



**Fisheries New Zealand**

Tini a Tangaroa

# Review of Sustainability Measures for Hake (HAK 7) for 2019/20

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# Contents

Page

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<b>1</b>	<b>Stock being reviewed</b>	<b>1</b>
<b>2</b>	<b>Summary</b>	<b>1</b>
<b>3</b>	<b>Quota Management System</b>	<b>2</b>
<b>4</b>	<b>Legal basis for managing fisheries in New Zealand</b>	<b>2</b>
<b>5</b>	<b>Treaty of Waitangi Obligations</b>	<b>2</b>
5.1	Input and participation of tangata whenua	2
5.2	Kaitiakitanga	2
<b>6</b>	<b>Relevant plans, strategies, statements and context</b>	<b>2</b>
<b>7</b>	<b>Current state of the stock</b>	<b>3</b>
<b>8</b>	<b>Recent catch levels and trends</b>	<b>4</b>
8.1	Target vs bycatch	4
8.2	Catch by sectors of the deepwater trawl fleet	5
8.3	Catch by depth	5
<b>9</b>	<b>Projections of biomass</b>	<b>5</b>
<b>10</b>	<b>Current TAC and allowances</b>	<b>7</b>
<b>11</b>	<b>Options – Varying the TAC and TACC</b>	<b>7</b>
<b>12</b>	<b>Environmental interactions</b>	<b>7</b>
<b>13</b>	<b>Analysis of options for varying the TAC, TACC and allowances</b>	<b>8</b>
	Option 1 (TAC = 3,200 tonnes)	8
	Option 2 (TAC = 2,300 tonnes)	9
	Option 3 (TAC = 1,400 tonnes)	9
<b>14</b>	<b>Uncertainties and risks</b>	<b>10</b>
<b>15</b>	<b>Questions for submitters on options for varying TACs, TACCs and allowances</b>	<b>10</b>
<b>16</b>	<b>Deemed values</b>	<b>10</b>
<b>17</b>	<b>Referenced reports</b>	<b>10</b>
<b>18</b>	<b>How to get more information and have your say</b>	<b>10</b>



# 1 Stock being reviewed

Hake (HAK 7)

(*Merluccius australis*; kehe, tiikati)

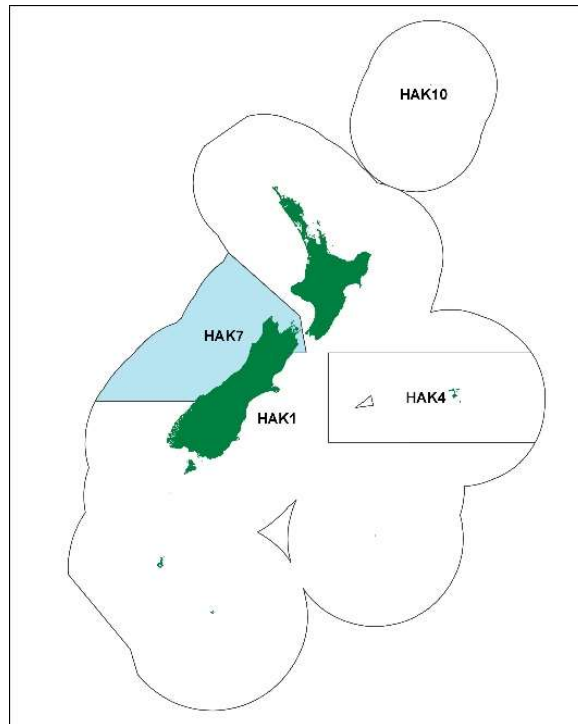


Figure 1: Quota Management Area (QMA) for HAK 7

## 2 Summary

The base case model for the 2019 stock assessment indicates the biomass of this stock is 17%  $B_0$ . This is below the soft limit of 20%  $B_0$ . The Harvest Strategy Standard (HSS) recommends that stocks that have fallen below the soft limit should be rebuilt back to at least the target level via a formal, time-constrained, rebuilding plan.

Three options are proposed to initiate the rebuilding plan:

1. Reducing the TAC by 1,864 tonnes, from 5,064 to 3,200 tonnes
2. Reducing the TAC by 2,764 tonnes, from 5,064 to 2,300 tonnes
3. Reducing the TAC by 3,664 tonnes, from 5,064 to 1,400 tonnes.

Each option is consistent with the objective of the stock status being at the target level (40%  $B_0$ ) within HSS timeframes.

The next stock assessment for HAK 7 is scheduled for the 2021/22 financial year, and the next West Coast South Island trawl survey is scheduled for winter 2021. The stock assessment will incorporate additional data from the fishery as well as trawl survey results.

### 3 Quota Management System

HAK 7 is managed under the Quota Management System (QMS), with an October fishing year. 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.

Input and participation with relevant iwi on the proposals for HAK 7 will be provided for during the period of consultation on these proposals.

#### 5.2 Kaitiakitanga

Hake (kehe, tiikati) is listed as a taonga species in the Te Waipounamu (all of South Island) Iwi Fisheries Plan. The 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 two objectives that are relevant to the management options proposed for HAK 7:

**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.

### 6 Relevant plans, strategies, statements and context

All hake stocks are managed as Tier 1 species within the National Fisheries Plan for Deepwater and Middle-depth Fisheries 2019 – Part 1A (National Deepwater Plan). Tier 1 species are high volume and/or high value fisheries, and are typically targeted.

The National Deepwater Plan sets out a series of Management Objectives for deepwater fisheries, the most relevant to HAK 7 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 hake in HAK 7.

## 7 Current state of the stock

Hake is a moderately productive species found throughout New Zealand waters, but is more common around the South Island. It is most common at depths of between 300 and 800 metres. Hake reach a maximum age of at least 25 years, with females growing to around 120cm in length and males to 100cm.

The HAK 7 QMA includes the West Coast South Island biological stock and a small portion of the Chatham Rise biological stock (in Cook Strait).

There are regular stock assessments to ensure the HAK 7 stock is managed within the default reference points that are set out in the Harvest Strategy Standard (

Table 1).

**Table 1: Hake default reference points, and the associated management response**

Reference point	Management response
Management target 40% unfished biomass ( $B_0$ )	Stock permitted to fluctuate around this management target. TAC/TACC changes will be employed to keep the stock around the target (with a 50% probability of being at the target)
Soft limit of 20% $B_0$	A formal time constrained rebuilding plan will be implemented if this limit is reached
Hard limit of 10% $B_0$	The limit below which fisheries will be considered for closure
Rebuild strategy	$2 * T_{min}$ ( $T_{min}$ is the number of years to rebuild a stock to the target, in the absence of fishing)

The HAK 7 stock was assessed in 2019. The Fisheries New Zealand Deepwater Fisheries Assessment working group considered catch per unit effort (CPUE) to be a less reliable index of abundance than the fishery-independent trawl survey series. The base model used in the assessment uses catch and catch at age composition data from the commercial trawl fishery, research trawl survey biomass index and age composition data, and biological parameters available in the scientific literature.

A base model and four sensitivities were developed. The base model outputs reflect a declining trend in the trawl survey series, and estimates the stock status to be 17%  $B_0$  for 2018/19.

When a stock is below the soft limit (20%  $B_0$ ), the HSS requires development of a formal, time-constrained rebuilding plan. The stock should be rebuilt to at least the target level of biomass within a timeframe of between  $T_{min}$ , and  $2 * T_{min}$  with an acceptable level of probability.  $T_{min}$  is defined as the number of years required to rebuild a stock to the target, in the absence of fishing. For the HAK 7 stock,  $T_{min}$  has been estimated using the base case stock assessment model under two recruitment assumptions. The first used recruitment from 2006-2015, which is below average, and the second used a longer 1973-2015 series (Table 2 below).

**Table 2: Outputs from stock assessment model for rebuild time periods**

Recruitment assumption	Rebuild time period	
	$T_{min}$	$2 * T_{min}$
Below average recruitment	8 years	16 years
Average recruitment	5 years	10 years

## 8 Recent catch levels and trends

Hake is an important component of the West Coast South Island middle depth trawl fishery. It is most commonly taken as a target species or as bycatch in the hoki fishery. Although there is a reasonable overlap between the depth distributions of hake and hoki, on average, hake tends to be taken slightly deeper than hoki. Most hake is caught at depths between 500-650m, whereas hoki tends to be taken between 400-500m.

### 8.1 Target vs bycatch

During the last five completed fishing years, the proportion taken as target or bycatch has varied significantly, as has the total quantity of HAK 7 taken. Figure 2 shows that catch has been below the TACC during each of the last five years. It also shows that only a small proportion of hake taken during 2017/18 was taken as a target species.

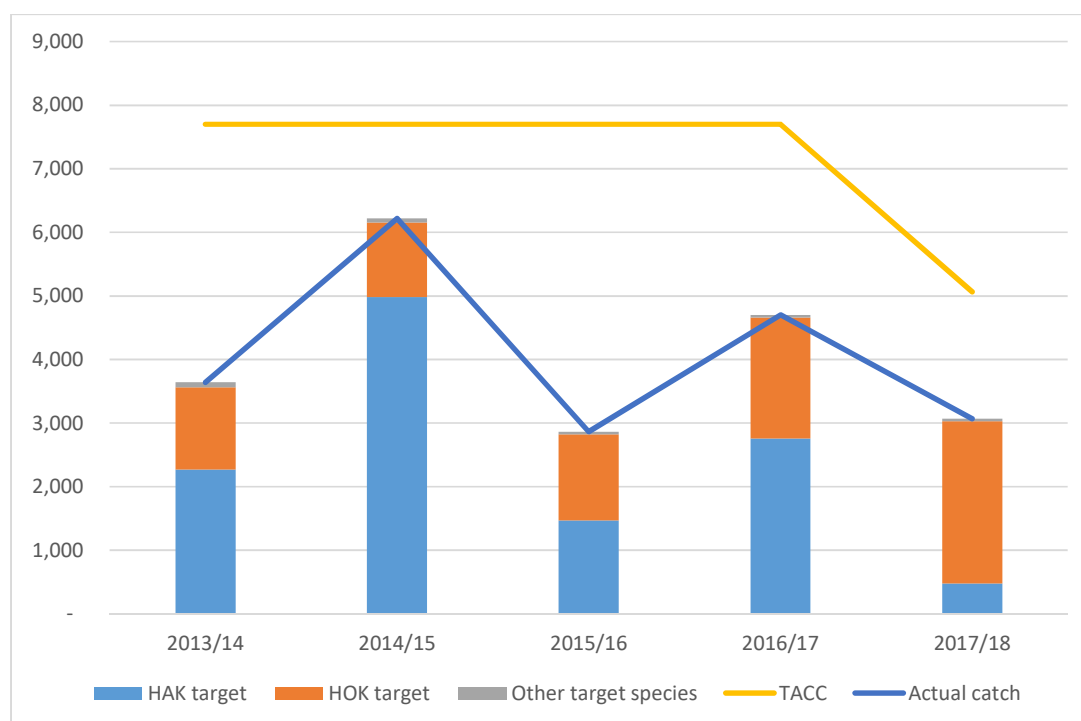


Figure 2: Actual catch<sup>1</sup>, target by species, and TACC in HAK 7 for the last five years (all figures in tonnes).

As noted earlier, a significant proportion of hake is taken as bycatch in the West Coast South Island hoki fishery. Analysis of catch information from the last five years indicates that between 2013/14 and 2015/16, the amount of HAK 7 taken as bycatch was approximately the same as the TACC proposed under Option 3. In the last two years, the amount of hake taken as bycatch increased, despite the decrease in hoki catch.

One possible explanation for this is that as CPUE in the West Coast South Island hoki fishery has declined during these two years, tows have been longer and fishers have spent a higher proportion of time fishing in deeper water trying to catch hoki or trying to catch more hake to boost overall catch.

<sup>1</sup> From Monthly Harvest Returns



## 8.2 Catch by sectors of the deepwater trawl fleet

Analysis of HAK 7 catch over the last five years indicates that the foreign-owned bottom trawl (FOV) fleet is generally responsible for the most hake catch (60% of total catch during the five years from 2013/14 to 2017/18).

The FOV fleet numbered four vessels during 2017/18, and six vessels in the four years prior to that.

## 8.3 Catch by depth

As noted above, most hake is caught at depths between 500–650m, whereas hoki tends to be taken between 400–500m. The FOV fleet targets both hoki and hake during the winter fishery, and tends to target hoki over a greater range of depths than other vessels.

Collectively, the information available indicates that fishers have some control over how much hake they catch in HAK 7 by adjusting the depth at which they fish.

## 9 Projections of biomass

Projections using the 2019 stock assessment were undertaken to determine the catch levels that would rebuild the stock to the target level, within the timeframe required under the HSS (refer to Options in section 11 for an analysis of the rebuilding options).

Projections used two recruitment assumptions; one that is below average, and one that is average. The outputs are presented below, and show the time taken to rebuild to the target level of 40%  $B_0$  with a 50% probability under a range of catch scenarios.

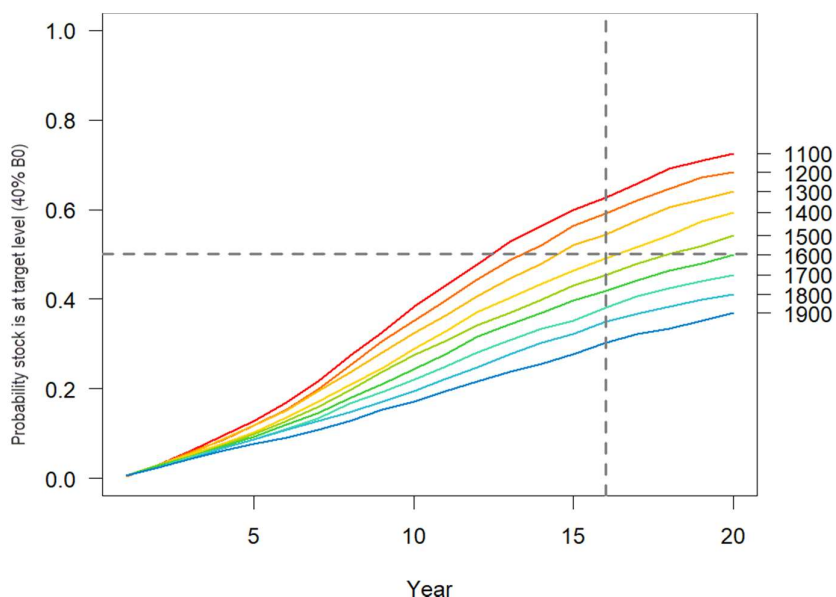
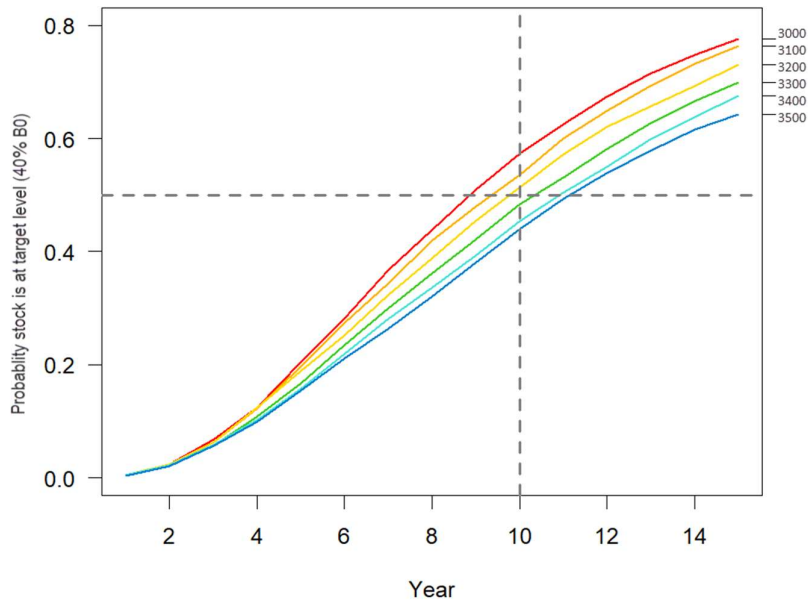


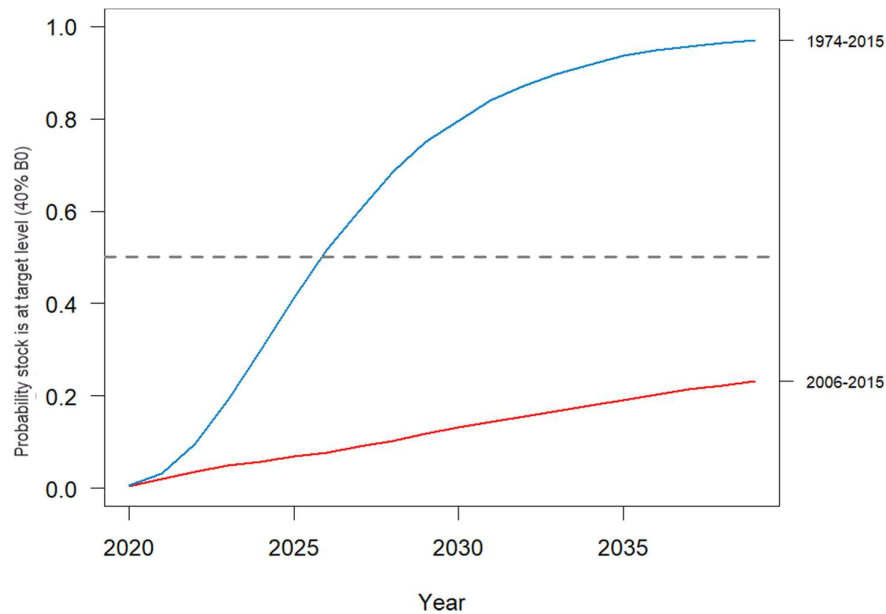
Figure 3: Rebuilding timeframe under future catch ranges from 1,100 to 1,900 tonnes per annum, using the below average recruitment assumption. The vertical grey line indicates  $2^* T_{min}$  (16 years), while the horizontal grey line represents 50% probability of the stock being at the target level (40%  $B_0$ ).



**Figure 4: Rebuilding timeframe under future catch ranges from 3,000 to 3,500 tonnes per annum, using the average recruitment assumption. The vertical grey line indicates  $2 \times T_{min}$  (10 years), while the horizontal grey line represents 50% probability of the stock being at the target level ( $40\% B_0$ ).**

To inform the options in this paper, additional projections were run under a future catch scenario of 2,300 tonnes per annum. This represents the midpoint between the catch levels that would achieve the rebuild under the below average recruitment assumption (3,200 tonnes) and average recruitment assumption (1,400 tonnes) respectively. Both recruitment assumptions were used and the outputs are presented below.

The rationale for this additional projection was to test rebuild timeframes for a TAC midway between the two options.



**Figure 5: Rebuilding timeframe under future catch of 2,300 tonnes per annum for below average recruitment assumption (red line) and average recruitment assumption (blue line). The horizontal grey line represents 50% probability of the stock being at the target level ( $40\% B_0$ ).**

## 10 Current TAC and allowances

Catch limits for HAK 7 were reviewed for the 2017/18 fishing year.

Table 3: TAC, TACC and allowances for HAK 7 (tonnes)

Total Allowable Catch	Total Allowable Commercial Catch	Allowances		
		Customary Māori	Recreational	All other mortality to the stock caused by fishing
5,120	5,064	5	0	51

## 11 Options – Varying the TAC and TACC

The projections presented in Figures 3-5 indicate the range of future catch scenarios that would result in the HAK 7 stock reaching the target level (40%  $B_0$ ) within the timeframe required under the HSS, using each of the two recruitment assumptions.

Under the average recruitment assumption, projections indicate the stock would reach the target level within the 10 year timeframe under a future catch scenario of 3,200 tonnes per annum (Option 1).

Under the below average recruitment assumption, projections indicate that the stock would reach the target level within the 16 year timeframe under a future catch scenario of around 1,400 tonnes per annum (Option 3).

Fisheries New Zealand also proposes a middle option of a 2,300 tonne TAC (Option 2) that reflects a compromise between the two recruitment assumptions used for projections. The proposed options for HAK 7, with the percentage change relative to the current settings in brackets, are shown in Table 4.

All three options propose to maintain current allowances for customary Māori and recreational allowances; these would remain at five tonnes and zero tonnes respectively. Fisheries New Zealand proposes to continue setting the allowance for other sources of fishing-related mortality at 1% of the TACC.

Table 4: Proposed TACs, TACCs and allowance for other sources of fishing related mortality (in tonnes) for HAK 7 from 1 October 2019

Option	TAC (t)	TACC (t)	Other sources of fishing-related mortality (t)	Rebuild time (below average recruitment assumption)	Rebuild time (average recruitment assumption)
Current Setting	5,120	5,064	51	N/a <sup>^</sup>	N/a
Option 1	3,200 ↓ (38%)	3,163 ↓ (38%)	32 ↓ (37%)	N/a	10 years
Option 2	2,300 ↓ (55%)	2,272 ↓ (55%)	23 ↓ (55%)	N/a	7 years
Option 3	1,400 ↓ (73%)	1,382 ↓ (73%)	14 ↓ (73%)	16 years	5-7 years

<sup>^</sup> In this context, N/a means that the rebuild will not be achieved, or not achieved within a timeframe consistent with the HSS

## 12 Environmental interactions

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

### Marine mammals

Fur seals have a low rate of capture in hake target tows; observers have reported 14 captures during the last five fishing years with 70% of tows observed.

## **Fish bycatch**

Observer data from the last five years indicates that when hake is targeted, hake and hoki together comprise over 80% of the catch. Non-target catch in the fishery will continue to be monitored.

## **Seabirds**

Seabirds are taken in hake target tows at a very low rate; observers have reported three seabirds caught during the last five fishing years with 70% of tows observed.

The 2019 seabird risk assessment indicates that hake trawl fisheries nationwide contribute approximately 1% of the risk to white-capped albatross.

## **Benthic impacts**

The likely reduction in effort of the HAK 7 target fishery will result in a reduced trawl footprint for this fishery. The trawl footprint of this fishery (and that of the hoki fishery where most hake is likely to be taken as bycatch) will continue to be mapped annually.

## **Habitats of significance**

Within the area of the HAK 7 fishery, there is no known habitat of significance to fisheries management.

# **13 Analysis of options for varying the TAC, TACC and allowances**

## **Option 1 (TAC = 3,200 tonnes)**

This option is based on projected rebuild time of 10 years using the average recruitment assumption.

Fisheries New Zealand estimates the short term potential annual loss in economic value would be \$1.3m. This is based on:

- the most common state of fish landed during 2017/18 (headed, gutted and tailed)
- the average FOB unit value of hake exported as frozen headed and gutted during 2018 (\$5.55 per kg<sup>2</sup>)
- a baseline of the average HAK 7 catch during the last three completed fishing years (3,545 tonnes).

The short-term economic loss should be considered in the context of the value of a fully rebuilt fishery and the potential benefits from a more rapid rebuild.

A TACC of 3,163 tonnes is unlikely to affect fishers' ability to catch their hoki ACE, and may provide for some limited hake target fishing.

The reduction in effort in the HAK 7 target fishery resulting from the lower TACC is likely to reduce the environmental impacts of this fishery.

The 'average' recruitment assumption is that future recruitment to the fishery will be higher than that of recent years. If this assumption is wrong, the option would carry the highest risk of the fishery not rebuilding to the target within the calculated rebuild time.

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<sup>2</sup> 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.

## **Option 2 (TAC = 2,300 tonnes)**

This option proposes a TAC between those proposed in options 1 and 3. Although the primary rationale for this option was to test rebuild timeframes, it also provides a means to acknowledge additional information that was unable to be used in any of the projections. Both the 2018 West Coast South Island trawl survey and the 2017 inshore trawl survey indicate that the 2016 year class strength was above average. This data was not included in any of the projections, as fish from this year class have not yet recruited to the fishery. A strong 2016 year class may mean the 'below average' recruitment assumption, which is the basis of Option 3, represents a pessimistic view of recruitment in the short term.

Using the same economic information as that used for Option 1, the annual loss in economic value under Option 2 would be \$4.4m. The short-term economic loss should be considered in the context of the value of a fully rebuilt fishery and the potential benefits from a more rapid rebuild.

Based on catch information from the last five years, at a TACC of 2,272 tonnes, fishers may not be able to catch their hoki ACE without exceeding their HAK 7 ACE. If this were to eventuate, Option 2 would provide for little or no hake target fishing and potentially impact on the hoki fishery by constraining it. Note that there is also a discussion paper for hoki in this sustainability round, which has specific focus on the western hoki stock.

A much reduced HAK 7 target fishery would further reduce the environmental impacts of this fishery.

## **Option 3 (TAC = 1,400 tonnes)**

Option 3 is based on the projected rebuild time of 16 years using the 'below average' recruitment assumption; that recruitment to the fishery would continue at the level estimated for recent years, which is below the long-term average.

Using the same economic information as that used for Option 1, the potential annual loss in economic value under Option 3 would be \$7.5m. The short-term economic loss should be considered in the context of the value of a fully rebuilt fishery and the potential benefits from a more rapid rebuild.

Based on catch information from the last two years, at a TACC of 1,382 tonnes fishers may not be able to catch their hoki ACE without exceeding their HAK 7 ACE. It would also likely preclude any hake target fishing. Again, however, this analysis does not consider any future reduction in hoki effort resulting from a reduced catch limit in that fishery.

The effective lack of a HAK 7 target fishery in the short-term would mean that this fishery would have negligible environmental impacts.

This option carries the least risk of the fishery not rebuilding to the target within the calculated rebuild time. However, it does not consider the information on the 2016 year class referred to earlier. This information indicates that the strength of this year class is above average, which would result in a faster rebuild than under the below average recruitment assumption.

This option would have the greatest impact on operators of the four foreign-owned bottom trawl vessels. These vessels undertake almost all hake target fishing in HAK 7, with hake historically being an important component of their fishing plan during the winter fishery on the west coast of the South Island. The loss in economic value would be felt in large part by operators of these four vessels.

## 14 Uncertainties and risks

The Deepwater Fisheries Working Group noted that the major sources of uncertainty in the stock assessment included:

- uncertainty regarding the assumption of a single West Coast South Island stock independent of hake in all other areas
- uncertainty about the size of recent year classes affects the reliability of stock projections
- the spatial and temporal representativeness of the trawl survey of the hake stock on the West Coast South Island is not known
- an assumption in the assessment models that natural mortality is constant over all ages and years.

## 15 Questions for submitters on options for varying TACs, TACCs and allowances

- Which option for varying TAC and TACC do you support, and why?

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

## 16 Deemed values

Fisheries New Zealand is not proposing to make any changes to the deemed value rates for HAK 7.

## 17 Referenced reports

Hake Fisheries Assessment Report 2017/47: <https://www.mpi.govt.nz/dmsdocument/19895-far-201747-hake-stock-assessment-hak4-and-7>

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

## 18 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](mailto:FMSubmissions@mpi.govt.nz).