



Review of Sustainability Measures for Orange Roughy (ORH 7A) for 2019/20

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1 Stock being reviewed

Challenger orange roughy (ORH 7A + Westpac Bank)

(*Hoplostethus atlanticus*; nihorata)

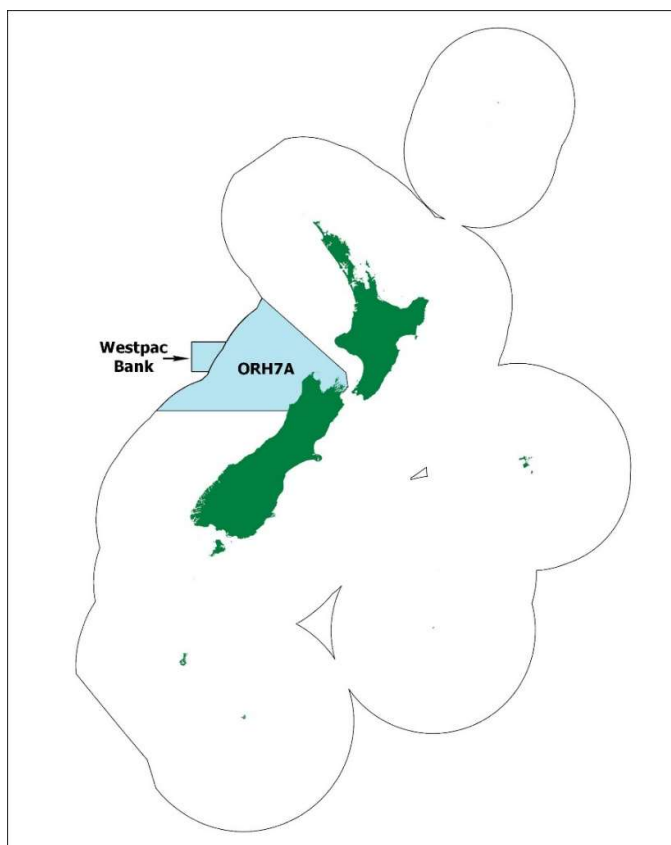


Figure 1: Quota Management Area for ORH 7A and Westpac Bank Area on the high seas

2 Summary

A new stock assessment of the orange roughy stock on the Challenger Plateau (comprising the ORH 7A QMA and the portion of the stock that occurs on the Westpac Bank in the high seas) was completed following an acoustic biomass survey in July/August 2018. The stock assessment, and subsequent application of the harvest control rule to determine a sustainable yield, shows that there is an opportunity to increase the catch limit for this stock.

Fisheries New Zealand proposes four options for the total allowable catch (TAC) and total allowable commercial catch (TACC) for ORH 7A. As New Zealand requires catch taken from the Westpac Bank Area to be counted against ORH 7A Annual Catch Entitlement, catch from the Westpac Bank is accounted for within the ORH 7A TACC.

Option 1 maintains the TAC at 1,680 tonnes and the TACC at 1,600 tonnes

Option 2 increases the TAC from 1,680 tonnes to 2,163 tonnes and the TACC to 2,060 tonnes

Option 3 increases the TAC from 1,680 tonnes to 2,310 tonnes and the TACC to 2,200 tonnes

Option 4 increases the TAC from 1,680 tonnes to 2,555 tonnes and the TACC to 2,433 tonnes.

3 Quota Management System

Within New Zealand, ORH 7A is managed using the Quota Management System (QMS), with a 1 October fishing year. For more information on our QMS please see our references section. For more information about the QMS go to <https://www.mpi.govt.nz/law-and-policy/legal-overviews/fisheries/quota-management-system/>.

4 Legal basis for managing fisheries in New Zealand

The Fisheries Act 1996 provides the legal basis for managing fisheries in New Zealand, including the Minister's responsibilities for setting and varying sustainability measures. See the separate document *Overview of legislative requirements and other considerations* on the Fisheries New Zealand sustainability consultation webpage (<https://www.fisheries.govt.nz/news-and-resources/consultations/review-of-sustainability-measures-for-1-october-2019>) for more information.

5 Treaty of Waitangi obligations

5.1 Input and participation of tangata whenua

Input and participation is provided for through discussions with relevant iwi at Iwi Fisheries Forums. Each Iwi Fisheries Forum has developed an Iwi Fisheries Forum Plan, which describes how the iwi in the Forum exercise kaitiakitanga over the fisheries of importance to them, and their objectives for the management of their interest in fisheries.

Iwi Fisheries Forums may also be used as entities to consult iwi with an interest in a fishery.

It is proposed that input and participation with relevant iwi on the proposals for ORH 7A is provided for during the period of consultation on these proposals.

5.2 Kaitiakitanga

Orange roughy is listed as a taonga species in Te Waipounamu Iwi Fisheries Plan which covers all of the South Island. In addition, Te Waka a Māui me Ōna Toka Iwi Forum consider all fish species taonga. The Te Waipounamu plan contains objectives to support and provide for the interests of South Island iwi, and contains three objectives which are relevant to the management options proposed for ORH 7A:

Management objective 1: to create thriving customary non-commercial fisheries that support the cultural wellbeing of South Island iwi and our whānau

Management objective 3: to develop environmentally responsible, productive, sustainable and culturally-appropriate commercial fisheries that create long-term commercial benefits and economic development opportunities for South Island iwi

Management objective 5: to restore, maintain and enhance the mauri and wairua of fisheries throughout the South Island.

Fisheries New Zealand considers the proposals in this consultation document meet those objectives in developing responsible, productive, sustainable and culturally appropriate commercial fisheries.

6 Relevant plans, strategies, statements and context

Orange roughy in ORH 7A is managed as a Tier 1 species within the National Fisheries Plan for Deepwater and Middle-depth fisheries 2019 – Part 1A (National Deepwater Plan). The National Deepwater Plan sets out a series of Management Objectives for deepwater fisheries, the most relevant to ORH 7A being:

Management Objective 1: Ensure the deepwater and middle-depth fisheries resources are managed so as to provide for the needs of future generations.

Management Objective 4: Ensure deepwater and middle-depth fish stocks and key bycatch fish stocks are managed to an agreed harvest strategy or reference points.

There are no other plans, strategies or statements relevant to orange roughy or ORH 7A.

7 International commitments and context

Challenger Plateau orange roughy is a straddling stock, which means that the biological stock extends across the boundary of New Zealand's exclusive economic zone (EEZ) and onto the High Seas in the area known as Westpac Bank.

The Westpac Bank portion of the stock falls within the jurisdiction of the South Pacific Regional Fisheries Management Organisation (SPRFMO), which has a mandate to manage benthic fisheries, including orange roughy fisheries, within the SPRFMO Convention area (on the High Seas).

New Zealand is a founding member of SPRFMO, and participates actively in decision-making in the SPRFMO Commission (the decision-making body of the organisation). At the seventh meeting of the SPRFMO Commission in 2019, catch limits were set for SPRFMO orange roughy fisheries for the first time. In recognition of the straddling nature of this stock, the SPRFMO Commission agreed to set an orange roughy catch limit for the Westpac Bank Area of 200 tonnes. This was based on the New Zealand assessment of the whole biological stock, and an estimate of 12.5% of the stock being resident in the Westpac Bank Area. The Westpac Bank Area catch limit was allocated between SPRFMO Members active in the fishery, resulting in an allocation of 95% of the catch limit (190 tonnes) to New Zealand and 5% (10 tonnes) to Australia.

Following the update of the ORH 7A + Westpac Bank stock assessment in 2019, there is an expectation that the Westpac Bank Area catch limit will be updated by the SPRFMO Commission in early 2020.

8 Current state of the stock

Orange roughy is a long-lived fish that inhabits depths between 700 and 1500m. It is estimated that orange roughy live up to 120-130 years, and they are thought to begin spawning at around 32-41 years of age.

ORH 7A is currently managed to fluctuate within a management target range of 30-50% B_0 . This target range is based on a management strategy evaluation, which has an objective of maintaining the stock above B_{MSY} (deterministically estimated to be 23% B_0) in the long term, with surveys and assessments at 4-year intervals.

The management target range is primarily implemented through a harvest control rule that recommends an appropriate catch limit which, in the long term, will maintain the stock within the target management range 99% of the time. The harvest control rule is based on 4-yearly adjustments of the TACC, and is designed to provide for higher catch when the stock is assessed to be above the mid-point of the target range, and potentially more significant catch limit reductions when the stock is assessed to be in the lower half of the management target range.

The 2019 stock assessment for ORH7A estimated the stock to be at 47% B_0 , which is above the mid-point of the management target range and above both the soft and hard limits (Figure 2, below).

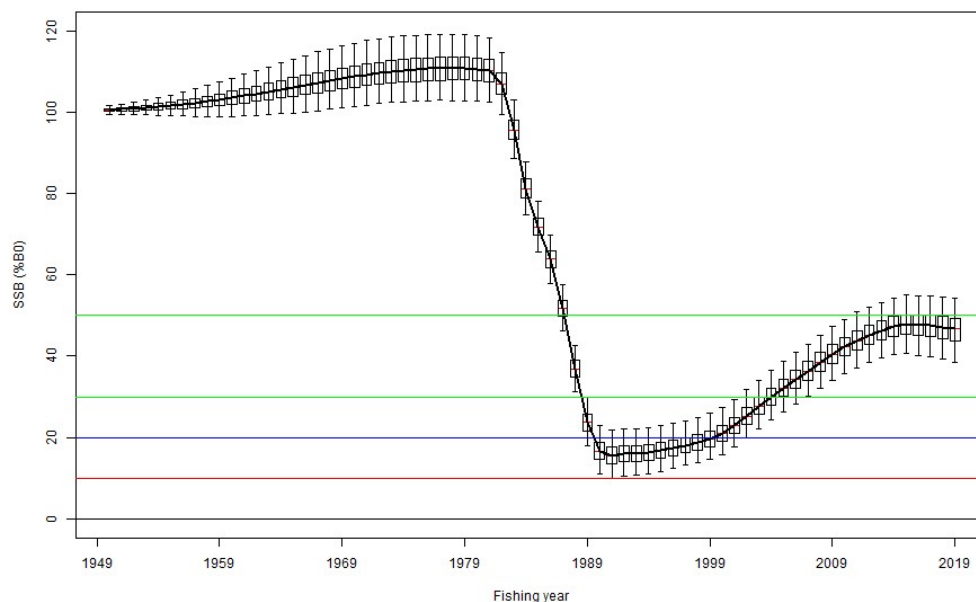


Figure 2: Estimated spawning stock biomass trajectory. The hard limit 10% B_0 (red), soft limit 20% B_0 (blue) and biomass target range 30–50% B_0 (green) are marked by horizontal lines.

A number of sensitivities were run with the model, which indicated that it is robust to a number of assumptions, giving very similar outputs in regards to stock status. The most pessimistic scenario, assuming that our best estimates of natural mortality and stock-recruitment relationship are overly optimistic, estimated stock status to be 37% B_0 .

9 Recent catch levels and trends

The ORH 7A (including Westpac Bank) fishery peaked in the late 1980s, with a maximum estimated annual catch of over 12,000 tonnes. The stock was quickly depleted, and the TAC was significantly reduced in the early 1990s, and set at 1 tonne from 2000, essentially closing the fishery.

Following acoustic surveys in the late 2000s, the fishery was re-opened in 2010 with a TACC of 500 tonnes, then increased to 1,600 tonnes in 2014 based on an updated stock assessment, which estimated stock status to be 42% B_0 .

The TACC has been fully caught nearly every year since 2010.

The spatial distribution of catch has fluctuated over time, and the proportion of the catch taken from Westpac Bank has varied from <1% to 36% in 2017-18.

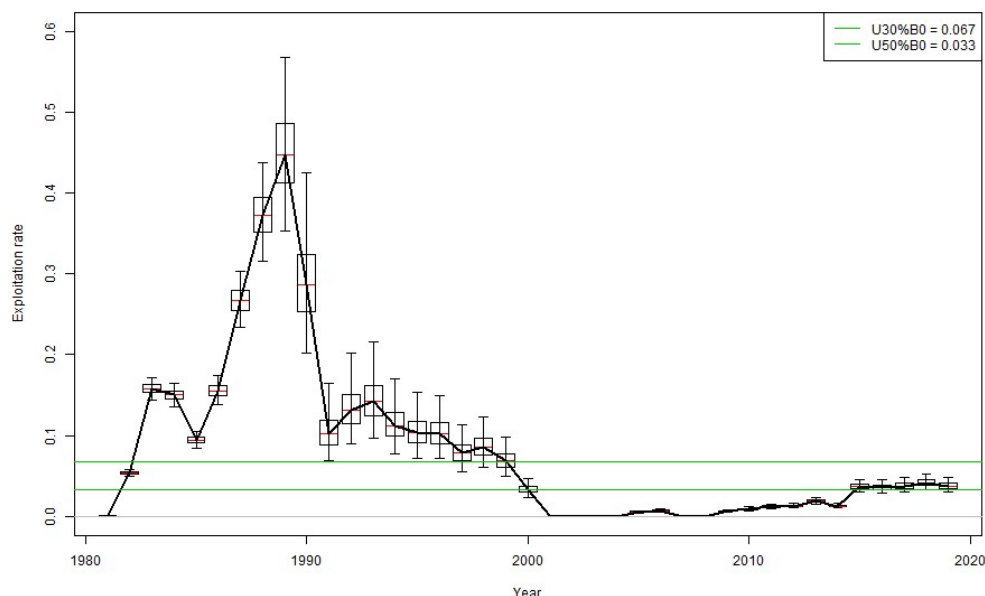


Figure 3: Estimated fishing intensity (exploitation rate) over time. The fishing intensity range associated with the biomass target of 30–50% B_0 ($U30\%B_0$ and $U50\%B_0$) is marked by green horizontal lines.

Estimates of fishing intensity, defined as the proportion of the available biomass caught in a given year, indicate that the stock is currently being fished below or at the lower end of the management target range and has been since 2014/15 (Figure 3). This suggests that a higher proportion of the available biomass could be taken sustainably.

10 Projections of biomass

Projections using the base case model and the most pessimistic sensitivity were run for current catch levels and a range of options based on the application of the harvest control rule. Projections were run for a period of 8 years, with a TAC and TACC adjustment provided for after year 4, based on the estimate of future stock status in 2023. Probabilities of being at or above the lower end of the management target range for the proposed options are shown in Table 1, below.

Table 1: Predicted 2023 and 2027 stock status under current TAC/TACC proposals.

2019/20 TACC (tonnes)	Predicted 2023 % B_0	Assumed 2023-24 TACC (tonnes)	Predicted 2027 % B_0	Probability of being below 30% B_0 in 2027
1600	43%	1600	43%	1%
2060	43%	2060	40%	4%
2200	43%	2037	39%	5%
2433	42%	1940	38%	7%

11 Current TAC, TACC and allowances

Table 2: Current TAC, TACC and allowances

TAC (tonnes)	TACC (tonnes)	Customary Non-Commercial (tonnes)	Recreational (tonnes)	Other Sources of Fishing Mortality (tonnes)
1,680	1,600	0	0	80

New Zealand Westpac Bank Area Catch Limit (set by SPRFMO Commission for 2019 Calendar Year): 190 tonnes (Australia has a 10 tonne catch limit for the Westpac Bank Area set by the SPRFMO Commission).

12 Current controls

New Zealand requires catch taken from the Westpac Bank Area to be counted against ORH 7A ACE, and therefore be accounted for within the ORH 7A TACC. New Zealand fishers may take all of their Annual Catch Entitlement within the New Zealand EEZ, but only 190 tonnes total may be taken from the Westpac Bank Area. This results in no more than the TACC being taken in total, regardless of where the fishing is taken.

To implement the New Zealand catch limit set by SPRFMO for the Westpac Bank Area portion of the stock, the schedule for the SPRFMO Convention Area attached to the High Seas Fishing Permit sets the total catch limit to 190 tonnes.

This is supported by the implementation of a non-regulatory measure administered by Deepwater Group Ltd that manages the available ACE for the Westpac Bank area within the total ACE available for the stock. Under the non-regulatory measure, up to 190 tonnes of ORH 7A ACE will be transferred to a holding account which will comprise the ACE available to be fished out of zone. MPI will monitor catches from the Westpac Bank Area, and may be required to close the Westpac Bank Area once catches are near 190 tonnes, to ensure that the total catch is not exceeded.

13 Environmental interactions

The key environmental interactions with the fishery which must be taken into account are:

Marine mammals

There have been no reported interactions with marine mammals in ORH 7A in the last ten years.

Fish bycatch

In the last five years, orange roughy has made up over 94% of the catch in the ORH 7A fishery. The next most common species caught was spiky oreo, which made up, on average, 1% of the catch.

Orange roughy fisheries also catch some low productivity species (e.g. deepwater sharks). In the ORH 7A fishery, elasmobranchs have made up less than 2% of the catch on average over the last five years.

Seabirds

The seabird risk assessment estimates that deepwater fisheries (including orange roughy) pose low-negligible risk to seabirds. There have been four observed seabird captures in the west coast South Island orange roughy fishery in the last ten years.

All vessels operating in ORH 7A and Westpac Bank fishery have Vessel Management Plans which specify how they will operate to minimise risk to seabirds.

Benthic impacts

Orange roughy is fished using bottom trawl gear, which is known to impact on the benthic environment.

In the New Zealand EEZ, the impacts of fishing on the benthic environment are primarily managed through the closure of over 30% of the EEZ to bottom trawling through Seamount Closures (implemented in 2001), and Benthic Protected Areas (implemented in 2007).

Fisheries New Zealand has a comprehensive programme of research aimed at improving information and understanding of benthic environments to better quantify the nature and extent of the impacts of bottom trawling. In addition, Fisheries New Zealand assesses the bycatch of benthic species, and analyses the trawl footprint annually to monitor the potential impacts of fishing on the benthic environment.

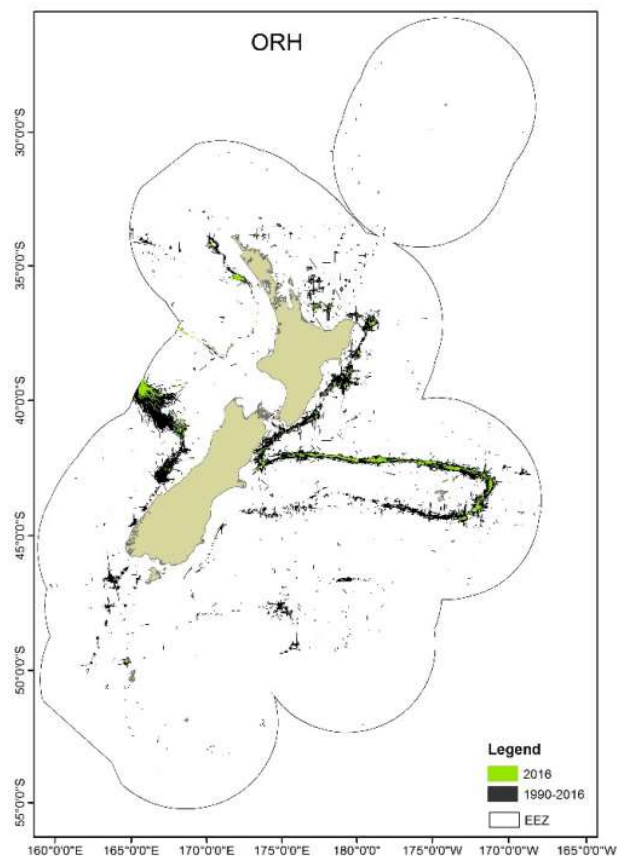


Figure 4: Estimated trawl footprint for orange roughy target fishing from 1990 to 2016 with the 2015-16 fishing year footprint in green

The New Zealand deepwater trawl footprint, measured from 1989/90 to 2015/16, is estimated to cover roughly 8% (335,812 km²) of the EEZ. The orange roughy footprint in ORH 7A is estimated to have contacted 3% (2,551 km²) of the seabed in the ORH 7A QMA, and 0.5% (65 km²) of the Westpac Bank Area between 800-1600m depths from 2008-2017 (Figure 4). Note that the fishery was closed from 2000 to 2010, so this likely an underestimate of total historical contact in these areas. Most fishing occurs within areas that have been fished for a number of years, and it is estimated that there is very little 'new' area trawled each year.

In the Westpac Bank Area, fishing vessels must comply with the SPRFMO Bottom Fishing Conservation and Management Measure which specifies where fishing may take place, and implements an 'encounter protocol', which closes a specified tow path to all fishing if benthic organism bycatch thresholds are reached.

14 Options – Varying the TAC and TACC

The harvest control rule for orange roughy was applied to the outputs of the 2019 stock assessment to guide options for the TAC and TACC. The harvest control rule uses the estimate of current stock status (e.g. 47% B_0) to calculate an exploitation rate to be applied between now and the next assessment.

The harvest control rule recommended a maximum TACC of 2,448 tonnes, noting that a subsequent reduction in the TACC would be required in 2023 to maintain the stock within the management target range.

Assuming that there is no additional data to change the estimate of the proportion of the stock found in the New Zealand EEZ, and that the SPRFMO Commission will increase the Westpac Bank catch limit based on the outputs of this assessment, 0.625% of the total catch limit may be taken by Australian fishing effort. Under the option for the maximum increase in TAC and TACC (Option 4), this is calculated to be roughly 15 tonnes and the proposed TAC and TACC for Option 4 have been reduced by this amount to ensure that the total catch of the stock does not exceed the estimated yield.

Options 1-3 do not include this adjustment as the proposed TAC and TACC settings are below the maximum yield recommended by the harvest control rule. It is expected that an additional 15 tonnes taken in addition to the proposed catch limits will have a negligible impact on stock status. Any catch taken in addition to the New Zealand catch will be included in future stock assessments.

Table 3: Options for varying TAC, TACC and allowances

Option	Total Allowable Catch (tonnes)	Total Allowable Commercial Catch (tonnes)	Allowances		
			Customary Māori (tonnes)	Recreational (tonnes)	All other mortality to the stock caused by fishing (tonnes)
Option 1 (Status quo)	1680	1600	0	0	80
Option 2	2163 ↑ (29%)	2060 ↑ (29%)	0	0	103 ↑ (29%)
Option 3	2310 ↑ (38%)	2200 ↑ (38%)	0	0	110 ↑ (38%)
Option 4	2555 ↑ (52%)	2433 ↑ (52%)	0	0	122 ↑ (52%)

15 Analysis of options for varying the TAC, TACC and allowances

Fisheries New Zealand proposes four options for the TAC and TACC for ORH 7A and Westpac Bank, based on the 2019 stock assessment outputs and guided by the harvest control rule.

All options presented would result in a decline in the stock status, but are projected to have a high probability of maintaining the stock within the management target range over the next 4 years.

Option 1

Retaining the TAC and TACC at their current settings is projected to maintain the stock above the midpoint of the management target range for the next 8 years, estimating the stock will be at 43% in 2027. This would result in an annual average yield over the next 8 years of 1600 tonnes per year.

Option 1 does not make full use of the identified utilisation opportunity; the harvest control rule and projections indicate that additional fish could be taken without the stock status dropping below the bottom of the management target range.

This option would potentially have the least environmental impact, as there would not be any increase in fishing activity, however there remains scope for fishing effort to move within the area.

A decision to maintain the status quo and forego the additional yield available within the EEZ in ORH7A would not limit the ability of the SPRFMO Scientific Committee and Commission to increase the Westpac Bank Area catch limit, to take advantage of the utilisation opportunity indicated by the stock assessment and harvest control rule.

Option 2

Increasing the TAC and TACC to 2163 tonnes and 2060 tonnes respectively is expected to result in a slight decline in stock status, but to maintain it within the management target range for the next 8 years. The stock status is estimated to be 40% B_0 in 2027. This would result in an annual average yield over the next 8 years of 2060 tonnes per year.

Option 2 would represent an increase of 460 tonnes to the TACC, which could represent an additional export value of \$3.5 million per year¹ and an estimated \$21.8 million over the next 8 years.

This option would likely result in a moderate increase in fishing effort in ORH 7A. Given the low fish bycatch rates and low interaction rates of orange roughy fishing with seabirds and marine mammals, Fisheries New Zealand does not expect this option to have any additional impact on seabirds, marine mammals, or other fish species.

The increase in fishing effort under this option is considered unlikely to expand fishing beyond the current footprint, although scope remains for fishing effort to move within the area. Therefore, Fisheries New Zealand considers that this option will not have any material additional impact on the benthic environment.

Option 2 represents the most conservative TAC and TACC increase, and would forego some opportunity for increased utilisation. It maintains the stock at a level similar to other options over the next 4 years, and has a very low risk of reducing the stock below the management target range in 2023.

Option 3

Increasing the TAC and TACC to 2310 tonnes and 2200 tonnes respectively is expected to result in a decline in stock status, but to maintain the stock within the management target range for the next 4 years, and for the next 8 years assuming the TAC and TACC are decreased by around 160 tonnes in 2023. The stock status is estimated to be 43% B_0 in 2023, and 39% B_0 in 2027 if the TAC is decreased. This would result in an annual average yield over the next 8 years of 2119 tonnes per year.

Option 3 would represent an increase in catch of 600 tonnes per year for the next four years, representing an additional \$4.6 million annually in export values. If the TAC is adjusted similar to that predicted by the harvest control rule, the increase in average annual yield over the 8 years of 519 tonnes would represent an estimated \$31.7 million over the next 8 years.

This option would likely result in an increase in fishing effort in ORH 7A. Given the low fish bycatch rates and low interaction rates of orange roughy fishing with seabirds and marine mammals, Fisheries New Zealand does not expect this option to have any additional impact on seabirds, marine mammals, or other fish species.

The increase in fishing effort under this option is considered unlikely to significantly expand fishing beyond the current footprint (although there is scope for fishing effort to move within the area), and

¹ Export value based on price per kg of whole orange roughy exported to China in 2018 of \$7.65 - FOB: "Free on board. The value of export goods, including raw material, processing, packaging, storage and transportation up to the point where the goods are about to leave the country as exports. FOB does not include storage, export transport or insurance cost to get the goods to the export market.

therefore Fisheries New Zealand considers that this option will not have any material additional impact on the benthic environment.

Option 4

Increasing the TAC and TACC to 2555 tonnes and 2433 tonnes respectively is expected to result in a decline in stock status, but to maintain it within the management target range for the next 4 years, and for the next 8 assuming the TAC and TACC are reduced by around 500 tonnes in 2023. The stock status is estimated to be 42% B_0 in 2023, and 38% B_0 in 2027 if the TAC is reduced. This would result in an annual average yield over the next 8 years of 2194 tonnes per year.

Option 4 would represent an increase of 833 tonnes per year for the next four years, representing an additional \$6.5 million in export value per year. If the TAC is reduced similar to that predicted by the harvest control rule, the average annual yield over the 8 years of 594 tonnes would represent a total estimated \$36.3 million over the next 8 years.

This option would very likely result in an increase in fishing effort in ORH 7A. Given the low fish bycatch rates and low interaction rates of orange roughy fishing with seabirds and marine mammals, Fisheries New Zealand does not expect this option to have any material additional impact on seabirds, marine mammals, or other fish species.

This option is the most likely to lead to an expansion of fishing beyond the current footprint; however Fisheries New Zealand considers it is unlikely that this will expand beyond areas previously fished, and therefore this option is unlikely to result in adverse effects on the benthic environment.

This option maximises the utilisation opportunity, but also results in the lowest estimated stock status in 2023 of 42% B_0 and a 1% probability that the stock will decline below the lower bound of the management target range by 2023. The next survey and stock assessment of ORH 7A is scheduled for 2023.

16 Uncertainties and risks

Key uncertainties in the model include the assumptions regarding the proportion of the stock that is indexed by the acoustic and trawl surveys, uncertainties associated with possible contamination of acoustic estimates by other fish species, catch histories, and orange roughy biology and behaviour.

SPRFMO decisions regarding catch limits for the Westpac Bank Area relative to the stock status and ORH7A TAC / TACCs set are made outside of New Zealand's management setting processes.

17 Questions for submitters on options for varying TACs, TACCs and allowances

- Which option do you support for revising the TACs, TACCs and allowances? Why?
- If you do not support any of the options listed, what alternative should be considered? Why?

Please provide detailed, verifiable information and rationale to support your views.

18 Deemed values

The purpose of deemed values is to provide incentives for commercial fishers to match their catch with their Annual Catch Entitlement within each fishing year for each QMS stock. The current deemed value rates for ORH 7A are consistent with the deemed value guidelines. No changes are proposed.

19 Referenced reports

Management Strategy Evaluation: <http://deepwatergroup.org/wp-content/uploads/2014/08/Cordue-2014-A-Management-Strategy-Evaluation-for-Orange-Roughy.-ISL-Re....pdf>

National Deepwater Fisheries Plan: <https://www.mpi.govt.nz/growing-and-harvesting/fisheries/fisheries-management/deepwater-fisheries/>

June 2019 Fisheries Assessment Plenary: <https://www.fisheries.govt.nz/news-and-resources/science-and-research/fisheries-research/>.

20 How to get more information and have your say

Fisheries New Zealand invites you to make a submission on the proposals set out in this discussion document. We must receive your submission by 5pm on 26 July 2019. Please see the Fisheries New Zealand sustainability consultation webpage (<https://www.fisheries.govt.nz/news-and-resources/consultations/review-of-sustainability-measures-for-1-october-2019>) for related information, a helpful submissions template, and information on how to submit your feedback. If you cannot access the webpage or require hard copies of documents or any other information, please email FMSubmissions@mpi.govt.nz.