

BLUENOSE (BNS 1, 2, 3, 7 AND 8)

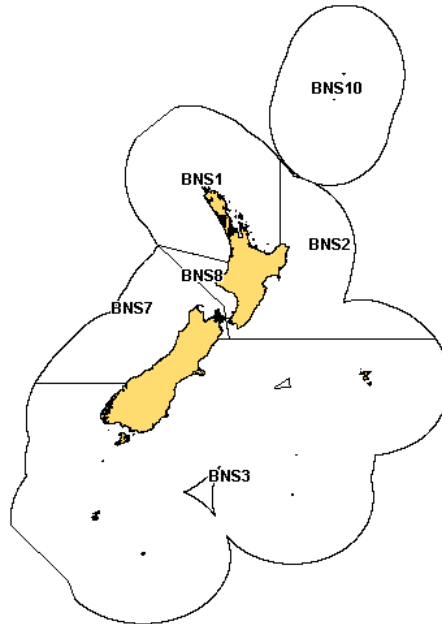


Figure 1: Quota Management Areas (QMAs) for BNS stocks.

Executive Summary

- 1 All five major bluenose (BNS) fishstocks (BNS 1, 2, 3, 7 and 8 – Figure 1) have this year been reviewed by the Adaptive Management Programme Working Group (Working Group) and the Plenary.¹ All BNS stocks show significant declines in catch per unit effort (CPUE) and current catches are not likely to be sustainable.
- 2 All CPUE indices for all BNS stocks show markedly similar declines in the period between 1 October 2001 and 30 September 2007. For the six most reliable CPUE series (at least one per fishstock), CPUE has declined by between 43% and 79% (mean 64%) over the six years between 1 October 2001 and 30 September 2007.
- 3 CPUE has previously not been considered to be a reliable indicator of abundance for BNS stocks. However, close coincidence observed in declining trends in the six most reliable CPUE indices in recent years has increased confidence in their value as indices of abundance. If this decline is indicative of the overall abundance of BNS in these areas, then BNS abundance could have declined by more than 50% across all areas over these six years. If there has been replenishment of the features being fished in the period prior to the decline, the overall decline in abundance could be even larger.

¹ The Plenary annually peer reviews and summarises the available science for fish stocks.

- 4 The Plenary did not provide a stock assessment for any BNS stock to allow explicit estimation of B_{MSY} and $B_{CURRENT}$. Further, uncertainty regarding the extent of the stock which is contributing to the BNS fisheries in the various QMAs makes it difficult to estimate B_{MSY} for these stocks. However, although the Plenary did not supply estimates of $B_{CURRENT}$ and B_{MSY} , MFish scientists consider that it is still possible to infer that $B_{CURRENT}$ is below B_{MSY} in all BNS stocks.
- 5 The concurrent decline of six independent CPUE series covering all the main New Zealand BNS fisheries may indicate that there is a single New Zealand stock of BNS. The 2008 Plenary noted that declines in CPUE have been observed even in areas that are relatively lightly fished such as BNS 7 and BNS 8. The existence of a single New Zealand-wide BNS stock declining in all areas would imply not only that current catches are not sustainable, but that the overall combined TACC is also not sustainable.
- 6 MFish scientists consider that if BNS were assumed to be one single New Zealand-wide stock then the current biomass would almost certainly be below B_{MSY} . This conclusion is based on further consideration of the CPUE indices and analyses presented in the 2008 Plenary, together with interpretation of the likely relationship of CPUE to abundance.
- 7 Based on the declines in CPUE, and the likelihood that BNS stocks are below B_{MSY} , MFish proposes reducing the total allowable catch (TAC) in BNS 1, 2, 3, 7 and 8. MFish considers that new TACs should be based on a total allowable commercial catch (TACC) that is between 10 and 40% below average commercial catch between 1 October 2001 and 30 September 2007.
- 8 MFish considers that these options represent the range of reasonable options for the basis of consultation and will increase the likelihood that the biomass of BNS stocks remains at or rebuilds to appropriate levels. The final decision on the quantum of any reduction in the TAC will depend on the Minister's interpretation of the severity of the sustainability risk and the socio-economic impacts associated with various reductions. The IPP focuses on providing an understanding of the sustainability risk and the impacts of TAC reductions.
- 9 MFish considers that any reduction in the TAC should be applied only to the commercial sector. This is considered reasonable because the initial Adaptive Management Programme (AMP) for each fishery increased substantially the TACC only. This represented an allocation of the TAC to the commercial sector so any reduction in the TAC should now be applied only to the commercial sector. Secondly, the combined recreational and customary non-commercial allowances are very minor components of the BNS TACs (between 2.2% and 3.7%); it is unlikely that catches by these sectors have increased significantly in recent years.
- 10 MFish also notes reports of predation of BNS caught by long-line and believes that an allowance should be made in BNS 1, 3, 7 and 8 for other sources of fishing-related mortality to reflect this and other mortality associated with trawling.

- 11 The approximate lost revenue for the commercial sector differs significantly among BNS stocks and options.
- 12 MFish is also consulting on increasing deemed values in BNS 1, 3, 7 and 8. Further information on this is included in the Ministry's deemed value review.

The Issue

Overview of the fisheries

- 13 TACs were first established for BNS upon establishment of the QMS in 1986–87, with TACCs for all BNS stocks totalling 1 350 t. Over the past 15 years, all BNS stocks have been managed under AMPs; details of current TACs and allowances are provided below (Table 1).
- 14 BNS 1, the second largest fishery, entered an AMP in October 1996, with a TACC increase from 705 t to 1 000 t. The majority of BNS is caught in bottom long-line fisheries in the Bay of Plenty and off Northland.
- 15 BNS 2 is the largest fishery and was the most recent entry into an AMP in October 2004. The TACC was increased from 873 t to 1 048 t. Important trawl fisheries occur off the Wairarapa Coast where BNS is a major bycatch in trawl fisheries. In recent years the bottom long-line fishery has become increasingly important in BNS 2 and accounted for 70% of landings in 2006–07.
- 16 BNS 3 entered an AMP in October 1992, with a TACC increase from 175 t to 350 t. This was further increased within the AMP to 925 t in October 2001 (plus an additional 250 t of ACE provided to Chatham Islands commercial fishers in 2001–02 and 2002–03 only). BNS 3 is the third most important of the BNS stocks and contributed about 20% of the total BNS catch between 1989–90 and 2006–07. This catch was primarily taken by bottom long-line and bottom trawl, each taking about 40% of the total historic catch. The BNS 3 fishery is an amalgam of several bycatch and target BNS fisheries that have developed since the introduction of BNS 3 into the QMS; many have small and sporadic catches.
- 17 BNS 7 entered the AMP in October 1994 when the TACC was increased from 97 t to 150 t. Bottom long-lining has accounted for 62% of the total BNS 7 landings since 1989–90 with midwater and bottom trawling accounting for another 30% of landings. 70% of BNS 7 landings come from the central west coast of the South Island (Statistical Areas 033 and 034).
- 18 BNS 8 entered the AMP in October 1994 when the TACC was increased from 22 t to 100 t. Bottom long-lining has accounted for 94% of BNS 8 landings since 1989–90. Over 75% of BNS 8 landings come from the combined Statistical Areas 041 and 801 in the northern Taranaki bight, with the remainder coming from the southern Taranaki bight, south of Cape Egmont.

Table 1: Current TACs, TACCs and allowances for BNS stocks.

	TAC (t)	TACC (t)	Customary Allowance (t)	Recreational Allowance (t)	Other sources of fishing-related mortality (t)
BNS 1	1 023	1 000	8	15	-
BNS 2	1 107	1 048	13	25	21
BNS 3	961	925	18	18	-
BNS 7	155	150	2	3	-
BNS 8	103	100	1	2	-

Biology

- 19 BNS have a pelagic larval phase and probably move into deeper areas as they grow. BNS are distributed at depths from near-surface waters to 1 200 m; although their main depth range is between 250 and 750 m with a peak between 300 and 400 m.
- 20 Recent estimates of age suggest a maximum of between 50 and 60 years. The estimated age at maturity is approximately 10 years; with a corresponding length of 60-65 cm. Based on these recent age estimates, natural mortality is considered to be between approximately 6 and 8 % per year.

Stock status

- 21 There is currently no stock assessment available for any BNS stock to allow assessment of stock status or long-term yields. There is no evaluation of stock size in relation to the biomass that can produce the maximum sustainable yield (B_{MSY}) or current biomass ($B_{CURRENT}$).
- 22 The best available information on the status of BNS stocks is an analysis of catch per unit effort (CPUE). Eleven CPUE analyses were conducted on a variety of BNS fisheries that use both trawl and long-line methods. An overlay plot of the six standardised CPUE indices that the Working Group and Plenary considered to be most reliable, and representative of the BNS 1, BNS 2, BNS 3 and BNS 7 and 8 stocks, is shown in Figure 2.² Each of these indices is also shown separately in Figure 4.
- 23 All six CPUE indices show markedly similar declines in the period between 2001–02 and 2006–07. For the six most reliable CPUE series (Figures 2 and 4), declines appear to have started around 2001–02 to 2002–03, with the indices declining by between 43% and 79% (mean 64%) over the six years from 2001–02 to 2006–07 (Table 2).³

² Each of the CPUE analyses are based on a suite of core vessels selected so that there was continuity of effort in the fishery over the entire time period in the analysis, including the period of the decline.

³ All eleven CPUE indices from which the most reliable six were selected show similar declining trends in CPUE.

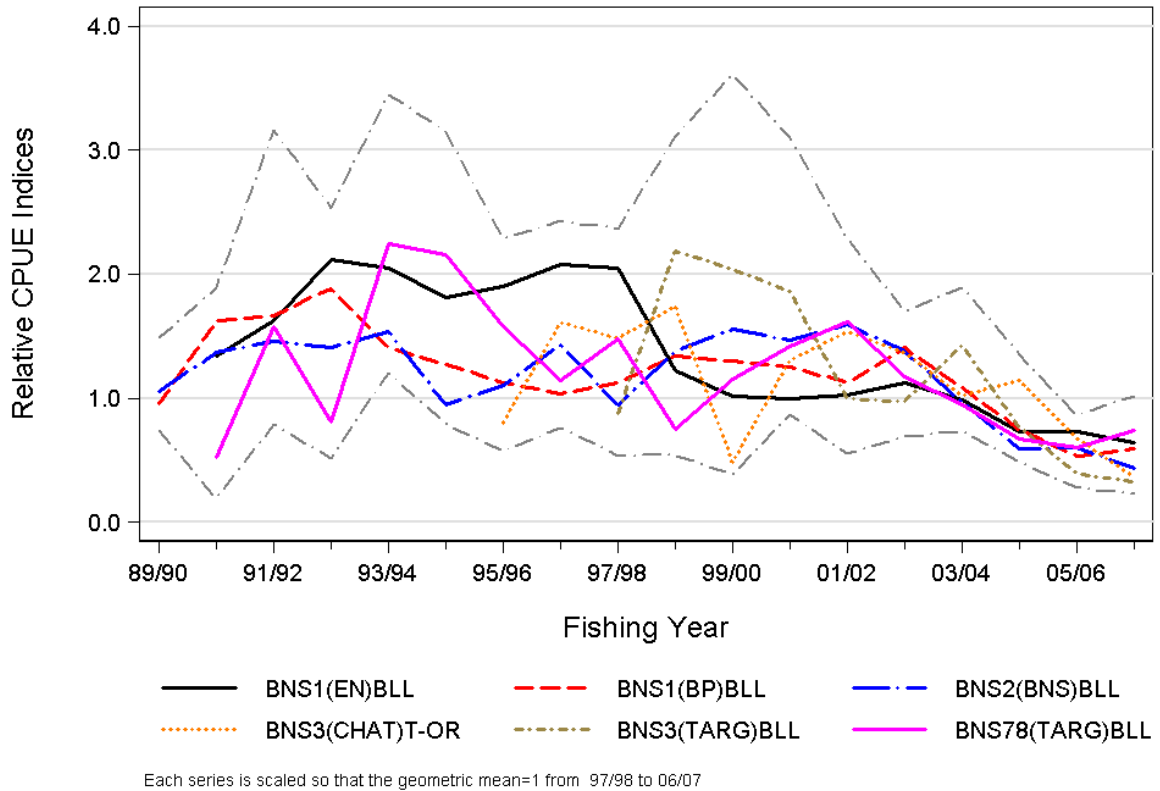


Figure 2: Overlay plots of relative CPUE indices from six BNS fisheries operating in five New Zealand quota management areas (QMAs). Data are standardised to the 1997–98 to 2006–07 geometric mean. See below for explanation of each CPUE series.

- BNS1(EN)BLL – Target BLL fishery for BNS, hāpuku and ling in East Northland
- BNS1(BP)BLL – Target BLL fishery for BNS, hāpuku and ling off Bay of Plenty
- BNS2(BNS)BLL – Target BLL fishery for BNS, hāpuku and ling
- BNS(CHAT)T-OR – Target trawl fishery for BNS and alfonsino on Chatham Rise
- BNS3(TARG)BLL – Target BLL fishery for BNS and hāpuku
- BNS78(TARG)BLL – Target BLL fishery for BNS and hāpuku in QMAs 7 and 8 combined

24 CPUE has previously not been considered to be a reliable indicator of abundance for BNS stocks because the relationship between CPUE and abundance was not thought to be linear. The likely consequences of non-linear relationships between CPUE and abundance are briefly outlined here. One such non-linear relationship between CPUE and vulnerable biomass (V) is shown in Equation 1, where q is the proportionality constant and β (beta) is a power co-efficient (Hilborn and Walters 1992).⁴

25 $CPUE = qV^\beta$ Equation 1

26 When beta is equal to 1 the relationship between CPUE and abundance is proportional. When beta is less than 1 the relationship is defined as hyperstable (CPUE declines slower than the abundance). In Figure 3 it can be seen

⁴ Hilborn, R. and C. J. Walters. 1992. Quantitative Fisheries Stock Assessment: Choice, Dynamics and Uncertainty. Chapman and Hall, New York, 570 p.

that for decreasing values of beta the relationship becomes more and more curved (non-linear).

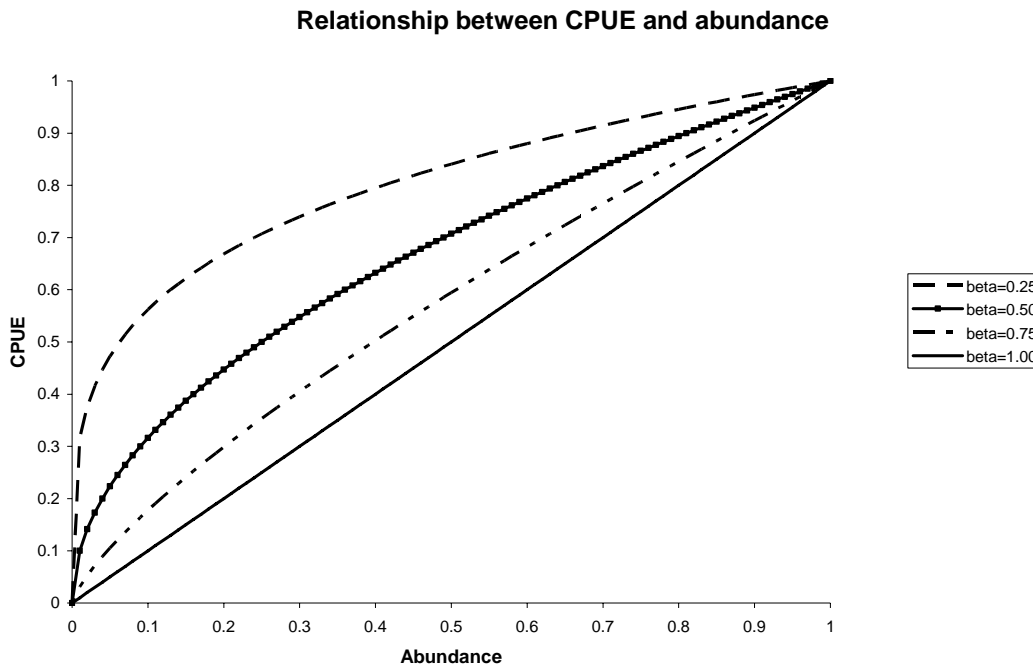


Figure 3: Relationship between CPUE and abundance.

- 27 The Plenary noted that “There is a possibility that the long period of relatively stable CPUE observations outlined above, in the face of increasing catches before the period of decline, may be evidence of hyper-stability in CPUE caused by the replenishment of adult stocks in specific areas or features.” When hyper-stability occurs, CPUE declines at a slower rate than the underlying population, e.g. declines in CPUE underestimate the true decline in abundance.
- 28 Hyper-stability can occur when stocks form aggregations that are targeted by fishers. Whilst targeting these aggregations, catch rates remain high as the fish caught are replenished by those that move in from surrounding areas. This is significant because it has the effect of disguising biomass decline on the specifically targeted seabed features until such time as the wider population is not of sufficient size to replenish the aggregation at a rate greater than fishing mortality.
- 29 Recent increases in targeting BNS in some areas, and increasing catches, could have exceeded the replenishment rate, causing the rapid and synchronous declines in CPUE observed since 2001–02.
- 30 The relationship between CPUE and abundance for BNS may not be linear, and is more likely to be hyper-stable. Although the Plenary did not supply estimates of $B_{CURRENT}$ and B_{MSY} , MFish scientists consider that it is still possible to make inferences about the stock status of the BNS stocks based on the

CPUE data. If CPUE were proportional to abundance then the stocks of BNS would have declined by an average of 64% since 2001. The stock would therefore be below 36% B_0 as the history of substantial fishing stretches back to 1986. If the relationship is hyper-stable the decline in biomass would be greater; for beta values of 0.75, the CPUE declines would mean that stock would be at about 26% B_0 . For lower values of beta the stock status would be even lower. Although an estimate of B_{MSY} as a percentage of B_0 is not given in the Plenary, MFish scientists consider that, based on species with similar life history including a very low natural mortality (0.08), it is likely to be in the range of 30-45% B_0 or higher.

- 31 Thus, if BNS is considered as one single New Zealand-wide stock and the relationship between CPUE and abundance is hyper-stable as surmised in the 2008 Plenary, then the current biomass is likely to be below B_{MSY} .

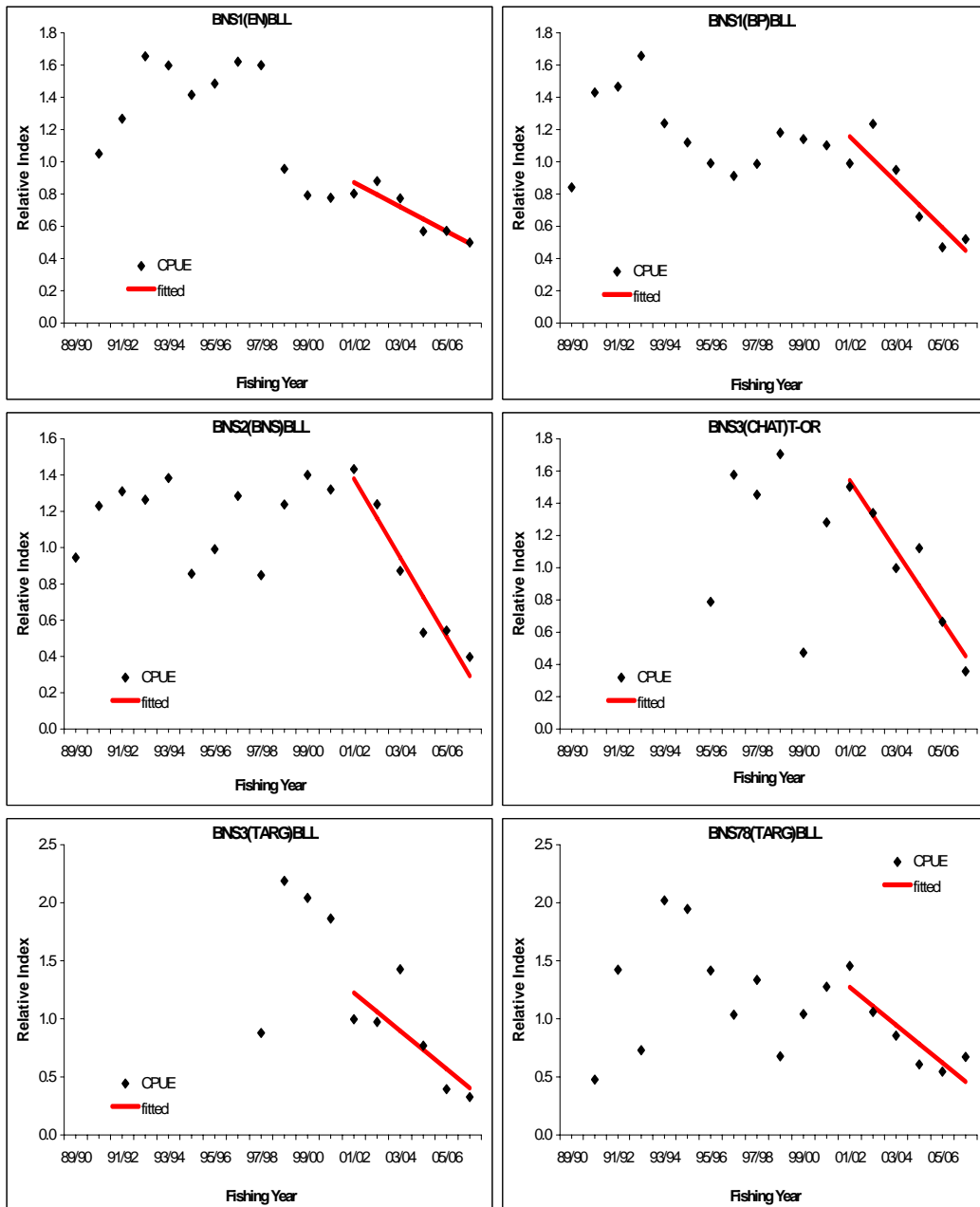


Figure 4: Plots of the six main standardised CPUE series for BNS from five BNS QMAs with linear regressions fitted to the period of recent declining catch rate.

Table 2: Estimates of CPUE decline over the most recent six years for the six CPUE models fitted to the years 2001–02 to 2006–07 (Figure 2). Data were obtained from the end points of linear models in Figure 4.

CPUE Model	Decline (% over 6 years)
BNS 1 (EN) BLL	43 %
BNS 1 (BP) BLL	61 %
BNS 2 (BNS) BLL	79 %
BNS 3 (CHAT) T-OR	71 %
BNS 3 (TARG) BLL	67 %
BNS 7 and 8 (TARG) BLL	64 %
Average	64 %

Changes in the length of BNS caught

- 32 The decline in the East Northland CPUE data in BNS 1 is corroborated by a gradual reduction in the proportion of mature fish (> 60 cm) in the sampled catch (Figure 5). This indicates that a larger proportion of BNS catch is made of immature fish and this could represent a reduction in the abundance of mature fish which may impact on recruitment to the fishery. There are also indications of declines in the proportion of fish larger than 60cm caught in the Chatham Rise bottom trawl fishery in BNS 3 (Figure 5). These trends are not evident across all BNS stocks.

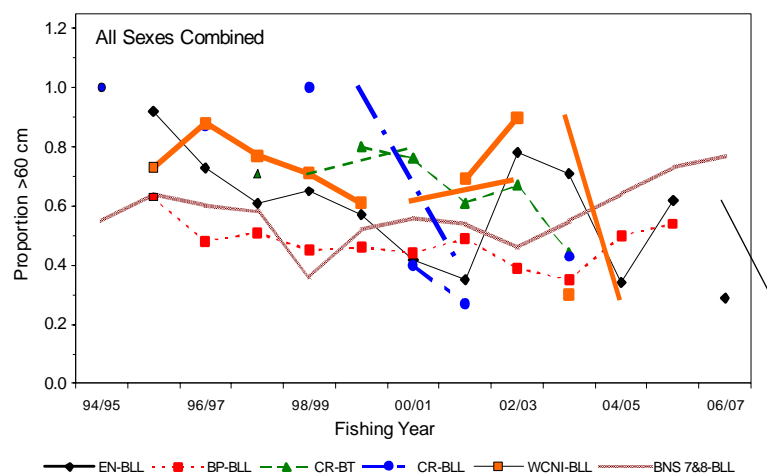


Figure 5: Summary of the total proportion of BNS > 60cm length by QMA / fishing area by year, from commercial logbook programme data. See below for description of series.

- EN-BLL – Target BLL fishery for BNS, hāpuku and ling in East Northland (BNS 1)
- BP-BLL – Target BLL fishery for BNS, hāpuku and ling off Bay of Plenty (BNS 1)
- CR-BT – Target trawl fishery for BNS and alfonsino on Chatham Rise (BNS 3)
- CR-BLL – Target BLL fishery for BNS and hāpuku (BNS 3)
- WCNI-BLL – West Coast North Island target BLL fishery
- BNS7&8BLL – Target BLL fishery for BNS and hāpuku (BNS 7 and 8)

Summary of Options

- 33 A summary of options is provided below and is followed by a brief description of the key features of each option (Table 3).
- 34 For each BNS stock several options are presented for varying TACs: all stocks have the option of retaining the status quo; setting a TAC based on a 10% reduction in recent commercial catch (this is based on the average commercial catch of that stock between 1 October 2001 and 30 September 2007); and setting a TAC based on a 30% reduction in recent commercial catch (based on the average commercial catch of that stock between 1 October 2001 and 30

September 2007). In addition to these options, an option is presented for BNS 1 and 3 of a 40% reduction in recent commercial catch (based on the average commercial catch of that stock between 1 October 2001 and 30 September 2007).

- 35 The reason for this additional option in BNS 1 and 3 is that catch has declined significantly over the period between 1 October 2001 and 30 September 2007. This means that the mean over the period between 1 October 2001 and 30 September 2007 is significantly higher than the last two fishing years. As such, Options 2 and 3 may not sufficiently increase the likelihood that the biomass of BNS 1 and 3 will increase.
- 36 The average catch between 1 October 2001 and 30 September 2007 was selected as the basis for considering reductions in TACs as this generally covers the period of declining CPUE (Figures 2 and 4). MFish also considers that an average over this time period is preferable to a shorter period because it better accounts for any changes in fishing behaviour based on prevailing economic conditions or other operational imperatives. Average commercial catches from which options were derived are given in Table 4.
- 37 MFish believes that a reduction of less than 10% will not sufficiently address the sustainability concern. For some BNS stocks, where catches have been declining steadily, this will not constrain catch below that taken in the last two years (Table 6). Any reduction greater than 30% (or 40% for BNS 1 and 3) may impose too great a short-term cost on the commercial industry relative to the benefits of reducing risk, and the possibility of further adjustments to the TAC in the medium term.
- 38 In MFish's opinion, these options represent a range of reasonable options for the basis of consultation. This does not constrain the Minister from considering measures outside this range; however, the final decision on the quantum of any reduction in the TAC will depend on the Minister's interpretation of the severity and immediacy of the sustainability risk and the socio-economic impacts associated with various reductions.
- 39 Should the Minister consider there is a need to reduce BNS catches significantly, but recognises that such reductions would have substantial impact on fishers, the Minister may consider a phased reduction. A phased reduction would see the Minister consulting on gradual reductions of the TAC over several years to allow fishers the opportunity to minimise the impact of reduced catches on their businesses. This would also allow CPUE to be re-examined and the effect of catch reductions assessed before considering further management action.
- 40 In most BNS stocks, recent commercial catches have been lower than the TACCs; the exception being BNS 2.⁵ As a result, proposed TACCs based on recent catch represent significant reductions compared to the existing TACC. The smallest proposed reduction being from BNS 2 (13%, because of over-catch of the TACC); and the greatest reduction being BNS 8 (67%, because of

⁵ Deemed values were increased in BNS 2 on 1 October 2007 to address this over-catch.

the greatest under-catch of the TACC) and it is unlikely that catches by these sectors has increased significantly in recent years.

Table 3: Summary of the proposed options for all BNS stocks.

		Option 1 Status quo (t)	Option 2 – TAC based on a TACC set at 10% below recent commercial catch (t)	Option 3 – TAC based on a TACC set at 30% below recent commercial catch (t)	Option 4 – TAC based on a TACC set at 40% below recent commercial catch (t)
BNS 1	TAC	1 023	825	647	558
	TACC	1 000	786	612	524
BNS 2	TAC	1 107	958	753	-
	TACC	1 048	902	701	-
BNS 3	TAC	961	698	551	478
	TACC	925	649	505	433
BNS 7	TAC	155	96	76	-
	TACC	150	89	70	-
BNS 8	TAC	103	47	37	-
	TACC	100	43	33	-

- 41 The options below reduce only the commercial allowance, i.e. the TACC. This is considered reasonable for two reasons. First, the initial AMP for each fishery increased substantially the TACCs only; as this represented an allocation of the TAC to the commercial sector, any reduction in the TAC should now be applied only to the commercial sector. Secondly, the combined recreational and customary non-commercial allowances are very minor components of the BNS TACs: BNS 1 (2.2%); BNS 2 (3.4%); BNS 3 (3.7%); BNS 7 (3.2%); BNS 8 (2.9%).
- 42 The TAC for BNS 2 contains an allowance for other sources of fishing-related mortality that is set at 2% of the TACC. Based on a TACC of 1 048, this equated to 21 tonnes when it was set for the 1 October 2004 fishing year. MFish considers that this allowance should remain but be reduced to equate to 2 % of any reduced TACC. There is no similar allowance in BNS 1, 3, 7 or 8. MFish also notes that there have been reports of predation of BNS caught by long-line. MFish proposes to set an allowance of 2 % of the TACC for other sources of fishing-related mortality in BNS 1, 3, 7 and 8 to align these stocks with BNS 2.

- 43 MFish is also consulting on increasing deemed values in BNS 1, 3, 7 and 8. Further information on this is included in the Ministry's deemed value review.

Option 1 – Status quo option for all BNS stocks

- 44 The status quo option maintains the current TAC for each BNS stock. Further, based on the average catch between 1 October 2001 and 30 September 2007, the current TACs are under-caught in BNS 1, 3, 7 and 8 (Tables 4 and 6 and Figures 6 to 10). Consequently, this option will allow the possibility for current catch to increase. Given the Plenary's opinion that current harvests in all BNS stocks are unlikely to be sustainable over the short to medium term, this option is likely to be inconsistent with the purpose of the Fisheries Act 1996 (the Act). The purpose of the Act is to provide for the utilisation of fisheries resources while ensuring sustainability. The definition of sustainability includes maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations.

Option 2 – TAC set based on 10% reduction in recent commercial catch

- 45 This option reduces the TAC to a level that is 10% lower than the average commercial catch between 1 October 2001 and 30 September 2007. An allowance for other sources of fishing-related mortality would also be set for BNS 1, 3, 7 and 8 at 2 % of the TACC. Allowances for customary and recreational interests would remain the same.

Option 3 – TAC set based on 30% reduction in recent commercial catch

- 46 This option reduces the TAC to a level that is 30% lower than the average commercial catch between 1 October 2001 and 30 September 2007. An allowance for other sources of fishing-related mortality would also be set for BNS 1, 3, 7 and 8 at 2 % of the TACC. Allowances for customary and recreational interests would remain the same.

Option 4 – TAC set based on 40% reduction in recent commercial catch for BNS 1 and 3 only

- 47 This option reduces the TAC to a level that is 40% lower than the average commercial catch between 1 October 2001 and 30 September 2007. An allowance for other sources of fishing-related mortality would also be set for BNS 1 and 3 at 2 % of the TACC. Allowances for customary and recreational interests would remain the same.

Rationale for Management Options

Status of the stocks

- 48 As discussed above, all CPUE indices show markedly similar declines in the period between 1 October 2001 and 30 September 2007; these declines range from 43% to 79% (mean 64%) (Table 2).

- 49 The declines in CPUE generally follow the increases in TACCs after stocks entered the AMP. The decline in CPUE in BNS 3 appears to coincide with the TACC increase in 2001–02. The steep decline in the East Northland fishery between 1997–98 and 1998–99 coincides with the entry of BNS 1 into the AMP in 1996–97 and the accompanying TACC increase. However, the Bay of Plenty fishery was stable up to around 2003–04 as was the East Northland fishery after the first decline. There was a long period of catches in excess of the TACC in BNS 2, beginning in the early 1990s. However, the decline in CPUE in BNS 2 coincides closely with the increase in the BNS 2 TACC in 2003–04. Conversely, the increased TACCs substantially pre-dated the decline estimated for BNS 7 and 8.
- 50 There is currently no stock assessment available for any BNS stock that will allow estimation of the biomass that can produce the maximum sustainable yield (B_{MSY}) or the current biomass ($B_{CURRENT}$).
- 51 However, as noted above, if BNS is considered as one single New Zealand-wide stock and if the relationship between CPUE and abundance is hyper-stable as surmised in the 2008 Plenary, then the current biomass is likely to be below B_{MSY} .

Stock Structure

- 52 The concurrent decline of six independent CPUE series covering all the main BNS fisheries may indicate that there is a single New Zealand stock of BNS or some close relationship among stocks in these QMAs. The Plenary noted that declines in CPUE have been observed even in areas that are relatively lightly fished such as BNS 7 and BNS 8. The existence of a single New Zealand-wide BNS stock declining in all areas would imply not only that current catch in each BNS stock is unsustainable, but that the overall combined catch is also unsustainable.
- 53 An environmental mechanism simultaneously affecting availability or catchability of BNS across all QMAs is considered to be less likely than the possibility of a single stock, or of correlated recruitment across sub-stocks in the various areas. The Plenary considered that the synchronous recent declines in CPUE were probably caused by high fishing mortality and a possible coincidental decline in recruitment.

Management Objectives

- 54 The purpose of the Act is to provide for the utilisation of fisheries resources while ensuring sustainability. Based on the decline in CPUE in all BNS stocks, the Plenary considered that current catches in all BNS stocks are not likely to be sustainable.
- 55 Section 13(2) of the Act requires the Minister to set a TAC at or above a level that can produce the maximum sustainable yield (MSY). The Plenary did not provide a stock assessment for any BNS stock to allow explicit estimation of B_{MSY} and $B_{CURRENT}$. Further, uncertainty regarding the extent of the stock which is contributing to the BNS fisheries in the various QMAs makes it difficult to estimate B_{MSY} for these stocks.

56 However, MFish scientists consider that if BNS were assumed to be one single New Zealand-wide stock then the current biomass is likely to be below B_{MSY} . This conclusion is based on analyses of the CPUE indices in the bluenose fisheries, together with interpretation of the likely relationship between CPUE and abundance.

Recent BNS Catches

57 The TACCs in BNS 1, 3, 7 and 8 have been under-caught on average over the last six years (Table 4 and Figures 6 to 10). In contrast, the TACC in BNS 2 has been over-caught in five of the last six fishing years with the exception being last fishing year when only 957 of the 1 048 t TACC was taken.

Table 4: Average catch and TACCs between 1 October 2001 and 30 September 2007; percent of the TACC caught; and 10%, 30% and 40% reductions in average catch. A 2% allowance for other sources of fishing-related mortality has also been subtracted from all TACCs.

	Average catch (t)	Average TACC (t)	% of TACC caught	10% reduction in catch (t)	30% reduction in catch (t)	40% reduction in catch (t)
BNS 1	891	1000	89%	786	612	524
BNS 2	1022	961	106%	902	701	-
BNS 3	736	1008	73%	649	505	433
BNS 7	101	150	67%	89	70	-
BNS 8	49	100	49%	43	33	-

58 The rationale for reducing the TACC is based on a decline in the CPUE of all BNS stocks. As a result of the general trend of under-catching TACCs, MFish considers that the level to which TACCs are reduced should be below recent catch. MFish considers that the TACC should be reduced below the average catch between 1 October 2001 and 30 September 2007. This period generally covers the period of declining CPUE and is preferable to a shorter period because it better accounts for any changes in fishing behaviour based on prevailing economic conditions or other operational imperatives.

59 Because of the varying extent to which TACCs have been caught in each BNS stock, the options will have the effect of reducing the TACCs for some BNS stocks more than others.

Uniformity of management options

60 While there are differences in the magnitude of the decline in CPUE among BNS stocks (Table 2), MFish believes the information is not sufficient to establish whether there is greater risk to the sustainability of particular BNS stocks that would justify greater or lesser reductions in TACCs. However, because of the difference in recent catch among stocks, the Minister may consider that for some stocks a greater reduction in the TAC is necessary to ensure that the biomass of BNS stocks remains at, or rebuilds to, appropriate levels.

- 61 For example, catches in the last two fishing years are below the TACCs that are proposed under Option 2 in BNS 1, 3 and 8 (Tables 6 and 7). As such, these options represent no reduction in catch over this shorter recent period and no loss in revenue. In these instances a greater reduction may be necessary to increase the likelihood that the stocks will increase. This is also reflected by the addition of a 40 % option for BNS 1 and 3.
- 62 There may also be different social, cultural or economic considerations that warrant different management responses in specific BNS stocks. For example, reducing the TACCs in BNS 7 and 8, where there are already low TACCs and catches, may significantly reduce the availability of ACE in those fisheries. This may have a significant impact on fishers that rely on ACE for their fishing operations. In light of the possibility of a single BNS stock, any reduction in TACCs in such fisheries will need to consider such social and economic factors.

Impact of TAC reductions

- 63 BNS is a relatively high value species with an export price in December 2007 of approximately \$7.37 per kg (greenweight equivalent for the most common exported state – chilled headed and gutted). Reducing the TAC of BNS stocks would result in reductions in revenue (Table 5).
- 64 Current catches have averaged only 76% of the TACCs in the last two fishing years (Table 6). Consequently, when the reduced TACCs proposed are compared against current, generally under-caught, TACCs, there appears to be a greater loss in revenue.
- 65 However, when the average recent catches between 1 October 2005 and 30 September 2007 are compared to the proposed TACCs, the estimated revenue reduction is significantly less in all BNS stocks except BNS 2 (Table 7).

Table 5: Estimated reduction in revenue based on difference between average catch between 1 October 2001 and 30 September 2007 and proposed new TACCs. Estimates are based on an export price of \$7.37 per kg greenweight.

	Average catch (t)	TACC based on 10% reduction in catch (t)	Revenue reduction for 10% reduction	TACC based on 30% reduction in catch (t)	Revenue reduction for 30% reduction	TACC based on 40% reduction in catch (t)	Revenue reduction for 40% reduction
BNS 1	891	786	\$774,000	612	\$2.06M	524	\$2.70M
BNS 2	1 022	902	\$804,000	701	\$2.37M	-	-
BNS 3	736	649	\$641,000	505	\$1.70M	433	\$2.23M
BNS 7	101	89	\$88,000	70	\$228,000	-	-
BNS 8	49	43	\$44,000	33	\$118,000	-	-

Total	2 799	2 519	\$2.30M	1 959	\$6.37M	977	\$4.97M
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Table 6: Average catches compared against TACCs in the last two fishing years.

	Current TACC (t)	Average catch in 05/06 and 06/07 fishing years (t)	TACC in 05/06 and 06/07 fishing years (t)	Percentage of TACC caught
BNS 1	1 000	721	1000	72.1%
BNS 2	1 048	1 047	1 048	99.9%
BNS 3	925	524	925	56.6%
BNS 7	150	124	150	82.7%
BNS 8	100	35	100	35.0%
Total	3 223	2 450	3223	76.0%

Table 7: Estimated reduction in revenue based on difference between average catch between 1 October 2005 and 30 September 2007 and proposed new TACCs. Estimates are based on an export price of \$7.37 per kg greenweight.

	TACC based on 10% reduction in catch (t)	Reduction in revenue based on 10% TACC reduction	TACC based on 30% reduction in catch (t)	Reduction in revenue based on 30% TACC reduction	TACC based on 40% reduction in catch (t)	Reduction in revenue based on 40% TACC reduction
BNS 1	786	nil	612	\$803,000	524	\$1.45M
BNS 2	902	\$1.07M	701	\$2.55M	-	-
BNS 3	649	nil	505	\$140,000	433	\$671,000
BNS 7	89	\$258,000	70	\$398,000	-	-
BNS 8	43	nil	33	\$15,000	-	-
Total	2 519	\$1.19M	1 959	\$3.81M	977	\$1.97M

Assessment of Management Options

Other sources of fishing-related mortality

- 66 No quantitative information is available on the level of illegal catch or other sources of mortality. It is likely that some indirect fishing-related mortality will occur because of BNS escaping through trawl nets but being fatally injured. Similarly it is likely that there is some additional predation associated with the long-line fishing.
- 67 MFish considers that it is appropriate to include an allowance for other sources of fishing-related mortality for all BNS stocks. MFish propose to set an allowance in BNS 1, 3, 7 and 8 at 2 % of the TACC to align the allowance with that in BNS 2 (Table 8).

Table 8: Proposed allowances for other sources of fishing-related mortality for Options 2, 3 and 4.

	TACC based on Option 2 (t)	Allowance based on Option 2 (t)	TACC based on Option 3 (t)	Allowance based on Option 3 (t)	TACC based on Option 4 (t)	Allowance based on Option 4 (t)
BNS 1	786	16	612	12	524	11
BNS 2	902	18	701	14	-	-
BNS 3	649	13	505	10	433	9
BNS 7	89	2	70	1	-	-
BNS 8	43	1	33	1	-	-

All BNS stocks

Option 1 – Status Quo

68 Because the costs and benefits of Option 1 are similar among BNS stocks they are considered generically in this section.

Impact

69 As discussed above, the status quo has resulted in declines in CPUE of between 43% and 79% (mean 64%) between 1 October 2001 and 30 September 2007 for the six most reliable CPUE indices. Based largely on these data, the Plenary concluded that current harvests of all BNS stocks are unlikely to be sustainable over the short to medium term.

Costs

70 As discussed above, the status quo option maintains the current TAC for each BNS stock and will provide for the opportunity for BNS catches to increase above their current levels in all stocks.

71 Maintaining the status quo will likely result in the continuation of fishing at levels that are considered by the Plenary as unsustainable; this option therefore is likely to be inconsistent with the purpose of the Act. The purpose of the Act is to provide for the utilisation of fisheries resources while ensuring sustainability. The definition of sustainability includes maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations.

Benefits

72 There may be a short-term financial advantage to the commercial sector in maintaining higher BNS catches in the coming fishing year or allowing more time to adjust their fishing practices and infrastructure to accommodate any future reductions in BNS TACs. However, these advantages are likely to be

short lived if stocks decline and subsequently result in significantly worse catches in future.

BNS 1

- 73 Two CPUE indices were presented above for BNS 1. CPUE in the East Northland bottom long-line fishery declined by 43 % between 1 October 2001 and 30 September 2007; and by 61 % in the Bay of Plenty bottom long-line fishery. There is also evidence of a gradual reduction in the proportion of mature fish (> 60 cm) in the sampled catch. Three options are discussed below; all of which are summarised in Table 10.

Option 2 - Impact and Costs

- 74 This option would reduce the TACC in BNS 1 from 1000 t to 786 t. The average catch in BNS 1 between 1 October 2001 and 30 September 2007 was 891 t and, based on an export price of \$7.37 per kg, would represent a reduction in revenue of approximately \$774,000.
- 75 BNS catches have been declining steadily in BNS 1 over the last six years (Table 9 and Figure 6). The average catch from the last two fishing years, 1 October 2005 to 30 September 2007, was only 721 t. Based on these recent catches, a reduction in the TACC to 786 t would not represent a reduction in catch or revenue.

Table 9: Reported landings of BNS in BNS 1.

	Reported landings (t)	TACC (t)
2001–02	954	1 000
2002–03	1 051	1 000
2003–04	1 030	1 000
2004–05	870	1 000
2005–06	699	1 000
2006–07	742	1 000

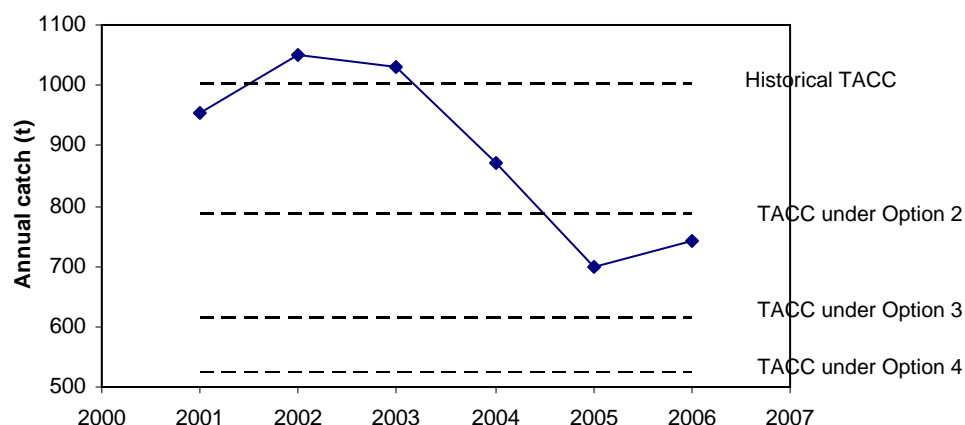


Figure 6: Average catches in relation to the historical TACC and the proposed TACCs for Options 2, 3 and 4.

76 Because of the decline in recent catches, a reduction in the TACC to 10% below average catches between 1 October 2001 and 30 September 2007 will not constrain catch at recent levels (Figure 6). As such, there is a risk that continuing to fish at current levels, or potentially slightly higher levels, will not sufficiently arrest any decline in stock size implied by falling CPUE. Consequently, a greater reduction in the TAC may be necessary for this stock.

Benefits

77 Taking a long-term view, this option should increase the likelihood that BNS 1 increases to, or remains at, a level that can produce MSY. When compared to Option 3, this option will result in a lesser reduction in the TAC and may provide a short-term financial advantage to the commercial sector by maintaining higher BNS catches in the coming fishing year or allowing more time to adjust their fishing practices and infrastructure to accommodate any future reductions in BNS TACs should they be necessary.

78 Reducing the TACC should have the advantage of leaving additional BNS in the water. These additional fish may benefit the recreational and customary sectors by increasing catch rates and possibly, over time, the size of BNS available.

Option 3 – Impacts and Costs

79 This option would reduce the TACC in BNS 1 from 1000 t to 612 t. The average catch in BNS 1 between 1 October 2001 and 30 September 2007 was 891 t and, based on an export price of \$7.37 per kg, would represent a reduction in revenue of approximately \$2.06M.

80 BNS catches have been declining steadily in BNS 1 over the last six years (Table 9 and Figure 6). The average catch from the last two fishing years, 1 October 2005 to 30 September 2007, was only 721 t. Based on these recent catches, a reduction in the TACC to 612 t would represent a reduction in revenue of approximately \$803,000.

- 81 Unlike Option 2, Option 3 will reduce the TACC below the average catch levels of the last two fishing years.

Benefits

- 82 Taking a long-term view, this option should provide a greater likelihood than Option 2 that BNS 1 increases to, or remains at, a level that can produce MSY. When compared to Option 2, this option will result in a greater reduction in the TAC and would not provide a short-term financial advantage as outlined above for Option 1.
- 83 Reducing the TACC should have the advantage of leaving additional BNS in the water. These additional fish may benefit the recreational and customary sectors by increasing catch rates and possibly, over time, the size of BNS available.

Option 4 – Impacts and Costs

- 84 Because BNS catches have been declining steadily in BNS 1 over the last six years (Table 9 and Figure 6), the six year average is considerably higher than the catch from the last two fishing years. As a result, Option 1 does not constrain recent catch from the last two fishing years. A fourth option is suggested to reduce recent catch to a level further below the average catch of the last two years to increase the likelihood that the biomass of BNS 1 will increase.
- 85 This option would reduce the TACC in BNS 1 from 1000 t to 524 t. The average catch in BNS 1 between 1 October 2001 and 30 September 2007 was 891 t and, based on an export price of \$7.37 per kg, would represent a reduction in revenue of approximately \$2.70M.
- 86 The average catch from the last two fishing years, 1 October 2005 to 30 September 2007, was only 721 t. Based on these recent catches, a reduction in the TACC to 524 t would represent a reduction in revenue of approximately \$1.45M.

Benefits

- 87 Taking a long-term view, this option should provide a greater likelihood than Option 3 that BNS 1 increases to, or remains at, a level that can produce MSY. When compared to Option 3, this option will result in a greater reduction in the TAC and would not provide a short-term financial advantage as outlined above for Option 1.
- 88 Reducing the TACC should have the advantage of leaving additional BNS in the water. These additional fish may benefit the recreational and customary sectors by increasing catch rates and possibly, over time, the size of BNS available.

Hauraki Gulf Marine Park Act 2000

- 89 Section 11(2)(c) of the Fisheries Act requires the Minister to take into account ss 7 and 8 of the Hauraki Gulf Marine Park Act 2000 when setting or varying

any sustainability measure; including a TAC. Further, s 13 of the Hauraki Gulf Marine Park Act 2000 requires the Minister when setting a TACC to have particular regard to ss 7 and 8 of the Hauraki Gulf Marine Park Act 2000 in so far as the decision relates to the Hauraki Gulf.

- 90 Section 7 recognises the national significance of the Hauraki Gulf including its capacity to provide for the relationship of tangata whenua with the Gulf and the social, economic, recreational, and cultural well-being of people and communities. Section 8 sets out the objectives of the management of the Hauraki Gulf, which include the maintenance of the Hauraki Gulf for the social and economic well-being and its contribution to the recreation and enjoyment of the people and communities of the Hauraki Gulf and New Zealand. The maintenance and enhancement of the physical resources of the Gulf, which include BNS, is also an objective.
- 91 Given that the options proposed for BNS TACs do not change the customary or recreational allowances, there is likely to be little impact on the historic, traditional, cultural, and spiritual relationship of the tangata whenua; or the social, economic, recreational, and cultural well-being of people and communities associated with the Gulf.
- 92 There is a possibility that reduced commercial catch in the larger area of BNS 1 will increase the availability of BNS to the customary and recreational sector in the Hauraki Gulf. In addition, based on the proposals to reduce the TACC only, the options for all BNS stocks will result in a greater proportion of the TAC being allocated to non-commercial Māori and recreational fishing interests.
- 93 There is little reported commercial catch of BNS from the Statistical Areas 005, 006 and 007; between 1 October 2001 and 30 September 2007, 7.7 t of BNS was reported as being caught commercially from this area using any method. These Statistical Areas are situated in the BNS 1 and also overlap with the Hauraki Gulf Marine Park in the inner Hauraki Gulf. Given this small current catch, the well-being of the commercial sector is unlikely to be affected. If the TACC of BNS was reduced commercial fishers would still be able to harvest BNS from the Hauraki Gulf.
- 94 There is also partial overlap of the Hauraki Gulf Marine Park with the significantly larger statistical area 008. This area encompasses the eastern side of Great Barrier Island and the eastern coast of the Coromandel Peninsula down to Shoe Island. BNS catches from area 008 are more significant; between 1 October 2001 and 30 September 2007, 346 t of BNS was reported as being caught commercially from this area using any method. MFish believes that the options proposed in this paper do not impact significantly on the wellbeing of the people of the Hauraki Gulf.

Table 10. Summary of options proposed for BNS 1.

TACC (t)	Customary Allowance (t)	Recreational Allowance (t)	Other sources of fishing-related mortality (t)	TAC (t)
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Option 2	786	8	15	16	825
Option 3	612	8	15	12	647
Option 4	524	8	15	11	558

BNS 2

95 CPUE in the target bottom long-line fishery declined by 79 % between 1 October 2001 and 30 September 2007. Two options are discussed below and are summarised in Table 12.

Option 2 – Impact and Costs

96 This option would reduce the TACC in BNS 2 from 1 048 t to 902 t. The average catch in BNS 2 between 1 October 2001 and 30 September 2007 was 1022 t and, based on an export price of \$7.37 per kg, would represent a reduction in revenue of approximately \$804,000.

97 Unlike BNS 1, catches have remained relatively stable in BNS 2 over the last six years (Table 11 and Figure 7). It appears that commercial fishers have had to expend significantly more effort to maintain these catches as is evident from the large decline in CPUE of 79 % in BNS 2; the largest decline in any of the CPUE indices.

98 The average recent catch between 1 October 2005 and 30 September 2007 is 1 047 t and is greater than the average over the longer period. Based on these recent catches, a reduction in the TACC to 902 t would represent a reduction in revenue of approximately \$1.07M.

Table 11: Reported landings of BNS in BNS 2.

	Reported landings (t)	TACC (t)
2001–02	1 010	873
2002–03	933	873
2003–04	933	873
2004–05	1 162	1 048
2005–06	1 136	1 048
2006–07	957	1 048

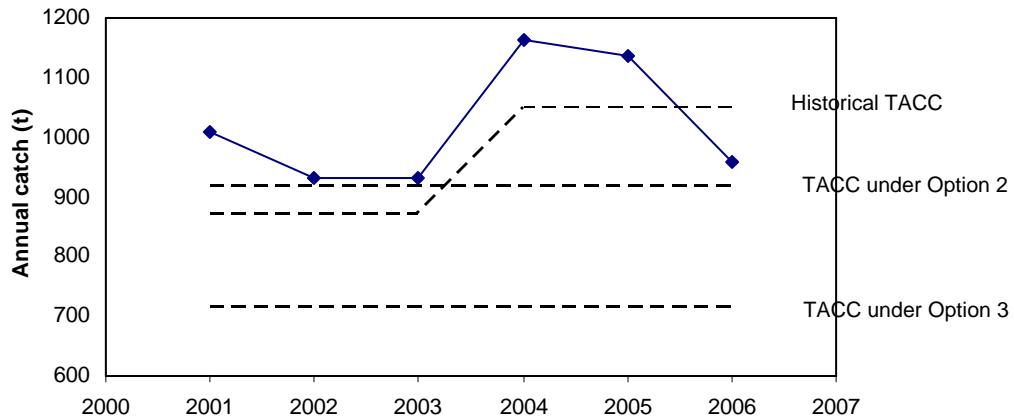


Figure 7: Average catches in relation to the historical TACC and the proposed TACCs under Options 2 and 3.

- 99 Because of the maintenance of catches in BNS 2, and in some years catch in excess of the TACC, this option would reduce catch below recent catch level.

Benefits

- 100 Taking a long-term view, this option should increase the likelihood that BNS 2 increases to, or remains at, a level that can produce MSY. When compared to Option 3, this option will result in a lesser reduction in the TAC and may provide a short-term financial advantage to the commercial sector by maintaining higher BNS catches in the coming fishing year or allowing more time to adjust their fishing practices and infrastructure to accommodate any future reductions in BNS TACs should they be necessary.
- 101 Reducing the TACC should have the advantage of leaving additional BNS in the water; this will benefit all sector groups.

Option 3 – Impact and Costs

- 102 This option would reduce the TACC in BNS 2 from 1 048 t to 701 t. The average catch in BNS 2 between 1 October 2001 and 30 September 2007 was 1022 t and, based on an export price of \$7.37 per kg, would represent a reduction in revenue of approximately \$2.37M.
- 103 The average recent catch between 1 October 2005 and 30 September 2007 is 1 047 t and is greater than the average over the longer period (Figure 7). Based on these recent catches, a reduction in the TACC to 701 t would represent a reduction in revenue of approximately \$2.55M.
- 104 Because of the maintenance of catches in BNS 2, this option represents the highest reduction in catch and therefore most significant economic cost of the options proposed in all BNS stocks.

Benefits

- 105 Taking a long-term view, this option should provide a greater likelihood than Option 2 that BNS 2 increases to, or remains at, a level that can produce MSY.

When compared to Option 2, this option will result in a greater reduction in the TAC and would not provide a short-term financial advantage as outlined above for Option 1.

- 106 Reducing the TACC should have the advantage of leaving additional BNS in the water; this will benefit all sector groups.

Table 12. Summary of options proposed for BNS 2.

	TACC (t)	Customary Allowance (t)	Recreational Allowance (t)	Other sources of fishing-related mortality (t)	TAC (t)
Option 2	902	13	25	18	958
Option 3	701	13	25	14	753

BNS 3

- 107 Two CPUE indices were presented above for BNS 3. CPUE in the Chatham Rise trawl fishery (by-catch) declined by 71 % between 1 October 2001 and 30 September 2007; and by 67 % in the target bottom long-line fishery. There is also evidence of a gradual reduction in the proportion of mature fish (> 60 cm) in the sampled catch in the trawl fishery. Three options are discussed below; all of which are summarised in Table 14.

Option 2 – Impact and Costs

- 108 This option would reduce the TACC in BNS 3 from 925 t to 649 t. The average catch in BNS 3 between 1 October 2001 and 30 September 2007 was 736 t. Based on an export price of \$7.37 per kg this would represent a reduction in revenue of approximately \$641,000.
- 109 Catches have declined in BNS 3 over the last six years with an average recent catch between 1 October 2005 and 30 September 2007 of only 524 t (Table 13 and Figure 8). Based on these recent catches, a reduction in the TACC to 649 t would not represent reduction in catch or revenue.

Table 13: Reported landings of BNS in BNS 3. Asterisk denotes the 250 t transitional ACE provided to the Chatham Islands.

	Reported landings (t)	TACC (t)
2001–02	733	925*
2002–03	876	925*
2003–04	915	925
2004–05	844	925
2005–06	536	925
2006–07	511	925

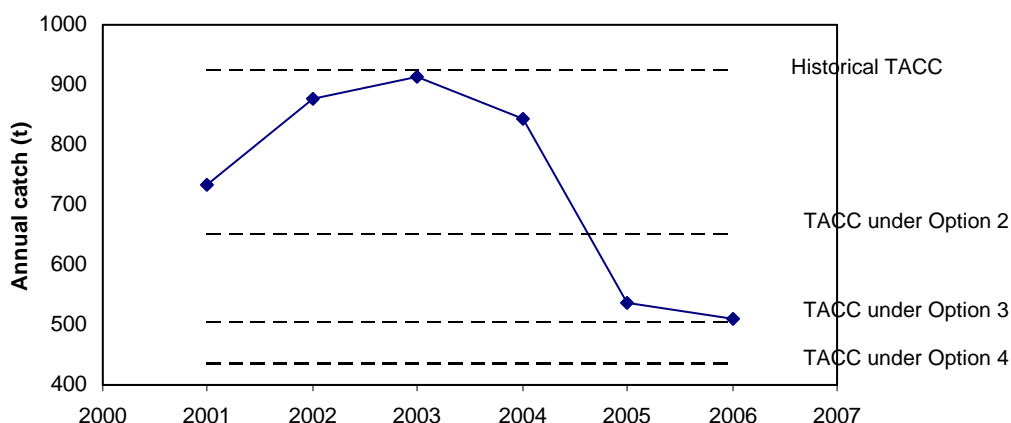


Figure 8: Average catches in relation to the historical TACC and the proposed TACCs under Options 2, 3 and 4. This does not include the 250 t transitional ACE provided to the Chatham Islands in 2001 and 2002.

- 110 Because of the decline in recent catches, a reduction in the TACC to 10% below average catches between 1 October 2001 and 30 September 2007 will not constrain recent catch. As such, there is a risk that continuing to fish at current levels, or potentially slightly higher, will not sufficiently arrest any decline in stock size implied by falling CPUE.

Benefits

- 111 Taking a long-term view, this option should increase the likelihood that BNS 3 increases to, or remains at, a level that can produce MSY. However, given the recent under-catch of the TACC this option would not constrain catches based on the catch over the last two fishing years, as such, it is less clear that this option will increase the biomass in BNS 3. The benefit of this option to the commercial sector is that it does not result in any loss in revenue compared to the last two fishing years.

Option 3 – Impact and Costs

- 112 This option would reduce the TACC in BNS 3 from 925 t to 505 t. The average catch in BNS 3 between 1 October 2001 and 30 September 2007 was 736 t and, based on an export price of \$7.37 per kg, would represent a reduction in revenue of approximately \$1.70M.
- 113 Catches have declined in BNS 3 over the last six years with an average recent catch between 1 October 2005 and 30 September 2007 of only 524 t (Table 13 and Figure 8). Based on these recent catches, a reduction in the TACC to 505 t would represent a reduction in revenue of approximately \$140,000.
- 114 Because of the decline in recent catches, a reduction in the TACC to 30% below average catches between 1 October 2001 and 30 September 2007 will only represent a small constraint on fishing in relation to average catches of the past two fishing years.

Benefits

115 Given the recent under-catch of the TACC this option would constrain catches to approximately those of the last two fishing years. As such, this option will result in a greater likelihood that the biomass of BNS 3 will increase when compared to Option 2. The benefit of this option to the commercial sector is that it results in only modest reductions in revenue compared to the last two fishing years.

Option 4 – Impacts and Costs

116 Because BNS catches have been declining steadily in BNS 3 over the last six years (Table 13 and Figure 8), the six year average is considerably higher than the catch from the last two fishing years. As a result, Option 2 does not constrain recent catch from the last two fishing years. A fourth option is suggested to reduce recent catch to a level further below the average catch of the last two years to increase the likelihood that the biomass of BNS 1 will increase.

117 This option would reduce the TACC in BNS 3 from 1000 t to 433 t. The average catch in BNS 3 between 1 October 2001 and 30 September 2007 was 736 t and, based on an export price of \$7.37 per kg, would represent a reduction in revenue of approximately \$2.23M.

118 The average catch from the last two fishing years, 1 October 2005 to 30 September 2007, was only 524 t. Based on these recent catches, a reduction in the TACC to 433 t would represent a reduction in revenue of approximately \$671,000.

Benefits

119 Taking a long-term view, this option should provide a greater likelihood than Option 3 that BNS 3 increases to, or remains at, a level that can produce MSY. When compared to Option 3, this option will result in a greater reduction in the TAC and would not provide a short-term financial advantage as outlined above for Option 1.

120 Reducing the TACC should have the advantage of leaving additional BNS in the water; this will benefit all sector groups.

Table 14. Summary of options proposed for BNS 3.

	TACC (t)	Customary Allowance (t)	Recreational Allowance (t)	Other sources of fishing-related mortality (t)	TAC (t)
Option 2	649	18	18	13	698
Option 3	505	18	18	10	551
Option 4	433	18	18	9	478

BNS 7

121 The lack of data in both BNS 7 and 8 required a combined CPUE analysis for the target bottom long-line fishery in these two areas. The CPUE declined by 64 % between 1 October 2001 and 30 September 2007. Two options are discussed below and are summarised in Table 16.

Option 2 – Impact and Costs

122 This option would reduce the TACC in BNS 7 from 150 t to 89 t. The average catch in BNS 7 between 1 October 2001 and 30 September 2007 was 101 t and, based on an export price of \$7.37 per kg, would represent a reduction in revenue of approximately \$88,000.

123 However, catches have fluctuated significantly in BNS 7 over the last six years; with an average recent catch between 1 October 2005 and 30 September 2007 of 124 t (Table 15 and Figure 9). Based on these recent catches, a reduction in the TACC to 89 t would represent a reduction in revenue of approximately \$258,000.

Table 15: Reported landings of BNS in BNS 7.

	Reported landings (t)	TACC (t)
2001–02	70	150
2002–03	76	150
2003–04	117	150
2004–05	94	150
2005–06	84	150
2006–07	164	150

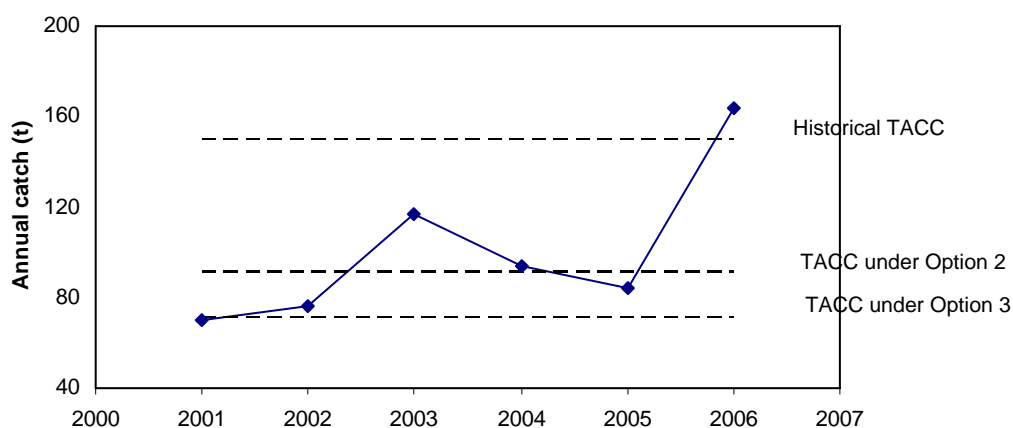


Figure 9: Average catches in relation to the historical TACC and the proposed TACCs under Options 2 and 3.

- 124 Because of the fluctuation in catch in BNS 7, a TACC of 89 t would only have constrained catches in three of the last six years (Figure 9).
- 125 Catches in BNS 7 are low compared to BNS 1, 2 and 3, yet the CPUE in BNS 7 and 8 still declined by 64 %. This lends support to the proposition that there may be a single BNS stock.
- 126 Reducing the TACC in BNS 7 may significantly reduce the liquidity of the ACE market as larger operators retain ACE to cover by-catch in larger fisheries such as hoki. This may have considerable impact on smaller fishers who rely on ACE for target BNS fisheries. Given this, and the possibility of a single New Zealand-wide BNS stock, reductions in BNS 7 may have disproportionate impacts on individual fishers in BNS 7.

Benefits

- 127 Taking a long-term view, this option should increase the likelihood that BNS 7 increases to, or remains at, a level that can produce MSY. When compared to Option 3, this option will result in a lesser reduction in the TAC and may provide a short-term financial advantage to the commercial sector by maintaining higher BNS catches in the coming fishing year or allowing more time to adjust their fishing practices and infrastructure to accommodate any future reductions in BNS TACs should they be necessary.
- 128 Reducing the TACC should have the advantage of leaving additional BNS in the water; this will benefit all sector groups.

Option 3 – Impact and Costs

- 129 This option would reduce the TACC in BNS 7 from 150 t to 70 t. The average catch in BNS 7 between 1 October 2001 and 30 September 2007 was 101 t and, based on an export price of \$7.37 per kg, would represent a reduction in revenue of approximately \$228,000.
- 130 Because catches have fluctuated significantly in BNS 7 over the last six years; with an average recent catch between 1 October 2005 and 30 September 2007 of 124 t (Table 15 and Figure 9) the recent catches have been higher than the average over the longer period. Based on these recent catches, a reduction in the TACC to 70 t would represent a reduction in revenue of approximately \$398,000.
- 131 Catches in BNS 7 are low compared to BNS 1, 2 and 3, yet the CPUE in BNS 7 and 8 still declined by 64 %. This lends support to the proposition that there may be a single BNS stock.
- 132 Reducing the TACC in BNS 7 may significantly reduce the liquidity of the ACE market as larger operators retain ACE to cover by-catch in larger fisheries such as hoki. This may have considerable impact on smaller fishers who rely on ACE for target BNS fisheries. Given this, and the possibility of a single New Zealand-wide BNS stock, reductions in BNS 7 may have disproportionate impacts in individual commercial fishers in BNS 7.

Benefits

- 133 Taking a long-term view, this option should provide a greater likelihood than Option 2 that BNS 1 increases to, or remains at, a level that can produce MSY. When compared to Option 2, this option will result in a greater reduction in the TAC and would not provide a short-term financial advantage as outlined above for Option 1.
- 134 Reducing the TACC should have the advantage of leaving additional BNS in the water; this will benefit all sector groups.

Table 16. Summary of options proposed for BNS 7.

	TACC (t)	Customary Allowance (t)	Recreational Allowance (t)	Other sources of fishing-related mortality (t)	TAC (t)
Option 2	89	2	3	2	96
Option 3	70	2	3	1	76

BNS 8

- 135 The combined CPUE index for the target bottom long-line fishery in BNS 7 and 8 declined by 64 % between 1 October 2001 and 30 September 2007. Two options are discussed below and are summarised in Table 18.

Option 2 – Impact and Costs

- 136 This option would reduce the TACC in BNS 8 from 100 t to 43 t. The average catch in BNS 8 between 1 October 2001 and 30 September 2007 was 49 t and, based on an export price of \$7.37 per kg, would represent a reduction in revenue of approximately \$44,000.
- 137 However, the average recent catch between 1 October 2005 and 30 September 2007 was only 35 t (Table 17 and Figure 10) and based on these recent catches, a reduction in the TACC to 43 t would not represent a reduction in catch or revenue.

Table 17: Reported landings of BNS in BNS 8.

	Reported landings (t)	TACC (t)
2001–02	17	100
2002–03	66	100
2003–04	96	100
2004–05	42	100
2005–06	20	100
2006–07	50	100

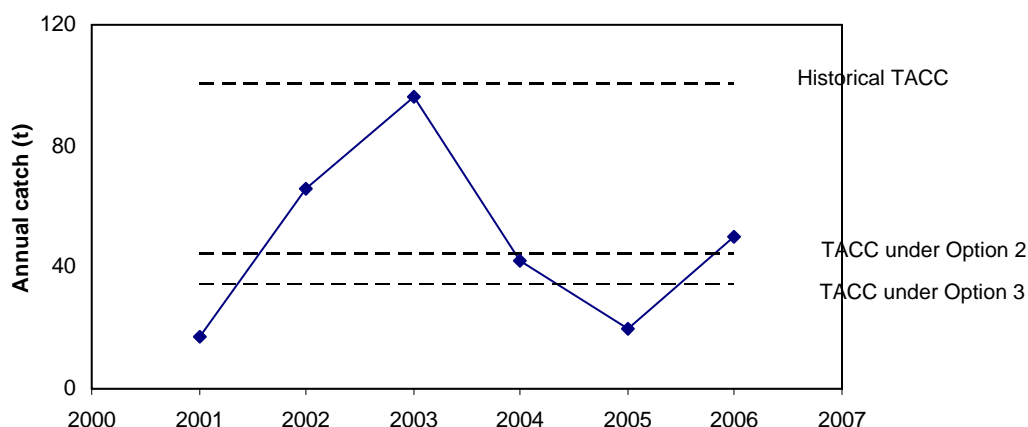


Figure 10: Average catches in relation to the historical TACC and the proposed TACCs under Options 2 and 3.

138 As in BNS 7, catches in BNS 8 are low compared to BNS 1, 2 and 3, yet the CPUE in BNS 7 and 8 still declined by 64 %. This lends support to the proposition that there may be a single BNS stock.

139 Reducing the TACC in BNS 8 may significantly reduce the liquidity of the ACE market as larger operators retain ACE to cover by-catch in larger fisheries such as hoki. This may have considerable impact on smaller fishers who rely on ACE for target BNS fisheries. Given this, and the possibility of a single New Zealand-wide BNS stock, reductions in BNS 8 may have disproportionate impacts on individual fishers in BNS 8.

Benefits

140 Taking a long-term view, this option should increase the likelihood that BNS 8 increases to, or remains at, a level that can produce MSY. However, given the consistent under-catch of the TACC this option would not constrain catches based on the catch over the last two fishing years, as such, it is less clear that this option will increase the biomass in BNS 8. The benefit of this option to the commercial sector is that it does not result in any loss in revenue compared to the last two fishing years.

141 Reducing the TACC under this option may not result in a reduction in catches compared to the last two fishing years. Consequently, there may be little or no benefit to any sector.

Option 3 – Impact and Costs

142 This option would reduce the TACC in BNS 8 from 100 t to 33 t. The average catch in BNS 8 between 1 October 2001 and 30 September 2007 was 49 t and, based on an export price of \$7.37 per kg, would represent a reduction in revenue of approximately \$118,000.

143 The average recent catch between 1 October 2005 and 30 September 2007 was only 35 t (Table 17 and Figure 10) and based on these recent catches, a

reduction in the TACC to 33 t would represent a reduction in revenue of \$15,000.

- 144 As in BNS 7, catches in BNS 8 are low compared to BNS 1, 2 and 3, yet the CPUE in BNS 7 and 8 still declined by 64 %. This lends support to the proposition that there may be a single BNS stock.
- 145 Reducing the TACC in BNS 8 may significantly reduce the liquidity of the ACE market as larger operators retain ACE to cover by-catch in larger fisheries such as hoki. This may have considerable impact on smaller fishers who rely on ACE for target BNS fisheries. Given this, and the possibility of a single New Zealand-wide BNS stock, reductions in BNS 8 may have disproportionate impacts on individual fishers in BNS 8.

Benefits

- 146 Taking a long-term view, this option should increase the likelihood that BNS 8 increases to, or remains at, a level that can produce MSY. However, given the consistent under-catch of the TACC this option would not constrain catches based on the catch over the last two fishing years, as such, it is less clear that this option will increase the biomass in BNS 8. The benefit of this option to the commercial sector is that it results in only a modest reduction in revenue compared to the last two fishing years.
- 147 Reducing the TACC under this option may not result in a reduction in catches compared to the last two fishing years. Consequently, there may be little or no benefit to any sector.

Table 18. Summary of options proposed for BNS 8.

	TACC (t)	Customary Allowance (t)	Recreational Allowance (t)	Other sources of fishing-related mortality (t)	TAC (t)
Option 2	43	1	2	1	47
Option 3	33	1	2	1	37

Review of Other Management Measures

Compliance

- 148 There may be compliance implications associated with any reductions in TACCs to levels below current. The reduced ACE available may lead to some fishers not being able to cover their catch.
- 149 This shortage of ACE may provide an incentive to misreport the area from which catches were taken or the weight of species caught. In some cases different species may be reported. Similarly there may be an increased likelihood that species will be dumped.

- 150 MFish has monitoring and at sea surveillance in place to ensure that any illegal fishing activity that occurs is detected. This is part of MFish's overarching monitoring and compliance activity.

Deemed values

- 151 MFish is also consulting on increasing deemed values in BNS 1, 3, 7 and 8. Further information on this is included in the Ministry's deemed value review.

Appendix One: Statutory Considerations

- 152 **Section 5** of the Fisheries Act 1996 (the Act) requires that the Minister shall act in a manner consistent with New Zealand's international obligations and Treaty of Waitangi (Fisheries Claims) Settlement Act 1992. To this end, the provisions of general international instruments such as UNCLOS and the Fish Stocks Agreement have been implemented through the provisions of the Act. The Ministry is not aware of any specific international obligations relating to BNS fisheries. The proposed options are consistent with the obligations relating to the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992.
- 153 **Section 8** of the Act describes the purpose of the Act as being to provide for the utilisation of fisheries resources while ensuring sustainability, and defines the meanings of utilisation and sustainability. The management options presented seek to achieve the purpose of the Act. The proposals seek to ensure sustainability under the respective catch limits and take into account the respective costs of management versus the utilisation benefits.
- 154 **Section 9** of the Act prescribes the following environmental principles that must be taken into account when exercising powers in relation to utilisation of fisheries resources while ensuring sustainability:
- 155 **Sections 9(a) and (b)** require the Minister to take into account that associated or dependent species (those that are not harvested) be maintained at or above a level that ensures their long-term viability, and that the biological diversity of the aquatic environment should be maintained. While some bycatch of non-harvested species is known in BNS trawl fisheries, long-line fisheries have a relatively low level of by-catch. Management of BNS fisheries will within standards developed for protected species such as seabirds.
- 156 By-catch of fish species is also monitored under the reporting requirements of the Act; at this time there is no concern around any fish by-catch.
- 157 The impact that fishing for BNS stocks has on the long term viability and biological diversity of the aquatic environment is of greater concern in regions of relatively more bio-diverse topographic features. Large areas of the seabed have been set aside from trawling under the recent Fisheries (Benthic Protection Areas) Regulations 2007. These protected areas include many seamounts and other underwater topographic features and cover some 1.2 million square kilometres or approximately 30% of New Zealand's EEZ.
- 158 **Section 9(c)** requires the Minister to take into account the principle that habitat of particular importance for fisheries management should be protected. MFish are not aware of any such habitats that are affected by BNS fisheries.
- 159 **Section 10** of the Act sets out the information principles, which require that decisions be based on the best available information, taking into account any uncertainty in that information, and applying caution when information is uncertain, unreliable, or inadequate. In accordance with s 10, the absence of

information should not be used as a reason to postpone, or fail to take, any measure to achieve the purpose of the Act, including providing for utilisation at levels considered to be sustainable. A thorough review of available information has been undertaken by the Adaptive Management Programme Working Group and the Plenary and the best available information has been used to derive management options. MFish has endeavoured to set out the relevant uncertainty in, and inadequacy of, that information so that the appropriate caution can be applied in assessing the proposed management options.

- 160 **Section 11(1)(a):** Before varying the TAC for any BNS stock, the Minister must take into account any effects of fishing on any stock and the aquatic environment. No information about any effects of fishing on any stock or on the aquatic environment is considered relevant to the consideration of sustainability measures for BNS stocks at this time.
- 161 **Section 11(1)(b):** Before varying the TAC for BNS stocks, the Minister must take into account of any existing controls under the Act that apply to the stock or area concerned. For BNS stocks, the measures that apply currently are a TAC, TACC, recreational and customary allowances and, in BNS 2, an allowance for incidental fishing-related mortality. These allowances are described in the body of the paper. No other controls under the Act apply specifically to BNS stocks.
- 162 **Section 11(1)(c):** Before varying the TAC for BNS stocks, the Minister must take into account the natural variability of the stock. Annual variation in BNS biomass is not known to be high, and therefore the natural variability of BNS is not a concern in setting the TAC for any BNS stock.
- 163 **Sections 11(2)(a) and (b):** Before varying the TAC for BNS stocks, the Minister must have regard to any provisions of any regional policy or plan under the Resource Management Act 1991 and any management strategy or plan under the Conservation Act 1997 that apply to the coastal marine area and are considered relevant. MFish is not aware of any such provisions that should be taken into account for any BNS stock.
- 164 **Section 11(2)(c):** Before varying the TAC for BNS stocks, the Minister must have regard to sections 7 and 8 of the Hauraki Gulf Marine Park Act 2000 that apply to the coastal marine area and you consider relevant. A portion of BNS 1 overlaps with the Hauraki Gulf Marine Park, as such, that Act must be considered in making decisions for BNS 1. The relevant sections of the Hauraki Gulf Marine Park Act 2000 are set out below.

Hauraki Gulf Marine Park Act 2000

Section 7. Recognition of national significance of Hauraki Gulf

(1) The interrelationship between the Hauraki Gulf, its islands, and catchments and the ability of that interrelationship to sustain the life-supporting capacity of the environment of the Hauraki Gulf and its islands are matters of national significance.

- (2) The life-supporting capacity of the environment of the Gulf and its islands includes the capacity—
- (a) to provide for—
 - (i) the historic, traditional, cultural, and spiritual relationship of the tangata whenua of the Gulf with the Gulf and its islands; and
 - (ii) the social, economic, recreational, and cultural well-being of people and communities:
 - (b) to use the resources of the Gulf by the people and communities of the Gulf and New Zealand for economic activities and recreation:
 - (c) to maintain the soil, air, water, and ecosystems of the Gulf.

Section 8. Management of Hauraki Gulf

To recognise the national significance of the Hauraki Gulf, its islands, and catchments, the objectives of the management of the Hauraki Gulf, its islands, and catchments are—

- (a) the protection and, where appropriate, the enhancement of the life-supporting capacity of the environment of the Hauraki Gulf, its islands, and catchments:
- (b) the protection and, where appropriate, the enhancement of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments:
- (c) the protection and, where appropriate, the enhancement of those natural, historic, and physical resources (including kaimoana) of the Hauraki Gulf, its islands, and catchments with which tangata whenua have an historic, traditional, cultural, and spiritual relationship:
- (d) the protection of the cultural and historic associations of people and communities in and around the Hauraki Gulf with its natural, historic, and physical resources:
- (e) the maintenance and, where appropriate, the enhancement of the contribution of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments to the social and economic well-being of the people and communities of the Hauraki Gulf and New Zealand:
- (f) the maintenance and, where appropriate, the enhancement of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments, which contribute to the

recreation and enjoyment of the Hauraki Gulf for the people and communities of the Hauraki Gulf and New Zealand.

Section 13. Obligation to have particular regard to sections 7 and 8

Except as provided in sections 9 to 12, in order to achieve the purpose of this Act, all persons exercising powers or carrying out functions for the Hauraki Gulf under any Act specified in Schedule 1 [including the Fisheries Act 1996] must, in addition to any other requirement specified in those Acts for the exercise of that power or the carrying out of that function, have particular regard to the provisions of sections 7 and 8 and of this Act.

- 165 **Section 11(2A)(b):** Before varying the TAC for BNS stocks the Minister must take account of any relevant and approved fisheries plans. There is no approved fisheries plan in place for any BNS stock.
- 166 **Sections 11(2A)(a) and (c):** Before varying the TAC for BNS stocks the Minister must take into account any conservation or fisheries service, or any decision not to require such services. MFish does not consider that existing or proposed services materially affect the proposals for any BNS stock. No decision has been made to not require a service in any BNS fishery at this time.
- 167 **Section 13:** MFish recommends that the TAC be considered for variation pursuant to s 13(2)(b) to enable BNS stocks to be restored to a level at or above B_{MSY} . Whether or not the TAC can, finally, be varied under this provision will depend upon what advice can be given to the Minister on $B_{CURRENT}$ and B_{MSY} once the consultation process is completed.
- 168 Of the stocks that make up BNS, all have shown significant declines in CPUE over the last six years. Although the Plenary did not supply estimates of $B_{CURRENT}$ and B_{MSY} , MFish scientists consider that it is still possible to make inferences about the stock status of the BNS stocks based on the CPUE data. If BNS stocks are hyper-stable, the decline in biomass would result in stock biomass of about 26% B_0 . Although an estimate of B_{MSY} as a percentage of B_0 is not given in the Plenary, MFish scientists consider that, based on species with similar life history including a very low natural mortality (0.08), it is likely to be in the range of 30-45% B_0 .
- 169 The specific considerations set out in s 13(2)(b) include having regard to the interdependence of stocks, the biological characteristics of the stock and any environmental conditions affecting the stock. As such, in considering the proposed TAC options and corresponding proposed periods of rebuild, the Minister must take into account:
- i) The interdependence of stocks for BNS stocks (as required by s 13(2)(b)(i)). There is no information to suggest the interdependence of stocks should affect the level of the TAC for any BNS stock at this time.

- ii) Environmental factors affecting BNS stocks (as required under s 13(2)(b)(ii)). No specific environmental conditions affecting BNS stocks have been identified.
- iii) The biological characteristics of BNS (as required under s 13(2)(b)(ii)). It is known that BNS are relatively long-lived and late maturing, which are biological characteristics that render them slow to recover from overfishing.

170 **Section 13(3)** requires that the Minister, in considering the way and rate at which a stock is moved towards B_{MSY} , have regard to such social, cultural, and economic factors as he considers being relevant when determining the way and rate at which to move the stock biomass toward or above the B_{MSY} level.

171 MFish has considered the economic impact of reducing the BNS TACs. The final decision on the quantum of any reduction in the TAC will depend on the Minister's interpretation of the severity and immediacy of the sustainability risk and the socio-economic impacts associated with various reductions.

172 **Section 20 and 21** specify a number of matters that must be taken into account when setting or varying a TACC. Section 21 requires the Minister to allow for non-commercial Māori and recreational fishing interests, and other sources of fishing-related mortality when setting or varying the TACC. Allowances for recreational and customary fishers have been retained in the proposed TACs. Based on the proposals to reduce the TACC only, the options for all BNS stocks will result in a greater proportion of the TAC being allocated to non-commercial Māori and recreational fishing interests. Allowances for other sources of fishing-related mortality are also included in this paper.

173 **Section 21(4)** also requires that any mātaihai reserve or closures/restrictions under s 186A to facilitate customary fishing be taken into account. Mātaihai reserves are located within BNS QMAs; however, the nature of BNS fisheries being primarily offshore and confined to deeper waters means that the options outlined in this paper should not impact on mātaihai reserves or closures/restrictions under s 186A.

174 **Section 21(5)** also requires that any regulations to prohibit fishing made under s 311 be taken into account when setting allowances for recreational interests. MFish is not aware of any restrictions under s 311 that have been placed on fishing in any area within current BNS fisheries.