Ministry for Primary Industries
Manatū Ahu Matua

Review of Management Controls for Hoki 1 (HOK 1) in 2014

MPI Discussion Paper No: 2014/18

Prepared by the Ministry for Primary Industries

ISBN No: 978-0-478-43232-9 (online)
ISSN No: 2253-3907 (online)

May 2014

New Zealand Government

Growing and Protecting New Zealand

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Contents

Page

INTRODUCTION

1 This Discussion Paper provides the Ministry for Primary Industries' (MPI's) initial proposals relating to catch limits and allowances for HOK 1. Any changes to the current management settings would apply from 1 October 2014.

2 MPI has developed this paper for the purpose of consultation as required under the Fisheries Act 1996 (the Act). The proposals outlined in the paper are preliminary and are provided as the basis for consultation with stakeholders.

3 In July 2014, MPI intends to provide a Final Advice Paper (FAP) to the Minister for Primary Industries. The FAP will summarise MPI's position and make recommendations to the Minister that incorporate the views of stakeholders resulting from the consultation. A copy of the FAP and the Minister's letter setting out his final decisions will be posted on the MPI website as soon as these become available.

DEADLINE FOR SUBMISSIONS

4 MPI welcomes written submissions on the proposals contained in the Discussion Paper. All written submissions must be received by MPI no later than 5pm on **Wednesday, 25 June 2014**.

Written submissions should be sent directly to:

Deepwater Fisheries Management
Ministry for Primary Industries
P O Box 2526
Wellington 6011

or emailed to fmsubmissions@mpi.govt.nz

Official Information Act 1982

5 All submissions are subject to the Official Information Act and can be released (along with the personal details of the submitter) under the Act. If you have specific reasons for wanting to have your submission or personal details withheld, please set out your reasons in the submission. MPI will consider those reasons when making any assessment for the release of submissions if requested under the Official Information Act.

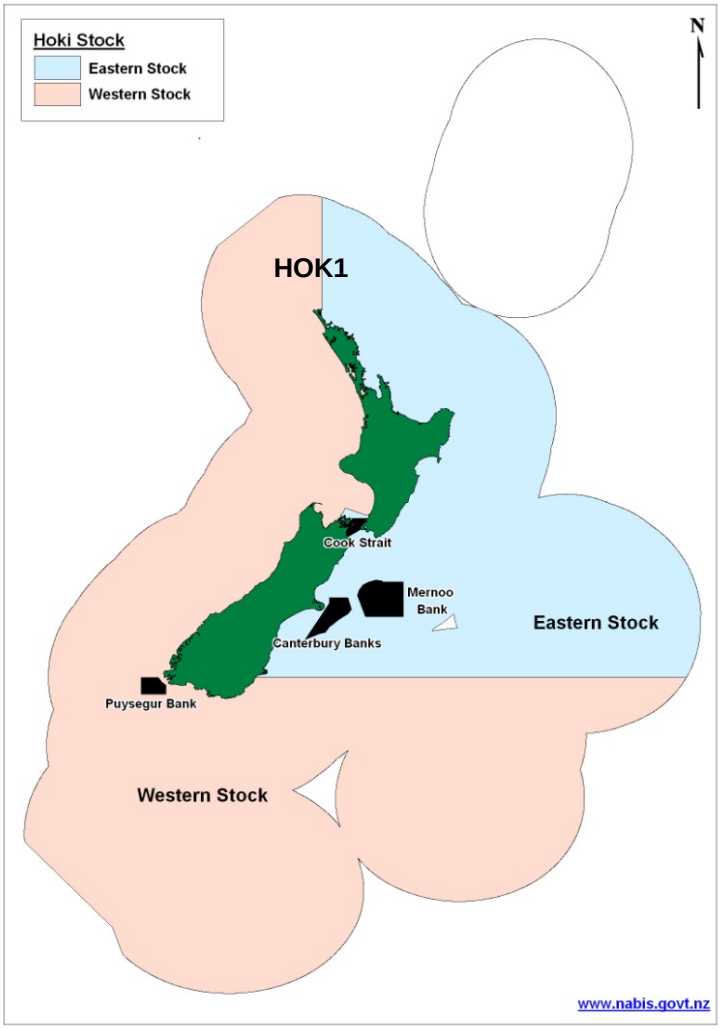

Figure 1: Map of the HOK1 quota management area detailing the boundaries between the eastern and western biological stocks and the hoki management areas (HMAs) in black

EXECUTIVE SUMMARY

6 The Ministry for Primary Industries (MPI) is seeking tangata whenua and stakeholder input to inform a review of the catch limits and other management controls for New Zealand hoki (HOK 1).

7 New Zealand hoki is managed under section 13 of the Fisheries Act 1996 (the Act) as two separate biological sub-stocks within one quota management area (QMA) – HOK 1 (Figure 1). A single total allowable catch (TAC) and total allowable commercial catch (TACC) is set for HOK 1, which is then divided between the two sub-stocks[1] through a non-regulatory catch split arrangement.

8 The 2014 hoki stock assessment estimates the stock status of both the eastern and western stocks to be above the biomass that will produce the maximum sustainable yield (B_{MSY}) and above the hoki management target range.[2]

[1] For the remainder of the Discussion Paper, the term 'stock' will refer to either eastern or western sub-stocks.
[2] Deterministic B_{MSY} for hoki is estimated to be 24-26% of the unfished hoki biomass (B_0), and the management target has been set at 35-50% B_0.

9 Five year projections, using the 2014 stock assessment model show that both stocks are likely to remain above B_{MSY} and within or above the management target range at increased catch levels. This suggests that a higher catch limit could be sustainable.

10 In response, MPI proposes the following options for the 2014-15 fishing year (Table 1).

Table 1: Proposed TACs, TACCs and allowances for HOK1 in 2014-15

Option	TAC	TACC	Non-regulatory catch split arrangement		Allowances (tonnes)		
			Eastern stock limit	Western stock limit	Customary **Māori**	Recreational	Other sources of fishing related mortality
Option 1 (status quo)	151,540	150,000	60,000	90,000	20	20	1,500
Option 2	161,640	160,000	65,000	95,000	20	20	1,600
Option 3	171,740	170,000	70,000	100,000	20	20	1,700

11 MPI is confident that the options proposed are consistent with the purpose of the Act. All options will ensure the stock remains above B_{MSY} and within or above the management target range while also providing an appropriate utilisation opportunity for the fishing industry.

CONTEXT

12 The 2014 hoki stock assessment estimated the current status of the western hoki stock to be 59% B_0 and the eastern stock 60% B_0 (Table 2). Both stocks are currently above B_{MSY} and are above the upper bound of the hoki management target range of 35-50% B_0.

13 A stock status estimate above the upper bound of the management target range indicates that a utilisation opportunity is available. Hoki quota holders have indicated during initial consultation that there is interest in increasing the HOK 1 TACC for the 2014-15 fishing year.

14 MPI has investigated the likely impacts of a range of different catch levels on the status of both stocks. This paper presents these details and seeks stakeholder and tangata whenua input on MPI's proposed management response.

Biological Characteristics of Hoki

15 Hoki is a relatively fast growing productive species that is widely distributed throughout New Zealand waters at depths of 300 to 800 m. Hoki are thought to mature between the ages of two and four and to reach a maximum age of 20 to 25 years old.

16 Two biological stocks of hoki exist within New Zealand's Exclusive Economic Zone (EEZ), referred to as the "eastern" and "western" stocks (Figure 1). The un-fished biomass

(B_0) of the western stock is estimated to have been significantly larger than the eastern stock.[3]

17 For the majority of the year, fish from both stocks are found on their feeding grounds: the Chatham Rise for the eastern stock and the sub-Antarctic for the western stock. Juvenile fish from both stocks mix on the Chatham Rise and are thought to migrate to the eastern or western stock feeding grounds before recruiting to the spawning grounds.

18 Mature hoki from both stocks migrate to spawn between late June and early September. The west coast of the South Island (WCSI) is the main spawning ground for the western stock, as is the Cook Strait for the eastern stock. Smaller spawning events occur on the east coast of the South Island (eastern stock) and at Puysegur Bank (western stock).

The Hoki Fisheries

19 New Zealand's hoki fisheries have been managed within the quota management system (QMS) since 1986. Both stocks are managed within a single QMA, HOK 1, which covers fishery management areas (FMAs) 1-9 (Figure 1). The TAC for HOK 1 is set under section 13(2) of the Act.

20 To manage fishing effort across the two stocks, the HOK 1 TAC is set by the Minister for Primary Industries (the Minister)[4] and is then divided between the stocks each year via a non-regulatory catch split arrangement that has been agreed between MPI and quota holders. Each catch limit is varied in response to the current estimate of stock status and projected impacts of catch levels on each stock. This was first implemented by industry in 2001 and is now formally administered through FishServe[5] and endorsed by the Minister.

21 The hoki stocks are predominantly fished across four main fishing grounds. Less than 1% of the total catch in 2012-13 was caught outside these four areas:

a) The Cook Strait fishery: the fishery operates at a low level year-round, with a peak in late-June to September. Approximately 15% of the HOK 1 catch was caught here in 2012-13.

b) The WCSI fishery: the fishery on the WCSI operates from June-August, approximately 43% of the HOK 1 catch was caught here during 2012-13.

c) The Chatham Rise fishery: the fishery on the Chatham Rise operates year round and during 2012-13 harvested approximately 30% of the total catch.

d) The sub-Antarctic fishery: this fishery also operates year round and during 2012-13 harvested approximately 11% of the total catch.

[3] Median estimates of B_0 for the western stock = 938,000 tonnes; and for the eastern stock = 542,000 tonnes. These median estimates are taken from the final model run in the 2014 hoki stock assessment.
[4] The Minister for Primary Industries now exercises the powers and responsibilities of the Minister of Fisheries under the Fisheries Act 1996.
[5] FishServe is a wholly-owned subsidiary of Seafood New Zealand and is responsible for the administration of catch reporting requirements.

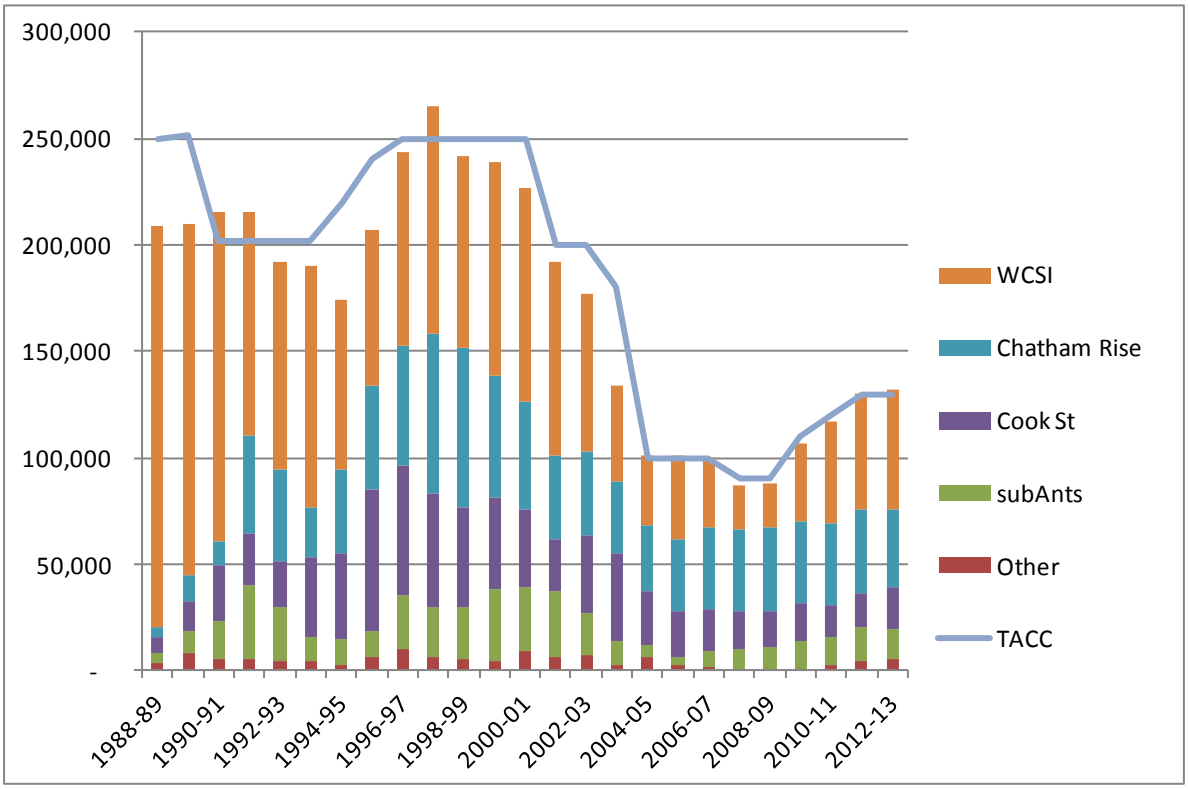

Figure 2: Estimated catch reported from the main hoki fishing grounds, and the HOK 1 TACC (t) from 1988-89 to 2012-13

22 To protect juvenile hoki, the industry has closed four areas to target hoki fishing where juvenile hoki are known to be most abundant. These hoki management areas (HMAs, Figure 1) aim to ensure that the mortality of juvenile fish does not adversely affect later recruitment to the spawning stock.

Recreational and Māori Customary Interests

23 Recreational and customary fishers do not generally target hoki, as it is predominantly available offshore in deep water. Recent data on the level of customary and recreational hoki catch is negligible, although references of customary catches in the past do exist. Hoki has been identified as a taonga species, however there are no specific references to hoki in Forum Fisheries Plans. It is also likely that a small amount of hoki is caught by recreational fishers while targeting other species.

24 A small allowance of 20 tonnes each for both the recreational and customary fishers is provided for within the current HOK 1 TAC. MPI considers that these allowances should be retained under all proposed options.

Other Sources of Fishing Related Mortality

25 MPI proposes to retain the current allowance for other sources of fishing-related mortality, set at 1% of the TACC. This nominal allowance accounts for unreported hoki mortality, such as loss due to burst nets, or discarding of damaged hoki.

Previous Review

26 The hoki stocks are assessed every year, providing updated estimates of the stock status. Management settings were previously reviewed prior to 1 October 2013, when the TAC was increased from 131,340 tonnes to 151,540 tonnes for the 2013-14 fishing year. Prior to that the TAC was increased from 121,240 tonnes to 131,340 tonnes for the 2011-12 fishing year. The recent TAC reviews have generally taken a conservative approach to utilising the available biomass with the objective of maintaining the stock within the target range.

27 As a result, both stocks are currently at or above the upper bound of the management target range.

Hoki Stock Assessment

28 In 2014, the Deepwater Fisheries Assessment Working Group agreed that the 2014 hoki stock assessment was of high quality and met New Zealand's Science and Research Information Standard.[6] The model was also subjected to a fully independent peer review by a panel of internationally recognised reviewers in February 2014. The review panel suggested a number of potential technical improvements but raised no issues of major concern. MPI is confident that the results from the assessment can therefore be accorded a high weight in fisheries management decisions.

29 A comprehensive range of data inputs are used to assess the status of the hoki stocks. Proportion at age data from the commercial fishery and research surveys are combined with estimates of biological parameters and five indices of hoki abundance. Each abundance index is derived from a time series of research surveys across the four key hoki fishing grounds.

30 Three of these indices included a new data point in 2014 from surveys completed during the 2013-14 financial year on the Chatham Rise, in Cook Strait and on the WCSI. Indices from the Chatham Rise trawl survey and the WCSI acoustic survey both showed small decreases, while the Cook Strait index showed an increase in hoki biomass since the last survey in each time series.

31 The Chatham Rise survey, originally scheduled for January 2015, was brought forward by one year to provide a further observation of the 2011 year class. This year class was estimated in January 2013 to be the largest year class of 1-year old fish on record. The results from this survey indicate that as 2-year olds, the 2011 year class had remained strong and is now estimated to be the fourth largest year class of 2-year olds record. How this year class recruits to the western and eastern stocks will be an important influence on the future biomass trajectory of both stocks and is discussed in further detail in relation to the 5-year projections provided.

[6] Available at: http://www.fish.govt.nz/en-nz/Publications/Research+and+Science+Information+Standard.htm

32 In 2014, the Deepwater Working Group agreed on a final assessment model which estimates current stock status of both eastern and western stocks as being above both the deterministic B_{MSY} for hoki and the management target range (35-50% B_0) (Table 2). The eastern stock is estimated at 60% B_0, and the western stock is estimated to be at 59% B_0. The estimate of combined stock status was 60% B_0. A healthy stock status estimate indicates that higher yields could be investigated.

33 The assessment model from the 2014 stock assessment is similar to run 1.7 in the 2013 assessment. Key assumptions of the model are that natural mortality (M) is dependent on age, fish exhibit natal fidelity.[7] In the 2014 base model, trawl survey indices were not upweighted, the Haist method of parameterisation of year class strengths was used, and constant 'catchability'[8] has been assumed throughout the sub-Antarctic survey.

34 The four surveys of the sub-Antarctic between 2004 and 2007 estimated that the western stock biomass had declined significantly since the survey in 2003 (relative biomass was estimated to be 14,000-21,000 tonnes, compared to 40,000 tonnes in 2003). However, the subsequent survey in 2008 estimated that relative biomass had increased by a factor of three, to 46,000 tonnes, a level that has now remained stable in each of the three surveys since.

35 In 2014, the Deepwater Working Group agreed that the probability of the sub-Antarctic trawl surveys being the result of chance was acceptable. There was considered to limited information to support an assumption that the 'catchability' of fish had changed through time. Therefore, the Working Group agreed on a base case that assumed the trawl survey was consistent over the time series.

36 The main sources of uncertainty associated with the hoki stock assessment model include the assumed stock structure and migration patterns of hoki, and the assumed proportion of the strong 2011 year class that recruits to either the eastern or western stocks in future projections.

Management Approach

37 Hoki stocks are managed under section 13(2) of the Act, with TAC setting also guided by the hoki harvest strategy which requires both stocks to fluctuate within the management target range of 35-50% B_0. This target is set above the estimate of deterministic B_{MSY} for hoki to provide greater certainty that the hoki stocks will remain at or above the deterministic B_{MSY} and can sustain the fishery in the long term. The Soft and Hard Limit reference points in the harvest strategy are set at 20% and 10% B_0, respectively.

38 The stock assessment model is also used to generate a series of five year projections that provide estimates of future stock status in relation to B_0 and the target and limit reference

[7] Under a natal fidelity assumption, the fish spawn in the same general location where they were born.
[8] Catchability refers to the proportion of the stock assumed to be seen or available to an acoustic or trawl survey

points. The projections estimate the likely stock status trajectory under different catch and recruitment scenario to guide selection of appropriate management settings.

39 To inform the 2014 review of management settings, projections have been produced assuming three different catch scenarios:

1. the status quo of 150,000 tonnes, with 60,000 tonnes allocated to the eastern stock, and 90,000 tonnes allocated to the western stock
2. an increase of 10,000 tonnes split evenly between the western and eastern stock catch limits
3. an increase of 20,000 tonnes split evenly between the western and eastern stock catch limits.

40 In previous reviews, TAC increases have been allocated to the western stock to limit fishing pressure on juvenile hoki from both stocks that exist on the Chatham Rise, where the majority of hoki from the eastern stock are harvested. Allocation to the western stock is generally a more conservative approach to increasing catches and aims to limit fishing pressure on juvenile fish.

41 MPI considers that given the high stock status of the eastern stock and uncertainty regarding the recruitment of the 2011 year class, splitting any increase evenly between the two stocks will not adversely impact the stock status of either stock and will spread fishing effort across the fishery.

42 Five-year projections were also run under two additional assumptions. The sensitivity run assumed that the 'catchability' of the sub-Antarctic trawl survey changed in 2008, and that the recruitment of the large 2011 year class will be split evenly between the eastern and western stock.

43 The assumption that 'catchability' of the sub-Antarctic trawl survey changed in 2008 leads to a less optimistic estimation of the western stock status both in 2014 and in the five-year projections. This assumption has little effect on the estimation of the eastern stock status, leading only to a slight increase in estimated stock status.

44 The assumption of how the large 2011 year class recruits to either the eastern or western stock also impacts the trajectories of the two stocks. The assessment model estimates that the 2011 year class mainly recruits to the western stock, potentially inflating the estimates of stock status for the western stock in the 5-year projections. The assumption that the 2011 year class will recruit evenly to the eastern and western stock results in lower stock status for the western stock, offset by higher projected stock status in the eastern stock.

45 The combined effect of the two assumptions on the five-year projections is shown in Table 3. About half of the difference in the projections of 2019 stock status for each stock can be

explained by the 'catchability' assumption and the remainder of the difference is explained by the recruitment assumption.

Table 2: Expected median status of the hoki stocks in 2019 under a variety of catch assumptions

TACC	Eastern limit (t)	Western limit (t)	Eastern stock (% B_0)		Western stock (% B_0)	
			Base	Sensitivity run	Base	Sensitivity run
150,000	60,000	90,000	62	70	70	52
160,000	65,000	95,000	61	69	69	50
170,000	70,000	100,000	59	67	67	49

46 All the projections, under both alternative assumptions and all catch levels, result in both hoki stocks remaining above the lower bound of the management target (35% B_0) through to 2019 (Table 2).

PROPOSED RESPONSE

47 MPI is consulting on the following management options for setting TACs, TACCs and allowances for HOK 1 (Table 1).

48 Based on the results of the 2014 hoki stock assessment, and the projections that assume a range of catch levels, MPI considers all the options proposed are consistent with the objective of maintaining the hoki stocks at or above B_{MSY} and within or above the agreed management target range.

Option 1 (Status Quo)

49 Under this option the TAC would remain at 151,540 tonnes and the TACC would remain at 150,000 tonnes. The current catch split arrangement would also remain unchanged under this option.

50 This option will result in lost utilisation opportunities as both stocks combined are likely to be able to support a harvest level greater than 150,000 tonnes. It is not the intention of the hoki harvest strategy to manage the stocks above the agreed management target range.

Option 2

51 Option 2 proposes:

- To increase the TAC from 151,540 tonnes to 161,640 tonnes
- To increase the TACC from 150,000 tonnes to 160,000 tonnes
- To allocate the additional 10,000 tonnes taking stakeholder views into account evenly between the eastern and western stocks (5,000 tonnes each)
- The allowance for other sources of fishing related mortality be increased from 1500 tonnes to 1600 tonnes (1% of the TACC)
- No changes to customary or recreational allowances.

52 The five-year management projections indicate that the status of both stocks would remain at or above the lower end of the target range for the next five years with a catch increase of 10,000 tonnes. Even under the most conservative projection scenario, the lowest estimate of the 2019 status of the western stock is 50% B_0, and the eastern stock status at 61% B_0 with a catch increase of 10,000 tonnes split between both stocks.

53 The projections show that both stocks could likely support a larger catch increase without falling below the lower end of the management target range. This option also represents a conservative approach to utilising the available biomass.

54 Taking a conservative approach to the current harvesting opportunity in 2014, and waiting another year until the 2011 year class grow to a larger size, may provide greater benefit to the industry in the medium term. Taking a smaller increase now would also reduce the uncertainty relative to where these fish will recruit.

55 Based on export figures from 2013 of $1.45/kg greenweight, a 10,000 tonne increase in the TACC may result in an additional $16.9 m in revenue.[9]

Option 3

56 Option 3 proposes:

- To increase the TAC from 151,540 tonnes to 171,740 tonnes
- To increase the TACC from 150,000 tonnes to 170,000 tonnes
- To allocate the additional 20,000 tonnes evenly between the eastern and western stocks (10,000 tonnes each)
- To increase the allowance for other sources of fishing related mortality from 1500 tonnes to 1700 tonnes (1% of the TACC)
- No change to customary or recreational allowances.

57 Implementing this option would also be unlikely to cause a sustainability risk for either hoki stock. The projections indicate that the stocks will remain within or be above the upper bound of the management target range, which gives MPI confidence that this option will not adversely affect the sustainability of the stocks over the next five years.

58 The status of the western stock in 2019 is projected to be 49% B_0 under the most pessimistic model assumptions, while the eastern stock would be at 59% B_0. MPI also intends to review these management settings well before 2019, mitigating any risk to the hoki stocks from this level of increased catch.

59 Based on export figures from 2013 of $1.45/kg greenweight, a 20,000 tonne increase in the TACC may result in an additional $29 m in revenue.

[9] Based export figures for 2013 calendar year of $1.45 / kg greenweight. This uses frozen headed and gutted (HGU) to estimate the greenweight export price as this form accounted for 28% of export earnings and 45% of export volume for hoki in the 2013 calendar year.

Other Key Considerations

60 When making a decision concerning the TAC for a stock, the Minister must have regard to the interdependence of stocks. Interdependent stocks and key environmental issues associated with the HOK 1 fishery and how they will be affected by the proposal to increase the TAC are discussed below.

Interdependence of stocks

61 The main commercial bycatch species in the hoki fisheries are hake, ling and silver warehou. Options 2 and 3 in this IPP would result in increased hoki fishing effort.

62 All three hake stocks have been assessed in the last three years. All stocks were assessed to be Likely or Very Likely to be above the default management target of 40% B_0. It is considered that all stocks could probably support higher catch levels, especially as all three TACCs have been under-caught in recent years. Any increase in the hoki TAC is unlikely to cause catches to exceed HAK TACCs or impact the sustainability of any hake stock.

63 Stock assessments for all ling stocks potentially affected by an increase in hoki fishing effort have been completed in the past four years. All stocks were estimated to be above the default management target of 40% B_0 and catch limits were increased in both LIN 5 and LIN 7 in 2013. MPI considers that increased catches of ling associated with additional hoki fishing effort are unlikely to impact on the sustainability of any ling stock.

64 The silver warehou TACC for the area that includes the WCSI (SWA 1) has been under-caught in recent years indicating that levels of additional catch resulting from the proposed increased hoki fishing effort in this area are unlikely to have a negative impace on the stock. The TACC for SWA 3 has been over-caught for the past 3 years and the TACC for SWA 4 was exceeded in 2012-13. It is possible that an increase to the eastern stock catch limit will result in the TACCs for SWA 3 and SWA 4 being overcaught again. However, an analysis of Catch Per Unit Effort and length data from those areas suggested that these stocks may be able to support additional catch without impacts on the sustainability of either stock. Catches will be monitored with a view to potentially reviewing these TACCs if they are overcaught again.

65 For these reasons, MPI is satisfied that any increase to the hoki TAC is unlikely to have an unacceptable impact on the sustainability of the key species that are caught in conjunction with hoki. Fish by-catch levels in the fishery will continue to be monitored.

Protected species interactions

66 Both proposed Options 2 and 3 would result in increased hoki fishing effort. This may result in increases to the known interactions with protected species, which are outlined below. However, MPI considers that current management processes will ensure that the long-term viability of these affected protected species populations is not negatively impacted.

67 Management of seabird interactions with New Zealand's commercial fisheries is driven through the 2013 National Plan of Action to Reduce the Incidental Captures of Seabirds in New Zealand fisheries (NPOA-Seabirds). The NPOA-Seabirds has established a risk-based approach to managing fishing interactions with seabirds, targeting management actions at the species most at risk.

68 The level of risk from commercial fishing to individual seabird species has been identified through a comprehensive hierarchical risk assessment and risk screening approach that underpins the NPOA-Seabirds. Hoki fishing effort generally contributes a relatively low proportion of the total risk score for most seabird species.

69 There are three species captured in hoki fisheries which are estimated to be at very high risk from commercial fishing in New Zealand waters. These are the New Zealand white-capped albatross, Salvin's albatross, and Southern Buller's albatross. A brief summary of each species is provided below as well as catch rate information for the period from 2007-08 to 2011-12. 2007 was the first year of implementation of the non-regulatory seabird mitigation measures detailed below and 2011-12 was the most recent year for which 'complete' data is available.

70 New Zealand white-capped albatross is categorised by the New Zealand Department of Conservation[10] (DOC) as 'At Risk: Declining', and 'Near Threatened' by the International Union for the Conservation of Nature[11] (IUCN). However, recent population studies show fluctuating numbers of breeding birds at the main colonies and it is not possible to determine population trend with any certainty.[12] Hoki fishing is estimated to contribute roughly 10% of the total risk for NZ white-capped albatross from New Zealand fishing activity and has, on average, comprised around 6% of the total estimated captures. The proportion of risk is higher than the proportion of estimated on-deck captures because the risk assessment incorporates cryptic mortality, including potentially fatal captures with trawl warps that do not lead to an observed capture. From 2007-08 to 2011-12, the average capture rate for white-capped albatross in hoki fisheries was 0.29 white-capped albatross captures per 100 tows.

71 Salvin's albatross is categorised by DOC as 'Threatened: Nationally Critical', and 'Vulnerable' by the IUCN. Some populations of Salvin's albatross are monitored by DOC using photographic surveys and field estimates of breeding pairs. The population appears to have declined between 1997 and 2011 based on review of these population estimates. Hoki fishing is estimated to contribute just under 20% of the total risk to Salvin's albatross from New Zealand fishing activity, and has, on average, comprised around 11% of the total estimated captures. The proportion of risk is higher than the proportion of estimated on-deck captures because the risk assessment incorporates cryptic mortality, including

[10] DOC categorisation information may be found at http://www.doc.govt.nz/documents/science-and-technical/nztcs4entire.pdf
[11] Details on categorisation of the IUCN may be found at http://www.iucnredlist.org/
[12] Seabird population and risk information available in the Ministry for Primary Industries Aquatic Environment and Biodiversity Annual Review 2013. Available at http://mpi.govt.nz/news-resources/publications

potentially fatal captures with trawl warps that do not lead to an observed capture. From 2007-08 to 2011-12, the average capture rate for Salvin's albatross in hoki fisheries was 0.27 Salvin's albatross captures per 100 tows.

72 Southern Buller's albatross is categorised by DOC as 'At Risk: Naturally Uncommon', and 'Near Threatened' by the IUCN. The current population trend for Southern Buller's albatross is uncertain but the population increased markedly between 1950 and 2005. Hoki fishing is estimated to contribute roughly 40% of the estimated risk to Southern Buller's albatross from New Zealand fishing activity. There is no estimate of the proportion of overall Southern Buller's captures that are attributed to hoki fishing. From 2007-08 to 2011-12, the average capture rate for Southern Buller's albatross in hoki fisheries was 0.38 Southern Buller's albatross captures per 100 tows.

73 In 2011-12, 61 seabird captures were observed from 2,580 observed hoki target tows. Subsequent modelling of the level of effort and the number of observed seabird captured across the different hoki grounds provides an estimate of total seabird captures in hoki fisheries of 265 seabirds in 2011-12 (Table 5).

Table 5: Estimated and observed seabird captures in hoki fisheries 2007-08 to 2011-12

	Observed captures	Estimated captures	% tows observed	Total # of tows	Capture rate (per 100 tows)
2011-12	61	265	22.8	11,332	2.36
2010-11	54	335	16.6	10,405	3.13
2009-10	53	228	20.7	9,966	2.58
2008-09	37	200	20.3	8,176	2.23
2007-08	28	155	21.4	8,786	1.49

74 Increasing the hoki TACC will result in additional fishing effort and potentially a proportional increase in captures of seabirds in hoki fisheries (i.e. potentially a 7 to 13% increase in captures from hoki trawling). MPI will continue to work with industry stakeholders to reduce the risk to key seabird species.

75 A range of measures are currently in place or are under development. Mandatory seabird mitigation measures include the requirement that all trawlers over 28 m in length deploy bird mitigation devices during fishing. Research projects are currently underway that aim to improve the performance of these mitigation devices.[13]

76 Non-regulatory measures are also used to reduce the risk of seabird interactions with the hoki fleet. Every vessel over 28m in length has developed a specific vessel management plan (VMP) that sets out the onboard practices vessels must follow to reduce the risk to seabirds, including offal management procedures and good factory cleanliness. MPI monitors each vessel's performance against its VMP and works with the Deepwater Group

[13] More information on these projects can be found at the Department of Conservation's Conservation Services Programme website: www.doc.govt.nz/csp

Ltd. (DWG) to rectify any non-adherence and also to assist the fleet improving their offal management capacity. These practices will continue during 2014-15.

77 The hoki fisheries are also responsible for some fur seal mortalities, particularly the fisheries on the WCSI and in Cook Strait. During the 2011-12 fishing year it is estimated that 200 fur seal incidental captures occurred in the hoki fisheries.

Table 6: Estimated and observed NZ fur seal incidental captures and capture rates in hoki fisheries 2007-08 to 2011-12

Year	Observed captures	Estimated captures	% tows observed	Capture rate (per 100 tows)	Total # of tows
2011-12	33	200	22.8	1.28	11,332
2010-11	24	172	16.6	1.39	10,405
2009-10	30	173	20.7	1.45	9,966
2008-09	37	202	20.3	2.23	8,176
2007-08	58	311	21.4	3.09	8,786

78 The rate of fur seal captures has declined fairly steadily since 2005. Increasing the TACC may result in additional fur seal mortalities, but MPI notes that the population is believed to be increasing and considers it is unlikely that the current level of mortalities is affecting the long-term viability of the national population.

79 New Zealand sea lions are rarely captured in hoki fisheries, with two observed captures having been reported in the past 10 years. In 2011-12, no New Zealand sea lions were observed captured in hoki fisheries. MPI considers that the risk to sea lions from hoki fishing is low, but will continue to work with DWG to monitor and minimise marine mammal captures in deepwater fisheries.

80 A risk assessment for marine mammals is underway which will provide further information on particular species at risk from fishing and allow management to be targeted based on risk. This work will inform future management of the New Zealand fur seal and New Zealand sea lion with respect to the deepwater fisheries, including that for hoki. Results are expected in the second half of 2014.

Benthic impacts

81 Although hoki is a mid-water species, it is often caught by bottom trawl or midwater trawl fished on or near the bottom which will have an impact on benthic habitat.

82 Management measures to address the effects of deepwater trawl activity have focused on 'avoiding' these effects. This has been achieved through closing areas to bottom trawling; first with seamount closures in 2001 and then with Benthic Protection Areas (BPAs). The implementation of BPAs in 2007 effectively closed approximately 30% of the New Zealand EEZ to bottom trawling. A monitoring regime to ensure these closures are adhered to was also implemented.

83 The proposals to increase the TACC for hoki will result in an increase in fishing effort. Any change in the level of benthic interactions from increased fishing effort is partially dependent on which stock the TACC increase is allocated to. In the spawning fisheries, the majority of fishing is carried out using mid-water trawl gear which has little contact with the seabed. Most of the additional effort from any increase in the hoki TACC will be on grounds that have previously been fished, somewhat limiting further benthic impacts.

84 MPI will continue to monitor the trawl footprint of the hoki and other deepwater fisheries annually.

Other Management Measures

85 MPI is not proposing to make any changes to the deemed value rates for hoki, or any other management measures.

FUTURE CONSIDERATIONS

86 Recommendations from the independent review of the hoki stock assessment model will be implemented prior to the 2015 and 2016 stock assessments.

CONCLUSION

87 The 2014 stock assessment results indicate that a utilisation opportunity exists in the New Zealand hoki fisheries. Estimates of current stock status from the 2014 assessment model indicate that catch increases of over 20,000 tonnes could be sustained while still retaining both stocks within or above the management target range.