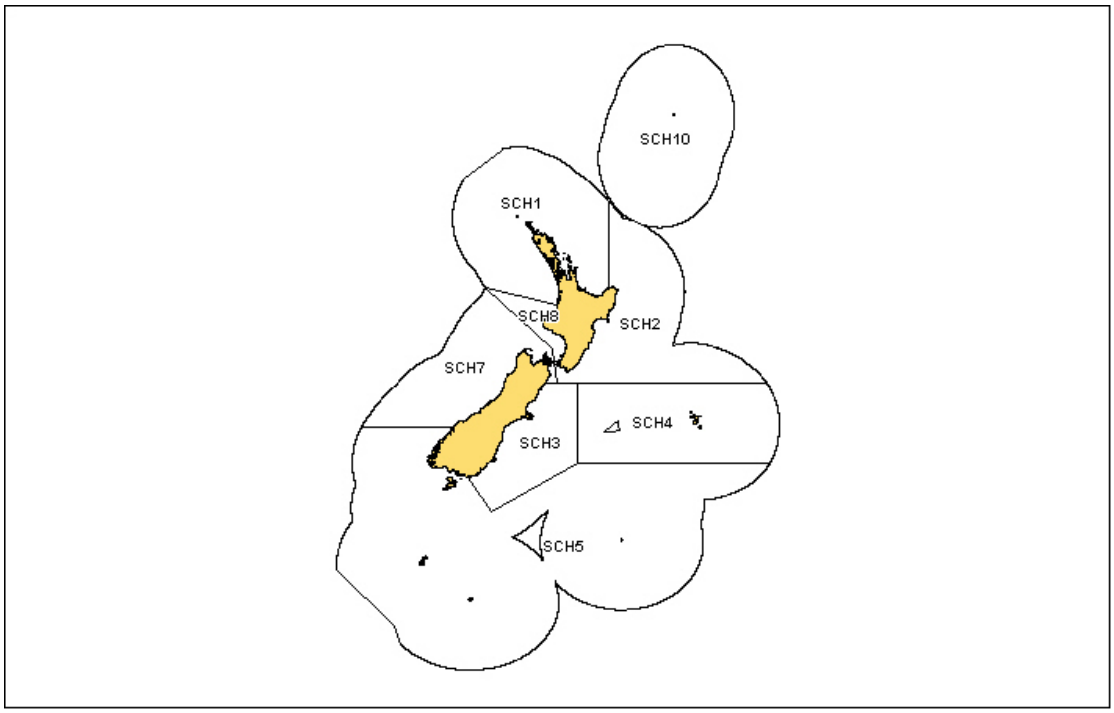
SCHOOL SHARK (SCH 1)

Figure 1: Map showing Quota Management Areas for School Shark (SCH) stocks



Executive Summary

1 The SCH 1 TACC has been set at 668 tonnes since 1994/95. Commercial Stakeholder Organisations (CSOs) have applied for this TACC to be increased under an adaptive management program (AMP) a number of times in recent years, most recently in March 2007. After confirmation that MFish was not accepting new AMP applications during the current financial year, the Northern Fisheries Management Stakeholder Company Ltd (Northern Fisheries) requested that a TACC increase be considered in the October 2007 sustainability round.

2 A TAC has not previously been set for SCH 1. MFish proposes to set a TAC for SCH 1 at a level that either: reflects current commercial catch limits and estimates of other catches (status quo); or is above the current limits to reflect recent and past catches. In setting the TAC under section 13(2)(a) of the Fisheries Act 1996 (the Act), the Minister must seek to maintain the stock at or above a level that can produce the maximum sustainable yield (MSY).

3 It is not known whether recent catch levels, or the current TACC, or the options presented in this paper are sustainable or if they are at levels that will allow the stocks to move towards a size that will support the MSY. However, catches and TACCs of SCH 1 and other SCH stocks have increased since 1986/87 and there are no indications that current catches are not sustainable in the short-term. Any increase in the TAC will depend on the Minister's

consideration of the risk of the stock falling below a level that can produce the MSY, and the relative social, economic and cultural effects of the increase.

4 Commercial landings of SCH 1 were consistently above the TACC from 1995/96 to 2004/05 (inclusive). Landings fell below the TACC in 2005/06; advice from CSOs and MFish data suggest that this fall in landings was because a reduction in the SNA 8 TACC in 2005/06 led to less school shark being taken as bycatch in the snapper fishery. The TACC at its current level may be constraining fishing for SCH 1 and for the stocks with which it is taken as a bycatch, such as hāpuku, rig and red gurnard around the north of the North Island.

5 The inherent sustainability risks associated with fishing for school shark need to be considered carefully in this review. Estimates of school shark biomass are unavailable. School shark is a species that is late maturing, slow growing with low fecundity and productivity and it is predicted to have a slow rate of recovery from over fishing (rebound potential). The rebound potential of school shark from fishing pressure has been assessed as amongst the lowest for shark species. School shark around New Zealand is considered to be a single biological stock so any changes in catch limits for one stock area are likely to affect the stock as a whole. Stock boundaries (based on QMAs) are essentially in place to prevent localised depletion.

6 Other risks of fishing for school shark include the impacts on Maui's dolphin and pregnant female school shark in the Kaipara Harbour. School shark fisheries are found within the range of Maui's dolphin on the west coast of the North Island. Increasing the SCH 1 TAC could increase the risk of Maui's dolphin interaction with fishing gear. Pregnant female school shark gather in the Kaipara Harbour to pup. While catches of school shark in the harbour are low, removing pregnant females could be a risk to sustainability given the biological characteristics of the species. However, it is not known if fishing pressure on school shark in the Kaipara Harbour would increase if the TAC was increased.

7 Sharks, including school shark, are an important taonga species and anecdotal information suggests that school shark formed part of a significant traditional customary fishery. School shark is of moderate importance to recreational fishers and to commercial fishers.

8 MFish proposes to set allowances for customary and recreational catches based on estimates of current catches by recreational fishers. MFish proposes to set the TACC based on either the existing TACC, or recent commercial catch levels.

9 A review of the SCH 1 deemed value is included in the *Review of the Deemed Value Rates for the October 2007 Sustainability Round* section of this document.

Summary of Options

10 Option 1 proposes that the TAC for SCH 1 be set at 866 tonnes. This option represents the status quo, providing for the existing TACC of 668 tonnes and estimates of current customary and recreational catches and other fishing-related mortality.

11 Option 2 proposes that the TAC for SCH 1 be set at 893 tonnes, an increase of 27 tonnes above option 1. A TAC of 893 tonnes reflects the average reported commercial landings in the past five years, plus allowances for customary and recreational fishing and other fishing-related mortality. Within this option the Minister may choose to allocate the increase proportionally to all sectors or non-proportionally in favour of one sector.

12 Option 3 proposes that the TAC for SCH 1 be set at 944 tonnes, an increase of 78 tonnes above option 1. A TAC of 944 tonnes reflects the average reported commercial landings in the past ten years, plus allowances for customary and recreational fishing and other fishing-related mortality. Within this option the Minister may choose to allocate the increase proportionally to all sectors or non-proportionally in favour of one sector.

13 For reasons discussed in detail further on in this paper, MFish considers that where the TAC is allocated non-proportionally, any increase should be allocated to the commercial sector.

14 The TAC options and allocation options are outlined in Table 1, below.

Table 1: SCH 1 management options (tonnes)

Option	Allowance Approach	TAC	Recreational Allowance	Customary Allowance	Other fishing related mortality	TACC
Option 1. TAC set at current limits	Not applicable	866	66	99	33	668
Option 2. TAC increase of 25 tonnes	Proportional	893	68	102	34	689
	Non-proportional	893	66	99	35	693
Option 3. TAC increase of 74 tonnes	Proportional	944	72	108	36	728
	Non-proportional	944	66	99	37	742

Rationale for Management Options

Request for TAC review

15 Commercial Stakeholder Organisations (CSOs) have applied for the SCH 1 TACC to be increased under an adaptive management program (AMP) a number of times in recent years, most recently in March 2007. After confirmation that MFish was not accepting new AMP applications during the current financial year, Northern Fisheries requested that a TACC increase be considered in the October 2007 sustainability round.

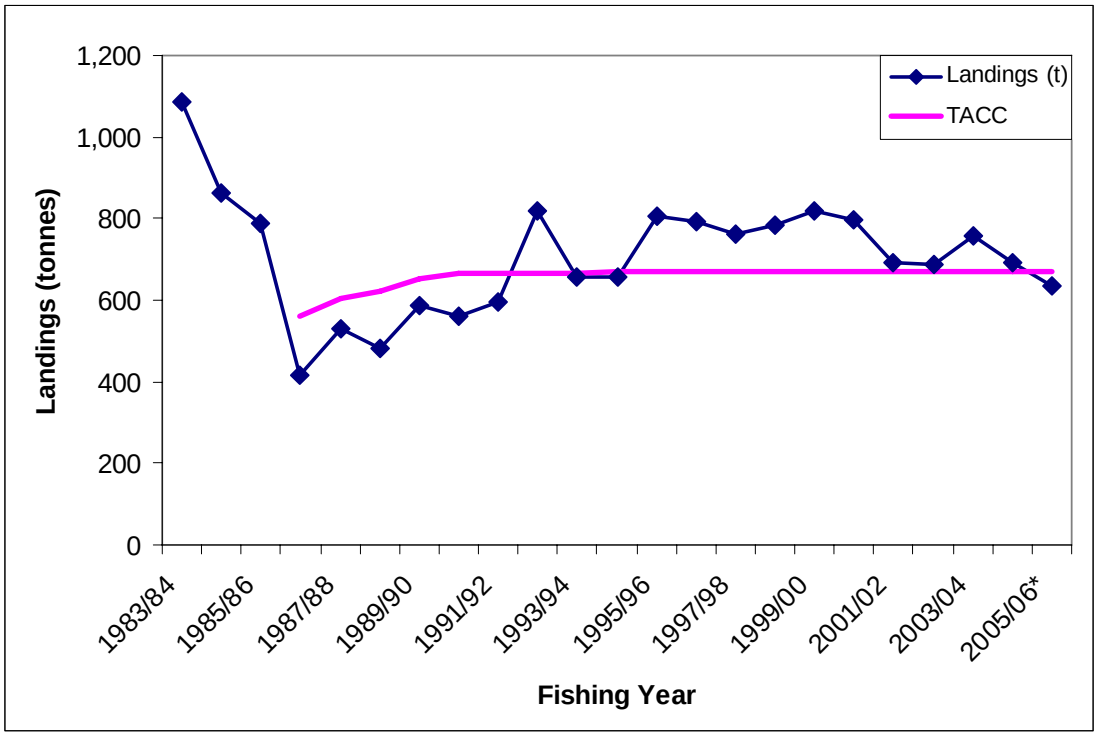
Current and recent commercial catches

16 MFish data[1] suggests that approximately 60% of SCH 1 was taken as a bycatch and 40% as a target stock in the last five fishing years. Of the target fishery, 64% has been taken by set-net and 34% by bottom long-line. Where school shark was taken as a bycatch, 45% was taken by bottom trawl (mainly while targeting tarakihi with some snapper and trevally), 32% by bottom long-line (mainly while targeting hāpuku with some snapper) and 19% by set-net (mainly while targeting rig, with some red gurnard and tarakihi). 30% of the total SCH 1 catch has been taken on the east coast with 70% on the west coast.

17 Commercial landings of SCH 1 have exceeded the TACC in all fishing years since 1994/95 except for 2005/06 (see Figure 2). The extent of overcatch has reduced since deemed values were introduced.

[1] These data are generated from catch effort reports (for fishing years 2001/02 to 2005/06) and will not include all catches of SCH 1 where taken as a bycatch. They therefore probably over-estimate the amount of SCH 1 which is taken as a target species. However, they are useful for indicative purposes.

Figure 2: SCH1 landings and TACC 1983/84 – 2005/06



18 The commercial sector has reported difficulties in securing sufficient ACE to cover all of their school shark catch. Deemed value payments have averaged $101,000 in the past five fishing years. Analysis of deemed value payments since 2003 shows that almost all fishers and fishing companies who made substantial deemed value payments for SCH 1 also held substantial amounts of ACE for SCH 1. Therefore, it does not appear that the overcatch is due to people deliberately fishing for SCH 1 without holding ACE. Rather, the overcatch appears to be mainly caught by those who have substantial ACE holdings, but not enough to cover their SCH 1 catch. Any increase in the TACC would increase the amount of ACE available.

19 Advice from CSOs suggests that the fall in landings in 2005/06 was because the SNA 8 TACC reduction in 2005/06 led to less school shark being taken as bycatch in the snapper fishery. MFish data[2] partially support this by showing that catches of SCH 1 when snapper was the target species fell from approximately 62 tonnes in 2004/05 to 35 tonnes in 2005/06, a drop of 27 tonnes. The fall in total SCH 1 landings between 2004/05 and 2005/06 was 60 tonnes.

20 Other school shark stocks in the South Island and the south-west coast of the North Island have had TACC increases of 5% (SCH 5) and 20% (SCH 3, 7 & 8) under adaptive management programmes[3]. As school shark around New

[2] These data are generated from catch effort reports and will not include all catches of SCH 1 where taken as a bycatch. However, they are useful for indicative purposes.
[3] Adaptive Management Programmes are programmes under which commercial catch limits are temporarily increased in return for commercial fishers recording far more detailed information on

Zealand is considered to be a single biological stock, the increases to the TACCs of school shark stocks are likely to impact both on abundance within the QMA where the TACC was increased and the wider stock.

Target fisheries

21 Discussions with commercial stakeholders suggest that the current TACC for SCH 1 is constraining their target SCH 1 fishery as they often only have sufficient ACE to cover bycatch. Increasing the TACC could therefore be expected to increase target fisheries for school shark using set nets and bottom long-lines.

22 There is a possibility that increasing the TACC may also increase commercial catches of some trawl fisheries with which SCH 1 is taken as a bycatch such as hāpuku (HPB 1), rig (SPO 1) and red gurnard (GUR 1).

23 Commercial landings of HPB 1, GUR 1 and SPO 1 have consistently been below their TACCs in recent years. Therefore if catches of HPB 1, GUR 1 and/or SPO 1 increased due to a SCH 1 TACC increase the increased catches may not exceed the TACCs of these stocks.

24 Commercial landings of other species with which SCH 1 has been taken as bycatch, such as TAR 1, SNA 1 and SNA 8, have been at or above their TACC levels. It is therefore considered that an increase to the SCH 1 TACC is unlikely to lead to increased catches of these stocks.

25 MFish considers that this discussion illustrates possible impacts on other commercially important species of increasing the SCH 1 TACC. However, it is not possible to say for certain what impact such an increase would have on the catch levels of these stocks.

Non-commercial catches

26 Compared to the commercial fishery, estimates of non-commercial catches are small. Nevertheless, recreational and customary fishers do target and catch school shark and the species is reportedly of particular value to Maori. If increasing the TACC increased commercial catch of school shark, there is a risk that this could cause a reduction in the size and abundance of school shark available to recreational and customary fishers, possibly reducing the value that these sectors obtain from the fishery.

Status of the SCH 1 stock

27 Historically, landings of school shark rose steeply from the late 1970s until 1983. Catches decreased by about 50% from 1986 onwards because of reduced catch limits within the QMS. TACs were originally set at half the 1983 catch because of apparently declining catch rates and concern about the low productivity of the species. As Figure 2 shows, the SCH 1 TACC has increased in various steps from 560 tonnes to 668 tonnes since 1986, and catches have also increased since 1986.

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things like fishing locations, fishing effort and size of fish caught. This information is then used to develop understanding of the status and biology of the stock concerned.

28 No estimates of current absolute biomass are available for any SCH stock. Estimates of relative abundance are based on CPUE analyses have been undertaken for target and bycatch fisheries around the country, using catches up to and including the 2001/02 fishing year[4]. No trends were found that could be interpreted as a change in abundance for the New Zealand stock as a whole. However, CPUE indices for school shark are characterised by high uncertainty.

29 Research is currently underway to determine more recent trends in relative abundance for SCH 1 based on catch and effort data. These results will be available later in 2007, but not in time to inform any decision this year.

30 MFish notes that trends in targeted CPUE time series can be unreliable for school shark populations because the fishery is unlikely to sample the population randomly due to the sparse, patchy, and variable distribution of school shark, a small variable target fishery, and a widespread bycatch fishery[5]. It has been recommended that because of the mobility of school sharks, New Zealand wide trends in landings or CPUE should take precedence over regional trends[4].

31 Nevertheless, CPUE analyses have produced indices that are flat or declining around the North Island (including SCH 1) and flat or increasing around the South Island. Although abundance of South Island fish stocks appeared to have increased, there is a view that this pattern may be due to a southward displacement of North Island fish.

32 The 2007 School Shark Plenary[6] reported that school shark catches and actual TACCs have steadily increased since 1986–87 and that CPUE indices are characterised by high uncertainty. However, there are no indications that current catches are not sustainable in the short-term. However, it is not known whether recent catch levels or the current TACCs are sustainable in the long-term, or if they are at levels that will allow the stocks to move towards a size that will support the maximum sustainable yield.

School shark biology

33 Tagged fish movements suggest that school shark around New Zealand is a single biological stock. However, there are no definitive data on which to base changes to the stock boundaries currently used for management purposes. The majority of recaptures have been within the same QMA, but some large scale, and even trans-Tasman, movements have been reported. Stock boundaries based on the current QMAs, are essentially in place to prevent localised depletion.

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[4] Ayers, D, Paul, L.J., Sanders, B.M. 2004. Estimation of catch per unit effort analyses for school shark (*Galeorhinus galeus*) from bycatch and target fisheries in New Zealand, 1989-90 to 2001-02. .*New Zealand Fisheries Assessment Report 2006/26.* 121 p.

[5] Bradford, E. (2001). Standardised catch rate indices for New Zealand school shark, *Galeorhinus galeus,* in New Zealand, 1989–90 to 1998–99. *New Zealand Fisheries Assessment Report 2001/33*. 75 p.

[6] This document summarises the conclusions and recommendations of scientists on the Inshore Working Group relating to school shark fisheries in New Zealand

34 School shark is a relatively slow growing, late maturing species with low fecundity. Age at maturity has been estimated at 12-17 years for males and 13-15 years for females. Breeding occurs once either every two or three years. These factors suggest that the stock is less productive and hence more susceptible to overfishing than many other fisheries, including most target fisheries of which SCH 1 is a bycatch.

35 A study of the productivity of shark stocks and their ability to recover from fishing pressure found that the "rebound ability" (resilience) of school shark was one of the lowest among shark species and that any recovery of school shark from fishing pressure would be slow. Shark species have a strong relationship between population size and recruitment, meaning that if the population declines, recruitment is likely to become progressively less successful.

36 School shark as a species is particularly vulnerable to over-fishing if the older, larger and more productive females are removed from the stock. Modelling work undertaken on the Australian school shark population indicates that it is important to protect the older, larger female school sharks during their years of greatest productivity.

37 These biological characteristics support setting a cautious TAC that would have a higher probability of ensuring sustainability.

Other impacts of fishing for SCH 1

38 MFish data suggests that in the past five fishing years around 40% of the SCH 1 caught has been taken within the probable range of Maui's dolphin. This includes 36% of SCH 1 taken by trawl and 17% of SCH 1 taken by set-net. Increasing the SCH 1 TAC could increase risk of Maui's dolphin interaction with fishing gear. In particular, CSOs have reported that the current TACC is constraining commercial target set-netting for SCH 1. Increasing the TACC could result in an increasing in targeting SCH 1 by set-net, a method considered to be a significant threat to Maui's dolphin. However, it is entirely possible that this increased fishing effort would occur outside of the range of Maui's dolphin. MFish is also working with the Department of Conservation and stakeholders to develop a Threat Management Plan for Maui's dolphin that seeks to mitigate fishing-related risks.

39 MFish is also concerned about the impact fishing for school shark in the Kaipara Harbour (statistical area 044) may have on the wider stock. The harbour may be a habitat of particular importance to the school shark fishery as pupping females migrate there to give birth. The results of the Australian modelling work suggest that removing the larger females from the population could be a significant risk to the sustainability of the stock.

40 As commercial catches of school shark in the Kaipara Harbour have declined from 35 tonnes in 2001/02 to 6 tonnes in 2005/06 (mainly due to retirements of fishers from the fishery) and only around 1% of the total SCH 1 commercial catch is now caught in the harbour, this risk may not be significant at current catch levels. However, it is possible that school shark catches in the Kaipara

Harbour could increase if the TACC is increased. Levels of customary and recreational catch in the harbour are unknown.

41 MFish data suggests that in the past five fishing years around 28% of the SCH 1 fishery has been taken as a trawl bycatch. If an increased SCH 1 TACC would lead to increased target bottom trawl fishing for other finfish species, an increase could intensify the impact of bottom trawling on the benthic environment.

Assessment of Management Options

Total Allowable Catch

42 MFish proposes to set a TAC under section 13(2)(a) of the Act. In managing a stock under section 13(2)(a) the Minister must, in setting the TAC, seek to maintain the stock at or above a level that can produce the maximum sustainable yield (MSY), having regard to the interdependence of stocks. However, estimates of current biomass for SCH 1 or any other school shark stocks are unavailable. It is not known whether any of the proposed TAC options are sustainable, or if they are at levels which will allow the stock to move towards a size that will support the MSY.

43 In the absence of reliable biomass and MSY estimates for SCH 1, MFish proposes to set the TAC based on assessment of past and current catches and an estimate of other fishing-related mortality. MFish considers that the relatively stable level of commercial catches and the estimates of non-commercial catches constitute the best available information for considering the TAC for SCH 1. Further, school shark are considered to constitute a single biological stock around New Zealand and TACs have been set under section 13 for some of the other school shark stocks.

44 Three options have been proposed for setting the TAC. The first represents the status quo, based on existing catch limits and estimates of non-commercial catches and other fishing-related mortality. The other two options propose TACs that reflect recent and past commercial landings, and provide increased utilisation opportunities in the fishery.

Option 1: TAC of 866 tonnes (status quo)

45 Option 1 proposes that the TAC for SCH 1 be set at 866 tonnes. This option represents the status quo, providing for the existing TACC of 668 tonnes and estimates of current customary and recreational catches and other fishing-related mortality. This option poses the least risk of causing the stock to be fished at a level that would move the stock to below a size that would support the MSY.

46 It is unknown whether current catches are at a level that ensures the SCH 1 stock remains at a size that will support the MSY. Given that uncertainty and the biological characteristics of the stock, setting the TAC at 866 tonnes should ensure that any sustainability and environmental risks associated with the fishery are not increased. Under this option, the TACC would still be

above the level of commercial landings in the last fishing year, but not the previous 10 fishing years.

Option 2: TAC of 893 tonnes

47 Option 2 proposes that the TAC for SCH 1 be set at 893 tonnes, an increase of 27 tonnes above option 1. A TAC of 893 tonnes reflects the average reported commercial landings in the past five years, plus allowances for customary and recreational fishing and other fishing-related mortality.

48 Given that catches have averaged at around this level for the past five years and above this level for the past five to ten years, this option is unlikely to increase sustainability risks beyond those that already exist in the fishery. However, the risks of this option are greater than those for option 1.

49 The benefit of option 2 is that it provides for recent catches of school shark, above the TACC, that are likely to have been taken as a bycatch in trawl fisheries targeted at other finfish stocks.

Option 3: TAC of 944 tonnes

50 Option 3 proposes that the TAC for SCH 1 be set at 944 tonnes, an increase of 78 tonnes above option 1. A TAC of 944 tonnes reflects the average reported commercial landings in the past ten years, plus allowances for customary and recreational fishing and other fishing-related mortality.

51 Commercial landings have averaged at around level for the past ten years. Given that commercial catches (constrained by both the TACC and the deemed values) have not reached this level in the past five years, this option provides for increased utilisation opportunities in the fishery and removes some constraints on commercial fishing for SCH 1 and the target stocks it is taken with as a bycatch.

52 However, considering the biological characteristics of the species (slow growth, late maturity, low productivity, not predicted to recover quickly from fishing pressure), a TAC that is 78 tonnes higher than the status quo would increase the sustainability risks associated with fishing for the stock. In particular, as the period of the past five to ten years includes most of the highest landings of SCH 1 recorded since the stock entered the quota management system (QMS), and as landings have fallen in recent years, there is a higher risk that annual catches of 944 tonnes will not be sustainable or maintain the stock at or above the level that can produce the MSY.

TACC and allowances

53 MFish proposes that the TACC and allowances for customary and recreational catches and other fishing-related mortality be set under section 20 of the Act.

54 Section 21 requires the Minister to make allowances for Maori customary non-commercial interests, recreational fishing interests and for any other sources of fishing-related mortality before setting the TACC. In setting allowances and

the TACC, the Minister is required to consider the social, economic and cultural wellbeing of the persons within each sector.

55 School shark is of traditional importance to Maori and is an important taonga species, although the fishery has reportedly declined in recent decades. School shark is a species of moderate importance to recreational fishers but they do not value it as highly as many other gamefish.

56 The SCH 1 fishery has some value to commercial fishers but is a predominantly by-catch fishery with a port price that is relatively low compared to other stocks.

57 These points are discussed in more detail below. MFish invites respondents to submit any additional information which they feel is relevant to the Minister's consideration of social, economic and cultural factors associated with setting catch limits for SCH 1.

58 This paper proposes to set a TAC at either:

a) a level that accounts for existing commercial catch limits and estimates of non-commercial catches and other fishing-related mortality (option 1); or

b) a level (options 2 and 3) that provides for increased utilisation opportunities in the fishery. This increase in the TAC could either be allocated proportionally across all allowances and the TACC or allocated entirely to the TACC.

Proportional allocation

59 Proportionally allocating any increase in the TAC above the status quo would, notionally, share the benefit of the increased catch level between all three sectors. However, this would provide for non-commercial allowances that are above the estimate of current non-commercial catches. It is unlikely that any such additional allocation would be fully utilised and thus best value may not be realised through proportional allocation. MFish considers that a proportional allocation would not increase the value that non-commercial fishers can obtain from the fishery as existing levels of catch are considered to be provided for in full under all options.

Non-proportional allocation

60 The brief discussion above of the value of school shark to each sector may suggest that any proportional allocation of school shark should favour the customary sector above the others as the fishery could be of higher value to that sector. However, MFish does not consider that allocating a non-proportional increase to the customary sector would increase the value they could obtain from the fishery, as customary catches are considered to have already been provided for in full under all options.

61 MFish considers that it may be appropriate in this case to allocate any increase in the SCH 1 TAC above the level envisaged in option 1, entirely to the TACC for the following reasons:

a) The TAC is being set for the first time; there are no existing customary or recreational allowances to increase.

b) The estimates of current recreational and customary catch are considered to provide in full for the catches of those sectors and so an increase to recreational and customary allowances may have no effect on those fisheries, particularly as the increases to the allowances would be relatively small.

c) The TACs proposed in options 2 and 3 are based on recent commercial catches, plus estimates of current non-commercial catches.

Customary allowance

62 MFish has very little information on the level of customary catch of SCH 1.

63 Sharks in general are seen as one of the most important taonga species. Anecdotal information suggests that school shark is an important species for Maori. The fishery for mangō (a term that collectively covers a number of shark species including school shark, rig, and spiny dogfish) was traditionally important to many coastal communities who took part in regular annual fishing expeditions during which large numbers of mangō were caught in coastal bays and sun-dried on trees or wooden frames for storage. However, this fishery has declined in recent decades and customary catches of shark species are reportedly smaller than they used to be.

64 In recognition of the importance of school shark to Maori, MFish proposes to base the customary allowance for SCH 1 at a level starting at 99 tonnes; this is 150% of the recreational catch estimate.

Option 1

65 Under TAC option 1, MFish proposes to set the customary allowance at 99 tonnes.

Option 2

66 Under TAC option 2, MFish proposes to set the customary allowance at either 102 tonnes (proportional allocation) or 99 tonnes (non-proportional allocation).

Option 3

67 Under TAC option 3, MFish proposes to set the customary allowance at either 108 tonnes (proportional allocation) or 99 tonnes (non-proportional allocation).

Recreational allowance

68 School shark is of moderate importance to recreational fishers – of 123 species included in the 1999/2000 recreational catch survey, school shark had the 45th highest catch estimate (by weight of catch). Although it is listed as a gamefish it is not thought to be particularly desirable to recreational fishers.

69 MFish proposes to set the recreational allowance on the basis of estimates of recreational catches of SCH 1. A review in 1996 estimated the recreational catch of SCH 1 to be around 46 tonnes per year. A review in 1999/2000 estimated the recreational catch of SCH 1 to be around 66 tonnes per year. The 1999/2000 survey is believed to be more accurate for school shark. MFish therefore proposes to set the recreational allowance for SCH 1 at a level starting at 66 tonnes.

Option 1

70 Under TAC option 1, MFish proposes to set the recreational allowance at 66 tonnes.

Option 2

71 Under TAC option 2, MFish proposes to set the recreational allowance at either 68 tonnes (proportional allocation) or 66 tonnes (non-proportional allocation).

Option 3

72 Under TAC option 3, MFish proposes to set the customary allowance at either 72 tonnes (proportional allocation) or 66 tonnes (non-proportional allocation).

Allowance for other fishing-related mortality

73 Other fishing-related mortality is an estimate of the amount of the stock killed by but not caught during a fishing operation (for example, where a fish escapes from a fishing net but dies due to its encounter with the fishing gear). For all options discussed MFish proposes an allowance for other fishing-related mortality of 5% of the TACC. This approach is consistent with allowances for other New Zealand school shark stocks and provides for allowances for other fishing-related mortality of between 33 and 37 tonnes depending on the option chosen (see Table 1).

TACC

74 In table 2, below, MFish has illustrated the potential economic impact of the TACC options by considering the export and domestic economic value of school shark. To determine how much SCH 1 is exported, MFish calculated that approximately 12.3% of all school shark TACCs in New Zealand was exported in the 2005/06 fishing year and therefore assumed that 12.3% of SCH 1 was exported with the remainder being sold domestically. MFish has assumed that this proportion will remain unchanged if the TACC is increased.

For each option, MFish then calculated the value of the proportion of the stock which is exported (12.3%) against the export price and the value of the proportion of the stock which is sold domestically (87.7%) against the port price to get an overall value for the stock.

75 MFish acknowledges that this approach involves inherent uncertainties and that the port price may not represent the actual wharf-side value of the fish. However, MFish considers this coarse analysis illustrates the potential gains to industry in the short term under the management options MFish proposes.

Table 2: Value, by export price and port price, of each TACC option

Option	TACC	Export value[7]	Domestic value[8]	Total value	Increase in value from status quo
Option 1. TAC set at current limits	668	$726,330	$1,036,930	$1,763,259	$0
Option 2. TAC increase of 25 tonnes	689	$749,163	$1,069,528	$1,818,691	$55,432
	693	$753,513	$1,075,737	$1,829,250	$65,990
Option 3. TAC increase of 74 tonnes	728	$791,569	$1,130,067	$1,921,636	$158,377
	742	$806,791	$1,151,799	$1,958,591	$195,331

76 Deemed value payments have cost the commercial sector an average $101,000 in the past five fishing years. An increased TACC should reduce the cost to the sector of paying deemed value.

77 There will be other direct and indirect economic consequences of increasing the SCH 1 TACC. It is possible that increasing the TACC would increase the ability of fishers to catch stocks with which SCH 1 is taken as a bycatch, such as HPB 1, SPO 1 and GUR 1. However, MFish is not able to quantify the increased catch resulting from this or any resultant economic benefit.

78 A TACC increase may have "downstream" impacts on related industries such as processing and transport services. It could also improve the financial situation for coastal communities that are dependent on the inshore fishing industry.

79 There is a longer-term economic risk associated with increasing the TACC. If the TACC increase leads to catches that are not sustainable, it could lead to reduced catches and income from the fishery in future years. It is unknown how significant this risk is with regard to the TACCs proposed in this paper; however the higher the TACC the higher this risk will be. This risk is relevant to the fishing industry, related industries and to coastal communities that are dependent on the inshore fishing industry.

80 MFish invites respondents to this consultation to submit additional information on the economic impacts associated with the proposed management options.

Option 1

81 Under TAC option 1, MFish proposes to set a TACC of 668 tonnes, confirming current catch limits. This TACC has been regularly overcaught and the SCH 1 deemed value would need to be reviewed to ensure the TACC

[7] Export value is $8.04/kg based export price of school shark for year ending December 2006.
[8] Domestic value is $1.77 based on the port price of school shark in the 2005/06 fishing year.

was not overcaught in future if this option were chosen. If the deemed value was increased, commercial catches could be restricted closer to the TACC level and this could reduce commercial income from catches of SCH 1 to below the current level. The issue of proportional allocation does not arise with regard to this option.

Option 2

82 Under TAC option 2, MFish proposes to set a TACC of either:

a) 689 tonnes, an increase of 21 tonnes (proportional allocation); or

b) 693 tonnes, an increase of 25 tonnes (non-proportional allocation).

83 This option sets a TACC at or just below the level of average commercial landings in the past five fishing years. Because this does not increase the TACC above the level of average recent landings, it is unlikely that this option would significantly increase commercial fishing industry income from sales of school shark. The most likely impact would be a reduction in deemed value payments to MFish, which have averaged at $101,000 over the past five fishing years.

Option 3

84 Under TAC option 3, MFish proposes to set a TACC of either:

a) 728 tonnes, an increase of 60 tonnes (proportional allocation); or

b) 742 tonnes, an increase of 74 tonnes (non-proportional allocation).

85 This option sets a TACC at or just below the level of average commercial landings in the past ten fishing years. Because landings in the past five years have been lower, it is likely that this option would increase commercial fishing industry income from sales of school shark as well as reducing deemed value payments.

Other Management Measures

Pregnant school shark: Kaipara Harbour

86 Given the biological risks associated with removing the older, more productive females from the school shark population, measures to protect pregnant school shark in the Kaipara Harbour could be of value. For example, as school shark give birth from November to January, it may be sensible to prohibit the taking of school shark in the Kaipara during those months. MFish invites stakeholders to comment on this suggestion and make any alternative suggestions for the protection of pregnant school shark in the Kaipara.

Research

87 Results from a research project on school shark CPUE are expected to be available by the end of 2007, unfortunately too late to inform the Minister's decision on the setting of this TAC. The results of the research may change

current views on the sustainability of school shark catches and may require a further review of school shark to take place in a future year.

88 Given the risks to stock sustainability, if the TAC is increased above the status quo, a full stock assessment to assess school shark biomass would be advisable. As school shark around New Zealand is thought to be a single biological stock, yield and biomass assessments are not possible for SCH 1 only but would need to be done for all school shark in New Zealand waters.

Deemed value

89 In setting a TAC, and potentially a new TACC, it is appropriate for the Minister of Fisheries to consider revising the deemed value level for school shark to help ensure that commercial catches do not exceed the level of the TACC in future. Deemed values for a number of stocks, including SCH 1, are being reviewed in the *Review of the Deemed Value Rates for the October 2007 Sustainability Round* section of this document.

Compliance

90 ACE for SCH 1 is often in short supply and can be unavailable to cover bycatch. Key compliance concerns in a fishery with this type of problem relate to misreporting (of weights, area and species) and dumping. In part, MFish relies on the incentives that quota provides for commercial fishers to fish the stock in a sustainable manner. More proactively, MFish will rely on monitoring and at sea surveillance to detect dumping.

91 If the TACC is increased, the availability of ACE should improve, reducing these problems. If the TACC is unchanged and deemed values are raised, the compliance problems may increase.

NPOA for sharks

92 The Ministry of Fisheries is developing a National Plan of Action (NPOA) for Sharks. This is an operational plan that records actions already under way and makes recommendations for actions that could enhance shark fisheries management in New Zealand. The NPOA identifies actions that are required to improve the conservation and management of shark species in New Zealand. These will be implemented separately to the proposals in this paper.

Hauraki Gulf Marine Park Act 2000

93 In setting a TAC for SCH 1, the Minister is required to consider the social, economic, recreational and cultural wellbeing of people in the Hauraki Gulf and, in particular, to maintain and enhance the physical resources of the Gulf, including school shark.

94 Relatively little school shark is caught commercially in the inner Hauraki Gulf (Fisheries Statistical Areas 005, 006 and 007). School shark is caught in larger quantities in Statistical Areas 003 and 008 but the Hauraki Gulf Marine Park only covers a relatively small part of these Areas. The Marine Park also covers a small amount of Areas 004 and 009 but relatively little school shark is caught in these Areas (see map in Appendix 2). It is therefore not apparent

that the Hauraki Gulf Marine Park Area is of significant importance for the wellbeing of commercial fishers of school shark or for the wellbeing of those living in the Gulf who purchase commercially caught school shark.

95 MFish has no information to suggest that school shark in the Hauraki Gulf is more or less important to non-commercial fishers than school shark elsewhere. Traditionally Maori are known to have fished for shark species in the Firth of Thames and may have done so in other areas of the Gulf.

96 MFish invites respondents to this consultation to provide any additional information that they have on the importance of school shark to the social, economic, recreational and cultural wellbeing of people in the Hauraki Gulf.

97 Statutory Considerations are summarised in Appendix One.

APPENDICES

Appendix 1 - Statutory considerations

98 In developing the management options outlined in this paper, MFish has considered all of the relevant statutory obligations set out in the Fisheries Act 1996. These are summarised below:

c) ***Purpose of the Act:*** **Section 8:** The management options provide for utilisation by setting allowances for commercial, recreational and customary fishers. TAC options 2 and 3 should have economic benefits for commercial fishers and TAC option 1 does not reduce the amount of SCH 1 available to the commercial sector. Any increase of the TAC, to above the level of option 1, could increase the risk to stock sustainability as school shark have low productivity. Recent catches have been relatively stable and may indicate that those risks are small, at least in the short term.

d) ***Total Allowable Catch:*** **Section 13(2)(a):** The TAC under section 13(2) should be set at a level that maintains the stock at or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks. As biomass information is unavailable, it is unknown whether the current TACC, current catch levels, or the options presented in this paper, are at levels that will support the maximum sustainable yield. However, recent catches have been relatively stable and there are no indications that current catches are not sustainable in the short-term.

e) ***Natural variability of the stock:*** **Section 11(1)(c):** Although no estimate of school shark biomass is available, it is assumed to fluctuate over time due to variable recruitment caused primarily by environmental conditions. This variability is likely to be less important than in other stocks. Indeed, variability of shark species is generally lower than for bony finfish with pelagic eggs and larvae.

f) ***Associated or dependent species:*** **Section 9(a):** Maui's dolphin occur within the range of school shark. Increasing the SCH 1 TACC could increase the risk of Maui's dolphin interaction with fishing gear, however this risk cannot be quantified.

g) ***Biological diversity:*** **Section 9(b):** There is no evidence that interactions between school shark and other species are of significant magnitude to impact on biological diversity.

h) ***Habitat of particular significance for fisheries management:*** **Section 9(c):** One school shark habitat of particular significance for fisheries management has been identified. The Kaipara Harbour is a location where female school shark congregate to pup and where the catch can be made up entirely of pregnant females. It is unknown whether the options presented will increase fishing pressure on the Kaipara Harbour school

shark. However, an option to mitigate any risks have been explored in the paper and further suggestions have been sought from stakeholders.

i) ***Existing controls under the Act:*** **Section 11(1)(b):** For SCH 1 there is a current TACC of 668 tonnes. Under the Fisheries (Auckland and Kermadec Areas Amateur Fishing) Regulations 1986, school shark is included in the combined daily bag limit of 20 and has a minimum set net mesh size of 125mm.

j) ***Effects of fishing on any stock and the aquatic environment:*** **Section 11(1)(a):** A significant amount of SCH 1 is caught by bottom trawl, which does impact on the benthic environment. However, SCH 1 is only taken by bottom trawl as a bycatch and the bottom trawl operations do not generally target school shark. As a result, MFish does not consider that fishing for school shark has a significant impact on biological diversity of the aquatic environment.

k) ***Application of International Obligations and Treaty of Waitangi (Fisheries Claims) Settlement Act 1992:*** **Section 5(a) and 5(b):** There is a wide range of international obligations relating to fishing including sustainability and utilisation of fishstocks and maintaining biodiversity. MFish considers issues arising under international obligations – discussed in the Statutory Obligations and Interpretation section of this document – and the provisions of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 are adequately addressed in the management options for SCH 1.

l) ***Conservation and fisheries services:*** **Section 11(2A)(a) and (c):** A Threat Management Plan has been produced to develop options to mitigate the risk to Maui's dolphin. The potential impact of any SCH 1 TAC increase on Maui's dolphin has been discussed in this paper. Standard fisheries services such as research and enforcement of the fisheries regulations are ongoing. No decision has been made not to require conservation or fisheries services.

m) ***Relevant fisheries plans:*** **Section 11(2A)(b):** While fisheries plans that include school shark are in an early drafting stage, no relevant fisheries plans have been approved under section 11A(1).

n) ***Resource Management Act 1991 and Conservation Act 1987:*** **Section 11(2)(a) and (b):** There are no provisions applicable to the coastal marine area known to exist in any policy statement or plan under the Resource Management Act 1991, or any management strategy or plan under the Conservation Act 1987, that are relevant to the setting or varying of any sustainability measure for this stock.

o) ***Hauraki Gulf Marine Park Act 2000:*** **Section 11(2)(c):** The implications of sections 7 and 8 of the Hauraki Gulf Marine Park Act 2000 were considered in the main section of this paper.

p) ***Non-commercial fishing interests and other mortality caused by fishing:*** **Section 21(1):** The nature of the fishery and the interests of the respective

fishing sectors have been considered in proposing TACCs and allowances for recreational and customary interests and all other mortality to the stock caused by fishing.

q) ***Mataitai reserves and closures under sections 186A and 311 of the Act:*** **Section 21(4) and (5):** There is one Mataitai reserve in the QMA – at Raukokore on the eastern Bay of Plenty, however it is not considered that this has significant implications for the SCH 1 TAC. There are three areas closed for customary purposes in the QMA, all of these are closures are for certain shellfish species only and have no implications for the SCH 1 TAC. No section 311 closures have been enacted in the QMA.

r) ***Information Principles:*** **Section 10:** In preparing this paper, MFish relied primarily on the following information sources to develop the management options:

   i. The Report from the Stock Assessment Plenary on School Shark, May 2006

   ii. Commercial catch and landings data held by the Ministry of Fisheries.

   iii. Ayres et al. Examination of catch per unit effort analyses for school shark from bycatch and target fisheries in New Zealand, 1989-90 to 2001-02 (*Fisheries Assessment Report 2006/26*)