8950 Martin Luther King Jr. Street N. #202
St. Petersburg, Florida 33702-2211
Tel: (727) 563-9070
Fax: (727) 563-0207
Email: MRAG.Americas@mragamericas.com

President: Andrew A. Rosenberg, Ph.D.

New Zealand Orange Roughy
1st Surveillance Report

Conformity Assessment Body (CAB)	MRAG Americas, Inc.
Assessment team	Amanda Stern-Pirlot and Andre Punt
Fishery client	Deepwater Group, Ltd.
Assessment type	First Surveillance Audit
Author name	Amanda Stern-Pirlot and Andre Punt
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1. Contents

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2. List of Abbreviations

ACAP	Agreement on Conservation of Albatross and Petrels
ACE	Annual Catch Entitlement
ACCOBAMS	Agreement on the Conservation of Small Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area
AEEF	Assessment of the Environmental Effects of Fishing
AEWA	African-Eurasian Migratory Waterbird Agreement
ALC	Automatic Location Communicator
AOP	Annual Operational Plan
ARR	Annual Review Report
B0	Unfished Equilibrium Biomass
BMA	Benthic Management Areas
BPA	Benthic Protection Area
BRT	Boosted Regression Tree
CAY	Current Annual Yield
CITES	Convention on International Trade in Endangered Species
CLR	Catch Landing Return
CMM	Conservation Management Measures
CMS	Convention on Migratory Species

CPUE	Catch Per Unit Effort
CSP	Conservation Services Programme
CV	Coefficient of Variation
DFAWG	Deepwater Fisheries Assessment Working Group
DOC	New Zealand Department of Conservation
DSCC	Deep Sea Conservation Coalition
DWG	Deepwater Group Limited
DWWG	Deep Water Working Group
ECO	Environment an Conservation Organisations
ELO	Environmental Liaison Officer
ESCR	East and South Chatham Rise
EEZ	Exclusive Economic Zone
ELR	Electronic Reporting
ETP	Endangered, Threatened, Protected Species
FARs	Fishery Assessment Reports
FAWGs	Fishery Assessment Working Groups
FCV	Foreign Charter Vessel
FMA	Fishery Management Areas
FPAG	Fish Plan Advisory Group
FNZ	Fisheries New Zealand-entity within MPI responsible for fisheries science and management
GPR	Geospatial Position Reporting
HCR	Harvest Control Rule
HSS	Harvest Strategy Standard for New Zealand Fisheries
IQANZ	Independent Quality Assurance New Zealand
IQF	Individual Quick Freezing
IUCN	International Union for Conservation of Nature
LFR	Licensed Fish Receiver
LMA	Large Marine Reserve
M	Natural mortality
MLS	Minimum Legal Size
MPA	Marine Protected Area
MPSA	Monitor, Pause, Survey and Assess (Benthic Management framework)
MPI	Ministry for Primary Industries (representing the Crown and its statutory obligations to the public). Formerly the Ministry of Agriculture and Forestry and before that the Ministry of Fisheries.
MSE	Management Strategy Evaluation
MSY	Maximum Sustainable Yield
MTRP	Medium Term Research Plan (Deepwater Fisheries
NGO	Non-Governmental Organisation
NIWA	National Institute of Water and Atmospheric Research
nm	Nautical MileNPOA National Plan of Actions
NWCR	North West Chatham Rise
NZ	New Zealand
ORH3B	ESCR UoA The UoA within the ORH3B QMA within the designated area known as the East and South Chatham Rise management area east of 179º 30' W on the southern Chatham Rise (see **Error! Reference source not found.**)
ORH3B	NWCR UoA The UoA within the ORH3B QMA managed as a separate stock unit within the designated area known as the North West Chatham Rise (see **Error! Reference source not found.**)
ORH7A	The UoA including the orange roughy 7A QMA along with that area known as the Westpac Bank immediately adjacent to and outside of the New Zealand EEZ boundary – recognised as a straddling stock under UNCLOS
PST	Population Sustainability Threshold
QMA	Quota Management Area
QMS	Quota Management System
RCP	Regions of Common Profile
RF	Random Forest
SCA	Seamount Closure Area
SEFRA	Spatially Explicit Fisheries Risk Assessment

SMART	Seafloor Monitoring, Automated Recording of Trawls
SPRFMO	South Pacific Regional Fisheries Management Organisation
TAC	Total Allowable Catch
TACC	Total Allowable Commercial Catch
TCEPR	Trawl Catch Effort and Processing Returns
TCER	Trawl Catch Effort Returns
TOKM	Te Ohu Kai Moana
UoA	Unit of Assessment (see MSC-MSCI Vocabulary for MSC defined terms)
UoC	Unit of Certification
UNCLOS	United Nations Convention on the Law of the Sea
UTF	Underwater Topographic Features (including hills, knolls, and seamounts)
VADE	Voluntary, Assisted, Directed and Enforced Compliance operating model
VME	Vulnerable Marine Ecosystem
VMP	Vessel Management Plan
VMS	Vessel Monitoring System
WCPFC	West & Central Pacific Fisheries Commission

3. Executive summary

This report contains the results of the first annual surveillance audit for the MSC certified New Zealand orange roughy fishery. Two of the original three Units of Certification remain in the MSC program and are reported on in the present report. One unit, Orange Roughy 3B ESCR, has been “self-suspended” by Deepwater Group, the fishery client. Per the “intent to self-suspend” announcement, the certificate for the 3B ESCR UoC will not be valid as of 20 December 2023. There is therefore no reporting on this UoC within the current surveillance report.

A “hybrid” surveillance audit was carried out on October 9-11, 2023 in Auckland and Wellington, NZ with one assessment team member participating remotely from Seattle, WA USA. At least thirty days beforehand, the assessment site visit was announced to provide stakeholders with an opportunity to express interest or provide written comment. During the site visit, information supplied by industry, managers and scientists was reviewed, and interviews with relevant stakeholders were held.

As mentioned previously, the present report contains the findings of the 1st surveillance audit for the ORH 3B NWCR and ORH 7A including Westpac Bank Units of Certification. Progress on the single open condition has been made, and PIs 1.1.1. for the NWCR unit has been rescored, although no new condition has been raised. MRAG Americas has determined that these two UoCs remain in conformity with the MSC Fishery Standard and should remain certified.

4. Audit details

4.1. Surveillance information

Table 1: Surveillance information

1	Fishery name
New Zealand orange roughy	
2	**Unit(s) of Assessment (UoA)**

UoA 1	Description
Species	Orange Roughy (*Hoplostethus atlanticus*)
Stock	ORH7A including Westpac Bank
Fishing gear type(s) and, if relevant, vessel type(s)	Demersal trawl
Client group	Deepwater Group Limited
Other eligible fishers	The three units of assessment represent three of the nine management units of orange roughy in New Zealand. Eligible fishers are DWG shareholders with authorization from the New Zealand government to fish for orange roughy.
Geographical area	FAO Area 81 (Pacific, Southwest), ORH7A, including Westpac Bank which is outside the NZ EEZ.
~~UoA 2~~	~~Description~~
~~Species~~	~~Orange Roughy (*Hoplostethus atlanticus*)~~
~~Stock~~	~~ORH3B East & South Chatham Rise~~
~~Fishing gear type(s) and, if relevant, vessel type(s)~~	~~Demersal trawl~~
~~Client group~~	~~Deepwater Group Limited~~
~~Other eligible fishers~~	~~The three units of assessment represent three of the nine management units of orange roughy in New Zealand. Eligible fishers are DWG shareholders with authorization from the New Zealand government to fish for orange roughy.~~
~~Geographical area~~	~~FAO Area 81 (Pacific, Southwest), ORH3B East and South Chatham Rise (ESCR), east of 179° 30' W~~
UoA 3	Description
Species	Orange Roughy (*Hoplostethus atlanticus*)
Stock	ORH3B Northwest Chatham Rise

Fishing gear type(s) and, if relevant, vessel type(s)	Demersal trawl
Client group	Deepwater Group Limited
Other eligible fishers	The three units of assessment represent three of the nine management units of orange roughy in New Zealand. Eligible fishers are DWG shareholders with authorization from the New Zealand government to fish for orange roughy.
Geographical area	FAO Area 81 (Pacific, Southwest), ORH3B Northwest Chatham Rise (NWCR)

3	Date certified	Date of expiry
	02 August 2022	01 August 2027

4 Audit type and number

First surveillance audit

5 Surveillance level

Level 4, hybrid

6 Surveillance team leader

Ms. Amanda Stern-Pirlot (on-site) serves as team leader for the assessment. Amanda is an M.Sc. graduate in Marine Ecology and Fisheries Biology from the University of Bremen, Center for Marine Tropical Ecology (ZMT). She joined MRAG Americas Inc. in 2014 and now serves as Vice President—Science, providing technical oversight of all projects, ensuring MRAG Americas maintains a strong science- and evidence-based ethos. She also oversees our growing portfolio of fisheries certification projects under the MSC, RFM, and FISH Standard for Crew standards. Throughout her career, she has worked with many scientists, conservationists, fisheries managers, and producer groups on international fisheries sustainability issues. With the Institute for Marine Research (IFM-GEOMAR) in Kiel, Germany, she led a work package on simple indicators for sustainability within the EU-funded international cooperation project INCOFISH. This was followed by 5 years in the Standards Department at MSC in London developing standards, and policies and assessment methods informed by best practices in global fisheries management. She was Resources Analyst of the Alaska pollock industry in the North Pacific Fisheries Management Council focusing on bycatch and ecosystem-based management issues and managing the operations of the offshore pollock cooperative. She has co-authored publications on fisheries sustainability in the developing world and the functioning of sustainability standards as an instrument for transforming fisheries to a sustainable basis.

MRAG Americas confirms that Ms. Stern-Pirlot meets the competency criteria in Annex PC for team leader as follows:

- She has an appropriate university degree and more than five years' experience in management and research in fisheries;
- She has passed the MSC team leader training;
- She has the required competencies described in Table PC1, section 2;
- She has passed the MSC Traceability training module;
- She is qualified to carry out assessments using the MSC's Risk Based Framework for data-deficient fisheries;
- She meets ISO 19011 training requirements;
- She has undertaken two fishery assessments as a team member in the last five years, and
- She has experience in applying different types of interviewing and facilitation techniques and is able to effectively communicate with clients and other stakeholders.

In addition, she has the appropriate skills and experience required to serve as a Principle 2 & 3 assessor as described in FCP Annex PC table PC3.

7 Surveillance team members

Dr. Andre Punt (off-site) is a Professor at the University of Washington and Director of the School of Aquatic and Fisheries Sciences. He is a quantitative scientist with a specialty of providing quantitative scientific advice for fisheries management, focusing on new methods for assessing fish and marine mammal populations; Bayesian

assessment and risk analysis methods; and valuating the performance of existing methods for assessing and managing renewable resource populations. He uses methods for assessing fish and marine mammal populations that are tailored specifically to the situation in question. Current areas of interest are spatial models, individual-based models, and stage-structured models. He has worked as a resource population models for the Benguela Current in South Africa, a resource modeler at CSIRO in Australia, and at the University of Washington. He has a Ph.D. from the University of Cape Town in South Africa.

MRAG Americas confirms that Dr. Punt meets the competency criteria in Annex PC for team members as follows:

- He has an appropriate university degree and more than five years' experience in management and research in fisheries;
- He has undertaken at least two MSC fishery assessments or surveillance site visits in the last five years; and
- He is able to score a fishery using the default assessment tree and describe how conditions are set and monitored.

In addition, he has the appropriate skills and experience required to serve as a Principle 1 assessor as described in FCP Annex PC table PC3, and MRAG Americas confirms he has no conflicts of interest in relation to the fishery under assessment.

The whole assessment team collectively meets the requirements as described in FCP Annex PC table PC3.

A discussion between team members regarding conflict of interest and biases was held and none were identified.

8	Audit time and location

9-11 October 2023, Auckland and Wellington NZ, with P1 expert participating remotely from Seattle, USA and one client representative in the UK.

9	Assessment and review activities

The surveillance reviewed any changes in science and management and will monitor progress in closing out conditions.

- The following was reviewed during the audit:
  - Changes to the information provided in the Scope Declaration form.
  - Changes to the UoA and its management.
  - Performance in relation to any relevant conditions of the certification.
  - Any developments or changes within the UoA that affect traceability and the ability to segregate MSC from non-MSC products.
  - Any other significant changes in the UoA.
- No modifications were made to the assessment tree.

4.2. Version details

Table 2: Fisheries program documents versions

Document/Assessment Tree	Version number/Type
MSC Fisheries Certification Process	Version 2.3
MSC Fisheries Standard	Version 2.01
Assessment tree	Default
MSC General Certification Requirements	Version 2.5
MSC Surveillance Reporting Template	Version 2.2

4.3. Update on the fishery

The CAB shall outline in the surveillance report any changes to the fishery since the initial assessment or last surveillance report, including (but not limited to) changes to:

- *Scope as per FCP v2.3 7.4*
- *Management systems.*
- *Relevant regulations.*
- *Personnel involved in science, management or industry.*
- *Scientific base of information, including stock assessments.*
- *Changes that affect traceability and the ability to segregate MSC from non-MSC products*

The CAB shall state if no changes to the fishery have been identified.

For an expedited audit, the CAB shall only outline in the report changes to the fishery and/or new information that triggered the expedited audit and were reviewed as part of the expedited audit; this could include (but is not limited to) changes to the issues outlined above.

Principle 1

UoC 1: ORH 7A

The catches for the 2021-22 and 2022-23 fishing seasons were 2,193t and 1,763t, at (2021-22), or below (by 16%; 2022-23) the available ACE. No assessment was scheduled for ORH 7A during 2022 or 2023. An acoustic survey for ORH 7A was conducted during July 2023 (it had originally been planned for 2022 but Tangaroa had to return to port due to COVID), with the results expected to be available for an assessment planned for 2024. It is unclear at present whether the issues with the assessment for the ESCR apply to that for ORH 7A.

UoA 2: ORH 3B ESCR—Self-suspended; not assessed as part of surveillance 1.

UoA 3: ORH 3B NWCR

ORH 3B: NWCR

Fishery performance and new survey data

The NWCR fishery took 17% of the agreed catch limit during the 2021–22 fishing year. Roughly 20% of the recent catch was taken during the spawning season, compared with 60–85% historically. FNZ (2023a) notes that the change in catch may be because the main spawning aggregation now occurs on the Morgue hill, which was closed to bottom fishing in 2001, rather than the Graveyard hill, which remains open to fishing. Industry also noted that the effects of COVID led to difficulties finding crew, which led to changes in vessel deployments, and that increases in fuel prices also resulted in redeployment of vessels.

The recent fishery used more long tows on flat ground, rather than short tows on features, with about 50% of the catch taken during tows > 4 hours duration after 2015–16, compared historically with about 50–90% from tows < 1 hour duration (FNZ, 2023a). Unstandardised CPUE has been flat or declining and was at historical lows between 2016–17 and 2021–22 (Figure 1; FNZ, 2023a).

The acoustic estimates of the spawning biomass on the Northwest Chatham Rise were low and variable for the Graveyard hill and increased for the Morgue hill (Figure 2; Table 3) and it remains unknown whether the spawning biomass of orange roughy on the closed Morgue hill move away from the hill to areas open for fishing outside the spawning season. The combined area series shows an increasing spawning biomass. The 2018 assessment model estimated spawning biomass to be about 40% higher than was observed, although the acoustic estimates are included in the assessment under the assumption that acoustic estimates of biomass for the Graveyard and Morgue hills alone under-estimate the actual total biomass of the NWCR stock, and the 2018 assessment included a prior that has a mean of 0.8 for the acoustic catchability.

New data for the NWCR sub-area considered in the assessment work during 2023 included acoustic spawning biomass estimates and age frequencies from 2021 and 2022.

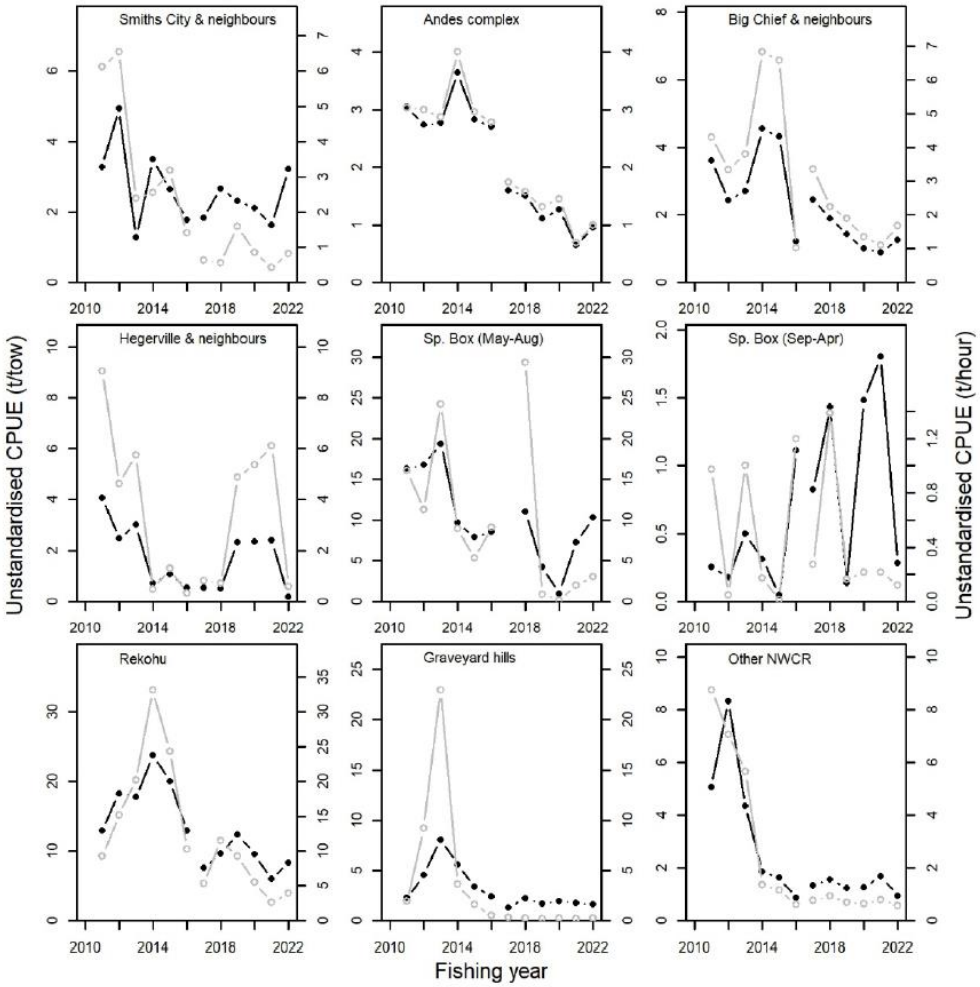

Figure 1. ORH 3B fishery regions and annual unstandardised CPUE for 2009–10 to 2015–16 (period of lower catches and TAC); 2016–17 to 2021–22 (recent years within which fishery characteristics have changed). Black lines and points, t/tow (left y-axis); Grey lines and points, t/hour (right y-axis). Graveyard hills and Other NWCR are within the NWCR sub-area - the other Areas are within the ECSR sub-area (source: FNZ, 2023a).

Table 3. Acoustic survey spawning stock biomass estimates (tonnes) and CVs for the Northwest Chatham Rise stock (source: FNZ, 2023a).

Fishing Years	Graveyard		Morgue		Combined	
	Biomass (t)	CV	Biomass (t)	CV	Biomass (t)	CV
1998–99	NA	NA	NA	NA	8,126	0.22
2003–04	2,717	0.16	–	–	–	–
2011–12	5,550	0.17	9,087	0.11	14,637	0.17
2012–13	6,656	0.31	–	–	–	–
2015–16	–[1]	–	14,051	0.17	14,051	0.17
2020–21	–[1]	–	16,332	0.09	16,332	0.09
2021–22	225	0.66	21,747	0.08	21,972	0.08

1: Marks deemed insufficient to motivate a full AOS survey.

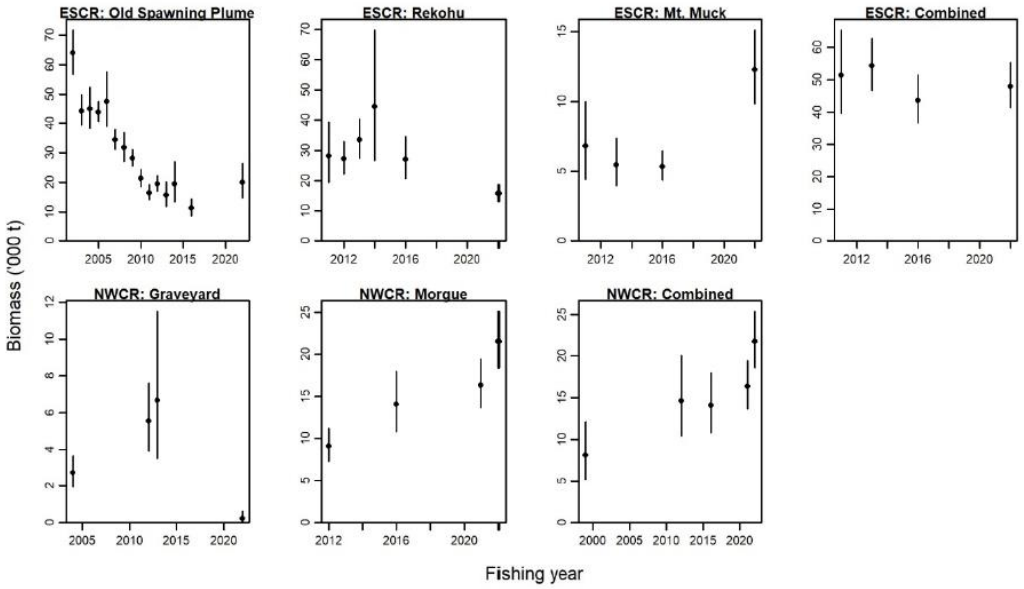

Figure 2. Acoustic survey spawning stock biomass estimates (t) for the Northwest Chatham Rise sub-area and East and South Chatham Rise sub-area. CV in parentheses. NA – not available (source: FNZ, 2023a).

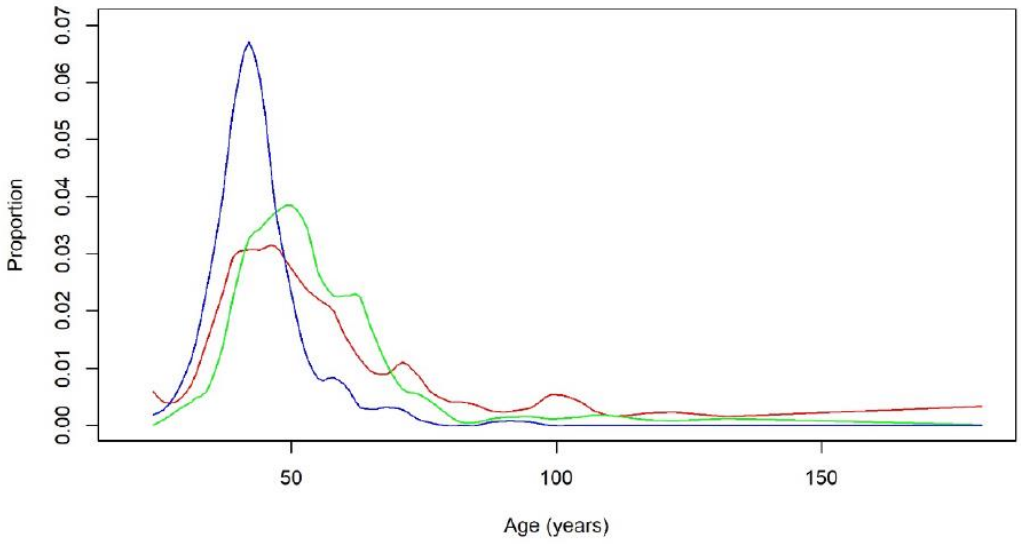

Figure 3. Morgue hill smoothed age frequency distributions: red line, 2016; green line, 2021 blue line, 2022 (source: FNZ, 2023a).

The assessment planned for 2023

Updates to the assessments for the NWCR sub-area conducted during 2018 (Cordue, 2018; FNZ, 2023a) and for the ESCR conducted during 2020 (Cordue, 2021; FNZ 2023a) were planned for 2022, but the assessments were deferred to 2023 owing to the 2021 acoustic survey not being completed (it was completed in 2022). The assessments were led by Matt Dunn (NIWA). Neither assessment was updated given difficulties interpreting the available data. Most of the difficulties identified during the analyses conducted during 2023 related to the ESCR sub-area. The issues pertinent to the NWCR (and the ESCR) sub-areas were:

- Analyses of unstandardized CPUE indicated low catch rates, which would be considered inconsistent with the increasing trend in biomass implied by the 2018 (NWCR) and 2020 (ESCR) assessments (see Figure 1 for trends in understandized CPUE). While unstandardized (and likely) standardized CPUE are not considered reliable indicators of the biomass of orange roughy at the stock level, trends in standardized CPUE locally may reflect local trends.
- Additional age-composition data collected since the last assessment are inconsistent in that the age-frequencies for different years could not have been taken from the same population (Figure 3). Specifically, while the age frequencies for the Morgue hill are broadly similar for 2016 and 2021, they differ substantially from the age frequency for 2022 which contains many more young fish, and preliminary runs of the assessment model could

not simultaneously fit all the age frequencies. The 2012 age frequency was also excluded from the 2018 assessment due to inconsistency with other data. The reasons for the inconsistency in age frequencies among years is unclear and could not be resolved as part of the analyses conducted during 2023 even though age-composition data are required for the assessment to be able to obtain acceptable fits to the data. FNZ (2023a) notes that the changes in age-frequencies among years might be explained by selectivity or recruitment patterns, but perhaps more likely by sampling variability (due to the aggregating nature of orange roughy). Similarly pronounced changes in age structure have previously been seen for Chatham Rise orange roughy, and the age data have been rejected from earlier assessment models (Francis, 2006).

- The 2021 and 2022 estimates of biomass for the NWCR sub-area are somewhat less than expected given the 2018 assessment but the trend in biomass from the survey is similar to that expected from the 2018 assessment (Figure 4). In contrast, the estimates of biomass for the ESCR sub-area from the acoustic surveys exhibit no trend, which is not consistent with the expectation of an increasing biomass from the 2020 assessment of the ESCR sub-area. Moreover, the estimates from the 2020 assessment of ESCR sub-area are substantially greater than observed from the acoustic surveys.

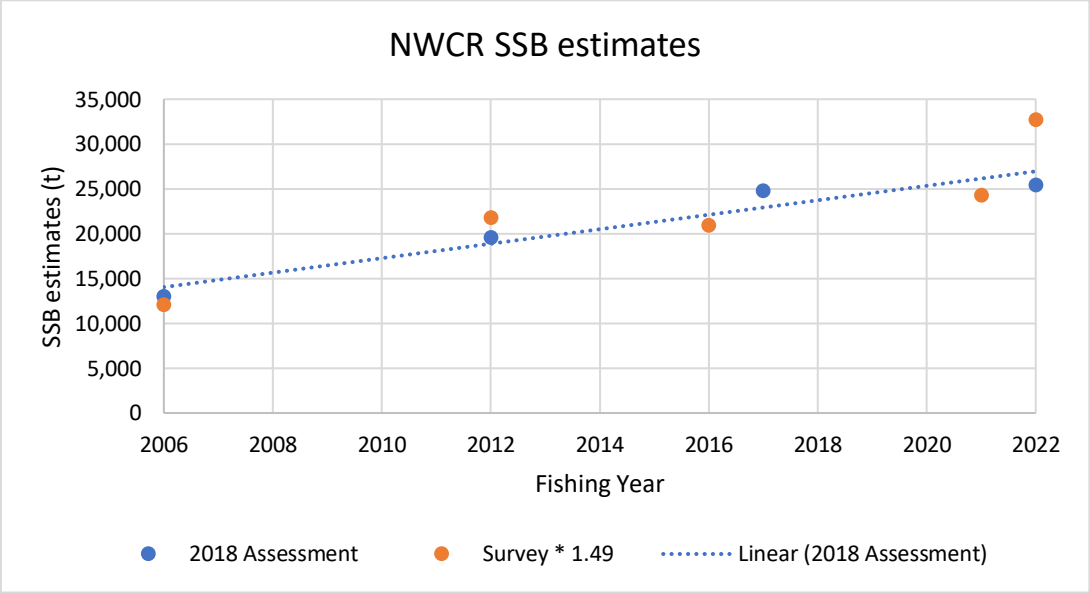

Figure 4. Estimates of spawning biomass for the NWCR sub-area based on the 2018 assessment (blue dots) and the acoustic estimates scaled by an acoustic catchability coefficient of 1/1.49 (Doonan et al., 2015) – the 2018 assessment was based on a prior mean for catchability of 1/1.25

Other concerns related to the NWCR assessment identified by the FNZ Deepwater Working Group (DWWG)[1] include:

- Stock productivity appears to be lower than expected given the estimates of the biological parameters used in the 2018 assessment. All observations were inconsistent with the hypothesis that recruitment had remained constant. Recruitment was estimated to decline and then remain low once the fishery started.
- Length frequencies from research trawl surveys provide some information on recruitment in the model, but the surveys were not representative (they were not designed for year-class strength estimation), and this influence may be misleading.
- Length frequencies from the commercial fishery and research trawl surveys had a predominant influence on model biomass estimates. Because of the slow growth of orange roughy, length frequencies are not expected to provide reliable information on stock status.
- The longevity of orange roughy, and the potential for extended gaps in recruitment, made estimation of B_0 problematic. This is because the fishery, and scientific monitoring, may not have existed long enough to estimate average productivity.
- The longevity and extended age structure of orange roughy populations means that recruitment estimation has to cover a wide range of year classes. Simulation studies have shown this can lead to model over-parameterisation, and potentially to inaccurate estimates of stock size and status (Stephenson et al., 2022).

Stock status relative to reference points

The DWWG recommended that the stock assessments for both the NWCR and ESCR sub-areas be rejected. However, the Stock Assessment Plenary (which has broader representation than the DWWG) decided to reject only the

[1] The DWWG identified additional concerns with the ESCR stock.

assessment for the ESCR sub-area. The 2018 assessment for the NWCR sub-area was therefore retained in the report of the Plenary (FNZ, 2023a). However, although the assessment for the NWCR sub-area was not rejected by the Plenary, it was noted that uncertainty was higher than is expressed in the results of the 2018 assessment and hence the 2022 and earlier Stock Assessment Plenary reports.

The probabilities of the biomass in 2017 (the last year included in the 2018 assessment) being above the lower end of the target range ($0.3B_0$) and the soft limit ($0.2B_0$) were reported to be <0.05 in the report of the 2022 Stock Assessment Plenary (FNZ, 2022), while the probability of this biomass being above $0.3B_0$ (the lower end of the target range) was reflected as "as likely as not". Given the additional uncertainty associated with the assessment, the status of the NWCR stock in relation to being below $0.2B_0$ was modified in the report of the 2023 Stock Assessment Plenary to "unlikely" or a probability between 0.1 and 0.4, with no indication of where within the range the probability lies. In relation the probabilities of being above or below the management reference points, the FNZ "Guidelines for Status of Stocks Summary Tables" (FNZ, 2023b) note that

> "*Probability categories and associated descriptions should relate to the probability of being "at or above" biomass targets (or "at or below" fishing intensity targets if these are used), below biomass limits, and above overfishing thresholds. Note, however, that the descriptions and associated probabilities adopted need not correspond exactly to model outputs; rather they should be superimposed with the Working Group's belief about the extent to which the model fully specifies the probabilities. This is particularly relevant for the "Virtually Certain" and "Exceptionally Unlikely" categories, which should be used sparingly*."

A key question is therefore the reliability of the range of 0.1 to 0.4 for assessing the probability of being below $0.2B_0$ given the semi-quantitative basis for the range. Moreover, if the range is appropriate where within the 0.1 to 0.4 range does the probability lie (in particularly whether it is above or below 0.3). Figure 4 is suggestive that the trend in biomass continues to be increasing[2] and if the acoustic catchability is 0.66 [Doonan et al., 2015] (rather than the 0.8 implied the priors for acoustic catchability in the 2018 assessment), of the same scale. Had Figure 4 been created with an acoustic catchability coefficient of 0.8 the absolute biomass would be lower but the trend would remain. Thus, while there is clearly increased uncertainty regarding the status of the stock relative to the outcomes of the 2018 assessment, it is unlikely based on the current information that the stock is below $0.2B_0$ with more than a 0.2 probability so meeeting SG 80. However, the additional uncertainty reinforces the need to address the problems with the stock assessment identified during 2023 and produce a new quantitative assessment.

The estimates of B_{MSY} based on deterministic considerations (the usual basis for estimating B_{MSY} when conducting stock assessment) are not considered reliable for orange roughy and range from $0.31B_0$ to $0.43B_0$ depending on whether the Beverton-Holt or Ricker stock-recruitment relationships is assumed. The management target range adopted for orange roughy in New Zealand is $0.3\text{-}0.5B_0$. The stock assessments provide estimates of biomass relative to B_0. For the base model, the stocks are assessed to have been above the lower end of the management target range ($0.3B_0$) since 2012 (ORH3B NWCR). However, while the report of the stock assessment plenary reflects that the stock is as likely as not above the lower end of the management target range (FNZ, 2023a), the increased uncertainty associated with assessment means that it is not possible to conclude with 95% certainty (required for SG100; the previous score) that the stock is above the level consistent with MSY. However, the available evidence is that the stock is fluctuating about B_{MSY} and hence meeting SG 80.

Changes in TACC

Fisheries New Zealand proposed three options for reducing the TAC for ORH 3B given the difficulties with the stock assessment for the NWCR and ESCR sub-areas, and in particular the lack of an agreed assessment for the ESCR sub-area (FNZ, 2023c). The TACC reductions all pertained to the ESCR sub-area (by 1,195 t: option 1; by 2,770 t: option 2; by 3,215: option 3). The proposal for a change in TAC was consulted on and 32 submissions were received. There was no support for options 1 and 2, with nine submissions supporting option 3. The remaining submissions ranged from a closure of the fishery, to application of an $F{=}M$ HCR with a lower value assumed for M than that on which option 3 was based ($0.045yr^{-1}$), to a TAC reduction of 27% [between those for options 1 and 1] (FNZ, 2023c). The Minister decided to reduce the TACC for ORB 3B from 7,967 t to 4,752 t (a 40% reduction). The Minister expressed an expectation that the TACC reduction would apply the ESCR sub-area (Minister of Fisheries, 2023).

Plans for the next assessment

No assessment of the NWCR sub-area could be conducted during 2023, and the analyses conducted for the NWCR and ESCR sub-areas have increased the uncertainty associated with the existing assessment for the NWCR sub-area. The next assessment of ORH 3B (i.e., the NWCR and ESCR sub-areas) is scheduled for 2025. The Stock Assessment

[2] A key part of the views of some DWWG members in rejecting the 2020 stock assessment for the ESCR fishery was the poor fit to the observed acoustic biomass index (the model estimates of biomass are increasing in size, the observations are flat).

Plenary identified several activities[3] which if completed should enhance the likelihood of the assessments in 2025 being fully satisfactory (in particular for the ESCR sub-area).

- Activities related to age-composition data:
    - Examine availability of existing otoliths and prioritise samples for ageing. Additional age frequency data would increase the information available for estimation of trends in recruitment, and for evaluating the causes of variability in age samples. FNZ has undertaken to contract the collation of all orange roughy otoliths that have been sampled over the past ~40 years and to assess which of these might be aged to improve the understanding of the age structure of the NWCR (and other) orange roughy stocks. This ageing work is planned to be undertaken during 2023-24, with the objective of these data being used to better inform future orange roughy stock assessments.
    - Investigate the representativeness of age frequencies derived from mark identification trawls, including comparison with age frequencies from the commercial spawning fishery. Increase the number of samples and tows sampled as appropriate.
    - Estimate the age frequency for the spawning and non-spawning fisheries. If otoliths are not available, increase observer sampling to collect adequate otoliths.
    - Estimate ageing error to ensure an appropriate signal is taken from age frequency data.
- Activities related to acoustic surveys:
    - Consider that regular acoustic biomass surveys be conducted for the Northwest Chatham Rise that cover all of the main spawning areas (Morgue, Graveyard, and other appropriate hills in the Graveyard complex).
    - Investigate if use of acoustic biomass surveys of the Morgue hill outside the spawning season could determine whether the spawning aggregations are absent and therefore likely to be vulnerable to fishing.
    - Re-investigate the information to inform priors for the proportion of spawning biomass considered to be within the surveyed plumes.
    - Further explore skipped spawning to determine whether it has an age component that might explain selectivity/spawning being older than maturity, and whether inter-annual variability might explain 'process error' in the surveys.

- Other activities:
    - Develop (re-develop) a management procedure to provide advice on target exploitation rates for the fishery.
    - Briefly catalogue, overview, and investigate data sources available for the stock assessment model.
    - Develop stock assessment models to evaluate different hypotheses related to spatial stock structure.
    - Ensure stock assessment models evaluate methods for reducing the number of parameters being estimated, particularly in the estimation of recruitment.
    - Further explore the utility of CPUE to support stock assessment models, including consideration of changes in the nature of fishing (feature or flat fishing, and changes in tow duration) and the impact of fishing activity on fish.
    - Examine posterior predictive plots on MCMC outputs.

Principle 2

Monitoring

In the 2021/22 financial year, within the Chatham Rise deepwater fisheries, which include the ORH3B NWCR UoA, 275 observer seadays were planned, and 336 were achieved (123% of planned). In ORH 7A, while 80 were planned, only 63 were achieved (79%).

Primary and Secondary Species

Observer catch data for UoAs 1 (ORH 7A+Westpac) and 3 (ORH 3B NWCR) between 2018 and 2023 were used to confirm the catch composition in the orange roughy UoCs—particularly proportions of different species/groups in the catch. In both UoCs, Orange Roughy comprises the large majority of fish in the catch. In ORH7A+Westpac there are a total of 28 species or species groups comprising at least 0.1% of the catch, but all species or groups except orange roughy comprise less than 2%, therefore there are no main species (primary or secondary; Table 4). In ORH3B NWCR, 39 species or species groups each comprise at least 0.1% of the catch. There's a smaller proportion of

[3] Restricted here to those that pertain to the NWCR sub-area.

orange roughy (64.3%) and rattails (secondary), Johnson's cod (secondary), and smooth oreo (primary) are main species (Table 5). This situation is unchanged from the full assessment.

Smooth Oreo (*Pseudocyttus maculatus*). The OEO4 management area for smooth oreo (reporting code SSO) overlaps the NWCR and ESCR UoAs. A 2019 stock assessment of SSO in OEO4 estimated B_{2018} at 40%B_0 for the base model (FNZ 2021). B_{2018} is 'About as Likely as Not (40-60%)' to be at or above the target of 40%B_0. Stock projections indicate there would be little change in biomass over the next five years at annual catches of 2,300 – 3,000 t (Cordue, 2019). The catch limit for SSO in OEO4 is currently 2,600 t (DWG, 2021). Smooth oreo was assessed in 2018 using a CASAL age-structured population model with Bayesian estimation, incorporating stochastic recruitment, life history parameters, and catch history up to 2017–18 (FNZ 2021). There has been no new stock assessment for this species since the most recent reassessment.

Rattails. The IUCN has graded rattails in gerneral as least concern (https://www.iucnredlist.org/search?query=Rattails&searchType=species). This grading includes the four-rayed rattail, *Corphaenoides subserrulatus* (https://www.iucnredlist.org/species/154890/115249673), which is commonly found in trawl surveys in New Zealand. These species have depth and areal distributions that extend beyond the range of the fishing fleets (and substantially beyond that of the UoAs), so the IUCN concluded that fishing activities are not likely to cause a significant population decline at present. Although analytic stock assessments are not conducted for rattails, trawl surveys have monitored relative abundance on the Chatham Rise since 1992, including Bollon's rattail. In 2010, the surveys added a number of species, including four-rayed rattail. Bollon's rattail has shown no trends in abundance for the period since 1992, and four-rayed rattail no trends since 2010 according to the annual Chatham Rise trawl survey (**https://tsip-uat.niwa.co.nz/search)**.

Johnson's cod. *Johnson's cod* is listed as Least Concern (https://www.iucnredlist.org/species/18126404/45142052). There are no known species-specific threats to *it*. It is circumglobally distributed, with an anti-tropical distribution in the Atlantic and Pacific Oceans. It is found at depths ranging from 450 to 3000 m over both hard and soft substrates, and has been associated with seamounts. It is taken as bycatch in deepwater demersal trawls. Although analytic stock assessments are not conducted for Johnson's cod, trawl surveys have monitored relative abundance on the Chatham Rise since 1992, The trawl survey (**https://tsip-uat.niwa.co.nz/search)** has shown no trends in Chatham Rise trawl survey abundance for the period since 2010. The lack of trends provides evidence that fishing is not jeopardizing the stocks, as they continue to reproduce at consistent levels over the time series available, qualitatively equivalent to 80% probability that they are above biological limits.

Anderson and Finucci (2022) published a summary of non-target fish and invertebrate catch and discards in the NZ orange roughy and oreo trawl fisheries from 2002-3 through 2019-20. Their analysis of discards in the orange roughy fishery shows the folloiwng:

1. Very low annual discards of non-target QMS species (between 1 and 46t annually with no obvious trend).
2. Discards of non-QMS species ranged from 108t in 2013-14 to 1,504t in 2017-18 with no obvious trend over time.
3. Annual discards of invertebrate species ranged from 5t to 140 t with levels in the first five years of the time searies higher than in any subsequent year, after which they remained relatively steady.

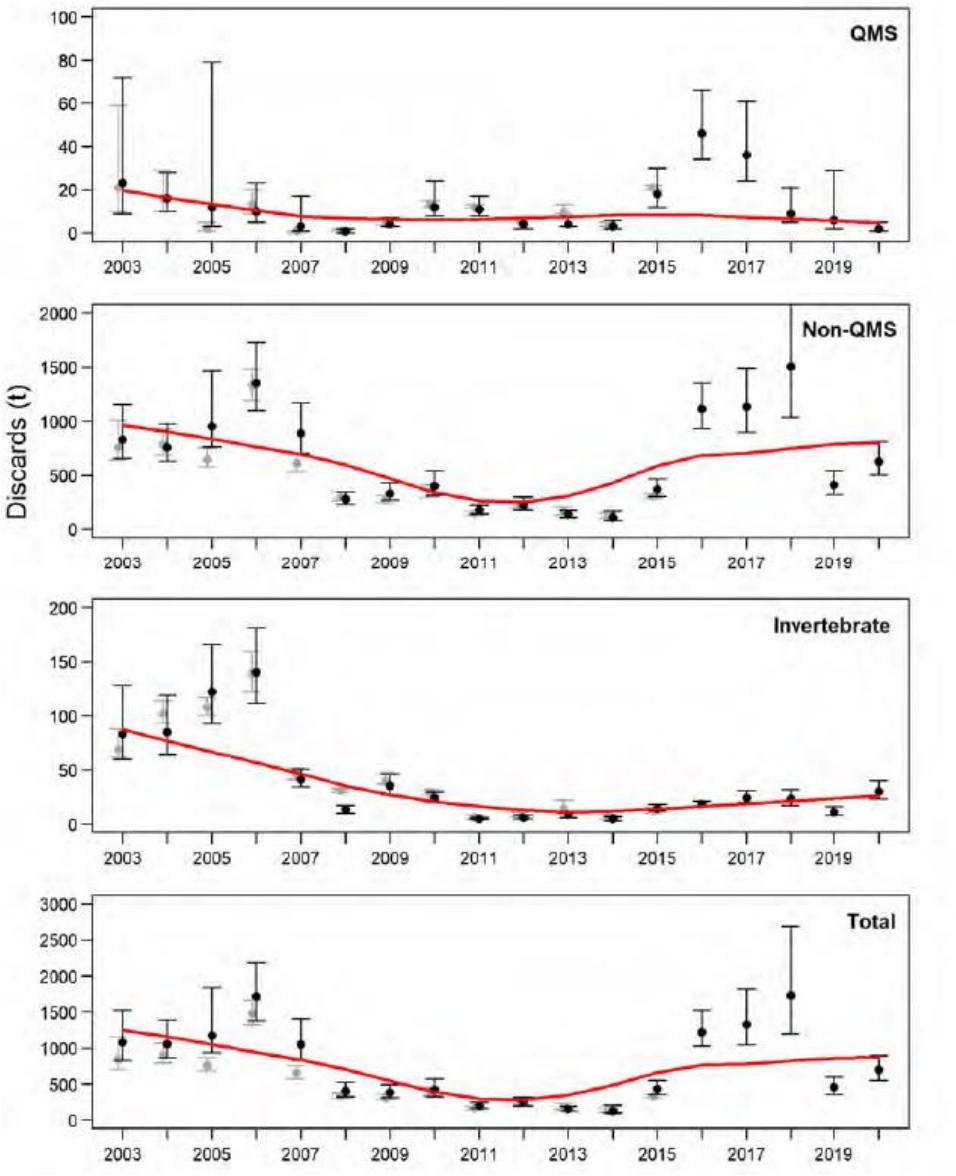

Figure 5. Annual estimates of discards in the target orange roughy trawl fishery, by species category, for 2002-2003 to 2019-2020 and equivalent estimates up to 2014-15 from Anderson et. al. (2017; grey dots). Error bars indicate 95% confidence intervals. The red lines show the fit of ta locally-weighted polynomial regression to annual discards. Source: Anderson and Finucci (2022), Figure 25

Table 4. Catch composition of fish and invertebrate species in UoA ORH7A+Westpac. The target species, orange roughy, is in the green row. Data source: Fisheries New Zealand

ORH 7A+Westpac									
Code	**Species Name**	**Scientific Name**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**Grand Total**	**% of Total**
ORH	Orange Roughy	*Hoplostethus atlanticus*	**691,905**	**584,015**	**692,721**	**649,102**	**441,983**	**3,059,726**	**88.9%**
RIB	Ribaldo	*Mora moro*	**4,346**	**6,535**	**19,816**	**21,294**	**11,836**	**63,827**	**1.9%**
RAT	Rattails	*Coelorinchus sp. (various species)*	**518**	**7,198**	**10,644**	**25,093**	**10,969**	**54,422**	**1.6%**
HAK	Hake	*Merluccius merluccius*	**811**	**3,150**	**9,235**	**10,986**	**7,416**	**31,598**	**0.9%**
WHX	Unicorn Rattail	*Coelorinchus caelorhincus*	**410**	**2,781**	**11,273**	**3,200**	**8,126**	**25,790**	**0.7%**
SND	Shovelnose Dogfish	*Deania calcea*	**879**	**4,575**	**7,960**	**1,551**	**6,564**	**21,529**	**0.6%**
BSH	Seal Shark	*Dalatias licha*	**300**	**2,186**	**9,584**	**4,388**	**4,769**	**21,227**	**0.6%**
SOR	Spiky Oreo	*Allocyttus niger*	**8,618**	**5,285**	**3,622**	**1,126**	**1,113**	**19,764**	**0.6%**
LCH	Long-nosed Chimaera	*Harriotta raleighana*	**145**	**1,311**	**7,694**	**4,374**	**971**	**14,495**	**0.4%**
HJO	Johnson's Cod	*Halargyreus johnsonii*	**435**	**1,665**	**4,492**	**4,398**	**3,161**	**14,151**	**0.4%**
CSQ	Leafscale Gulper Shark	*Centrophorus squamosus*	**304**	**851**	**2,077**	**4,174**	**2,870**	**10,276**	**0.3%**
BSL	Black Slickhead	*Lepidorhynchus denticulatus*	**246**	**262**	**21**	**6,101**	**2,422**	**9,052**	**0.3%**
GSP	Pale Ghost Shark	*Hydrolagus mirabilis*	**138**	**692**	**2,794**	**3,751**	**1,467**	**8,842**	**0.3%**
TAL	Channel Catfish	*Ictalurus punctatus*	**38**	**3**	**7,930**	**750**		**8,721**	**0.3%**
SLK	Slickhead	*Alepocephalus tenebrosus*	**181**	**1,655**	**938**	**3,741**	**2,030**	**8,545**	**0.2%**
ZAS	Velvet Dogfish	*Centroscymnus sp. (various species)*			**6,570**	**1,349**		**7,919**	**0.2%**
HOK	Hoki	*Macruronus novaezelandiae*	**556**	**446**	**3,908**	**1,186**	**888**	**6,984**	**0.2%**
SSM	Smallscaled Brown Slickhead	*Lepidorhynchus denticulatus*	**84**	**1,548**	**1**	**2,375**	**802**	**4,810**	**0.1%**
ETB	Baxter's Lantern Dogfish	*Etmopterus baxteri*	**547**	**1,026**	**444**	**2,257**	**66**	**4,340**	**0.1%**
OSD	Sharks & Dogfish Not Otherwise Specified		**385**	**345**	**695**	**1,635**	**1,217**	**4,277**	**0.1%**
DWD	Deepwater Dogfish (Unspecified)		**1,416**	**2,032**	**70**	**240**		**3,758**	**0.1%**
RCH	Widenosed Chimaera	*Hydrolagus macrophthalmus*	**46**	**521**	**5**	**1,080**	**1,689**	**3,341**	**0.1%**
MOD	Morids	*Moridae*	**403**	**2,370**	**161**	**140**		**3,074**	**0.1%**
SPE	Sea Perch	*Lutjanus sp. (various species)*	**71**	**290**	**846**	**1,379**	**436**	**3,022**	**0.1%**
PLS	Plunket's Shark	*Deania calcea*	**1,415**	**211**	**12**	**1,081**	**145**	**2,864**	**0.1%**
TRS	Cape Scorpionfish	*Scorpaena papillosa*	**73**	**522**	**910**	**445**	**741**	**2,691**	**0.1%**

CYP	Longnose Velvet Dogfish	*Centroscymnus crepidater*	**328**	**388**	**30**	**963**	**587**	**2,296**	**0.1%**
JAV	Javelinfish	*Halichoeres iridis*	**29**	**215**	**496**	**324**	**1,134**	**2,198**	**0.1%**

Table 5. Catch composition of fish and invertebrate species in UoA ORH3B NWCR. The target species, orange roughy, is in the green row and main species are in yellow. Data source: Fisheries New Zealand

ORH3B NWCR									
Code	**Species Name**	**Scientific Name**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**Grand Total**	**% of Total**
ORH	Orange Roughy	*Hoplostethus atlanticus*	**66,075**	**138,109**	**144,602**	**83,794**	**167,971**	**600,551**	**64.3%**
RAT	Rattails	*Coelorinchus sp. (various species)*	**40,924**	**11,244**	**4,464**	**2,543**	**7,614**	**66,789**	**7.2%**
HJO	Johnson's Cod	*Halargyreus johnsonii*	**8,089**	**17,389**	**11,273**	**3,765**	**8,110**	**48,626**	**5.2%**
SSO	Smooth Oreo	*Allocyttus verrucosus*	**4,871**	**18,710**	**8,624**	**1,746**	**1,182**	**35,133**	**3.8%**
HOK	Hoki	*Macruronus novaezelandiae*	**5,334**	**1,269**	**6,831**	**2,142**	**10,702**	**26,278**	**2.8%**
SLK	Slickhead	*Alepocephalus tenebrosus*	**5,383**	**3,722**	**4,826**	**1,755**	**8,590**	**24,276**	**2.6%**
MOD	Morids	*Moridae*	**1,062**	**512**	**1,492**	**895**	**11,462**	**15,423**	**1.7%**
JAV	Javelinfish	*Halichoeres iridis*	**1,208**	**7,506**	**2,854**	**53**	**3,713**	**15,334**	**1.6%**
SFI	Shortbill Spearfish	*Tetrapturus angustirostris*	**730**	**7,440**	**3,115**	**8**	**102**	**11,395**	**1.2%**
WSQ	Warty Squid	*Moroteuthis ingens*	**734**	**1,788**	**2,429**	**1,591**	**4,316**	**10,858**	**1.2%**
SND	Shovelnose Dogfish	*Deania calcea*	**1,088**	**1,493**	**2,888**	**951**	**4,371**	**10,791**	**1.2%**
ROK	Deepwater Kingclip	*Genypterus blacodes*	**1,720**	**2,163**	**419**	**4,034**		**8,336**	**0.9%**
LCH	Long-nosed Chimaera	*Harriotta raleighana*	**2,504**	**996**	**841**	**503**	**833**	**5,677**	**0.6%**
BSH	Seal Shark	*Dalatias licha*	**1,648**	**2,360**	**939**	**256**	**23**	**5,226**	**0.6%**
CYP	Longnose Velvet Dogfish	*Centroscymnus crepidater*	**307**	**500**	**588**	**966**	**2,139**	**4,500**	**0.5%**
BEE	Basketwork Eel	*Benthalbella dentata*	**529**	**1,070**	**622**	**628**	**1,324**	**4,173**	**0.4%**
ETB	Baxter's Lantern Dogfish	*Etmopterus baxteri*	**2**	**830**	**1,636**	**628**	**393**	**3,489**	**0.4%**
RCH	Widenosed Chimaera	*Hydrolagus macrophthalmus*	**89**	**815**	**609**	**729**	**1,240**	**3,482**	**0.4%**
HAK	Hake	*Merluccius merluccius*	**718**	**250**	**927**	**623**	**445**	**2,963**	**0.3%**
DWD	Deepwater Dogfish (Unspecified)		**1,712**	**225**	**439**		**297**	**2,673**	**0.3%**
SSM	Smallscaled Brown Slickhead	*Lepidorhynchus denticulatus*		**1,081**	**692**	**880**	**5**	**2,658**	**0.3%**
GSP	Pale Ghost Shark	*Hydrolagus mirabilis*	**337**	**228**	**627**	**394**	**374**	**1,960**	**0.2%**
OSD	Sharks & Dogfish Not Otherwise Specified					**605**	**1,342**	**1,947**	**0.2%**
CHP	Chimaera, Purple	*Chimaera sp. (various species)*	**40**	**1,281**	**70**	**20**	**378**	**1,789**	**0.2%**

WHX	Unicorn Rattail	*Coelorinchus caelorhincus*			**46**	**295**	**1,000**	**1,341**	**0.1%**
CSQ	Leafscale Gulper Shark	*Centrophorus squamosus*	**10**	**142**	**606**	**282**	**8**	**1,048**	**0.1%**
PSK	Longnosed Deepsea Skate	*Bathyraja abyssicola*	**15**	**601**	**372**	**15**	**42**	**1,045**	**0.1%**
CYO	Smooth Skin Dogfish	*Centroscymnus owstonii*		**32**	**620**	**248**	**112**	**1,012**	**0.1%**
SMC	Small-Headed Cod	*Notothenia microlepidota*			**2**	**32**	**910**	**944**	**0.1%**
SOR	Spiky Oreo	*Allocyttus niger*	**13**	**806**	**81**	**14**	**2**	**916**	**0.1%**
CYL	Portuguese Dogfish	*Centroscymnus coelolepis*			**780**			**780**	**0.1%**
SPD	Spiny Dogfish	*Squalus acanthias*					**755**	**755**	**0.1%**
ETL	Lucifer Dogfish	*Centrophorus lusitanicus*		**567**	**82**	**2**	**2**	**653**	**0.1%**
WOE	Warty Oreo	*Allocyttus verrucosus*		**19**	**71**	**14**	**439**	**543**	**0.1%**
CDL	Cardinal Fish	*Apogonidae (various species)*	**10**	**65**	**26**	**410**	**30**	**541**	**0.1%**
BSL	Black Slickhead	*Lepidorhynchus denticulatus*		**505**	**1**	**11**		**517**	**0.1%**
LIN	Ling	*Molva molva*	**15**		**14**	**4**	**476**	**509**	**0.1%**
SED	Silver Dory	*Cygnodraco mawsoni*			**500**			**500**	**0.1%**
GSH	Ghost Shark	*Hydrolagus sp. (various species)*		**435**	**17**		**20**	**472**	**0.1%**

Endangered, Threatened and Protected (ETP) species

Seabirds

The estimated seabird capture rates in deepwater fisheries (including orange roughy) remain below the benchmark level of 0.4 captures per 100 tows. The 2020/21 estimated capture rate was approximately 0.2/100 tows (FNZ 2023c) In the 2020–21 fishing year, there were three observed captures of all birds in orange roughy trawl fisheries. Observed captures were of northern giant petrel (2), and white-chinned petrel (1)[4]. No estimates of total captures were made.

Mammals

In the 2020–21 fishing year, there were no observed captures of New Zealand sea lion in orange roughy trawl fisheries[5]. No estimates of total interactions were made. Likewise, there were no observed captures of New Zealand fur seal in orange roughy trawl fisheries. No estimates of total captures were made[6].

Corals/Habitat

The single open condition on this fishery pertains to performance indicator 2.4.2 and potential encounters with sensitive benthic organisms such as corals. An update on the progress against this condition is given in section 5.3 of this report. In New Zealand, because some coral groups are technically ETP species under domestic legislation, the evaluation of the fishery's impact to corals has been done under both the ETP and habitats components of the assessment tree.

Since the initial assessment, the NZ department of conservation (DOC) has made considerable advancements in research and data analysis on interactions between protected corals and fisheries, as well as improved modelling of coral occurrence and potential "hot spots."

Using presence/absence date of observed coral captures from NZ's commercial fisheries, project INT2021-02 analyzed the spatio-temporal distribution of observed coral captures between 2007/08 and 2019/20 to characterize coral bycatch and analyzed fisherman reports of coral bycatch for the same period. It found that overall, fisheries targeting orange roughy have the highest interaction with corals and that the majority of bycatch was branching stony coral from the Northeast Chatham Rise region (Meyer 2023). The study noted that, while the analysis of presence-absence data can help identify risk areas of coral catch in commercial fisheries, it does not provide a comprehensive measure of the actual impact on coral communities. Factors such as habitat destruction, physical damage and post-capture mortality should be considered. The study also emphasizes the need for standardized protocols for determining coral catch weights and exploring alternative indicators that capture the broader ecological implications of fishing on coral habitats.

In addition, NIWA, commissioned by the DOC produced a report "Deep diving into decades of uncatalogued corals" (Mills et al 2023), which updated records for known protected coral locations in New Zealand, collected from biodiversity surveys, research trawl surveys, and by fisheries observers since the 1950s through 2023. The inclusion of biodiversity surveys and research trawl surveys is helpful because those surveys take place independently of the fishery (although generally do happen in the same areas where fishing occurs). The project uses this data to present maps of where corals occur in NZ based upon presence (empirical) distribution data. The maps including footprint layers are for all trawl effort and are not specific to orange roughy (Figure 6).

[4] https://protectedspeciescaptures.nz/PSCv7/released/birds/orange-roughy-trawl/all-vessels/eez/2020-21/
[5] https://protectedspeciescaptures.nz/PSCv7/released/new-zealand-sea-lion/orange-roughy-trawl/all-vessels/eez/2020-21/
[6] https://protectedspeciescaptures.nz/PSCv7/released/new-zealand-fur-seal/orange-roughy-trawl/all-vessels/eez/2020-21/

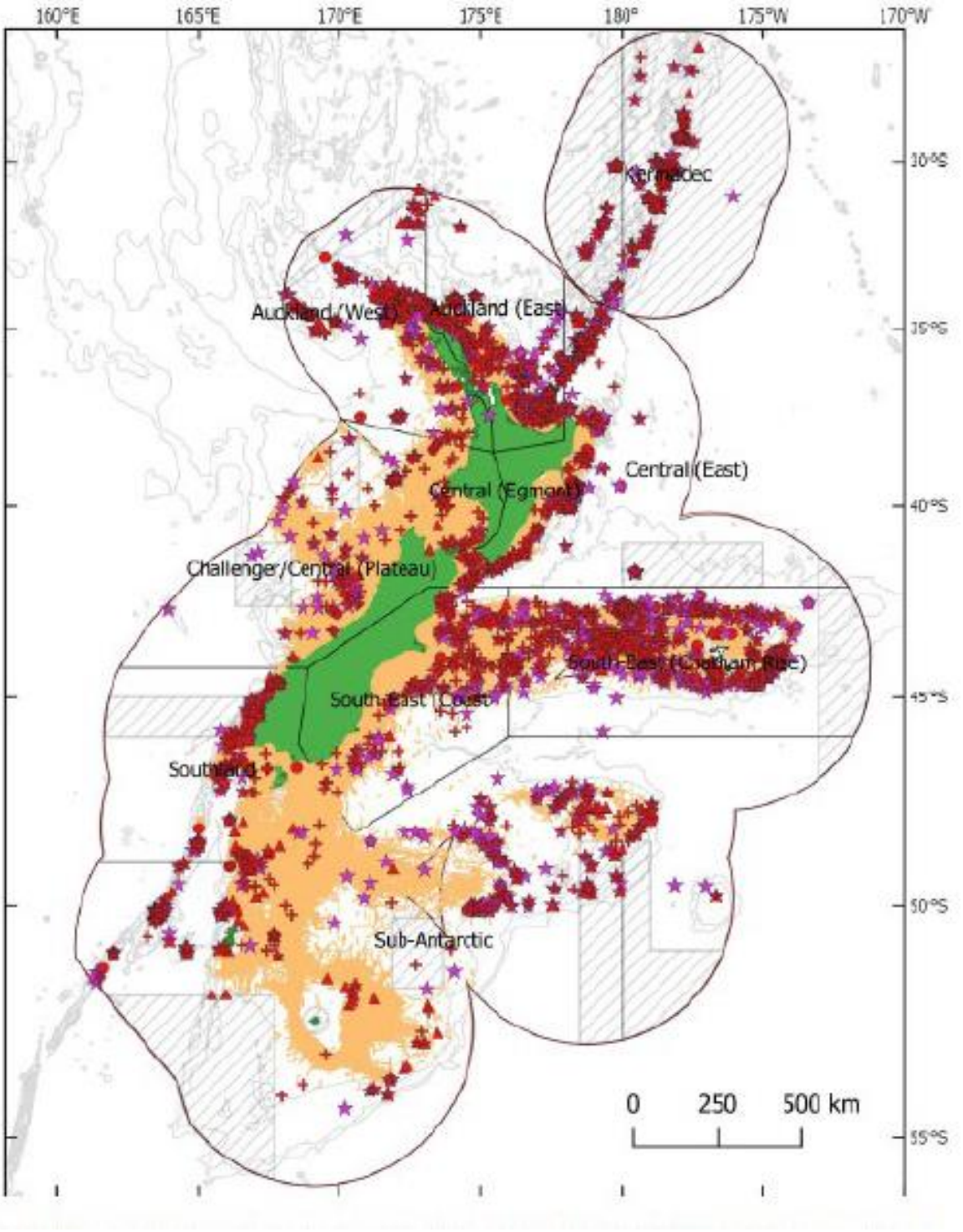

Figure 6. Map of all protected coral samples collected from within the NZ EEZ and registered in the NIWA Invertebrate Collection overlaid on the commercial trawl footprint for all fish stocks from 1989-90 to 2020-21. Orange markings=trawl footprint; Hatched boxes = Benthic Protected Areas. Stars=gorgonian corals, pluses=stony corals, circles=black corals, and triangles=hydrocorals. Figure Source: Mills et. al. (2023).

Concurrently with the above, using species distribution modelling, protected coral hotspots have been identified (Anderson et al 2023; see Figure 7). This paper presents maps of abundance within the NZ region for eleven coral taxa, based on species distribution modelling using abundance values measured at 949 sample sites from image data collected by towed camera or remotely operated vehicle (ROV) systems. Most of these sites were sampled using NIWA's Deep-towed Imaging System (DTIS) and abundance values were based on archived analysis of video data. Further analysis of video data from three surveys was undertaken during this study to provide abundance values for

selected locations not already covered by archived data. The study identified a number of factors influencing the hotspot results, noting the influence of the fishing impact variable was low in models for most taxa.

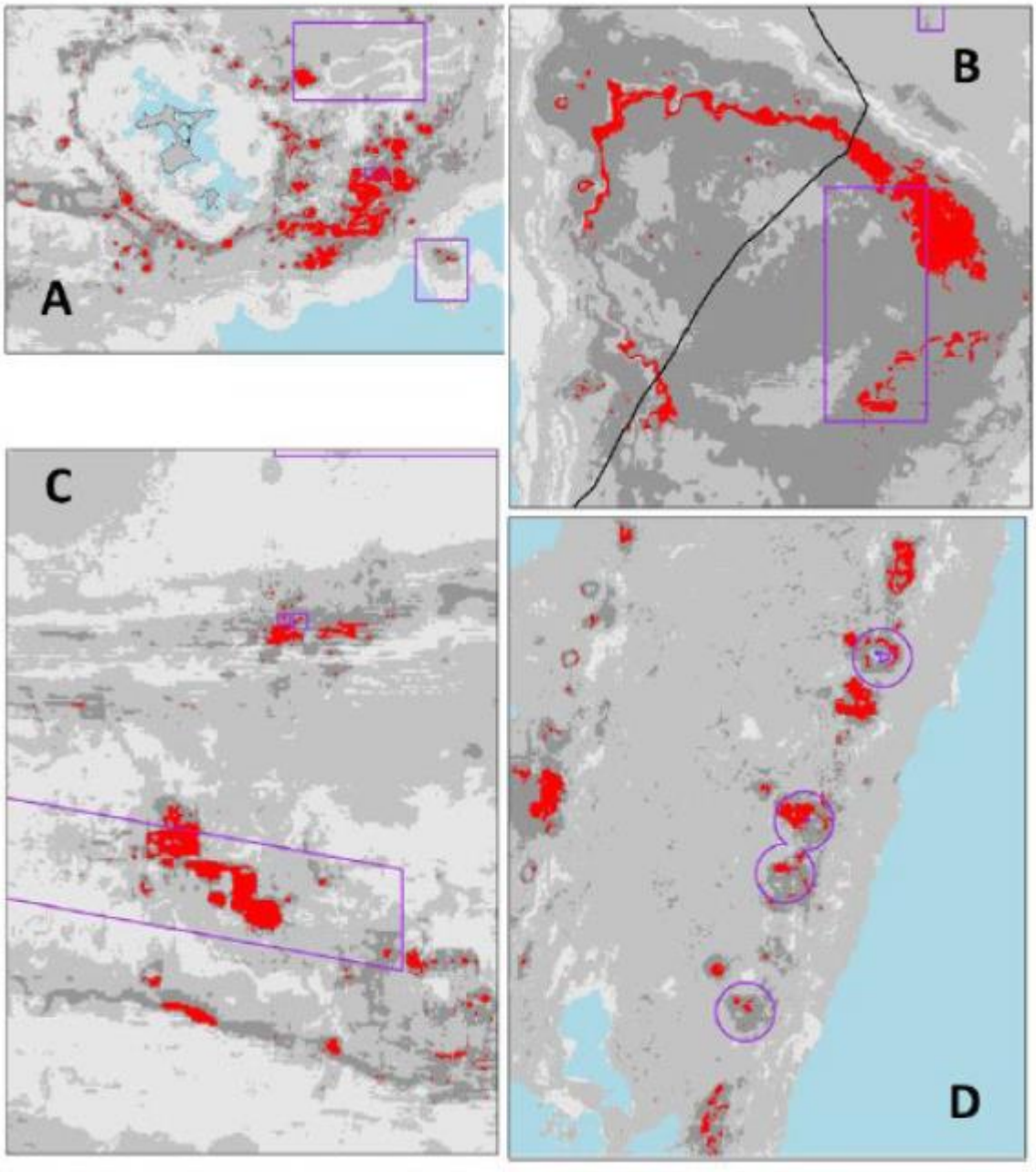

Figure 7. Hotspots of protected coral, close ups. Hotspots of protected coral in the NZ region. Close-up maps for: A, Southeast Chatham Rise; B, Challenger Plateau, C, Central Chyatcham Rise; D Kermadec Ridge. Purple boxes/circles are benthic protection areas. Figure Source: Anderson et. al. (2023).

These studies provide important new insight into the spatial extent of protected corals as well as potential fishery overlap and represent a big step forward in our understanding relative to previous analysis which relied primarily on fishery observer and survey coral encounter data.

Principle 3

Fisheries New Zealand published a review of sustainability measures for orange roughy (ORH 3B) for the 2023/2024 fishing season in June of 2023 (FNZ 2023d). This review is in response to the issues with the Chatham Rise stock assessment for orange roughy and the need to understand issues such as flat or declining patterns and recent historical lows in unstandardized CPUE that are inconsistent with the stock assessment, and divergences between

catch and sub-area limit in the NWCR, etc. The review looks at the implications of different levels of TAC reduction relative to e.g. Treaty of Waitangi obligations, and environmental principles in the Fisheries Act (section 9). This is listed as a Principle 3 update because it's an example of the fishery-specific management system responding to serious or other concerns arising within the fishery, as well as an example of well-defined roles and responsibilities within the fisheries management system.

4.3.1. Inseparable or practicably inseparable (IPI) stock status

Not Applicable

4.3.2. Total Allowable Catch (TAC) and catch data

Table 6: Allowable Catch (TAC) and catch data-ORH 7A (UoC 1)

TAC / Catch Data	Year	Amount
TAC	Year (22-23)	2,058 mt
UoA share of TAC	Year (22-23)	100%
Total catch by UoC (most recent year)	Year (22-23)	1,763 mt
Total catch by UoC (second most recent year)	Year (21-22)	2,193 mt

Table 7: Allowable Catch (TAC) and catch data-ORH3B NWCR (UoC 3)

TAC / Catch Data	Year	Amount
TAC	Year (22-23)	1,150 mt
UoA share of TAC	Year (22-23)	100%
Total catch by UoC (most recent year)	Year (22-23)	176 mt
Total catch by UoC (second most recent year)	Year (21-22)	203 mt

4.4. Changes which impact traceability systems

Table 8: Changes affecting traceability and segregation

Are there any developments or changes within the fishery that affect traceability and the ability to segregate MSC from non-MSC products?
Yes **One previously certified UoA (OR3B ESCR) will be suspended as of 20 December 2023. This means there will be a need to ensure segregation is possible between the still-certified UoAs and the suspended UoA.**

4.4.1. Traceability within the fishery description

Copy from last full assessment and update as relevant.

Table 9: Traceability within the fishery

Statement on fishery's ability to track and trace to each Unit of Certification
Systems are in place to allow the tracking and tracing of product to each UoC.
Movement of fish and fish product between **harvest** and **landing** *An illustration of movement of product between harvest and landing. Include when any of the following happen: Harvesting, At-Sea processing, Translocation, Transhipment, Offloading, Landing.*
All catches are landed to a Licensed Fish Receiver (LFR) in New Zealand and these landings are recorded and balanced (to the nearest kg) against total allowable landings for each stock. The LFRs are responsible for ensuring catch records are aligned with landing records, and they are audited to ensure compliance. The following information is recorded from the vessel: catch weight by species, date, area where the fish was caught, and processed state (if there was processing at sea). Every container into which fish is packaged on an LFR's premises shall be marked with species name, date, LFR's name, processed state and area. Product moves from the fishing vessel (freezer vessels) to land (there is no transshipment) in cartons labelled with species, weight, and catch area. On board, factory vessels have fully integrated weighing/labelling systems that barcode every carton on production before storage in the ship's hold. The data is downloaded on arrival, reconciled on landing figures, providing a final inventory. This system allows the tagging of product lines. An example of using a fully integrated weighing/labelling system, is with orange roughy, where on a trip, a vessel may target orange roughy within units of certification, and then in areas that are not subject to MSC certification. In these different areas, in addition to accurate catch, time and location information, a MSC code is also encoded on the box, and as such traceable and separable simply upon scanning. These systems are all auditable and are audited. Another example where MSC certified and non-certified fish is kept separated is in the southern blue whiting fisheries where again not all fish is MSC certified. Here keeping certified MSC fish and non-certified fish is accomplished by not only to adhering to reporting and landing regulations, but also by operational procedures completed on board the vessel as described above. All LFRs hold CoC certification, so there is no further product flow prior to the start of CoC
Movement of fish and fish products between **landing** and **start of the CoC** if relevant. *An illustration of movement of product between landing and start of CoC. Include when any of the following is happening: Transport, Storage, Sorting/ Grading, Packing, Auction.*
Landing to LFR (who has CoC)
Description of any processing and sorting/ grading prior to change of ownership
Most orange roughy vessels are freezer trawlers, that do all primary processing prior to change of ownership. Product comes off the boat already processed, frozen and in labelled cartons. It's offloaded to an LFR when ownership effectively changes.
For the critical tracking events (i.e. where in the product flow this data needs to be transferred) of all fish and fish product handling and sale not covered by CoC describe: • Process of segregating to each Unit of Certification • Key data elements (i.e. the data or documents to identify the UoC such as species, catch area, gear)
CoC starts upon landing to an LFR. On board the vessels, information on the location and gear type of the landing is registered in the factory upon haulback of a fishing event, and coded into the factory labelling system, so as the product is processed in the factory, it is labelled with the correct information relevant to certification.
Where there are IPI stock(s) within the scope of certification, describe the verification of traceability systems
N/A
Other relevant information on the systems to track and trace to each UoC

If there is any doubt whether orange roughy landed into an LFR is from a certified fishery the product is treated as non-certified.

4.4.2. Traceability within the fishery description

Table 10: Traceability risks and mitigation within the fishery

Factor	**Description of the traceability risk factors and details of the risk mitigation and management** *Include in each description:* • *Whether each factor occurs* • *When it occurs and how frequently (e.g. regularly, seasonally, rarely)* • *How any potential traceability risks are mitigated and any risk management* • *If covered by information provided elsewhere in the assessment report (such as Table 5 for segregation or in Section 5 MSC Fisheries Standard – Principle 3 – Effective management for regulatory frameworks), cross reference as needed.*
Will the fishery use gears that are not part of the UoC? If Yes, include in the description: • If this may occur on the same trip, on the same vessels, or during the same season; • How any risks are mitigated.	No. The fisheries use only bottom trawl gear. No other types of fishing gear are used.
Will vessels in the UoC also fish outside the UoC geographic area? If Yes, include in the description: • If this may occur on the same trip; • How any risks are mitigated.	Yes. Vessels regularly fish outside the UoC and may do so during a single voyage. Factory vessels are equipped with fully integrated weighing and labelling systems in which every carton is barcoded on production and before storage in the hold. This system allows non-certified product to be barcoded as non-certified and to be trackable and separable by scanning at any subsequent stage. In port, vessel product data are reconciled with landing figures to arrive at a final inventory. Fresher vessels land their fish whole, and standard practice involves all fish bins being labelled as per MPI and NZFSA requirements. These outer markings are used to separate and inventory all product on landing.
Do vessels from outside the UoC and/or client group ever fish on the same stock?	All fish and fish product is landed to Licenced Fish Receivers (LFR) who hold Chain of Custody certification requiring strict, approved procedures to ensure certified and non-certified products are separately stored and are identifiable as certified or non-certified throughout the landing, processing, storage and transportation stages. In addition, MPI regulations require all packaged fish on a LFR's premises to be labelled such that the species name, date of landing, LFR name, processed state and area caught are clearly displayed. The process is considered to be well managed.
Do the fishery client members ever handle certified and non-certified products during any of the activities covered by the fishery certificate?	There is no transhipment of catches at sea within the EEZ by New Zealand vessels.

Factor	Description of the traceability risk factors and details of the risk mitigation and management *Include in each description:* • *Whether each factor occurs* • *When it occurs and how frequently (e.g. regularly, seasonally, rarely)* • *How any potential traceability risks are mitigated and any risk management* • *If covered by information provided elsewhere in the assessment report (such as Table 5 for segregation or in Section 5 MSC Fisheries Standard – Principle 3 – Effective management for regulatory frameworks), cross reference as needed.*
This refers to both at-sea activities and on-land activities and should reflect those listed in product movement in Table 5. It includes: • Translocation • Transhipment • Transport • Storage • Processing • Sorting/ grading • Packing • Landing • Auction	
Does transhipment occur within the fishery? If yes, include in the description: • What is the type of transhipment in-port/ high seas/ other • What are the systems used to track and trace to UoC For high seas transhipment include in the description how the systems to track and trace to the UoC: • Are verified independently of the fishery client • Cover all fishing and receiving vessels involved in transhipment • Apply to all transhipment events If any of these 3 criteria above are not met for high seas transhipment CoC certification is required for both the fishing and receiving vessels involved in this transhipment.	If there is any doubt whether orange roughy landed into an LFR is from a certified fishery the product is treated as non-certified.
Are trading agents to be covered within the fishery certificate? If yes, include in the description:	No, LFRs are effectively the “agents” taking delivery of product at landing and they have their own CoC.

Factor	Description of the traceability risk factors and details of the risk mitigation and management *Include in each description:* • *Whether each factor occurs* • *When it occurs and how frequently (e.g. regularly, seasonally, rarely)* • *How any potential traceability risks are mitigated and any risk management* • *If covered by information provided elsewhere in the assessment report (such as Table 5 for segregation or in Section 5 MSC Fisheries Standard – Principle 3 – Effective management for regulatory frameworks), cross reference as needed.*
• How information on UoC is passed through	
Are there any other risks of mixing or substitution between certified and non-certified fish? If No, refer to the section describing product movement and segregation which demonstrates this.	No. Please see Table 6.
Are there any other risks of mixing between different Units of Certification? If Yes, include in the description: • link to any relevant variations relating to this If No, refer to the section describing product movement and segregation which demonstrates this.	

4.4.3. Traceability within the fishery description

Copy from last full assessment and update as relevant.

Table 11: Traceability risks and mitigation within the fishery

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

The change of ownership occurs upon landing to Licensed Fish Receivers, who have their own CoC.
The point from which subsequent Chain of Custody (CoC) is required *The latest this can happen is the point of change of ownership of fish or fish product to any party not covered by the fishery certificate (reference section above) but it may happen sooner in which case describe as per the product flow (in Table 5). Note the requirement for when CoC is required to start on High Seas Transhipment*
CoC is required by LFRs who take delivery of product at landing.
The entities, or categories of entities, at the point of landing and/or sale required to have separate CoC including any auctions, selling agents, offloaders or storage facilities and so not covered in the above Tables 5 and 6.
A list of entities, or categories of entities, eligible to access the certificate and sell product as certified including: • *Confirm if all vessels within the geographic area and gear of the UoC are eligible to sell fish and fish products as certified.* • *Any other limits to vessel types, ownership, client group membership.* • *Include any trading agents used.*
All vessels fishing in one of the certified UoCs.
Points of landing, auctions or other transfer which may be used for the sale of fish from the certified fishery into further chains of custody, either: • *The geographic region where all landing points are possible, or* • *Named landing points, auctions or other transfer sites if there are limits.*
Any Licensed Fish Receiver within NZ.
Any specific eligibility criteria for product to be sold as certified, or where to find this information where relevant, including: • *Product form.* • *Trip type (e.g. includes outside EEZ).* • *Need for Chain of Custody.* • *Need for trading through client group members*.
N/A
How fish or fish products can be identified or can be confirmed as certified at the point it enters certified CoC, including: • *How information on gear, species, stock, area, vessel (where relevant) client group member (where relevant) is provided.* • *Any segregation to UoC required of first buyers (e.g. sort batches by species).* • *Where relevant how any specific eligibility criteria can be confirmed by the first buyer (as per section above).*
Information on species, catch location, gear, weight, certified status, and other information is coded into the barcode of cartons offloaded from freezer vessels.
How IPI is identified to first buyers at the point it enters certified CoC where relevant
N/A

5. Surveillance Audit Results

5.1. Summary overview

5.1.1. Summary of conditions update

Table 12: Summary of conditions

Condition number	Condition	PI	Status	PI original score	PI revised score
Add rows as needed	*Add condition summary*		*Choose from: New / Closed / Ahead of target / On target / Behind target / Inadequate progress. If closed, indicate surveillance number when closed.*	*PI score from most recent assessment.*	*PI score after this surveillance, or 'Not revised'.*
1	By the 4th annual audit in 2026 there will be some quantitative evidence that the partial strategy outlined in the DWG benthic operational procedures is being implemented successfully in the NWCR ~~and ESCR*~~ unit of assessment.	2.4.2(c)	On-target	75	Not Revised

* Note the ESCR UoA is still subject to this condition but the certificate is suspended and it's now covered in the ITM Improvement Action Plan.

5.1.2. Recommendations (new) –

Recommendations for Principle 1

- Conducting a new assessment for the NWCR sub-area should be a priority. However, given the difficulties with making use of the age-composition data (especially if it is concluded that the differences in age-frequencies among years is due to sampling error), consideration should be given to applying simpler assessment methods (e.g. based on Bayesian surplus production models) that have the ability to fit the primarily data sources (catch and acoustic estimate of biomass) and provide the information needed to apply the harvest strategy (or management procedure).
- Consider collecting age data from the commercial fishery as well as the survey.
- The assessment process did not lead to an accepted assessment in 2023. Management of the fishery would benefit from "back up" approaches for providing advice for TAC setting as the rejection of assessments is not uncommon worldwide (Punt et al., 2020). Management jurisdictions such as the US New England and Mid-Atlantic regions must develop a 'plan B,' along with the proposed assessment in case the proposed assessment is rejected. The 'plan B' assessments are index-based, easy to compute, and theoretically require little review once agreed upon (NEFSC, 2017). This 'plan B' approach was developed to define roles, responsibilities and process in cases when assessment working groups or review panels deem that a stock assessment is insufficient or inappropriate, and empirical approaches are required to provide management advice. The approaches used in the 'plan B' should be MSE-based.
- The probabilities included in the report of the Stock Assessment Plenary were qualitative and reflected both the results of the quantitative stock assessment and expert option. The interpretation of these probabilities would be enhanced by text that more clearly reflects the logic that led to the final probabilities. In addition, reporting probability ranges that better match those referred to in the MSC Standard would enhance the ability to evaluate stock status relative to PI 1.1.1.
- The next full assessment should explore the impact of higher ages at maturity and older plus group ages in the models considered for the assessment.

- The next assessment for ORH 7A should explore the issues that led to the rejection of the assessment of ESCR, in particular whether recent survey estimates of abundance, length-frequencies and age-compositions are consistent with the results of the 2019 assessment. The next assessment for ORH 7A should also analyze (ideally standardize) the CPUE data for the fishery.

5.2. Re-scoring Performance Indicators

PI 1.1.1. for the Northwest Chatham Rise UoA was rescored due to the impact of issues with the stock assessment described in the Principle 1 update section. The following table is the result of this rescoring. The overall score for this PI was reduced from 100 to 80. No new condition was raised. **The overall P1 score for this UoA is reduced from 94.6 to 85.6.**

1.1.1. – Stock status Northwest Chatham Rise

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
a	Stock status relative to recruitment impairment			
	Guide post	It is **likely** that the stock is above the point where recruitment would be impaired (PRI).	It is **highly likely** that the stock is above the PRI.	There is a **high degree of certainty** that the stock is above the PRI.
	Met?	NWCR – Y	NWCR – Y	NWCR – N
Rationale				

For the purposes of this assessment, the PRI is taken to be the limit reference point. This was set to $0.2B_0$ by Cordue (2014) who defined the limit reference point to be the maximum of $0.2B_0$ and $0.5B_{MSY}$ (based on a deterministic yield analysis), accounting for uncertainty in natural mortality *M* and stock-recruitment steepness *h*. Cordue (2019) revised the analysis on which the limit reference point was based taking into account the results of new assessments.

The probabilities of the biomass in 2017 (the last year included in the 2018 assessment) being above the lower end of the target range ($0.3B_0$) and the soft limit ($0.2B_0$) were reported to be <0.05 in the report of the 2022 Stock Assessment Plenary (FNZ, 2022), while the probability of this biomass being above $0.3B_0$ (the lower end of the target range) was reflected as "as likely as not". Given the additional uncertainty associated with the assessment, the status of the NWCR stock in relation to being below $0.2B_0$ was modified in the report of the 2023 Stock Assessment Plenary to "unlikely" or a probability between 0.1 and 0.4, with no indication of where within the range the probability lies. In relation the probabilities of being above or below the management reference points, the FNZ "Guidelines for Status of Stocks Summary Tables" (FNZ, 2023b) note that

> "*Probability categories and associated descriptions should relate to the probability of being "at or above" biomass targets (or "at or below" fishing intensity targets if these are used), below biomass limits, and above overfishing thresholds. Note, however, that the descriptions and associated probabilities adopted need not correspond exactly to model outputs; rather they should be superimposed with the Working Group's belief about the extent to which the model fully specifies the probabilities. This is particularly relevant for the "Virtually Certain" and "Exceptionally Unlikely" categories, which should be used sparingly*."

A key question is therefore the reliability of the range of 0.1 to 0.4 for assessing the probability of being below $0.2B_0$ given the semi-quantitative basis for the range. Moreover, if the range is appropriate where within the 0.1 to 0.4 range does the probability lie (in particularly whether it is above or below 0.3). Figure 4 is suggestive that the trend in biomass

continues to be increasing[7] and if the acoustic catchability is 0.66 [Doonan et al., 2015] (rather than the 0.8 implied the priors for acoustic catchability in the 2018 assessment), of the same scale. Had Figure 4 been created with an acoustic catchability coefficient of 0.8 the absolute biomass would be lower but the trend would remain. Thus, while there is clearly increased uncertainty regarding the status of the stock relative to the outcomes of the 2018 assessment, it is unlikely based on the current information that the stock is below $0.2B_0$ with more than a 0.2 probability **hence meeting SG80**. However, the additional uncertainty reinforces the need to address the problems with the stock assessment identified during 2023 and produce a new quantitative assessment.

The new information arising from the 2023 assessments suggest that while SG 60 and most likely SG 80 is satisfied. However, the increased uncertainty means that the evidence cannot justify that the probability of the stock being above the PRI is as high as 95%

Stock status in relation to achievement of Maximum Sustainable Yield (MSY)				
b	Guide post		The stock is at or fluctuating around a level consistent with MSY.	There is **a high degree of certainty** that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years.
	Met?		NWCR – Y	NWCR – N
Rationale				

The estimates of B_{MSY} based on deterministic considerations (the usual basis for estimating B_{MSY} when conducting stock assessment) are not considered reliable for orange roughy and range from $0.31B_0$ to $0.43B_0$ depending on whether the Beverton-Holt or Ricker stock-recruitment relationships is assumed. The management target range adopted for orange roughy in New Zealand is $0.3\text{-}0.5B_0$. The stock assessments provide estimates of biomass relative to B_0. For the base model, the stocks are assessed to have been above the lower end of the management target range ($0.3B_0$) since 2012 (ORH3B NWCR). However, while the report of the stock assessment plenary reflects that the stock is as likely as not above the lower end of the management target range (FNZ, 2023a), the increased uncertainty associated with assessment means that it is not possible to conclude with 95% certainty (required for SG100) that the stock is above the level consistent with MSY. However, the available evidence is that the stock is fluctuating about B_{MSY} and hence meeting SG 80.

References:

FNZ (2023a); Cordue (2014, 2019)

Stock status relative to reference points			
	Type of reference point	Value of reference point	Current stock status relative to reference point
Reference point used in scoring stock relative to PRI (SIa)	*Spawning biomass*	*0.2 B_0*	*ORH 3B NWCR: 0.38 B_0 (2017)*
Reference point used in scoring stock relative to MSY (SIb)	*Spawning biomass*	*0.3 – 0.5 B_0*	*(Relative to $0.3B_0$)* *ORH 3B NWCR: 0.38 B_0 (2017)*

[7] A key part of the views of some DWWG members in rejecting the 2020 stock assessment for the ESCR fishery was the poor fit to the observed acoustic biomass index (the model estimates of biomass are increasing in size, the observations are flat).

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

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

Overall Performance Indicator score	**3B NWCR-80**
Condition number (if relevant)	**N/A**

Where the information base has changed the CAB shall re-score relevant Performance Indicators.

5.3. Conditions

5.3.1. Progress against conditions

Table 13: Condition 1–OPEN

Performance Indicator	2.4.2
Score	*75*
Justification	From the study by Black (2021), management action would have been triggered in ORH3B NWCR and ESCR, but not in ORH7A. This suggests that pVME has a non-trivial chance of designation as VME in ORH3B NWCR and ESCR, while designation of pVME as VME in ORH7A is unlikely. For potential VME habitat, DWGs operational procedures for BMA indicator taxa encounters have been implemented too recently for there to be quantitative evidence of successful implementation. Therefore, for potential VME habitat in ORH3B NWCR and ESCR, the SG80 is not met and a condition has been assigned.
Condition	By the 4th annual audit in 2026 there will be some quantitative evidence that the partial strategy outlined in the DWG benthic operational procedures is being implemented successfully in the NWCR and ESCR units of assessment.
Condition start	Certification date, 2022.
Condition deadline	4th annual audit, 2026 (month TBD)
Milestones	At the first annual surveillance audit (2023), the client will provide a plan that assures availability of some quantitative metrics capable of demonstrating successful implementation. At the second and third surveillance audits, the client will provide a report of progress in meeting the condition. At the fourth surveillance audit, the client will provide a report with some quantitative metrics capable of demonstrating that the partial strategy has been successfully implemented. Score SG80.
Year 1 Action Plan Expected Output.	**<u>Surveillance Audit 1:</u>** DWG will provide a report outlining the processes and analyses undertaken that provide information on the estimated nature and scale of any coral habitat encountered. This report will demonstrate that a plan has been put into effect to ensure tows catching orange roughy in the NWCR and ESCR UoA areas do not pose a risk of serious or irreversible harm to coral habitats.

Progress on Condition (Year 1)	The first milestone for this condition is that the client would provide a plan that assures availability of some quantitative metrics capable of demonstrating successful implementation of the benthic operational procedures. At the time of recertification, DWG's Benthic Operational Procedures had just been implemented (starting 1 October 2021) and are designed to ensure that vessels are cognisant of the requirement to accurately measure, record and report all captures of benthic biota to the Ministry and to their shore managers. DWG's Environmental Liaison Officer is at hand to assist in providing response management advice for implementation in real-time (DWG, 2021b). Orange roughy quota owners had agreed to implement specific benthic interaction measures to closely monitor and minimize catches of live corals within the UoA areas, noting Westpac Bank is excluded from these specific procedures because measures relating to the impact of fishing on benthic biodiversity in this area are managed by SPRFMO. These measures include identifying Benthic Management Areas (BMAs) containing extensive aggregations or communities of epibenthic organisms such as corals and sponges, and a "Monitor, Pause, Survey and Assess (MPSA)" management framework, underpinned by a set of "trigger points" that, when reached, require management action. At the time of this first surveillance audit, these encounter protocols had been in place and working for two orange roughy fishing seasons. If coral or sponge bycatch triggers a toweline pause, a sample of the coral is sent to a coral expert to determine the species and whether it is alive or dead. If it is verified as dead coral rubble only, the tow is unpaused. Otherwise it remains paused until video of the area can check whether there is a "VME-like" aggregation of benthic biota in the area. The buffer zones around paused towlines were modified in 2022 to better reflect the real position of the net during the tow. In addition, a coral and sponge identification guide and online quiz for crew has been developed and launched in order to improve identification of benthic biota. To date, four towlines on the Chatham Rise (one in NWCR and three in ESCR) have been paused due to triggering the encounter protocols. This evidence is sufficient to meet the first milestone for this condition.
Progress status	This condition is on target.
Remedial action	N/A
Additional information	N/A

5.3.2. Progress against recommendations

The possibility that orange roughy live to ages greater than observed previously in New Zealand (180 years on the Morgue Sea Mount, Doonan et al., 2018) suggests that future assessments should examine sensitivity to the plus-group age when conducting assessment and an assessment whether the current base-case value of *M* of 0.45yr^{-1}. Any updated estimate of *M* should feed into future reviews of the harvest control rule.

The most recent assessment of the ORH 2A (south), 2B and 3A area (not a UoC), suggests a higher age-at-maturity (55 years) than estimated for orange on the Chatham Rise, and hence that spawning fish constitute a smaller proportion of the mature biomass in ORH 2A (south), 2B and 3A area than earlier believed. Future assessments should report the

posteriors for the A_{50} and A_{95} parameters of the spawning ogive, as well as the data that suggest higher A_{50} and A_{95} values, to allow this issue to be explored in more detail.

5.4. Client Action Plan

N/A No updates to the CAP. However, the self-suspended ESCR UoA will be published as an In-Transition to MSC (ITM) fishery on the MSC's track-a-fishery page on 20 December 2023.

6. Appendices

6.1. Evaluation processes and techniques

6.1.1. Site visits

A hybrid site visit was held in Auckland, NZ and via videoconference 9-11 October 2023. The purpose of these meetings is for the assessment team to receive information from fishery representatives, government management agencies, non-governmental organizations, and other interested stakeholders. Thirty days prior to the surveillance audit, all stakeholders from the previous full assessment and parties to other related assessments, and others having expressed interest in this assessment, were informed of the meeting and the opportunity to provide information to the auditors in advance of, or during, the meeting. The following participants were in attendance:

Name	Organization
Amanda Stern-Pirlot	MRAG Americas, Assessment Team
Andre Punt	Assessment Team
Aaron Irving	Deepwater Group, Fishery client
Oliver Wilson	Deepwater Group
Geoff Tingley	Gingerfish Ltd.
Robert Tinkler	Fisheries New Zealand (FNZ)
Gretchen Skea	FNZ
James Andrew	FNZ
Ben Steele-Mortimer	FNZ
Richard O'Driscoll	FNZ
Lyndsey Holland	NZ Department of Conservation (DOC)
Darryn Shaw	Sanford fleet manager

The following agenda was followed:

9 October 2023

08:00-Opening meeting with client and assessment team

09:00- Chatham Rise stock assessments and the Plenary Report

The CAB shall include in the report:

- *An itinerary of site visit activities with dates.*
- *A description of site visit activities, including any locations that were inspected.*

Reference(s): FCP v2.3 7.29

6.1.2. Stakeholder participation

The assessment team received written comments from the Deep Sea Conservation Coalition (DSCC; see below), however they were unavailable for participation in the site visit. Written comments were also received by the Department of Conservation on the stakeholder comment template. This appears together with assessment team responses after the letter from DSCC.

6.2. Stakeholder input

MRAG Americas received the following letter (reproduced in its entirety) from Karli Thomas on behalf of the Deep Sea Conservation Coalition.

The assessment team carefully reviewed the contents of this letter and supporting information within the context of the surveillance audit and changes in Principle 1 scoring for the NWCR UoC resulted. In addition, the ESCR UoA is now suspended, and will enter the MSC's ITM program. Regarding coral bycatch, evidence shows the encounter protocols are in place and resulting in paused tow lines and areas subject to further investigation as potential VME areas. The team also received written comments on the stakeholder comment form from the NZ Department of Conservation who has made considerable progress understanding the density and distribution of coral species in NZ waters, some of which has been reported in the P2 background section of the present report.

MSC must suspend New Zealand orange roughy sustainability certification

Letter to MRAG Americas audit of MSC certification for NZ orange roughy

2 October 2023

The Deep Sea Conservation Coalition (DSCC) is an alliance of over 100 organisations globally, working to promote the conservation of biodiversity in the deep sea. We are contacting you with important new information relevant to your audit of the Marine Stewardship Council (MSC) certification for the orange roughy bottom trawl fishery in NZ waters and the adjacent high seas.

We don't wish to meet with MRAG Americas during your audit: we would rather you spent the time getting up-to-date on the science, which should speak for itself. We urge you to **immediately suspend the MSC sustainability certification of New Zealand orange roughy**. The latest scientific evidence highlights the poor status of the stock, the lack of a stock assessment for most of the unit of assessment and the substantial impact of the fishery on the marine environment - including protected species and vulnerable marine ecosystems.

Dire state of the main MSC-certified sub-stock, and no stock assessment

In May 2022 new scientific evidence came to light that indicated orange roughy do not reach full maturity at 30 years as previously assumed, but at around 80 years, with only skipped spawning from 35-80 years age. (Fisheries New Zealand, 2022) This has fundamental implications for our understanding of the health of orange roughy populations.

The DSCC and other NZ NGOs provided initial information on this alarming new finding last year to MRAG Americas when you were assessing the fishery for recertification. Unfortunately our submission and the accompanying scientific report were read over a weekend by the assessors and the recertification went ahead the following week, regardless of this new and worrying information, and its implications for other orange roughy populations and fisheries.

The impacts of that information are now - as expected - playing out across more orange roughy fisheries, including the main sub-stock ORH 3B East and South Chatham Rise (ESCR) that, in 2021-22, accounted for over 70% of the catch in the MSC unit of certification. (Fisheries New Zealand, 2023)

The New Zealand Science Plenary has now withdrawn the stock assessments for this sub-stock altogether. There will not be a stock assessment until at least 2025.
To be clear: this stock no longer has a valid assessment, so it follows that continuing to market that fish as "sustainable" is unacceptable.

- **The majority of the orange roughy bearing an MSC "certified sustainable" logo now has no stock assessment. That amounted to 6,123 tonnes of catch in 2021-22, or 72% of New Zealand's total MSC certified orange roughy catch.**
- Scientists considered the stock assessment for another sub-stock in the unit of certification (ORH 3B, Northwest Chatham Rise) was also invalid, but left it to stand because there had not been enough investigation of that assessment.
- The United States is the main market for New Zealand orange roughy, taking almost half of all exports. US companies selling it market it on the basis of its "gold standard" "certified sustainable" "MSC certified" - unaware of the trouble it is in.
- The science plenary also noted that spawning aggregations in the Northwest Chatham Rise (MSC certified) no longer occur on seamounts and features open to fishing (Graveyard complex), only a seamount closed to fishing (Morgue).

The science plenary is clear that previous stock assessments were painting an inaccurate picture of the East and South Chatham Rise stock, including the assessment that informed the MSC re-certification of New Zealand orange roughy last year (emphasis added):

> *"**The recent increase in spawning stock biomass (SSB) predicted by the previous 2018 and 2020 assessments is not seen in the observational data** and could be an artefact of model assumptions. **Stock productivity appears to be lower than expected** given the estimates of biological parameters used in the 2018 and 2020 models. **All observations were inconsistent with the hypothesis that recruitment had remained constant. Recruitment was estimated to decline and then remain low once the fishery started.** However, inconsistencies in age frequency data, and relatively high ageing error, meant recruitment was poorly informed."* (FNZ Plenary 2023 Vol. 2 page 921)

The science plenary has determined that previous stock assessments for the (MSC certified) East and South Chatham Rise sub-stock are not valid:

> *"The 2020 ESCR stock assessment was re-evaluated in 2023 and subsequently rejected on the basis of analyses summarised above and described by Dunn (in prep)."* (FNZ Plenary 2023 Vol. 2 page 927) and *"**The consensus of the Working Group was that the previously accepted assessment model for the (2020) ESCR can no longer be considered to accurately reflect stock status** and the Status of the Stocks table has been removed."* (FNZ Plenary 2023 Vol. 2 page 935)

Furthermore, spawning aggregations in several orange roughy fishing grounds (including those certified by the MSC) have disappeared from heavily fished seamounts and features, in some case restricting spawning aggregations to closed seamounts only:

"On Chatham Rise, the main spawning aggregation no longer occurs at the Old Spawning Plume but at Rekohu, and ***spawning aggregations occur on the Morgue Hill but no longer the Graveyard Hill****. The relationship between different spawning aggregations within the same assumed stock, and the implications of the loss of spawning aggregations for orange roughy and the wider ecosystem, is unknown."* (Plenary 2023 Vol. 2 page 869)

Significant impacts by the fishery on protected deep-sea species

In addition to the poor state of orange roughy populations, the fishery's impacts on the wider marine environment are severe. Last month the Department of Conservation released a report on observed and reported coral bycatch in NZ fisheries in the 13 years to 2019-20:

- Virtually all (99%) of the observed and reported coral catch was from bottom trawling, which reported 211.58 tonnes of coral bycatch. These corals are protected species, and indicators of vulnerable marine ecosystems.
- The highest risk of coral captures is for stony corals, which are predominantly caught in bottom trawl fisheries targeting orange roughy in the North-East Chatham Rise.
- The FMAs with the highest reported coral catch weight were FMA4, FMA6, and FMA9, accounting for 96% of all coral catch within the EEZ. 45% of coral catch was in FMA4, where most of the MSC certified orange roughy catch is taken.
- This data only represents observed and/or reported coral bycatch, however 7 out of 10 bottom trawls in the orange roughy fishery do not have observer coverage and the fishery is not due to be included in the government's initial roll-out of cameras on boats.
- On that basis, most coral bycatch should have been reported by fishers, not observers, however that is not the case and the biggest discrepancy was in FMA4 (including MSC certified fisheries) where observers reported twice as much coral bycatch as fishers.
- Furthermore, the amount of coral that makes it up in the net is only a tiny fraction of what is destroyed on the seabed.

"The fishing method with the highest number of observed fishing events (6,615 events) was bottom trawling, with 211.58 tonnes of corals being observed caught between the 2007–08 to 2019–20 fishing years" (Meyer, S. page 29)

"fisher-reported captures by FMA were generally comparable to those reported by observers, except for FMA4, where observers reported approximately twice the amount of coral catch compared to fishers. Overall, the expectation that a higher amount of coral captures would occur in the dataset of fisher-reported captures compared to observer-reported captures was not met" (Meyer, S. page 53)

Protection measures urgently needed

In addition to the immediate suspension of the MSC certification of the New Zealand orange roughy bottom trawl fishery, additional steps are needed.

1. **All seamounts and features must be closed to bottom trawling**. For some orange roughy stocks, protected seamounts are the last remaining sites where orange roughy spawning aggregations occur. On unprotected seamounts, spawning aggregations have disappeared and not returned (e.g. Graveyard, Strawberry Mountain).

2. For the protection of corals (protected species under the NZ Wildlife Act, and indicators of Vulnerable Marine Ecosystems under SPRFMO measures) the **closure of all seamounts and features to bottom trawling** is also critical, but must be combined with **an encounter protocol and move-on rule** to ensure that where corals and VMEs are damaged or destroyed, the trawler must relocate to avoid further harm, and the site of the damage must be closed to further bottom trawling. Such a rule is already in place in all the waters surrounding NZ EEZ (except to the south where bottom trawling is banned altogether by CCAMLR). New Zealand fisheries - including those certified by the MSC - are operating to a lower standard in regard to responding to benthic bycatch than the surrounding high seas.

3. **The MSC must evaluate the Chatham Rise orange roughy stocks and sub-stocks as threatened species populations**. The MSC Standard was recently changed to allow MSC assessors to set aside national threatened species listings (such as the listing of orange roughy in Australia) and come to their own determination about the status of a TEP species population. This can be seen as a cynical attempt to certify populations of a nationally-listed threatened species, however the MSC claims this is in fact an enhancement to the Standard allowing it to assess and treat populations as “threatened” even if the relevant authorities have not listed them as such. If that’s the case, the Chatham Rise orange roughy populations deserve a threatened / conservation dependent listing on the basis of their extremely vulnerable lifecycle traits and over-exploitation: Living to 250 years, high age at maturity and initial skipped spawning until full maturity at around 80 years of age, the catch per unit effort indicating declining biomass, the loss of numerous spawning aggregations and for some sub-stocks a complete reliance on a small number of protected seamounts for their spawning aggregations.

The above information should leave no doubt that New Zealand’s orange roughy bottom trawl fisheries are in no way sustainable, and their continued marketing as such (despite over 70% of the certified catch not even having a stock assessment) would be a blatant deception of seafood consumers.

We trust that MRAG Americas will make the recommendation to suspend the certification of New Zealand bottom trawled orange roughy following its surveillance audit next week, and that the Marine Stewardship Council will act swiftly to ensure that the suspension is enacted, and to avoid any further false marketing of orange roughy as sustainable.

Below are the references mentioned in this letter, if you have any further questions please feel free to contact me.

Ngā mihi,

Karli Thomas
Pacific Seamounts Campaign Lead
Deep Sea Conservation Coalition

References:

Fisheries New Zealand (2023) Fisheries Assessment Plenary May 2023 Volume 2

Fisheries New Zealand (2022) Fisheries Assessment Plenary May 2022 Volume 2

Meyer, S. (2023). Report - Final results: INT2021-02 Characterisation of protected coral interactions. Report for the Department of Conservation, by Proteus. September 28 2023.

Performance Indicator (PI) input by NZ Department of Conservation

Performance Indicator (PI)	Condition	Input summary	Input detail	Evidence or references	Stakeholder input code	CAB response to stakeholder input	CAB response code
Performance Indicator - please copy and insert rows to raise more than one input against a Performance Indicator	If relevant, please provide the associated condition - please copy and insert rows to raise more than one input against a condition	Summary sentence	Detail of stakeholder input	Objective evidence or references should be provided in support of any claims or claimed errors of fact.	Please assign an input code to describe the suggested change based on your input and evidence. Optional. See the Codes section for a description of the codes.	The CAB shall respond in this column. CAB responses should include details of where different changes have been made in the report (which section #, table etc).	The CAB shall assign a response code to each row completed by the stakeholder.
Principle 1 - Sustainable fish stocks							
Principle 2 - Minimising environmental impacts							
2.3.1 - ETP species outcome		In light of recent new scientific information generated by DOC, we strongly advise the audit needs to review all likely impacted coral ETP species outlined in new reports provided here as supporting evidence, including hotspots for coral bycatch and trawl interactions.	DOC provides updated records and maps for known ETP coral distribution locations in New Zealand and overlaps with trawl footprints.	Deep diving into decades of uncatalogued corals: csp reports (doc.govt.nz) (figures 6.7 – 6.10 shows coral overlaps with the cumulative trawl footprint) Identification of protected coral hotspots using species distribution modelling: csp reports (doc.govt.nz) Fig 3-26		The assessment team appreciates the important new information resulting from analysis of coral samples. We have included a summary of this in our report, however, at this time this information does not result in rescoring of the performance indicators (except possibly to revise the information score on ETP corals upwards).	Information considered and included in the report
2.3.2 - ETP species management		There is some evidence of under-reporting of coral bycatch, and there is no mitigation practices in NZ waters for corals.	We strongly encourage the audit team to consider how bycatch under reporting fits in to the surveillance audit process. In addition, in terms of mitigation, NZ does not currently have coral bycatch mitigation practices in place in domestic waters (e.g.	Characterisation of protected coral interactions: csp reports (doc.govt.nz)		The assessment team appreciates this information and acknowledges that potential underreporting of catches can influence our understanding of	Information considered and included in the report.

			encounter thresholds / move-on rules). However, we consider spatial closures are the preferred option for corals. There is generally a lack of data on bycatch rates and the reliability of both observer and fisher reported coral bycatch is in question. Observer coverage in the ORH is somewhere around 20-40%.			true interactions. However, the new DWG encounter protocols put in place in 2021/2022 appear to be ensuring correct classification and reporting (as well as action when triggered under the protocols).	
2.3.3 - ETP species information		There are at least 40 taxa impacted by trawl fisheries in NZ waters, based on expert-ID from confirmed observer data between 2007/08 – 2019/2020, that reported coral bycatch where orange roughy was the target species. See attached reports for species list.	The majority of NZ coral bycatch are stony corals from fisheries targeting ORH in the Northeast Chatham Rise region.	Status of knowledge of NZ corals report Characterisation of protected coral interactions: csp reports (doc.govt.nz) Protected coral reproduction : csp reports (doc.govt.nz)		This information has been reported in the surveillance, however at this time the information does not rise to the level of rescoring ETP information or outcome indicators.	Information considered and included int eh report.
2.4.3 - Habitats information		Here we provide some additional reports on the impacts of trawling on coral habitat which may or may not be relevant to the surveillance audit.		Environmental impact of trawling on the seabed: A review (tandfonline.com) Commercial bottom trawling as a driver of sediment dynamics and deep seascape evolution in the Anthropocene - ScienceDirect Aquatic Conservation: Marine and Freshwater Ecosystems | Aquatic Journal | Wiley Online Library Effects of sediment pulses on the deep-sea coral Goniocorella dumosa: New Zealand Journal of Marine and Freshwater Research: Vol 0, No 0 (tandfonline.com)		The assessment team appreciates these reports. The information presented is not expected to alter the results of the current assessment, but we will ensure they are considered at any reassessment against version 3.0.	Information reviewed but it's not directly relevant to the fishery assessment.

6.3. Revised surveillance program

No change to the surveillance program. The next (2nd) annual audit is scheduled to be off-site, and the surveillance level is still 4. See MRAG Americas (2022) for details.

6.4. Harmonised fishery assessments

Overlapping fisheries		
Fishery name	Certification status and date	Performance Indicators to harmonise
New Zealand Hoki, Hake and Ling Trawl Fishery	Certified since September 2018 under FCR v 1.3	Principle 3 for 3.1.1-3.1.3

Overlapping fisheries	
Supporting information	
- Describe any background or supporting information relevant to the harmonisation activities, processes and outcomes.	
Harmony exists between the P3 assessments for these fisheries.	
Was either FCP v2.2 Annex PB1.3.3.4 or PB1.3.4.5 applied when harmonising?	**No**
Date of harmonisation meeting	**NA**
If applicable, describe the meeting outcome	
- e.g. Agreement found among teams or lowest score adopted.	

7. References (Bibliography)

The CAB shall list all references here, including hyperlinks to publicly-available documents.

Anderson, O.F. and B. Finucci. Non-target fish and invertebrate catch and discards in New Zealand orange roughy and oreo trawl fisheries from 2002-2003 to 2019-2020.

Anderson, O., Schnabel, K., Bowden, D., Davey, N., and A. Hart (2023). Identification of protected coral hotspots using species distribution modelling. Report prepared for Project POP2021-02, Conservation Services Programme, Department of Conservation. August 2023.

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FNZ (2023c). National Plan of Action-Seabirds 2020 Seabird Annual Report 2021/22. Information Paper 2023/04. August 2023 https://www.mpi.govt.nz/dmsdocument/58780/direct

FNZ (2023d). Review of Sustainability Measures for Orange Roughy (ORH 3B) for 2023/24. Fisheries New Zealand Discussion Paper No: 2023/24. 11 p. https://www.mpi.govt.nz/dmsdocument/59167-Public-Submissions-Received-on-the-2023-Review-of-Orange-Roughy-ORH-3B

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