set at 10% of B_0. The soft limit here is regarded as the limit reference point for the purposes of the assessment against the MSC standard.

Whether 20% of B_0 is above the level at which there is an appreciable risk of impairing reproductive capacity in orange roughy stocks is yet to be demonstrated, because of the short time over which stocks

have been fished relative to the species' longevity and the uncertainty about the stock-recruit relationship, making scoring of this issue problematic.

c. Level of target reference point
The management targets for orange roughy are 30% B_0 which is toward the lower end of the range of target biomass levels that are generally in use for teleosts. It is above the deterministic estimates of B_{MSY} that have been calculated for orange roughy but these are not robust (mainly because they are confounded with assumptions about the steepness of the stock-recruit relationship) and are not used. The justification for selecting this target is not clear but for one stock (ORH 7A) it is stated that B_{MSY} is interpreted as the mean biomass under a CAY policy which is estimated to be 30% B_0.

The Operational Guidelines for New Zealand's Harvest Strategy Standard recommends proxies for B_{MSY} for very low productivity species such as orange roughy of at least 45% B_0. This is well above the current management target.

It is not clear, therefore, that a stock that was maintained at this target reference point would be at a level that is consistent with B_{MSY} and therefore WWF NZ concludes that it is arguable that all orange roughy stocks would not meet either SG 60 or SG 80 on this PI.

d. Low trophic level target reference points
Orange roughy are not a LTL species.

It is important to note that the MRAG pre-assessment report refers to the limit reference point in b. as the "hard" limit i.e. 10%B_O but also scored all four fisheries as < 60 under this PI. It mentions "*additional justification of the reference points is needed to satisfy scoring issues b and c at SG60 and SG 80. There is great concern that the hard limit is below the MSC default level, and that there is no rationale given for why the current range (3-40% B_O) is an appropriate management target for Orange Roughy".*

5.3 Stock Rebuilding

All the orange roughy stocks considered here are estimated to be below target levels and have been for some time so they are 'depleted' in MSC language and require there to be a rebuilding strategy. For New Zealand's Harvest Strategy, however, stocks are only subject to formal rebuilding plans if they are estimated to be below the soft limit.

For this assessment against the MSC PIs, the combination of the formal rebuilding plans and the approach used for setting TACs for stocks that are not below the soft limit but are below target levels are considered together as representing the rebuilding strategy that is in place.

ORH Mid-East Coast Stock (2A South, 2B, 3A)
a. Rebuilding strategy design
It is not known whether the rebuilding plan that is in place for the mid-East Coast stock is considered to have a reasonable chance of success, therefore it's WWF NZ's opinion that this would not reach the SG60.

b. Rebuilding timeframes
According to the Operational Guidelines for New Zealand's Harvest Strategy Standard, rebuilding timeframes needed for formal rebuilding plans are based on the time it would take a stock to rebuild to target levels without any fishing (T_{min}) and allows rebuilding to take up to twice this duration.

From an MSC perspective rebuilding of all stocks to target levels must occur within 30 years but a single generation time of orange roughy is greater than 30 years.

Stock projections provided in the Plenary reports do not specify the estimated time to reach target levels and any such projections would be entirely dependent on the assumed levels of incoming recruitment. It is not clear, therefore, what levels of catch would still allow stocks to rebuild within the required timeframes making scoring of this issue problematic.

c. Rebuilding evaluation
There is monitoring in place that would allow the level of any rebuilding to be determined, so the SG60 requirements are met. Because rebuilding timeframes are expected to be decades long, frequent monitoring is not required.

For the mid-East Coast stock, the base case assessment indicates that recruitment has been low and the stock is not yet rebuilding so WWF NZ believes that this stock would not meet the SG80 requirements.

ORH3B North West Chatham Rise
a. Rebuilding strategy design
It is not known whether the rebuilding plan that is in place for the Northwest Chatham Rise stock is considered to have a reasonable chance of success therefore it's WWF NZ's opinion that this would not reach the SG60.

b. Rebuilding timeframes
As for the mid-East Coast stock, projections provided in the Plenary reports do not specify the estimated time to reach target levels making scoring of this issue problematic.

c. Rebuilding evaluation
There is monitoring in place that would allow the level of any rebuilding to be determined, so the SG60 requirements are met. Because rebuilding timeframes are expected to be decades long, frequent monitoring is not required.

For the Northwest Chatham Rise, the 2012 acoustic survey has provided biomass estimates that indicate that the stock is above the target reference point of 30% of B0. These have yet to be agreed by the Deepwater Working Group but they do provide evidence of rebuilding and WWF NZ believes that the stock would meet the requirements of the SG80 level.

East and South Chatham Rise (ORH3B)
a. Rebuilding strategy design
It is not known whether the rebuilding plan that is in place for the East and South Chatham Rise stock is considered to have a reasonable chance of success, therefore WWF NZ believes that this would not reach the SG60.

b. Rebuilding timeframes
As for the mid-East Coast stock, projections provided in the Plenary reports do not specify the estimated time to reach target levels making scoring of this issue problematic.

c. Rebuilding evaluation
There is monitoring in place that would allow the level of any rebuilding to be determined, so the SG60 requirements are met. Because rebuilding timeframes are expected to be decades long, frequent monitoring is not required.

There are alternative interpretations of the discovery of the new Rekohu spawning plume, making scoring of this issue as problematic.

ORH7A, Challenger Plateau including Westpac Bank
a. Rebuilding strategy design
It is not known whether the rebuilding plan that is in place for the Challenger Plateau stock is considered to have a reasonable chance of success, therefore it's WWF NZ's opinion that this would not reach the SG60.

b. Rebuilding timeframes
As for the mid-East Coast stock, projections provided in the Plenary reports do not specify the estimated time to reach target levels making scoring of this issue problematic.

c. Rebuilding evaluation
There is monitoring in place that would allow the level of any rebuilding to be determined, so the SG60 requirements are met. Because rebuilding timeframes are expected to be decades long, frequent monitoring is not required.

For the Challenger stock, a much higher proportion of newly recruited fish was found in the spawning population in 2009 than in 1987, but the mature biomass was assessed has having been relatively constant from 2009 to 2011. This would be unlikely, in WWF NZ's opinion, to meet the requirements of the SG80 level.

It should be noted that the MRAG pre-assessment report concluded that additional analyses were needed for this condition and therefore gave it a scoring guideline of <60 across all fisheries. It went on to state "*It is not clear that the proposed harvest control rule is consistent with the requirements of the MSC standard. In particular, there is no analysis which shows that the expected rebuilding time is 30 years (SG 60) or 20 years (SG80). Consequently, it is not possible to evaluate the fishery against scoring issues b and c*".

5.4 Assessment of stock status

The assessments of stock status vary among stocks and need to be assessed individually.

ORH Mid-East Coast Stock (2A South, 2B, 3A)

a. Appropriateness of assessment to stock under consideration

The assessment of the mid-East Coast stock is based on integrated age-structured model that takes into account the major features relevant to the biology of the species and the nature of the fishery. This meets the requirements of the SG100 level.

b. Assessment approach

The assessment estimates stock status relative to reference points and so meets the SG60 level requirements.

c. Uncertainty in the assessment

The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way. MCMC runs for base case and a sensitivity were conducted and results used to provide probabilistic statements about stock status. This meets the requirements of the SG100 level.

d. Evaluation of assessment

The assessment has been tested and shown to be robust. A key alternative assessment approach has been rigorously explored and taken through to MCMC results stage. This would go close to meeting the requirements of the SG100 level.

e. Peer review of assessment

The assessment of stock status is at least subject to internal peer review through the plenary process. This meets the requirements of the SG80 level.

There are currently no recent stock assessment models for **ORH3B North West Chatham Rise**, **East and South Chatham Rise (ORH3B)**, and **ORH7A, Challenger Plateau including Westpac Bank** therefore it's WWF NZ's opinion that all these fisheries would fail at SG 60, point a.

The results from the MRAG pre-assessment report support the results from this study, also failing ORH 3B NWCR, ORH7A and ORH ESCR. It concludes "*Population model-based assessments either do not exist for the other stocks or are dated, and therefore would not be sufficient as the basis for satisfying PI 1.2.4*".

5.5 Bycatch species: outcome

For the purpose of this assessment and following the MSC guidance (GCB 3.8.2 CR v. 1.3, 2013) two species can be considered main bycatch species in the orange roughy fisheries (ORH3B ESCR, ORH3B NWCR, ORH7A, ORH MEC). Both Smooth skate (*Dipturus innominatus*) and deepwater dogfishes (spp.) are considered main bycatch species for the purpose of this assessment because there status is uncertain and at least the skate species is considered vulnerable to fishing due to its biology. The risks to the deepwater sharks are also recognized in the New Zealand National Plan of Action (NPOA) for the Conservation and Management of Sharks, with a range of measures to prevent and reduce potential impacts of fisheries on

shark species (Ministry of Fisheries 2008). From the document, however, it is not clear if these have been implemented.

Smooth skates are quota managed and because the catch in each of the management areas are negligible the risk from the orange roughy fishery is considered low and the fishery does not hinder recovery and rebuilding.

Nevertheless deepwater dogfish, in particular the shovelnose dogfish (*Deania calcea*) is caught in numbers that should be concerning for a species that has extremely low reproductive capacity and is not managed under the QMS. It is not clear whether deepwater dogfish are likely to be within biologically based limits, considering the lack of information on the biology and distribution of these fish. It is also not apparent that there are mitigation measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding.

For these reasons WWF NZ believes it is reasonable to assume that all four fisheries would fail this PI (SG<60).

The MRAG pre-assessment report gives this PI a condition (SG 70-79) and notes "*none of the bycatch species is actively managed, and are non-QMS. However, MPI can move those species into QMS for active management should problems occur*".

6. Performance indicators with SG 60-79

6.1 Harvest Strategy

The same harvest strategy is used for all orange roughy stocks considered here so the score and the rationale are also the same.

There is little evidence that the harvest strategy used for these fisheries will achieve its stock management objectives and therefore WWF NZ believes that this would not meet SG80.

It is worth noting that the pre-assessment from MRAG also scores this PI with a condition noting that "*further justification for the orange roughy harvest strategy is needed to achieve a higher score"*.

6.2 Harvest Control Rules and Tools

The same harvest control rules are used for all orange roughy stocks considered here so the score and the rationale are also the same.

a. Harvest control rules design and application
The harvest control rules are well defined, are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached. This meets all the requirements of the SG100 level.

b. Harvest control rules account for uncertainty
Whilst the design of the harvest control rules take into account a wide range of uncertainties it is not understood if the selection of the harvest control rules take in to account the main uncertainties, therefore WWF NZ believes that this would not meet the requirement of SG80.

c. Harvest control rules evaluation
The available evidence does indicate that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules. The evidence for this is necessarily much slower to accumulate for orange roughy than for species with younger ages to maturity and shorter longevity. Nevertheless, since the harvest strategy was originally adopted in 2008, there is evidence that it has led a cessation in the overfishing that depleted stocks of orange roughy and reduced exploitation levels to more sustainable levels. This meets the requirements of the SG80 level at least and could be considered to meet the SG100 level requirements.

The MRAG pre-assessment report also raises a condition for this PI, stating "*additional justification for all aspects of the harvest control rule is required"*.

6.3 Bycatch species: management strategy

Smooth skate (*Dipturus innominatus*) and deepwater dogfishes (spp.) are both considered main bycatch species for the purpose of this assessment because their status is uncertain. Smooth skate (*Dipturus innominatus*) are the only quota managed bycatch species. Therefore for this species there is a full strategy. However there is a question if the management arrangements for deepwater dogfishes are sufficient to maintain these species within biologically based limits and not hinder the recovery.

WWF NZ believes that this could lead to the fishery scoring below 80 and therefore having a condition assigned related to deepwater dogfishes (spp.).

The MRAG pre-assessment report also scores this PI as a conditional pass (60-79), and states "*although some measures are in place (eg. Catch data recording, observer data collection, data from trawl surveys) for non QMS species, this does not amount to a partial strategy, which would be resolved with introduction to the QMS system*".

6.4 ETP species: outcome status

Key legislation for ETP species includes the Fisheries Act (1996), Wildlife Act (1953), and Marine Mammals Protection Act (1978). There is a requirement to report injury or mortality of protected species to the Department of Conservation.

There are highly developed and active monitoring and observer programs on board trawler vessels; these provide a strategy to monitor the legislation. VMS is mandatory on ORH vessels

National Plans of Action have been developed for birds and sharks. An environmental risk assessment process has been completed for the fisheries (Boyd, 2013). The New Zealand Wildlife Act (1953) is administered by the Department of Conservation. No additional species are listed in CITES appendix 1 for the region.

Protected fishes: MPI Observer data (DWG and MPI 2013) and Conservation Services Programme reports (Rowe 2009, 2010; Ramm 2010, 2012a, 2012b), revealed that there has been no captures of oceanic whitetip shark, white pointer shark, whale shark, deepwater nurse shark, manta ray, spinetail devil ray, giant grouper or spotted black grouper (all protected under the Wildlife Act) in orange roughy fisheries. Observer reports on different types of interactions are specifically for seabirds (Ramm 2010, 2012) but the extent of indirect effects are less well known for these species. In addition in an assessment of the ecological effects of the New Zealand orange roughy fisheries, Boyd (2013) indicated that the knowledge of potential interactions of the fisheries with Basking shark (*Cetorhinus maximus*) could be improved.

Whale shark, manta ray, giant grouper and reptiles like marine turtles are tropical species and do not overlap with the four orange roughy fisheries.

Seabirds: Thompson & Berkenbusch (2013) provide estimates of seabird captures by orange roughy fishery for the past ten years, and Richard & Abraham (2013) which estimates the risk to New Zealand seabird species from all commercial fisheries. This is a 'Level 2' (semi-quantitative) risk assessment.

Boyd (2013) specifically considered Salvin's albatross, Chatham Island albatross and Northern giant petrel taking into account the two studies and determined that there is a high degree of certainty of actual mortalities due to the level of observer coverage and determined to be very low or negligible.

Maybe some higher resolution on species diversity is needed for the Northern giant petrel to confirm actual captured and mortalities by species.

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, Hydrocorals are protected. The process of mapping the distribution of cold water corals area has been undertaken across the New Zealand EEZ. In addition there is good information a good information base from NIWA research, including dredge samples and video (Boyd, 2013). However much of the information of the corals is based on trawl net captures which has limitations. In addition taxonomic information is limited at the species level.

Marine mammals:
All marine mammals are protected. There are no records of New Zealand fur seals, New Zealand sea lions, dolphin or whale species in the four orange roughy fisheries (Thompson & Berkenbusch 2013). The fisheries operate in areas where no sea lions are present.

While the observer records do not provide complete coverage of the fishery and it varies between management areas, the infrequent encounters of ETP species in general, combined with the fisheries footprint suggest that it is highly unlikely to create unacceptable impacts.

WWF NZ believes that the uncertainty of indirect effects (especially with regards to the corals) would give this PI a conditional pass (60-79) for this assessment.

The MRAG pre-assessment reports also scores this PI as a conditional pass stating "*In most cases (fish, seabirds, sharks, and marine mammals) direct and indirect effects of the orange roughy fishery are minimal and highly unlikely to create unacceptable impacts.*
However, the direct and indirect impacts on coral are less certain, as the extent to which trawling might be linked to impaired benthic ecosystem functioning has yet to be determined. It is not clear that sufficient analysis has occurred to demonstrate that the fisheries are highly unlikely to have unacceptable direct and indirect impacts for deep sea corals.

The fishery continues to add new areas of trawling, although at a declining level. If protected corals are impacted, or may be impacted to any significant extent, then there is a need to define the level of that impact, including adequate identification, quantity taken and distribution of the corals".

6.5 ETP species: management strategy

Key legislation for ETP species includes the Fisheries Act (1996), Wildlife Act (1953), Marine Mammals Protection Act (1978), There is a requirement to report injury or mortality of protected species to the Department of Conservation.

There are highly developed and active monitoring and observer programs on board trawler vessels; these provide a strategy to monitor the legislation. VMS is mandatory on ORH vessels

National Plans of Action have been developed for birds and sharks. An environmental risk assessment process has been completed (Boyd, 2013).

It is not clear, however, that the impact on deepwater corals is likely to achieve national and international requirements for the protection of ETP species, therefore WWF NZ believes that this would raise a condition (SG 60-79) under this PI.

The MRAG pre-assessment agrees with this scoring and also notes "*There is monitoring of the trawl footprint on an annual basis through mandatory reporting and VMS and this information is used to analyse the nature and extent of trawl footprint against habitat area and some regional assessments. In addition benthic interactions are measured and recorded by on board fisheries observers. Together these measures provide some understanding of the nature and extent of impacts. But the fishery continues to expand to new areas (although at a declining rate). Orange roughy tows appear to follow existing tow lines, but by practice, not requirement. It is unclear that a strategy is in place to minimise coral mortality, especially with the possibility of expansion of the trawl area from the fishery, and if the measures follow the approach outlined by the Ministry for Primary Industries leading to appropriate management strategies. Evaluation of whether there is a need to reduce expansion of the fisheries to new trawling areas, and if so, how that would happen would benefit the management of corals".*

6.6 ETP species: information

Monitoring seabird and marine mammal mortality within the fishery is a specific role of the observer on board vessels. The coverage of observers has been sufficient to develop reasonable estimates of the likely total mortality of seabirds in each fishery and area.

Higher species resolution would also be advisable for the Northern giant petrel to confirm actual captured and mortalities by species.

Cold water corals captured in trawl nets are noted by observers present onboard, but species identification remains a problem with information on distribution largely based on trawl capture. With this in mind WWF NZ believes that points b. and c. would not pass the SG80.

The MRAG report concurs with theses results and adds "at present *data are insufficient to quantitatively determine outcomes for deepwater corals*".

6.7 Habitats: outcome

Bottom trawls in the New Zealand orange roughy fishery are primarily deployed along a single type of benthic habitat: undersea topographic features (UTFs) (Boyd 2013). Habitat-forming deepwater corals, many species of which are protected (see section on ETP), form on these topographic features.

Stewart (2013) and Clark (2013) presented assessments of the trawl footprint. Even though studies used differences time scale and depth data, results indicated that the area impacted was small in relation to total habitat and therefore it is unlikely that the fishery will reduce habitat structure and function to a point where there would be serious or irreversible harm. In addition, the EEZ and Territorial Sea (TS) annual trawl footprint for orange roughy reached a peak in 1998/99 at around 7,200 km^2, after which it steadily decreased, by almost two-thirds, to around 2,500 km^2 in 2009/10 (Tilney 2013).

Boyd (2013) noted, however, a lack of detailed information on structure and function of the habitat and description of the composition of communities in the fishery and therefore it is WWF NZ''s opinion that it is difficult to state that the fishery is highly unlikely to reduce habitat structure.

The MRAG report reaches the same conclusion for this PI and states "*analysis of the distribution of benthic habitats relative to the footprint of the fisheries would increase understanding of the impacts of the four fisheries being assessed"*.

6.8 Habitats: information

Observer coverage and VMS has been sufficient to develop reasonable estimates on trawl footprint in each fishery and area.

Cold water corals captured in trawl nets are noted by observers present onboard, but species identification has been identified as a problem. However a mapping study of the entire EEZ is underway and may even be completed. Boyd (2013) also noted a lack of detailed information on structure and function of the habitat and description of the species composition of habitat communities in the fishery.

Information is adequate to allow the nature of the impacts of the fishery on habitat to be identified and reliable on the spatial extent of interaction, and the timing and location of use of the fishing gear. However, the nature, distribution and vulnerability of all habitat types in the fishery area are not known in detail and therefore WWF NZ believes that this PI would be given a conditional pass (60-79) for this reason.

6.9 Ecosystem: information

Key elements of the ecosystem such as prey and predators of the target species are quite well known and components and characteristics of the ecosystem are largely described (Dunn 2013) to **broadly** understand the key elements of the ecosystem.

Pinkerton (2011) provides a balanced trophic model of the Chatham Rise ecosystem with focus of the model on the role of demersal fishes resulting in a better knowledge base of the Chatham Rise fishery.

Dunn (2013) indicated that research on the biodiversity of the ecosystem for all management areas and monitoring of the identified functional groups or species that are linked to the dynamics and maintenance of ecosystem function would be desirable. This would allow detection of any increase in risk of interrupting the ecosystem structure and function or the operation of the fishery as well as the effectiveness of its measures.

Nevertheless, because the history of the orange roughy fishery in New Zealand is relatively short compared to the unusually long generation time of the species, assessments of **long term** impacts of removals on the broader ecosystem may be difficult and misleading at this time and therefore WWF NZ believes it is reasonable to suggest that this condition would score a conditional pass (60-79).

7. Other issues and concerns

Whilst the main emphasis of this report is to highlight concerns that are reflected in the evaluation results (scoring guidelines), it is important to also mention areas of concern that concentrate on how the data is collected, how it is interpreted and ultimatley the quality of the assessments that are the main feature of the plenary documents for these fisheries. Much of this information is omitted from official documents, but yet is deserves equal attention with regards to the assessment of the fisheries in question.

7.1 Data defeciency on the biology of Orange Roughy

Most biological data for orange roughy are historical, and then assumed to be constant. Information about the stock structure and migrations of orange roughy is still relatively poor. For example, the “new” Rekohu plume in ORH3B was found only a few years ago, and about 50 km from the spawning plume in the Spawning Box. How independent these areas are is not known. The origin and affiliation of the Rekohu plume is also not known (historical research indicate fish from the main plume migrated east towards the non-spawning fishery region after the breeding season; no information on movements of the Rekohu fish is available).

Ageing of orange roughy in the past has been highly problematic, to the extent that all age data (although not information derived from these data, such as growth, maturity, and longevity) were excluded a few years ago. Whilst ageing work is continuing, the uncertainly in age estimates remain high and this remains a concern for stock assessments.

7.2 Data collection

Some areas, like ORH1, are enormously data deficient. It seems that problems occur when surveys are done by commercial fishing vessels, as they conduct research in between their commercial operations but the latter take precedence and may compromise research work. In addition, the crew may not follow the sampling methodology correctly, for example not switching equipment on when they should (2013 surveys in ORH1).

The location and/or timing of the surveys also seem to be questionable, with several instances showing that fish were present in low numbers at the time of data collection. Yet skippers from commercial boats in the same area report large numbers just prior to or after the research survey. As a result several areas, including ORH1 and the subantarctic area of ORH3B, do not have the most basic biomass monitoring data sets.

When orange roughy are not found during a survey, it has often been thought that the survey was in the wrong place and/or the wrong time. In some areas, for example Mercury-Colville in ORH1, the original orange roughy fisheries were temporally and spatially expansive, and therefore the apparent scarcity of fish in recent years does tend to indicate the stock remains substantially depleted, rather than it was simply “missed” by the survey. The precautionary approach suggests managers setting catch limits should assume biomass to be absent until proven. The ORH1 area is a real challenge for the assessments, as the biomass surveys to date have not been accepted, and therefore no data are available to evaluate the catch limits.

7.3 Interpretation of results

Previous surveys have used trawls, acoustics, and egg surveys, and all have experienced problems and data collection has been varied and fragmentary.

The primary technique currently being used for tracking stock biomass is acoustic surveys. Recent surveys have generally used the echosounder on the hull of a fishing vessel, or the towed Acoustic Optional System (AOS). The AOS, recently purchased by Sealord and previously developed and used by CSIRO to estimate fish acoustic target strengths, has now been used to provide biomass estimates. However Rudy Kloser, the scientist leading the use of this technology, has stated recently that problems (listed below) exist in several areas of the interpretation, and his research team continue to work on sources of error and bias in estimates. In some areas (such as the Morgue seamount, NZ) he concluded that it is very hard to get an acceptable biomass estimate of orange roughy from AOS surveys, due to slope of hill.

Mixed species in aggregations still prove to be a big problem, with recent data showing that deep water sharks have similar target strengths to orange roughy and as a result the two fish are difficult to tell apart. There are also still "unknown" species in some areas (i.e., not orange roughy, but exactly what isn't known). For such areas, it is very difficult to decompose the acoustic "mark" into biomass of different species. The biomass estimates of orange roughy are also very sensitive to the proportion of gas bladder species, so small errors in the estimated species composition could have large effects on the biomass estimates.

A second main issue affecting biomass estimates is the correction made for fish in the acoustic "deadzone". The deadzone area can encompass the 5-50+ m of water depth above the seabed which cannot be seen because of interference from acoustic backscatter off the seabed. On a flat seabed the deadzone is minimal (a few m), but on sloping areas (e.g., hills) the deadzone can become very large (the greater the angle of slope, the greater the deadzone). A correction is currently made for orange roughy present in the deadzone, but whilst evidence suggests fish are there, in some surveys the proportion assumed in the deadzone is actually greater than the observed biomass. In other words, most of the biomass in the biomass estimate was never actually seen, it was just assumed. The deadzone is reduced when the acoustic device is closer to the fish, but if it gets too close it spooks the fish, and on hills a substantial deadzone nevertheless remains (eg. the Morgue seamount).

A third major issue for acoustic surveys concerns the variability in biomass estimates over space and time, and what these may mean. The acoustic estimates sometimes vary by an order of magnitude over short time periods, suggesting fish are moving (a problem for any survey), or that confidence in the acoustic survey technique and estimates may be misplaced. Understanding what the fish are doing seems to be a major challenge, and whilst new technologies are being used, they have only provided a glimpse into the problem, and remain far from tractable solutions.

7.4 Stock assessment models

Patrick Cordue (Innovations Ltd) has been assigned to compile current stock assessments for the four orange roughy fisheries that are reviewed in this report. Whilst progress has been adequate with models created for certain stocks (e.g. MEC), there are still substantial issues with the stock assessment models.

Biomass estimates

In models presented to date, the main information on stock biomass seems to be coming not from the biomass surveys, but from the age data. This is concerning because it is doubtful how much information the age structure of the stock (the Year Class Strengths, YCS) would actually have about biomass. The Deepwater Working Group rejected the use of YCS data several years ago because of their uncertainty (mainly related to the accuracy of the way otoliths were being interpreted), so it is worrying that these data are now become central to determining the size and status of the stocks.

In addition, what biomass data that will be used in future stock assessment models will be taken from acoustic surveys (using the AOS device), and the problems with quality of these data have already been discussed.

Finally, there seems an "urgency" to get the available data to fit the models, and as a result assumptions have been made and accepted that were apparently argued about and ultimately rejected years ago by the Deepwater Working Group. There seems to be little discussion or justification for why such assumptions are now accepted. For example, the plume biomass survey was taken for many years as an indicator of spawning stock biomass, but this has now been rejected. This seems to be because it conflicts with the biomass estimates when the Rekohu plume is included, and when interpreted by a model. But if there is a conflict between data series (as it seems there is here), a better approach may be to treat them as two different indices, rather than effectively modify one index so that it fits the other. At the very least, the support for the assumption needs to be clearly stated.

Model predictions

There are so many unknown effects that are yet to be observed following the dramatic fishing down of orange roughy stocks in the late 1980s and early 1990s, owing to the fact that roughy take 30 years or more to mature. It is possible that recruitment to the fishery may have been dramatically affected by the fishing in the 1980s, but with such late recruitment we will not see this for another 5-10 years. If the fishing down substantially reduced recruitment, then we should expect a period of low recruitment or recruitment failure to arrive in the near future. In cases where the stock is supposed to be recovering, this will at best stop the recovery, and probably the stock would go into decline again. This may make stock rebuilding targets effectively impossible for the foreseeable future.

The models are extreme simplifications of reality, in that they have only one sex, one area, assume complete mixing of individuals, and the biology does not change over time. The models do not allow for changes in the natural environment, or changes brought about by fishing (such as disturbance, habitat changes, and the influences these may have on productivity). The models don't account for these things, and therefore the real uncertainty in the science is greater than it appears in the results from stock assessments.

We do not know what the structure of the stocks currently are, but changes in the size of spawning fish in some areas, and in particular in the main location of spawning, shows stock structure is not the same now as it was in the past. This poses questions as to how similar the stock productivity will be in the future as it was in the past. The models used are naïve to this.

8. Fisheries Improvement Projects

Results from the WWF NZ and the MRAG pre-assessment report have indicated several key areas of concern with the four proposed orange roughy fisheries that would prevent them from reaching Marine stewardship council standard, the majority of which are concerned with Principle 1: stock status and management.

In early January 2013, WWF NZ received an email from the Deepwater Group (DWG) inviting them to attend a consultation meeting on the 21st of January to discuss the results of the MRAG report and the plan proceeding forward for the four orange roughy fisheries.

WWF NZ welcomes open and constructive dialogue with the industry and relevant stakeholders to address the issues that need improvement. The recognised vehicle for this is a formal Fisheries Improvement Project (FIP).

A FIP is defined as a multi-stakeholder effort to improve a fishery. FIPs are unique because they utilize the power of the private sector to incentivize positive changes in the fishery towards sustainability. FIP participants may include stakeholders such as producers, NGOs, fishery or aquaculture managers, government, and members of the supply chain. The ultimate goal of a FIP is to have the fishery performing at a level consistent with an unconditional pass of the Marine Stewardship Council (MSC) standard.

A FIP involves three stages:
(1) Scoping: Identify all stakeholders and agree on the environmental issues that need to be addressed by the project.
(2) Action Planning: Bring together all stakeholders to develop a plan to transition the fishery to the required standards; and
(3) Implementation: Implement the plan and report on its progress.

It would be the intention of WWF NZ to suggest that a scientific workshop meeting is convened before stage (1) to address the unique issues with orange roughy fisheries that are concerned with stock status and management to provide the best and most robust FIP plan.

WWF NZ welcomes the input and views from the Deepwater group on these points and hopes to continue dialogue in this area to address these concerns.

9. List of Acronyms

B_0	Unfished Biomass
B_{curr}	Current Biomass
B_{targ}	Target Biomass
B_{msy}	Biomass at Maximum Sustainable Yield
CAY	constant annual yield
CITES	Convention on International Trade in Endangered Species
cm	centimeter
CPUE	catch per unit effort
CR	certification requirement or Chatham Rise
DWG	Deepwater Group
EEZ	exclusive economic zone
ETP	Endangered Threatened or Protected
$F_{\%SPR}$	Fishing Mortality Rates at Maximum Spawning Potential Ratio
F_{MSY}	Fishing Mortality at Maximum Sustainable Yield
kg	kilogram
km	kilometer
LTL	low trophic level
m	meter
M	natural mortality
mm	millimeter
MPI	Ministry for Primary Industries
MSC	Marine Stewardship Council
NIWA	National Institute of Water and Atmospheric Research
NPOA	National Plan of Action
ORH	Orange Roughy
PI	performance indicator
QMS	Quota Management System
RBF	risk based framework
SG	Scoring Guidepost
SL	standard length
t	tonne
TAC	total allowable catch
TACC	total allowable commercial catch
T_{min}	Minimum time period
UTF	underwater topographic feature
VMS	vessel monitoring system
WWF	World Wildlife Fund

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17th July 2014

Re: New Zealand Orange Roughy fishery assessment/ Use of the MSC Certification Requirements V1.3 and Default Assessment Tree

Dear Dr Trumble,

WWF welcomes your request for feedback on use of the MSC default assessment tree for the New Zealand Orange Roughy Fishery assessment. While we consider the default tree is an appropriate tool to assess most fisheries, we are concerned that some of the default performance indicators are not well-suited to unique aspects of the orange roughy fishery. Our specific concerns are outlined below for PIs 1.1.1, 1.1.2 and 2.4.1.

WWF is also concerned that there may not be sufficient information available to score the fishery according to the conventional MSC process. Based on your pre-assessment report and other published information sources relating to this fishery, it appears there may be data deficiencies for three performance indicators. We would urge the assessment team to reconsider using RBF to score PIs 2.2.1, 2.4.1 and 2.5.1.

Stock status (PI 1.1.1):
Scoring issue (a) of PI 1.1.1 requires the team to assess the stock in relation to the point where recruitment would be impaired. In our view, this is really a matter of comparing two different variables. The first variable is an assertion about our knowledge of current stock size (i.e. biomass

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or $B_{current}$ – a discrete, measurable quantity). The second measurement is an inference about population behavior. It is usually assembled from our knowledge of past recruitment patterns at varying population sizes. Both variables have uncertainty associated with them. Since the stock-recruitment relationship of orange roughy has such significant ramifications for sustainable management of New Zealand stocks, we feel it is important to disentangle these two issues. To this end, we recommend the team introduces another scoring issue under PI 1.1.1 as follows:

Scoring Issues	SG60	SG80	SG100
[NEW]	It is likely that the point where recruitment impairment occurs is known with accuracy for the stock.	It is highly likely that the point where recruitment impairment occurs is known with accuracy for the stock.	There is high degree of certainty that the point where recruitment impairment occurs is known with accuracy for the stock.
a. Stock status	It is likely that the stock is above the point where recruitment would be impaired.	It is highly likely that the stock is above the point where recruitment would be impaired.	There is a high degree of certainty that the stock is above the point where recruitment would be impaired.

Reference points (PI 1.1.2)

We question whether generic target and limit reference points described in the MSC default assessment tree are appropriate for the orange roughy fishery. Orange roughy is a deepwater species with life history attributes (slow growth, late maturation, low fecundity) that favor a low productivity fishery. And there is a high degree of uncertainty attached to most estimates of stock abundance. Target and limit reference points for orange roughy should be set at a level which is appropriate for this species category rather than following practices used for highly productive fisheries. We expect that fishery managers will be transparent in their selection of reference points. They should give explicit justification for why limit reference points (10% and 20% B_o) and target reference points (range: 30 to 40% B_o) were selected for these orange roughy fisheries. The assessment team should then evaluate the appropriateness of reference point based on whether they reflect best practice for this species category. WWF feels this is a minimum entry level (SG60) to show that a fishery meets the MSC environmental standard. To spell this out more clearly, we would propose an editorial change to the SG60 guidepost of scoring issue (a) in PI 1.1.2.

Scoring Issue (a) at SG60: "Generic limit and target reference points are **justified** based on ~~justifiable and reasonable~~ **best** practice appropriate for the species category"

It is also worth noting that the reference points for NZ orange roughy are perhaps more complicated than envisioned in the MSC default tree. The fisheries are managed according to a harvest strategy with two limit reference points: a 'hard' limit at 10% B_0 and a 'soft' limit at 20% B_0. The harvest strategy also specifies a range of biomass target values (from 30% to 40% of B_0) rather than a single trigger value. It is still unclear to us how the team will relate these four reference points to the scoring requirements of PI 1.1.1. However, we would expect the team to adopt a conservative view during their scoring (i.e. the target RP is reached only when biomass exceeds the higher end of the range (i.e. $B_{current} > 40\% B_0$), and the limit RP is exceeded whenever biomass drops below the soft trigger point (i.e. $B_{current} < 20\% B_0$).

Habitat Outcome (PI 2.4.1)

Under PI 2.4.1, MSC requires assessment teams to evaluate fishery impacts to habitats. The NZ orange roughy fishery is a trawl fishery that operates in topologically complex coral reef habitats. By its very nature the fishery has high potential to directly impact on the form and function of benthic habitats. We are concerned that the team will not give adequate consideration to both structure and function (despite the fact that MSC requires all assessment teams to evaluate structure and function, we have seen many assessments where it wasn't done). We feel this situation can be easily avoided by splitting the scoring issue under PI 2.4.1 so that the team can speak directly to the structure and function. This modification will help ensure that the team's scoring rationales for PI 2.4.1 are robust and comprehensive.

PI 2.4.1 Outcome Status	The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function.		
Scoring Issues	SG60	SG80	SG100
a. Habitat status: structure	The fishery is unlikely to reduce habitat **structure** ~~and function~~ to a point where there would be serious or irreversible harm.	The fishery is highly unlikely to reduce habitat **structure** ~~and function~~ to a point where there would be serious or irreversible harm.	There is evidence that the fishery is highly unlikely to reduce habitat **structure** ~~and function~~ to a point where there would be serious or irreversible harm.
b. Habitat status: function	The fishery is unlikely to reduce habitat ~~structure and~~ **function** to a point where there would be serious or irreversible harm.	The fishery is highly unlikely to reduce habitat ~~structure and~~ **function** to a point where there would be serious or irreversible harm.	There is evidence that the fishery is highly unlikely to reduce habitat ~~structure and~~ **function** to a point where there would be serious or irreversible harm.

WWF is also concerned about how the team will apply a definition of "regional or bioregional basis" for their evaluation of impacts to benthic habitats. The pre-assessment report for NZ orange roughy implied that the team would evaluate the extent of habitat damage narrowly (i.e. only tabulated using current practices within the boundaries of select fishery management areas) whereas the fishery would be credited with taking habitat protection measures wherever and whenever they might occur within domestic seas (e.g. reporting UTF protection as the percentage of all EEZ waters closed to trawling). Obviously the team needs to find an internally consistent approach. We suggest the most reasonable scope is to consider all orange roughy fishery impacts to habitats throughout the EEZ of New Zealand – past and present.

Under PI 2.4.1 the team is required to score fishery impacts to habitat structure and function according to quantitative guidelines provided by MSC (CB3.14.5). WWF questions whether there is sufficient information for the assessment team to score PI 2.4.1 quantitatively. For example, the pre-assessment report for NZ orange roughy stated that "there have been no studies investigating whether current trawling frequencies have had adverse effects on the structure and function of benthic communities" (Black et al 2013). Although a recent ecological risk assessment (Boyd 2013) attempted to address this issue, it is still unclear whether conclusions from the workshop are robust and consistent with MSC requirements for risk assessment. We recommend that the assessment team reconsider using RBF to score PI 2.4.1.

Bycatch Species Outcome (PI 2.2.1)

Under PI 2.2.1, the team will be required to evaluate fishery impacts to main bycatch species. The pre-assessment report for NZ orange roughy identified a number of main bycatch species or species groups that would likely need to be evaluated using PSA. These groups were: slickheads (Alepocephalidae; considered as a group), chimaeras (Chimaeridae and Rhinochimaeridae; considered as a group), rattails (Macrouridae; considered as a group) deepwater skates and rays (considered as a group), morid cods (Moridae; primarily Johnson's cod, *Halargyreus johnsonii*), shovelnose dogfish (*Deania calcea*), seal shark (*Dalatias licha*), Baxter's dogfish (*Etmopterus baxteri*), and deepwater dogfish (considered as a group).

The recent ecological risk assessment (Boyd 2013) concluded that risks to these species/groups were low to moderate. However the pre-assessment report for NZ orange roughy said none of the species groups have sufficient information to determine abundance relative to biological limits (PI 2.2.1, scoring issue (a) at SG60). Thus we were surprised to learn that the assessment team does not propose to use RBF for this PI. It is unclear to us how the team has determined that *none* of the bycatch species will be considered 'main' (CB3.8.2) in the assessment. WWF takes issue with that determination on the grounds at least some of these bycatch species/groups are "of particular vulnerability" (GCB3.8.2). For example, Fishbase lists shovelnose dogfish as "high to very high vulnerability" and "very low" resilience (minimum population doubling time > 14 yrs). The orange roughy fishery alone may account for up to 40% of all catch of shovelnose dogfish in quota managed areas each year. WWF suggests the team reconsider using RBF for PI 2.2.1.

Ecosystem Outcome (PI 2.5.1)
Under PI 2.5.1, the team will be required to evaluate fishery impacts to key elements of the ecosystem. The MSC specifies that biodiversity is a key element of ecosystems. Biodiversity surveys have shown convincingly that trawls damage or destroy exposed fauna of deepsea habitats. However the implications of this remain poorly understood (Dunn, 2013).

An ecological risk assessment was recently undertaken for the NZ orange roughy fishery (Boyd 2013). The assessment report suggested that the risk of the fisheries causing serious or irreversible harm to the ecosystem is "low". However Panel Experts disagreed over this conclusion and their final recommendation was that "more information is needed on ecosystem characteristics including the role of species, relationships between species and biodiversity."

Given the above, WWF is concerned that there is not enough information about the New Zealand orange roughy trawl fishery to assess (with the level of certainty required by MSC in CB3.14.6.1) how fishery activities impact upon the biodiversity of the deepsea slope/seamount ecosystem. Therefore we would urge the team to reconsider using RBF for PI 2.5.1.

We look forward to your feedback and hearing how you will respond to these concerns.

Best regards,

Peter Hardstaff
Head of Campaigns
WWF-New Zealand

Dr Annika Mackensen
Fisheries Certification and Livelihoods Manager
WWF Smart Fishing Initiative

References

Black, J, Wood, R, Berthelsen, T, and Tilney R (2013) Monitoring New Zealand's trawl footprint for deepwater fisheries: 1989-90 to 2009-10. New Zealand Aquatic Environment and Biodiversity Report No. 110. May 2013.

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1.2.3 Annual Catch Limits

Annual catch limits (ACLs) are specified for each stock and stock complex that is "in the fishery" as specified under the FMP framework. An ACL is a harvest specification set equal to the ABC or below the ABC in consideration of conservation objectives, management uncertainty, socioeconomic considerations, ecological considerations, and other factors (e.g. rebuilding considerations) needed to meet management objectives. Sector-specific ACLs may be specified in cases where a sector has a formal, long-term allocation of the harvestable surplus of a stock or stock complex. The ACL counts all sources of fishing-related mortality including landed catch, discard mortalities, research catches, and set-asides for exempted fishing permits (EFPs).

Under the FMP, the biomass level that produces MSY (B_{MSY}) is defined as the precautionary threshold. When the biomass for an assessed category 1 or 2 stock falls below the precautionary threshold, the harvest rate will be reduced to help the stock return to the B_{MSY} level, which is the management target for groundfish stocks. If a stock biomass is larger than B_{MSY}, the ACL may be set equal to or less than ABC. Because B_{MSY} is a long-term average, the true biomass could be below B_{MSY} in some years and above B_{MSY} in other years. Even in the absence of overfishing, biomass may decline to levels below B_{MSY} due to natural fluctuations in recruitment. The minimum stock size threshold (MSST) is the biomass threshold for declaring a stock overfished. When spawning stock biomass falls below the MSST, a rebuilding plan must be developed that determines the strategy for rebuilding the stock in the shortest time possible while considering impacts to fishing-dependent communities and other factors. When spawning stock biomass is below B_{MSY} yet above the MSST, the stock is considered to be in the precautionary zone. The current proxy B_{MSY} and MSST reference points for west coast groundfish stocks are as follows:

- Assessed flatfish stocks: B_{MSY} = 25 percent of initial biomass or $B_{25\%}$; MSST = 12.5 percent of initial biomass or $B_{12.5\%}$ (PFMC and NMFS 2011); and
- All other assessed groundfish stocks: B_{MSY} = 40 percent of initial biomass or $B_{40\%}$; MSST = 25 percent of initial biomass or $B_{25\%}$.

These reference points are only used to manage assessed stocks since they require estimates of spawning stock biomass.

West coast groundfish stocks are managed with harvest control rules that calculate ACLs below the ABCs when spawning biomass is estimated to be in the precautionary zone. These harvest control rules are designed to prevent a stock from becoming overfished. The FMP defines the 40-10 harvest control rule for stocks with a B_{MSY} proxy of $B_{40\%}$ that are in the precautionary zone. The analogous harvest control rule for assessed flatfish stocks is the 25-5 harvest control rule. Both ACL harvest control rules are applied after the ABC deduction is made. The further the stock biomass is below the precautionary threshold, the greater the reduction in ACL relative to the ABC, until at $B_{10\%}$ for a stock with a B_{MSY} proxy of $B_{40\%}$ or $B_{5\%}$ for a stock with a B_{MSY} proxy of $B_{25\%}$, the ACL would be set at zero[12] (Figure 36). These harvest policies foster a quicker return to the B_{MSY} level and serve as an interim rebuilding policy for stocks that are below the MSST. The Council may recommend setting the ACL higher than what the default ACL harvest control rule specifies as long as the ACL does not exceed the ABC, complies with the requirements of the MSA, and is consistent with the FMP and National Standard Guidelines. Additional precautionary adjustments may be made to an ACL if necessary to address management

[12] The lower $B_{10\%}$ and $B_{5\%}$ thresholds in the precautionary ACL harvest control rules are used to establish the slope of the ACL curve in Figure 36. These precautionary ACL control rules only apply for stocks in the precautionary zone ($B_{MSY} > B_{CURRENT} >$ MSST). A rebuilding plan governs the ACL harvest control rule for any stock that falls below the MSST and is designated as overfished.

uncertainty, conservation concerns, socioeconomic concerns, ecological considerations, and the other factors that are considered when setting ACLs.

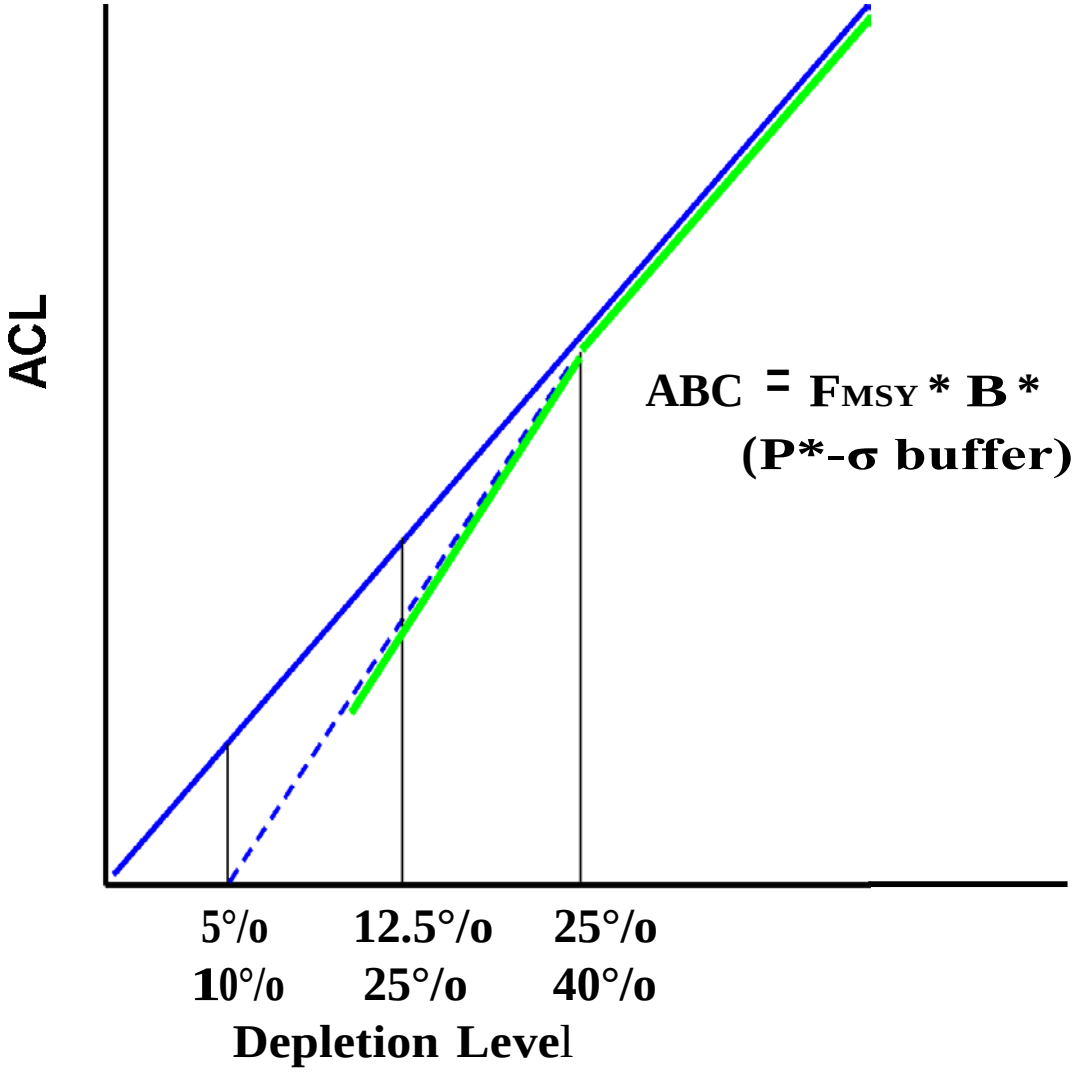

Figure 36. Conceptual diagram of the 25-5 and 40-10 ACL harvest control rules used to manage assessed west coast flatfish and other groundfish species, respectively, that are in the precautionary zone.

The ACL serves as the basis for invoking accountability measures (AMs), which are management measures or mechanisms used to address any management uncertainty that may result in exceeding an ACL. If ACLs are exceeded more often than 1 in 4 years, then AMs, such as catch monitoring and inseason adjustments to fisheries, need to improve or additional AMs may need to be implemented. Additional AMs may include setting an annual catch target (ACT), which is a specified level of harvest below the ACL. The use of ACTs may be especially important for a stock subject to highly uncertain inseason catch monitoring. A sector-specific ACT may serve as a harvest guideline (HG) for a sector or may be used strategically in a rebuilding plan to attempt to reduce mortality of an overfished stock more than the rebuilding plan limits prescribe.

The Council has the discretion to adjust the ACLs for uncertainty on a case-by-case basis. In cases where there is a high degree of uncertainty about the condition of the stock or stocks, the ACL may be reduced accordingly. Most category 3 species are managed in a stock complex (such as the minor rockfish complexes and the Other Flatfish complex) where harvest specifications are set for the complex in its entirety. For stock complexes, the ACL will be less than or equal to the sum of the individual component ABCs. The ACL may be adjusted below the sum of component ABCs as appropriate.

For most stocks and stock complexes, the Council elected to use the same general policies for deciding 2015 and 2016 ACLs as were used for deciding the 2014 ACLs (No Action) (Table 14). The No Action ACLs are the 2014 ACLs specified in Federal regulations.

Section 4.6.3 of the FMP states the Council's general policies on rebuilding overfished stocks. Section 4.6.3.1 of the FMP specifies the overall goals of rebuilding programs are to (1) achieve the population size and structure that will support the MSY within a specified time period that is as short as possible, taking into account the status and biology of the stock, the needs of fishing communities, and the interaction of the stock of fish within the marine ecosystem; (2) minimize, to the extent practicable, the adverse social and economic impacts associated with rebuilding, including adverse impacts on fishing communities; (3) fairly and equitably distribute both the conservation burdens (overfishing restrictions) and recovery benefits among commercial, recreational, and charter fishing sectors; (4) protect the quantity and quality of habitat necessary to support the stock at healthy levels in the future; and (5) promote widespread public awareness, understanding and support for the rebuilding program. These overall goals are derived from and consistent with the requirements of the MSA. The first goal embodies MSA National Standard 1 (NS1) and the requirements for rebuilding overfished stocks found at MSA section 304(e)(4)(A). The third goal is required by MSA section 304(e)(4)(B). The fourth and fifth goals represent additional policy preferences of the Council that recognize the importance of habitat protection to the rebuilding of some fish stocks and the desire for public outreach and education on the complexities—biological, economic, and social issues—involved with rebuilding overfished stocks. Overfished groundfish species are those with spawning biomasses that have dropped below the Council's MSST (i.e., 25 percent of initial spawning biomass or $B_{25\%}$ for all groundfish species other than flatfish where the MSST is $B_{12.5\%}$). The FMP requires these stocks to be rebuilt to a target biomass that supports MSY (i.e., B_{MSY} or $B_{40\%}$ for all groundfish species other than flatfish where the target is $B_{25\%}$).

Rebuilding plans are in place for six overfished rockfish species, as well as petrale sole, where assessments have indicated spawning biomass has declined to below the MSST. New full and updated assessments and rebuilding analyses were done in 2013 inform the 2015 and 2016 harvest specifications for many of the overfished species. New full assessments were conducted for cowcod, darkblotched rockfish, and petrale sole in 2013; however, a new rebuilding analysis was only prepared for cowcod. The results of the new assessments for darkblotched rockfish and petrale sole indicated those stocks would be rebuilt by 2015 and 2014, respectively. The SSC did not recommend new rebuilding analyses for these two stocks given their imminent rebuilding expectation. An update assessment for bocaccio was prepared in 2013. Like darkblotched, the stock is predicted to rebuild by 2015 and the SSC therefore recommended no new rebuilding analysis be prepared. Catch reports for canary rockfish, Pacific ocean perch, and yelloweye rockfish were prepared in 2013. These catch reports indicated total catches were within limits prescribed in these stocks' respective rebuilding plans.

MRAG response

The WWF submission of **Comments and Information for the MSC Assessment of New Zealand Orange Roughy Fisheries** (July 2014) listed a wide range of topics and provided information available at the time relative to the orange roughy fisheries. However, a major amount of new information, made available to all stakeholders through the DWG webpage, supplants the information available to WWF at the time of the submission. The Assessment team recognized the importance of these topics, and has carefully evaluated the new information and the previous information in developing the assessment of the fisheries. The topics listed by WWF are presented below with a brief comment by the assessment team.

Data deficiencies - Updated to the degree practicable with new assessment and MSE.

Clarify the Unit of Certification – Done

Define the Regional Basis for Scoring Habitat Impacts – Done

Status of Ecological Risk Assessment – The ERA is not sufficient by itself, but can add information for the evaluation

Target Reference Point – Completely redone and based on MSE

Limit Reference Point – Completely redone and based on MSE

Stock Depletion – The range is explained in MSE. More conservative as abundance declines, and less conservative as abundance increases.

Stock Rebuilding – Analysis based on MSC requirements

Recruitment and other uncertainties – Addressed in new assessments and MSE. Recruitment explicitly evaluated.

Harvest Control Rules and Tools – Addressed in MSE. HCR completely revamped

Habitats and Corals – Evaluated with new information, including haul-specific locations

Ecosystem Impacts – Evaluated with new information, including haul-specific locations

Bycatch – Evaluated with new information

Appendix 3.2 Stakeholder Comments Following Site Visit

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8. June 2015

Orange roughy assessment: additional information June 2015

Dear Dr Trumble,

WWF welcomes the opportunity to provide feedback on the additional information that was provided after our earlier stakeholder submission, dated July 30th, 2014.

Principle 1 Comments

WWF offers the following for consideration by the assessment team when assessing the fishery against P1:

- An implicit assumption in the stock analysis is that spawning biomass at age is proportional to the number of eggs spawned by fish at that age. This is a standard initial assumption in many assessments. However, if fecundity changes disproportionally as the fish ages, the contributions to recruitment may be altered. This may be especially important for OR where older ages and their spawning contributions may be significantly affecting recovery, depletion, etc. We suggest that fecundity ogives be developed to determine whether the initial assumption regarding spawning biomass and eggs spawned holds true for slow-growing, long-lived orange roughy, as this could have a large impact on the population productivity parameters.

- Another life history consideration is natural mortality and how it is distributed across ages. In the assessment and in the management strategy evaluation, M was assumed to be constant for all ages. The model is assuming that somewhere between spawning and

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recruitment (one year) the natural mortality reduces from a high rate implied by the stock recruitment relationship to an M at age one of 0.04. Alternative M-at-age schedules likely would not impact the general dynamics over time for the stock, but could change the rate of trend and the perceptions of B0. We would generally expect Bmsy/B0 to be higher than 25% for a slow-growing, long-lived species and wonder if this might have to do with the selectivity curves mentioned above.

- In an analysis done for WWF of Bmsy/B0 it was found that the yield at Bmsy/B0 is very similar to that at a rather wide range of values of B/B0 (from 10 to 40%). Thus, foregone yield is relatively small within this range of risk. Therefore, accepting B40 (or higher) would minimize risk without sacfificing yield. We believe that the value used for management should be at least 40% under the precautionary principle.

- As with all Bayesian analyses, the structure of the priors can be important. In this case the difference between the prior and posterior for M and for the catchability quotients (q's) is relatively large. This suggests that these priors have influence on the analysis. In these cases, the priors were defined by a modal distribution over a relatively restricted range of the variable (M or q's). We would argue for more uniform distributions for these priors.

- The survey data are weak: some surveys are not conducted annually, many only index a portion of each stock, and size data are spotty, sometimes pooled over several years. These affect the estimates of q. This again accentuates the importance of the priors on those q's, which we believe should be developed further.

- We note that several of our earlier concerns presented to the assessment team were addressed to some extent in the MSE document (Cordue, P.L. 2014. A management strategy evaluation for orange roughy. ISL Client Report for Deepwater Group Ltd., 42 p) and its development of harvest control rules (HCRs). A remaining issue, however, is the selection of reference points. The current management scheme seems to have arisen from a generic management approach and not specifically for orange roughy. As far as limit reference points, there can be no "limit" without a consequence of exceeding that limit (hence the difference between hard and soft limits). Therefore, one can argue that a more appropriate limit for orange roughy is 25% since Bmsy/B0 is about 25%. Such an action implies Bmsy is a limit and is consistent with international agreements.

- In the original management scheme the aforementioned consequences were not very well evaluated. To some extent the MSE report addressed this by evaluating probabilities of exceeding various B/B0s. Nevertheless, as the MSE document points out, the consequences of unforeseen reductions in B/B0 can have ramifications for many years. The MSE report used the current limit/target reference points, depletions below them, and recovery to them as indicators in defining the HCR. But because they arose from the original management scheme, then arguably these should be modified to reflect alternate schemes.

- It is unclear to WWF whether the HCR has been implemented and is deserving of a score of 80. Since the assessment indicates that the orange roughy stock was depleted, then there

should have been a recovery plan implemented to recover to the target. The more ad hoc recovery has been marginally successful in that the target 40% is just now being reached. One might argue that median recovery is now 40%, which means that there is a 50-50 chance that recovery has occurred. This supports the need for formally implementing the HCR, and suggests that scoring of the harvest strategy or HCR at 80 or above is problematic.

Principle 2 Comments

WWF offers the following for consideration by the assessment team when assessing the fishery against P2:

Bycatch

- In our original stakeholder submission for the OR fishery WWF raised the issue of whether key information is available to determine whether a number of less resilient bycatch species are likely to be within their biologically based limits (PI 2.2.1, scoring issue a). In particular we listed the following species as examples of species with low reproductive capacity and "high to very high vulnerability" and "low" resilience (e.g. shovelnose spiny dogfish, *Deania calcea;* pale ghost shark, *Hydrolagus bemisi;* dark ghost shark, *Hydrolagus novaezealandiae;* smooth skate, *Dipturus innominatus)*. The additional data analysis provided by the Ministry for Primary Industries (MPI) indicates that Baxter's lantern dogfish (*Etmopterus baxteri*) and the Deepwater dogfish group also warrant consideration as main species due to their "low" resilience and "high to very high vulnerability." The observed catch of these species met the MPI criteria of more than 1% of total catch averaged over the years with adequate data. WWF strongly recommends that, under a precautionary approach, less resilient species such as these should be considered as main bycatch species due to their particular vulnerability (GCB 3.8.2) and the fact that these species and groups are data deficient and not actively managed under the Quota Management System (QMS).

- The additional data analysis provided by the MPI for Baxter's lantern dogfish in the East and South Chatham Rise UoC may provide additional insight into the potential risk to highly vulnerable species from even low levels of bycatch. When the annual observed catch is scaled up to total estimated catch for the fishery, the average annual catch for this UoC is estimated at 88.4 tons with an estimated catch over five years of 441.8 tons. This may present a high level of risk for a high vulnerability species for which there is inadequate information on its status in regards to biological limits. The MPI analysis estimates that the scaled up catch of Baxter's lantern dogfish in the East and South Chatham Rise UoC amounts to 51.6% of the total catch for the species in the UoC and 24.5% or the catch in the New Zealand EEZ. This analysis indicates that even the low catch levels observed in the OR fishery represent a substantial portion of the overall catch for this species. WWF remains concerned that the management strategy for species exhibiting similar life history characteristics (such as low productivity and high susceptibility to fishing mortality) does not meet the MSC requirements for 1) a 'partial strategy' sufficient to maintain these

species within biologically based limits and not hinder recovery (PI 2.2.2 scoring issue a) and 2) evidence that the strategy is being implemented successfully (scoring issue c).

Habitat

- WWF acknowledges the effort the Deepwater Group has undertaken to provide a better picture of the overall trawl footprint and fishing impacts on UTFs. However, as pointed out previously, our interest is more related to the different habitat types potentially covering the UFTs. The more important metric is the proportional area of each habitat type that has been and is swept by trawls. We are looking forward to understanding how the assessment team scores the different habitats affected (e.g. a supposed overlap between ORH3B NWCR UoA area and *Antipatharia* corals according to Baird et al 2015). As you know, the protection of habitats is a topic of crucial importance for us and we will thus also be trying to gain a good understanding of the fishing operations of the Deepwater Group on the unit of assessment. We will do so with the help of the available satellite data and are of course willing to share our findings with the assessment team pending the signature of a non-disclosure agreement.

Best regards,

Peter Hardstaff
Head of Campaigns
WWF-New Zealand

Dr Annika Mackensen
Fisheries Certification and Livelihoods Manager
WWF Smart Fishing Initiative

Responses to WWF Comments of 8 June 2015

P1

1. WWF comment: An implicit assumption in the stock analysis is that spawning biomass at age is proportional to the number of eggs spawned by fish at that age. This is a standard initial assumption in many assessments. However, if fecundity changes disproportionally as the fish ages, the contributions to recruitment may be altered. This may be especially important for OR where older ages and their spawning contributions may be significantly affecting recovery, depletion, etc. We suggest that fecundity ogives be developed to determine whether the initial assumption regarding spawning biomass and eggs spawned holds true for slow-growing, long-lived orange roughy, as this could have a large impact on the population productivity parameters.
Cordue Response: The use of spawning stock biomass (SSB) as a proxy for fertilized egg production is the standard approach in most New Zealand fish stock assessments, including those for orange roughy. The approach of using a mean fecundity to age relationship could not be used at this stage as there are few or no data on fecundity at age for fish aged under the latest protocol (Tracey et al. 2007). However, there is a suggestion that there may be reduced fecundity at older ages (Koslow 1995) and that there may be increased fecundity at length in depleted stocks (Pitman 2014). Minto and Nolan (2006) show increasing total fecundity for increasing length, weight, and age for a Northeast Atlantic stock. They dispute the reduction in fecundity at age suggested by Koslow (1995) but their data do not suggest an increase in relative fecundity with age (although they did not explicitly test for this). Ignoring a possible reduction in relative fecundity with age and a possible increase in fecundity at length (or age) over time, for depleted stocks, may introduce a negative bias in the estimation of stock status for the current assessments (that is, the spawning potential of the stocks is higher than is estimated by using SSB as a time-invariant proxy for fertilized egg production). Thus, the current approach is precautionary.
Assessment team comment: In general, fecundity in marine fish increases with fish weight and this implies that stock depletion will generally be lower in terms of egg production than spawning biomass Minto and Nolan (2006) found this for a population of orange roughy in the Northeast Atlantic. If the suggestion of Koslow (1995) is correct, the effects will be opposite to the general expectation. Reference points and production parameters such as steepness need to be computed in terms of egg production impacting the population responses if depletion is expressed in terms of egg production. Collecting and analysing data on fecundity is an appropriate research task. However, the effects of any estimated relationship need to accounted for throughout the assessment process. A research recommendation has been raised in response to this comment.

2. **WWF comment**: Another life history consideration is natural mortality and how it is distributed across ages. In the assessment and in the management strategy evaluation, M was assumed to be constant for all ages. The model is assuming that somewhere between spawning and recruitment (one year) the natural mortality reduces from a high rate implied by the stock recruitment relationship to an M at age one of 0.04. Alternative M-at-age schedules likely would not impact the general dynamics over time for the stock, but could change the rate of trend and the perceptions of B0. We would generally expect Bmsy/B0 to be higher than 25% for a slow-growing, long-lived species and wonder if this might have to do with the selectivity curves mentioned above.
Cordue response: Natural mortality (M) is very unlikely to be constant at age but the models use an average adult natural mortality that was estimated from the right-hand limb of catch curves from near virgin populations. Assuming the adult M for juvenile ages is not a problem in the assessments because there are no juvenile data fitted. It will make very little difference to the MSE because, again, all of the action is for spawning biomass. It will also make very little difference to BMSY/B0 because this is a spawning biomass ratio. Putting in

higher Ms for juveniles would be expected to have almost no impact on the assessments or the MSE results.
Assessment team comment: We agree with the Cordue response. The 'recruitment' to the modelled population at age-0 will be biased low if natural mortality is larger than the adult natural mortality, but the effect on the estimates of 'recruitment' at the age-at-recruitment will be minor. No changes made to the report.

3. **WWF comment**: In an analysis done for WWF of Bmsy/B0 it was found that the yield at Bmsy/B0 is very similar to that at a rather wide range of values of B/B0 (from 10 to 40%). Thus, foregone yield is relatively small within this range of risk. Therefore, accepting B40 (or higher) would minimize risk without sacrificing yield. We believe that the value used for management should be at least 40% under the precautionary principle.
Cordue response: The target range is 30–50% B0. The MSE shows that the stock can be managed adequately within this range with the given HCR. The HCR performs well over a wide range of productivity parameters (steepness and natural mortality).
Assessment team comment: We have not seen the analysis referred to by WWF. However, it is generally true that the yield function is fairly flat over a range of values of B/B_0. Foregone equilibrium yield is therefore likely to be fairly small over a range of target biomass levels. However, to fully understand the consequence of the choice of target in a control rule, it is necessary to conduct a MSE, which DWG has conducted. No changes made.

4. **WWF comment**: As with all Bayesian analyses, the structure of the priors can be important. In this case the difference between the prior and posterior for M and for the catchability quotients (q's) is relatively large. This suggests that these priors have influence on the analysis. In these cases, the priors were defined by a modal distribution over a relatively restricted range of the variable (M or q's). We would argue for more uniform distributions for these priors.
Cordue response: One of the advantages of Bayesian estimation is that ancillary information can be included in an assessment through an informed prior developed using observed data. The priors for the acoustic *q*s and M used in the assessments are informative. The prior on M incorporates the point estimate (mean) and associated uncertainty (CV) from the catch curve estimates of Z from near virgin stocks. The priors on the acoustic *q*s likewise contain the available information on potential biases in target strength estimation and assumed availability. Uniform priors would ignore this valuable information.
Assessment team comment: We note, and take into account in our scoring, that priors for the catchability coefficients for the surveys are a key input to the assessment, and that as expected the assessment outcomes are sensitive to the choice of prior (some of which are informative while others are non-informative). Uniform priors on *q* would actually be quite informative. If analyses are to be undertaken with non-informative priors for all *q*s, they should be uniform on the log-scale. This is how the non-informative priors were implemented in the assessments for the three stocks. . Appendix 2 of Cordue (2014x) should sensitivity to the choice of the CV and mean of the priors for acoustic *q*. Use of prior information in assessments should improve the precision of assessment outcomes and it is standard practice when data to construct informative priors are available. No changes made.

5. **WWF comment**: The survey data are weak: some surveys are not conducted annually, many only index a portion of each stock, and size data are spotty, sometimes pooled over several years. These affect the estimates of q. This again accentuates the importance of the priors on those q's, which we believe should be developed further.
Cordue response: There is no need to conduct annual surveys as SSB can be expected to change slowly over time given the low natural mortality and now that fishing mortality is at appropriately low levels. The priors will be developed further as more information becomes available. Making them uniform would be a retrograde step.

Assessment team comment: While annual surveys would improve the accuracy and precision of the stock assessments outcomes, orange roughy are long-lived with slow dynamics. As such, infrequent surveys combined with an appropriate harvest control rule should allow management objectives to be achieved. The MSE was based on the anticipated inter-survey frequency of three years (Cordue, 2014). Thus, while more surveys would lead to a more rapidly updating on priors (and hence less reliance on the priors), the fact that the harvest control rule is based on the anticipated survey interval addresses the concern about survey frequency. Were surveys not be conducted at the planned rate (see tables 12 and 13 the main report), a condition could be raised. No changes made.

6. **WWF comment**: We note that several of our earlier concerns presented to the assessment team were addressed to some extent in the MSE document (Cordue, P.L. 2014. A management strategy evaluation for orange roughy. ISL Client Report for Deepwater Group Ltd., 42 p) and its development of harvest control rules (HCRs). A remaining issue, however, is the selection of reference points. The current management scheme seems to have arisen from a generic management approach and not specifically for orange roughy. As far as limit reference points, there can be no "limit" without a consequence of exceeding that limit (hence the difference between hard and soft limits). Therefore, one can argue that a more appropriate limit for orange roughy is 25% since Bmsy/B0 is about 25%. Such an action implies Bmsy is a limit and is consistent with international agreements.
Cordue response: The current management scheme has arisen out of the MSE. It is specifically designed for orange roughy. The limit reference point was also a product of the MSE and was estimated to be 20% B0 (using the definition of being the greater of 20% B0 or 50% BMSY). While BMSY may be used elsewhere as a LRP, the requirements of the MSC standard explicitly permits a stock to fluctuate around BMSY, hence there is no requirement to have BMSY as a LRP as proposed by WWF.
Assessment team response: We agree with the Cordue response. No changes made.

7. **WWF comment**: In the original management scheme the aforementioned consequences were not very well evaluated. To some extent the MSE report addressed this by evaluating probabilities of exceeding various B/B0s. Nevertheless, as the MSE document points out, the consequences of unforeseen reductions in B/B0 can have ramifications for many years. The MSE report used the current limit/target reference points, depletions below them, and recovery to them as indicators in defining the HCR. But because they arose from the original management scheme, then arguably these should be modified to reflect alternate schemes.
Cordue response: The original management scheme has been replaced and the consequences of breaching thresholds are now clear. The LRP was estimated as part of the MSE. The lower bound of the target biomass range was then set at 30% B0 because this was "well above" the LRP and in conjunction with the HCR allowed SSB to be maintained above the LRP almost all of the time (and above the lower bound of the target biomass range most of the time). It is somewhat coincidental that the lower bound of the target biomass range was equal to the previous target.
Assessment team response: The MSE provides estimates of the probability of falling below various reference points for alternative control rules. The reference points were chosen using the MSE and differ from those used previously. However, the reference points were selected based on information for orange roughy in New Zealand which is preferable to using generic reference points such as those used previously. No changes made.

8. **WWF comment**: It is unclear to WWF whether the HCR has been implemented and is deserving of a score of 80. Since the assessment indicates that the orange roughy stock was depleted, then there should have been a recovery plan implemented to recover to the target. The more ad hoc recovery has been marginally successful in that the target 40% is just now being reached. One might argue that median recovery is now 40%, which means that there is a 50-50 chance that recovery has occurred. This supports the need for formally

implementing the HCR, and suggests that scoring of the harvest strategy or HCR at 80 or above is problematic.

Cordue response: The HCR developed through the MSE has been implemented for the three orange roughy stocks under consideration1 (except that for ESCR a lesser TACC has been set). For the MEC, it was the 2014 stock assessment that indicated that the stock had previously been depleted, it is not possible to implement a rebuilding plan in the past. For one of the stocks (7A) the fishery was closed from 2000-01 to permit rebuilding and the fishery was reopened in 2010 with a relatively small TACC (500 t) when evidence of rebuilding had been evaluated including a series of biomass surveys conducted from 2005 (MPI, 2014). The target biomass range is 30–50% B0. Rebuilding means getting the SBB into the target biomass range with a 70% probability, not getting it above the mid-point of the range. Once within the target biomass range the HCR will maintain the stock within this range most of the time.

Assessment team response: MPI (2014) notes that the work to finalize and agree the HCR was not complete when the Minister for Primary Industries made his decisions regarding the 2014 catch limits for the NWCR and ORH7A stocks. MPI (2014) notes that the 2014 catch limits are broadly consistent with those produced by the HCR, but the catch limit for the NCWR stock was set above that required by the HCR and that industry has shelved all catch above the HCR-generated limit. MPA (2014) notes that in future, now the HCR has been formally agreed, it will endeavour to set catch limits for the three orange roughy stocks using the agreed HCR whenever possible. Thus, the HCR is therefore for all intents are purposes implemented. However, MPI (2014) suggests that following the HCR will occur "whenever possible". Whether catch limits are set consistent with the HCR will be monitored during annual surveillance reports and a condition may be raised if catch limits are set above those generated using the HCR. The text of the report was updated to reflect this.

P2

1**. WWF comment**: …we listed the following species as examples of species with low reproductive capacity and "high to very high vulnerability" and "low" resilience (e.g. shovelnose spiny dogfish, *Deania calcea;* pale ghost shark*, Hydrolagus bemisi;* dark ghost shark*, Hydrolagus novaezealandiae;* smooth skate*, Dipturus innominatus).* The additional data analysis provided by the Ministry for Primary Industries (MPI) indicates that Baxter's lantern dogfish (*Etmopterus baxteri*) and the Deepwater dogfish group also warrant consideration as main species due to their "low" resilience and "high to very high vulnerability." The observed catch of these species met the MPI criteria of more than 1% of total catch averaged over the years with adequate data. WWF strongly recommends that, under a precautionary approach, less resilient species such as these should be considered as main bycatch species due to their particular vulnerability (GCB 3.8.2) and the fact that these species and groups are data deficient and not actively managed under the Quota Management System (QMS).

Assessment team response: Three of the four species are managed under the Quota Management System (i.e. pale ghost shark, dark ghost shark, and smooth skate). For each of these three species catch limits and monitoring regimes (through trawl surveys and stock assessments) are in place. In addition, the catches of each of these species make up very low proportions of the catch from the relevant orange roughy UoCs; Tables 15, 17. 18, 20, and 21 of the assessment report demonstrate that the catch of these species falls substantially below the typically used threshold of 2% of total catch and below the more precautionary threshold of 1% used in this assessment for vulnerable species. Therefore, these species are not considered Main species.

2. **WWF comment**: The additional data analysis provided by the MPI for Baxter's lantern dogfish in the East and South Chatham Rise UoC may provide additional insight into the potential risk to highly vulnerable species from even low levels of bycatch. When the annual

observed catch is scaled up to total estimated catch for the fishery, the average annual catch for this UoC is estimated at 88.4 tons with an estimated catch over five years of 441.8 tons. This may present a high level of risk for a high vulnerability species for which there is inadequate information on its status in regards to biological limits. The MPI analysis estimates that the scaled up catch of Baxter's lantern dogfish in the East and South Chatham Rise UoC amounts to 51.6% of the total catch for the species in the UoC and 24.5% or the catch in the New Zealand EEZ. This analysis indicates that even the low catch levels observed in the OR fishery represent a substantial portion of the overall catch for this species. WWF remains concerned that the management strategy for species exhibiting similar life history characteristics (such as low productivity and high susceptibility to fishing mortality) does not meet the MSC requirements for 1) a 'partial strategy' sufficient to maintain these species within biologically based limits and not hinder recovery (PI 2.2.2 scoring issue a) and 2) evidence that the strategy is being implemented successfully (scoring issue c).
Assessment team response: Baxter's dogfish, a non-QMS species, reaches the 1% threshold only in the ESCR area, although is also considered in the NWCR. A long duration of trawl surveys in the Chatham Rise (Stevens et al. 2014, 2015) show abundance indices that fluctuate without trend, and that the length composition shows a wide range of lengths indicating substantial older fish (therefore, the old fish are not fished down) and a number of age classes (therefore, recruitment is continuing). The non-QMS management strategy calls for monitoring species for signs of impairment, and moving to QMS if necessary. The stability of biological indicators from the trawl surveys does not indicate any problem. The wide distribution of the species in NZ waters (Anderson et al., 1998) further suggests that proportion of the stock that intersects with the fisheries is sufficiently small to minimize the risk to Baxter's dogfish.

3 **WWF comment**: WWF acknowledges the effort the Deepwater Group has undertaken to provide a better picture of the overall trawl footprint and fishing impacts on UTFs. However, as pointed out previously, our interest is more related to the different habitat types potentially covering the UFTs. The more important metric is the proportional area of each habitat type that has been and is swept by trawls. We are looking forward to understanding how the assessment team scores the different habitats affected (e.g. a supposed overlap between ORH3B NWCR UoA area and *Antipatharia* corals according to Baird et al 2015). As you know, the protection of habitats is a topic of crucial importance for us and we will thus also be trying to gain a good understanding of the fishing operations of the Deepwater Group on the unit of assessment. We will do so with the help of the available satellite data and are of course willing to share our findings with the assessment team pending the signature of a nondisclosure agreement.
Assessment team comment: The DWG has provided the assessment team with confidential (in the sense of MSC CR 24.4.3) haul by haul data for determining distribution of fishing in relation to UTFs. The confidential data specifically address coral, and the Assessment Team has addressed impacts on coral under ETP.

Appendix 3.3 Stakeholder Comments to Peer Reviewer

From:	Barry Weeber
To:	Bob Trumble; Erin Wilson
Cc:	Amanda Stern-Pirlot
Subject:	Re: Proposed Peer Reviewers for NZ Orange Roughy (MragRef:Orange Roughy)
Date:	Thursday, December 03, 2015 3:41:55 PM

Bob

Thanks for the note but our objection stands.

Regards

Barry Weeber
For ECONZ

On 4/12/2015 9:32 a.m., Bob Trumble wrote:

> Barry – The confirmation for Don Bowen as peer reviewer posted today, in accordance with the MSC requirements. We believe that Don is highly qualified as a peer reviewer. To address your concern, we have edited Don's bio to demonstrate that he has experience with deepwater benthic habitats and spatial analysis of impacts.
>
> > **Dr. Don Bowen**. William Don Bowen is a Ph.D. graduate of the University of British Columbia, Vancouver, British Columbia. He has been a research scientist at the Bedford Institute of Oceanography, Dartmouth and an Adjunct Professor of Biology at Dalhousie University, Halifax, Nova Scotia for more than 25 years. He has studied the ecology, energetics and population dynamics of North Atlantic seals. As Chief Marine Fish Division, he was responsible for fisheries research and stock assessments of commercially harvested fishes on the Scotian Shelf and currently leads the assessments of seals and Atlantic halibut. Interests also include ecological interactions of marine mammals and seabirds with fisheries and ecosystem change. Has published over 220 scientific papers, including 155 journal articles and book chapters and two books. He has served on the USA recovery team of the Hawaiian monk seal, and as chair of the UK Special Committee on Seals. He has broad national (Natural Science and Engineering Research Council, DFO) and international (National Academy, NSF, NRC, NMFS, NERC, NRPB) experience as a science advisor and served as member of the Board and Editor of Marine Mammal Science for five years. He has considerable experience as an MSC assessor having been involved with a number of groundfish fisheries certifications (e.g., pollock, Pacific cod, flatfishes) in the Bering Sea and Gulf of Alaska and has served as an external reviewer on US West coast trawl groundfish fisheries and Cornish hake. In these assessments, he has evaluated the effects of both bottom and pelagic trawls on benthic habitats, including structure forming groups, such as corals, sponges and sea pen/whips, habitat diversity and the spatial effects of fishing on habitats.
>
> Regards,

Bob

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From: Barry Weeber [mailto:baz.weeber@gmail.com]
Sent: Thursday, December 03, 2015 4:16 AM
To: Erin Wilson
Cc: Bob Trumble
Subject: Re: Proposed Peer Reviewers for NZ Orange Roughy (MragRef:Orange Roughy)

Erin

I realise we have missed the deadline. I mis read this thinking it was a month for feedback rather than less than 10 days.

We object to the proposed peer reviewers as there is no expertise for benthic biodiversity or benthic impacts of bottom fishing.

Dr Don Bowen's expertise does not appear relevant to this proposed certification. We would suggest alternatives if that was appropriate.

Regards

Barry Weeber
for ECO NZ.

On 20/11/2015 6:30 a.m., Erin Wilson wrote:

> Dear Stakeholder,
>
> We are contacting you as you have been identified as a potential stakeholder for the New Zealand Orange Roughy fishery. MRAG Americas has proposed two peer reviewers for this assessment. Attached is the notification for the two proposed peer reviewers for this assessment and information on how to get involved. Please submit all comments by 5PM GMT on November 29th, 2015.

Kind Regards,
Erin Wilson
MRAG Americas—Seattle
1631 15th Ave W., STE 201
Seattle, WA 98119
(206) 430-5286

Appendix 3.4 Stakeholder Comments to PCDR

MRAG Americas received comments to the PCDR from WWF; Greenpeace New Zealand, Inc. (Greenpeace) and Deep Sea Conservation Coalition, Inc. (DSCC); Environment and Conservation Organisations of NZ (ECO); and Bloom Association (Bloom). Because of the similarities in the comments, the MRAG assessment team provided responses to the comments at the end of the comment letters. Following the comments and responses to these stakeholders, the MRAG assessment team has responded to the technical oversight from the MSC.

Appendix 3.4.1 Stakeholder Comments

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29. February 2016

RE: New Zealand Orange Roughy fishery assessment / Public Comment Draft Report

Dear Dr Trumble,

Thank you for the opportunity to comment on the Public Comment Draft Report (PCDR) for the New Zealand orange roughy (OR) fishery.

While WWF applauds the efforts of Deep Water Group (DWG) for their commitment to meet the MSC standard, our review of the PCDR has identified serious shortcomings with the fishery assessment. We present our concerns on the following pages. The issues which we raise are fundamental and we conclude that the fishery has not been shown to meet the MSC's global environmental standard for sustainable fisheries.

We look forward to your feedback and to understand how you will address these issues.

WWF-New Zealand is part of the international conservation organisation World Wide Fund for Nature (WWF).

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Kind regards,

Peter Hardstaff
Head of Campaigns
WWF-New Zealand

Alfred Schumm
Director
WWF Smart Fishing Initiative

PRINCIPLE 1

PI 1.1.1: The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing

Scoring issue (SI) b requires the stock to be "at or fluctuating around its target reference point." We agree with the need for a condition to assure that ESCR achieves the target biomass range. However, we question whether the 7A and NWCR stocks have been shown with any level of certainty to be "fluctuating around" the TRP.

MSC FCR1.3 CB 2.2.2.1 states: "At SG80, there shall be evidence that the stock is at the target reference point *now or has fluctuated around the target reference point for the past few years*." We would take this to mean that the stock must be estimated to be at or above the target reference point for some number of years before a score of 80 could be awarded.

The information presented shows that the stocks historically fell substantially below the target reference point under the old management procedure, and are now simply rising under the new. This is not "fluctuating around." **We feel that 7A and NWCR have not been shown to meet SIb at SG80, and that a condition is also required to ensure that these stocks achieve the target biomass and remain within range**.

PI 1.1.2 Limit and target reference points are appropriate for the stock

The implication of the limit reference points (LRPs) is that 20% $B_{current}/B_0$ is a measure of the point where there is a "low probability of recruitment overfishing" and that the target range will "maintain high productivity" as the reference points are used in PI 1.1.1. The case for this is not strong.

Given the late age of both maturity and of the age entering fishery, the dynamics of the stocks are being driven by year classes that already existed in 1990, when the 7A and ESCR biomasses bottomed out. While management actions taken since 1990 have likely contributed to biomass increases (increases in biomass per recruit), it is unlikely that those effects would be near to the contributions of the good year classes that were spawned prior to 1990. The implication is that the strong recovery has been driven by good year classes that were already in the pipeline and not caused by the new management policies.

However, recruitment variability is high. The assessment used σ_R=1.1. This level of lognormal variability means that most year classes will be relatively close to average, but that there will be periodic episodes of very high recruitment. **What if OR recovery is being driven by such events? And to what extent can we assume that such events will continue in the ensuing years? Are the limit and target reference points appropriate for the OR stocks?**

To some extent these were addressed through the Management Strategy Evaluations and the development of the harvest control rule (HCR). The results indicate that current management strategies are expected to be robust over the next 5 years or so. But over the longer term it is less likely that the target reference point range starting at 30% has been demonstrated to be robust, especially due to the long time-lag between management actions and the response of the stock biomass. The generic hard and soft limits were simulation tested, but it can be argued that the risks imposed by the unquantified uncertainties are not well accomodated by those limits and that the life history of orange roughy suggests that more risk averse limits might needed. **Whether or not the soft and hard limits and targets are fully appropriate over the longer term remains a question.**

We are concerned with the HCR that sets the target reference point as a uniform range from 30-50% B0 that, in practice, actually lowers the reference point to 30%. The default for the (MSC certified) US West Coast rockfish, which has a similar life history with a very long but somewhat shorter life span, is set at 40% B0, with the LRP at 25% B0. Arguably **the reference points should be more precautionary for a longer-lived species like orange roughy**, and a higher reference point (instead of a reference band that defaults to its lower bound) would be more appropriate for ensuring that the stock is above the point at which recruitment would be imparied.

We do not believe that the reference points have been shown to be appropriate for the OR stocks and do not believe the fishery achieves a score of 80 for this PI.

PI 1.1.3 Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe

While 7A and NWCR rebuilt within the 24 year time frame since 1990 to a biomass within the target range, ESCR has only marginally recovered to the target range. In all these cases this occurred without a formal recovery plan as defined by the MSC process. Therefore, there is a need for these plans, especially for ESCR. The assessment team argues that ESCR recovery is close to the target range and that recent management actions have been conservative such that it is likely that recovery will continue. Therefore, a recovery plan is not needed. While this conclusion may be acceptable in the present context, **there is still a need to establish appropriate recovery rates**. This should be done in the context of the harvest control rule (PI 1.2.2; see next).

PI 1.2.2 There are well defined and effective harvest control rules in place

The harvest control rules were simulation tested using MSEs which indicated their potential effectiveness. They have recently been implemented with TACCs being at or below those specified by the rule. The **effectiveness cannot be shown yet** and is unlikely to be shown in the near future due to the long time lag in the stock's response to any management action. Therefore, there needs to be an explicit coupling of the HCR with the duration of recovery plans if the stocks deteriorated more than expected. Based on this, the current CAB scoring on PI 1.2.2 is too high. **Available evidence does not indicate that the tools in use are appropriate *and effective* in achieving the exploitation levels required under the harvest control rules. Scoring issue c is not shown to be met at SG80.**

Principle 1 Condition

It is difficult to determine from the wording of Condition 1 how the assessment team will consider the estimates obtained in Years 1-4 and what the assessment team will accept as "fluctuating around." Currently, the ESCR stock is estimated to be just below the lower bound of the target reference point and there is a 57% probability of being below the lower limit of the target range. *MSC FCR1.3 CB 2.2.2.1 states: "At SG80, there shall be evidence that the stock is at the target reference point now or has fluctuated around the target reference point for the past few years."* We would take this to mean that the stock must be estimated to be at or above the target reference point for some number of years before a score of 80 could be awarded. However, it is unclear how the assessment team will consider this. In fact, the current wording indicates that the score could be changed to 80 with one year of an estimate at or above the target, which would not be in line with MSC requirements. In accordance with the FCR, **"How the CAB will assess outcomes and milestones" (MSC FCR1.3 27.11.2.5) must be made more explicit.**

P1 References

Cordue, P.L. 2014a. The 2014 orange roughy stock assessments. *New Zealand Fisheries Assessment Report 2014/50*. 135 p.

Cordue, P.L. 2014b. A management strategy evaluation for orange roughy. ISL Client Report for Deepwater Group Ltd. 42 p.

Cordue, P.L. 2014c. Additional material for the 2014 MSC assessment of N.Z. orange roughy fisheries: supplement 1. 2 Sept 2014.

Cordue, P.L. 2014d. Additional material for the 2014 MSC assessment of N.Z. orange roughy fisheries: supplement 2. 12 Sept 2014

Dunn, M.R. 2014. Review of New Zealand orange roughy stock assessments. 3 June 2014

PRINCIPLE 2

Retained Species and Bycatch

PI 2.1.2 There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species

We believe that the CAB has incorrectly applied the MSC scoring guidelines under PI 2.1.2 SI(e) for ORH3B ESCR regarding shark finning. The MSC scoring guideposts in version 1.3 of the MSC standard are clear regarding shark finning (and recently strengthened in CR version 2.0 due to the international importance of this issue for the conservation of elasmobranch species).

Under PI 2.1.2 scoring issue e at SG100, if sharks are processed onboard (CAB3.6.4.2), good observer coverage is required to provide evidence that shark finning is not taking place. The applicable MSC requirement (CAB3.6.3.1) states that "a default rate of 20% shall apply for good onboard observer coverage." The observer coverage for ORH3B ESCR has ranged from 3% to 17% from 2010–2011 to 2013–2014, averaging approximately 11.5% over the four year period (Table 14). The CAB states that the lower observer coverage in recent years is due to a reprioritization of observer deployment to cover foreign charter vessels and that this issue will be resolved in May 2016. Peer reviewer 2 commented on this issue and the CAB stated in response that the team had noted the decline in observer coverage and would reassess the score if coverage does not increase to the default value of 20%. In the opinion of WWF, in spite of the generally proactive approach of the NZ fisheries in regards to shark finning, the scoring approach applied by the CAB is backwards and represents a misapplication of the MSC scoring process, which if done in a consistent manner across PIs could contribute to an upward bias in overall scoring. **To be consistent with both the letter and intent of MSC scoring requirements, the CAB must rescore PI 2.1.2 SI(e) for ORH3B ESCR to reflect *current* management practices in the fishery.** Assurances from managers about increasing observer coverage at some time in the future can be evaluated by the assessment team during surveillance audits to ensure that observer coverage in ESCR never falls below the 20% threshold.

PI 2.2.2 There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations

WWF remains concerned that the 'catch-all' category applied to the deepwater shark bycatch category does not provide adequate species-level information for species with "low" resilience and "high to very high vulnerability." This is especially relevant given the lack of logbook records and the high level of misidentification of deepwater dogfish. Bycatch of unidentified dogfish as a 'catch-all' group may be substantial in some fishery management areas including ESCR (FMA 4; see Table 20 in the PCDR). Such uncertainty in taxonomic identification could make a material difference to how bycatch species are apportioned into 'scoring elements' (Table 29 in PCDR) prior to scoring.

WWF questions whether the existing management arrangements for deepwater dogfish (and other species exhibiting similar life characteristics such as low productivity and high susceptibility to fishing mortality) can be considered a 'partial strategy' that is sufficient to maintain these species within biologically based limits and not hinder recovery (scoring issue a of PI 2.2.2).

ETP Species

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

Impacts on ETP Corals

Overall, the PCDR appears to have summarized information from a wide range of studies and diverse data sets to evaluate the severity of impacts to ETP coral species. In particular, the CAB has drawn extensively from the most recent NIWA technical reports by Clark et al. (2015), Roux et al. (2014), and Black et al. (2015).

WWF considers the presentation of this information selective in terms of both the truncated time frame of the data that is summarized (primary consideration is given to data from the most recent five years) and the conclusions that are drawn from this data relative to the requirements of the MSC Principles and Criteria. Overall, the CAB gives the impression that it is attempting to apply a simplified metric to a complex issue by using only the overlap of the trawl footprint with coral distribution. Clark et al. (2015) state: "Evaluating the extent of impacts depends not just on the overlap of the total footprint, but understanding also the direction of tows, length of tow, and frequency of trawling. The aspects of direction and length of tow are particularly important on UTFs, where there is considerable variability in both."

It is clear from the methodology and results presented by Black et al. (2015) that detailed analyses of the extent of fishing on UTFs can be conducted and that these results indicate that, for UTFs where fishing has occurred, approximately 50% of the total UTF area has been trawled. This is approaching a level that may impair the viability of some coral communities (Clark et al. 2015). Given the potential severity of the impacts to date on ETP coral communities, **WWF stresses the need for clear and decisive actions to protect ETP corals resulting from the conditions related to ETP corals set by the CAB** (see below).

Indirect Effects on ETP Corals

It has been suggested that sediment clouds raised by deep water trawling may have indirect impacts upon the adjacent deep-sea benthos (Consalvey et al. 2006, Clark and Anderson 2013), although these impacts are difficult to quantify (Clark et al. 2015). Sedimentation has been demonstrated to impact deep-sea sponge respiration (Tjensvoll et al. 2013), however the impact of sediment plumes remains speculative for deep-sea corals and it is not known over what spatial and temporal scales it may be relevant (Clark et al. 2015). Despite the fact that the best available science says that we don't understand the indirect effects of sedimentation and that additional research is needed, the assessment team concludes that "indirect effects

have been considered and are thought to be unlikely to create unacceptable impacts to ETP corals" under PI 2.3.1 scoring issue c at SG80. **WWF asserts that this conclusion is incorrect based on the information provided to the assessment team (e.g. Clark et al. 2015) indicating that indirect effects on corals due to sedimentation of ETP corals resulting from trawling may be a serious issue.**

Also, the assessment team recognizes (PCDR, p. 64) that UTF habitats may be less susceptible to indirect impacts from trawling than slope habitats because of the predominance of hard substrata in the former (Clark et al. 2010). However, given the current paucity of information about the effects of sedimentation on these deepwater benthic communities generally, **WWF contends that it would be premature to separate the scoring of ETP corals under PI 2.3.1(c) based on differences in habitat type**.

Unassessed Impacts on ETP Corals

The PCDR does not adequately describe the methods used by Clark et al. (2015) to map the overlap between ETP corals and the trawl footprint in each UoA. In particular, the difference between the total footprint and the single swept area should be defined in the text to clarify the figures and summary data that are presented. In the interest of transparency, the CAB should also clearly explain that all trawls with a similar start/finish position were excluded from the trawl footprint calculations (Black et al. 2013; Clark et al. 2015). Clark et al. (2015) state that "these short tows are frequently associated with orange roughy target fishing around the summits of UTFs, regions which provide important habitat for cold water corals (Rowden et al. 2010)." It is also important that this source of impact to UTFs is quantified and discussed in the PCDR. By excluding this information, the CAB has relied on a minimum estimate of overlap. **This does not provide an accurate assessment of the total trawl impact on ETP coral species and the habitats in which they occur and may have upwardly affected the scoring.**

PI 2.3.2 The fishery has in place precautionary management strategies designed to:

- ***meet national and international requirements;***
- ***ensure the fishery does not pose a risk of serious or irreversible harm to ETP species;***
- ***ensure the fishery does not hinder recovery of ETP species; and***
- ***minimise mortality of ETP species.***

The MSC guidance (GCAB3.2) states that "irreversible harm from fishing includes very slowly reversible harm that is effectively irreversible on timescales of natural ecological processes (e.g. natural perturbation, recovery and generation times in the absence of fishing, normally one or two decades but may be shorter or longer depending on the species and ecosystem concerned)."

The relevant national legislation, the NZ Fisheries Act of 1996 only requires that the fishery minimize impacts on protected and endangered species, including ETP corals. **It is not clear to WWF that the MSC requirements for a sustainable management strategy are currently met for this fishery for the protection of ETP corals.** Clark et al. (2015) states that "the repetitive nature of much of the trawling footprint implies that where fishing has occurred, damage to the ETP coral assemblages is likely to have been considerable" and that "there is no indication of any recovery of stony corals."

WWF is concerned that throughout the PCDR the CAB relies on the fishery trawling predominantly along existing trawl corridors and only expanding at a slow and decreasing rate to new areas as a "measure" to ensure the protection ETP corals. In the scoring rationale for PI 2.3.1(a) the CAB specifically states that "*measures* such as closed areas and limited trawl lines apply to the fisheries." Again under PI 2.3.2(b) the CAB cites "the practice of using the same tow paths" as evidence of a strategy that is being implemented successfully. It is incorrect and misleading to imply that this is a precautionary management measure that will prevent serious or irreversible harm to ETP coral species. **WWF questions whether the fishery meets**

SG80 for any of the scoring guideposts under PI 2.3.2 until management measures restricting the expansion of the fishery footprint and minimizing the impact on corals are actually in place.

MSC certified fisheries are required to apply the precautionary principle under the MSC Standard. The MSC clearly states that a lack of scientific certainty shall not be used as a reason for not taking management action. Specifically, management actions shall be more precautionary (conservative) in conditions of higher uncertainty (Table AA1). The bottom line is that there are no existing management measures or restrictions in place preventing the fishery from expanding into new areas except for the limited closures, which exist primarily outside of the fishery footprint and cannot be taken into account. A reliance on the persistence of recent fishing patterns indicating that vessels tend to fish in the same trawl corridors does not constitute a management measure. The only existing management measures actually in place that protect ETP corals within the current trawl footprint are the existing UTF closures, however only a small percentage of UTFs are actually closed to trawling: 6% (n=5) in the ESCR; 12% (n=3) in the NWCR; and, 0% (n=0) in the Chall-Wpac UoAs (Table 26).

Furthermore, it is not possible for WWF to determine from the information presented in the PCDR how many of the closed UTFs have been previously bottom trawled. At least one of the "closed" UTF features (the seamount named "Morgue" in the Graveyard Seamount Complex on the NWCR) was heavily impacted by bottom trawling before the closure was enacted in 2001 (Clark and Anderson 2013). This issue is particularly disturbing given that the new MSC Fishery Standard (FCR2.0) was extensively revised to incorporate explicit criteria for the regular reviews of the potential effectiveness and practicality of alternative measures to minimize UoA-related mortality of ETP species. Although the orange roughy fishery is being assessed under version 1.3 of the MSC Standard, it is not unreasonable to expect the CAB to pay more rigorous attention to this issue given the clear mandate set by the MSC regarding this issue.

In addition, on page 153, MRAG asserts that the fishery meets the SG100 level of scoring issue (c) for PI 2.3.2 in regards to precautionary management strategies for endangered, threatened and protected species. The scoring rationale says "*Good observer and VMS data on fishery interactions with protected species (including avoidance of protected corals inside and outside of BPAs; and the 100% observer coverage and VME-focused move-on rule outside the EEZ), and compliance with vessel operational procedures such as those designed to minimize capture of seabirds, provides clear evience [sic.] that the strategies described above are being implemented successfully.*" But MRAG does not describe VME-focused move-on rules anywhere else in the PCDR. The list of citations does not identify where this information comes from. WWF is aware that SPRFMO had enacted "interim" measures to protect VMEs which included a move-on rule but their objective was to identify unknown VMEs (Penny et al. 2009). The original authors have since investigated the effectiveness of protective measures in SPRFMO convention area and found them to be "sub-optimal" (see Penny and Guinotte 2013). More generally, scientists are now questioning whether move-on rules are an appropriate tool for protecting seamount communities (e.g. Clark et al. 2016). **WWF concludes that the rationale given by MRAG is unsupported and the score of 100 is not justified based on available information**.

As described above, FCR version 1.3 clearly states that the fishery must have in place precautionary management strategies designed to ensure the fishery does not pose a risk of serious or irreversible harm to ETP species, does not hinder recovery of ETP species, and minimises mortality of ETP species. **A management strategy that meets these criteria is not in place in this fishery.** WWF understands that the fishery poses a risk of serious or irreversible harm to ETP species, hinders recovery of ETP species, and even increases mortality of ETP species.

Conditions 2 and 3 for ETP Species are Vague and Poorly Defined

Condition 2, regarding PI 2.3.1, has been set for the NWCR and ESCR UoAs requiring that by the end of the certification period, "the direct effects of ORH fishing must be highly unlikely to create unacceptable impacts to ETP coral species."

In the opinion of WWF the condition is poorly defined, fails to acknowledge the current knowledge of ETP coral impacts and fails to satisfy the MSC requirements for condition setting. At the SG80 level for PI 2.3.1 the MSC defines "unlikely to create unacceptable impacts" as a direct demonstration that requirements for protection and rebuilding are being achieved (CAB3.11.3.1). The milestone for the first surveillance audit requires the client to present a plan to increase certainty regarding the impact of ORH fishing in the two UoAs on ETP coral groups and carry out the plan in subsequent years. However, the client action plan is equally vague in committing to deliver a plan "plus any additional management actions implemented to protect corals" by the fourth surveillance audit that will improve certainty that the likelihood of unacceptable impacts meets the SG80 level for each UoA.

In the opinion of WWF, both the condition set by the CAB and the corresponding action plan specified by the client fishery are unreasonably vague and provide little certainty that the condition will result in measurable improvements that minimize the impact of the fishery on ETP corals as required by PI 2.3.1. Specifically, under the MSC certification requirements **the CAB is required to draft conditions to specify milestones that spell out the measurable improvements and outcomes (using quantitative metrics) expected each year** (27.11.1.4). **The MSC requirements for setting conditions also require that "if a condition or milestone relates to reducing uncertainty or improving processes, the CAB shall include in its reports narrative about the ultimate ecological or management outcome that the condition aims to achieve over the longer term"** (27.11.7). As currently defined Condition 2 fails to meet the MSC requirements and will likely allow the continued destruction of ETP corals by an MSC certified fishery over the next five years through expansion of trawling to pristine areas (see also Habitat Impacts below).

Condition 3, which has been set for the ETP species information PI 2.3.3, is similarly vague and requires additional specificity regarding the ecological or management outcome expected from the condition.

Habitat Impacts

An Expanding Trawl Footprint

The assessment team is forthright about the fact that the trawl footprint of the NZ Orange Roughy fishery continues to expand, saying for example that "...the fishery has moved into new areas each year." WWF is extremely concerned about the expanding footprint and its adverse consequences for vulnerable deepwater benthic communities.

To date, MPI has not expressed any intentions of "freezing" the fishery footprint - a common approach for protecting VMEs in high-seas bottom trawl fisheries (e.g. SPRFMO, see description in Penny and Guinotte 2013), nor does MRAG identify any pending proposals by management that would stop the expansion of trawl footprint. Instead the assessment team states that there has been a decline in the rate at which new areas are swept by bottom trawls. The team makes this point repeatedly (see pp 64-65, 75, 149, 159 and 160 of the PCDR).

This argument is unsatisfactory to WWF because the observation of a recent slowdown of footprint growth was driven by reductions in the TAC (i.e. there was less fishing effort), which will be reversed as soon as stocks rebuild or new stocks are identified (see WWF comments 2014). Regardless, **a deceleration in the rate of habitat destruction is not the same as a cessation or even a reversal of habitat impacts**. Under current management, this fishery will continue to trawl new 'virgin' deepwater habitats.

From WWF's perspective, continuous expansion of the trawl footprint has two profound implications for gauging the sustainability of the orange roughy fishery. First, it means that the root cause of the problem has not been addressed and so it will be propagated into the foreseeable future. If the areal extent of impacted benthic habitats continues to accumulate alongside fishery operations, we must ask what the spatial extent and distribution of the remaining unimpacted habitats will be in 10 or 20 years time. The team does not calculate nor answer this question. Given that impacts of bottom trawling in seamount communities (or UTFs) are effectively irreversible (see below), we can expect that any gains that are accrued through habitat recovery (recovery may require "hundreds of years if not millenia"; Clark et al. 2016) will not offset the rate at which habitat is lost to trawling. **Each year there will be a net loss of unimpacted habitat.**

Second, an ever-expanding footprint serves to underscore the weakness and shortsightedness of current management arrangements for the protection of deepwater benthic communities. Aside from establishing area closures, MPI has not imposed any measures that would act directly to control the quality (community composition, location) or the extent of new benthic habitats that are subjected to bottom trawling. From an outsider's point of view, footprint expansion appears to be unregulated. And as far as WWF can discern, there is no rational "plan" for how to utilize the >70% of deepwater benthic communities that fall outside of area closures. This implies that **MPI lacks a strategy to minimize coral mortality and benthic habitat impacts**. Inexplicably, this lack of strategic planning is not reflected in the PCDR.

The assessment team does not address the absence of management strategy in the PCDR. Instead the team gives unjustifiably high scores to PI 2.3.2 for managing corals as ETP species and to PI 2.4.2 for managing habitat impacts. **We do not believe the fishery attains the SG80 level of scoring issues a, b and c of PI 2.3.2. Similarly, we do not believe the fishery attains the SG100 level of scoring issues c of PI 2.4.2 and we seriously question whether it should even meet SG80.**

Scoring Irreversibility of Impacts

Performance indicator 2.4.1 is designed to assess whether the fishery causes serious or irreversible harm to habitat structure (when considered on a regional or bioregional basis) and function. In scoring PI 2.4.1, MRAG does not follow MSC's rules for scoring the irreversibility of trawl impacts. **MSC requires that the assessment team consider impacts as "irreversible" when those impacts would require much longer to recover from than the dynamics in un-fished situations would imply** (GCAB3.14.2). Clark et al. (2016) estimate that recovery times for impacted megabenthos "are likely to span centuries to millennia" for many communities. Studies done in the region support the conclusion that recovery from benthic trawling is very protracted (e.g. Koslow et al. 2001, Clark and Rowden 2009, Althaus et al. 2009, Williams et al. 2010, Clark et al. 2015). Thus, **habitat impacts caused by the orange roughy fishery are essentially "irreversible."**

Instead, the assessment team focuses on whether or not habitat impacts are "serious." The scoring rationale cites MSC guidance: "Examples of serious or irreversible harm 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" (GCAB3.14.2). While it may be true that no species extinctions have been observed to date, WWF takes strong exception to MRAG's conclusion that "no difference in community structure in coral-dominated UTFs within or outside of a protected area…has been observed." **This statement has not been proven and runs counter to the findings of Clark et al. (2015) who concluded that "compare and contrast studies clearly indicate that trawling is likely to have a substantial impact on deep-sea coral communities in fished areas."**

In addition, the assessment team appears to have given almost no serious consideration to the topic of reversibility of trawl impacts to deep sea benthic communities. The assessment team's scoring rationales

instead indicate that they feel there is sufficient information to understand recovery patterns and to estimate recovery rates in impacted communities. For example, MRAG assigns the SG100 scoring level to PI 2.4.3(c), saying that there are "...vessel monitoring and research programs providing robust information on trawl footprint and the impact of trawling and recovery for the fisheries." **Recovery is not however considered in the scoring rationale for 2.4.3(c). Without detailed information on habitat recovery, we do not believe the team can justify a score of 100 for the adequacy of information used to measure changes in habitat distribution over time.** The team's conclusion is also inconsistent with the conditions set for PIs 2.3.1 and 2.3.3 based on uncertainty surrounding the impacts to ETP corals.

Similarly, PI 2.5.3(a) is awarded the highest level because there is good information on "...the impact of trawling and the slow recovery for some UTF habitats (e.g. reef-building stony coral habitat)." In neither case does MRAG present information about pattern or rate of recovery. While we understand that this assessment was conducted under FCR v1.3, we believe it prudent to note that the new MSC Fishery Standard (FCR2.0) was extensively revised to incorporate the latest scientific information about recovery of habitats, and especially VMEs, from fishery impacts (see section below).

WWF understands from recent science that the fishery causes serious or irreversible harm to habitat structure and function.

Omission of the Scientific Concept of VME

In the past decade, one of the areas of most significant developments in the field of fisheries management is the mandate to protect Vulnerable Marine Ecosystems (VMEs). The VME concept is now a cornerstone of the management of deep sea fisheries in the high seas. United Nations General Assembly Resolution 61/105 on sustainable fisheries (UNGA 2007) calls upon regional fisheries management organisations to establish measures requiring participants in bottom fisheries to assess, on the basis of the best available scientific information, whether fishing activities would have significant adverse impacts on vulnerable marine ecosystems (VMEs), and to close areas where VMEs are known or are likely to occur, unless conservation and management measures have been established to prevent significant adverse impacts on those VMEs. The FAO International Guidelines for the Management of Deep Sea Fisheries in the High Seas (FAO 2009) include advice on broad characteristics of VMEs and guidelines on what might constitute a significant adverse impact. In 2014 the MSC Scheme formally embraced these developments by making VMEs an explicit element of the assessment of Principle 2 in the revised fishery standard.

Given the centrality of the concept of VME to deep sea fisheries (i.e. to sectors such as the NZ orange roughy trawl fishery), WWF would expect the CAB to discuss VMEs at great length. However MRAG does not explicitly address under PI 2.4.1 whether any of NZ habitats constitute VMEs. Quite the contrary, MRAG mentions VMEs in exactly two places in the whole PCDR: on page 76 in relation to VME indicator taxa found in scientific trawling on seamounts of the Louisville Ridge (which is located outside of the EEZ of New Zealand), and on page 155 in relation to VME-focused move-on rule outside the EEZ.

We recognize that MPI and NIWA do not routinely categorize deep sea benthic communities as VMEs when those communities occur within the EEZ of New Zealand. However, the same authorities use the concept of VME to describe comparable, if not identical, benthic communities occurring outside the NZ EEZ in the SPRFMO Convention Area (e.g. Penny et al. 2009, Williams et al. 2011, Penny and Guinotte 2013). The discontinuity in terminology between national and international management areas is confusing and this has not been reconciled in the PCDR. For the sake of clarity and objectivity, **WWF asks the team to explain how the concept of VME applies to the habitat categories of UTF and Slope that the team has used in their assessment of habitat impacts in the EEZ of New Zealand**. Without this rationale, WWF cannot see how the team can justify awarding a score of 100 to the adequacy of information on the "… distribution of habitat

types… over their range, with particular attention paid to the occurrence of vulnerable habitat types" (SG100 level of PI 2.4.3a).

Relevance of MSC FCR2.0

Full assessment of the New Zealand orange roughy fishery commenced before release of FCR2.0, and WWF does not contest the fact that the older version of the MSC standard is being used in this assessment in accordance with MSC rules.

WWF brings up FCR2.0 primarily because we want to refer to this document as a source reference rather than see it applied here as the standard. We believe that the content of FCR2.0 is highly relevant to the evaluation of the PCDR because it captures the views of a leading authority and major stakeholder in the field of sustainable fisheries certification - the Marine Stewardship Council.

In regards to how FCR2.0 would relate to the NZ orange roughy fishery, the most conspicuous advancement is that MSC now makes protection of VMEs an explicit objective by creating a dedicated VME scoring element within the MSC default tree. Teams must follow established criteria which are adapted from FAO (2009) as a basis for categorizing habitats as VMEs. A second and related change is that habitat impact thresholds are now made explicit and teams must also consider habitat recovery rates. A third important change is that MSC now sets an explicit threshold for allowable levels of impact to VMEs: they cannot be impacted beyond 20% of their unimpacted state (i.e. VMEs must be maintained at > 80% of their unimpacted state).

MSC says: "*...the only allowance for continued fishing by MSC UoAs on a VME is (a) if there is a comprehensive plan that shows that all fishing will keep the VME at 80% or recover it to 80% and (b) when the VME has recovered or is above 80%*" (GSA3.14.2.1) In regards to the NZ orange roughy fishery, we note that the assessment team considers that measures which lead to protection of about 30% of UTF habitats are sufficient to conclude that it is highly likely that there is no irreversible harm to UTFs. In essence, **the team accepts a risk level which is far below the 80% threshold set by MSC for VME status. Current expert opinion, as reflected in FCR2.0, states that this is not an acceptable level of not yet serious or not yet irreversible harm to deepwater benthic communities dominated by fragile, slow growing stony corals.**

In addition, we consider the extent of benthic habitat damage that has been documented in the three UoAs. At the level of the individual UoA, the trawl footprint of impacted UTF habitat area is: 16.7% (ESCR), 21.9% (NWCR), and 45.7% (ORH7A & Westpac Bank). Two of the three UoAs have already exceeded the absolute threshold prescribed by MSC (i.e. > 20% impact) and these estimates were based on conservative estimates of impact area, using only the most recent five-year period 2008-09 to 2012-13 rather than the full time period (as discussed above, this approach is not science-based and therefore not acceptable). The third UoA (ESCR) is sufficiently close to threshold that we can predict it will exceed the 20% impact threshold before the third surveillance audit (assuming trawl footprint continues to expand at the rate indicated by MRAG minimally 1% per year; p. 159 of PCDR). **If FCR2.0 were applied today, it is debatable whether any of the three UoAs would meet the SG60 level of PI 2.4.1. Yet the scores assigned by the assessment team were: 90 (NWCR), 90 (ESCR) and 90 (ORH7A).**

WWF cannot reconcile the disparity between the assessment team's optimistic views about current levels of habitat impact in the orange roughy fishery with the standard setter's directive to apply a more precautionary threshold to vulnerable deepwater habitats. It is worth noting that Clark et al. (2015) said the following regarding impacts to corals: "*It is unknown how much of a coral population can be damaged before the viability of the coral communities/ecosystem is impaired. Shallow-water studies associated with protected area design have tended to average around maintaining at least 30–50% of a community to ensure its survival (e.g., Botsford et al. 2001, Airame et al. 2003). The spatial extent of coral populations is unknown.*

If it is assumed that the fishery stock area reflects also the coral population distribution, then the fishing pressure on the Chatham Rise may be approaching, or at, such levels. However, this is a key area of uncertainty when interpreting the significance of overlap between fishing and corals." Speaking more directly to the question of how MSC assessment teams should treat impacts of fishing on benthic habitats, Grieve et al. (2014) urged the MSC to "…emphasise that certification bodies take great care to adopt a precautionary approach when certifying deep-water habitat."

Truncated Period for Assessment of Trawl Impacts

The assessment team appears to have based a number of conclusions about habitat impacts on a truncated data set. Despite the existence of over 20 years of information about a fishery that has been in continuous operation throughout that period, the team justified its scores by emphasizing information from the last five years. For example, MRAG rationalizes assigning a score of 90 to the UTF element of each UoA under PI 2.4.1 because "... over the last 5 years, the maximum amount of structural damage to UTF habitats within the orange roughy distribution range that could be attributed to orange roughy fishing in the UoC areas is 12%..." However, if the team were to consider the entire dataset, their estimation of the amount of structural damage that is attributable to the fishery would be much larger. Black et al. (2013), for example, estimated that cumulative swept area on the NWCR was 50.1% of the seafloor within the target depth range over a 20 year period.

Truncation of the data set tends to reduce estimation of cumulative fishery-habitat interactions including trawl footprint area, swept area, and proportion of overlap with ETP species and is **neither scientifically appropriate nor meets the intent of the MSC standard**. Given the near irreversibility of structural damage caused by bottom trawling, an underestimation of cumulative impact area will not be appreciably off-set by habitat recovery, at least over timeframes relevant to this assessment. Therefore this issue is absolutely fundamental to maintaining objectivity and fairness when scoring MSC performance indicators that address the status of P2 components (i.e. ETP, Habitat and Ecosystem).

Truncating the trawl dataset also tends to exaggerate the effects of a recent decrease in fishing effort that was itself driven by reductions in TAC - not a measure to reduce habitat impacts. As Clark et al. stated: "Overlap [between coral distribution and trawl footprint] in the last 5 years was much less than for the full time period, which was expected due to reduced fishing effort relative to the all-years dataset."

Putting these concerns together, it is clear that reliance on recent data will yield a minimum estimate of impact at best. It gives us only part of the picture and hence an incorrect picture. The PCDR does not adequately address the issue of truncation. WWF contends that **eliminating information beyond some arbitrary point (5 years) is not an objective approach and it has materially affected the scoring of the fishery against a number of PIs, but most conspicuously the outcome PIs for ETP corals, habitat and ecosystem** (2.3.1, 2.4.1 and 2.5.1).

PI 2.4.2 There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types.

WWF was encouraged to see that the assessment team also examined how benthic impacts in NZ EEZ fit in the wider geographic context of the Kermadec Bioregion. However, the introductory section of PCDR gives almost no description of the responsible management body - the South Pacific Regional Fisheries Management Council (SPRFMO). With respect to the team's consideration of the effectiveness of SPRFMO habitat management actions across the Kermadec Bioregion under scoring of PI 2.4.2, **there is insufficient background material presented in the PCDR for the reader to evaluate whether SPRFMO has developed a partial strategy for managing impacts to deepwater benthic communities (scoring issue a), whether there**

is some objective basis for confidence that SPRFMO's partial strategy will work using information from the fishery and habitats across the Kermadec Bioregion (scoring issue b), and whether there is objective evidence that SPRFMO's partial strategy is being implemented successfully (scoring issue c).

With respect to the scoring of management of habitat impacts (PI 2.4.2), the assessment team has awarded the SG100 scoring level to scoring issue (c), saying that there is "clear evidence that the strategy is being implemented successfully." This statement is incorrect, being contradicted by the scoring rationale for PI 2.4.2(a), which explains that a benthic impacts strategy has been in development but "is not yet fully implemented" and comprises a "partial strategy." **WWF contends that there is currently no strategy to manage benthic impacts (although perhaps a partial strategy exists but is not sufficiently implemented) and therefore it cannot be said that a strategy is being successfully implemented**.

In the scoring rationale for PI 2.4.2(c), the assessment team justifies a score of 100 on grounds that "*...the quality of UTF and slope habitats, specifically 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.*" Despite some excellent benthic monitoring and mapping programs, WWF contends that (aside from the provision of closed areas), **MPI does not provide any discernable mechanism or measure for the "avoidance, mitigation or remedy" of trawl impacts to ETP coral species or deepwater benthic communities. Therefore a score of 100 is not justified for 2.4.2(c).**

Ecosystem Impacts

Uncertainty about Ecosystem Impacts

We must preface our comments with a note about how the team has partitioned corals and other benthic constituents into MSC categories for ETP species, habitats and ecosystems. Although the team's approach may follow the letter of MSC requirements, it is simply not intuitive to us. The CAB has treated corals as ETP species and, in so doing, has treated the benthic communities of seamounts, hills, and knolls as being largely independently of their corals. This distinction is difficult for us visualize because seamount habitats are dominated by, if not defined by, their coral fauna. It's a bit like asking someone to picture a forest habitat but ignore the trees. In the same way, the team has largely removed the biodiversity of benthic communities from their discussion of the orange roughy ecosystem. It is not clear to WWF that the CAB's categorization is entirely consistent with MSC's intent. Had the team fully considered the biodiversity of the benthos as a "key component" of the orange roughy ecosystem, we believe the scores assigned to ecosystem PIs would not be justified.

PI 2.5.1 The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function

On page 166, MRAG states in the scoring rationale for PI 2.5.1 that the fishery attains the SG100 level because the "...benthic impact that may damage ecosystem structure and function are restricted to <20% of the fishery management areas…" This is inaccurate and is contradicted by scientific information which is available to the assessment team. For example, Black et al. (2015) showed that when considered at the level of individual management areas, the proportion of trawl-impacted UTF communities usually exceeds 20% (e.g. data table 2: ORH3B NWCR = 22.0%; ORH3B ESCR = 16.3%, ORH7A = 45.7%). Those numbers are a minimum estimate of impacted area, using only data from the most recent five years. The actual extent of impacted UTF is likely to be much higher. Black et al. (2013) suggested that swept area may be much larger when considered on a cumulative basis within narrow depth strata (e.g. 50.1% of the seafloor within the target depth range on the NWCR over a 20 year period).

WWF was troubled to see that the assessment team awarded the SG100 level for PI 2.5.1. The team justifies this score because "...the fishery is highly unlikely to disrupt [ecosystem] structure and function to the point of serious harm" (note: in the MSC scoring system, the term "highly unlikely" means there should be no more than a 30% probability that the true status of the ecosystem is within the range where there is risk of serious or irreversible harm; CRv1.3 Table CAB18). **We have serious concerns with this degree of certitude considering the significant unknowns or doubts expressed by leading scientists about fishery impacts to deepwater communities and ecosystems.** Below we give some examples to illustrate these doubts or unknowns.

Consalvey et al. (2006) reviewed information on deep-sea corals in the New Zealand region. The assessment team summarized their conclusions in relation to orange roughy ecosystem (p.63 of the PCDR): "Possible effects of coral damage to the ecosystem include: changes to local hydrodynamic and sedimentary conditions and a shift from a diverse reef community to a reduced species/biomass "disturbance" community; and, reduced reproductive output from: (1) a reduction in colony size; (2) an increase in energy resources channelled to repair rather than growth/reproduction; (3) immature colonies being delayed to reach maturity; and, (4) the loss of larger individuals with a disproportionately large contribution to the reproductive output of the entire population." Consalvey et al. were also concerned that damage to habitat forming corals "...can have profound implications to the entire ecosystem e.g. a shift from a diverse reef community to a reduced species/biomass 'disturbance' community." Those authors felt it was imperative that "...scientists and managers work together to increase our understanding of coral biodiversity so that action can be taken to manage vulnerable habitats."

Dunn (2013) reviewed ecosystem impacts of orange roughy fisheries. In regards to community composition, productivity patterns and biodiversity, he noted that "Benthic biodiversity surveys have shown that trawls remove exposed fauna such as corals and sponges. The implications of this, however, remain poorly known." Dunn concluded that "In the longer term, and in principle, measures to reduce, minimise or mitigate benthic impact may help benthic processes to remain intact, despite a fishery. The trawl footprint alone may provide a measure of fishery impact on benthic processes."

Clark et al. (2012) pointed out that we have still have a limited understanding of how seamounts (i.e. UTFs) form part of the wider deep-sea ecosystem and what the broader effects of human disturbance might be. They say: "Future seamount research programmes must broaden their focus to wider deep-sea communities in order to understand their regional significance, and include habitats such as the continental slope, canyons, and sites of hydrothermal venting or methane seeps that host chemosynthetic communities. Successful deep-sea management regimes will need to consider a suite of biological systems in a regional framework." Further, Clark et al. (2012) say that "Changes in the relative abundance of species on seamounts can almost certainly influence trophic linkages and the overall structure of the system, yet few detailed trophic studies have been conducted on seamount communities. Of particular concern are large-scale removals of filter-feeders such as corals and sponges that can dominate the benthic invertebrate assemblages….These types of indirect effects from trawling or longline operations are uncertain, and should be addressed."

In 2013, an expert panel was convened to assess the ecological effects of the New Zealand orange roughy bottom trawl fishery (Boyd 2013). The general view was that "Risks of serious or irreversible harm to the ecosystem were assessed as being low." However it is noted that there was not consensus among experts. The panel concluded that "...more information would assist in reducing areas of uncertainty."

Indeed, the MRAG assessment team also expressed their doubts about impacts at the ecosystem level, stating that "...the extent to which this [expansion of trawl footprint to new areas] might be linked to impaired benthic ecosystem functioning has yet to be determined" (p.159 of PCDR).

In summary, WWF believes that **there is not enough evidence to infer that the risk of serious or irreversible harm to key elements of ecosystem structure and function is highly unlikely and therefore the fishery does not meet SG100.** As we stated previously (WWF 2014), WWF views the biodiversity of the deepwater benthic communities as a 'key' element of the ecosystem in which the orange roughy fishery operates. WWF sees a fishery that causes measurable and long-lasting impacts to benthic habitats (Koslow et al. 2001, Clark and Rowden 2009, Williams et al. 2010) and those impacts are known to reduce the biomass, biodiversity and structural complexity of benthic communities at local spatial scales (at least). But how those impacts ramify across the broader deepwater benthic ecosystems remains largely unknown. Current scientific opinion supports our position. There is a great deal of uncertainty about whether or not current deepwater trawl activities have long lasting impacts on the biodiversity of benthic ecosystems.

PI 2.5.2 There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function

As we noted above for PI 2.4.2, WWF contends that MPI does not have a strategy in place for managing deepwater trawl impacts to benthic communities outside of closed areas. We believe that the biodiversity of the deep-sea benthos comprises a 'key' ecosystem in the MSC sense and the majority of this ecosystem lies outside of protected areas. WWF believes the team must consider the absence of a strategy for managing ecosystem-level consequences of fishery impacts to deepwater benthic communities under PI 2.5.2. **The team has scored the fishery as meeting the SG100 level of scoring issue a of PI 2.5.2 because "there is a strategy that consists of a plan in place." We do not believe this conclusion is justified with respect to managing ecosystem-level impacts to the biodiversity of deepwater benthic communities.**

Without a strategy to protect this key ecosystem component, it is inaccurate to conclude that there are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function. There is potential for the fishery to adversely impact the biodiversity of the deepwater benthic ecosystem. Therefore **we believe the fishery does not meet the SG80 level of PI 2.5.2.**

P2 Errata

Mechanism for Restricting Trawls to Tow Lines is Not Clear from the Information

On page 77 of the PCDR, MRAG makes this statement: "*If the protection of corals from trawling in the orange roughy [fishery] also relies on fishing only on established tow lines, a mechanism for how the restriction to these tow lines occurs is not clear from the available information*." WWF endorses this sentiment. In fact we have repeatedly asked ourselves the same question: how can management restrict fishers to established tow lines? And how can managers reconcile an expanding trawl footprint (growing by $\geq$ 4% per year) with a mechanism that restricts all fishing to established tow lines? We agree with MRAG that such a mechanism is not clear from the available information. Therefore **the scoring rationales for PI 2.3.1(a), PI 2.3.2(b), and PI 2.4.1 should be revised to reflect this uncertainty and the scores of these PIs reduced accordingly**.

Vast SPRFMO Area is not 'Closed' to Bottom Trawling

On page 149, MRAG makes a misleading statement that "... >99% of the SPRFMO Convention area is not within any bottom fishing footprint declared to SPRFMO and is closed to bottom trawling." It may be accurate that 98% of the Convention Area is not fishable, being deeper than 2,000 m (Williams et al. 2011). However **saying that the area is 'closed to bottom trawling' is quite misleading** because it implies active management by the RFMO rather than being a simple consequence of some habitats being inaccessible to the fishing industry.

Consequences of Reducing ESCR Area

On page 8, MRAG notes that the Unit of Certification for ORH3B ESCR refers to the area east of 179 degrees 30 minutes West, which is substantially smaller than the actual fishery management area. MRAG explains that "while the UoA represents 47% of the total ESCR management area, it comprises ~99% of the total catch (based on the past 10 years catch data)." However there is no discussion about how this decision may affect the assessment of benthic habitat status in ORH3B ESCR. It is clear that bottom trawling does occur in the excluded western portion of ESCR (e.g. see Clark and Anderson 2013 for a map of trawl footprint across the whole management area). WWF suggests that, in the interest of transparency, the team should **explicitly describe how exclusion of the western half of ORH3B ESCR affects an assessment of habitat-related metrics** (e.g. estimation of swept area, proportion of unimpacted UTF).

Improper and Confusing Citations

The references given in the text appear to cite NIWA Client Report No: WLG2014-56WLG2014-56 as both NIWA 2015) and Clark et al. 2015 (e.g. for Figures 18-24 - cited only in the narrative, not with each figure as should be done). NIWA 2015 is not listed in the references. This is confusing for the reader.

In another instance on page 75 of the PCDR, MRAG cites Black et al. (2013), stating: *"According to Black et al. (2013), there have been no studies investigating whether the current trawling activities have had adverse effects on the structure and function of benthic communities, or on the productivity of the associated fisheries."* However the actual statement in Black et al. (2013) is: *"There have been no studies investigating whether current trawling frequencies, as determined for the 5 × 5 km cell grid, have had adverse effects on the structure and function of benthic communities, or on the productivity of the associated fisheries."* Although this may seem a minor difference, the omission of the clause referring to the grid size used for the analysis has the potential to change the context of a statement which has methodological implications into a wider ranging conclusion.

Number of UTFs Closed

On page 76 of the PCDR, Table 26 gives percentages for overlap of UTFs with ORH combined trawl footprint and closed or unfished areas (data are from Roux et al. 2014). In citing their own table, the team says "Managed areas have closed approximately 68% of UTFs within New Zealand's EEZ…" This is contradicted by the table which shows that only 26% of UTFs are closed within NZ EEZ. Further, the table is missing figures for number and percentage of closed UTFs in the bioregion, but they clearly cannot total to 74% unless all UTFs in the Kermadec Bioregion that aren't being fished are closed to all fishing (?). If this is the case, then it certainly has not been explained in the PCDR.

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Deep Sea Conservation Coalition, Inc.
and
Greenpeace New Zealand, Inc.
Stakeholder Submission

Comments on the Draft Marine Stewardship Council (MSC) Public Comment Draft Report - Assessment of New Zealand Orange Roughy Fisheries

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Introduction

These comments are on the "Full Assessment New Zealand Orange Roughy Fisheries" Public Comment Draft Report (PCDR), January 2016 Prepared for Deepwater Group Limited, by MRAG Americas, Inc.

They are submitted on behalf of Greenpeace New Zealand, Inc. ("Greenpeace") and Deep Sea Conservation Coalition, Inc., ("DSCC") both New Zealand incorporated societies which work in marine conservation. DSCC is a coalition of over 70 non-governmental organisations concerned with conservation of the deep sea environment, and Greenpeace is the New Zealand national office of Greenpeace International, and has a long-term involvement with and interest in marine conservation, including the deep sea. Greenpeace is a member of DSCC. Together this submission calls them the Submitters.

DSCC and Greenpeace strongly submit that the proposed certification application should be denied, on the basis that it breaches Principle 1, Sustainable Target Fish Stocks, Principle 2, Environmental Impact of Fishing, and Principle 3, Effective Management, and the assessed scores are incorrect.

Principle 1 Sustainable target fish stocks

A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.

Target Reference Point

The submitters strongly submit that the level of the target reference point (TRP), and consequently the limit reference point (LRP) level, for orange roughy is not precautionary and cannot be justified based on best practice. In this respect we support the submissions of WWF in this regard. The target reference point for orange roughy is formulated as a 'range' of 30% to 40% of the estimated virgin un-fished biomass (B_0), but in practice, management in fact applies only the lower 30% as a *de facto* TRP. 30% is far too low for a low productivity deep-sea species. Orange roughy may live to 130 years of age (page 18). The age at which 50% of animals are spawning was estimated within the assessment models to range from 32 - 41 years (Page 18). The relationship between spawning biomass and recruitment for orange roughy is poorly known, owing to a lack of data on recruitment strength and the long lag between spawning and subsequent recruitment to the fishable stock. The larval biology of orange roughy, in common with that for most deepwater marine species, is poorly known. (page 19)

The proposed Target Reference Point is not precautionary. The Submitters support WWF's submissions on this matter.

Limit Reference Point

At present, there is a so-called 'soft' limit set at 20% B_0 and a 'hard' limit set at 10% of B_0. There would be a rebuilding plan when biomass is estimated to be below the soft limit, and a complete closure of the fishery when the biomass falls below the hard limit. However, the Submitters do not accept that a LRP of 20% B_0 is above the level at which there is an appreciable risk of impairing reproductive capacity in orange roughy stocks. There is significant uncertainty stemming from the fact that very long lived stocks have been fished for a relatively short timeframe, compounded by uncertainty about the stock-recruit relationship. The Submitters support WWF's submissions on this matter.

Stock Depletion

The assessment notes that "A concern with orange roughy fisheries is the potential for spawning success to be disrupted by fishing of spawning aggregations. Given the nature of the fishery, it is not possible to directly measure this impact (if it exists) and consequently it is not modelled explicitly in the MSE." (page 35) The history of orange roughy fishing is a history of serial depletion." As noted by MRAG, here is evidence that fishing effort has shifted geographically over time in response to changes in catch rates on individual hills. (Page 77)

By 1992 it became evident that orange roughy are slower growing, longer lived, and less productive than previously thought. As a result, the stock assessment parameters, estimated sustainable yields and TACCs were adjusted downwards." (page 12) Although several genetic and other methods have been applied to examine stock structure in New Zealand, considerable uncertainty regarding stock structure and stock boundaries remain. (page 14)

An overview of some of the fisheries supports this.

ORH Mid-East Coast Stock (2A South, 2B, 3A)

The 2013 assessment estimated the stock to be at 24% B_0, and as such is close to the soft limit.Low recruitment means that it would not meet the SG 60 level.

ORH3B Northwest Chatham Rise

The estimate of virgin biomass was 66,000 tonnes, and the current biomass was estimated to be 37% of the un-fished spawning biomass. The stocks were as low as 10% in 2005, and now are said to be around 30-40% of virgin biomass (page 26), and the recent catch of orange roughy is a third to a quarter of the catch taken at the peak of the fishery (page 49). The 2014 NWCR stock assessment considers the NWCR stock "fully rebuilt", despite an absence of information as to whether the stock is at or above the upper end of the management target range. At the current catch (110t per annum) or the current voluntary catch limit (750t per annum) it is very unlikely the biomass will decline below 20%. Other uncertainties in this assessment include how much of the spawning biomass the acoustic assessment covers, patterns in year class strength, and that the time series of abundance is short.

This absence of information means that the stock would not reach the SG 60 level.

ORH3B East and South Chatham Rise

Stocks plummeted to 20-30% of un-fished biomass from 2000 to 2015 and have not recovered above that (page 29). Uncertainties in this assessment include how much of spawning biomass the acoustic survey covers, whether a spawning plume ("Rekohu") is new or longstanding, and patterns in year class strength as only 2 years of age composition data was used. The uncertainties about the so-called Rekohu spawning plume means that it is quite possible that the stock has been fished down to below the point where recruitment would be impaired, and the stock would not meet the SG 60 level.

On most of the South Rise and east features catch rates have tended to decline rapidly and then flatten out with little recovery. The fishery on the South Rise moved east over time "which was described as a serial depletion of orange roughy from the hills" (Clark 1997, MPI 2015). "The non-spawning fishery has therefore largely contracted to the hill complexes in the southeast corner of the Rise." (MPI 2015). There has also been a "spatial contraction of the fishery during the spawning period" (MPI 2015).

ORH7A Challenger Plateau, including the Westpac Bank

The fishery was fished down to 10% of biomass and only reached anywhere near 30% of biomass during the last 6 years. The stock was assessed in 2013 and estimated to be 20 or 24% B_0. As such, it is close to the soft limit (which itself is uncertain) and would not meet the SG 60 level. Uncertainties

in this assessment include how much of spawning biomass the acoustic and trawl survey covers and patterns in year class strength. While the assessment model shows increasing biomass, the acoustic and trawl surveys have been declining since 2009 – the 2013 survey was 54% of the 2009 result.

Stock Rebuilding

All stocks are below target levels, and so are depleted. Rebuilding strategies must be implemented in a manner consistent with the MSC standard. Plans must include rebuilding timeframes which are based on the time it would take a stock to rebuild to target levels without any fishing (T_{min}) and the standard allows rebuilding to take up to twice this duration ($2*T_{min}$). Rebuilding of all stocks to target levels must occur within the *shorter* of 20 years or 2 times its generation time to achieve SG60: but orange roughy reach reproductive maturity at ages of approximately 30 years, and so a single generation time is very likely to exceed 20 years. There are enormous uncertainties left in orange roughy stock assessments, including whether 20% B_0 is a sufficiently precautionary limit, and whether the hard limit (10% B_0) accurately reflects the point at which recruitment is impaired. Reference points must be set high enough to prevent recruitment impairment and to have a sustainable fishery. Instead, the evidence is that the footprint of the orange roughy fisheries continues to expand to move into new areas to engage in serial overfishing.
In conclusion, all orange roughy stocks are likely to be depleted below target levels, which would impair recruitment and therefore not meet the SG 60 scoring guidepost of the MSC standard.

PI 1.2.3 Relevant information is collected to support the harvest strategy

There is no guarantee the observer coverage will be 20% coverage. Priorities are wider than those for research and management and can within years change priorities. There is a level of observer coverage is patchy in the deepwater trawl fishery (orange roughy, oreos and cardinal fish) with an average of 11% of tows observed in 2012-13. In the orange roughy target fishery 11.6% of tow were observed in 2012-13 and 13.1% in 2013-14 but observer vessel days where only half the level required for collection of representative biological information and samples (e.g. otoliths for ageing and length frequency) to manage the fishery and its impacts (MPI 2015b). While fishers are required to report by-catch of marine mammals and seabirds, as well as quota species, the rate of reporting is low. Only with observers on board is there sufficient information to assess by-catch rates. Reporting of non-quota management species and non-target fish species (e.g. corals) relies on reporting from observers. There is currently no long-term planning for research and management.

Principle 2: Environmental impact of fishing

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

Ecosystem impacts include by-catch and damage to soft and hard corals, sponges and other habitat.

By-catch

The orange roughy fishery is still lacking key information on at least some of the main by-catch species. NZ MPI has stated that if catch levels are deemed to be impacting on the sustainability of a by-catch population then by-catch species may be considered for possible introduction into the QMS, or other management measures may be implemented, such as catch limits, gear restrictions or closed fishing areas (MPI, 2010a; Page 45). Yet without stock assessments for affected by-catch, the fishing managers will not know. MPI has also observed that orange roughy fishing is also known to interact with several species of sharks, many reported using generic codes for 'other sharks and dogfish' and 'deepwater dogfish', that are vulnerable to overfishing. (page 46)

By-catch is a significant issue. In the ORH3B Northwest Chatham Rise, Baxter's lantern dogfish are considered a main by-catch species because they have low productivity and high vulnerability, and reach the 1% threshold set for shark species (page 47), and in the RH3B East and South Chatham Rise, catches from the ORH3B ESCR UoA average about 100 t per year of Baxter's lantern dogfish and about 180 t of combined dogfish (Page 52).

The shovelnose spiny dogfish, *Deania calcea*, is caught in fairly large numbers by the orange roughy fishery yet there are no stock assessments and no management of the species under the New Zealand quota management system. (Punt et al. 2013). Other species of concern include the pale ghost shark, *Hydrolagus bemisi*, dark ghost shark, *H. novaezealandiae*, and the smooth skate, *Dipturus innominatus*.

It is simply not possible to state that species of deepwater dogfish are likely to be within their biologically based limits, given the lack of data and their poor reproductive output.

PI 2.3.1 The fishery meets national and international requirements for the protection of ETP species

PI 2.3.2 The fishery has in place precautionary management strategies designed to:

- **Meet national and international requirements;**
- **Ensure the fishery does not pose a risk of serious harm to ETP species;**
- **Ensure the fishery does not hinder recovery of ETP species; and**
- **Minimise mortality of ETP species.**

The orange roughy fishery captures fur seals and albatross and petrels. There are specific threats to species from trawl by-catch. The Salvin's albatross, a vulnerable threatened species (Birdlife 2012), has the highest risk from fishing rating of all seabirds assessed in New Zealand (Richards 2013). For this species "captures rates have fluctuated without trend or increased in all fisheries taking substantial numbers of this species between 2002–03 and 2012-13, especially after 2006–07." Trawl fisheries "account for 75% of all estimated captures of Salvin's albatross in these years." About 25% of the impacts in the combined middle-depth fishery.

"Salvin's (vulnerable threatened species), southern Buller's (at risk – nationally uncommon), and NZ white-capped (at risk declining) albatrosses make up 39%, 28%, and 25% of the albatrosses captured, respectively." For all three species the annual potential fatalities (APF) (including cryptic mortality) exceed the estimate of potential biological removals (PBR), assuming an inappropriate recovery factor (f) of 1 (MPI 2014). Dillingham and Fletcher (2011) noted: "A value of f = 0.1 is suggested for threatened species, f = 0.3 for near-threatened species, and f = 0.5 for all other species due to the potential for bias in population estimates (Wade, 1998; Dillingham and Fletcher, 2008)." For Salvin's, a vulnerable threatened species, the estimated potential fatalities (APF) was 35 times the PBR, with f= 0.1 for a threatened species. Orange roughy is small part of overall trawl mortalities.

The National Plan of Action on Seabirds for New Zealand (2013) has goals to reduce by-catch but no new measures are in place and no new measures have been applied to reduce by-catch.

- Management has not defined significant habitats.
- No bioregions have been determined in the main trawling areas in follow-up research.

- Fishery catches many protected coral habitats, and land mainly Scleractinia, with some gorgonians and hydrocorals also landed.
- Significant gaps in knowledge for habitat. Rice (2006) reviews the impacts of trawling. The "conclusions about the effects on habitats of mobile bottom fishing gears were that they:
    - can damage or reduce structural biota (All reviews, strong evidence or support).
    - can damage or reduce habitat complexity (All reviews, variable evidence or support).
    - can reduce or remove major habitat features such as boulders (Some reviews, strong evidence or support).
    - can alter seafloor structure (Some reviews, conflicting evidence for benefits or harm)." (MPI 2014)

"The trawl fisheries for orange roughy, oreos, and cardinalfish take place to a large extent on seamounts or other features (Clark & O'Driscoll 2003, O'Driscoll & Clark 2005). These features are often geographically small and, in common with other, localised habitats like vents, seeps, and sponge beds, do not appear on broad-scale habitat maps (e.g., at EEZ scale) and cannot realistically be predicted by broadscale environmental classifications." (MPI 2014).

Most of orange roughy catch comes from seamounts (including hills and ridges). O'Driscoll and Clark (2003) reported that 59.5% of effort and 62.4% of catch targeted on orange roughy comes from seamounts.

The impact of bottom trawling on corals is likely to be significant with high sensitivity to trawling and long recovery times in the order of decades if not centuries.

A large number of researchers have noted a high degree of endemism associated with seamounts. De Forges et al (2000) noted that:

"Seamounts comprise a unique deep-sea environment, characterized by substantially enhanced currents and a fauna that is dominated by suspension feeders, such as corals."

"Low species overlap between seamounts in different portions of the region indicates that the seamounts in clusters or along ridge systems function as 'island groups' or 'chains,' leading to highly localized species distributions and apparent speciation between groups or ridge systems that is exceptional for the deep sea. These results have substantial implications for the conservation of this fauna, which is threatened by fishing activity."

This endemism is likely to mean that the classification system devised by Rowden et al (2005) will under-estimate the biodiversity on seamounts. For example, fish species diversity on some seamounts has also been reviewed by NIWA scientists (Tracey et al 2004). Tracey et al (2004) found there was clearly different fish fauna on seamounts north and south of 41oS and that in 10 seamount complexes there was different species richness. Even within a seamount complex they found different species dominating different seamounts.

Tracey et al (2011) analysed the distribution of nine groups of protected corals based on bycatch records from observed trawl effort from 2007–08 to 2009–10, primarily from 800–1000 m depth. For the orange roughy target fishery, about 10% of observed tows in FMAs 4 and 6 included coral

bycatch, but a higher proportion of tows in northern waters included coral (28% in FMA 1, 53% in FMA 9). (MPI 2014)

Tracey et al (2012) noted in a study of a seamount complex on the North Chatham Rise which had been targeted for orange roughy – "The study showed that fish assemblages on seamounts can vary over very small spatial scales, in the order of several km. However, patterns of species similarity and abundance were inconsistent across the seamounts examined, and these results add to a growing literature suggesting that faunal communities on seamounts may be populated from a broad regional species pool, yet show considerable variation on individual seamounts."

The impacts of trawling on seamounts and the potential recovery time of the diversity that is there could take centuries to recovery from just one trawl. As Clark et al (2015) observed: "many deep-sea invertebrates are exceptionally long-lived and grow extremely slowly: these biological attributes mean that the recovery capacity of the benthos is highly limited and prolonged, predicted to take decades to centuries after fishing has ceased."

Protected deep sea corals are amongst those long-lived invertebrates. (Tracey et al 2003). Corals collections from trawl nets have been aged at 300-500 years old for bubblegum coral (Paragorgia arborea), at least 300-500 years for bamboo corals (Keratoisis sp.) and deep-sea stony corals have reported ages of 50 to 640 years (Enallopsammia rostrata).

Impacts on Habitats, and Vulnerable Marine Ecosystems

Bottom trawls in the New Zealand orange roughy fishery target seamounts on which vulnerable marine ecosystems have formed over thousands of years. Bottom trawlers destroy coral, sponges and other species and vulnerable marine ecosystems. These impacts are a central concern for the Submitters, and are an insurmountable problem for the applicants. Coral bycatch from the orange roughy fisheries on the Chatham Rise includes black corals, stony branching and cup corals, and dead coral rubble, with relatively smaller catches of bubblegum coral, precious coral, other gorgonians (such as primniods and plexaurids) and hydrocoral. (page 65) The overlap of coral distribution and the fishing activities, combined with corals low productivity long recovery period, makes deep-sea coral populations especially vulnerable to damage by fishing gear. (page 66)

Some misconceptions need to be addressed. Firstly, it is sometimes claimed that the footprint of the trawl fishery is small. This is both wrong in fact and completely misleading. The fact is that a significant area of each type of habitat has been impacted by bottom trawlers, which target seamounts. Cumulative impacts and connectivity between ecosystems means that this claim can be given no credibility. For instance, the assessment claims that "[o]f the 1.1% of the SPRFMO Convention Area that is shallower than 2,000 m, about 0.5% is deeper than 1,500 m and thus deeper than orange roughy fisheries normally operate, has never been fished and is not within any footprint declared to SPFRMO. This means that >99% of the SPRFMO Convention Area is not within any bottom fishing footprint declared to SPRFMO and is closed to bottom trawling." (Page 77) This logic fails: the issue are the VMEs that are damaged and destroyed by orange roughy fishing, not the areas that are not.

Secondly, it is sometimes claimed that impacts are restricted to the trawl footprint. However, sediment clouds affect surrounding areas.

Thirdly, it is sometimes claimed that trawls follow established tow lines. Yet there is no evidence that this is the case and that trawls do not in fact impact new areas, and evidence of corals and sponges being caught in nets underline that the reverse is the case. This is itself a problem. There are no prior assessments of areas before they are trawled, and without that, there can be no confidence that new vulnerable marine ecosystems (VMEs) are being destroyed or damage. As MRAG notes, "Recent information from trawl surveys supports a conclusion that coral will remain well established on fished

UTFs (Underwater Topographic Feature), although not at the density prior to trawling." (pages 77-78). In other words, coral has been destroyed.

Another ecosystem issue is that of removal of orange roughy biomass on the ecosystem, its biodiversity and related groups or species.

In summary, there is no basis for awarding SG60, far less SG80, based on the damage to coral. The draft assessment that SG80 level is not met for NWCR and ESCR with regard to ETP coral species due to unacceptable impacts is supported by the submitters, but this conclusion should also have been reached for ORH7A.

Principle 3: Effective management

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

PI 3.1.1 The management system exists within an appropriate legal and/or customary framework which ensures that it:

- **Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and**
- **Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and**
- **Incorporates an appropriate dispute resolution framework.**

Some areas, like ORH1, are enormously data deficient. Research takes a second place to commercial operations and there are questions about whether the crew follow the sampling methodology.

That part of the fishery that is in international waters is not subject to effective management. The South Pacific RFMO measure CM-2.03 called for stock assessments of target, and, where possible, by-catch (paragraph 5(a)), to be undertaken during 2015, but this was not done. Further, the method of addressing damage to benthic habitat, being to permit fishing to continue in 'heavily fished areas' and not to apply the move-on rule (which requires captains to report catch of VME indicator species, stop fishing and move away) to those areas, is inconsistent with United Nations resolutions 61/105 and 64/72, which in fact require States to cease authorising fishing in these circumstances.

2009 UNGA resolution 64/72 called on States and RFMOs to *"[a]dopt conservation and management measures, including monitoring, control and surveillance measures, on the basis of stock assessments and the best available scientific information, to ensure the long-term sustainability of deep sea fish stocks and non-target species, and the rebuilding of depleted stocks, consistent with the Guidelines"* (paragraph 119(d)). Article 5(f) of the UN Fish Stocks Agreement requires States to *"minimize...catch of non-target species...and impacts on associated or dependent species, in particular endangered species"* This is a longstanding obligation under international law. In the absence of scientific information such as stock assessments, UNGA resolution 64/72 calls on States to *"ensure that conservation and management measures be established consistent with the precautionary approach, including measures to ensure that fishing effort, fishing capacity and catch limits, as appropriate, are at levels commensurate with the long-term sustainability of such stocks;"* in cases *"where scientific information is uncertain, unreliable, or inadequate"* (paragraph 119(d)), again reflecting the obligations of States established in Article 6 of the UN Fish Stocks Agreement. If this is not done, flag States and RFMOs are *"not to authorize bottom fishing activities until such measures have been adopted and implemented"* (UNGA 64/72, paragraph 120).

There is no explicit precautionary approach in the NZ Fisheries Act. Proposals by Ministers to improve the Fisheries Act to make it clear that section 10 is precautionary approach were rejected by the fishing industry.

The current Deepwater Management Plan ends at the end of June and currently it is unclear whether there will be a replacement plan. Despite commitments on consultation on reviewing and consultation on these plans at the beginning on 2015 there has been no consultation. We were advised at the end of 2015 that the Ministry was reconsidering the role of management plans.

The Annual Operational Plan process is difficult to influence as it is decided by the industry and the Ministry prior to discussions with other interests.

There is no clear dispute resolution framework as the operational plan provisions, the allocation of catches between areas, and the Fisheries 2030 framework are all voluntary and have no statutory base.

The Westpac Bank is outside the NZ EEZ and is subject to the requirements of SPRFMO. The regime that applies is an interim regime only and does not meet the requirements of UNGA resolutions.

PI 3.1.2 The management system has effective consultation processes that are open to interested and affected parties.

The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties

The consultation system does not meet the requirement for 100. There is not consultation of all parties in the process. The MOU between the fishing industry and the Ministry of Primary Industry means that there is exclusion of a number of both science and environmental interests from the consultation process.

The consultation on future research is very patchy. There is currently no research plan and the current cost recovery regime means that final consultation and the scope of the project that consultation only occurs with the fishing industry.

The Ministry is undertaking a review of the cost recovery regime but we have not been consulted on that process.

PI 3.1.3 The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach

The current Deepwater Management Plan ends at the end of June and currently it is unclear whether there will be a replacement plan. Despite commitments on consultation on reviewing and consultation on these plans at the beginning of 2015 there has been no consultation. We were advised at the end of 2015 that the Ministry was reconsidering the role of management plans.

The Annual Operational Plan process is difficult to influence as it is decided by the industry and the Ministry prior to discussions with other interests.

The Westpac Bank is outside the NZ EEZ and is subject to the requirements of SPRFMO. The regime that applies does not meet the requirements of the UNGA resolutions.

PI 3.2.3 Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with

The management of by-catch species and protected species are less well managed than target species with threats from fisheries catching orange roughy. Protected species interactions with fisheries are also managed under the Wildlife Act (seabirds, corals, sharks, and turtles) and the Marine Mammal Protection Act (whales, seals and dolphins) but this has little teeth to control fishing.

The orange roughy fishery has moderate observer coverage which has varied with the most recent year having the lowest level of coverage. Observer coverage can be poor spatially.

While fishers are required to report by-catch of marine mammals and seabirds, as well as quota species, the rate of reporting is low. Only with observers on board is there sufficient information to assess by-catch rates.

Reporting of non-quota management species and non-target fish species (eg corals) relies on reporting from observers.

PI 3.2.4 The fishery has a research plan that addresses the information needs of management

The 10 year research plan is ended and is no longer relevant to the research for orange roughy. As we were advised in last year, the proposal for a 5 year extension was considered to be unfundable by the Ministry of Primary Industry (Turner D, Jan 2015). For the last 2 years it has been only ad hoc research project for deepwater species including orange roughy.
The current annual operational plan for deepwater research for 2015-16 has no directed orange roughy research in the areas proposed.

The operational plan proposed for 2016-17 has one project for orange roughy - North West and East-South Acoustic Survey. At this stage we do not know whether this will occur in the winter of this year.

On this basis a score of 80 or 90 cannot be justified.

PI 3.2.5 There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives

There is effective and timely review of the fishery-specific management system

There is no guarantee the observer coverage will be 20% coverage. Priorities are wider than those for research and management and can within years change priorities.

The targeted observer coverage was not met on the Chatham Rise or in the Challenger fishery with only 30% of the target being achieved in the Challenger fishery.

There were no otoliths collected in 2014-15 in the NW Chatham Rise.

It is unclear the status of the Deepwater Management Plan and research priorities.

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1.0 Introduction

The Environment and Conservation Organisations of NZ (ECO) is the national alliance of 5**0** organisations with a concern for the environment. ECO has been involved in issues of resource and marine management, biosecurity, biodiversity protection, toxics and environmental administration since its formation in 1972.

This submission has been prepared by members of ECO Executive and is in line with ECO Policy that was developed in consultation with ECO member bodies and endorsed by our AGM.

ECO has been concerned at the management of orange roughy fisheries for over 30 years and has engaged with and made submissions on catch limits and the management arrangements on deepwater fisheries over this time.

2.0 General Comments

ECO does not consider that that orange roughy unit of certification (North-West Chatham Rise, East and South Chatham Rise and Challenger fisheries) meets the criteria for certification. ECO considers the application of criteria all UOC would have to be rejected.

ECO representative participated in the site visit undertaken by MRAG on 31 July 2014. ECO notes that at this stage the unit of certification (UOC) was uncertain so it was unclear which fisheries were involved. Apologies were given for Duncan Currie from Deep Sea Conservation Coalition at that meeting. Without knowing the unit of certification it is difficult for any

We would note that:

- This certification is being undertaken using MSC certification requirements v1.3, not the latest criteria v2.0.
- That there was nearly 18 month gaps between the site visit and the publication of the Draft Report. Under Ver 2.0 if a "9 month pause between site visit and PCDR publication; in which case FCR v2.0 (process and standard) shall be applied" (p137, Ver2.0). So why was version 2.0 not applied?

ECO objected to the peer reviewers as we considered they were missing key expertise in benthic and ecosystem impacts which is a critical issue in the consideration of MSC certification. While this submission was late due to family bereavement we are concerned at the inflexibility of MRAG and the MSC process.

2.1 Issues in Certification

ECO supports the comments made by WWF in its letter of 30 July 2014. This includes:

- Data deficiencies on orange roughy biology and research;
- Target reference point being not precautionary or best practice;
- Limit reference point is not best practice or considered significant sources of uncertainty;
- Stock depletion and rebuild strategy is not consistent with the MSC standard;
- Significant uncertainties with orange roughy recruitment and stock structure;
- Harvest control rules - which ECO emphasises is a voluntary mechanism which has no hard standards and has been applied to allow continued fishing rather than closing a fishery eg black cardinal fish.

A key element of the MSC standard is the application of the precautionary approach. New Zealand has no explicitly precautionary approach in law. Efforts by Ministers to introduce a precautionary approach has been rejected by Ministers.

Efforts to cut orange roughy catch limits in past years to prevent a hard land have been rebuffed by the fishing industry. Wallace and Weeber (2005) documents the history of decisions on deepwater fisheries including orange roughy.

3.0 MRAG Appendix 1 Scoring and Rationales

Below is a commentary on the MRAG scoring of the orange roughy units of certification – North-West Chatham Rise, East and South Chatham Rise and Challenger fisheries.

3.1 Appendix 1.1 Performance Indicator Scores and Rationale

Principle 1: Target Species

PI 1.1.1	**The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing**
OVERALL PERFORMANCE INDICATOR SCORE:	ORH3B NWCR 90 ORH3B ESCR 70 ORH7A 90
CONDITION NUMBER (if relevant):	**ORH3B ESCR 1**

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 70 or 90 score respectively.

There are a number of uncertainties with the current stock assessments for that UOC:.

ORH3B - NW Chatham Rise

- An assessment in 2014 estimated to have increased to 37%Bo and the biomass was very likely to be at or above the target (30%);
- B2014 is very unlikely to be below B20%.
- At the current catch (110t) or the current voluntary catch limit (750t) it is very unlikely the biomass will decline below B20%.
- The biomass is expected to increase or stay steady over the next 5 years with annual catches of up to 1400t.
- Uncertainties in this assessment include how much of the spawning biomass the acoustic assessment covers, patterns in year class strength, and that the time series of abundance is short.
- There is a voluntary catch limit of 750 tonnes for this area within a total catch limit of 4500 tonnes.

ORH 3B – E and S Chatham Rise

- An assessment in 2014 estimated to have increased to 30%Bo and about as likely as not to be at or above the lower end of the management target range (30%);
- B2014 was unlikely to be below B20% but very unlikely to below B10%.

- "Overfishing is very unlikely to be occurring".
- Uncertainties in this assessment include how much of spawning biomass the acoustic survey covers, whether a spawning plume ("Rekohu") is new or longstanding, and patterns in year class strength as only 2 years of age composition data was used.
- The "old" spawning plume had the lowest estimated biomass in 2013 which was only 25% of the 2002 acoustic estimate, at which stage the stock was already well below 30%Bo.
- Alternative model assumptions (including lower value of M (0.036) estimated in the model) produced a range in biomass from 19 to 32% (95%CI) for B2014.
- On most of the South Rise and east features catch rates have tended to decline rapidly and then flatten out with little recovery. The fishery on the South Rise moved east over time "which was described as a serial depletion of orange roughy from the hills" (Clark 1997, MPI 2015). "The non-spawning fishery has therefore largely contracted to the hill complexes in the southeast corner of the Rise.." (MPI 2015). There has also been a "spatial contraction of the fishery during the spawning period" (MPI 2015).
- There is a voluntary catch limit of 3100 tonnes for this area within a total catch limit of 4500 tonnes.

ORH7A

- This fishery was closed in 2000 when the stock was estimated to have been reduced to 3%Bo (1-6%, 95%CI).
- An assessment in 2014 estimated that the biomass had increased to 42%Bo and was very likely to be at or above the target (30%);
- B2014 was very unlikely to be below B20%.
- "Overfishing is very unlikely to be occurring".
- Uncertainties in this assessment include how much of spawning biomass the acoustic and trawl survey covers and patterns in year class strength.
- Age frequency of the fishery in 2009 was much younger than in 1988 with mean ages of 33 years (2009) and 53 years (1987). The age range from otoliths were 18-90 years (2009) and 26-145 years (1987). The spawning population in 2009 "consisted mainly of relatively young recruits (mean age of maturity is estimated at 23 years) most of which would not have been present prior to 2000." (MPI 2012).
- While the assessment model shows increasing biomass, the acoustic and trawl surveys have been declining since 2009 – the 2013 survey was 54% of the 2009 result.
- This area was opened to fishing in 2010 with a catch limit of 500 tonnes.

Overall: Orange roughy fishery have a history of over-optimistic assessments and predicted recovery which never takes places. The assessment for ORH7A and E&Sth Chatham Rise have similar issues – with the main historic index declining while the stock assessment suggests the stock is increasing.

For these reasons we have downweighted the scores.

Revised Score:

- **ORH7A 70**
- **ESCR 60**
- **NWCR 80**

PI 1.1.2	Limit and target reference points are appropriate for the stock
OVERALL PERFORMANCE INDICATOR SCORE:	ORH3B NWCR 80 ORH3B ESCR 80 ORH7A 80
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 80 score.

We agree with the critique of the limit and target reference point made by WWF. We would not that CCAMLR has one example of best practice target reference points of 50%Bo for predator species and 75%Bo for prey species.

The current New Zealand reference points are not precautionary and they are not applied for either soft or hard limits. Given the uncertainty about orange roughy recruitment it is not possible to determine whether the limit reference point is appropriate,

For these reason we consider a score close to 60 is more appropriate.

Revised Score:
All Stocks
- **ORH7A 65**
- **ESCR 65**
- **NWCR 65**

PI 1.1.3	Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe
OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 90 score.

New Zealand does not have a clear rebuilding strategy applied to orange roughy. Peer reviewer 1 raised issues over the rebuild strategy. ECO supports WWF and reviewer 1 concern over the rebuild strategy.

For these reason we consider a score close to 60 is more appropriate.

Revised Score:
All Stocks 60
- **ORH7A**

- **ESCR**
- **NWCR**

PI 1.2.1	There is a robust and precautionary harvest strategy in place
OVERALL PERFORMANCE INDICATOR SCORE:	ORH3B NWCR 85 ORH3B ESCR 85 ORH7A 85
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 85 score.

There is neither a robust nor precautionary harvest strategy in place. The precautionary principle is not clear in the Fisheries Act.

Given the history of over-optimistic orange roughy assessment caused by the limited period orange roughy have been fished and researched compared to their long life history it is essential that any MSE consider a wide set of uncertainties. The effect of climate change on a long lived species like orange roughy is not known.

For these reason we consider a score close to 60 is more appropriate.

Revised Score:
All Stocks 65

PI 1.2.2	There are well defined and effective harvest control rules in place
OVERALL PERFORMANCE INDICATOR SCORE:	ORH3B NWCR 90 ORH3B ESCR 90 ORH7A 90
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 90 score.

There is neither a robust nor precautionary harvest control rules in place. The precautionary principle is not clear in the Fisheries Act. Harvest control rules are a voluntary mechanism and not a legal requirement.

Given the history of over-optimistic orange roughy assessment caused by the limited period orange roughy have been fished and researched compared to their long life history it is essential

that any MSE consider a wide set of uncertainties. The effect of climate change on a long lived species like orange roughy is not known.

The uncertainty over orange roughy recruitment must be considered as part of any MSE approach.

For these reason we consider a score close to 60 is more appropriate.

Revised Score:
All Stocks 65

PI 1.2.3	**Relevant information is collected to support the harvest strategy**
OVERALL PERFORMANCE INDICATOR SCORE:	ORH3B NWCR 90 ORH3B ESCR 90 ORH7A 90
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 90 score.

Peer reviewer 1 questioned whether the scoring could be justified.

A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
"Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues."

Only with observers on board is there sufficient information to assess by-catch rates. Reporting of non-quota management species and non-target fish species (eg corals) relies on reporting from observers.

There is no guarantee the observer coverage will be 20% coverage. MPI priorities are wider than research priorities, and include enforcement and labour standards, and can priorities can change between and within years.

The level of observer coverage is patchy in the deepwater trawl fishery (orange roughy, oreos and cardinal fish) with an average of 11% of tows observed in 2012-13. In the orange roughy target fishery 11.6% of tow were observed in 2012-13 and 13.1% in 2013-14 but observer vessel days where only half the level required for collection of representative biological information and samples (eg otoliths for ageing and length frequency) to manage the fishery and its impacts (MPI 2015b).

There is currently no long-term planning for research and management. The 10 year research plan has ended, there is currently no replacement, and the deepwater management plan ends in June and it is unclear whether it will be replaced.

For these reason we consider a score close to 60 is more appropriate.

Revised Score:
All Stocks 65

PI 1.2.4	There is an adequate assessment of the stock status
OVERALL PERFORMANCE INDICATOR SCORE:	ORH3B NWCR 90 ORH3B ESCR 90 ORH7A 90
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 90 score.

Given the history of over-optimistic orange roughy assessment caused by the limited period orange roughy have been fished and researched compared to their long life history it is essential that any MSE consider a wide set of uncertainties. The effect of climate change on a long lived species like orange roughy is not known.

The uncertainty over orange roughy recruitment must be considered as part of any stock assessment.

Like any stock assessment working group it is only as good as the participants that can attend. The trend over time in working grojup has been to less diverse membership and thus smaller review. This is a problem with the robustness of any assessment. For NGOs it is difficult for us to attend meny meetings over the year.

A wider peer review of all the assessment would be a positive step forward.

For these reason we consider a score close to 60 is more appropriate.

Revised Score:
All Stocks 60

Principle 2: Ecosystem

Evaluation Table for PI 2.1.1

PI 2.1.1	The fishery does not pose a risk of serious or irreversible harm to the retained species or species groups and does not hinder recovery of depleted retained species or species groups
OVERALL PERFORMANCE INDICATOR SCORE:	ORH3B NWCR – 95 ORH3B ESCR – 80 ORH7A – 80

CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 80 or 95 score respectively.

Smooth oreos assessment (OEO4) in this commentary for the Chatham Rise UOCs indicates it is trending downwards, it is below the target Biomass (B40%), "exploitation rates have steadily increased, and stocks is predicted to decline below 20%Bo by 2018.

Anderson (2011) also notes in his review a problem with spatial coverage of observed effort that should be considered.

This information indicates that there clearly are conservation concerns which should be considered and that they are closer to 60 than 80.

Revised Score:
All Stocks
- **ORH7A 95**
- **ESCR 65**
- **NWCR 65**

Evaluation Table for PI 2.1.2

PI 2.1.2	There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species	
OVERALL PERFORMANCE INDICATOR SCORE:		95
CONDITION NUMBER (if relevant):		

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 95 score.

A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

There is no fishery species chapter for oreos in the Deepwater Management Plan. This chapter would be essential for considering the management of smooth oreo bycatch in the orange roughy fishery.

Smooth oreos assessment (OEO4) in this commentary for the Chatham Rise UOCs indicates it is trending downwards, it is below the target Biomass (B40%), "exploitation rates have steadily increased, and stocks is predicted to decline below 20%Bo by 2018.

The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.

The sustainability of deepwater sharks caught in the orange roughy fishery has been highlighted by the need for a risk assessment of all shark species. The level 1 risk assessment (Ford et al 2015) has listed four of the top five species as being caught in orange roughy fisheries including Baxter's dogfish and seal shark.

Given these concerns an assessment closer to 60 would be more appropriate.

Revised Score:
All Stocks 65

PI 2.1.3	**Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species**
OVERALL PERFORMANCE INDICATOR SCORE:	**85**
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 85 score.

A key element in justification is the information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

There is no fishery species chapter for oreos in the Deepwater Management Plan. This chapter would be essential for considering the management of smooth oreo bycatch in the orange roughy fishery.

Smooth oreos assessment (OEO4) is trending downwards, it is below the target Biomass (B40%), "exploitation rates have steadily increased", and stocks is predicted to decline below 20%Bo by 2018.

The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.

The sustainability of deepwater sharks caught in the orange roughy fishery has been highlighted by the need for a risk assessment of all shark species. The level 1 risk assessment (Ford et al 2015) has listed four of the top five species as being caught in orange roughy fisheries including Baxter's dogfish and seal shark.

Given these concerns an assessment closer to 60 would be more appropriate.

Revised Score:
All Stocks 65

PI 2.2.1	The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups
OVERALL PERFORMANCE INDICATOR SCORE:	**ORH3B NWCR, ORH3B ESCR, ORH7A – 80**
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 80 score.

The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.

The sustainability of deepwater sharks caught in the orange roughy fishery has been highlighted by the need for a risk assessment of all shark species. The level 1 risk assessment (Ford et al 2015) has listed four of the top five species as being caught in orange roughy fisheries including Baxter's dogfish and seal shark.

Given the risk assessment it is very doubtful that the claim in the report of "within biologically" based limits can be justified. Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.

Revised Score:
All Stocks 65

Evaluation Table for PI 2.2.2

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
OVERALL PERFORMANCE INDICATOR SCORE:	**ORH3B NWCR, ORH3B ESCR, ORH7A – 85**
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 85 score.

A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

Moving a non-QMS species to the QMS may increase the risk to the species given the incentives in the New Zealand cost recovery regime for research and management.

The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.

The sustainability of deepwater sharks caught in the orange roughy fishery has been highlighted by the need for a risk assessment of all shark species. The level 1 risk assessment (Ford et al 2015) has listed four of the top five species as being caught in orange roughy fisheries including Baxter's dogfish and seal shark.

Given the risk assessment it is very doubtful that the claim in the report of "within biologically" based limits can be justified. Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.

Revised Score:
All Stocks 65

PI 2.2.3	**Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch**
OVERALL PERFORMANCE INDICATOR SCORE:	**ORH3B NWCR, ORH3B ESCR, ORH7A – 80**
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 80 score.

A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

Orange roughy are caught using bottom trawls and between 1588 and 5001 tows were undertaken annually targeting roughy between 2003-04 and 2012-13.

Anderson (2011) summarised the bycatch of orange roughy and oreo trawl fisheries from 1990–91 to 2008–09." In trawls "since 2005–06, orange roughy accounted for about 84% of the total observed catch and the remainder comprised mainly oreos (10%), hoki (0.4%), and cardinalfish (0.3%)."

"Rattails (various species, 0.8%) and shovelnose spiny dogfish (Deania calcea, 0.6%) were the species most adversely affected by this fishery, with over 90% discarded. Other fish species frequently caught and usually discarded included deepwater dogfishes (family Squalidae), especially Etmopterus species, the most common was probably Baxter's dogfish (Etmoptertus baxteri), slickheads, and morid cods, especially Johnson's cod (Halargyreus johnsonii) and ribaldo. In total, over 250 bycatch species or species groups were observed, most were noncommercial species, including invertebrate species, caught in low numbers. Squid (mostly warty squid, Onykia spp.) were the largest component of invertebrate catch, followed by

various groups of coral, echinoderms (mainly starfish), and crustaceans (mainly king crabs, family Lithodidae)" (MPI 2014)

"Total annual bycatch in the orange roughy fishery has been as high as 27 000 t but has declined with the TACC and was less than 4000 t between 2005–06 and 2008–09 (non-commercial species comprising only 5–10% of the total). Total annual discards also decreased over time, from about 3400 t in 1990 –91 to about 300 t in 2007–08 and, since about 2000, has been almost entirely of non-QMS species (rattails, shovelnose spiny dogfish, and other deepwater dogfishes)."

It is unknown whether the bycatch and discards are sustainable in this fishery. Some of the species discarded are relatively long lived (eg rattails) or have low resilence and high vulnerability to fishing.

The impact of bottom trawling on corals is likely to be significant with high sensitivity to trawling and long recovery times in the order of decades if not centuries.

"Tracey et al (2011) analysed the distribution of nine groups of protected corals based on bycatch records from observed trawl effort from 2007–08 to 2009–10, primarily from 800–1000 m depth. For the orange roughy target fishery, about 10% of observed tows in FMAs 4 and 6 included coral bycatch, but a higher proportion of tows in northern waters included coral (28% in FMA 1, 53% in FMA 9)." (MPI 2014)

Tracey et al (2012) noted in a study of a seamount complex on the North Chatham Rise which had been targeted for orange roughy – "The study showed that fish assemblages on seamounts can vary over very small spatial scales, in the order of several km. However, patterns of species similarity and abundance were inconsistent across the seamounts examined, and these results add to a growing literature suggesting that faunal communities on seamounts may be populated from a broad regional species pool, yet show considerable variation on individual seamounts."

The impacts of trawling on seamounts and the potential recovery time of the diversity that is there could take centuries to recovery from just one trawl. As Clark et al (2015) observed: "many deep-sea invertebrates are exceptionally long-lived and grow extremely slowly: these biological attributes mean that the recovery capacity of the benthos is highly limited and prolonged, predicted to take decades to centuries after fishing has ceased." Protected deep sea corals are amongst those long-lived invertebrates. (Tracey et al 2003).

Reporting of non-quota management species and non-target fish species (eg corals) relies on reporting from observers. Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.

Revised Score:
All Stocks 65

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

OVERALL PERFORMANCE INDICATOR SCORE:	**ORH3B ESCR-75** **ORH3B NWCR-75** **ORH7A-95**
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 75 or 95 score.

A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

Orange roughy are caught using bottom trawls and between 1588 and 5001 tows were undertaken annually targeting roughy between 2003-04 and 2012-13. Much of this fishing effort is on seamounts, hills and other features. . (Black et al 2013). Of these 94% were tows between 700 and 1200m.

The orange roughy fishery captures fur seals and albatross and petrels.

- Average rate of capture of fur seals is 0.06 per 100 tows (excluding cryptic mortality) between 2002-03 and 2012-13 (up to 9 per year) which is "very low compared with NZ other trawl fisheries";
- Average rate of capture of seabirds is 0.48 per 100 tows (excluding cryptic mortality) between 2002-03 and 2012-13 (up to 77 per year) which is a "very low rate relative to other trawl fisheries".

Salvin's albatross was the most frequently caught albatross (46%) while sooty shearwater was the most frequently caught petrel. Fisheries on the Chatham Rise had the highest reported captures.

The measures applied to date to reduce seabird captures in trawl fisheries have not affected the bycatch rate in fishery in the last 10 years.

There are specific threats to species from trawl bycatch. The Salvin's albatross, a vulnerable threatened species (Birdlife 2012), has the highest risk from fishing rating of all seabirds assessed in New Zealand (Richards 2013). For this species "captures rates have fluctuated without trend or increased in all fisheries taking substantial numbers of this species between 2002–03 and 2012-13, especially after 2006–07." Trawl fisheries "account for 75% of all estimated captures of Salvin's albatross in these years." About 25% of the impacts in the combined middle-depth fishery.

"Salvin's (vulnerable threatened species), southern Buller's (at risk – nationally uncommon), and NZ white-capped (at risk declining) albatrosses make up 39%, 28%, and 25% of the albatrosses captured, Respectively." For all three species the annual potential fatalities (APF) (including cryptic mortality) exceed the estimate of potential biological removals (PBR), assuming an inappropriate recovery factor (f) of 1 (MPI 2014). Dillingham and Fletcher (2011) noted: "A value of f = 0.1 is suggested for threatened species, f = 0.3 for near-threatened

species, and f = 0.5 for all other species due to the potential for bias in population estimates (Wade, 1998; Dillingham and Fletcher, 2008)." For Salvin's, a vulnerable threatened species, the estimated potential fatalities (APF) was 35 times the PBR, with f= 0.1 for a threatened species. Orange roughy trawl fishery is part of this assessed impact.

The National Plan of Action on Seabirds for New Zealand (2013) has goals to reduce by-catch but no new measures are in place and no new measures have been applied to reduce bycatch.

Other issues relevant to this criterion include:

- Management has not defined significant habitats.
- No bioregions have been determined in the main trawling areas in follow-up research.
- Fishery catches many protected coral habitats, and land mainly Scleractinia, with some gorgonians and hydrocorals also landed.
- Significant gaps in knowledge for habitat.

Rice (2006) reviews the impacts of trawling. The *"conclusions about the effects on habitats of mobile bottom fishing gears were that they:*

- *can damage or reduce structural biota (All reviews, strong evidence or support).*
- *can damage or reduce habitat complexity (All reviews, variable evidence or support).*
- *can reduce or remove major habitat features such as boulders (Some reviews, strong evidence or support).*
- *can alter seafloor structure (Some reviews, conflicting evidence for benefits or harm)." (MPI 2014)*

"The trawl fisheries for orange roughy, oreos, and cardinalfish take place to a large extent on seamounts or other features (Clark & O'Driscoll 2003, O'Driscoll & Clark 2005). These features are often geographically small and, in common with other, localised habitats like vents, seeps, and sponge beds, do not appear on broad-scale habitat maps (e.g., at EEZ scale) and cannot realistically be predicted by broadscale environmental classifications." (MPI 2014).

Most of orange roughy catch comes from seamounts (including hills and ridges). O'Driscoll and Clark (2003) reported that 59.5% of effort and 62.4% of catch targeted on orange roughy comes from seamounts.

The impact of bottom trawling on corals is likely to be significant with high sensitivity to trawling and long recovery times in the order of decades if not centuries.

A large number of researchers have noted a high degree of endemism associated with seamounts. De Forges et al (2000) noted that:

> *"Seamounts comprise a unique deep-sea environment, characterized by substantially enhanced currents and a fauna that is dominated by suspension feeders, such as corals."*
> *"Low species overlap between seamounts in different portions of the region indicates that the seamounts in clusters or along ridge systems function as 'island groups' or 'chains,' leading to highly localized species distributions and apparent speciation between groups or ridge systems that is exceptional for the deep sea. These results have substantial implications for the conservation of this fauna, which is threatened by fishing activity."*

This endemism is likely to mean that the classification system devised by Rowden et al (2005) will under-estimate the biodiversity on seamounts. For example, fish species diversity on some seamounts has also been reviewed by NIWA scientists (Tracey et al 2004). Tracey et al (2004) found there was clearly different fish fauna on seamounts north and south of 41^{o}S and that in 10 seamount complexes there was different species richness. Even within a seamount complex they found different species dominating different seamounts.

"Tracey et al (2011) analysed the distribution of nine groups of protected corals based on bycatch records from observed trawl effort from 2007–08 to 2009–10, primarily from 800–1000 m depth. For the orange roughy target fishery, about 10% of observed tows in FMAs 4 and 6 included coral bycatch, but a higher proportion of tows in northern waters included coral (28% in FMA 1, 53% in FMA 9)." (MPI 2014)

Tracey et al (2012) noted in a study of a seamount complex on the North Chatham Rise which had been targeted for orange roughy – "The study showed that fish assemblages on seamounts can vary over very small spatial scales, in the order of several km. However, patterns of species similarity and abundance were inconsistent across the seamounts examined, and these results add to a growing literature suggesting that faunal communities on seamounts may be populated from a broad regional species pool, yet show considerable variation on individual seamounts."

The impacts of trawling on seamounts and the potential recovery time of the diversity that is there could take centuries to recovery from just one trawl. As Clark et al (2015) observed: "many deep-sea invertebrates are exceptionally long-lived and grow extremely slowly: these biological attributes mean that the recovery capacity of the benthos is highly limited and prolonged, predicted to take decades to centuries after fishing has ceased."

Protected deep sea corals are amongst those long-lived invertebrates. (Tracey et al 2003). Corals collections from trawl nets have been aged at 300-500 years old for bubblegum coral (*Paragorgia arborea*), at least 300-500 years for bamboo corals (*Keratoisis sp.*) and deep-sea stony corals have reported ages of 50 to 640 years (*Enallopsammia rostrata*).

The sustainability of deepwater sharks caught in the orange roughy fishery has been highlighted by the need for a risk assessment of all shark species. The level 1 risk assessment (Ford et al 2015) has listed four of the top five species as being caught in orange roughy fisheries including Baxter's dogfish and seal shark.

Given the risk assessment it is very doubtful that the claim in the report of "within biologically" based limits can be justified. Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.

Revised Score:
All Stocks 65

Evaluation Table for PI 2.3.2

PI 2.3.2	**The fishery has in place precautionary management strategies designed to:** • **Meet national and international requirements;** • **Ensure the fishery does not pose a risk of serious harm to ETP species;** • **Ensure the fishery does not hinder recovery of ETP species; and** • **Minimise mortality of ETP species.**
OVERALL PERFORMANCE INDICATOR SCORE:	**70**
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 70 score.

A key element in information collection is the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.

There is no population management plan for protected species and the provisions of the Wildlife Act and the Marine Mammals Protection Act have been found impossible to implement to limit the impact on ETP species.

There is no strategy apart from research for most ETP species. The exceptions are the National Plan of Action on Sharks and Seabirds but these have yet to be fully implemented. There is no strategy for marine mammals capture or benthic species including corals.

The BPA is not a strategy to protect corals rather it is a strategy to avoid protecting corals as they were establish in areas where little or no fishing was taking place and most was much deeper than trawling depths.

For these reason the assessment should be closed to 60.

Revised Score:
All Stocks 65

PI 2.3.3	**Relevant information is collected to support the management of fishery impacts on ETP species, including:** • **Information for the development of the management strategy;** • **Information to assess the effectiveness of the management strategy; and** • **Information to determine the outcome status of ETP species.**
OVERALL PERFORMANCE INDICATOR SCORE:	**80-ORH7A** **75-ESCR, NWCR**
CONDITION NUMBER (if relevant):	**3**

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 70 score.

A key element in information collection is the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.

There is no population management plan for protected species and the provisions of the Wildlife Act and the Marine Mammals Protection Act have been found impossible to implement to limit the impact on ETP species.

There is no strategy apart from research for most ETP species. The exceptions are the National Plan of Action on Sharks and Seabirds but these have yet to be fully implemented. There is no strategy for marine mammals capture or benthic species including corals.

The BPA is not a strategy to protect corals rather it is a strategy to avoid protecting corals as they were establish in areas where little or no fishing was taking place and most was much deeper than trawling depths.

For these reason the assessment should be closed to 60.

Revised Score:
All Stocks 65

PI 2.4.1	**The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function**
OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	**N/A**

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 70 score.

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 70 score.

A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

The impact of bottom trawling on corals is likely to be significant with high sensitivity to trawling and long recovery times in the order of decades if not centuries.

"Tracey et al (2011) analysed the distribution of nine groups of protected corals based on bycatch records from observed trawl effort from 2007–08 to 2009–10, primarily from 800–1000 m depth. For the orange roughy target fishery, about 10% of observed tows in FMAs 4 and 6 included coral bycatch" (MPI 2014)

Tracey et al (2012) noted in a study of a seamount complex on the North Chatham Rise which had been targeted for orange roughy – "The study showed that fish assemblages on seamounts can vary over very small spatial scales, in the order of several km. However, patterns of species similarity and abundance were inconsistent across the seamounts examined, and these results add to a growing literature suggesting that faunal communities on seamounts may be populated from a broad regional species pool, yet show considerable variation on individual seamounts."

The impacts of trawling on seamounts and the potential recovery time of the diversity that is there could take centuries to recovery from just one trawl. As Clark et al (2015) observed: "many deep-sea invertebrates are exceptionally long-lived and grow extremely slowly: these biological attributes mean that the recovery capacity of the benthos is highly limited and prolonged, predicted to take decades to centuries after fishing has ceased." Protected deep sea corals are amongst those long-lived invertebrates. (Tracey et al 2003).

Reporting of non-quota management species and non-target fish species (eg corals) relies on reporting from observers. Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.

Revised Score:
All Stocks 60

Evaluation Table for PI 2.4.2

PI 2.4.2	There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types	
OVERALL PERFORMANCE INDICATOR SCORE:		**85**
CONDITION NUMBER (if relevant):		

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 70 score.

A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

The impact of bottom trawling on corals is likely to be significant with high sensitivity to trawling and long recovery times in the order of decades if not centuries.

There is no strategy in place to deal with the impact of trawling on corals and other sensitive species.

The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.

There is no population management plan for protected species and the provisions of the Wildlife Act and the Marine Mammals Protection Act have been found impossible to implement to limit the impact on ETP species. There is no strategy apart from research for most ETP species.

The BPA is not a strategy to protect corals rather it is a strategy to avoid protecting corals as they were establish in areas where little or no fishing was taking place and most was much deeper than trawling depths.

Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.

Revised Score:
All Stocks 60

PI 2.4.3	Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types
OVERALL PERFORMANCE INDICATOR SCORE:	**95**
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 70 score.

A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

The impact of bottom trawling on corals is likely to be significant with high sensitivity to trawling and long recovery times in the order of decades if not centuries.

There is no strategy in place to deal with the impact of trawling on corals and other sensitive species.

The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.

There is no population management plan for protected species and the provisions of the Wildlife Act and the Marine Mammals Protection Act have been found impossible to implement to limit the impact on ETP species. There is no strategy apart from research for most ETP species.

The BPA is not a strategy to protect corals rather it is a strategy to avoid protecting corals as they were establish in areas where little or no fishing was taking place and most was much deeper than trawling depths.

There is not sufficient information on habitats, variation in coral diversity between features, and the data collection coverage is patchy.

Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.

Revised Score:
All Stocks 60

PI 2.5.1	The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function	
OVERALL PERFORMANCE INDICATOR SCORE:		**100**
CONDITION NUMBER (if relevant):		

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 100 score.

Given the known impacts of trawling on coral and other sensitive benthic species and the inadequate information on habitats, variation in coral diversity between features, and that data collection coverage is patchy, it is likely that the fishery is causing serious and irreversible harm to ecosystem structure and function (see earlier comments on Principle 2).

Given the uncertainty and taking a precautionary approach an assessment under 60 would be more appropriate.

Revised Score:
All Stocks Less than 60

PI 2.5.2	There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function	
OVERALL PERFORMANCE INDICATOR SCORE:		**90**
CONDITION NUMBER (if relevant):		

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 90 score.

A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

There is no population management plan for protected species and the provisions of the Wildlife Act and the Marine Mammals Protection Act have been found impossible to implement to limit the impact on ETP species. There is no strategy apart from research for most ETP species.

The BPA is not a strategy to protect corals rather it is a strategy to avoid protecting corals as they were establish in areas where little or no fishing was taking place and most was much deeper than trawling depths.

There is not sufficient information on habitats, variation in coral diversity between features, and the data collection coverage is patchy.

Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.

Revised Score:
All Stocks 60

Evaluation Table for PI 2.5.3

PI 2.5.3	There is adequate knowledge of the impacts of the fishery on the ecosystem	
OVERALL PERFORMANCE INDICATOR SCORE:		**85**
CONDITION NUMBER (if relevant):		

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 85 score.

There is no population management plan for protected species and the provisions of the Wildlife Act and the Marine Mammals Protection Act have been found impossible to implement to limit the impact on ETP species. There is no strategy apart from research for most ETP species.

The BPA is not a strategy to protect corals rather it is a strategy to avoid protecting corals as they were establish in areas where little or no fishing was taking place and most was much deeper than trawling depths.

There is not sufficient information on habitats, variation in coral diversity between features, and the data collection coverage is patchy.

Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.

Revised Score:
All Stocks 60

Principle 3: Management System

Evaluation Table for PI 3.1.1

PI 3.1.1	**The management system exists within an appropriate legal and/or customary framework which ensures that it:** • **Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and** • **Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and** • **Incorporates an appropriate dispute resolution framework.**	
OVERALL PERFORMANCE INDICATOR SCORE:		**100**

CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 100 score. MRAG should not just base this information on that produced by Intertek in other MSC Certifications.

The commentary focuses on the relationship between the Ministry of Primary Industry or the Minister and the Commercial Sector and does not consider other interests in fisheries apart from customary fishing interests. The commentary does not consider the role of the Department of Conservation or the Minister of Conservation.

There is no explicit precautionary approach in the Fisheries Act. Proposals by Ministers to improve the Fisheries Act to make it clear that section 10 is precautionary approach were rejected by the fishing industry.

The current Deepwater Management Plan ends at the end of June and currently it is unclear whether there will be a replacement plan. Despite commitments on consultation on reviewing and consultation on these plans at the beginning on 2015 there has been no consultation. We were advised at the end of 2015 that the Ministry was reconsidering the role of management plans.

The Annual Operational Plan process is difficult to influence as it is decided by the industry and the Ministry prior to discussions with other interests.

There is no clear dispute resolution framework as the operational plan provisions, the allocation of catches between areas, and the Fisheries 2030 framework are all voluntary and have no statutory base.

The Westpac Bank is outside the NZ EEZ and is subject to the requirements of SPRFMO. There regime that applies is an interim regime only and does not meet the requirements of UNGA resolutions.

Revised Score:
- **ORH7A 60**
- **ESCR 70**
- **NWCR 70**

Evaluation Table for PI 3.1.2

PI 3.1.2	**The management system has effective consultation processes that are open to interested and affected parties.** **The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties**
OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant

issues would mean the UOC would not meet a 100 score.

MRAG should not just base this information on that produced by Intertek in other MSC Certifications.

The commentary focuses on the relationship between the Ministry of Primary Industry or the Minister and the Commercial Sector and does not consider other interests in fisheries apart from customary fishing interests.

The consultation system does not meet the requirement for 100. There is no consultation of all parties in the process. The MOU between the fishing industry and the Ministry of Primary Industry means that there is exclusion of both science and environmental interest from consultation process.

The Ministry has ignored alternative suggestions for catch limits or approaches and only considered the approaches they or the industry have put forward.

The consultation on future research is very patchy. There is currently no research plan and the current cost recovery regime means that final consultation and the scope of the project that consultation only occurs with the fishing industry.

The Ministry is undertaking a review of the cost recovery regime but we have not been consulted on that process.

MPI's predecessor MAF consulted on a binding standard for consultation and participation but withdrew if after submissions closed.

Revised Score:
All Stocks 90

Evaluation Table for PI 3.1.3

PI 3.1.3	**The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach**
OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 100 score.

MRAG should not just base this information on that produced by Intertek in other MSC Certifications.

The current Deepwater Management Plan ends at the end of June and currently it is unclear whether there will be a replacement plan. Despite commitments on consultation on reviewing and consultation on these plans at the beginning on 2015 there has been no consultation. We were advised at the end of 2015 that the Ministry was reconsidering the role of management plans.

The Annual Operational Plan process is difficult to influence as it is decided by the industry and the Ministry prior to discussions with other interests.

In ORH7A, the Westpac Bank is outside the NZ EEZ and is subject to the requirements of SPRFMO. There regime that applies is an interim regime only and does not currently meet the requirements of UNGA resolutions. There is still no strategy to protect vulnerable marine ecosystems or VMEs.

Revised Score:
- **ORH7A 60**
- **ESCR 70**
- **NWCR 70**

PI 3.1.4	**The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing**
OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 90 score.

MRAG should not just base this information on that produced by Intertek in other MSC Certifications.

The perverse incentives in the system have arisen from the separation of catching entitlements from quota, and the operations where quota manager place incentives on crew to pay deem values. This places an incentive to dump non-quota species or dump low value fish. Only if there is an observer onboard is this incentive reduced.

The reporting rate for marine mammal, seabirds and other protected species is lower on non-observed compared to observed vessels.

Revised Score:
All Stocks 80

PI 3.2.1	**The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2**
OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 100 score.

MRAG should not just base this information on that produced by Intertek in other MSC Certifications.

The current Deepwater Management Plan ends at the end of June and currently it is unclear whether there will be a replacement plan. Despite commitments on consultation on reviewing and consultation on these plans at the beginning on 2015 there has been no consultation. We were advised at the end of 2015 that the Ministry was reconsidering the role of management plans.

The Annual Operational Plan process is difficult to influence as it is decided by the industry and the Ministry prior to discussions with other interests.

In ORH7A, the Westpac Bank is outside the NZ EEZ and is subject to the requirements of SPRFMO. There regime that applies is an interim regime only and does not currently meet the requirements of UNGA resolutions. There is still no strategy to protect vulnerable marine ecosystems or VMEs.

SPRFMO has yet to agree to sustainable catch limit for high seas fisheries.

Revised Score:
All Stocks 80

PI 3.2.2	**The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery under assessment.**
OVERALL PERFORMANCE INDICATOR SCORE:	**95**
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 95 score.

The dispute resolution procedure is a narrow arrangement only applying to disputes between fishers and does not apply to sustainability issues. There is no formal process of appeal from sustainability decisions as occurs under the Resource Management Act.

Many of the issues of concerns to ECO have not been resolved by the decision making process eg bycatch of marine mammals, seabird or other protected species, benthic impacts of bottom trawling etc. There is no strategy or arrangements to consider these issues.

Revised Score:
All Stocks 85

Evaluation Table for PI 3.2.3

PI 3.2.3	**Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with**
OVERALL PERFORMANCE INDICATOR SCORE:	**100**

CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 100 score.

A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

The management of by-catch species and protected species are less well managed than target species with threats from fisheries catching orange roughy. Protected species interactions with fisheries are also managed under the Wildlife Act (seabirds, corals, sharks, and turtles) and the Marine Mammal Protection Act (whales, seals and dolphins) but this has little teeth to control fishing.

The orange roughy fishery has moderate observer coverage which has varied with the most recent year having the lowest level of coverage. Observer coverage can be poor spatially.

While fishers are required to report by-catch of marine mammals and seabirds, as well as quota species, the rate of reporting is low. Only with observers on board is there sufficient information to assess by-catch rates.

Reporting of non-quota management species and non-target fish species (eg corals) relies on reporting from observers.

Revised Score:
All Stocks 90

PI 3.2.4	The fishery has a research plan that addresses the information needs of management
OVERALL PERFORMANCE INDICATOR SCORE:	100
CONDITION NUMBER (if relevant):	

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 100 score.

Firstly the 10 year research plan is ended and is no longer relevant to the research for orange roughy. As we were advised in last year, the proposal for a 5 year extension was considered not to be fundable by the Ministry of Primary Industry (Turner D, Jan 2015). For the last 2 years it has been only ad hoc research projects for deepwater species including orange roughy.

The current annual operational plan for deepwater research for 2015-16 has no directed orange roughy research in the areas proposed.

The operational plan proposed for 2016-17 has one project for orange roughy - North West and

East-South Acoustic Survey. At this stage we do not know whether this will occur in the winter of this year.

On this basis a score of 80 or 90 cannot be justified, and the current arrangements are well below a score of 100..

Revised Score:
All Stocks

- **ORH7A 60**
- **ESCR 65**
- **NWCR 65**

PI 3.2.5	**There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives** **There is effective and timely review of the fishery-specific management system**	
OVERALL PERFORMANCE INDICATOR SCORE:		**70**
CONDITION NUMBER (if relevant): .		

There are a range of issues that MRAG have not considered, and the assumptions made, which requires the indicator score to be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 70 score.

A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

There is no guarantee the observer coverage will be 20% coverage. Priorities are wider than those for research and management and can within years change priorities.

The targeted observer coverage was not met on the Chatham Rise or in the Challenger fishery with only 30% of the target being achieved in the Challenger fishery. There were no otoliths collected in 2014-15 in the NW Chatham Rise.

The Annual Review Report is missing key reporting requirements for these UOC. These include:

- Observer targets and biological reporting targets;
- Benthic impact reporting;
- Not delineating orange roughy from other deepwater species (eg cardinal fish and oreos);
- Not dividing between different orange roughy areas including the three UOCs.

It is unclear the status of the current Deepwater Management Plan and research priorities (see response to 3.2.4).

On this basis a score of 80 or 90 cannot be justified, and the current arrangements are well below a score of 100..

Revised Score:
All Stocks 65

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February 29th, 2016

CONTRIBUTION TO MRAG'S PUBLIC COMMENT DRAFT REPORT FOR THE NEW ZEALAND ORANGE ROUGHY FISHERY

BLOOM is a non-profit organization founded in 2005 that works to preserve the ocean and to increase social benefits in the fishing sector. One of our main topics of action is the protection of the highly vulnerable deep-sea ecosystems, notably against the impacts of bottom trawling. We would hereby like to express our opposition to the conclusions reached by MRAG's Public Comment Draft Report (PCDR)[1] about New Zealand's (NZ) orange roughy (*Hoplostethus atlanticus*) deep-sea bottom-trawl fishery, which recommended that the fishery receive the Marine Stewardship Council (MSC) certification and therefore that the orange roughy fishery be called "sustainable seafood".

We disagree with this certification on at least two grounds:

1. The highly destructive nature of deep-sea bottom trawling and the little social benefits that are associated to its use. We believe that no fishery using bottom-trawls below 600 meters should, anywhere in the world, be considered "sustainable" by any ecolabel;
2. The impact associated with this fishery: habitat destruction (corals, sponges…) and bycatch. Some of these elements have lead to significant improvement requirements according to MRAG's PCDR.

Because of these issues, the NZ orange roughy fishery should not have received approval for certification.

[1] MRAG Americas (2016) Full Assessment, New Zealand Orange Roughy Fisheries. Public Comment Draft Report. Prepared for Deepwater Group Ltd. 294pp. Available at : https://www.msc.org/track-a-fishery/fisheries-in-the-program/in-assessment/pacific/new_zealand_orange_roughy/assessment-downloads-1/20160126_PCDR_ROU462.pdf

IMPACTS OF DEEP-SEA BOTTOM TRAWLS

The deep sea is widely recognized as a low resilience, highly vulnerable environment of which we still known little.[2] Its particular need for protection against human-induced impacts has been acknowledged in various international regulations such as the United Nations' General Assembly resolutions 61/105,[3] 64/72,[4] and 66/68,[5] the Food and Agriculture Organization's international guidelines for the management of deep-sea fisheries in the High Seas,[6] the relevant provisions of Articles 5 and 6 of the 1995 United Nations' Fish Stocks Agreement,[7] and the Council Regulation (EC) No 734/2008.[8] In 2004, over 1,400 marine scientists and conservation biologists signed a statement in favor of protecting the world's deep-sea coral and sponge ecosystems, noting their profound concern that "human activities, particularly bottom trawling, were causing unprecedented damage" to these ecosystems.[9] In 2013, over 300 researchers signed a declaration calling on European policymakers to protect the deep sea from destructive fishing.[10]

Bottom trawling in shallower waters has been considered altogether as the most damaging gear in a US study that polled representatives of several sectors[11] and in the North Sea, the impact of bottom trawling proved to be much greater than several other industrial activities at sea,[12] and its effects on the sea floor have been compared by researchers to the impacts of destructive land-based practices such as intensive agriculture[13] or forest clear-cutting,[14, 15] with the worrying difference that they were occurring "out-of-sight" and thus would need particular

[2] Mengerink, *et al.* (2014) A Call for deep-ocean Stewardship. Science 344: 696-698.
[3] United Nations (2007) Resolution adopted by the General Assembly on 8 December 2006—61/105. Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments. A/RES/61/105—Sixty-first session, United Nations, New York, NY (USA). 21 p.
[4] United Nations (2010) Resolution adopted by the General Assembly on 4 December 2009—64/72. Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments. A/RES/64/72—Sixty-fourth session, United Nations, New York, NY (USA). 26 p.
[5] United Nations (2012) Resolution adopted by the General Assembly on 6 December 2011—66/68. Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments. A/RES/66/68—Sixty-sixth session, United Nations, New York, NY (USA). 30 p.
[6] FAO (2009) International guidelines for the management of deep-sea fisheries in the High Seas Food and Agriculture Organization of the United Nations (FAO), Rome (Italy). xv + 73 p.
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[8] European Union (2008) Council Regulation (EC) No 734/2008 of 15 July 2008 on the protection of vulnerable marine ecosystems in the high seas from the adverse impacts of bottom fishing gears. Official Journal L 201: 8-13.
[9] https://mcbi.marine-conservation.org/what/what_pdfs/dsc_signatures.pdf
[10] http://www.bloomassociation.org/en/declaration-of-support-protect-the-deep-sea-from-destructive-fishing/
[11] Chuenpagdee, *et al.* (2003) Shifting gears: assessing collateral impacts of fishing methods in US waters. Frontiers in Ecology and the Environment 10(1): 517-524.
[12] Human activities analysed included waste disposal, telecommunication cables, the hydrocarbon industry, marine research activities, and bottom trawling. see Benn A, Weaver P, Billet D, van den Hove S, Murdock A, Doneghan G and Le Bas T (2010) Human activities on the deep seafloor in the North East Atlantic: an assessment of spatial extent. PLoS ONE 5(9): 15.
[13] Puig, *et al.* (2012) Ploughing the deep sea floor. Nature 489: 286-290.
[14] Watling and Norse (1998) Disturbance of the seabed by mobile fishing gear: A comparison to forest clearcutting. Conservation Biology 12(6): 1180–1197.

stewardship. With specific regards to deep-sea bottom trawling, about 100 scientific peer-reviewed publications show the negative impacts of deep-sea bottom trawls on species and habitats.[16] It was also estimated that one deep-sea bottom trawl had the same impact as 296 to 1,719 longlines.[17]

We realize that mapping of deep-sea habitats is better now than before; science has been striving to develop population models for deep-sea fishes and some management measures (some whose efficacy is highly questionable) have been put in place by companies and fisheries managers in order to try to curb the ongoing depletion of deep-sea fish populations.[18] However, the fishing technique has not changed and deep-sea bottom trawls still scrape the ocean floor, destroying sensitive habitats and species with large wheels and panels. The fishing nets are still non-selective causing high bycatch of vulnerable and poorly-known fauna and deep-sea fishes are still highly vulnerable to fishing pressure. Calling deep-sea bottom trawling a "sustainable fishery" is therefore completely inappropriate. The precise question of whether deep-sea species could be sustainably fished was addressed during an international scientific workshop in 2010 that BLOOM convened. The workshop's key findings concluded that "*The only way for a deep-sea fishery to be sustainable in an ecosystem context is for it to have a slight ecosystem impact. Bottom trawls are non-discriminatory and do irrevocable damage to the ecosystem, and the workshop participants felt that no bottom trawl fishery could ever adequately satisfy the international objectives of fish stock sustainability and habitat preservation*."

In 2015, during the evaluation process of the French Scapêche deep-sea fishery for blue ling, black scabbardfish and roundnose grenadier, the French non-profit organization BLOOM has already expressed concerns to the certification body MacAlister Elliott and Partners about the confusing message that would be sent to consumers if deep-sea fisheries using bottom trawls were labeled "sustainable". This would affect both the credibility of the MSC as a warrant of sustainable practices and the image of the industry. The signal sent by this certification would mean that the industry would rather choose to invest in marketing and communication rather than committing to convert its fleets to truly virtuous and sustainable fishing practices.

Sustainability is a journey faced with a series of challenges.[19] Having companies pledge "sustainable" practices without having endorsed truly ambitious sustainable standards is counter-productive in creating a general move towards sustainability.

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[15] Rossi (2013) The destruction of the 'animal forests' in the oceans: Towards an over-simplification of the benthic ecosystems. Ocean & Coastal Management 84: 77-85.
[16] See bibliography at: http://bloomassociation.org/download/Bibliographie_sur_les_impacts_des_chaluts_profonds.pdf
[17] Pham C, Diogo H, Menezes G, Porteiro F, Braga-Henriques A, Vandeperre F and Morato T (2014) Deep-water longline fishing has reduced impact on Vulnerable Marine Ecosystems. Scientific Reports 4: 6.
[18] https://www.msc.org/track-a-fishery/fisheries-in-the-program/in-assessment/north-east-atlantic/scapeche-roundnose-grenadier-black-scabbard-fish-and-blue-ling-deep-sea/
[19] Tlusty, *et al.* (2012) Refocusing Seafood Sustainability as a Journey Using the Law of the Minimum. Sustainability 4: 2038-2050.

SUSTAINABILITY AND THE NZ ORANGE ROUGHY FISHERY

Orange roughy is an emblematic deep-sea species: one of the most long-lived, late-maturing marine species that we know of, which has been red-listed in most NGOs' consumption guides.[20] In the EU, quotas for orange roughy have been set to zero since 2010.

In the following pages, we give some comments on the PCDR of the NZ orange roughy fishery published by MRAG in January 2016:

A. <80 scoring performance indicators and associated improvement conditions

General outcome of the assessment

"On the basis of this re-assessment of the fisheries, the Assessment Team recommends that the New Zealand fishery for orange roughy receive certification. The assessment team identified two performance indicators for ORH3B NWCR and ORH3B ESCR, one performance indicator for ESCR and one performance indicator for all units that scored less than 80 and received conditions" (PCDR p5)

- In the PCDR, the certification body MRAG, in agreement with the Deepwater group and the Ministry of Primary Industry (MPI), set the conditions for four performance indicators that did not score high enough during the evaluation process to pass the MSC standards: stock status, ETP species outcome, ETP species information and management system review.
- We find incoherent to grant a positive advice for the MSC certification of a fishery whilst recognizing that some of the sustainability criteria are not met.
- It is even more incoherent to invoke the fact that the fisheries will be re-assessed as a justification to grant the certification. The public will not be able to make the distinction between a fishery that has been granted conditional certification and a fishery that is actually virtuous, since both will be sold with a "sustainable seafood" logo on their packaging.
- **It is the main, if not the only, responsibility of the certification body to prevent fisheries that cannot prove to be sustainable from being certified.**

Performance indicator 1.1.1b

This performance indicator aims to evaluate whether *"The stock is at or fluctuating around its target reference point."*

In NZ, the exploitation of orange roughy started in the 1980s, rapidly leading to a fishing-down phase.[21]

[20] Roheim (2009) Thalassorama : An evaluation of sustainable seafood guides: implications for environmental groups and the seafood industry. Marine Resource Economics 24: 301-310.
[21] Clark (2001) Are deepwater fisheries sustainable? The example of orange roughy (Hoplostethus atlanticus) in New Zealand. Fisheries Research 51: 123-135.

Demographic models predicting rebuilds of orange roughy biomass have conflicted with real-world observations.[22]

It is acknowledged in the PCDR *that: "The East and South Chatham Rise stock is estimated to be just below the lower bound of the target management range in 2014. There is a 57% probability of being below the lower limit of the target range. The stock is projected to recover to the lower limit of management target range in 2015. However, given the uncertainty in the estimate, more than one year at or above the lower limit or a lower uncertainty is needed to assure that the stock has reached the harvest range. Hence this stock is not considered to meet the SG80, resulting in a condition."*

- The score given by MRAG for this performance indicator is 70, with the associated condition to *"provide evidence that the ESCR stock is at or fluctuating around its target reference point"* through an action plan that will continue to monitor the stock biomass trajectory for the next 5 years. **This condition/action plan does not look like a solid-enough counterpart to uncertainties in the current assessment of the target stock, which are repeatedly acknowledged in the PCDR.**
- **The reasons for rejecting the approval of a sustainable certification for orange roughy is comprised in the very language of the PCDR:**

Life history (PCDR p18-19)

- *"Although age determination from otolith rings has been validated by length-mode analysis for juveniles up to four years of age in one study (MPI, 2014a), routine ageing of orange roughy has proven difficult."*
- *"Determination of the age of maturation for orange roughy has also proven difficult although it has been inferred that most orange roughy may take more than two decades to reach maturity."*
- *"The larval biology of orange roughy, in common with that for most deepwater marine species, is poorly known."*
- *"The relationship between spawning biomass and recruitment for orange roughy is poorly known owing to a lack of data on recruitment strength and, in particular, the long lag between spawning and subsequent recruitment to the fishable stock."*

Stock assessment (PCDR p19-20)

- *"it has proven challenging to conduct assessments that are not subject to considerable uncertainty for a variety of reasons. In 2014, stock assessments based on fitting population dynamics models were approved for the first time in many years for the three areas considered in this assessment (MPI, 2014b, c)"*
- *"Independent stock assessment scientists from New Zealand (1), Australia (2), USA (1), and Canada (1) familiar with stock assessment of orange roughy participated in MPI's 2014 DFAWG and Plenary meetings*

[22] Watling, *et al.* (2011) Can ecosystem-based deep-sea fishing be sustained? Report of a workshop held 31 August-3 September 2010. 11, University of Maine, Darling Marine Center, Walpole, ME (USA). 84 p.

that considered and reviewed the orange roughy stock assessments. However, no formal comprehensive external review of the current assessment framework has been undertaken."

Performance indicator 2.3.1

This performance indicator aims to evaluate whether *"the fishery meets national and international requirements for the protection of ETP species"* and whether *"the fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species."*

It is acknowledged in the PCDR that *"in the absence of ground-truthing of the predictive model, and the fact that the trawl fishery does expand to new areas (albeit at a very slow and continually reduced rate), it is not possible to determine that the fishery does not pose a risk of serious or irreversible harm to ETP coral species in these areas with high likelihood as defined by the MSC standard"* and that *"On balance, it is possible that on the scale of the UoAs, due to the large overlap between the orange roughy fishery, particularly on the Chatham Rise, and observed coral distributions, could be having an impact on the ability for ETP coral species to recover from disturbance."*

- The score given by MRAG for this performance indicator is 75, with the associated condition to implement an action plan for the next five years aiming to *"increase our understanding of the direct effects of fishing on ETP coral so as to reduce uncertainty in relation to the impacts of fishing on ETP coral"* and then be able to *"report with improved certainty the likelihood of unacceptable impacts of the (…) fisheries on ETP coral such that the SG 80 will be met for each fishery."*
  Again, **this condition/action plan does not look like a solid-enough counterpart to uncertainties in the current assessment of the impact of the fishery on ETP coral species. The review of coral bycatch literature compiled in the PCDR speaks for itself and is inconsistent with granting a score as high as 75**:

Coral bycatch (PCDR p63-64)

"Coral bycatch from the orange roughy fisheries on the Chatham Rise includes black corals, stony branching and cup corals, and dead coral rubble, with relatively smaller catches of bubblegum coral, precious coral, other gorgonians (such as primniods and plexaurids) and hydrocoral. (…) Baird et al. (2012) also modelled the distribution of the corals and predicted the areas likely to have the greatest probability of coral occurrence were outside the main fisheries areas, except for some deepwater fisheries that occurred on areas of steeper relief. This study concluded the fisheries that pose the most risk to protected corals are the deepwater trawl fisheries for species such as orange roughy, oreo species, black cardinalfish, and alfonsino. Tracey (2011a) and Consalvey (2006) concluded that the overlap of coral distribution and the fishing activities, combined with corals low productivity long recovery period, makes deep-sea coral populations especially vulnerable to damage by fishing gear. The fishery areas of highest risk to protected corals are the deepwater fisheries targeting orange roughy and oreo on UTFs, including those on the northern and southern slopes of the Chatham Rise (Tracey, 2011a). This is

consistent with a study by NIWA (2015) indicating the potential damage that trawling can have on deep-sea coral communities in fished areas."

"Regarding indirect trawling impacts, MPI's (2015) literature review indicates that trawling has been shown to create a substantial sediment plume, that in low-current deep-sea environments can disperse very slowly, over large distances (Bluhm, 2001, Rolinski et al., 2001). There have been no-specific studies examining sediment mobilization by fishing gear in deep-sea fisheries but sediment plumes generated through trawling over soft substrate have potential impacts on ETP coral species through smothering of small individuals (Glover & Smith, 2003) and preventing settlement of juveniles (Rogers et al., 1999) with deposition of mm to cm depth. Impacts on coral feeding and metabolic function are uncertain, although shallow water stony corals can actively shed sediment (Riegl, 1995) and potentially cope with a sediment plume but deep-sea sponge respiration has been reported as largely shutting down when subjected to heavy sedimentation loads (Tjensvoll et al., 2013). Sediment impacts are likely to be higher on Goniocorella dumosa *communities as they are distributed over slope habitat of the Chatham Rise dominated by soft sediment interspersed with hard substrate patches. The longer trawl tows on the slope will tend to generate greater sediment clouds than would the shorter tows typical of UTF fishing. Sediment effects will be less on coral assemblages on UTFs where the substratum is typically rocky, with only small patches of interspersed soft-sediment (Clark et al., 2010)."*

"According to Black et al. (2013), there have been no studies investigating whether the current trawling activities have had adverse effects on the structure and function of benthic communities, or on the productivity of the associated fisheries. In the orange roughy fishery on the Chatham Rise, which occurs primarily between depths of 800 – 1,200 m, there is evidence that fishing effort has shifted geographically over time in response to changes in catch rates on individual hills (MPI, 2012). While the fishery has moved into new areas each year, the rate of additional 'new area' subjected to trawling in each successive year has continued to decline throughout the time series (Black et al., 2013). In 2009-10 new area amounted to 3,208 km^2, which is 4% of the 2009-10 trawl footprint of 79,512 km^2 and less than 1% of the cumulative swept area for the period 1989-90 to 2009-10 of 385,032 km^2."

(PCDR p75)

"However, UTFs considered to be heavily fished still contain diverse assemblages of corals and other epibenthic fauna and no difference in species numbers or community structures in coral-dominated UTFs within or outside of protected areas (coral dominance indicated no or only light fishing) has been observed (Consalvey, 2006; Clark et al., 2015b). This suggests that coral diversity continues to be maintained on fished UTFs, as most UTFs are fished only on established tow lines, leaving areas of many UTFs unfished because the seabed is too rough or steep to trawl, or where orange roughy do not aggregate. Recent information from trawl surveys supports a conclusion that coral will remain well established on fished UTFs, although not at the density prior to trawling."

(PCR p76-77)

"Cold water corals are fully protected under the Wildlife Act 1953. Interactions with fisheries are monitored through the MPI's Scientific Observer Programme and vessel reporting; however, there is no overall management plan (Boyd 2013). The orange roughy fishery is spatially managed with defined areas where bottom trawling or all trawling is prohibited (e.g., benthic protected areas (BPAs), 'seamount' closures), which provide some protection for corals. Managed areas have closed approximately 68% of UTFs within New Zealand's EEZ and 74% of UTFs within the Kermadec Bioregion to trawling (Table 26); the remaining open areas allow for potential expansion of trawling beyond the current footprint of the fishery. If the protection of corals from trawling in the orange roughy also relies on fishing only on established tow lines, a mechanism for how the restriction to these tow lines occurs is not clear from the available information."

Performance indicator 2.3.3

This performance indicator aims to evaluate whether *"relevant information is collected to support the management of the fishery impacts on ETP species, including: information for the development of the management strategy; information to assess the effectiveness of the management strategy; and –information to determine the outcome status of ETP species."*

It is acknowledged in the PCDR that: *"Although there has been analysis on the distribution of corals and its overlap with orange roughy fisheries in the three UoC areas as well as contained within BPAs in these areas (MPI 2015), the large discrepancy between observed and predicted occurrences of coral and the commensurate large discrepancy in observed vs predicted degree of overlap of protected corals with the orange roughy fisheries creates uncertainty in determining whether the fishery may be threat to the protection of these species."*

- The score given by MRAG for this performance indicator is 75, with the assumption that *"by the end of the certification period information must be sufficient to determine whether the fishery may be a threat to protection and recovery of ETP coral species"*. If we understand correctly, MRAG is suggesting that the fishery should be certified before we know whether the NZ orange roughy has an impact on ETP coral species. Given the extensive scientific evidence on the impact of deep-sea bottom trawling on deep-sea corals, such a risky approach should not be endorsed by a "sustainable seafood" label.

Performance Indicator 3.2.5

This performance indicator aims to evaluate whether *"the fishery-specific management system is subject to regular internal and occasional external review."*

It is acknowledged in the PCDR that: *"Progress against the objectives in the National Fisheries Plan for Deepwater and the Annual Operational Plan is reviewed annually and reported in the Annual Review Report. MPI conducts an extensive review of performance of the deepwater fisheries (e.g., MPI 2015) that incorporates consultations with*

industry and other stakeholders. Parts of the management system, specifically science and enforcement, undergo external review. Although the internal review is very comprehensive and parties external to MPI participate, there is no explicit separate external review reported for the management system."

- The score given by MRAG for this performance indicator is 70, under the condition that *"by the third annual surveillance the fishery-specific management system must undergo occasional external review."* It is however not made clear how the Deepwater group and the MPI intend to make sure some external review of the management system will occur.

B. >80 scoring performance indicators

Performance Indicator 2.1.1

This performance indicator aims to evaluate whether *"the fishery does not pose a risk of serious or irreversible harm to the retained species or species groups and does not hinder recovery of depleted retained species or species groups"*

It is acknowledged in the PCDR that: *"Since 2005–06, orange roughy accounted for about 84% of the total observed catch by weight across all orange roughy fisheries combined, including the three fisheries under assessment (MPI, 2015b). Most of the remainder of the total catch (about 10% of the total) comprised oreo species (Family Oreosomatidae): mainly smooth oreo (*Pseudocyttus maculatus*) and black oreo (*Allocyttus niger*). Rattails (various species) and shovelnose spiny dogfish (*Deania calcea*) were the species with high discard rates (90% discarded)."* (PCDR p42)

Deep-sea sharks are particularly vulnerable species to bottom trawling. In the PCDR it is mentioned that *"Among the non-QMS species making up the bulk of discards, Baxter's lantern dogfish and other deepwater dogfish make up small quantities of the catch, but exceeded 1% of the catch for the ORH3B NWCR and ORH3B ESCR UoA (MPI, 2015b). These dogfish are not as yet fully managed, but the management system recognizes their vulnerability and the need for explicit management. MPI (2014d) stated the following in regard to these species:*
"(...) Orange roughy fishing is also known to interact with several species of sharks, many reported using generic codes for 'other sharks and dogfish' and 'deepwater dogfish'. It is considered that these species may have life history characteristics that make them vulnerable to overfishing. As part of the implementation of the NPOA-Sharks 2013, a two-stage risk assessment is being completed for all sharks that will guide ongoing management. A preliminary, expert based assessment should be available in late 2014 and a formal quantitative analysis will be available in 2015 to prioritise actions for species estimated to be at higher risk from fishing activities. Any additional catches of deepwater sharks will be taken into account through the risk assessment process"."

- The scores given by MRAG for this performance indicator are high: respectively 95, 80 and 80 for areas ORH3B NWCR, ORH3B ESCR and ORH7A. We are wondering whether MRAG considered that the other

commercially-retained species, oreos,[23] are species that were engaged through the Deepwater group in an MSC evaluation but were withdrawn to start a fishery improvement project?[24] MRAG's positive advice for the orange roughy suggests that the same deep-sea bottom fishery is unsustainable for oreos, which does not seem to make a lot of sense.

- Regarding deep-sea sharks, recognizing their vulnerability and the need for explicit management only is not sufficient to guarantee the sustainability for the retained species.

Performance Indicator 2.4.2.

This performance indicator aims to evaluate whether there is *"a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types".*

It is acknowledged in the PCDR 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"* and that *"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."*

- The score given by MRAG for this performance indicator is 85. We would like to question this scoring given the results of an analysis of the distribution of benthic habitat protection measures adopted by quota-owning industry sectors in New Zealand, Alaska and the Indian Ocean. Conclusions of this study suggest that *"protection of both benthic ecosystems and essential fish habitats are marginal at best when quota owners have primacy in determining the boundaries of BT closures"*, since the majority of the areas in these three regions may not contain vulnerable marine ecosystems and do not have high abundance of commercially important species. In particular, the authors noted that *"about 65% of New Zealand's EEZ is in water more than 1500 m deep and 40% of those deep waters are within the BPAs. Looked at another way, 82.3% of the 1.1 million km^2 of deep-sea bottom set aside as BPAs are in water that is too deep to fish."*[25] **Therefore, we fear that the presence of BPA in itself does not seem to be a powerful enough argument to give a score of 85 to this performance indicator, and we believe that more studies should be conducted in order to ensure that protection measures are not taken on the basis of quota-owners' best interests, but on the interest of the general public.**

Performance Indicator 3.1.1

[23] Up to 62,5% of smooth oreo in the retained species in the area ORH3B East and South Chatham Rise.
[24] http://deepwatergroup.org/species/oreo/oreo-fisheries-improvement-projects/
[25] Rieser, *et al.* (2013) Trawl fisheries, catch shares and the protection of benthic marine ecosystems: Has ownership generated incentives for seafloor stewardship? Marine Policy 40: 75-83.

This performance indicator aims to evaluate whether *"the management system exists within an appropriate legal and/or customary framework which ensures that it: is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and incorporates an appropriate dispute resolution framework."*
The PCDR explicitly uses the Intertek rationale as a base for the orange roughy scores for New Zealand hoki, hake, and ling *"in order to ensure harmonization"*:

"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 hapu¨ manage their non-commercial fishing in a way that best fits their local practices, without having a major effect on the fishing rights of others. When the government sets the total catch limits for fisheries each year, it allows for this customary use of fisheries before allocating comercial quotas. The management system therefore has a mechanism to formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2. This meets the SG60, SG80, and SG100.
References: Fisheries Act 1996; DWG Partnership 2010; Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 Deed of Settlement 1992; Maori Fisheries Act 2004; Customary Fisheries Regulations 1998; MFish 2009a; Intertek 2014a, b and c"

- The score given by MRAG for this performance indicator is 100, although the references only include institutional texts and are based upon a previous deep-sea fishery assessment. We regret that no scientific input from sociologists or anthropologists is used here. Although we do not have the time for an in-depth study, we would like to quote Dr Howard Schiffman, Director and Clinical Associate Professor at the New York University in his attempt to broaden the scope of the question of the allocation of quotas to Maori populations as an argument for appropriate ethical management.

"The native Maori population, understandably and rightfully, has a strong influence in New Zealand's commercial fisheries. The Maori fought hard to realize rights to New Zealand fisheries promised to them in 1840. While all [South Pacific Regional Fisheries Management Organization] Parties must be sensitive to this historical fact, a balance must be found between the exercise of these rights and achieving conservation objectives. The use of bottom-trawling to harvest Orange Roughy, with its highly destructive effects on seamounts, forces this issue like no other. Significantly, the Maori never harvested the Orange Roughy, a deep sea species, as part of its traditional catch. Bottom trawling is a modern fishing method. Whether the designation of vulnerable marine ecosystems is sufficient to address the impacts of bottom trawling, as highlighted by the UN General Assembly in Resolution 61–105, is still very much an open question. A precautionary approach seems appropriate since so little is known

about the ecology of seamounts. Reflection upon the SPRFMO Interim Measures adopted thus far to address bottom- trawling suggests the SPRFMO proceeds from the assumption that bottom trawling can be deployed sustainably. Given its destructive effects, this is a questionable assumption at best."[26]

Performance indicator 3.1.4

This performance indicator aims to evaluate whether *"the management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing".*
The PCDR explains that there are no public subsidies to the fishing industry in New Zealand although:

- The score given by MRAG for this performance indicator is 90 and not 100 because: *"There do not appear to be explicit incentives and encouragement not to catch marine mammals and protected species, i.e. there is no positive feedback for those not catching these species. The management system does not explicitly consider incentives in a regular review of management policy or procedures to ensure they not contribute to unsustainable fishing practices."* Although incentives and encouragement not to catch marine mammals and protected species can certainly be beneficial onboard bottom-trawlers, the impacts of the management system in a broader sense are not reviewed here. We are concerned about the potential indirect effects of the ITQ program on the social and environmental aspects of sustainability. Since the 1980's, New Zealand has converted all its commercial fisheries to a quota-owning system by conveying to fishing companies property rights in percentage shares of the annual catch quotas, set separately for individual fish stocks.[27] The QMS and the use of ITQs is considered in the PCDR as providing *"stability and security for quota owners and hence incentives for sustainable utilisation (Fisheries Act)."* It is however argued by several scholars that the "private ownership promotes stewardship" thesis of ITQs is a flawed rationale, and that on the contrary privatization leads to concentration of fishing rights in the hands of a few companies, with direct negative consequences for the small-scale fleets and communities, and indirect consequences for the environment since the capitalization of the fleet results in the few boats left using the most effective gears to catch fish: bottom trawls. In this case, economic sustainability seems to lead to lower environmental standards with a sector using a highly destructive fishing gear.

Although some argue that private fishing quotas help align the interests of the fishing industry with those of the greater public,[28] it seems that market-based instruments are not designed to address the ecological costs of intensive fishing. In the case of setting the Benthic Protection Areas mentioned above, this would be because *"the fishing industry has an incentive to prevent managers from adopting spatial closures or to ensure they put them where they impose the least cost to industry"*.[29]

[26] Schiffman (2013) The South Pacific Regional Fisheries Management Organization (SPRFMO): an improved model of decision-making for fisheries conservation? J Environ Stud Sci 3: 209-216.
[27] Gibbs (2008) The historical development of fisheries in New Zealand with respect to sustainable development principles. The Electronic Journal of Sustainable Development. 1(2) : 1-11. Available at : http://www.ejsd.co/public/journal_article/7
[28] Helson, *et al.* (2010) Private rights, public benefits: Industry-driven seabed protection. Marine Policy 34: 557-566.
[29] Ibid. Rieser, *et al.* (2013).

In conclusion, we find particularly inconsistent to grant a positive advice for the certification of the NZ orange roughy fishery given that:

- **The use of deep-sea bottom trawling as a fishing gear is widely recognized as destructive.** The MSC policy is that no fishing gear should be denied access to evaluation except for destructive methods, which, according to MSC standards, only include dynamite and poison fishing. Given the extensive scientific background demonstrating the tremendous impacts of bottom trawling on deep-sea habitats, we pledge that fisheries using bottom trawls gear below 600m should not be entitled to access the MSC assessment/certification process.

- **There is high uncertainty for many parameters and performance indicators assessing the sustainability of this fishery.** Granting a "conditional" certification would be a lie to consumers, who will be lead to believe everything is fine with this fishery. Consumers are not supposed to be experts of the complex MSC certification conditionality and will therefore not understand that the fishery has not yet reached "sustainability". Such discounted certification will bring much discredit to the auditing process, to the Marine Stewardship Council and eco-labeling in general.

Appendix 3.4.2 MRAG Responses to Stakeholder Comments

MRAG Response to Stakeholder Document

General Comments

ECO
ECO does not consider that that orange roughy unit of certification (North-West Chatham Rise, East and South Chatham Rise and Challenger fisheries) meets the criteria for certification. ECO considers the application of criteria all UOC would have to be rejected.

We would note that:

- This certification is being undertaken using MSC certification requirements v1.3, not the latest criteria v2.0.
- That there was nearly 18 month gaps between the site visit and the publication of the Draft Report. Under Ver 2.0 if a "9 month pause between site visit and PCDR publication; in which case FCR v2.0 (process and standard) shall be applied" (p137, Ver2.0). So why was version 2.0 not applied?

ECO objected to the peer reviewers as we considered they were missing key expertise in benthic and ecosystem impacts which is a critical issue in the consideration of MSC certification. While this submission was late due to family bereavement we are concerned at the inflexibility of MRAG and the MSC process.

ECO supports the comments made by WWF in its letter of 30 July 2014.

A key element of the MSC standard is the application of the precautionary approach. New Zealand has no explicitly precautionary approach in law. Efforts by Ministers to introduce a precautionary approach has been rejected by Ministers.

Efforts to cut orange roughy catch limits in past years to prevent a hard land have been rebuffed by the fishing industry. Wallace and Weeber (2005) documents the history of decisions on deepwater fisheries including orange roughy.

Response
Regarding ECO's contention that all units of assessment should fail, the MSC Certification Requirements call for evaluation of the fishery against the specific Performance Indicators and Scoring Guideposts. The MSC assessment team has properly conducted the evaluation, and is confident that the evidence provided supports the team's conclusion. The MSC Certification Requirements call for stakeholders to provide evidence in support of claims by stakeholders. The MRAG team has addressed evidence if provided by the commenter.

Regarding the use of CR V1.3 rather than CR V2.0, the relevant CR clauses state that if there is new information resulting from the 30 day additional information gathering stage, we would need to assess the new information against the most recent version of the CR. We interpreted "new information" as actual new information about the fishery that would bear on the team's evaluation in the form of e.g. updated stock assessments, papers or reports not previously available to the team, etc., rather than interpretations of existing information that some stakeholders might submit during this phase. We scheduled the additional 30 day period for the roughy from the outset for the assessment so that stakeholders could be assured that they had every opportunity to look at all the information about the fishery that was available to the assessment team at the same time as the team, rather than after, via the PCDR only. All of the information relevant to the assessment was made available at the time of the 30-day

consultation, and therefore there has been no new information. This was a proactive suggestion by the client to be as transparent as possible throughout the process. Therefore, we took heed of subclause 24.2.3.3.c.i and continued with our evaluation of the fishery against the v1.3 tree using the existing information (all of which has been available on the DWG website for anyone to look at since before the start of the new 30-day consultation period).

ECO submitted a letter opposing one peer reviewer. The letter arrived after the deadline set by the MSC for submitting comments on peer reviewers. MRAG did respond to ECO with more information on the qualifications of the peer reviewer. MRAG followed the MSC requirements and appropriately confirmed the peer reviewer.

The MRAG assessment team has responded on the precautionary approach below in reference to specific performance indicators, and demonstrated that the Fisheries Act is consistent with the requirements of the precautionary approach.

Substantial improvements to management of orange roughy have occurred since 2005. The assessment team has documented the current management system that has led to rebuilding of the stocks in the three units of assessment, two to well within the target range and one to just at the bottom of the range. It is clear that the industry has not rebuffed these efforts, but has contributed in a major way with MPI.

Greenpeace-DSCC
DSCC and Greenpeace strongly submit that the proposed certification application should be denied, on the basis that it breaches Principle 1, Sustainable Target Fish Stocks, Principle 2, Environmental Impact of Fishing, and Principle 3, Effective Management, and the assessed scores are incorrect.

Response
The MSC Certification Requirements call for evaluation of the fishery against the specific Performance Indicators and Scoring Guideposts. The MSC assessment team has properly conducted the evaluation, and is confident that the evidence provided supports the team's conclusion. The MSC Certification Requirements call for stakeholders to provide evidence in support of claims by stakeholders. The MRAG team has addressed evidence if provided by the commenter.

Bloom
We would hereby like to express our opposition to the conclusions reached by MRAG's Public Comment Draft Report (PCDR)1 about New Zealand's (NZ) orange roughy (*Hoplostethus atlanticus*) deep-sea bottom-trawl fishery, which recommended that the fishery receive the Marine Stewardship Council (MSC) certification and therefore that the orange roughy fishery be called "sustainable seafood".
We disagree with this certification on at least two grounds:
1. The highly destructive nature of deep-sea bottom trawling and the little social benefits that are associated to its use. We believe that no fishery using bottom-trawls below 600 meters should, anywhere in the world, be considered "sustainable" by any ecolabel;
2. The impact associated with this fishery: habitat destruction (corals, sponges…) and bycatch. Some of these elements have lead to significant improvement requirements according to MRAG's PCDR.

Response

The MSC Certification Requirements call for evaluation of the fishery against the specific Performance Indicators and Scoring Guideposts. The MSC assessment team has properly conducted the evaluation, and is confident that the evidence provided supports the team's conclusion. The MSC Certification Requirements call for stakeholders to provide evidence in support of claims by stakeholders. The MRAG team has addressed evidence if provided by the commenter.

Principle 1 Responses

Other Comments

PI 1.1.1

WWF: Scoring issue (SI) b requires the stock to be "at or fluctuating around its target reference point." We agree with the need for a condition to assure that ESCR achieves the target biomass range. However, we question whether the 7A and NWCR stocks have been shown with any level of certainty to be "fluctuating around" the TRP. MSC FCR1.3 CB 2.2.2.1 states: "At SG80, there shall be evidence that the stock is at the target reference point *now or has fluctuated around the target reference point for the past few years*." We would take this to mean that the stock must be estimated to be at or above the target reference point for some number of years before a score of 80 could be awarded. The information presented shows that the stocks historically fell substantially below the target reference point under the old management procedure, and are now simply rising under the new. This is not "fluctuating around." **We feel that 7A and NWCR have not been shown to meet SIb at SG80, and that a condition is also required to ensure that these stocks achieve the target biomass and remain within range**.

Response: The fluctuations language pertains to cases in which the stock fluctuates to a substantial extent naturally. However, even though recruitment of orange roughy exhibits considerable among-year variation, the biomass itself does not "fluctuate" because of the large number of age-classes in an orange roughy population. Once a stock is above the target reference point (or in the case of orange roughy within the management target range) with more than 80% probability, it is considered to satisfy SI b (as it is 'now' at the target). The ORH 7A stock has been above the lower limit of management target for seven years (Figs 10 and 11) owing to conservative management (fishing intensities well below those corresponding to the management target range for over a decade). The NWCR stock has been above the lower limit of management target range for three years (Figs 6 and 7) owing to fishing intensities well below those corresponding to the management target range. Both stocks show increasing trends under the current management regime, with projections indicating either additional increases (base-case) or stabilization ("lowM-highq" sensitivity test). The text associated with PI 1.1.1 was been edited to clarify that the NWCR and ORH 7A stocks are "at" the target.

No change in score resulted.

BLOOM: The reasons for rejecting the approval of a sustainable certification for orange roughy is comprised in the very language of the PCDR: Life history (PCDR p18-19): (a) "Although age determination from otolith rings has been validated by length-mode analysis for juveniles up to four years of age in one study (MPI, 2014a), routine ageing of orange roughy has proven difficult.", (b) "Determination of the age of maturation for orange roughy has also proven difficult although it has been inferred that most orange roughy may take more than two decades to reach maturity.", (c) "The larval biology of orange roughy, in common with that for most deepwater marine species, is poorly known.", (d) "The relationship between spawning biomass and recruitment for orange roughy is poorly known owing to a lack of data on recruitment

strength and, in particular, the long lag between spawning and subsequent recruitment to the fishable stock."
Stock assessment (PCDR p19-20): (a) "it has proven challenging to conduct assessments that are not subject to considerable uncertainty for a variety of reasons. In 2014, stock assessments based on fitting population dynamics models were approved for the first time in many years for the three areas considered in this assessment (MPI, 2014b, c)", (b) "Independent stock assessment scientists from New Zealand (1), Australia (2), USA (1), and Canada (1) familiar with stock assessment of orange roughy participated in MPI's 2014 DFAWG and Plenary meetings that considered and reviewed the orange roughy stock assessments. However, no formal comprehensive external review of the current assessment framework has been undertaken."

Response: These comments are taken from the assessment report. However, the comments are not placed in the context of the current status of the fishery and its assessment. Specifically:

- Life history (a): the major concerns with age determination have been addressed through the revised aging protocol (although uncertainty remains).
- Life history (b): the current assessment does not use information on maturation, but rather estimates spawning biomass.
- Life history (c): this issue does not impact the assessment per se, although more information on larval biology would improve our understanding of the population dynamics of orange roughy.
- Life history (d): this issue was addressed specifically in the MSE, which accounted for a distribution for the steepness of the stock-recruitment relationship based on an assessment of the MEC stock.
- Stock assessment (a): The concerns regarding stock assessments appear to have been largely overcome, in particular the predictions of increases in abundance from deterministic models no longer occur because the assessments estimate year-class strengths based on fitting to age and length data.
- Stock assessment (b): This point pertains to PI 1.2.4, and was the reason that the 100 SG for SI e was not considered to be met

No change in score resulted.

ECO: There are a number of uncertainties with the current stock assessments for that UOC:.
ORH3B - NW Chatham Rise: (a) An assessment in 2014 estimated to have increased to 37%Bo and the biomass was very likely to be at or above the target (30%); (b) B2014 is very unlikely to be below B20%. (c) At the current catch (110t) or the current voluntary catch limit (750t) it is very unlikely the biomass will decline below B20%. (c) The biomass is expected to increase or stay steady over the next 5 years with annual catches of up to 1400t. (d) Uncertainties in this assessment include how much of the spawning biomass the acoustic assessment covers, patterns in year class strength, and that the time series of abundance is short, and (e) There is a voluntary catch limit of 750 tonnes for this area within a total catch limit of 4500 tonnes.
ORH 3B – E and S Chatham Rise: (a) An assessment in 2014 estimated to have increased to 30%Bo and about as likely as not to be at or above the lower end of the management target range (30%); (b) B2014 was unlikely to be below B20% but very unlikely to below B10%, (c) "Overfishing is very unlikely to be occurring", (d) Uncertainties in this assessment include how much of spawning biomass the acoustic survey covers, whether a spawning plume ("Rekohu") is new or longstanding, and patterns in year class strength as only 2 years of age composition data was used, (e) the "old" spawning plume had the lowest estimated biomass in 2013 which

was only 25% of the 2002 acoustic estimate, at which stage the stock was already well below 30%Bo, (f) alternative model assumptions (including lower value of M (0.036) estimated in the model) produced a range in biomass from 19 to 32% (95%CI) for B2014, (g) on most of the South Rise and east features catch rates have tended to decline rapidly and then flatten out with little recovery. The fishery on the South Rise moved east over time "which was described as a serial depletion of orange roughy from the hills" (Clark 1997, MPI 2015). "The non-spawning fishery has therefore largely contracted to the hill complexes in the southeast corner of the Rise.." (MPI 2015). There has also been a "spatial contraction of the fishery during the spawning period" (MPI 2015), and (f) There is a voluntary catch limit of 3100 tonnes for this area within a total catch limit of 4500 tonnes.

ORH7A: (a) This fishery was closed in 2000 when the stock was estimated to have been reduced to 3%Bo (1-6%, 95%CI), (c) An assessment in 2014 estimated that the biomass had increased to 42%Bo and was very likely to be at or above the target (30%), (c) B2014 was very unlikely to be below B20%., (d) "Overfishing is very unlikely to be occurring". (e) Uncertainties in this assessment include how much of spawning biomass the acoustic and trawl survey covers and patterns in year class strength, (f) Age frequency of the fishery in 2009 was much younger than in 1988 with mean ages of 33 years (2009) and 53 years (1987). The age range from otoliths were 18-90 years (2009) and 26-145 years (1987). The spawning population in 2009 "consisted mainly of relatively young recruits (mean age of maturity is estimated at 23 years) most of which would not have been present prior to 2000." (MPI 2012), (f) while the assessment model shows increasing biomass, the acoustic and trawl surveys have been declining since 2009 – the 2013 survey was 54% of the 2009 result, (g) This area was opened to fishing in 2010 with a catch limit of 500 tonnes.

Overall: Orange roughy fishery have a history of over-optimistic assessments and predicted recovery which never takes places. The assessment for ORH7A and E&Sth Chatham Rise have similar issues – with the main historic index declining while the stock assessment suggests the stock is increasing.

Response: ECO note that the assessment is subject to uncertainties but that overfishing is very unlikely to be occurring.

- The fit of the models to the available data (in particular the estimates of abundance) was considered in scoring the fishery.
    - The decline in estimates of abundance from 2009 to 2011 and 2012 is barely statistically significant (Fig. 30 of the assessment report) and the model is able to pass through the confidence intervals. Overall, the fit the model is quite adequate by assessment standards (lower right panel of Fig 30 of the assessment report).
    - ECO state that the abundance estimates for the ESCR stock have also declined, but that is not evident in the available data (Tables 2 and 2a of the assessment report; note that one needs to account for the priors when interpreting the trends in estimate of abundance).
    - The fits of the models to the available data need to continue to be monitored as part of future audits.
- The issue raised by ECO regarding over-optimistic assessments was explicitly noted in the report. Previous assessments are no longer relevant given the recent improvements made to the assessment and harvest strategy. The evaluation of the fishery specifically considered the trends in the data when evaluating the status of the populations and the reliability of the assessment.
- ECO note that the assessment is subject to uncertainties, but does not provide any specific issues with the assessment (except for the change in abundance estimates from 2009 to 2011/12 for ORH7A). Note that perfect certainty (probably = 100%) is not

required for an evaluation (nor would it ever be possible to achieve 100% certainty for any marine resource assessment).

No change in score resulted.

Greenpeace & DSCC: The assessment notes that “A concern with orange roughy fisheries is the potential for spawning success to be disrupted by fishing of spawning aggregations. Given the nature of the fishery, it is not possible to directly measure this impact (if it exists) and consequently it is not modelled explicitly in the MSE.” (page 35) The history of orange roughy fishing is a history of serial depletion.” As noted by MRAG, here is evidence that fishing effort has shifted geographically over time in response to changes in catch rates on individual hills. (Page 77). By 1992 it became evident that orange roughy are slower growing, longer lived, and less productive than previously thought. As a result, the stock assessment parameters, estimated sustainable yields and TACCs were adjusted downwards.” (page 12) Although several genetic and other methods have been applied to examine stock structure in New Zealand, considerable uncertainty regarding stock structure and stock boundaries remain. (page 14)
An overview of some of the fisheries supports this.
ORH Mid-East Coast Stock (2A South, 2B, 3A)
The 2013 assessment estimated the stock to be at 24% *B0*, and as such is close to the soft limit. Low recruitment means that it would not meet the SG 60 level.
ORH3B Northwest Chatham Rise
The estimate of virgin biomass was 66,000 tonnes, and the current biomass was estimated to be 37% of the un-fished spawning biomass. The stocks were as low as 10% in 2005, and now are said to be around 30-40% of virgin biomass (page 26), and the recent catch of orange roughy is a third to a quarter of the catch taken at the peak of the fishery (page 49). The 2014 NWCR stock assessment considers the NWCR stock “fully rebuilt”, despite an absence of information as to whether the stock is at or above the upper end of the management target range. At the current catch (110t per annum) or the current voluntary catch limit (750t per annum) it is very unlikely the biomass will decline below 20%. Other uncertainties in this assessment include how much of the spawning biomass the acoustic assessment covers, patterns in year class strength, and that the time series of abundance is short. This absence of information means that the stock would not reach the SG 60 level.
ORH3B East and South Chatham Rise
Stocks plummeted to 20-30% of un-fished biomass from 2000 to 2015 and have not recovered above that (page 29). Uncertainties in this assessment include how much of spawning biomass the acoustic survey covers, whether a spawning plume (“Rekohu”) is new or longstanding, and patterns in year class strength as only 2 years of age composition data was used. The uncertainties about the so-called Rekohu spawning plume means that it is quite possible that the stock has been fished down to below the point where recruitment would be impaired, and the stock would not meet the SG 60 level. On most of the South Rise and east features catch rates have tended to decline rapidly and then flatten out with little recovery. The fishery on the South Rise moved east over time “which was described as a serial depletion of orange roughy from the hills” (Clark 1997, MPI 2015). “The non-spawning fishery has therefore largely contracted to the hill complexes in the southeast corner of the Rise.” (MPI 2015). There has also been a “spatial contraction of the fishery during the spawning period” (MPI 2015).
ORH7A Challenger Plateau, including the Westpac Bank
The fishery was fished down to 10% of biomass and only reached anywhere near 30% of biomass during the last 6 years. The stock was assessed in 2013 and estimated to be 20 or 24% *B0.* As such, it is close to the soft limit (which itself is uncertain) and would not meet the SG 60 level. Uncertainties in this assessment include how much of spawning biomass the

acoustic and trawl survey covers and patterns in year class strength. While the assessment model shows increasing biomass, the acoustic and trawl surveys have been declining since 2009 – the 2013 survey was 54% of the 2009 result.

Response: The MSC CR V1.3 for PI 1.1.1 requires that the assessment team determine the likelihood of stock status relative to the MSC scoring guideposts. It does not require evaluating the stock assessment, which occurs at PI 1.2.4. Greenpeace and DSCC note that there are uncertainties associated with the assessment. However, all assessments are subject to uncertainties and the evaluation of the assessment (and hence stock status) was based on whether the assessment considered the uncertainties, in particular attempted to capture them through priors as well as sensitivity examinations. It is not an MSC requirement that all uncertainties have been eliminated, which is why evaluations of stock status are expressed in probabilistic terms. The scores for the three stocks are correct given the probabilities demonstrated in the assessment. Note that the MEC area is not part of the UoC.

No change in score resulted.

PI 1.1.2

WWF: The implication of the limit reference points (LRPs) is that 20% Bcurrent/B0 is a measure of the point where there is a "low probability of recruitment overfishing" and that the target range will "maintain high productivity" as the reference points are used in PI 1.1.1. The case for this is not strong. Given the late age of both maturity and of the age entering fishery, the dynamics of the stocks are being driven by year classes that already existed in 1990, when the 7A and ESCR biomasses bottomed out. While management actions taken since 1990 have likely contributed to biomass increases (increases in biomass per recruit), it is unlikely that those effects would be near to the contributions of the good year classes that were spawned prior to 1990. The implication is that the strong recovery has been driven by good year classes that were already in the pipeline and not caused by the new management policies. However, recruitment variability is high. The assessment used σR=1.1. This level of lognormal variability means that most year classes will be relatively close to average, but that there will be periodic episodes of very high recruitment. **What if OR recovery is being driven by such events? And to what extent can we assume that such events will continue in the ensuing years? Are the limit and target reference points appropriate for the OR stocks?**

Response: The evaluation of the limit reference point (specifically the proportion of unfished recruitment at the limit reference points) is not based on the trajectory of biomass, but rather on the results from the assessment of the MEC stock that evaluated steepness (Cordue, 2014c). That assessment includes estimates of recruitment from when the MEC stock was depleted below its unfished level. If this were not the case the posterior for steepness would be the same as the prior. In addition, a value for σR of 1.1 means that most recruitments are below the average, with a small number of recruitments well above the average. The variation in recruitment, including episodes of high recruitment, is accounted for in the assessment and hence in the estimation of the form and parameters of the stock-recruitment relationship.

No change in score resulted.

WWF: To some extent these were addressed through the Management Strategy Evaluations and the development of the harvest control rule (HCR). The results indicate that current management strategies are expected to be robust over the next 5 years or so. But over the longer term it is less likely that the target reference point range starting at 30% has been demonstrated to be robust, especially due to the long time-lag between management actions

and the response of the stock biomass. The generic hard and soft limits were simulation tested, but it can be argued that the risks imposed by the unquantified uncertainties are not well accomodated by those limits and that the life history of orange roughy suggests that more risk averse limits might needed. **Whether or not the soft and hard limits and targets are fully appropriate over the longer term remains a question.** We are concerned with the HCR that sets the target reference point as a uniform range from 30-50% B0 that, in practice, actually lowers the reference point to 30%. The default for the (MSC certified) US West Coast rockfish, which has a similar life history with a very long but somewhat shorter life span, is set at 40% B0, with the LRP at 25% B0. Arguably **the reference points should be more precautionary for a longer-lived species like orange roughy**, and a higher reference point (instead of a reference band that defaults to its lower bound) would be more appropriate for ensuring that the stock is above the point at which recruitment would be imparied. **We do not believe that the reference points have been shown to be appropriate for the OR stocks and do not believe the fishery achieves a score of 80 for this PI.**

Response: The primary basis for limit reference points should be at what stock size is recruitment is impaired. This is why the evaluation focused on the soft limit (rather than the hard limit that is reflected in the Harvest Strategy Standard). The MSE considered a very long period of time (16,000 years) when evaluating the probability of the stock being below the limit reference point and within the management target range. Thus, the MSE fully evaluated the consequences of the long time-lag between assessments, management action and stock responses. The lower limit of the management target range is lower than the default target for US West Coast rockfish of 40% of B_0. However, the target range (30-50% B_0) encompasses that value, and was selected given the outcomes of the MSE. Moreover, the harvest rate (i.e. the level of fishing mortality and the catch) under the HCR is not constant within the management target range, but rather decreases at the lower end of the range and increases at the upper end of the range (see Fig. 14 of the assessment report), specifically included within the HCRs for the purpose of moving stock size away from the lower limit (see PI 1.2.2 HCR). WWF refers to unquantified uncertainties, but does not provide examples of uncertainties that were not accounted for in the assessment or the MSE. The team concludes that the reference points were set appropriately given the results of the stock assessment and MSE; note that the stock assessment is evaluated in PI 1.2.4.

No change in score resulted.

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 80 score. We agree with the critique of the limit and target reference point made by WWF. We would not that CCAMLR has one example of best practice target reference points of 50%Bo for predator species and 75%Bo for prey species. The current New Zealand reference points are not precautionary and they are not applied for either soft or hard limits. Given the uncertainty about orange roughy recruitment it is not possible to determine whether the limit reference point is appropriate,

Response: ECO refer to the issues raised by WWF. Please refer our response to the WWF comments.

No change in score resulted.

Greenpeace & DSCC: **Target Reference Point** The submitters strongly submit that the level of the target reference point (TRP), and consequently the limit reference point (LRP) level, for

orange roughy is not precautionary and cannot be justified based on best practice. In this respect we support the submissions of WWF in this regard. The target reference point for orange roughy is formulated as a 'range' of 30% to 40% of the estimated virgin unfished biomass (B0), but in practice, management in fact applies only the lower 30% as a *de facto* TRP. 30% is far too low for a low productivity deep-sea species. Orange roughy may live to 130 years of age (page 18). The age at which 50% of animals are spawning was estimated within the assessment models to range from 32 - 41 years (Page 18). The relationship between spawning biomass and recruitment for orange roughy is poorly known, owing to a lack of data on recruitment strength and the long lag between spawning and subsequent recruitment to the fishable stock. The larval biology of orange roughy, in common with that for most deepwater marine species, is poorly known. (page 19) The proposed Target Reference Point is not precautionary. The Submitters support WWF's submissions on this matter.

Response: The rationale for the target reference point is outlined in the assessment report. MRAG agrees with the Greenpeace that there is not "high certainty" associated with the target reference point. The text related to the SI c states "However, the spawner-recruit relationship was borrowed from another stock and uses the less precautionary average of the B_{MSY} rather than the maximum, so does not achieve 'high certainty'", and MRAG concluded that the fishery does not meet SG 100 for this SI. SG 80 for PI 1.1.1 pertains to the stock being maintained at a level consistent with BMSY or some measure or surrogate with similar intent or outcome. Cordue (2014c) notes "In terms of B_{MSY}, the mid-point of the target range at 35% B_0 seems low, as the median estimate of B_{MSY} is 38% B_0 and the 95% CI on the Ricker B_{MSY} is 37–47% B_0 (Table 4). As a compromise between potentially very low B_{MSY} from Beverton-Holt (95% CI: 12–39 % B0) and the higher Ricker range, it is appropriate to set a mid-point for the biomass target range at about the median of the combined posterior distribution (38% B_0). Since the commonly used B_{MSY} proxy of 40% B_0 is slightly above the median estimate it is convenient to use 40% as the mid-point of the target range." Thus, the management target range satisfies the requirement of being a level consistent with B_{MSY}. Greenpeace and DSCC refer to the issues raised by WWF. Please also refer our response to the WWF comments.

No change in score resulted.

Greenpeace & DSCC: **Limit Reference Point** At present, there is a so-called 'soft' limit set at 20% B0 and a 'hard' limit set at 10% of B0. There would be a rebuilding plan when biomass is estimated to be below the soft limit, and a complete closure of the fishery when the biomass falls below the hard limit. However, the Submitters do not accept that a LRP of 20% *B0* is above the level at which there is an appreciable risk of impairing reproductive capacity in orange roughy stocks. There is significant uncertainty stemming from the fact that very long lived stocks have been fished for a relatively short timeframe, compounded by uncertainty about the stock-recruit relationship. The Submitters support WWF's submissions on this matter.

Response: CR V1.3 addresses determination of reference points: "CB2.3.3.2 In the case where either B_{MSY} or B_{LIM} are analytically determined, those values should be used for reference points unless additional precaution is sought." The limit reference point for the assessment was taken to be 20% of B_0. The assessment estimated that recruitment would be reduced by 40% from its unfished level on average at 20% B_0. This evaluation was based on an analysis of stock and recruitment data for the MEC stock, along with a prior based on rockfish stocks. ECO "do not accept" the LRP, but do not appear to be aware that the value for steepness was based on analysis that was based on the available data and the uncertainty about the stock-recruitment relationship. Note that the reference of rebuilding plans at 20%B_0 and fishery closure at 10%B_0 are part of the Harvest Strategy Standard, but the fishery evaluation focused on the HCR and its

performance. The HCR reduces the exploitation rate at a biomass level much larger than the soft limit included in the Harvest Strategy Standard (Fig. 14 of the assessment report). Therefore, the team concluded that no additional precaution is needed. Greenpeace and DSCC refer to the issues raised by WWF. Please also refer our response to the WWF comments.

No change in score resulted.

PI 1.1.3

WWF: While 7A and NWCR rebuilt within the 24 year time frame since 1990 to a biomass within the target range, ESCR has only marginally recovered to the target range. In all these cases this occurred without a formal recovery plan as defined by the MSC process. Therefore, there is a need for these plans, especially for ESCR. The assessment team argues that ESCR recovery is close to the target range and that recent management actions have been conservative such that it is likely that recovery will continue. Therefore, a recovery plan is not needed. While this conclusion may be acceptable in the present context, **there is still a need to establish appropriate recovery rates**. This should be done in the context of the harvest control rule (PI 1.2.2; see next).

Response: MRAG acknowledges that the management system has not established an explicit timeframe for rebuilding. However, MRAG concludes that an implicit timeframe exists: as stated in the scoring justification, "the management system deliberately set quotas below the acceptable quantity calculated from the HCR to ensure rapid rebuilding, thus predicted to achieve rebuilding in the shortest practicable timeframe." The HCR directly leads to rebuilding when abundance falls below the target; harvests set below the amount allowed by the HCR lead to faster rebuilding. Rebuilding is predicted to occur in less than 20 years, consistent with the requirements for SG80.

No change in score resulted.

Greenpeace & DSCC: All stocks are below target levels, and so are depleted. Rebuilding strategies must be implemented in a manner consistent with the MSC standard. Plans must include rebuilding timeframes which are based on the time it would take a stock to rebuild to target levels without any fishing (Tmin) and the standard allows rebuilding to take up to twice this duration (2*Tmin). Rebuilding of all stocks to target levels must occur within the *shorter* of 20 years or 2 times its generation time to achieve SG60: but orange roughy reach reproductive maturity at ages of approximately 30 years, and so a single generation time is very likely to exceed 20 years. There are enormous uncertainties left in orange roughy stock assessments, including whether 20% B0 is a sufficiently precautionary limit, and whether the hard limit (10% B0) accurately reflects the point at which recruitment is impaired. Reference points must be set high enough to prevent recruitment impairment and to have a sustainable fishery. Instead, the evidence is that the footprint of the orange roughy fisheries continues to expand to move into new areas to engage in serial overfishing. In conclusion, all orange roughy stocks are likely to be depleted below target levels, which would impair recruitment and therefore not meet the SG 60 scoring guidepost of the MSC standard.

Response: According to the stock assessments, only the ESCR stock is below the lower end of management target range so PI 1.1.3 only applies to the ESCR stock. The projections provided in the assessment report indicate that the ESCR stock size is predicted to continue to increase under the current catch level which, for precautionary reasons, is set below that required under the HCR, and that there is a very high probability that the stock is already (in 2016) above the lower end of the management target range under the base-case analysis. The assessment

report indicates that rebuilding to 40% B_0 will occur by 2025 (Fig. 14). The recovery will thus occur within 20 years. The reference to the limit reference point is not relevant to the rebuilding strategy as the ESCR stock is above the limit reference point. Greenpeace and DSCC refer to the issues raised by WWF. Please also refer our response to the WWF comments.

No change in score resulted.

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 90 score. New Zealand does not have a clear rebuilding strategy applied to orange roughy. Peer reviewer 1 raised issues over the rebuild strategy. ECO supports WWF and reviewer 1 concern over the rebuild strategy.

Response: ECO do not outline the "issues" they are concerned about regarding the rebuilding of the ESCR stock so it is not possible to respond to their comment. ECO refer to the issues raised by WWF. Please also refer our response to the WWF comments, and also to our response to the comments of Peer Reviewer 1 in the assessment report.

No change in score resulted.

PI 1.2.1

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 85 score. There is neither a robust nor precautionary harvest strategy in place. The precautionary principle is not clear in the Fisheries Act. Given the history of over-optimistic orange roughy assessment caused by the limited period orange roughy have been fished and researched compared to their long life history it is essential that any MSE consider a wide set of uncertainties. The effect of climate change on a long lived species like orange roughy is not known.

Response*:* The management system recognizes the past overexploitation of the resource, and has taken action through the stock assessment and HCR (see PIs 1.2.4 and 1.2.2) to assure that the current management will lead to more sustainable harvest levels. The Harvest Strategy includes the setting of catch limits to provide for sustainable levels of fishing mortality (with 2014 exploitation rates between 0.5% and about 3% for the UoAs), reflecting a conservative and robust management approach. Further, the harvest control rule has been set to reduce the exploitation rate when the stock is below (and in fact within) the management target range for precautionary reasons. The robustness of the harvest control rule was evaluated relative to four main uncertainties: (a) the form of the stock-recruitment relationship (Ricker or Beverton-Holt); (b) whether fishing is restricted to spawning fish or independent of maturity status; (c) the extent of variation and temporal correlation in recruitment about the assumed stock-recruitment relationship; and (c) bias in the estimates of stock status and vulnerable biomass as well as a higher level of error in the estimates on which the HCR is based. MRAG did not score this issue to be 100 because although the main uncertainties were considered, other uncertainties (in particular stock structure) were not. The text has been updated to specifically mention climate change. It should be noted that very few MSEs attempt to address the impacts of climate change. The Precautionary Principle is specifically mentioned in Section 10 of the Fisheries Act (see discussion of PI 3.1.3), and is dealt with in Principle 3, not in PI 1.2.1.

No change in score resulted.

PI 1.2.2

WWF: The harvest control rules were simulation tested using MSEs which indicated their potential effectiveness. They have recently been implemented with TACCs being at or below those specified by the rule. The **effectiveness cannot be shown yet** and is unlikely to be shown in the near future due to the long time lag in the stock's response to any management action. Therefore, there needs to be an explicit coupling of the HCR with the duration of recovery plans if the stocks deteriorated more than expected. Based on this, the current CAB scoring on PI 1.2.2 is too high. **Available evidence does not indicate that the tools in use are appropriate *and effective* in achieving the exploitation levels required under the harvest control rules. Scoring issue c is not shown to be met at SG80.**

Response: Available evidence consists of simulations in the MSE and the experience that abundance is increasing under reduced exploitation over the past 10 years (NWCR), 5 years (ESCR), and 15 years (ORH7A). The harvest control rule requires that the catch limits be set based on stock status relative to reference points. If the HCR is followed and the fishery catches are at or below the catch limits, the desired exploitation levels should be such that the stock is moved towards the management target range. The effectiveness of the HCR was evaluated using the MSE, which is best practice for designing, comparing and evaluating harvest control rules. The increased abundance observed prior to the implementation of the HCR provided support that a robust HCR will continue and improve on this trend. This scoring issue does not pertain to long time lags in stock response, although this was considered in the design of the HCR.

No change in score resulted.

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 90 score. There is neither a robust nor precautionary harvest control rules in place. The precautionary principle is not clear in the Fisheries Act. Harvest control rules are a voluntary mechanism and not a legal requirement. Given the history of over-optimistic orange roughy assessment caused by the limited period orange roughy have been fished and researched compared to their long life history it is essential that any MSE consider a wide set of uncertainties. The effect of climate change on a long lived species like orange roughy is not known. The uncertainty over orange roughy recruitment must be considered as part of any MSE approach.

Response: MRAG evaluated the robustness of the HCR in section 3.3 and in the scoring justification for PI 1.2.2. We cannot determine the specific concerns of ECO as ECO did not provide any evidence to the contrary, so cannot further address this concern. The Precautionary Principle is specifically mentioned in Section 10 of the Fisheries Act (see discussion of PI 3.1.3) and is dealt with in Principle 3, not in PI 1.2.1. While the HCR is voluntary, it is supported by a formal agreement between quota onwers and the Minister and the locations of ORH catches within each QMA are required to be reported by law and MPI audits these against the agreed catch limits to ensure compliance. The evaluation of the HCR took the main uncertainties into account so achieves SG 80 for SI b. Consideration of the full set of uncertainties would achieve SG 100.

No change in score resulted.

PI 1.2.3

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 90 score. Peer reviewer 1 questioned whether the scoring could be justified. A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted: *"Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues."* Only with observers on board is there sufficient information to assess by-catch rates. Reporting of non-quota management species and non-target fish species (eg corals) relies on reporting from observers. There is no guarantee the observer coverage will be 20% coverage. MPI priorities are wider than research priorities, and include enforcement and labour standards, and can priorities can change between and within years. The level of observer coverage is patchy in the deepwater trawl fishery (orange roughy, oreos and cardinal fish) with an average of 11% of tows observed in 2012-13. In the orange roughy target fishery 11.6% of tow were observed in 2012-13 and 13.1% in 2013-14 but observer vessel days where only half the level required for collection of representative biological information and samples (eg otoliths for ageing and length frequency) to manage the fishery and its impacts (MPI 2015b). There is currently no long-term planning for research and management. The 10 year research plan has ended, there is currently no replacement, and the deepwater management plan ends in June and it is unclear whether it will be replaced.

Response: This PI relates to information needed to conduct assessments of the target species and not to monitor retained and bycatch species, which is dealt with under PIs 2.1.3 and 2.2.3. The key data source based on observer data that is used in the assessment is length- and age-composition data (although data on age composition are also available from surveys). The main data source for conducting assessments and estimating trends in biomass are the results of the acoustic surveys, and the data from these surveys are consistently assigned high weight in assessments. Representative samples of age and length can be obtained from observer and survey data and are weighted depending on how well the model is able to mimic the available data. Thus, the 20% value does not relate to the sample sizes for age and length data. MPI has assured that the management plan and the research plan will continue in force until replaced (see MPI letter annexed to this response).The research plan is further discussed under PI 3.2.4.

No change in score resulted.

Greenpeace&DSCC: There is no guarantee the observer coverage will be 20% coverage. Priorities are wider than those for research and management and can within years change priorities. There is a level of observer coverage is patchy in the deepwater trawl fishery (orange roughy, oreos and cardinal fish) with an average of 11% of tows observed in 2012-13. In the orange roughy target fishery 11.6% of tow were observed in 2012-13 and 13.1% in 2013-14 but observer vessel days where only half the level required for collection of representative biological information and samples (e.g. otoliths for ageing and length frequency) to manage the fishery and its impacts (MPI 2015b). While fishers are required to report by-catch of marine mammals and seabirds, as well as quota species, the rate of reporting is low. Only with observers on board is there sufficient information to assess by-catch rates. Reporting of non-quota management species and non-target fish species (e.g. corals) relies on reporting from observers. There is currently no long-term planning for research and management.

Response: This PI relates to information needed to conduct assessments of the target species and not to monitor retained and bycatch species, which is dealt with under PIs 2.1.3 and 2.2.3.

No change in score resulted.

PI 1.2.4

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 90 score. Given the history of over-optimistic orange roughy assessment caused by the limited period orange roughy have been fished and researched compared to their long life history it is essential that any MSE consider a wide set of uncertainties. The effect of climate change on a long lived species like orange roughy is not known. The uncertainty over orange roughy recruitment must be considered as part of any stock assessment. Like any stock assessment working group it is only as good as the participants that can attend. The trend over time in working group has been to less diverse membership and thus smaller review. This is a problem with the robustness of any assessment. For NGOs it is difficult for us to attend many meetings over the year. A wider peer review of all the assessment would be a positive step forward.

Response: It should be noted that there is some uncertainty in every aspect of any marine resource assessment; uncertainty about the values of all relevant biological and oceanographic processes and parameters, uncertainties about cause-effect relationships, and uncertainties about future states of nature due to environmental variability. Many sources of uncertainty are treated explicitly in stock assessments. Also, we assume that the 100 scoring guideposts were intended to be an attainable score for a scientifically sound assessment in a realistically data-rich condition. MRAG agrees that wider review of the assessment is to be encouraged. We note that WWF, DWG and MPI each contracted scientists (from New Zealand, Australia, USA and Canada) all of whom have expertise in orange roughy assessments, to participate during MPI's open scientific working group meetings and during the plenary review of the orange roughy assessments. However, as no reports from the reviewers were obtained, the fishery did not achieve 100 for SI e.

No change in score resulted.

Principle 1: Condition

WWF: It is difficult to determine from the wording of Condition 1 how the assessment team will consider the estimates obtained in Years 1-4 and what the assessment team will accept as "fluctuating around." Currently, the ESCR stock is estimated to be just below the lower bound of the target reference point and there is a 57% probability of being below the lower limit of the target range. *MSC FCR1.3 CB 2.2.2.1 states: "At SG80, there shall be evidence that the stock is at the target reference point now or has fluctuated around the target reference point for the past few years."* We would take this to mean that the stock must be estimated to be at or above the target reference point for some number of years before a score of 80 could be awarded. However, it is unclear how the assessment team will consider this. In fact, the current wording indicates that the score could be changed to 80 with one year of an estimate at or above the target, which would not be in line with MSC requirements. In accordance with the FCR, **"How the CAB will assess outcomes and milestones" (MSC FCR1.3 27.11.2.5) must be made more explicit.**

Response: CR V1.3 does not require consideration of 'fluctuating around' for stocks determined as 'at the TRP.' The performance indicator gives two options: 1) at TRP now and 2) fluctuating around the TRP. The 'fluctuating around' option is not applied if a stock is at or above the TRP now. MRAG determines that a stock is 'at' the TRP now' when the likelihood reaches or exceeds the probabilistic requirements of MSC for SG80 or SG100 at the time of assessment. If the stock were to decline below the TRP, the assessment team would consider whether the stock fluctuates around the TRP.

BLOOM: SI b: In NZ, the exploitation of orange roughy started in the 1980s, rapidly leading to a fishing-down phase. Demographic models predicting rebuilds of orange roughy biomass have conflicted with real-world observations It is acknowledged in the PCDR *that: "The East and South Chatham Rise stock is estimated to be just below the lower bound of the target management range in 2014. There is a 57% probability of being below the lower limit of the target range. The stock is projected to recover to the lower limit of management target range in 2015. However, given the uncertainty in the estimate, more than one year at or above the lower limit or a lower uncertainty is needed to assure that the stock has reached the harvest range. Hence this stock is not considered to meet the SG80, resulting in a condition."* The score given by MRAG for this performance indicator is 70, with the associated condition to *"provide evidence that the ESCR stock is at or fluctuating around its target reference point"* through an action plan that will continue to monitor the stock biomass trajectory for the next 5 years. **This condition/action plan does not look like a solid-enough counterpart to uncertainties in the current assessment of the target stock, which are repeatedly acknowledged in the PCDR.**

Response: The MSC requires that conditions follow the language of the Certification Requirements. CR V3.1 states "27.11.1.2 The CAB should draft conditions to follow the narrative or metric form of the PISGs used in the final tree." Under this requirement, the MSC does not allow prescriptive conditions. Similarly, milestones cannot be prescriptive. At each surveillance, the assessment team monitors progress not just of the action plan but of the performance of the fishery in achieving the SG80 score.

Principle 2 Responses

PI 2.1.1

BLOOM: This performance indicator aims to evaluate whether "*the fishery does not pose a risk of serious or irreversible harm to the retained species or species groups and does not hinder recovery of depleted retained species or species groups*"
It is acknowledged in the PCDR that: *"Since 2005–06, orange roughy accounted for about 84% of the total observed catch by weight across all orange roughy fisheries combined, including the three fisheries under assessment (MPI, 2015b). Most of the remainder of the total catch (about 10% of the total) comprised oreo species (Family Oreosomatidae): mainly smooth oreo (*Pseudocyttus maculatus*) and black oreo (*Allocyttus niger*). Rattails (various species) and shovelnose spiny dogfish (*Deania calcea*) were the species with high discard rates (90% discarded)."* (PCDR p42)
Deep-sea sharks are particularly vulnerable species to bottom trawling. In the PCDR it is mentioned that *"Among the non-QMS species making up the bulk of discards, Baxter's lantern dogfish and other deepwater dogfish make up small quantities of the catch, but exceeded 1% of the catch for the ORH3B NWCR and ORH3B ESCR UoA (MPI, 2015b). These dogfish are not as yet fully managed, but the management system recognizes their vulnerability and the need for explicit management. MPI (2014d) stated the following in regard to these species:*

"(...) Orange roughy fishing is also known to interact with several species of sharks, many reported using generic codes for 'other sharks and dogfish' and 'deepwater dogfish'. It is considered that these species may have life history characteristics that make them vulnerable to overfishing. As part of the implementation of the NPOA- Sharks 2013, a two-stage risk assessment is being completed for all sharks that will guide ongoing management. A preliminary, expert based assessment should be available in late 2014 and a formal quantitative analysis will be available in 2015 to prioritise actions for species estimated to be at higher risk from fishing activities. Any additional catches of deepwater sharks will be taken into account through the risk assessment process."

- The scores given by MRAG for this performance indicator are high: respectively 95, 80 and 80 for areas ORH3B NWCR, ORH3B ESCR and ORH7A. We are wondering whether MRAG considered that the other commercially-retained species, oreos, are species that were engaged through the Deepwater group in an MSC evaluation but were withdrawn to start a fishery improvement project? MRAG's positive advice for the orange roughy suggests that the same deep-sea bottom fishery is unsustainable for oreos, which does not seem to make a lot of sense.
- Regarding deep-sea sharks, recognizing their vulnerability and the need for explicit management only is not sufficient to guarantee the sustainability for the retained species.

Response:
The withdrawal of oreo from the MSC assessment process does not affect the analysis of the orange roughy fishery. MSC CR V1.3 requires consideration only of the unit of assessment on P2 species.
Deepwater dogfish are considered under PI 2.2.1, and will be dealt with in the response for that PI.

No change in score resulted.

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 80 or 95 score respectively.
Smooth oreos assessment (OEO4) in this commentary for the Chatham Rise UOCs indicates it is trending downwards, it is below the target Biomass (B40%), "exploitation rates have steadily increased, and stocks is predicted to decline below 20%Bo by 2018.
Anderson (2011) also notes in his review a problem with spatial coverage of observed effort that should be considered.
This information indicates that there clearly are conservation concerns which should be considered and that they are closer to 60 than 80.
Revised Score:

- **ORH7A 95**
- **ESCR 65**
- **NWCR 65**

Response:
The assessment team acknowledges that the smooth oreo biomass has trended down for a number of years, but the abundance has been above the limit reference point (soft limit of 20% B0) since the beginning of the fishery. The team added additional information from the stock assessment demonstrating that the smooth oreo abundance meets the requirements for highly likely above the point of recruitment impairment.

The two smooth oreo stocks that overlap the NWCR and ESCR ORH UoAs, are in formal fishery improvement plans that target sufficient improvements to start an MSC assessment of these fisheries in 2019 http://deepwatergroup.org/species/oreo/oreo-fisheries-improvement-projects/. An MSC assessment for smooth oreo would require improving the harvest strategy such that the stock size is maintained at the target level, and restored to this if stock size is below the target, as monitored by a stock assessment. Annual surveillance audits will monitor the harvest strategy and next stock assessment for smooth oreo in OEO4 when available, and this PI will be re-scored as appropriate. Surveillance will consider the effects of an OEO4 TACC reduction from 7,000 t to 3,000 t set from 1 October 2015. A new stock assessment for smooth oreo in OEO4 is currently underway, to be followed by a Management Strategy Evaluation to assess appropriate HCRs. The next biomass survey of this stock is planned for late 2016 followed by a stock assessment in 2017 – and further management adjustments from 1 October 2017 if and as required. Lack of progress and continued declines in biomass could result in lower scores; progress with stable or increasing abundance could lead to stable or increasing scores.

No change in score resulted.

PI 2.1.2

WWF: We believe that the CAB has incorrectly applied the MSC scoring guidelines under PI 2.1.2 SI(e) for ORH3B ESCR regarding shark finning. The MSC scoring guideposts in version 1.3 of the MSC standard are clear regarding shark finning (and recently strengthened in CR version 2.0 due to the international importance of this issue for the conservation of elasmobranch species).

Under PI 2.1.2 scoring issue e at SG100, if sharks are processed onboard (CAB3.6.4.2), good observer coverage is required to provide evidence that shark finning is not taking place. The applicable MSC requirement (CAB3.6.3.1) states that "a default rate of 20% shall apply for good onboard observer coverage." The observer coverage for ORH3B ESCR has ranged from 3% to 17% from 2010–2011 to 2013–2014, averaging approximately 11.5% over the four year period (Table 14). The CAB states that the lower observer coverage in recent years is due to a reprioritization of observer deployment to cover foreign charter vessels and that this issue will be resolved in May 2016. Peer reviewer 2 commented on this issue and the CAB stated in response that the team had noted the decline in observer coverage and would reassess the score if coverage does not increase to the default value of 20%. In the opinion of WWF, in spite of the generally proactive approach of the NZ fisheries in regards to shark finning, the scoring approach applied by the CAB is backwards and represents a misapplication of the MSC scoring process, which if done in a consistent manner across PIs could contribute to an upward bias in overall scoring. **To be consistent with both the letter and intent of MSC scoring requirements, the CAB must rescore PI 2.1.2 SI(e) for ORH3B ESCR to reflect *current* management practices in the fishery.** Assurances from managers about increasing observer coverage at some time in the future can be evaluated by the assessment team during surveillance audits to ensure that observer coverage in ESCR never falls below the 20% threshold.

Response:

Under CB3.6.6.2 d. the SG100 requirement states: "There is onboard observer coverage of all operations to provide evidence that shark finning is not taking place. Under GCR V1.3: GCB2.5.4 Percentage onboard observer coverage generally refers to fishing effort, although CABs may accept other expressions of coverage." To accept other expressions of coverage, the team should determine "…whether onboard observer data are representative of the activity of

the vessel during a year, and can be relied upon to have detected representative encounters with sharks ….” The Guidance gives examples of electronic monitoring and port sampling as examples of alternatives to onboard observers. The fishery has other elements that add assurance that shark finning does not occur. MPI has confirmed that confirming compliance with shark finning regulations, in addition to at-sea monitoring, occurs through in-port inspections, inspections of licensed fish receivers, detailed analysis of data collected through the comprehensive reporting requirements of the AMS, and retrospective analysis across all data sources (see MPI shark fin letter annexed to this response). The close relationship between DWG and MPI means that the industry has committed to the MPI conservation requirements. The catch of sharks is small, in the range of tens of tons. The amount of value in shark fins relative to the penalties for violations provides strong disincentives against occurrence of shark finning. The fishery enforcement in New Zealand puts a focus on preventing violations, including monitoring catches, both in person and electronically. The assessment team concluded that for ORH3B NWCR and ORH7A the extra monitoring conducted by MPI raises the default ‘good’ coverage achieved by exceeding 20% observer coverage to meet the requirement of CB2.5.7.2d “There is onboard observer coverage of all operations to provide evidence that shark finning is not taking place,” consistent with GCB2.5.4. The ESCR coverage has fallen below 20% in the past several years of the data series The assessment team concludes that for ORH3B ESCR the extra monitoring conducted by MPI raises the default ‘some’ coverage from greater than 5% but less than 20% observer coverage as equivalent to the requirement of CB2.5.6.2d “There is some onboard observer coverage or other equivalent evidence that shark finning is not taking place,” consistent with GCB2.5.4. Therefore, the ESCR is rescored to SG80 for PI 2.1.2e.

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ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 95 score.
A key element in information collection if the presence of MPI scientific observers on vessels.
As Peer Reviewer 2 noted:
Througrhout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.
There is no fishery species chapter for oreos in the Deepwater Management Plan. This chapter would be essential for considering the management of smooth oreo bycatch in the orange roughy fishery.
Smooth oreos assessment (OEO4) in this commentary for the Chatham Rise UOCs indicates it is trending downwards, it is below the target Biomass (B40%), “exploitation rates have steadily increased, and stocks is predicted to decline below 20%Bo by 2018.
The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.
The sustainability of deepwater sharks caught in the orange roughy fishery has been highlighted by the need for a risk assessment of all shark species. The level 1 risk assessment (Ford et al 2015) has listed four of the top five species as being caught in orange roughy fisheries including Baxter’s dogfish and seal shark.
Given these concerns an assessment closer to 60 would be more appropriate.
Revised Score:

- **All Stocks 65**

Response:
The issue of observer coverage rate was dealt with in the response to WWF. The team has added information in scoring justifications to acknowledge the observer coverage below 20% in ORH3B ESCR.

Section 1A of the National Plan for Deep Water and Mid-depth Fisheries http://deepwatergroup.org//wp-content/uploads/2013/08/MPI-2010-National-Fishing-Plan-Deepwater-and-Middledepth-Fisheries-Part-1A.pdf sets default management of all species, including smooth oreo; Section 1B provides additional specificity for several species. A chapter on oreos is available at http://deepwatergroup.org//wp-content/uploads/2013/03/2014-National-Deepwater-Plan-Oreo-Fishery-Chapter.pdf. The management plan sets minimum requirements for management that exceed requirements from most other national jurisdictions. The team has assurance from MPI that the management plan will continue in operation until replaced (see MPI letter annexed to this response).

The assessment team has demonstrated that management of smooth oreo has at least a partial strategy for managing this species as required for retained species. The team will monitor implementation of management for smooth oreo and orange roughy to assure that bycatch management continues to meet the MSC requirements.

The research plan is considered in PI 3.2.4; the 10 year plan (2010-2020) is still in place http://deepwatergroup.org//wp-content/uploads/2013/08/MPI-2010-10-Year-Research-Programme-for-Deepwater-Fisheries.-Ministry-of-Fisheries.-148p1.pdf (see also MPI letter annexed to this response).

The status of smooth oreo was considered in PI 2.1.1.

The status of main deepwater dogfish is considered in PI 2.2.1. The report by Ford et al. (2015) was issued after the assessment team scored the fisheries, so was not considered for this version of the report. The assessment team will consider this report at surveillance.

No evidence is presented by ECO to warrant changing any scores, other than shark finning as described in the WWF response.

PI 2.1.3
ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 85 score.
A key element in justification is the information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.
There is no fishery species chapter for oreos in the Deepwater Management Plan. This chapter would be essential for considering the management of smooth oreo bycatch in the orange roughy fishery.
Smooth oreos assessment (OEO4) is trending downwards, it is below the target Biomass (B40%), “exploitation rates have steadily increased”, and stocks is predicted to decline below 20%Bo by 2018.

The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.
The sustainability of deepwater sharks caught in the orange roughy fishery has been highlighted by the need for a risk assessment of all shark species. The level 1 risk assessment (Ford et al 2015) has listed four of the top five species as being caught in orange roughy fisheries including Baxter's dogfish and seal shark.
Given these concerns an assessment closer to 60 would be more appropriate.
Revised Score:

- **All Stocks 65**

Response:
These issues were all addressed in PI 2.1.2. No evidence is presented by ECO to warrant changing any scores.

No change in score resulted.

PI 2.2.1
ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 80 score.
The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.
The sustainability of deepwater sharks caught in the orange roughy fishery has been highlighted by the need for a risk assessment of all shark species. The level 1 risk assessment (Ford et al 2015) has listed four of the top five species as being caught in orange roughy fisheries including Baxter's dogfish and seal shark.
Given the risk assessment it is very doubtful that the claim in the report of "within biologically" based limits can be justified. Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.
Revised Score:

- **All Stocks 65**

Response:
The response given in PI 2.1.1 and 2.1.2 apply to the status of the Deepwater Plan and the Research Plan.

Of the numerous deepwater sharks and dogfish, only deepwater dogfish-Baxter's dogfish are caught in high enough amounts to qualify as Main. The report by Ford et al. (2015) was issued after the assessment team scored the fisheries, so was not considered for this version of the report. The assessment team will consider this report at surveillance. The justification for the score at 2.2.1 demonstrates results from trawl surveys showing stable biomass estimates; length frequencies that reach the maximum size of Baxter's dogfish and show regular recruitment; and the catch makes up a small proportions of the absolute abundance estimated. As detailed in the scoring justification, there is ample evidence that Baxter's dogfish/deepwater sharks are highly likely to be within biological limits.

No change in score resulted.

Greenpeace & DSCC: The orange roughy fishery is still lacking key information on at least some of the main by-catch species. NZ MPI has stated that if catch levels are deemed to be impacting on the sustainability of a by-catch population then by-catch species may be considered for possible introduction into the QMS, or other management measures may be

implemented, such as catch limits, gear restrictions or closed fishing areas (MPI, 2010a; Page 45). Yet without stock assessments for affected by-catch, the fishing managers will not know. MPI has also observed that orange roughy fishing is also known to interact with several species of sharks, many reported using generic codes for 'other sharks and dogfish' and 'deepwater dogfish', that are vulnerable to overfishing. (page 46)
By-catch is a significant issue. In the ORH3B Northwest Chatham Rise, Baxter's lantern dogfish are considered a main by-catch species because they have low productivity and high vulnerability, and reach the 1% threshold set for shark species (page 47), and in the RH3B East and South Chatham Rise, catches from the ORH3B ESCR UoA average about 100 t per year of Baxter's lantern dogfish and about 180 t of combined dogfish (Page 52).
The shovelnose spiny dogfish, *Deania calcea*, is caught in fairly large numbers by the orange roughy fishery yet there are no stock assessments and no management of the species under the New Zealand quota management system. (Punt et al. 2013). Other species of concern include the pale ghost shark, *Hydrolagus bemisi*, dark ghost shark, *H. novaezealandiae*, and the smooth skate, *Dipturus innominatus*.
It is simply not possible to state that species of deepwater dogfish are likely to be within their biologically based limits, given the lack of data and their poor reproductive output.

Response:
MPI uses risk assessments (e.g., Boyd 2013), survey results, and changes in catch quantities to monitor changes in risk to bycatch species. Of the dogfish and sharks, only Baxter's dogfish/deepwater dogfish reach the level for determination as Main. The scoring justification and the response to ECO explain how MPI uses this information to assess the stocks and track changes to risk.

No change in score resulted.

PI 2.2.2
WWF: WWF remains concerned that the 'catch-all' category applied to the deepwater shark bycatch category does not provide adequate species-level information for species with "low" resilience and "high to very high vulnerability." This is especially relevant given the lack of logbook records and the high level of misidentification of deepwater dogfish. Bycatch of unidentified dogfish as a 'catch-all' group may be substantial in some fishery management areas including ESCR (FMA 4; see Table 20 in the PCDR). Such uncertainty in taxonomic identification could make a material difference to how bycatch species are apportioned into 'scoring elements' (Table 29 in PCDR) prior to scoring.
WWF questions whether the existing management arrangements for deepwater dogfish (and other species exhibiting similar life characteristics such as low productivity and high susceptibility to fishing mortality) can be considered a 'partial strategy' that is sufficient to maintain these species within biologically based limits and not hinder recovery (scoring issue a of PI 2.2.2).

Response:
The 'other sharks and dogfish' are considered separate from deepwater dogfish. With only 0.73% of the catch in NWCR and 0.38% in ESCR, identification of other sharks by species would not increase sharks or non-deepwater dogfish above the 1% threshold for Main species when distributed among the several species in the category. Identification of deepwater sharks by species (at 1.06% in NWCR and 0.40% in ESCR) would not increase deepwater dogfish above the 1% threshold for Main species when distributed among the several species in the category. The two most recent years (Tables 16 and 19) demonstrate the reductions in unidentified sharks and unidentified deepwater dogfish. Better identification going forward will

substantially reduce or eliminate this as an issue. This demonstrates improvements to the already sufficient management of deepwater dogfish.

No change in score resulted.

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 85 score.
A key element in information collection if the presence of MPI scientific observers on vessels.
As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.
Moving a non-QMS species to the QMS may increase the risk to the species given the incentives in the New Zealand cost recovery regime for research and management.
The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.
The sustainability of deepwater sharks caught in the orange roughy fishery has been highlighted by the need for a risk assessment of all shark species. The level 1 risk assessment (Ford et al 2015) has listed four of the top five species as being caught in orange roughy fisheries including Baxter's dogfish and seal shark.
Given the risk assessment it is very doubtful that the claim in the report of "within biologically" based limits can be justified. Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.
Revised Score:

- **All Stocks 65**

Response:
The MRAG assessment team does not see increased risk to species by moving to a higher level of management (non-QMS to QMS). We do not see any incentive to target species with low to no value that would displace much more valuable species from the retained catch.

The issues of observer coverage, the Deepwater Management Plan and Research Plan, the sustainability of deepwater dogfish-Baxter's dogfish, and the Ford et al. risk assessment have been addressed previously.

No change in score resulted.

PI 2.2.3
ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 80 score.
A key element in information collection if the presence of MPI scientific observers on vessels.
As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.
Orange roughy are caught using bottom trawls and between 1588 and 5001 tows were undertaken annually targeting roughy between 2003-04 and 2012-13.

Anderson (2011) summarised the bycatch of orange roughy and oreo trawl fisheries from 1990–91 to 2008–09." In trawls "since 2005–06, orange roughy accounted for about 84% of the total observed catch and the remainder comprised mainly oreos (10%), hoki (0.4%), and cardinalfish (0.3%)."
"Rattails (various species, 0.8%) and shovelnose spiny dogfish (Deania calcea, 0.6%) were the species most adversely affected by this fishery, with over 90% discarded. Other fish species frequently caught and usually discarded included deepwater dogfishes (family Squalidae), especially Etmopterus species, the most common was probably Baxter's dogfish (Etmoptertus baxteri), slickheads, and morid cods, especially Johnson's cod (Halargyreus johnsonii) and ribaldo. In total, over 250 bycatch species or species groups were observed, most were noncommercial species, including invertebrate species, caught in low numbers. Squid (mostly warty squid, Onykia spp.) were the largest component of invertebrate catch, followed by various groups of coral, echinoderms (mainly starfish), and crustaceans (mainly king crabs, family Lithodidae)" (MPI 2014)
"Total annual bycatch in the orange roughy fishery has been as high as 27 000 t but has declined with the TACC and was less than 4000 t between 2005–06 and 2008–09 (non-commercial species comprising only 5–10% of the total). Total annual discards also decreased over time, from about 3400 t in 1990 –91 to about 300 t in 2007–08 and, since about 2000, has been almost entirely of non-QMS species (rattails, shovelnose spiny dogfish, and other deepwater dogfishes)."
It is unknown whether the bycatch and discards are sustainable in this fishery. Some of the species discarded are relatively long lived (eg rattails) or have low resilence and high vulnerability to fishing.
The impact of bottom trawling on corals is likely to be significant with high sensitivity to trawling and long recovery times in the order of decades if not centuries.
"Tracey et al (2011) analysed the distribution of nine groups of protected corals based on bycatch records from observed trawl effort from 2007–08 to 2009–10, primarily from 800–1000 m depth. For the orange roughy target fishery, about 10% of observed tows in FMAs 4 and 6 included coral bycatch, but a higher proportion of tows in northern waters included coral (28% in FMA 1, 53% in FMA 9)." (MPI 2014)
Tracey et al (2012) noted in a study of a seamount complex on the North Chatham Rise which had been targeted for orange roughy – "The study showed that fish assemblages on seamounts can vary over very small spatial scales, in the order of several km. However, patterns of species similarity and abundance were inconsistent across the seamounts examined, and these results add to a growing literature suggesting that faunal communities on seamounts may be populated from a broad regional species pool, yet show considerable variation on individual seamounts."
The impacts of trawling on seamounts and the potential recovery time of the diversity that is there could take centuries to recovery from just one trawl. As Clark et al (2015) observed: "many deep-sea invertebrates are exceptionally long-lived and grow extremely slowly: these biological attributes mean that the recovery capacity of the benthos is highly limited and prolonged, predicted to take decades to centuries after fishing has ceased." Protected deep sea corals are amongst those long-lived invertebrates. (Tracey et al 2003).
Reporting of non-quota management species and non-target fish species (eg corals) relies on reporting from observers. Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.

Revised Score:

- **All Stocks 65**

Response:

The issue of observer coverage has been addressed previously.

Corals and Seamounts are not bycatch, and information for these categories is addressed in PI 2.3.3 and 2.4.3, respectively.

The information for bycatch has been addressed in previously above. In spite of the long list of bycatch species provided in this comment, we have justified the Main and Minor species, and have appropriately laid out the information that supports status and management.

No change in score resulted.

PI 2.3.1

WWF: Overall, the PCDR appears to have summarized information from a wide range of studies and diverse data sets to evaluate the severity of impacts to ETP coral species. In particular, the CAB has drawn extensively from the most recent NIWA technical reports by Clark et al. (2015), Roux et al. (2014), and Black et al. (2015).

WWF considers the presentation of this information selective in terms of both the truncated time frame of the data that is summarized (primary consideration is given to data from the most recent five years) and the conclusions that are drawn from this data relative to the requirements of the MSC Principles and Criteria. Overall, the CAB gives the impression that it is attempting to apply a simplified metric to a complex issue by using only the overlap of the trawl footprint with coral distribution. Clark et al. (2015) state: "Evaluating the extent of impacts depends not just on the overlap of the total footprint, but understanding also the direction of tows, length of tow, and frequency of trawling. The aspects of direction and length of tow are particularly important on UTFs, where there is considerable variability in both."

It is clear from the methodology and results presented by Black et al. (2015) that detailed analyses of the extent of fishing on UTFs can be conducted and that these results indicate that, for UTFs where fishing has occurred, approximately 50% of the total UTF area has been trawled. This is approaching a level that may impair the viability of some coral communities (Clark et al. 2015). Given the potential severity of the impacts to date on ETP coral communities, **WWF stresses the need for clear and decisive actions to protect ETP corals resulting from the conditions related to ETP corals set by the CAB** (see below).

It has been suggested that sediment clouds raised by deep water trawling may have indirect impacts upon the adjacent deep-sea benthos (Consalvey et al. 2006, Clark and Anderson 2013), although these impacts are difficult to quantify (Clark et al. 2015). Sedimentation has been demonstrated to impact deep-sea sponge respiration (Tjensvoll et al. 2013), however the impact of sediment plumes remains speculative for deep-sea corals and it is not known over what spatial and temporal scales it may be relevant (Clark et al. 2015). Despite the fact that the best available science says that we don't understand the indirect effects of sedimentation and that additional research is needed, the assessment team concludes that "indirect effects have been considered and are thought to be unlikely to create unacceptable impacts to ETP corals" under PI 2.3.1 scoring issue c at SG80. **WWF asserts that this conclusion is incorrect based on the information provided to the assessment team (e.g. Clark et al. 2015) indicating that indirect effects on corals due to sedimentation of ETP corals resulting from trawling may be a serious issue.**

Also, the assessment team recognizes (PCDR, p. 64) that UTF habitats may be less susceptible to indirect impacts from trawling than slope habitats because of the predominance of hard substrata in the former (Clark et al. 2010). However, given the current paucity of information about the effects of sedimentation on these deepwater benthic communities generally, **WWF contends that it would be premature to separate the scoring of ETP corals under PI 2.3.1(c) based on differences in habitat type**.

The PCDR does not adequately describe the methods used by Clark et al. (2015) to map the overlap between ETP corals and the trawl footprint in each UoA. In particular, the difference

between the total footprint and the single swept area should be defined in the text to clarify the figures and summary data that are presented. In the interest of transparency, the CAB should also clearly explain that all trawls with a similar start/finish position were excluded from the trawl footprint calculations (Black et al. 2013; Clark et al. 2015). Clark et al. (2015) state that "these short tows are frequently associated with orange roughy target fishing around the summits of UTFs, regions which provide important habitat for cold water corals (Rowden et al. 2010)." It is also important that this source of impact to UTFs is quantified and discussed in the PCDR. By excluding this information, the CAB has relied on a minimum estimate of overlap. **This does not provide an accurate assessment of the total trawl impact on ETP coral species and the habitats in which they occur and may have upwardly affected the scoring.**

Response:

Response to the specific point about heavier reliance on the most recent 5-year time series rather than the total historical time series for orange roughy trawl overlap with coral habitat is presented below under WWFs specific comment about this aspect of the report.

Concerning the separation of scoring of ETP corals under 2.3.1(c) based on different habitat types, this has not been done here—ETP corals have been treated as one 'scoring element' for each of the three UoA areas in the ETP performance indicators, and we have determined that corals do not meet the SG100 guidepost for this scoring issue. For the habitat performance indicators, we identified two scoring elements (UTF and slope) based on the MSC guidance suggesting that habitats be classified according to the substratum, geomorphology, and biota (SGB) characteristics, which clearly means that slope habitat and UTF habitat are different enough to consider as two separate habitat types. See also the response to WWF regarding assessment of corals as ETP vs habitat, below.

Concerning the impacts of sediment plumes and other potential disturbances to coral communities caused by orange roughy fishing, as stated in the assessment report:

UTFs considered to be heavily fished still contain diverse assemblages of corals and other epibenthic fauna and no difference in species numbers or community structures in coral-dominated UTFs within or outside of protected areas (coral dominance indicated no or only light fishing) has been observed (Consalvey, 2006; Clark et al., 2015b). This suggests that coral diversity continues to be maintained on fished UTFs, as most UTFs are fished only on established tow lines, leaving areas of many UTFs unfished because the seabed is too rough or steep to trawl, or where orange roughy do not aggregate. Recent information from trawl surveys supports a conclusion that coral will remain well established on fished UTFs, although not at the density prior to trawling.

In addition, although it is not mandated by management, orange roughy fishing does tend to follow established tow lines on fished UTFs because these are where orange roughy tends to aggregate, conditions are suitable for trawling, and therefore these are the most efficient places to catch them. Confidential tow-by-tow information provided to the assessment team confirms this to be the case; therefore, we are confident that our evaluation of this performance indicator with respect to direct and indirect impacts to ETP corals is appropriate.

Regarding sediment re-suspension, if there are areas where sediment exists, it is unlikely that they will hold much coral, as these organisms need clean, hard substrates to attach to. Neither steep nor hard substrates on UTFs would be expected to hold much sediment, so, the risk to corals from sediment resuspension is low.

No change to the score has been made; however, the above paragraph from the text of the assessment report has been copied into the rationale for scoring issue (c).

BLOOM: This performance indicator aims to evaluate whether "*the fishery meets national and international requirements for the protection of ETP species*" and whether "*the fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species."*
It is acknowledged in the PCDR that *"in the absence of ground-truthing of the predictive model, and the fact that the trawl fishery does expand to new areas (albeit at a very slow and continually reduced rate), it is not possible to determine that the fishery does not pose a risk of serious or irreversible harm to ETP coral species in these areas with high likelihood as defined by the MSC standard"* and that *"On balance, it is possible that on the scale of the UoAs, due to the large overlap between the orange roughy fishery, particularly on the Chatham Rise, and observed coral distributions, could be having an impact on the ability for ETP coral species to recover from disturbance."*

- The score given by MRAG for this performance indicator is 75, with the associated condition to implement an action plan for the next five years aiming to *"increase our understanding of the direct effects of fishing on ETP coral so as to reduce uncertainty in relation to the impacts of fishing on ETP coral"* and then be able to *"report with improved certainty the likelihood of unacceptable impacts of the (...) fisheries on ETP coral such that the SG 80 will be met for each fishery."*

Again, **this condition/action plan does not look like a solid-enough counterpart to uncertainties in the current assessment of the impact of the fishery on ETP coral species. The review of coral bycatch literature compiled in the PCDR speaks for itself and is inconsistent with granting a score as high as 75**.
Coral bycatch (PCDR p63-64)
"Coral bycatch from the orange roughy fisheries on the Chatham Rise includes black corals, stony branching and cup corals, and dead coral rubble, with relatively smaller catches of bubblegum coral, precious coral, other gorgonians (such as primniods and plexaurids) and hydrocoral. (...) Baird et al. (2012) also modelled the distribution of the corals and predicted the areas likely to have the greatest probability of coral occurrence were outside the main fisheries areas, except for some deepwater fisheries that occurred on areas of steeper relief. This study concluded the fisheries that pose the most risk to protected corals are the deepwater trawl fisheries for species such as orange roughy, oreo species, black cardinalfish, and alfonsino. Tracey (2011a) and Consalvey (2006) concluded that the overlap of coral distribution and the fishing activities, combined with corals low productivity long recovery period, makes deep-sea coral populations especially vulnerable to damage by fishing gear. The fishery areas of highest risk to protected corals are the deepwater fisheries targeting orange roughy and oreo on UTFs, including those on the northern and southern slopes of the Chatham Rise (Tracey, 2011a). This is consistent with a study by NIWA (2015) indicating the potential damage that trawling can have on deep-sea coral communities in fished areas."
"Regarding indirect trawling impacts, MPI's (2015) literature review indicates that trawling has been shown to create a substantial sediment plume, that in low-current deep-sea environments can disperse very slowly, over large distances (Bluhm, 2001, Rolinski et al., 2001). There have been no-specific studies examining sediment mobilization by fishing gear in deep-sea fisheries but sediment plumes generated through trawling over soft substrate have potential impacts on ETP coral species through smothering of small individuals (Glover & Smith, 2003) and preventing settlement of juveniles (Rogers et al., 1999) with deposition of mm to cm depth. Impacts on coral feeding and metabolic function are uncertain, although shallow water stony corals can actively shed sediment (Riegl, 1995) and potentially cope with a sediment plume but deep-sea sponge respiration has been reported as largely shutting down when subjected to

heavy sedimentation loads (Tjensvoll et al., 2013). Sediment impacts are likely to be higher on Goniocorella dumosa *communities as they are distributed over slope habitat of the Chatham Rise dominated by soft sediment interspersed with hard substrate patches. The longer trawl tows on the slope will tend to generate greater sediment clouds than would the shorter tows typical of UTF fishing. Sediment effects will be less on coral assemblages on UTFs where the substratum is typically rocky, with only small patches of interspersed soft-sediment (Clark et al., 2010)."*

"According to Black et al. (2013), there have been no studies investigating whether the current trawling activities have had adverse effects on the structure and function of benthic communities, or on the productivity of the associated fisheries. In the orange roughy fishery on the Chatham Rise, which occurs primarily between depths of 800 – 1,200 m, there is evidence that fishing effort has shifted geographically over time in response to changes in catch rates on individual hills (MPI, 2012). While the fishery has moved into new areas each year, the rate of additional 'new area' subjected to trawling in each successive year has continued to decline throughout the time series (Black et al., 2013). In 2009-10 new area amounted to 3,208 km^2, which is 4% of the 2009-10 trawl footprint of 79,512 km^2 and less than 1% of the cumulative swept area for the period 1989-90 to 2009-10 of 385,032 km^2."

(PCDR p75)

"However, UTFs considered to be heavily fished still contain diverse assemblages of corals and other epibenthic fauna and no difference in species numbers or community structures in coral-dominated UTFs within or outside of protected areas (coral dominance indicated no or only light fishing) has been observed (Consalvey, 2006; Clark et al., 2015b). This suggests that coral diversity continues to be maintained on fished UTFs, as most UTFs are fished only on established tow lines, leaving areas of many UTFs unfished because the seabed is too rough or steep to trawl, or where orange roughy do not aggregate. Recent information from trawl surveys supports a conclusion that coral will remain well established on fished UTFs, although not at the density prior to trawling."

(PCR p76-77)

"Cold water corals are fully protected under the Wildlife Act 1953. Interactions with fisheries are monitored through the MPI's Scientific Observer Programme and vessel reporting; however, there is no overall management plan (Boyd 2013). The orange roughy fishery is spatially managed with defined areas where bottom trawling or all trawling is prohibited (e.g., benthic protected areas (BPAs), 'seamount' closures), which provide some protection for corals. Managed areas have closed approximately 68% of UTFs within New Zealand's EEZ and 74% of UTFs within the Kermadec Bioregion to trawling (Table 26); the remaining open areas allow for potential expansion of trawling beyond the current footprint of the fishery. If the protection of corals from trawling in the orange roughy also relies on fishing only on established tow lines, a mechanism for how the restriction to these tow lines occurs is not clear from the available information."

Response:

The ETP Performance Indicators included several "scoring elements" as listed in Table 29 of the report grouped into species categories (mammals, birds, sharks, and corals). The assessment team determined that only corals in ESCR and NWCR failed to meet the 80 scoring benchmark for scoring issue b. Because the other scoring elements did achieve the 80 level, using the MSC 'scoring elements' procedure laid out in CR v1.3 Table C2, the overall PI score was determined to be 75.

Bloom seems to agree that the assessment and scoring of the coral scoring element is appropriate, but takes issue with the language of the associated condition. A justification for

condition and action plan language is given below under the WWF comment under the heading "Condition 3," below.

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 75 or 95 score.
A key element in information collection if the presence of MPI scientific observers on vessels.
As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.
Orange roughy are caught using bottom trawls and between 1588 and 5001 tows were undertaken annually targeting roughy between 2003-04 and 2012-13. Much of this fishing effort is on seamounts, hills and other features (Black et al 2013). Of these 94% were tows between 700 and 1200m.
The orange roughy fishery captures fur seals and albatross and petrels.

- Average rate of capture of fur seals is 0.06 per 100 tows (excluding cryptic mortality) between 2002-03 and 2012-13 (up to 9 per year) which is "very low compared with NZ other trawl fisheries";
- Average rate of capture of seabirds is 0.48 per 100 tows (excluding cryptic mortality) between 2002-03 and 2012-13 (up to 77 per year) which is a "very low rate relative to other trawl fisheries".

Salvin's albatross was the most frequently caught albatross (46%) while sooty shearwater was the most frequently caught petrel. Fisheries on the Chatham Rise had the highest reported captures.
The measures applied to date to reduce seabird captures in trawl fisheries have not affected the bycatch rate in fishery in the last 10 years.
There are specific threats to species from trawl bycatch. The Salvin's albatross, a vulnerable threatened species (Birdlife 2012), has the highest risk from fishing rating of all seabirds assessed in New Zealand (Richards 2013). For this species "captures rates have fluctuated without trend or increased in all fisheries taking substantial numbers of this species between 2002–03 and 2012-13, especially after 2006–07." Trawl fisheries "account for 75% of all estimated captures of Salvin's albatross in these years." About 25% of the impacts in the combined middle-depth fishery.
"Salvin's (vulnerable threatened species), southern Buller's (at risk – nationally uncommon), and NZ white-capped (at risk declining) albatrosses make up 39%, 28%, and 25% of the albatrosses captured, Respectively." For all three species the annual potential fatalities (APF) (including cryptic mortality) exceed the estimate of potential biological removals (PBR), assuming an inappropriate recovery factor (f) of 1 (MPI 2014). Dillingham and Fletcher (2011) noted: "A value of f = 0.1 is suggested for threatened species, f = 0.3 for near-threatened species, and f = 0.5 for all other species due to the potential for bias in population estimates (Wade, 1998; Dillingham and Fletcher, 2008)." For Salvin's, a vulnerable threatened species, the estimated potential fatalities (APF) was 35 times the PBR, with f= 0.1 for a threatened species. Orange roughy trawl fishery is part of this assessed impact.
The National Plan of Action on Seabirds for New Zealand (2013) has goals to reduce by-catch but no new measures are in place and no new measures have been applied to reduce bycatch.
Other issues relevant to this criterion include:

- Management has not defined significant habitats.
- No bioregions have been determined in the main trawling areas in follow-up research.

- Fishery catches many protected coral habitats, and land mainly Scleractinia, with some gorgonians and hydrocorals also landed.
- Significant gaps in knowledge for habitat.

Rice (2006) reviews the impacts of trawling. The *"conclusions about the effects on habitats of mobile bottom fishing gears were that they:*

- *can damage or reduce structural biota (All reviews, strong evidence or support).*
- *can damage or reduce habitat complexity (All reviews, variable evidence or support).*
- *can reduce or remove major habitat features such as boulders (Some reviews, strong evidence or support).*
- *can alter seafloor structure (Some reviews, conflicting evidence for benefits or harm)." (MPI 2014)*

"The trawl fisheries for orange roughy, oreos, and cardinalfish take place to a large extent on seamounts or other features (Clark & O'Driscoll 2003, O'Driscoll & Clark 2005). These features are often geographically small and, in common with other, localised habitats like vents, seeps, and sponge beds, do not appear on broad-scale habitat maps (e.g., at EEZ scale) and cannot realistically be predicted by broadscale environmental classifications." (MPI 2014).

Most of orange roughy catch comes from seamounts (including hills and ridges). O'Driscoll and Clark (2003) reported that 59.5% of effort and 62.4% of catch targeted on orange roughy comes from seamounts.

The impact of bottom trawling on corals is likely to be significant with high sensitivity to trawling and long recovery times in the order of decades if not centuries.

A large number of researchers have noted a high degree of endemism associated with seamounts. De Forges et al (2000) noted that:

> *"Seamounts comprise a unique deep-sea environment, characterized by substantially enhanced currents and a fauna that is dominated by suspension feeders, such as corals."*
> *"Low species overlap between seamounts in different portions of the region indicates that the seamounts in clusters or along ridge systems function as 'island groups' or 'chains,' leading to highly localized species distributions and apparent speciation between groups or ridge systems that is exceptional for the deep sea. These results have substantial implications for the conservation of this fauna, which is threatened by fishing activity."*

This endemism is likely to mean that the classification system devised by Rowden et al (2005) will under-estimate the biodiversity on seamounts. For example, fish species diversity on some seamounts has also been reviewed by NIWA scientists (Tracey et al 2004). Tracey et al (2004) found there was clearly different fish fauna on seamounts north and south of 41^{o}S and that in 10 seamount complexes there was different species richness. Even within a seamount complex they found different species dominating different seamounts.

"Tracey et al (2011) analysed the distribution of nine groups of protected corals based on bycatch records from observed trawl effort from 2007–08 to 2009–10, primarily from 800–1000 m depth. For the orange roughy target fishery, about 10% of observed tows in FMAs 4 and 6 included coral bycatch, but a higher proportion of tows in northern waters included coral (28% in FMA 1, 53% in FMA 9)." (MPI 2014)

Tracey et al (2012) noted in a study of a seamount complex on the North Chatham Rise which had been targeted for orange roughy – "The study showed that fish assemblages on seamounts can vary over very small spatial scales, in the order of several km. However, patterns of species similarity and abundance were inconsistent across the seamounts examined, and these results add to a growing literature suggesting that faunal communities on seamounts may be populated from a broad regional species pool, yet show considerable variation on individual seamounts."

The impacts of trawling on seamounts and the potential recovery time of the diversity that is there could take centuries to recovery from just one trawl. As Clark et al (2015) observed:

"many deep-sea invertebrates are exceptionally long-lived and grow extremely slowly: these

biological attributes mean that the recovery capacity of the benthos is highly limited and prolonged, predicted to take decades to centuries after fishing has ceased."
Protected deep sea corals are amongst those long-lived invertebrates. (Tracey et al 2003). Corals collections from trawl nets have been aged at 300-500 years old for bubblegum coral (*Paragorgia arborea*), at least 300-500 years for bamboo corals (*Keratoisis sp.*) and deep-sea stony corals have reported ages of 50 to 640 years (*Enallopsammia rostrata*).
The sustainability of deepwater sharks caught in the orange roughy fishery has been highlighted by the need for a risk assessment of all shark species. The level 1 risk assessment (Ford et al 2015) has listed four of the top five species as being caught in orange roughy fisheries including Baxter's dogfish and seal shark.
Given the risk assessment it is very doubtful that the claim in the report of "within biologically" based limits can be justified. Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.
Revised Score:

- **All Stocks 65**

Response:
The assessment team is aware of, and has reviewed, the studies cited above by the commenters, as well as several other more recent studies and reports, and has determined that the scores and their supporting rationales are appropriate in light of the evidence and information available on the impacts of the orange roughy fishery in the UoA areas on ETP species. Specifically regarding the comments on Salvin's albatross, we note that it is actually Black Petral with the highest risk rating rather than Salvin's albatross.

A number of the statements made refer to 'all trawl fisheries' and are thus not relevant to the assessment of these UoCs which represent a relatively small proportion of the overall fishing effort in these areas.

Specific to the comments about seabirds, our report and rationales clearly lay out the available data on captures and mortalities resulting from orange roughy fishing in relation to the Potential Biological Removals, and in relation to the impacts of fisheries as a whole. As explained under our responses to the comments on the habitat indicators, the MSC standard for Principle 2 requires us to look at the impacts of the Units of Assessment only, rather than the total cumulative impacts of all fishing on ETP species. We have demonstrated with the low number of encounters of the fisheries with Salvin's albatross and other sea birds that the fisheries, in the absence of other impacts, will not hinder recovery of Salvin's albatross or other ETP seabirds. This is consistent with the GCR GCB3.2 "The assessment is based on the 'marginal contribution' that this fishery makes to the status or recovery of the component under consideration. This could be determined in a practical way by examining likely population trajectories if all the other fisheries reduced their catches to zero (i.e., the only catches were being taken by the fishery under assessment). If the fishery is not the root cause of human impacts on the component then actions of the fishery cannot redress the situation." The judgement of the assessment team regarding impacts to these ETP groups from the orange roughy fishery in the UoA areas has been documented in detail in the assessment report and we consider it to be appropriate.

No change to the scores or rationales has been made.

Greenpeace & DSCC: Bottom trawls in the New Zealand orange roughy fishery target seamounts on which vulnerable marine ecosystems have formed over thousands of years. Bottom trawlers destroy coral, sponges and other species and vulnerable marine ecosystems.

These impacts are a central concern for the Submitters, and are an insurmountable problem for the applicants. Coral bycatch from the orange roughy fisheries on the Chatham Rise includes black corals, stony branching and cup corals, and dead coral rubble, with relatively smaller catches of bubblegum coral, precious coral, other gorgonians (such as primniods and plexaurids) and hydrocoral. (page 65) The overlap of coral distribution and the fishing activities, combined with corals low productivity long recovery period, makes deep-sea coral populations especially vulnerable to damage by fishing gear. (page 66)
Some misconceptions need to be addressed. Firstly, it is sometimes claimed that the footprint of the trawl fishery is small. This is both wrong in fact and completely misleading. The fact is that a significant area of each type of habitat has been impacted by bottom trawlers, which target seamounts. Cumulative impacts and connectivity between ecosystems means that this claim can be given no credibility. For instance, the assessment claims that “[o]f the 1.1% of the SPRFMO Convention Area that is shallower than 2,000 m, about 0.5% is deeper than 1,500 m and thus deeper than orange roughy fisheries normally operate, has never been fished and is not within any footprint declared to SPFRMO. This means that >99% of the SPRFMO Convention Area is not within any bottom fishing footprint declared to SPRFMO and is closed to bottom trawling.” (Page 77) This logic fails: the issue are the VMEs that are damaged and destroyed by orange roughy fishing, not the areas that are not.
Secondly, it is sometimes claimed that impacts are restricted to the trawl footprint. However, sediment clouds affect surrounding areas.
Thirdly, it is sometimes claimed that trawls follow established tow lines. Yet there is no evidence that this is the case and that trawls do not in fact impact new areas, and evidence of corals and sponges being caught in nets underline that the reverse is the case. This is itself a problem. There are no prior assessments of areas before they are trawled, and without that, there can be no confidence that new vulnerable marine ecosystems (VMEs) are being destroyed or damage. As MRAG notes, “Recent information from trawl surveys supports a conclusion that coral will remain well established on fished UTFs (Underwater Topographic Feature), although not at the density prior to trawling.” (pages 77- 78). In other words, coral has been destroyed.
Another ecosystem issue is that of removal of orange roughy biomass on the ecosystem, its biodiversity and related groups or species.
In summary, there is no basis for awarding SG60, far less SG80, based on the damage to coral. The draft assessment that SG80 level is not met for NWCR and ESCR with regard to ETP coral species due to unacceptable impacts is supported by the submitters, but this conclusion should also have been reached for ORH7A.

Response:
As stated in the report, the main information used to make the distinction in scoring between the two Chatham Rise UoAs and the ORH7A UoA is the trawl footprint overlap analysis by Clark et al. (2015), which shows that in ORH7A, both observed and predicted overlap of the orange roughy fishery footprint with the habitat in which protected corals reside is less than 20%, whereas observed overlap is higher in the other two UoAs. With this relatively low level of overlap, and the additional tow-by-tow information available to the assessment team, we stand by our determination that in ORH7A, that the 80SG is met for scoring issue (b), requiring that direct effects are highly unlikely (no more than 20%) to create unacceptable impacts to ETP coral species as defined by the MSC standard in the ORH7A UoA.

No change to the rationale or score has been made.

PI 2.3.2
WWF: The MSC guidance (GCAB3.2) states that "irreversible harm from fishing includes very slowly reversible harm that is effectively irreversible on timescales of natural ecological

processes (e.g. natural perturbation, recovery and generation times in the absence of fishing, normally one or two decades but may be shorter or longer depending on the species and ecosystem concerned)."

The relevant national legislation, the NZ Fisheries Act of 1996 only requires that the fishery minimize impacts on protected and endangered species, including ETP corals. **It is not clear to WWF that the MSC requirements for a sustainable management strategy are currently met for this fishery for the protection of ETP corals.** Clark et al. (2015) states that "the repetitive nature of much of the trawling footprint implies that where fishing has occurred, damage to the ETP coral assemblages is likely to have been considerable" and that "there is no indication of any recovery of stony corals."

WWF is concerned that throughout the PCDR the CAB relies on the fishery trawling predominantly along existing trawl corridors and only expanding at a slow and decreasing rate to new areas as a "measure" to ensure the protection ETP corals. In the scoring rationale for PI 2.3.1(a) the CAB specifically states that "*measures* such as closed areas and limited trawl lines apply to the fisheries." Again under PI 2.3.2(b) the CAB cites "the practice of using the same tow paths" as evidence of a strategy that is being implemented successfully. It is incorrect and misleading to imply that this is a precautionary management measure that will prevent serious or irreversible harm to ETP coral species. **WWF questions whether the fishery meets SG80 for any of the scoring guideposts under PI 2.3.2 until management measures restricting the expansion of the fishery footprint and minimizing the impact on corals are actually in place.**

MSC certified fisheries are required to apply the precautionary principle under the MSC Standard. The MSC clearly states that a lack of scientific certainty shall not be used as a reason for not taking management action. Specifically, management actions shall be more precautionary (conservative) in conditions of higher uncertainty (Table AA1). The bottom line is that there are no existing management measures or restrictions in place preventing the fishery from expanding into new areas except for the limited closures, which exist primarily outside of the fishery footprint and cannot be taken into account. A reliance on the persistence of recent fishing patterns indicating that vessels tend to fish in the same trawl corridors does not constitute a management measure. The only existing management measures actually in place that protect ETP corals within the current trawl footprint are the existing UTF closures, however only a small percentage of UTFs are actually closed to trawling: 6% (n=5) in the ESCR; 12% (n=3) in the NWCR; and, 0% (n=0) in the Chall-Wpac UoAs (Table 26).

Furthermore, it is not possible for WWF to determine from the information presented in the PCDR how many of the closed UTFs have been previously bottom trawled. At least one of the "closed" UTF features (the seamount named "Morgue" in the Graveyard Seamount Complex on the NWCR) was heavily impacted by bottom trawling before the closure was enacted in 2001 (Clark and Anderson 2013). This issue is particularly disturbing given that the new MSC Fishery Standard (FSR2.0) was extensively revised to incorporate explicit criteria for the regular reviews of the potential effectiveness and practicality of alternative measures to minimize UoA-related mortality of ETP species. Although the orange roughy fishery is being assessed under version 1.3 of the MSC Standard, it is not unreasonable to expect the CAB to pay more rigorous attention to this issue given the clear mandate set the MSC regarding this issue.

In addition, on page 153, MRAG asserts that the fishery meets the SG100 level of scoring issue (c) for PI 2.3.2 in regards to precautionary management strategies for endangered, threatened and protected species. The scoring rationale says "*Good observer and VMS data on fishery interactions with protected species (including avoidance of protected corals inside and outside of BPAs; and the 100% observer coverage and VME-focused move-on rule outside the EEZ), and compliance with vessel operational procedures such as those designed to minimize capture of seabirds, provides clear evidence [sic.] that the strategies described above are being implemented successfully.*" But MRAG does not describe VME-focused move-on rules

anywhere else in the PCDR. The list of citations does not identify where this information comes from. WWF is aware that SPRFMO had enacted “interim” measures to protect VMEs which included a move-on rule but their objective was to identify unknown VMEs (Penny et al. 2009). The original authors have since investigated the effectiveness of protective measures in SPRFMO convention area and found them to be “sub-optimal” (see Penny and Guinotte 2013). More generally, scientists are now questioning whether move-on rules are an appropriate tool for protecting seamount communities (e.g. Clark et al. 2016). **WWF concludes that the rationale given by MRAG is unsupported and the score of 100 is not justified based on available information**.

As described above, FCR version 1.3 clearly states that the fishery must have in place precautionary management strategies designed to ensure the fishery does not pose a risk of serious or irreversible harm to ETP species, does not hinder recovery of ETP species, and minimises mortality of ETP species. **A management strategy that meets these criteria is not in place in this fishery.** WWF understands that the fishery poses a risk of serious or irreversible harm to ETP species, hinders recovery of ETP species, and even increases mortality of ETP species.

Response:

For ETP corals, concerning scoring issue (c), the requirement at SG100 is for clear evidence that the strategy (or partial strategy as clarified by MSC) is being implemented successfully. The requirement at the SG80 level is for ‘evidence’ rather than ‘clear evidence,’ and MSC provides no further interpretation to help in distinguishing between what is clear evidence and what is merely evidence. However, given the difference between the management measures already in place for birds, mammals and sharks, and the fact that the equivalent is still in development for corals, the assessment team has decided to reduce the score for scoring issue (c) for corals to 80. The overall score for the PI however has not been revised as a result due to MSC requirements regarding scoring of PIs with multiple scoring elements.

In addition, a paragraph has been added to the report in the habitats section to describe SPRFMO and conservation and management measures relevant to this fishery.

Regarding the requirements in v2.0 vs. 1.3 of the MSC assessment standard, we carried out this assessment under v1.3 and will consider any changes as a result of 2.0 in subsequent assessments in the future.

Regarding the assertion by WWF that existing BPAs and other closures do not constitute measures restricting the impact of trawling on ETP corals, we respectfully disagree. The consistent actions of the NZ government to designate representative sensitive habitat within its EEZ and close them to bottom fishing, and in some cases all extractive activities, are part of a strategy to restrict the impact of trawling to ETP corals. It is true that many of these areas are in places where the fishery has not operated, but this doesn’t mean that they are not effective in protecting these areas or restricting access to them.

As a result of the WWF and other comments related to footprint of the fisheries, the assessment team considered the management issues more broadly than the original scoring justification. In addition to the information presented in the scoring rationale, the team has added two considerations:

1. The requirement of the Harvest Control Rule to restrict the size of the fishery in terms of allowable removals and thus controlling fishing effort constitutes a ‘measure’ that forms part of the partial strategy. We recognize that this restriction is relative to the size of the stock; however, prior to the adoption of the current HCRs in these areas, there was no

such restriction on effort. Under the current target species management arrangements, it will not be possible for the fishery to expand to anything close to historically high levels, even with high stock abundances. Given the recent lower quotas, the fishermen have incentives to make better use of their time and resources by fishing on fish plumes over the slope than by fishing on UTFs; as there is less need to conduct the more difficult and risky fishing operations on UTFs the amount of fishing there has declined. This provides further evidence that the likelihood of rapidly expanding trawl footprint under the current management system is low.

2. Although the New Zealand MPA policy containing the habitat protection standard is under redevelopment and thus not ready for implementation, there is evidence of a continual evaluation of a variety of different impacts, including those from fishing, on important habitats, and ongoing designation of MPAs as a result of these evaluations. This allows the assessment team to be confident that this is an active area of work within the NZ management system and therefore adds to the evidence that the partial strategy described within the scoring rationale is being implemented successfully. Evidence of continued review and implementation of requirements that benefit habitat is provided by the current process underway to redesignate the large BPA around the Kermadec Islands as a fully protected Marine Reserve where all fishing and other extractive activities will be prohibited.

As stated in the scoring rationale for this PI, the assessment team has determined that the MSC requirements pertaining to management of impacts to ETP coral species meets the SG80 guidepost for all scoring issues. The score was changed as noted above, but has not been reduced below 80.

BLOOM: This performance indicator aims to evaluate whether "*relevant information is collected to support the management of the fishery impacts on ETP species, including: information for the development of the management strategy; information to assess the effectiveness of the management strategy; and –information to determine the outcome status of ETP species*.**"**
It is acknowledged in the PCDR that: *"Although there has been analysis on the distribution of corals and its overlap with orange roughy fisheries in the three UoC areas as well as contained within BPAs in these areas (MPI 2015), the large discrepancy between observed and predicted occurrences of coral and the commensurate large discrepancy in observed vs predicted degree of overlap of protected corals with the orange roughy fisheries creates uncertainty in determining whether the fishery may be threat to the protection of these species."*

- The score given by MRAG for this performance indicator is 75, with the assumption that "*by the end of the certification period information must be sufficient to determine whether the fishery may be a threat to protection and recovery of ETP coral species*". If we understand correctly, MRAG is suggesting that the fishery should be certified before we know whether the NZ orange roughy has an impact on ETP coral species. Given the extensive scientific evidence on the impact of deep-sea bottom trawling on deep-sea corals, such a risky approach should not be endorsed by a “sustainable seafood” label.

Response:
The MSC requirements for ‘outcome’ (i.e. performance indicators x.x.1) in Principles 1 and 2 revolve around the need for certain levels of certainty about impact or lack of impact. For 2.3.1, the SG60 requires known direct effects to be unlikely (defined by MSC as no more than a 30% probability) to create unacceptable impacts, whereas the SG80 level requires that direct effects are highly unlikely (no more than 20% probability) to create unacceptable impacts. The assessment team has judged the former to be the case based on available evidence for ETP corals and the impacts of the orange roughy fishery, but not the latter. The conditions on both 2.3.1 and 2.3.3 require that the information basis be improved and action be taken as necessary

to ensure that impacts are highly unlikely to be unacceptable by the end of the certification period.

No change to the score or rationale has been made.

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 70 score.
A key element in information collection is the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.
The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.
There is no population management plan for protected species and the provisions of the Wildlife Act and the Marine Mammals Protection Act have been found impossible to implement to limit the impact on ETP species.
There is no strategy apart from research for most ETP species. The exceptions are the National Plan of Action on Sharks and Seabirds but these have yet to be fully implemented.
There is no strategy for marine mammals capture or benthic species including corals.
The BPA is not a strategy to protect corals rather it is a strategy to avoid protecting corals as they were establish in areas where little or no fishing was taking place and most was much deeper than trawling depths.
For these reason the assessment should be closed to 60.
Revised Score:

- **All Stocks 65**

Response:
See response to WWF comments, above. Note that on the basis of their comment and ECO's comment, the score for the ETP corals scoring element has been reduced to 80.

PI 2.3.3.
ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a [75 or 80] score.
A key element in information collection is the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.
The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.
There is no population management plan for protected species and the provisions of the Wildlife Act and the Marine Mammals Protection Act have been found impossible to implement to limit the impact on ETP species.

There is no strategy apart from research for most ETP species. The exceptions are the National Plan of Action on Sharks and Seabirds but these have yet to be fully implemented. There is no strategy for marine mammals capture or benthic species including corals.
The BPA is not a strategy to protect corals rather it is a strategy to avoid protecting corals as they were establish in areas where little or no fishing was taking place and most was much deeper than trawling depths.
For these reason the assessment should be closed to 60.
Revised Score:

- **All Stocks 65**

Response:
This appears to be the same comment as under PI 2.3.2, and the responses to stakeholder comments under 2.3.2 are given above.

PI 2.4.1
WWF: Performance indicator 2.4.1 is designed to assess whether the fishery causes serious or irreversible harm to habitat structure (when considered on a regional or bioregional basis) and function. In scoring PI 2.4.1, MRAG does not follow MSC's rules for scoring the irreversibility of trawl impacts. **MSC requires that the assessment team consider impacts as "irreversible" when those impacts would require much longer to recover from than the dynamics in un-fished situations would imply** (GCAB3.14.2). Clark et al. (2016) estimate that recovery times for impacted megabenthos "are likely to span centuries to millennia" for many communities. Studies done in the region support the conclusion that recovery from benthic trawling is very protracted (e.g. Koslow et al. 2001, Clark and Rowden 2009, Althaus et al. 2009, Williams et al. 2010, Clark et al. 2015). Thus, **habitat impacts caused by the orange roughy fishery are essentially "irreversible."**
Instead, the assessment team focuses on whether or not habitat impacts are "serious." The scoring rationale cites MSC guidance: "Examples of serious or irreversible harm 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" (GCAB3.14.2). While it may be true that no species extinctions have been observed to date, WWF takes strong exception to MRAG's conclusion that "no difference in community structure in coral-dominated UTFs within or outside of a protected area...has been observed." **This statement has not been proven and runs counter to the findings of Clark et al. (2015) who concluded that "compare and contrast studies clearly indicate that trawling is likely to have a substantial impact on deep-sea coral communities in fished areas."**

Response:
MSC Guidance (GCB3.12 and sub sections) states the following with respect to assessing benthic habitat impact:

If benthic habitat is being assessed, the team may consider the following points:

- *Substratum—sediment type (e.g. hard substrate)*
- *Geomorphology—seafloor topography (e.g. flat rocky terrace)*
- *Biota—dominant floral and/or faunal group(s) (e.g. kelp forest and mixed epifauna, respectively)*

Further down in the section, MSC goes on to state the following (emphasis added):

Examples of serious or irreversible harm 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 to the structure or diversity of the associated species assemblages.***

For example 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.***

PI 2.4.1 requires an evaluation of whether the fishery causes serious or irreversible harm to habitat structure, **considered on a regional or bioregional basis**, and function.

On the basis of the above, MRAG Americas has determined that there are two primary habitat types to be considered in this assessment: Areas of flat seabed on the continental slope, and Underwater Topographical Features (UTFs). This is a sensible set of scoring elements for habitats based on the SGB benthic habitat definition laid out by MSC.

We concluded that these UTFs could be considered as one habitat type across this area because they contain similar faunal compositions in terms of benthic epifauna and associated fish and other species.

Concerning UTF habitats and the requirements of MSC to assess the impacts of the fishery on a regional or bioregional basis, the assessment team considered the information provided by Roux et al. (2015) pertaining to the distribution of UTFs across the orange roughy distribution range within the Kermadec Bioregion and NZ EEZ, as well as the number of fished UTFs within this subgroup, the number of fished UTFs within the geographic areas of the Units of Assessment, and the overlap between the orange roughy trawl footprint with UTF habitats at scales from the UoC area all the way up to the bioregional level. We also considered the information presented in Clark et al (2015) pertaining to the observed and predicted distribution of the main coral groups found on these UTFs on the same scales, which is what led us to the conclusion that UTFs as a whole found within the orange roughy distribution range could be considered as one habitat type, even given that there is likely to be some heterogeneity in habitat composition among UTFs as described in Tracey et al. (2012).

The above being the case, combined with the requirements in the CR v1.3 laid out above and the general requirement within P2 to consider only the UoA impact on habitat (rather than the impact of all fishing, or even all orange roughy fishing), means that it can be considered highly unlikely (no greater than 30% likelihood) that the orange roughy fishery within the UoC areas is reducing structure and function of UTF habitats in the bioregion to the point of serious or irreversible harm.

This is not counter to the statement cited by WWF from Clark et al. because we are not suggesting that trawling does not have an impact where it takes place. Instead we have concluded that the spatial scale of orange roughy fishing within the UoAs compared with the overall UTF habitat distribution in the NZ EEZ and bioregion is sufficiently small to ensure the impacts will not reduce habitat structure and function to a point where there would be serious or irreversible harm.

Thus we propose no change to the score or rationale.

WWF: In the past decade, one of the areas of most significant developments in the field of fisheries management is the mandate to protect Vulnerable Marine Ecosystems (VMEs). The VME concept is now a cornerstone of the management of deep sea fisheries in the high seas. United Nations General Assembly Resolution 61/105 on sustainable fisheries (UNGA 2007) calls upon regional fisheries management organisations to establish measures requiring participants in bottom fisheries to assess, on the basis of the best available scientific information, whether fishing activities would have significant adverse impacts on vulnerable marine ecosystems (VMEs), and to close areas where VMEs are known or are likely to occur, unless conservation and management measures have been established to prevent significant adverse impacts on those VMEs. The FAO International Guidelines for the Management of Deep Sea Fisheries in the High Seas (FAO 2009) include advice on broad characteristics of VMEs and guidelines on what might constitute a significant adverse impact. In 2014 the MSC Scheme formally embraced these developments by making VMEs an explicit element of the assessment of Principle 2 in the revised fishery standard.

Given the centrality of the concept of VME to deep sea fisheries (i.e. to sectors such as the NZ orange roughy trawl fishery), WWF would expect the CAB to discuss VMEs at great length. However MRAG does not explicitly address under PI 2.4.1 whether any of NZ habitats constitute VMEs. Quite the contrary, MRAG mentions VMEs in exactly two places in the whole PCDR: on page 76 in relation to VME indicator taxa found in scientific trawling on seamounts of the Louisville Ridge (which is located outside of the EEZ of New Zealand), and on page 155 in relation to VME-focused move-on rule outside the EEZ.

We recognize that MPI and NIWA do not routinely categorize deep sea benthic communities as VMEs when those communities occur within the EEZ of New Zealand. However, the same authorities use the concept of VME to describe comparable, if not identical, benthic communities occurring outside the NZ EEZ in the SPRFMO Convention Area (e.g. Penny et al. 2009, Williams et al. 2011, Penny and Guinotte 2013). The discontinuity in terminology between national and international management areas is confusing and this has not been reconciled in the PCDR. For the sake of clarity and objectivity, **WWF asks the team to explain how the concept of VME applies to the habitat categories of UTF and Slope that the team has used in their assessment of habitat impacts in the EEZ of New Zealand**. Without this rationale, WWF cannot see how the team can justify awarding a score of 100 to the adequacy of information on the "... distribution of habitat types... over their range, with particular attention paid to the occurrence of vulnerable habitat types" (SG100 level of PI 2.4.3a).

Full assessment of the New Zealand orange roughy fishery commenced before release of FCR2.0, and WWF does not contest the fact that the older version of the MSC standard is being used in this assessment in accordance with MSC rules.

WWF brings up FCR2.0 primarily because we want to refer to this document as a source reference rather than see it applied here as the standard. We believe that the content of FCR2.0 is highly relevant to the evaluation of the PCDR because it captures the views of a leading authority and major stakeholder in the field of sustainable fisheries certification - the Marine Stewardship Council.

In regards to how FCR2.0 would relate to the NZ orange roughy fishery, the most conspicuous advancement is that MSC now makes protection of VMEs an explicit objective by creating a dedicated VME scoring element within the MSC default tree. Teams must follow established criteria which are adapted from FAO (2009) as a basis for categorizing habitats as VMEs. A second and related change is that habitat impact thresholds are now made explicit and teams must also consider habitat recovery rates. A third important change is that MSC now sets an explicit threshold for allowable levels of impact to VMEs: they cannot be impacted beyond 20% of their unimpacted state (i.e. VMEs must be maintained at > 80% of their unimpacted state).

MSC says: "*...the only allowance for continued fishing by MSC UoAs on a VME is (a) if there is a comprehensive plan that shows that all fishing will keep the VME at 80% or recover it to 80% and (b) when the VME has recovered or is above 80%*" (GSA3.14.2.1) In regards to the NZ orange roughy fishery, we note that the assessment team considers that measures which lead to protection of about 30% of UTF habitats are sufficient to conclude that it is highly likely that there is no irreversible harm to UTFs. In essence, **the team accepts a risk level which is far below the 80% threshold set by MSC for VME status. Current expert opinion, as reflected in FCR2.0, states that this is not an acceptable level of not yet serious or not yet irreversible harm to deepwater benthic communities dominated by fragile, slow growing stony corals.**

In addition, we consider the extent of benthic habitat damage that has been documented in the three UoAs. At the level of the individual UoA, the trawl footprint of impacted UTF habitat area is: 16.7% (ESCR), 21.9% (NWCR), and 45.7% (ORH7A & Westpac Bank). Two of the three UoAs have already exceeded the absolute threshold prescribed by MSC (i.e. > 20% impact) and these estimates were based on conservative estimates of impact area, using only the most recent five-year period 2008-09 to 2012-13 rather than the full time period (as discussed above, this approach is not science-based and therefore not acceptable). The third UoA (ESCR) is sufficiently close to threshold that we can predict it will exceed the 20% impact threshold before the third surveillance audit (assuming trawl footprint continues to expand at the rate indicated by MRAG minimally 1% per year; p. 159 of PCDR). **If FCR2.0 were applied today, it is debatable whether any of the three UoAs would meet the SG60 level of PI 2.4.1. Yet the scores assigned by the assessment team were: 90 (NWCR), 90 (ESCR) and 90 (ORH7A).**

WWF cannot reconcile the disparity between the assessment team's optimistic views about current levels of habitat impact in the orange roughy fishery with the standard setter's directive to apply a more precautionary threshold to vulnerable deepwater habitats. It is worth noting that Clark et al. (2015) said the following regarding impacts to corals: "*It is unknown how much of a coral population can be damaged before the viability of the coral communities/ecosystem is impaired. Shallow-water studies associated with protected area design have tended to average around maintaining at least 30–50% of a community to ensure its survival (e.g., Botsford et al. 2001, Airame et al. 2003). The spatial extent of coral populations is unknown.*

If it is assumed that the fishery stock area reflects also the coral population distribution, then the fishing pressure on the Chatham Rise may be approaching, or at, such levels. However, this is a key area of uncertainty when interpreting the significance of overlap between fishing and corals." Speaking more directly to the question of how MSC assessment teams should treat impacts of fishing on benthic habitats, Grieve et al. (2014) urged the MSC to "...emphasise that certification bodies take great care to adopt a precautionary approach when certifying deep-water habitat."

Response:

MRAG Americas recognizes and is aware of developments pertaining to evaluation of habitat impacts, particularly with respect to VMEs, within MSC Fishery Certification Requirements Version 2.0. However, as acknowledged by WWF, the assessment team used CR version 1.3 for the assessment of this fishery, wherein the VME concept does not come into play so explicitly, thus we followed the requirements of CR V1.3.

That said, the response given above pertaining to habitat impact still holds in the sense that the UoA impact to the UTF habitat within the bioregion and NZ EEZ, whether some of it should be regarded as VME or not, is very small, and there is a consistent history within NZ management to designate no-trawl and no-fishing benthic protected areas and other MPAs which contain representative habitat that is closed to orange roughy fishing.

We have made no changes to the score or rationale.

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a [90] score.
A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.
The impact of bottom trawling on corals is likely to be significant with high sensitivity to trawling and long recovery times in the order of decades if not centuries.
"Tracey et al (2011) analysed the distribution of nine groups of protected corals based on bycatch records from observed trawl effort from 2007–08 to 2009–10, primarily from 800–1000 m depth. For the orange roughy target fishery, about 10% of observed tows in FMAs 4 and 6 included coral bycatch" (MPI 2014)
Tracey et al (2012) noted in a study of a seamount complex on the North Chatham Rise which had been targeted for orange roughy – "The study showed that fish assemblages on seamounts can vary over very small spatial scales, in the order of several km. However, patterns of species similarity and abundance were inconsistent across the seamounts examined, and these results add to a growing literature suggesting that faunal communities on seamounts may be populated from a broad regional species pool, yet show considerable variation on individual seamounts."
The impacts of trawling on seamounts and the potential recovery time of the diversity that is there could take centuries to recovery from just one trawl. As Clark et al (2015) observed: "many deep-sea invertebrates are exceptionally long-lived and grow extremely slowly: these biological attributes mean that the recovery capacity of the benthos is highly limited and prolonged, predicted to take decades to centuries after fishing has ceased." Protected deep sea corals are amongst those long-lived invertebrates. (Tracey et al 2003).
Reporting of non-quota management species and non-target fish species (eg corals) relies on reporting from observers. Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.
Revised Score:

- **All Stocks 60**

Response:
The assessment team is aware of the studies cited by the stakeholder, and has taken this information into account when arriving at the scores for PI 2.4.1 as well as 2.3.1. We specifically noted the information provided by Tracey et al. (2011) in determining under 2.3.1 that we could not consider ETP corals to meet the SG80 level of the standard. As discussed above under the response to WWF, in scoring the habitats PIs, although there is certainly heterogeneity among UTFs within the Kermadec Bioregion, there is sufficient evidence available to suggest that UTFs within the NZ EEZ and bioregion within the orange roughy distribution range can be considered as a single habitat type and have been treated as such. For more details see the response to the WWF comment above.

No change to the score or rationale has been made.

PI 2.4.2

WWF: The assessment team is forthright about the fact that the trawl footprint of the NZ Orange Roughy fishery continues to expand, saying for example that "...the fishery has moved into new areas each year." WWF is extremely concerned about the expanding footprint and its adverse consequences for vulnerable deepwater benthic communities.

To date, MPI has not expressed any intentions of "freezing" the fishery footprint - a common approach for protecting VMEs in high-seas bottom trawl fisheries (e.g. SPRFMO, see description in Penny and Guinotte 2013), nor does MRAG identify any pending proposals by management that would stop the expansion of trawl footprint. Instead the assessment team states that there has been a decline in the rate at which new areas are swept by bottom trawls. The team makes this point repeatedly (see pp 64-65, 75, 149, 159 and 160 of the PCDR). This argument is unsatisfactory to WWF because the observation of a recent slowdown of footprint growth was driven by reductions in the TAC (i.e. there was less fishing effort), which will be reversed as soon as stocks rebuild or new stocks are identified (see WWF comments 2014). Regardless, **a deceleration in the rate of habitat destruction is not the same as a cessation or even a reversal of habitat impacts**. Under current management, this fishery will continue to trawl new 'virgin' deepwater habitats.

From WWF's perspective, continuous expansion of the trawl footprint has two profound implications for gauging the sustainability of the orange roughy fishery. First, it means that the root cause of the problem has not been addressed and so it will be propagated into the foreseeable future. If the areal extent of impacted benthic habitats continues to accumulate alongside fishery operations, we must ask what the spatial extent and distribution of the remaining unimpacted habitats will be in 10 or 20 years time. The team does not calculate nor answer this question. Given that impacts of bottom trawling in seamount communities (or UTFs) are effectively irreversible (see below), we can expect that any gains that are accrued through habitat recovery (recovery may require "hundreds of years if not millenia"; Clark et al. 2016) will not offset the rate at which habitat is lost to trawling. **Each year there will be a net loss of unimpacted habitat.**

Second, an ever-expanding footprint serves to underscore the weakness and shortsightedness of current management arrangements for the protection of deepwater benthic communities. Aside from establishing area closures, MPI has not imposed any measures that would act directly to control the quality (community composition, location) or the extent of new benthic habitats that are subjected to bottom trawling. From an outsider's point of view, footprint expansion appears to be unregulated. And as far as WWF can discern, there is no rational "plan" for how to utilize the >70% of deepwater benthic communities that fall outside of area closures. This implies that **MPI lacks a strategy to minimize coral mortality and benthic habitat impacts**. Inexplicably, this lack of strategic planning is not reflected in the PCDR.

The assessment team does not address the absence of management strategy in the PCDR. Instead the team gives unjustifiably high scores to PI 2.3.2 for managing corals as ETP species and to PI 2.4.2 for managing habitat impacts. **We do not believe the fishery attains the SG80 level of scoring issues a, b and c of PI 2.3.2. Similarly, we do not believe the fishery attains the SG100 level of scoring issues c of PI 2.4.2 and we seriously question whether it should even meet SG80.**

Response:

The assessment team understands the concern of WWF to be that there is no requirement for the orange roughy fishery to freeze its trawl footprint, and therefore management measures in place to protect important habitat are not sufficient to warrant the score given for PI 2.4.2 (and 2.3.2). The response pertaining specifically to PI 2.3.2 is addressed above, under the PI 2.3.2 section.

Pertaining to the specific issue raised by WWF of no freezing of the trawl footprint, and the potential for unsustainable expansion thereof as ORH stocks recover and fishing effort increases, the assessment team determined that, under current management legislation, there is sufficient evidence that continued collection and evaluation of the data on habitats resulting in designation of new MPAs and other habitat protection measures to comprise some objective basis for confidence that the partial strategy will work, based on information directly about the fishery and/or habitats (SG80 requirement for Scoring Issue b).

As the assessment team laid out in the rationale for PI 2.4.2, there are a number of key elements that comprise the approach to managing fisheries impacts to habitats within NZ legislation including the following:

- 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; closed to bottom trawling).
- The designation of Marine Reserves.
- Monitoring vessel position

The rationale given by the assessment team under PI 2.4.2 includes an evaluation of the above-listed measures (together taken to comprise a partial strategy), and evidence of their successfulness, to conclude that this strategy is working and is being implemented successfully.

See the response to WWF for PI 2.3.2 for additional information on the harvest strategy.
In addition to the above, the fact that good data are produced regularly on the movement of the orange roughy fleet via VMS tracks and habitats continue to be studied and mapped, the assessment team is confident that during annual surveillance audits it will be able to evaluate any significant changes to the fishery, including expansion of the trawl footprint if this were to occur, and rescore the fishery on this basis if needed.

Therefore the score has not been changed for PI 2.4.2, but additional support for this score as described above has been added to the rationale.

WWF: WWF was encouraged to see that the assessment team also examined how benthic impacts in NZ EEZ fit in the wider geographic context of the Kermadec Bioregion. However, the introductory section of PCDR gives almost no description of the responsible management body - the South Pacific Regional Fisheries Management Council (SPRFMO). With respect to the team's consideration of the effectiveness of SPRFMO habitat management actions across the Kermadec Bioregion under scoring of PI 2.4.2, **there is insufficient background material presented in the PCDR for the reader to evaluate whether SPRFMO has developed a partial strategy for managing impacts to deepwater benthic communities (scoring issue a), whether there is some objective basis for confidence that SPRFMO's partial strategy will work using information from the fishery and habitats across the Kermadec Bioregion (scoring issue b), and whether there is objective evidence that SPRFMO's partial strategy is being implemented successfully (scoring issue c)**.
With respect to the scoring of management of habitat impacts (PI 2.4.2), the assessment team has awarded the SG100 scoring level to scoring issue (c), saying that there is "clear evidence that the strategy is being implemented successfully." This statement is incorrect, being contradicted by the scoring rationale for PI 2.4.2(a), which explains that a benthic impacts strategy has been in development but "is not yet fully implemented" and comprises a "partial strategy." **WWF contends that there is currently no strategy to manage benthic impacts**

(although perhaps a partial strategy exists but is not sufficiently implemented) and therefore it cannot be said that a strategy is being successfully implemented.
In the scoring rationale for PI 2.4.2(c), the assessment team justifies a score of 100 on grounds that "*...the quality of UTF and slope habitats, specifically 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.*" Despite some excellent benthic monitoring and mapping programs, WWF contends that (aside from the provision of closed areas), **MPI does not provide any discernable mechanism or measure for the "avoidance, mitigation or remedy" of trawl impacts to ETP coral species or deepwater benthic communities. Therefore a score of 100 is not justified for 2.4.2(c).**

Response:
As noted under the response to a previous comment, the assessment team has added a section to the report to describe in more detail the role of SPRFMO and its role in contributing to a strategy for managing impacts to deepwater benthic communities.

Regarding scoring issue (c), the assessment team received clarification from MSC (and this has also been reflected in the language of this scoring issue in v2.0 of the standard), that we are to evaluate evidence of effectiveness of the partial strategy or strategy. In this case, we have concluded that the combination of measures in place constitutes a partial strategy, and provide details under scoring issue (c) of the clear evidence that this partial strategy is being implemented successfully. However, we also acknowledge that since the full strategy has not yet been implemented, scoring issue (a) can only be scored at the SG80 level. The additional information about SPRFMO added to the assessment report further substantiates the finding that there is clear evidence of the effectiveness of the partial strategy for managing the impacts of orange roughy fishing to habitats.

BLOOM: This performance indicator aims to evaluate whether there is *"a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types".*
It is acknowledged in the PCDR 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*" and that "*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.*"

- The score given by MRAG for this performance indicator is 85. We would like to question this scoring given the results of an analysis of the distribution of benthic habitat protection measures adopted by quota- owning industry sectors in New Zealand, Alaska and the Indian Ocean. Conclusions of this study suggest that "*protection of both benthic ecosystems and essential fish habitats are marginal at best when quota owners have primacy in determining the boundaries of BT closures*", since the majority of the areas in these three regions may not contain vulnerable marine ecosystems and do not have high abundance of commercially important species. In particular, the authors noted that "*about 65% of New Zealand's EEZ is in water more than 1500 m deep and 40% of those deep waters are within the BPAs. Looked at another way, 82.3% of the 1.1 million km^2 of deep-sea bottom set aside as BPAs are in water that is too deep to fish.*" **Therefore, we fear that the presence of BPA in itself does not seem to be a powerful enough**

argument to give a score of 85 to this performance indicator, and we believe that more studies should be conducted in order to ensure that protection measures are not taken on the basis of quota-owners' best interests, but on the interest of the general public.

Response:
The assessment team evaluated the available evidence pertaining to the effectiveness of the siting of BPAs, MPAs and other closed areas in terms representativeness of vulnerable habitats, as well as the record within NZ government of using these tools to protect vulnerable habitat and have determined (see scoring rationales) that, regardless of the interests of those involved in the siting of these areas, they do contain a substantial quantity of key representative vulnerable habitats. In addition, information about the composition of habitat forming biota in areas outside the reach of the orange roughy fishery inside and outside of protected areas has led us to the conclusion that, taken as a whole, the measures in place comprise an effective partial strategy for managing impacts to the habitats across which orange roughy is distributed. The marine conservation objectives of BPAs and other spatial closures within the New Zealand EEZ are not intended to protect '*high abundance of commercial important species*', the abundance, and sustainable utilisation, of commercial species is managed though the setting of stock-based catch limits. The objective of the BPAs is to set aside large, representative areas of each scientifically recognised Marine Environment Category (MEC) that are (for the most part) untouched by human activities.

We agree with the commenters' contention that more information is needed to confirm that the impacts to ETP corals within the UoA areas are within acceptable limits, thus we have placed conditions on PIs 2.3.1 and 2.3.3 to address this.

No change to the score or rationale is made.

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a [85] score.
A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.
The impact of bottom trawling on corals is likely to be significant with high sensitivity to trawling and long recovery times in the order of decades if not centuries.
There is no strategy in place to deal with the impact of trawling on corals and other sensitive species.
The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.
There is no population management plan for protected species and the provisions of the Wildlife Act and the Marine Mammals Protection Act have been found impossible to implement to limit the impact on ETP species. There is no strategy apart from research for most ETP species.
The BPA is not a strategy to protect corals rather it is a strategy to avoid protecting corals as they were establish in areas where little or no fishing was taking place and most was much deeper than trawling depths.
Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.

Revised Score:

- **All Stocks 60**

Response:

This appears to repeat a previous comment and the points have been addressed in other responses, above.

Regarding the level of observer coverage, the team has found this to be less relevant when it comes to understanding impact of the fishery on habitats since we have a complete set of tow-by-tow VMS data showing exactly where the fishing vessels operate, and assess that this, combined with the current levels of observer coverage which provides a good sample of the fishery bycatch of benthic biota is sufficient to warrant the scores given for these PIs.

No change in score resulted.

PI 2.4.3

WWF: In addition, the assessment team appears to have given almost no serious consideration to the topic of reversibility of trawl impacts to deep sea benthic communities. The assessment team's scoring rationales instead indicate that they feel there is sufficient information to understand recovery patterns and to estimate recovery rates in impacted communities. For example, MRAG assigns the SG100 scoring level to PI 2.4.3(c), saying that there are "...vessel monitoring and research programs providing robust information on trawl footprint and the impact of trawling and recovery for the fisheries." **Recovery is not however considered in the scoring rationale for 2.4.3(c). Without detailed information on habitat recovery, we do not believe the team can justify a score of 100 for the adequacy of information used to measure changes in habitat distribution over time.** The team's conclusion is also inconsistent with the conditions set for PIs 2.3.1 and 2.3.3 based on uncertainty surrounding the impacts to ETP corals.

Response:

Scoring issue (c) for this PI requires at the 100 level that changes in habitat distributions over time are measured. The assessment team has determined that this is the case. The rationale states the following, and we have made no changes:

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 directed research programmes providing robust information on trawl footprint and the impact of trawling and recovery 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 (MPI 2015). This meets the requirements for detecting changes in risk, and changes in habitat distributions, meeting the SG 80 and SG100.

The team acknowledges that trawling on some sensitive habitats, particularly corals addressed in PI 2.3.3, will take very long times to recover. However, the MSC CR V1.3 does not require limiting these impacts to zero. As addressed in our response to PI 2.4.1, the MSC considers irreversible as "*high risk of extinction, and significant alteration of habitat cover/mosaic* ***that causes major change to the structure or diversity of the associated species assemblages.***" High impact over a small proportion of the area is equivalent to low impacts

over a large proportion of the area. Therefore, we conclude that the fisheries do not constitute irreversible impacts under the MSC definition. We have provided evidence that the area of impact of the orange roughy fishery within the UoA areas is small relative to the overall UTF habitat, and we have been provided with evidence that demonstrates that even on fished UTFs, functional habitat is maintained. And it remains true that the level of monitoring and information collection on habitats and the impacts of fishing and other activities within the NZ EEZ is exemplary.

No change in score resulted.

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a [95] score.
A key element in information collection if the presence of MPI scientific observers on vessels.
As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.
The impact of bottom trawling on corals is likely to be significant with high sensitivity to trawling and long recovery times in the order of decades if not centuries.
There is no strategy in place to deal with the impact of trawling on corals and other sensitive species.
The current status of the deepwater management plan is unclear, as is the commitment to deepwater research given the end of the Deepwater Research strategy.
There is no population management plan for protected species and the provisions of the Wildlife Act and the Marine Mammals Protection Act have been found impossible to implement to limit the impact on ETP species. There is no strategy apart from research for most ETP species.
The BPA is not a strategy to protect corals rather it is a strategy to avoid protecting corals as they were establish in areas where little or no fishing was taking place and most was much deeper than trawling depths.
There is not sufficient information on habitats, variation in coral diversity between features, and the data collection coverage is patchy.
Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.
Revised Score:

- **All Stocks 60**

Response:
This appears to repeat an earlier comment and thus has been responded to above.

PI 2.5.1
WWF: On page 166, MRAG states in the scoring rationale for PI 2.5.1 that the fishery attains the SG100 level because the "...benthic impact that may damage ecosystem structure and function are restricted to <20% of the fishery management areas..." This is inaccurate and is contradicted by scientific information which is available to the assessment team. For example, Black et al. (2015) showed that when considered at the level of individual management areas, the proportion of trawl-impacted UTF communities usually exceeds 20% (e.g. data table 2: ORH3B NWCR = 22.0%; ORH3B ESCR = 16.3%, ORH7A = 45.7%). Those numbers are a minimum estimate of impacted area, using only data from the most recent five years. The actual extent of impacted UTF is likely to be much higher. Black et al. (2013) suggested that swept

area may be much larger when considered on a cumulative basis within narrow depth strata (e.g. 50.1% of the seafloor within the target depth range on the NWCR over a 20 year period). WWF was troubled to see that the assessment team awarded the SG100 level for PI 2.5.1. The team justifies this score because "...the fishery is highly unlikely to disrupt [ecosystem] structure and function to the point of serious harm" (note: in the MSC scoring system, the term "highly unlikely" means there should be no more than a 30% probability that the true status of the ecosystem is within the range where there is risk of serious or irreversible harm; CRv1.3 Table CAB18). **We have serious concerns with this degree of certitude considering the significant unknowns or doubts expressed by leading scientists about fishery impacts to deepwater communities and ecosystems.** Below we give some examples to illustrate these doubts or unknowns.

Consalvey et al. (2006) reviewed information on deep-sea corals in the New Zealand region. The assessment team summarized their conclusions in relation to orange roughy ecosystem (p.63 of the PCDR): "Possible effects of coral damage to the ecosystem include: changes to local hydrodynamic and sedimentary conditions and a shift from a diverse reef community to a reduced species/biomass "disturbance" community; and, reduced reproductive output from: (1) a reduction in colony size; (2) an increase in energy resources channelled to repair rather than growth/reproduction; (3) immature colonies being delayed to reach maturity; and, (4) the loss of larger individuals with a disproportionately large contribution to the reproductive output of the entire population." Consalvey et al. were also concerned that damage to habitat forming corals "...can have profound implications to the entire ecosystem e.g. a shift from a diverse reef community to a reduced species/biomass 'disturbance' community." Those authors felt it was imperative that "...scientists and managers work together to increase our understanding of coral biodiversity so that action can be taken to manage vulnerable habitats."

Dunn (2013) reviewed ecosystem impacts of orange roughy fisheries. In regards to community composition, productivity patterns and biodiversity, he noted that "Benthic biodiversity surveys have shown that trawls remove exposed fauna such as corals and sponges. The implications of this, however, remain poorly known." Dunn concluded that "In the longer term, and in principle, measures to reduce, minimise or mitigate benthic impact may help benthic processes to remain intact, despite a fishery. The trawl footprint alone may provide a measure of fishery impact on benthic processes."

Clark et al. (2012) pointed out that we have still have a limited understanding of how seamounts (i.e. UTFs) form part of the wider deep-sea ecosystem and what the broader effects of human disturbance might be. They say: "Future seamount research programmes must broaden their focus to wider deep-sea communities in order to understand their regional significance, and include habitats such as the continental slope, canyons, and sites of hydrothermal venting or methane seeps that host chemosynthetic communities. Successful deep-sea management regimes will need to consider a suite of biological systems in a regional framework." Further, Clark et al. (2012) say that "Changes in the relative abundance of species on seamounts can almost certainly influence trophic linkages and the overall structure of the system, yet few detailed trophic studies have been conducted on seamount communities. Of particular concern are large- scale removals of filter-feeders such as corals and sponges that can dominate the benthic invertebrate assemblages... These types of indirect effects from trawling or longline operations are uncertain, and should be addressed."

In 2013, an expert panel was convened to assess the ecological effects of the New Zealand orange roughy bottom trawl fishery (Boyd 2013). The general view was that "Risks of serious or irreversible harm to the ecosystem were assessed as being low." However it is noted that there was not consensus among experts. The panel concluded that "...more information would assist in reducing areas of uncertainty."

Indeed, the MRAG assessment team also expressed their doubts about impacts at the ecosystem level, stating that "...the extent to which this [expansion of trawl footprint to new

areas] might be linked to impaired benthic ecosystem functioning has yet to be determined" (p.159 of PCDR).
In summary, WWF believes that **there is not enough evidence to infer that the risk of serious or irreversible harm to key elements of ecosystem structure and function is highly unlikely and therefore the fishery does not meet SG100.** As we stated previously (WWF 2014), WWF views the biodiversity of the deepwater benthic communities as a 'key' element of the ecosystem in which the orange roughy fishery operates. WWF sees a fishery that causes measurable and long-lasting impacts to benthic habitats (Koslow et al. 2001, Clark and Rowden 2009, Williams et al. 2010) and those impacts are known to reduce the biomass, biodiversity and structural complexity of benthic communities at local spatial scales (at least). But how those impacts ramify across the broader deepwater benthic ecosystems remains largely unknown. Current scientific opinion supports our position. There is a great deal of uncertainty about whether or not current deepwater trawl activities have long lasting impacts on the biodiversity of benthic ecosystems.

Response:

The response to the concerns raised under this PI by WWF and ECO follows a similar logic to the response under PI 2.4.1 given similar requirements and definitions within the MSC requirements and guidance which explain that serious or irreversible harm should be interpreted in relation to the capacity of the ecosystem to deliver ecosystem services. The associated guidance (GCB3.17.2) goes on to give the following examples of what 'serious or irreversible harm' could include:

- Trophic cascade
- Depletion of top predators
- Severely truncated size composition of the ecological community to the extent that recovery would be very slow due to the increased predation of intermediate-sized predators
- Gross changes in the species biodiversity of the ecological community
- Change in genetic diversity of species caused by selective fishing and resulting in genetically determined change in demographic parameters.

The GCR (section GCB3.17.1) also explains that *the ecosystem component does not repeat the status assessment of these elements individually but rather considers the wider system structure and function—although if all these components scored highly it might be expected that the Ecosystem component would also score highly. The Ecosystem component addresses system-wide issues, primarily impacted indirectly by the fishery including ecosystem structure, trophic relationships and biodiversity.*

The assessment team considers it reasonable to regard the ecosystem in question as that over which orange roughy is distributed, which is far larger than the footprint of the fishery within the UoA areas, for the reasons and data provided under the habitats outcome response. Therefore, due to the disparity between the scale of the fishery within the UoAs and the totality of the ecosystem, we have determined that this fishery alone is sufficiently small as to preclude the possibility of unacceptable impacts at the ecosystem level. In addition, and as noted above under responses to comments on the ETP indicators, we have considered information pertaining to the heterogeneity of UTFs and the uncertainty about the ability of corals and other habitat forming organisms to recruit over larger spatial scales, and this has been reflected in the scoring of the ETP component of the assessment.
No change to the score or rationale has been made here.

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 100 score.
Given the known impacts of trawling on coral and other sensitive benthic species and the inadequate information on habitats, variation in coral diversity between features, and that data collection coverage is patchy, it is likely that the fishery is causing serious and irreversible harm to ecosystem structure and function (see earlier comments on Principle 2).
Given the uncertainty and taking a precautionary approach an assessment under 60 would be more appropriate.
Revised Score:

- **All Stocks Less than 60**

Response:
See response above under WWF.

PI 2.5.2
WWF: As we noted above for PI 2.4.2, WWF contends that MPI does not have a strategy in place for managing deepwater trawl impacts to benthic communities outside of closed areas. We believe that the biodiversity of the deep-sea benthos comprises a 'key' ecosystem in the MSC sense and the majority of this ecosystem lies outside of protected areas. WWF believes the team must consider the absence of a strategy for managing ecosystem-level consequences of fishery impacts to deepwater benthic communities under PI 2.5.2. **The team has scored the fishery as meeting the SG100 level of scoring issue a of PI 2.5.2 because "there is a strategy that consists of a plan in place." We do not believe this conclusion is justified with respect to managing ecosystem-level impacts to the biodiversity of deepwater benthic communities.**
Without a strategy to protect this key ecosystem component, it is inaccurate to conclude that there are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function. There is potential for the fishery to adversely impact the biodiversity of the deepwater benthic ecosystem. Therefore **we believe the fishery does not meet the SG80 level of PI 2.5.2.**

Response:
The assessment team contends that closing of areas to fishing is part of the strategy to mitigate the impacts of fishing on ecosystems, therefore we do not agree with WWF that there must be a strategy in place entirely "outside of closed areas," since the closed areas are part of the strategy. See also the response under 2.4.1 and 2.5.1 above. The MSC does not require that this fishery be responsible for a strategy for managing ecosystem level impacts to the biodiversity of deepwater benthic communities as a whole, given that the area of its potential impact is small relative to the overall area of the ecosystem, most of which is unavailable to bottom fishing either through designated closures or due to lack of accessibility to the fishery (see further details in earlier responses).

No change has been made to the score or rationale.

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 90 score.
A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:

Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.
There is no population management plan for protected species and the provisions of the Wildlife Act and the Marine Mammals Protection Act have been found impossible to implement to limit the impact on ETP species. There is no strategy apart from research for most ETP species. The BPA is not a strategy to protect corals rather it is a strategy to avoid protecting corals as they were establish in areas where little or no fishing was taking place and most was much deeper than trawling depths.
There is not sufficient information on habitats, variation in coral diversity between features, and the data collection coverage is patchy.
Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.
Revised Score:

- **All Stocks 60**

Response:
This appears to be a repeated comment which has been addressed previously.

PI 2.5.3
WWF: Similarly [to PI 2.4.3], PI 2.5.3(a) is awarded the highest level because there is good information on "...the impact of trawling and the slow recovery for some UTF habitats (e.g. reef-building stony coral habitat)." In neither case does MRAG present information about pattern or rate of recovery. While we understand that this assessment was conducted under FCR v1.3, we believe it prudent to note that the new MSC Fishery Standard (FCR2.0) was extensively revised to incorporate the latest scientific information about recovery of habitats, and especially VMEs, from fishery impacts (see section below).

Response:
We have provided responses to all of these points previously under other indicators.

ECO: There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 85 score.
There is no population management plan for protected species and the provisions of the Wildlife Act and the Marine Mammals Protection Act have been found impossible to implement to limit the impact on ETP species. There is no strategy apart from research for most ETP species. The BPA is not a strategy to protect corals rather it is a strategy to avoid protecting corals as they were establish in areas where little or no fishing was taking place and most was much deeper than trawling depths.
There is not sufficient information on habitats, variation in coral diversity between features, and the data collection coverage is patchy.
Given the uncertainty and taking a precautionary approach an assessment closer to 60 would be more appropriate.
Revised Score:

- **All Stocks 60**

Response:
This appears to be a repeated comment that was previously addressed.

Condition2

WWF: Condition 2, regarding PI 2.3.1, has been set for the NWCR and ESCR UoAs requiring that by the end of the certification period, “the direct effects of ORH fishing must be highly unlikely to create unacceptable impacts to ETP coral species.”

In the opinion of WWF the condition is poorly defined, fails to acknowledge the current knowledge of ETP coral impacts and fails to satisfy the MSC requirements for condition setting. At the SG80 level for PI 2.3.1 the MSC defines “unlikely to create unacceptable impacts” as a direct demonstration that requirements for protection and rebuilding are being achieved (CAB3.11.3.1). The milestone for the first surveillance audit requires the client to present a plan to increase certainty regarding the impact of ORH fishing in the two UoAs on ETP coral groups and carry out the plan in subsequent years. However, the client action plan is equally vague in committing to deliver a plan "plus any additional management actions implemented to protect corals” by the fourth surveillance audit that will improve certainty that the likelihood of unacceptable impacts meets the SG80 level for each UoA.

In the opinion of WWF, both the condition set by the CAB and the corresponding action plan specified by the client fishery are unreasonably vague and provide little certainty that the condition will result in measurable improvements that minimize the impact of the fishery on ETP corals as required by PI 2.3.1. Specifically, under the MSC certification requirements **the CAB is required to draft conditions to specify milestones that spell out the measurable improvements and outcomes (using quantitative metrics) expected each year** (27.11.1.4). **The MSC requirements for setting conditions also require that "if a condition or milestone relates to reducing uncertainty or improving processes, the CAB shall include in its reports narrative about the ultimate ecological or management outcome that the condition aims to achieve over the longer term"** (27.11.7). As currently defined Condition 2 fails to meet the MSC requirements and will likely allow the continued destruction of ETP corals by an MSC certified fishery over the next five years through expansion of trawling to pristine areas (see also Habitat Impacts below).

Response:

The assessment team respectfully disagrees with WWF regarding the language of the condition set as well as that of the milestones. CR v1.3 Section 27.11.1.2 states that “The CAB should draft conditions to follow the narrative or metric form of the PISGs used in the final tree,” and, “The CAB shall draft conditions to result in improved performance to at least the 80 level within a period set by the CAB but no longer than the term of the certification…” The client action plan is then drafted by the client to specify how they will meet the condition. In this case, the scoring issue for ETP corals that falls short of the 80 Scoring Guidepost is scoring issue b, which states (SG80) “Direct effects are highly unlikely to create unacceptable impacts to ETP species,” therefore, the condition is written specifically to follow the narrative of this scoring issue as required by MSC. It is, by design, not prescriptive as the MSC prohibits prescriptive conditions. In this particular case, reducing uncertainty is what is needed to achieve the 80 level, there is more than one way to reduce uncertainty, and reduction of uncertainty does not necessarily mean reducing impacts. The current milestones are written such that it will be clear following the year one milestone how the client expects to need to focus its effort to reduce the uncertainty to a level where the fishery can achieve the SG80 level on this scoring issue. In this case, the ‘ultimate ecological outcome that the condition aims to achieve over the longer term’ is that the orange roughy fishery in these two UoAs is highly unlikely to create unacceptable impacts to ETP coral species, and that is what we have written here.

No change has been made to the condition.

Condition 3

WWF: Condition 3, which has been set for the ETP species information PI 2.3.3, is similarly vague and requires additional specificity regarding the ecological or management outcome expected from the condition.

Response:

As this is an information indicator, the condition language follows the language of the information PI scoring issue that failed to achieve the 80 level. Because it is an information indicator, the condition requires better information, rather than an 'ecological or management outcome.' Of course, the information needed to fulfil this condition is related to, and will contribute to, the action plan under PI 2.3.1, as improved information will lead to reduced outcome impact uncertainty.

The interrelationship between the information and outcome PIs in this case means that the initial action required to improve the available information will contribute to progress against both conditions. The assessment team determined that there was enough evidence to support the conclusion that the direct impacts of the fishery in these two areas was at least unlikely to create unacceptable impacts to ETP coral species, but not enough to deem them to be highly unlikely. Therefore a condition was also placed on the information PI (Scoring Issue b) which requires that information is sufficient to determine whether the fishery may be a threat to the protection and recovery of the ETP species. Since we did not determine that the 80SG was met for outcome (related to level of uncertainty), it stood to follow that the information available was also not sufficient to meet the 80SG.

No change has been made to the condition.

Other – Truncated Period for Assessment of Trawl Impacts

WWF: The assessment team appears to have based a number of conclusions about habitat impacts on a truncated data set. Despite the existence of over 20 years of information about a fishery that has been in continuous operation throughout that period, the team justified its scores by emphasizing information from the last five years. For example, MRAG rationalizes assigning a score of 90 to the UTF element of each UoA under PI 2.4.1 because "... over the last 5 years, the maximum amount of structural damage to UTF habitats within the orange roughy distribution range that could be attributed to orange roughy fishing in the UoC areas is 12%..." However, if the team were to consider the entire dataset, their estimation of the amount of structural damage that is attributable to the fishery would be much larger. Black et al. (2013), for example, estimated that cumulative swept area on the NWCR was 50.1% of the seafloor within the target depth range over a 20 year period.

Truncation of the data set tends to reduce estimation of cumulative fishery-habitat interactions including trawl footprint area, swept area, and proportion of overlap with ETP species and is **neither scientifically appropriate nor meets the intent of the MSC standard**. Given the near irreversibility of structural damage caused by bottom trawling, an underestimation of cumulative impact area will not be appreciably off-set by habitat recovery, at least over timeframes relevant to this assessment. Therefore this issue is absolutely fundamental to maintaining objectivity and fairness when scoring MSC performance indicators that address the status of P2 components (i.e. ETP, Habitat and Ecosystem).

Truncating the trawl dataset also tends to exaggerate the effects of a recent decrease in fishing effort that was itself driven by reductions in TAC - not a measure to reduce habitat impacts. As Clark et al. stated: "Overlap [between coral distribution and trawl footprint] in the last 5 years was much less than for the full time period, which was expected due to reduced fishing effort relative to the all-years dataset."

Putting these concerns together, it is clear that reliance on recent data will yield a minimum estimate of impact at best. It gives us only part of the picture and hence an incorrect picture. The PCDR does not adequately address the issue of truncation. WWF contends that **eliminating information beyond some arbitrary point (5 years) is not an objective approach and it has materially affected the scoring of the fishery against a number of PIs, but most conspicuously the outcome PIs for ETP corals, habitat and ecosystem** (2.3.1, 2.4.1 and 2.5.1).

Response:
The MSC does not give direction or guidance in CR V1.3 or GCR V1.3 on the period to examine for determining impacts on ETP, habitat, or ecosystem. However, the Performance Indicators consistently refer to the fisheries in the present tense and apply the concept of 'does not hinder.' For example, PI2.3.1 states "The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species" and PI 2.4.1a states "The fishery does not cause serious or irreversible harm to habitat structure,…." The use of does not pose, does not hinder, and does not cause suggests that the assessment teams should evaluate the current state of the fisheries. The past five years better represents the likely impacts of the fisheries going forward into the foreseeable future than would using the entire time series. The ongoing management review and implementation of mechanisms such as new MPAs and the highly limited opportunity for growth of the fishery under implementation of the harvest control rule, as discussed previously, provide evidence of the current and future impacts that the team has described in the scoring justifications for PIs 2.3.1, 2.4.1, and 2.5.1. Therefore, the team concludes that we have appropriately evaluated and scored the PIs 2.3.1, 2.4.1, and 2.5.1. The team acknowledges, and has informed the client, that scoring during re-assessment under CR V2.0 for any VMEs that may be identified will need to address the time period requirements of CR V2.0 GSA 3.13.4 that "…the pre-existing historical extent of the habitat should be considered in the calculation of the current state of the VME in relation to unimpacted levels if the historical extent is known and if recovery in those areas of historical extent would be possible."

Other – Uncertainty about Ecosystem Impacts
WWF: We must preface our [Ecosystem PI] comments with a note about how the team has partitioned corals and other benthic constituents into MSC categories for ETP species, habitats and ecosystems. Although the team's approach may follow the letter of MSC requirements, it is simply not intuitive to us. The CAB has treated corals as ETP species and, in so doing, has treated the benthic communities of seamounts, hills, and knolls as being largely independently of their corals. This distinction is difficult for us visualize because seamount habitats are dominated by, if not defined by, their coral fauna. It's a bit like asking someone to picture a forest habitat but ignore the trees. In the same way, the team has largely removed the biodiversity of benthic communities from their discussion of the orange roughy ecosystem. It is not clear to WWF that the CAB's categorization is entirely consistent with MSC's intent. Had the team fully considered the biodiversity of the benthos as a "key component" of the orange roughy ecosystem, we believe the scores assigned to ecosystem PIs would not be justified.

Response:

The assessment team considered carefully how to handle the situation of benthic habitat-forming organisms listed as ETP species, as to our knowledge, this has never before been the case with an MSC assessment. We feel as though we ended up with a good compartmentalization which meant that listed coral species were held to the ETP standard, and the fishery has been given conditions related to their impact to these species, while the overall

habitat and ecosystem areas in which these corals reside and of which they form a part are assessed as a whole under the habitats and ecosystems components, respectively. It is not the case that the team simply evaluated habitat and ecosystem impacts assuming that protected corals were not part of them. However, the reality is that these coral-containing habitats and ecosystems cover a much larger area than just the footprint of the orange roughy fishery within the three UoAs, and taken as a whole, the team judged the impacts of this fishery under assessment to be within acceptable limits according to the MSC standard. Evaluating ETP coral species under the ETP component actually allowed the team to take a closer look at the fishery impacts to these species in particular, as the ETP part of the standard is different and better fleshed out than the habitats and ecosystems part of the standard. We further note that seamounts rise to a depth too shallow for orange roughy, such that orange roughy fishing does not occur on seamounts in any of the UoA. We understand WWF's point here, but overall we remain of the view that we have handled this unprecedented situation appropriately.

Other – Mechanism for Restricting Trawls to Tow Lines is Not Clear from the Information

WWF: On page 77 of the PCDR, MRAG makes this statement: "*If the protection of corals from trawling in the orange roughy [fishery] also relies on fishing only on established tow lines, a mechanism for how the restriction to these tow lines occurs is not clear from the available information*." WWF endorses this sentiment. In fact we have repeatedly asked ourselves the same question: how can management restrict fishers to established tow lines? And how can managers reconcile an expanding trawl footprint (growing by > 4% per year) with a mechanism that restricts all fishing to established tow lines? We agree with MRAG that such a mechanism is not clear from the available information. Therefore **the scoring rationales for PI 2.3.1(a), PI 2.3.2(b), and PI 2.4.1 should be revised to reflect this uncertainty and the scores of these PIs reduced accordingly**.

Response:

The assessment team acknowledges that a mechanism to restrict future fishing to existing tow lines would provide a higher level of protection to corals and other habits. However, in response to WWF and other commenters for ETP and Habitat, we have added rationale that documents application of the harvest control rule as a mechanism that would eliminate most incentives to expand beyond existing tow lines. On UTFs, as well as in other areas, other than the precise location of the target species (as determined by echosounders), the principal driver for restricted tow lines are the steepness and roughness of the ground (i.e. untrawlable ground), attributes that will not change and thus will continue to limit opportunities to fish outside of these established towlines. The issue of restricting tow lines is a management mechanism that addresses the level of management strategy. PIs 2.3.1 and 2.4.1 address outcome and do have a management component. Therefore, the tow line issue added to the justification for 2.3.2 and to 2.4.2.

Other – Vast SPRFMO Area is not 'Closed' to Bottom Trawling

WWF: On page 149, MRAG makes a misleading statement that "... >99% of the SPRFMO Convention area is not within any bottom fishing footprint declared to SPRFMO and is closed to bottom trawling." It may be accurate that 98% of the Convention Area is not fishable, being deeper than 2,000 m (Williams et al. 2011). However **saying that the area is 'closed to bottom trawling' is quite misleading** because it implies active management by the RFMO rather than being a simple consequence of some habitats being inaccessible to the fishing industry.

Response:
Noted. The text has been revised to read “This means that >99% of the SPRFMO Convention Area is either outside of the combined Australian and NZ footprint and therefore formally closed to bottom fishing by the binding bottom fishing CMM implemented by SPRFMO, or effectively inaccessible to bottom fishing due to depth..”

Other – Consequences of Reducing ESCR Area
WWF: On page 8, MRAG notes that the Unit of Certification for ORH3B ESCR refers to the area east of 179 degrees 30 minutes West, which is substantially smaller than the actual fishery management area. MRAG explains that “while the UoA represents 47% of the total ESCR management area, it comprises ~99% of the total catch (based on the past 10 years catch data).” However there is no discussion about how this decision may affect the assessment of benthic habitat status in ORH3B ESCR. It is clear that bottom trawling does occur in the excluded western portion of ESCR (e.g. see Clark and Anderson 2013 for a map of trawl footprint across the whole management area). WWF suggests that, in the interest of transparency, the team should **explicitly describe how exclusion of the western half of ORH3B ESCR affects an assessment of habitat-related metrics** (e.g. estimation of swept area, proportion of unimpacted UTF).

Response:
The team has assessed habitat (and all other) impacts within the definitions of the UoA areas as required by the MSC certification requirements. We have not assessed the implications of expanding the assessment area outside the UoA areas, neither in the western portion of ESCR mentioned above, nor anywhere else outside the UoAs. Accordingly, should the fishery become certified, it will have no impact in the rest of ESCR or otherwise outside the UoA areas, as only orange roughy caught within the UoA areas would be considered part of the certified fishery.

Other – Improper and Confusing Citations
WWF: The references given in the text appear to cite NIWA Client Report No: WLG2014-56WLG2014-56 as both NIWA 2015) and Clark et al. 2015 (e.g. for Figures 18-24 - cited only in the narrative, not with each figure as should be done). NIWA 2015 is not listed in the references. This is confusing for the reader.
In another instance on page 75 of the PCDR, MRAG cites Black et al. (2013), stating: *"According to Black et al. (2013), there have been no studies investigating whether the current trawling activities have had adverse effects on the structure and function of benthic communities, or on the productivity of the associated fisheries."* However the actual statement in Black et al. (2013) is: *"There have been no studies investigating whether current trawling frequencies, as determined for the 5 × 5 km cell grid, have had adverse effects on the structure and function of benthic communities, or on the productivity of the associated fisheries."* Although this may seem a minor difference, the omission of the clause referring to the grid size used for the analysis has the potential to change the context of a statement which has methodological implications into a wider ranging conclusion.

Response:
Noted. Citations have been fixed. All references to NIWA 2015 have been changed to Clark et al 2015, and the addition of the detail about the 5x5 km cell grid has been added to the Black et al. (2013) text cited above.

Other – Number of UTFs Closed

WWF: On page 76 of the PCDR, Table 26 gives percentages for overlap of UTFs with ORH combined trawl footprint and closed or unfished areas (data are from Roux et al. 2015). In citing their own table, the team says "Managed areas have closed approximately 68% of UTFs within New Zealand's EEZ..." This is contradicted by the table which shows that only 26% of UTFs are closed within NZ EEZ. Further, the table is missing figures for number and percentage of closed UTFs in the bioregion, but they clearly cannot total to 74% unless all UTFs in the Kermadec Bioregion that aren't being fished are closed to all fishing (?). If this is the case, then it certainly has not been explained in the PCDR.

Response:

Noted. The text has been amended to say that "managed areas have closed approximately 26% of UTFs within New Zealand's EEZ, and a total of approximately 68% are either closed or unfished." A similar amendment has been made to the text to address the issue with percentage closed and unfished vs. closed within the bioregion.

Principle 3 Comments

PI 3.1.1

ECO

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 100 score.

MRAG should not just base this information on that produced by Intertek in other MSC Certifications.

The commentary focuses on the relationship between the Ministry of Primary Industry or the Minister and the Commercial Sector and does not consider other interests in fisheries apart from customary fishing interests.

The consultation system does not meet the requirement for 100. There is no consultation of all parties in the process. The MOU between the fishing industry and the Ministry of Primary Industry means that there is exclusion of both science and environmental interest from consultation process.

The consultation on future research is very patchy. There is currently no research plan and the current cost recovery regime means that final consultation and the scope of the project that consultation only occurs with the fishing industry.

Response

Under the Harmonization requirements of Annex CI, the MRAG assessment team must consider the results of overlapping fisheries. We used the scoring justifications of Intertek (a, b, c) as the basis of harmonization, as required. If any differences in scores occurred, we would identify and justify them.

We have added information on Department of Commerce and the South Pacific Regional Fisheries Management Organization to broaden the scope of the binding management.

The scoring justification explicitly addressed compatibility of laws or standards with effective management, resolution of disputes, and respect for rights, fully justifying the scores given.

Consultation with stakeholders is dealt with in PI 3.1.2.

The research plan is dealt with in PI3.2.4; the 10 year plan (2010-2020) is still in place http://deepwatergroup.org//wp-content/uploads/2013/08/MPI-2010-10-Year-Research-Programme-for-Deepwater-Fisheries.-Ministry-of-Fisheries.-148p1.pdf.

No change in score resulted.

Greenpeace-DSCC
Some areas, like ORH1, are enormously data deficient. Research takes a second place to commercial operations and there are questions about whether the crew follow the sampling methodology.

That part of the fishery that is in international waters is not subject to effective management. The South Pacific RFMO measure CM-2.03 called for stock assessments of target, and, where possible, by-catch (paragraph 5(a)), to be undertaken during 2015, but this was not done.

Further, the method of addressing damage to benthic habitat, being to permit fishing to continue in 'heavily fished areas' and not to apply the move-on rule (which requires captains to report catch of VME indicator species, stop fishing and move away) to those areas, is inconsistent with United Nations resolutions 61/10 5 and 64/72, which in fact require States to cease authorising fishing in these circumstances.

There is no explicit precautionary approach in the NZ Fisheries Act. Proposals by Ministers to improve the Fisheries Act to make it clear that section 10 is precautionary approach were rejected by the fishing industry.

The current Deepwater Management Plan ends at the end of June and currently it is unclear whether there will be a replacement plan.

Response
ORH1 is not part of the UoA, so is not considered in this assessment.

SPRFMO requires that its members and CNCPs cooperate to achieve management aims by having binding CMMs. New Zealand has provided the key document required by SPRFMO that is applicable to bottom fisheries: the Bottom Fishery Impact Assessment http://www.sprfmo.int/assets/Meetings/Meetings-before-2013/Scientific-Working-Group/SWG-06-2008/a-Miscellaneous-Documents/New-Zealand-Bottom-Fishery-Impact-Assessment-v1.3-2009-05-13.pdf. MSC requires that the management system delivers management outcomes consistent with MSC Principles 1 and 2. The specific benthic habitat management is addressed in PI 2.4.2 (and PI 2.3.2 for deepwater coral). The scores for retained catch, bycatch, ETP, habitat, and the ecosystem demonstrate that the current system delivers management outcomes consistent with MSC Principles 1 and 2.

The precautionary approach is dealt with in PI 3.1.3. The assessment team added text in Section 3.5.4 to clarify the use of the precautionary approach.

The team has assurance from MPI that the management plan will continue in operation until replaced. See MPI letter annexed to this response. The team will monitor implementation of management for smooth oreo and orange roughy to assure that bycatch management continues to meet the MSC requirements.

No change in score resulted.

PI 3.1.2

ECO

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 100 score.

MRAG should not just base this information on that produced by Intertek in other MSC Certifications.

The commentary focuses on the relationship between the Ministry of Primary Industry or the Minister and the Commercial Sector and does not consider other interests in fisheries apart from customary fishing interests.

The consultation system does not meet the requirement for 100. There is no consultation of all parties in the process. The MOU between the fishing industry and the Ministry of Primary Industry means that there is exclusion of both science and environmental interest from consultation process.

The Ministry has ignored alternative suggestions for catch limits or approaches and only considered the approaches they or the industry have put forward.

The consultation on future research is very patchy. There is currently no research plan and the current cost recovery regime means that final consultation and the scope of the project that consultation only occurs with the fishing industry.

Response:

Under the Harmonization requirements of Annex CI, the MRAG assessment team must consider the results of overlapping fisheries. We used the scoring justifications of Intertek (a, b, c) as the basis of harmonization, as required. If any differences in scores occurred, we would identify and justify them.

The MRAG assessment team explicitly described the organisations and individuals involved in the management process and identified functions, roles and responsibilities for all.

The MOU between the fishing industry and MPI does not preclude consultation with other participants in the management system. The Fisheries Act 1996 includes a range of specific consultation requirements with stakeholders before making a decision; it requires identifying who has an interest; and who are representative of those having an interest. Therefore, MPI is required to consult. ECO did not provide evidence that MPI refused to consult. The allegation of not accepting ECO suggestions does not constitute lack of consultation. A record of all consultations is documented at http://www.mpi.govt.nz/news-and-resources/consultations/, which includes summaries of the basis for decisions, and comments from all participating

stakeholders. Information in letters, emails, and in Final Advice papers for management actions demonstrate the consideration of stakeholder input and use or non-use of that information. The letters, emails, and Final Advice address the issues raised by stakeholders. MPI has provided further information on consultation in a letter annexed to this response, including planned consultation on the Deepwater Management Plan.

The research plan is dealt with in PI3.2.4; the 10 year plan (2010-2020) is still in place http://deepwatergroup.org//wp-content/uploads/2013/08/MPI-2010-10-Year-Research-Programme-for-Deepwater-Fisheries.-Ministry-of-Fisheries.-148p1.pdf. See MPI letter annexed to this response.

No change in score resulted.

Greenpeace-DSCC
The consultation system does not meet the requirement for 100. There is not consultation of all parties in the process. The MOU between the fishing industry and the Ministry of Primary Industry means that there is exclusion of a number of both science and environmental interests from the consultation process.

The consultation on future research is very patchy. There is currently no research plan and the current cost recovery regime means that final consultation and the scope of the project that consultation only occurs with the fishing industry.

Response:
See ECO response.

PI 3.1.3

ECO
There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 100 score.

MRAG should not just base this information on that produced by Intertek in other MSC Certifications.

The current Deepwater Management Plan ends at the end of June and currently it is unclear whether there will be a replacement plan. Despite commitments on consultation on reviewing and consultation on these plans at the beginning on 2015 there has been no consultation. We were advised at the end of 2015 that the Ministry was reconsidering the role of management plans.

The Annual Operational Plan process is difficult to influence as it is decided by the industry and the Ministry prior to discussions with other interests.

In ORH7A, the Westpac Bank is outside the NZ EEZ and is subject to the requirements of SPRFMO. There regime that applies is an interim regime only and does not currently meet the requirements of UNGA resolutions. There is still no strategy to protect vulnerable marine ecosystems or VMEs.

Response:
Under the Harmonization requirements of Annex CI, the MRAG assessment team must consider the results of overlapping fisheries. We used the scoring justifications of Intertek (a, b, c) as the basis of harmonization, as required. If difference scores occurred, we would identify and justify them.

See response to PI 3.1.2 for consultation, which would incorporate the Management Plan and Operational Plan.

The documents described in the scoring justification (e.g., the Deepwater Management and Fisheries 2030) provide comprehensive objectives for the fisheries. The objectives must comply with the requirements of the Fisheries Act; the Act (section 10) lays out the elements of the Precautionary Approach, even though the Act does not explicitly reference the Precautionary Approach. Therefore, the objectives are consistent with the precautionary approach, and are explicit within and required by management policy

The relationships with SPRFMO were addressed under PI 3.1.1. MSC CR V1.3 does not require definition of VME, but does require consideration and protection of habitats and ETP, as described in PI 2.4.2 and 2.3.2, respectively.

No change in score resulted.

Greenpeace-DSCC
The current Deepwater Management Plan ends at the end of June and currently it is unclear whether there will be a replacement plan. Despite commitments on consultation on reviewing and consultation on these plans at the beginning of 2015 there has been no consultation. We were advised at the end of 2015 that the Ministry was reconsidering the role of management plans.

The Annual Operational Plan process is difficult to influence as it is decided by the industry and the Ministry prior to discussions with other interests.

The Westpac Bank is outside the NZ EEZ and is subject to the requirements of SPRFMO. The regime that applies does not meet the requirements of the UNGA resolutions.

Response:
See ECO response.

PI 3.1.4

ECO
There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 90 score.

MRAG should not just base this information on that produced by Intertek in other MSC Certifications.

The perverse incentives in the system have arisen from the separation of catching entitlements from quota, and the operations where quota manager place incentives on crew to pay deem values. This places an incentive to dump non-quota species or dump low value fish. Only if

there is an observer onboard is this incentive reduced.

The reporting rate for marine mammal, seabirds and other protected species is lower on non-observed compared to observed vessels.

Response:

Under the Harmonization requirements of Annex CI, the MRAG assessment team must consider the results of overlapping fisheries. We used the scoring justifications of Intertek (a, b, c) as the basis of harmonization, as required. If difference scores occurred, we would identify and justify them.

Deemed values prevent an incentive for dumping. Deemed values are payable only for QMS species caught without balancing ACE. There is no restriction on discarding non-QMS species and thus there are no perverse incentives as proposed. Where deemed values are payable for QMS species taken without balancing ACE , the deemed value is set at a level to remove any financial benefit to industry to catch but at a level that will not incentivise what would be illegal discarding. The penalties for discarding QMS species without authorisation are severe, further reducing the incentives to discard.

Management response for ETP species uses only scaled up values from observer data; ETP estimates are not derived from logbook data. Therefore, should misreporting on logbooks occur, it would not affect the estimates from observer data. The quality of data for ETP species is dealt with in PI 2.3.3, which demonstrated for all elements except coral a) sufficient information to quantitatively estimate fishery related mortality and the impact of fishing; b) sufficient information to determine whether the fishery may be a threat to protection and recovery of the ETP species; and c) sufficient information to measure trends and support a full strategy to manage impacts on ETP species. Coral did not meet the requirement for c) so received a condition.

No change in score resulted.

PI 3.2.1

ECO

There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 100 score.

MRAG should not just base this information on that produced by Intertek in other MSC Certifications.

The current Deepwater Management Plan ends at the end of June and currently it is unclear whether there will be a replacement plan. Despite commitments on consultation on reviewing and consultation on these plans at the beginning on 2015 there has been no consultation. We were advised at the end of 2015 that the Ministry was reconsidering the role of management plans.

The Annual Operational Plan process is difficult to influence as it is decided by the industry and the Ministry prior to discussions with other interests.

In ORH7A, the Westpac Bank is outside the NZ EEZ and is subject to the requirements of SPRFMO. There regime that applies is an interim regime only and does not currently meet the

requirements of UNGA resolutions. There is still no strategy to protect vulnerable marine ecosystems or VMEs.

SPRFMO has yet to agree to sustainable catch limit for high seas fisheries.

Response:
Under the Harmonization requirements of Annex CI, the MRAG assessment team must consider the results of overlapping fisheries. We used the scoring justifications of Intertek (a, b, c) as the basis of harmonization, as required. If difference scores occurred, we would identify and justify them.

The ECO comments on the Deepwater Management Plan, Operations Plan, and SPRFMO do not deal with fishery specific objectives and do not provide any rationale for why the objectives in the documents listed do not meet the MSC scoring guideposts. The assessment team has previously addressed these topics.

No change in score resulted.

PI 3.2.2

ECO
There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 95 score.

The dispute resolution procedure is a narrow arrangement only applying to disputes between fishers and does not apply to sustainability issues. There is no formal process of appeal from sustainability decisions as occurs under the Resource Management Act.

Many of the issues of concerns to ECO have not been resolved by the decision making process eg bycatch of marine mammals, seabird or other protected species, benthic impacts of bottom trawling etc. There is no strategy or arrangements to consider these issues.

Response:
Under the Harmonization requirements of Annex CI, the MRAG assessment team must consider the results of overlapping fisheries. We used the scoring justifications of Intertek (a, b, c) as the basis of harmonization, as required. If difference scores occurred, we would identify and justify them.

Section 7 of the Fishery Act specifies fishery-oriented disputes. The Act provides opportunities to negotiate and resolve disputes. The Minister may appoint a Disputes Commissioner and the Minister makes the final determination. However, this mechanism does not seem to be widely used. Rather, the consultation process is an attempt to avoid unresolved disputes by ensuring all interested parties have an opportunity to participate and have an input into decisions. There have been occasions when there has not been a satisfactory outcome and then this has gone to litigation and the Court has made a decision. ECO does not provide any evidence that lack of good faith response by MPI has led to legal disputes or that MPI as avoided resolution of judicial decisions.

No change in score resulted.

PI 3.2.3

ECO
There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 100 score.

A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

Response:
Under the Harmonization requirements of Annex CI, the MRAG assessment team must consider the results of overlapping fisheries. We used the scoring justifications of Intertek (a, b, c) as the basis of harmonization, as required. If difference scores occurred, we would identify and justify them.

The ECO comments deal with observer coverage. The MRAG team has responded to impacts of observer coverage previously.

Monitoring, control, and surveillance involve much more than just observer coverage. The MRAG team has documented a comprehensive MCS system that demonstrates the capacity to effectively monitor and enforce relevant regulations and laws. The ECO comments do not provide any evidence to the contrary.

No change in score resulted.

Greenpeace-DSCC
The management of by-catch species and protected species are less well managed than target species with threats from fisheries catching orange roughy. Protected species interactions with fisheries are also managed under the Wildlife Act (seabirds, corals, sharks, and turtles) and the Marine Mammal Protection Act (whales, seals and dolphins) but this has little teeth to control fishing. The orange roughy fishery has moderate observer coverage which has varied with the most recent year having the lowest level of coverage. Observer coverage can be poor spatially.

While fishers are required to report by-catch of marine mammals and seabirds, as well as quota species, the rate of reporting is low. Only with observers on board is there sufficient information to assess by-catch rates.

Reporting of non-quota management species and non-target fish species (eg corals) relies on reporting from observers.

Response:
As with the ECO comments, the Greenpeace-DSCC comments deal with observer coverage. The MRAG team has responded to impacts of observer coverage previously. The response above to ECO applies to the Greenpeace-DSCC comments. The MRAG team further points out that fluctuating observer coverage does not mean that the MCS system is faulty. MPI uses a number of methods, as described in the report, to assure the capacity to effectively monitor and

enforce relevant regulations and laws. Greenpeace-DSCC has presented no evidence to the contrary.

No change in score resulted.

PI 3.2.4

ECO
There are a range of issues that MRAG have not considered which means the indicator score should be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 100 score.

Firstly the 10 year research plan is ended and is no longer relevant to the research for orange roughy. As we were advised in last year, the proposal for a 5 year extension was considered not to be fundable by the Ministry of Primary Industry (Turner D, Jan 2015). For the last 2 years it has been only ad hoc research projects for deepwater species including orange roughy.

The current annual operational plan for deepwater research for 2015-16 has no directed orange roughy research in the areas proposed.

The operational plan proposed for 2016-17 has one project for orange roughy - North West and East-South Acoustic Survey. At this stage we do not know whether this will occur in the winter of this year.

On this basis a score of 80 or 90 cannot be justified, and the current arrangements are well below a score of 100..

Response:
The 10-year research plan of 2010 http://deepwatergroup.org//wp-content/uploads/2013/08/MPI-2010-10-Year-Research-Programme-for-Deepwater-Fisheries.-Ministry-of-Fisheries.-148p1.pdf runs to 2020. We have received assurance from MPI that the research intent from Fisheries 2030 and the research programme will continue into the future, and that the research will respond to identified and new needs. Scientific results have regularly come out of the research contracted under the research plan. The research is based on overarching guidance documents such as Fisheries 2030, but research needs to evolve over time; Fisheries 2030 and the research plan allow for research on topics not foreseen at the time of drafting. Ongoing and supplemental research for orange roughy is documented and reported in operations plans and the annual assessment plenaries. Examples of ongoing research include the acoustic-trawl surveys and the special projects conducted for this MSC assessment and consolidated on the DWG website http://deepwatergroup.org/species/orange-roughy/msc-assessment-of-new-zealand-orange-roughy-fisheries/. Additional material was provided in the text of the report to further document the comprehensive nature of the research plan.

No change in score resulted.

Greenpeace-DSCC
The 10 year research plan is ended and is no longer relevant to the research for orange roughy. As we were advised in last year, the proposal for a 5 year extension was considered to be unfundable by the
Ministry of Primary Industry (Turner D, Jan 2015). For the last 2 years it has been only ad hoc research project for deepwater species including orange roughy.

The current annual operational plan for deepwater research for 2015-16 has no directed orange roughy research in the areas proposed.

The operational plan proposed for 2016-17 has one project for orange roughy - North West and East-
South Acoustic Survey. At this stage we do not know whether this will occur in the winter of this year.

Response:
See response to ECO.

PI 3.2.5

ECO
There are a range of issues that MRAG have not considered, and the assumptions made, which requires the indicator score to be changed and replaced with a much lower value. Full consideration of the relevant issues would mean the UOC would not meet a 70 score.

A key element in information collection if the presence of MPI scientific observers on vessels. As Peer Reviewer 2 noted:
Throughout the report reference is made to an average of 20% observer coverage of the orange roughy fisheries. However, coverage in the largest fishery has been consistently below 20% since 2010. The report does acknowledge is decline but not consistently throughout the scoring of P2 scoring issues.

The Annual Review Report is missing key reporting requirements for these UOC. These include:
- Observer targets and biological reporting targets;
- Benthic impact reporting;
- Not delineating orange roughy from other deepwater species (eg cardinal fish and oreos);
- Not dividing between different orange roughy areas including the three UOCs.

It is unclear the status of the current Deepwater Management Plan and research priorities (see response to 3.2.4).

On this basis a score of 80 or 90 cannot be justified, and the current arrangements are well below a score of 100..

Response:
PI 3.2.5 scored 70 after the assessment team could not document external peer review, and the performance indicator received a condition. While the team is confident that the internal review is rigorous and wide ranging, an external review provides additional assurance that key components of the management system are addressed and issues are identified. Such a review could comment on observer coverage or reporting in the Annual Review Report.

No change in score resulted.

Greenpeace-DSCC
There is no guarantee the observer coverage will be 20% coverage. Priorities are wider than those for research and management and can within years change priorities.

The targeted observer coverage was not met on the Chatham Rise or in the Challenger fishery with only 30% of the target being achieved in the Challenger fishery.

There were no otoliths collected in 2014-15 in the NW Chatham Rise.

It is unclear the status of the Deepwater Management Plan and research priorities.

Response:
It is unclear what Greenpeace-DSCC recommend for 3.2.5. The performance indicator currently has a condition requiring external review. As indicated in the ECO response, external review could comment on the concerns raised by Greenpeace-DSCC.

Ministry for Primary Industries
Manatū Ahu Matua

5 April 2016

Robert J. Trumble Ph.D.
MRAG Americas, Inc.
10051 5th St. N, Suite 105
St Petersburg FL 3372

Dear Bob

New Zealand's Fish Plans, research programme and consultative processes

The current (2010/11 – 2015/16) National Fisheries Plan for Deepwater and Middle depth species (National Deepwater Plan) expires at the end of June 2016. This National Deepwater Plan will remain in place and its objectives will continue to guide management until replaced. Likewise, the 10 Year Research Programme for deepwater fisheries continues to serve as the basis for research planning.

Research contracting is currently undertaken on an annual basis, however the annual research is based on the 10 Year Research Programme and stakeholders are consulted on projects each year. A return to longer term, multi-year contracting is being explored.

The National Deepwater Plan is currently being reviewed and a revised National Deepwater Plan will be developed through a consultative process prior to being signed by the Minister for Primary Industries in accordance with the Fisheries Act 1996.

The process for completion of the revised National Deepwater Plan will follow MPI's standard consultation process. This process includes informal consultation with stakeholders (which began with an Environmental Engagement Forum meeting on 17 March 2016) followed by a 4-6 week public consultation. Following this consultation, all submissions will be considered and incorporated into the final National Deepwater Plan for 2016-2020 which will be provided to the Minister along with a summary and analysis of the submissions received.

This process reflects that followed for all Total Allowable Catch and regulatory amendments. Public consultation is undertaken for a minimum of 4 weeks and submissions are summarised in final advice papers to the Minister. In addition, all submissions received are provided to the Minister along with the final advice.

All fisheries consultations are posted on the MPI website (http://www.mpi.govt.nz/news-and-resources/consultations/?cat=8) and a letter sent directly to all persons considered to have an interest in the fishstock, including Maori, environmental, commercial, and recreational stakeholders or their representatives. Following the consultation period, the final advice paper to the Minister including all submissions and details of the Minister's decision are also posted on the MPI website.

Yours sincerely

Tiffany Bock
Team Manager Deepwater Fisheries (Acting)

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Ministry for Primary Industries
Manatū Ahu Matua

5 April 2016

Robert J. Trumble Ph.D.
MRAG Americas, Inc.
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St Petersburg FL 3372

Dear Bob

Monitoring of compliance with New Zealand's shark finning regulations

New Zealand implemented a ban on shark finning, defined as the removal of the fins from a shark and disposal of the remainder of the shark at sea, from 1 October 2014.

Compliance with the regulations is monitored using data from at-sea observers and inspections, in-port inspections, inspections of licensed fish receivers, detailed analysis of data collected through the comprehensive reporting requirements of the QMS, and retrospective analysis across all data sources.

While at-sea observers form an important part of the monitoring system, MPI is confident that the wider processes in place provide the ability to monitor ongoing compliance with the regulations. As an example, during the first year of implementation, relevant fisher and licensed fish receiver reported data was monitored and any significant instances of non-compliance were followed up by MPI Compliance. At the end of the fishing year, the data were analysed and summarised for review by the NPOA Sharks Advisory Group. The regulations and relevant management settings will be reviewed in 2017.

More information on the shark finning ban regulations and monitoring of compliance can be found in the Final Advice Paper and the Regulatory Impact Statement on the NPOA sharks page of the MPI website.

Yours sincerely

Tiffany Bock
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Appendix 3.4.3 MSC Technical Oversight and MRAG Response

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Date: 29/02/2016

SUBJECT: MSC Review and Report on Compliance with the scheme requirements

Dear Robert Trumble

Please find below the results of our partial review of compliance with scheme requirements.

CAB	MRAG Americas, Inc (MRAG)
Lead Auditor	Robert Trumble
Fishery Name	New Zealand orange roughy
Document Reviewed	Public Comment Draft Report

Ref	Type	Page	Requirement	Reference	Details	PI
19499	Guidance	Throughout			A large number of cross references to figures and tables within the report and rationale have error messages. Ammend for Final Report to increase clarity.	
19500	Guidance	118	CR-27.10.6.1 v.1.3	Rationale shall be presented to support the team's conclusion	PI 1.1.1 SI b: Within the rationale, when discussing the ORH3B ESCR stock, it is stated that "The stock is projected to recover to the the lower limit of management target range in 2015 (Figure 13 and Figure 14)." However, this statement seems to only apply to the 'base case' scenario presented in Figure 13.	1.1.1

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19501	Major	123, 126	CR-27.10.6.1 v.1.3	Rationale shall be presented to support the team's conclusion	PI 1.2.1 SI b: Information presented in the rationale states that "….there has been insufficient time to assess that it [Harvest Strategy (HS)] is achieving its objectives." However, at the SG80 level, it is required that "evidence exists that it [HS] is achieving its objectives." Rationale does not support the score. PI 1.2.2 SI c: The rationale states that "Catches in New Zealand orange roughy fisheries are at or below agreed catch limits" Within the body of the report on page 40, it is stated that "Reeve (2014) notes that now the HCR has been formally agreed, MPI will in future endeavour to set catch limits for the three orange roughy stocks using the agreed HCR whenever possible." This statement seems to suggest that the most recent catches in the orange roughy fishery may not be directly due to the catch limits set by the HCR. Rather, the HCR will now apply to future catches and the recent catches/catch limits are an artefact of existing management or other factors within the fishery. If it is too early to assess the effectiveness of the tools used to implement the HCR, rationale does not support the score.	1.2.1, 1.2.2
19511	Major	132	CR-27.10.6.2 v.1.3	The rationale shall make direct reference to every scoring issue and whether or not it is fully met.	PI2.1.1 SI a & d: The rationale does not justify the score as not all scoring issues are addressed. PI2.1.1 has four scoring issues (a-d). The rationale provided for scoring issue (a) does not address fluctuating around target reference points. Scoring issue (b) (target reference points) is not included/scored in the report.	2.1.1
19512	Guidance	102			Table 29: The scoring elements summarised here do not accurately reflect the main/minor classification for retained species that is used in scoring tables & described in background information.	

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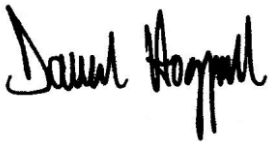
19513	Guidance	194			PI 3.2.5: Field for condition number is left blank, but there is a condition assigned to this this PI.	
19514	Guidance	108			ESCR scoring table: P1 overall score may not be correct in this table, as the 81.9 score is specified for if the stock rebuilding PI is not scored, however it was scored for this UoA.	

This report is provided for action by the CAB and ASI in order to improve consistency with the MSC scheme requirements; MSC does not review all work products submitted by Conformity Assessment Bodies and this review should not be considered a checking service. If any clarification is required, please contact Maylynn Nunn on +61 (0)2 9527 6683 or at maylynn.nunn@msc.org for more information.

Best regards,
Fisheries Oversight Director
Dan Hoggarth
Marine Stewardship Council



cc: Accreditation Services International

Assessment team response to MSC TO

MSC Reference 19499:
The Assessment team has fixed the broken links.

MSC Reference 19500:
1.1.1 SI b. This is correct. The text has been updated to reflect that the projection pertains only to the base-case analysis whereas the time to rebuild to the lower limit of management target range is 2025 for the “lowM - highq” case.

MSC Reference 19501:
1.2.1 SI b. The MSE provides strong (but indirect) evidence that the harvest strategy is achieving its objectives. Cordue (2014) reports that the probabilities that the spawning biomass will exceed the limit reference point and the lower limit of the management target range both exceed 90% and the mean biomass is 42% for the base-case specifications. This conclusion is robust to the frequency with which assessments are conducted, the form of the stock-recruitment relationship, and the extent of recruitment variability. The probability of being above the lower limit of the management target is less than 90% (78-80%) if biomass is positively biased by 20% and this bias does not reduced over time. The fisheries have had previous conservative management that has led to abundance increases; simulations explored in the MSE support the conclusion that the harvest strategy will continue the increases. It is not possible to formally contrast the previous management strategy and the HCR because the previous management strategy was not fully specified and could not be evaluated using MSE. The team has modified the text in the scoring table to clarify this point.

1.2.2 SI c. The HCR was not formally in place for the 2014-15 fishing year so catch limits before then were not mandated by the HCR. However, a shelving agreement was imposed by the industry so that the agreed catch limit for the NWCR for 2014-15 was reduced to 1,043t in line with the output from the HCR (see Section 3.3.2). Therefore, the TACC was based on the HCR, implemented voluntarily by the industry. It is not too early to assess the effectiveness of the HCR. Recent history of the fishery shows decreased catch in response to estimates of abundance, essentially what the HCR requires. The current reduction in catch responds to the HCR. Abundance had increased under the previous strategy, and the MSE demonstrated that continued growth would occur under the HCR.

MSC Reference 19511:
2.1.1.SI a, b. The text for target reference points in the SG100 for scoring issue a and scoring issue b were inadvertently dropped from the template. The missing text from the scoring table was reinserted, with edits to the justification for scoring issue a and justification added for scoring issue b. The text and the justification clarify the status relative to target and limit reference points. *[Note: the reference to SI d in the MSC TO reference to PI2.1.1 SI a & d contains a typographical error. The reference to SI d should be SI b. The MRAG team confirmed this with the MSC.*]

MSC Reference 19512:
Table 29. Main and minor designations were inadvertently switched for smooth oreo in NWCR and ESCR. The designations have been corrected.

MSC Reference 19513:
3.2.5 Condition number. The team has added the condition number

MSC Reference 19514:
ESCR Scoring Table. The team has corrected the scoring table to reflect the score using PI 1.1.3.

Appendix 4. Surveillance Frequency

As surveillance is a Process requirement, MRAG Americas will conduct surveillance annually as required under CR v2.0 Section 7.23. The MSC sets six levels of surveillance:

Surveillance level	Surveillance requirements
Level 6 *Default Surveillance*	4 on-site surveillance audits
Level 5	3 on-site surveillance audits 1 off-site surveillance audit
Level 4	2 on-site surveillance audits 2 off-site surveillance audits
Level 3	1 on-site surveillance audits 3 off-site surveillance audits
Level 2	1 on-site surveillance audits 2 off-site surveillance audits 1 review of information
Level 1 *Minimum Surveillance*	1 on-site surveillance audit 1 off-site surveillance audit 2 review of information

MRAG Americas has selected Surveillance Level 4. The opportunity to receive information from the client and the management agency is excellent, so some level of remote surveillance is appropriate. However, the interest in the fishery as demonstrated by the Objections Process (Appendix 3), and the substantial time since the fishery entered assessment (May 2014) demonstrates a need for an on-site visit for the first surveillance. Three of four conditions are due for closure at the fourth surveillance, which will occur on-site as part of re-assessment, and these conditions require a plan for closure at the first surveillance, and updates at the second and third. The remaining condition, due for closures at the third surveillance, can readily be evaluates remotely. Therefore, the assessment team as determined that the fishery is suitable for Level 4 surveillance, with on-site visits for surveillance 1 and 4, and off-site surveillance for the second and third. The assessment team will monitor progress and adjust the surveillance level if necessary.