



MINISTRY OF FISHERIES  
Te Tautiaki i nga tini a Tangaroa

**INTRODUCTION OF NEW STOCKS INTO  
THE QUOTA MANAGEMENT SYSTEM ON  
1 OCTOBER 2003**

**CONSULTATION DOCUMENT**

24 May 2002

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## EXECUTIVE SUMMARY

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1 In accordance with section 19(7) of the Fisheries Act 1996, the purpose of this document is to commence the initial consultation process on behalf of the Minister of Fisheries on new species/stocks proposed for introduction into the Quota Management System (QMS) on 1 October 2003. This document outlines the species/stocks' proposed Quota Management Areas (QMAs), fishing years and units of measure, and the results of an initial assessment of the costs and benefits of QMS introduction. The Ministry of Fisheries requests that you provide your written comments in response to this document no later than 12 July 2002. Please send your written comments to:

Randall Bess, Ministry of Fisheries, Private Bag 14, Nelson (03) 548 1069

2 The species/stocks proposed for QMS introduction on 1 October 2003 and their proposed QMAs are outlined below. Note that QMAs equate to existing Fisheries Management Area (FMA) boundaries unless stated otherwise.

- **Eel – shortfin and longfin (Chatham Islands only)**

*Option 1:* FMA4

*Option 2:* Eel statistical area 'AZ'

- **Kina (North Island only)**

SUR1A (FMA1: East Northland), SUR1B (FMA1: Hauraki Gulf – Bay of Plenty), SUR2A (Part FMA2: Gisborne), SUR2B (Part FMA2: Wairarapa – Wellington), SUR8 (FMA8), SUR9 (FMA9), and SUR10 (FMA10).

- **Kingfish (all FMAs)**

*Option 1:* KIN1 (FMA1), KIN2 (FMA2), KIN3 (FMAs 3, 4, 5 and 6), KIN7 (FMA7), KIN8 (FMAs 8 and 9), and KIN10 (FMA10).

*Option 2:* KIN1 (FMA1), KIN2 (FMA2), KIN3 (FMAs 3, 5 and 6), KIN4 (FMA4), KIN7 (FMA7), KIN8 (FMAs 8 and 9), and KIN10 (FMA10).

- **Leatherjacket (all FMAs)**

*Option 1:* LEA1 (FMAs 1 and 9), LEA2 (FMAs 2, 7 and 8), LEA3 (FMAs 3, 5 and 6), LEA4 (FMA4), and LEA10 (FMA10).

*Option 2:* LEA1 (FMAs 1 and 2), LEA3 (FMAs 3, 5 and 6), LEA4 (FMA4), LEA7 (FMAs 7, 8 and 9), and LEA10 (FMA10).

- **Rough and smooth skates (all FMAs)**

RSK1, SSK1 (FMAs 1 and 2), RSK3, SSK3 (FMAs 3, 4, 5 and 6), RSK7, SSK7 (FMA7), RSK8, SSK8 (FMAs 8 and 9), and RSK10, SSK10 (FMA10).

3 The proposed fishing year is 1 October to 30 September for all species/stocks proposed for QMS introduction on 1 October 2003. MFish proposes that the Total Allowable Commercial Catch and annual catch entitlements for all species/stocks are expressed as greenweight. The results of the initial assessment of the costs and benefits of QMS introduction demonstrate that for all species/stocks the benefits outweigh the costs. The details of the assessment are outlined at the end of each species-specific section in this document.

# INTRODUCTION

- 1 In accordance with section 19(7) of the Fisheries Act 1996 (the 1996 Act), the purpose of this document is to commence the consultation process on behalf of the Minister of Fisheries on those species/stocks proposed for introduction into the Quota Management System (QMS) on 1 October 2003 (refer to Table 1). The Ministry of Fisheries (MFish) requests that you provide your comments on the introduction of these species/stocks into the QMS, their proposed Quota Management Areas (QMAs), fishing years and units of measure, and the results of an initial assessment of the costs and benefits of QMS introduction, as outlined in this document.

**Table 1: MFish proposed list of species/stocks to be introduced into the QMS on 1 October 2003:**

Species (code)	Scientific name	Current Management Areas
Eel – shortfin (SFE)	<i>Anguilla australis</i>	*FMA 4 (Chatham Islands only)
Eel – longin (LFE)	<i>Anguilla dieffenbachii</i>	*FMA 4 (Chatham Islands only)
Kina (SUR)	<i>Evechinus chloroticus</i>	**FMAs 1, 2, 8 and 9
Kingfish (KIN)	<i>Seriola lalandi lalandi</i>	FMAs 1 – 10
Leatherjacket (LEA)	<i>Parika scaber</i>	FMAs 1 – 10
Rough skate (RSK)	<i>Dipturus nasutus</i>	FMAs 1 – 10
Smooth skate (SSK)	<i>Dipturus innominatus</i>	FMAs 1 – 10

\* Subsequent to the consultation document, dated 29 November 2001, that sought comment on proposed QMS introductions in 2003 and 2004, MFish has determined that the introduction of North Island eel stocks (FMAs 1, 2, 8 and 9) will be deferred until 1 October 2004. South Island eel stocks (ANG 11 – 16) were introduced into the QMS on 1 October 2000.

\*\* South Island and Chatham Islands kina stocks (FMAs 3, 4, 5 and 7) are scheduled for QMS introduction on 1 October 2002.

- 2 MFish proposes that the fishing year is 1 October to 30 September for all species/stocks, and that the Total Allowable Commercial Catch (TACC) and annual catch entitlements (ACE) are expressed as greenweight. The proposed QMAs for each stock and results of the initial assessment of the costs and benefits of QMS introduction are outlined in each of the species-specific sections.
- 3 MFish requests that you provide your written comments in response to this consultation document no later than 12 July 2002. Your comments should be in response to the following proposals:
  - The species/stocks outlined in Table 1, including the results of the initial assessment of costs and benefits of QMS introduction;
  - The QMAs, including alternative options, for each stock;
  - The fishing year (1 October to 30 September); and
  - The unit of measure (greenweight).

- 4 Because of the administrative timeframe to introduce species/stocks on 1 October 2003, your timely response would be greatly appreciated. Please send your written comments on this document to:

Randall Bess, Ministry of Fisheries, Private Bag 14, Nelson (03) 548 1069

- 5 If you have any questions regarding the consultation document, or wish MFish staff to attend a meeting/hui to discuss the information, you are encouraged to contact the following staff at your nearest MFish office:

Dave Allen, P O Box 3437, Auckland (09) 361 4117

Steve Halley, P O Box 1020, Wellington (04) 470 2622

Scott Williamson, Private Bag 14, Nelson (03) 548 1069

Raymond Necklen, Private Bag 14, Nelson (03) 548 1069 (Chatham Islands fisheries)

Allen Frazer, Private Bag 1926, Dunedin (03) 474 2682

## Background

- 6 There are around 100 species of aquatic life commercially harvested in New Zealand that are presently managed outside the QMS. Since 30 September 1992 there has been a moratorium on the issue of new non-QMS permits to commercially harvest these species, other than tuna. The permit moratorium was intended to (1) prevent expansion of non-QMS fisheries prior to QMS introduction, (2) avoid the creation of incentives to 'race for catch history', and (3) mitigate risks to stock sustainability. However, the prolonged presence of the permit moratorium has caused some management issues, such as (1) inhibiting the development of new and under-developed fisheries, and (2) preventing MFish from issuing permits to allow fishers to land non-QMS stocks caught in conjunction with QMS stocks.
- 7 These issues can be largely remedied by introducing non-QMS fisheries into the QMS, and developing management controls by way of stock management strategies and fisheries plans. For these reasons, the overall fisheries management framework that will be put into effect within the next few years involves the full implementation of the QMS and likely changes to the way any remaining non-QMS fisheries are managed.
- 8 While MFish supports the introduction of all commercially valuable species into the QMS, it should be remembered that introduction would not necessarily lead to expansion of commercial harvests. The QMS meets the 1996 Act's purpose 'to provide for the utilisation of fisheries resources while ensuring sustainability', which includes mitigating the impact fishing activity may have on stocks already considered vulnerable. The requirement to ensure sustainability applies equally to species managed outside the QMS. However, MFish considers that the QMS framework provides better tools for sustainable management, leading to enhanced fisheries for all resource users.
- 9 Species/stocks introduced into the QMS allows the Crown to meet its obligation to Māori under the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 (the Settlement Act). The Settlement Act established that the Treaty of Waitangi Fisheries Commission would be allocated, on behalf of Māori, 20 percent of all quota for stocks introduced into the QMS.

- 10 In addition, the QMS introduction process will take into account Crown Treaty settlements with individual iwi. When management measures, including Total Allowable Catches (TACs) and TACCs, for the species/stocks outlined in Table 1 are discussed next year, consideration will be given to the Crown's settlements with Ngai Tahu, Ngati Tama, Ngati Ruanui, Te Uri O Hau and Nga Rauru. These settlements contain provisions regarding species prohibited from commercial harvest and a right of first refusal over any residual Crown-held quota for particular shellfish species.
- 11 For the above reasons, in early 2001 MFish began a process to introduce further species/stocks into the QMS. This process led to the release of a consultation document, dated 6 August 2001, outlining the species/stocks proposed for QMS introduction on 1 April 2002, 1 October 2002 and 1 April 2003. After undertaking a consultation process in response to the 6 August 2001 document, the Minister agreed to gazette the species/stocks and their QMAs, fishing years and units of measure, as outlined in Table 2:

**Table 2: Quota Management Areas, fishing years and units of measure for species/stocks introduced into the QMS on 1 April 2002 and to be introduced on 1 October 2002 and 1 April 2003:**

Species (code)	Date of introduction	Quota Management Areas*	Fishing year	Unit of measure
Anchovy (ANC)	1 October 2002	7 based on FMAs 1, 2, (3, 5 & 6), 4, 7, (8 & 9), 10	1 October to 30 September	greenweight
Blue mackerel (EMA)	1 October 2002	5 based on FMAs 1, 2, (3, 4, 5, 6), (7, 8, 9), 10	1 October to 30 September	greenweight
Butterfish (BUT)	1 October 2002	8 based on FMAs (1, 8, & 9), 2, 3, 4, 5, 6, 7, 10	1 October to 30 September	greenweight
Chatham Islands scallop (SCA)	1 April 2003	1 based on reporting areas for Chatham Island scallop	1 April to 31 March	meatweight
Cockle (COC)	1 October 2002	1 based on boundaries of Whangarei Harbour	1 October to 30 September	greenweight
Coromandel scallop (SCA)	1 April 2002	1 based on scallop statistical areas 2A to 2Y	1 April to 31 March	meatweight
Garfish (GAR)	1 October 2002	7 based on FMAs 1, 2 (3, 5, 6), 4, 7, (8, 9), 10	1 October to 30 September	greenweight
Kina (SUR)	1 October 2002	5 based on FMAs 3, 4, 5, 7A, 7B	1 October to 30 September	greenweight
Queen scallop (QSC)	1 October 2002	1 based on FMAs (3, 5)	1 October to 30 September	greenweight
Paddle crab (PAD)	1 October 2002	10 based on FMAs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10	1 October to 30 September	greenweight
Pilchard (PIL)	1 October 2002	7 based on FMAs 1, 2 (3, 5, 6), 4, 7, (8, 9), 10	1 October to 30 September	greenweight
Sprats (SPR)	1 October 2002	5 based on FMAs (1, 2, 8, 9), (3, 5, 6), 4, 7, 10	1 October to 30 September	greenweight

\* brackets ( ) denote a QMA based on the combination of noted FMAs within brackets

- 12 It is expected that the QMS introduction process will continue for another two to three years, demonstrating MFish's intent to manage within the QMS all species for which there are commercial fisheries, those taken and landed by commercial fishers and those requiring ongoing management measures to ensure their sustainability.

- 13 To progress the QMS introduction process, MFish released a consultation document, dated 29 November 2001, outlining further species/stocks proposed for QMS introduction; this document outlined the results of a MFish prioritisation exercise that determined species/stocks proposed for QMS introduction on 1 October 2003, 1 April 2004 and 1 October 2004.
- 14 The species/stocks proposed for QMS introduction on 1 October 2003, as outlined in Table 1 above, were determined after consideration of submissions MFish received in response to the 29 November 2001 document in conjunction with the level of effort required to manage the administrative components of any new species/stocks introduced into the QMS. MFish considers that Table 1 represents a balance between stakeholder comments, the differences between the species under consideration, the amount of work required of MFish and the capacity of FishServe to administer the calculation and allocation of quota. As part of the QMS introduction process, later this year MFish proposes to recommend to the Minister of Fisheries, subject to consultation, that all species/stocks listed in Table 1 above be introduced into the QMS at the start of the 1 October 2003 fishing year.
- 15 Note that in early 2003 MFish will be seeking your comments on proposed TACs, allowances for customary, recreational and commercial interests, and other management controls for those species/stocks scheduled for QMS introduction on 1 October 2003.
- 16 In the near future MFish will finalise those species/stocks proposed for QMS introduction on 1 April 2004, and later this year a final decision will be made concerning species/stocks proposed for QMS introduction on 1 October 2004; the latter decision must be deferred to allow for completion of some policy work on highly migratory species, and subsequent consultation, the results of which could influence final decisions on the timing of QMS introductions.
- 17 Furthermore, MFish is currently consulting on proposed TACs, allowances for customary, recreational and commercial interests, and other management controls for those species/stocks scheduled for QMS introduction on 1 October 2002, as outlined in Table 2 above. Contact your nearest MFish office to request a copy of the consultation document.

## Outline of the Consultation Document

- 18 The next section of this document outlines the key principles used by MFish to determine proposed QMAs, titled 'Quota Management Areas', and the following section outlines the methodology used to assess the costs and benefits of introducing species/stocks into the QMS on 1 October 2003, titled 'Costs and Benefits of Introducing Species into the QMS'. The remainder of this document consists of a description of each of the species/stocks proposed for introduction into the QMS. Each species description includes the following:
  - **Species Characterisation** — this section consists of biological information and catch summary data based predominately on various reports produced by the National Institute of Water and Atmospheric Research (NIWA) on contract to MFish.
  - **Stocks and Areas** — this section describes each stock and issues to consider when proposing QMAs. In the case of rough and smooth skates and leatherjacket, this section includes QMAs suggested by NIWA, as stated in *Establishing potential area boundaries and indicative TACs for selected non-QMS species – Rough and Smooth*

*Skates and Leatherjacket Project MOF2001/03D*, dated 28 January 2002. MFish provided NIWA with key principles for establishing possible QMAs, as outlined in the next section of this document.

- **Proposed QMAs** — this section outlines MFish’s proposed QMAs for each species/stock based on the key principles outlined in the next section.
- **Assessment of Costs and Benefits** — this section outlines the results of MFish’s initial assessment of the costs and benefits of QMS introduction. Section 19(8) of the 1996 Act requires the Minister of Fisheries to have regard to the costs and benefits of introducing a stock into the QMS.
- **Summary of Proposals** – this section summarises MFish’s proposals and alternative options for each species/stock.

## Quota Management Areas

- 19 In proposing QMA boundaries for species/stocks to be introduced into the QMS, MFish used the principle objective under the 1996 Act of providing for the utilisation of fisheries resources while ensuring sustainability. MFish accomplished this by proposing QMAs it considers to be sensible and effective as long-term stock management boundaries based, first and foremost, on the biological characteristics of each stock. MFish’s key principles for establishing proposed QMA boundaries and their respective fisheries management outcomes, listed in their order of importance, are outlined in Table 3.

**Table 3: Key principles in setting proposed QMAs:**

Key Principles	Fisheries Management Outcomes
Management areas should be based principally on the biological characteristics of the stock.	Sustainability requirements of the 1996 Act (based around “stock”) are met.
The stock boundaries should take into account the existing characteristics of the fishery (known fisheries, relevant fisheries management issues).	Sensible stock boundaries. Simplified allocation of quota. Reduced business compliance costs.
Where practicable, QMAs for species that are taken together in the same fisheries should be aligned.	Integrated management of interrelated-stocks. Reduced complexity and business compliance costs.
Where practicable the same QMAs should be set for different species.	Reduced complexity and business compliance costs. Consistent with direction in s19(2) of the Act.
A separate QMA should be set for the waters surrounding the Chatham Islands if the stock can be managed effectively as a unit.	Consistent with direction in s19(3) of the Act.
QMAs with new boundaries may be appropriate for species with populations whose distributions do not align with existing QMA boundaries.	Sensible stock boundaries. Sustainability requirements of the Act are met. Improved control of harvest and reduced risk to the aquatic environment.
Subject to the principles noted above QMAs should be as large as possible.	Reduced complexity and business compliance costs. Flexibility for exercise of customary rights.

- 20 It is acknowledged that there may be compelling reasons to set QMAs that are different from the boundaries of the biological stock, and, of course biological stock boundaries may not be easy to identify and may vary over time. In some instances it will be appropriate to set a QMA that encompasses more than one biological stock, and move to smaller units of management using the tools in the 1996 Act as more becomes known about the boundaries of a biological stock. Smaller units of management can be implemented using fisheries plans, the QMA subdivision

provisions and catch splitting arrangements contained within the 1996 Act. Smaller units of management may be particularly applicable for some 'sedentary' species.

- 21 MFish took into consideration the above issues when developing the key principles used to guide the determination of proposed QMAs for species/stocks to be introduced into the QMS. An explanation of MFish's proposed QMAs for each species/stock is outlined in the species descriptions in this document.

## Costs and Benefits of Introducing Species into the QMS

- 22 As mentioned, section 19(8) of the 1996 Act requires the Minister of Fisheries to have regard to the costs and benefits of introducing species/stocks into the QMS. For this reason, MFish undertook an initial assessment of the costs and benefits for each species/stock proposed for QMS introduction.

- 23 MFish selected the 'incremental' approach to assess the costs and benefits of QMS introduction. The 'incremental' approach assesses expected changes in costs and benefits for each species/stock introduced into the QMS. This is accomplished by comparing the expected incremental changes in costs and benefits to a non-QMS, or baseline, scenario. In this way, the identified problem is to simply choose between two alternatives; either a species/stock is introduced into the QMS, 'QMS alternative', or not, 'non-QMS alternative', based on expected changes in the costs and benefits.

- 24 Because of the lack of some historical quantitative data on the QMS and the inherent complications of assessing relevant costs and benefits of QMS introduction, MFish made use of expert judgment, MFish officials and analysts, to assess expected incremental changes in costs and benefits. It was decided that the use of expert judgment would be assisted with an electronic decision-support system, which provides a structure to organise and evaluate the importance of various objectives when making final decisions about whether or not a species/stock should be introduced into the QMS.

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- 25 The use of expert judgment, aided with the help of the decision-support system, required the assumptions of both alternatives to be made explicit and held constant when assessing each species/stock. The assumptions of the QMS alternative were developed to reflect the consequences of expected changes in costs and benefits for the ten-year period after introduction, outlined as follows:

- a) The QMS would remain as outlined in current legislation;
- b) Depending on the management framework in place at the time the gazette notice declares a species/stock's introduction into the QMS, quota would be allocated by way of either provisional catch history (PCH) or individual catch entitlements (ICE).<sup>1</sup>
- c) Information requirements for each species would remain constant; and
- d) The environmental standards for each species would remain constant.

- 26 The assumptions of the 'non-QMS alternative', or baseline scenario, were based on the view that most of the current non-QMS management frameworks would be held constant. The assumptions of the 'non-QMS alternative' are outlined below. Note that point e) reflects the non-QMS environment after 1 October 2004:

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<sup>1</sup> Some species/stocks gazetted for QMS introduction on 1 October 2002 are subject to judicial review (set down for 2002) on the basis that, *inter alia*, their respective management frameworks were not altered from competitive to ICE as an interim step before introduction into the QMS.

- a) The current permit moratorium, which specifies access based on eligibility as of 30 September 1992, would remain in effect. Continuation of the moratorium would limit development of non-QMS fisheries;
  - b) The taking of aquatic life would be restricted to those fisheries deemed as authorised stocks;
  - c) Catch restraints, such as competitive commercial catch limits (CCLs), would remain in place or would be implemented using the same tests as a TAC/TACC (refer to section 11(5) of the 1996 Act);
  - d) Various other management controls that are currently in use would remain in effect, and may be reviewed as required;
  - e) The exception to the requirement to take fish only under the authority of and in accordance with a current fishing permit, which allows non-QMS fish to be taken as an inevitable consequence of the taking of fish under a current fishing permit, expires on 1 October 2004 (refer to section 89(2A) of the 1996 Act);
  - f) There would be less opportunity for stakeholder participation in the management of each species under the non-QMS environment;
  - g) Information requirements for each species would remain constant; and
  - h) The environmental standards for each species would remain constant.
- 27 Comparison of the two alternatives for each species/stock was based on four criteria categories, which were weighted to reflect their level of importance. Because the four criteria categories cover a reasonable and practical range of possible arguments for and against introducing a species/stock into the QMS, MFish considers the assessment of expected costs and benefits to be consistent with the purpose of the 1996 Act as expressed in section 8. As well, the use of the four criteria categories provides consistency in the assessment of costs and benefits and an opportunity to consider desired outcomes independent of a species/stock's introduction into the QMS. The four criteria categories are outlined as follows:
- 28 **Environmental Sustainability** — this criterion category measures the likely incremental differences in the ability of the QMS relative to the 'baseline' scenario to meet the sustainability measures outlined in section 11 of the 1996 Act. This category includes evaluation factors to measure expected changes in the ability to provide for stock sustainability, the quantity and quality of information about the fishstock and harvest effort, and the impacts on associated and dependent species and the aquatic environment, including on biodiversity.
- 29 **Treaty of Waitangi** — this criterion category incorporates section 5(b) of the 1996 Act, which requires persons exercising functions, duties and powers under the Act to act in a manner consistent with the Settlement Act 1992. There are two major obligations of the Crown in the Settlement Act, which are included as evaluation factors in the assessment of costs and benefits: (1) the first obligation is to provide for Māori participation in commercial fisheries. This evaluation factor is intended to reflect Māori commercial preferences for some species' introduction into the QMS; (2) the second obligation is to provide for and protect Māori customary fisheries. This evaluation factor measures the changes in predicted customary fishing opportunities between management of a fishery resource under the QMS and Māori preferences for management of the resource under the QMS.

- 30 **Economic** — this criterion category is intended to assess the economic benefits and costs of introducing a species/stock into the QMS with the following four evaluation factors:
- a) **Fisheries Management Costs** include the initial cost of introducing a species/stock into the QMS, the ongoing management costs, including cost recovery charges, and changes in fixed or variable costs associated with changes in harvest levels;
  - b) **Fisheries Output Benefits** arise from changes in fishing revenue associated with changes in harvest levels or price levels;
  - c) **Property Rights Benefits** assess the expected willingness of fishers to pay for access to fishery resources under the QMS compared to their willingness to pay for access to resources under the baseline scenario. This is a measure of the expected realisable benefits of the QMS, including the value placed on transferability, excludability, divisibility, durability, flexibility and quality of title of property rights afforded by the QMS; and
  - d) **Fishing Capacity** refers to the indirect consequences that introducing a species/stock into the QMS may have on the fishery and attempts to measure expected changes in the capacity of the fishery after introduction.
- 31 **Social** — this criterion category contains measures that indicate whether the introduction of a species/stock into the QMS is expected to improve overall social wellbeing. Evaluation factors consider the impact introducing a species/stock into the QMS would have on non-commercial, non-customary (i.e., recreational) fishers, coastal communities and commercial fishers, as well as the potential effects on future generations' ability to meet their reasonably foreseeable needs.
- 32 The results of the initial assessment demonstrate that for all of the species/stocks listed in Table 1 the benefits of QMS introduction outweigh the costs. The decision-support system, therefore, expresses the results for all species/stocks as an overall score greater than .500 out of 1.0. For example, the results demonstrate that Chatham Islands eels have the greatest benefits relative to the costs of QMS introduction with an overall score for introduction equal to .701, compared to an overall non-QMS or baseline score equal to .299. Conversely, in a previous assessment Chatham Islands oysters, which had been proposed for QMS introduction on 1 April 2003, had the lowest level of expected benefits relative to the costs of introduction, resulting in an overall score for QMS introduction equal to .495, compared to an overall non-QMS score equal to .505, as outlined in the consultation document, dated 6 August 2001. Subsequently, the Minister of Fisheries determined that the best decision was not to introduce Chatham Islands oysters into the QMS.
- 33 It is theoretically possible that changes to the weight (level of importance) of the evaluation factors (sub-criteria level) could result in the QMS and non-QMS alternatives having equal scores or, in some instances, being reversed. After the initial assessment of costs and benefits for each species/stock was completed, a sensitivity analysis was run to demonstrate whether a change in the weights of the criteria categories or their evaluation factors could influence and possibly change the outcome of the overall decisions concerning the QMS and non-QMS alternatives. An explanation of the results of the assessment of costs and benefits is outlined at the end of each species description in this document.

## Next Steps

- 34 The next steps in the process of determining whether species/stocks listed in Table 1 above will be introduced into the QMS on 1 October 2003 are as follows:
- 35 Following the consultation time period, ending 5 July 2002, MFish will submit final advice and recommendations to the Minister of Fisheries on each species/stock's QMAs, fishing year and unit of measure, and the results of the assessment of the costs and benefits of QMS introduction; and
- 36 If the Minister agrees that a species/stock should be introduced into the QMS, then a Declaration Notice will be published in the Gazette that will contain each species/stock's introduction date, QMAs, fishing year and unit of measure. Table 4 outlines the timeframe involved in introducing species/stocks into the QMS on 1 October 2003.

**Table 4: Combined timeframe for 1 October 2003 QMS introductions:**

Step	Introduction by Eligible Catch History	
	Fourth Schedule	Non-Fourth Schedule
	Short-fin and long-fin eels (Chatham Islands), Kingfish	Kina (North Island), Leatherjacket, Rough skate, Smooth skate
Consultation with stakeholders	24 May – 12 July 2002	24 May – 12 July 2002
Advice paper to Minister	23 August 2002	23 August 2002
Validation of catch data complete	29 August 2002	29 August 2002
Section 18 QMS declaration notified in gazette	12 September 2002	12 September 2002
Notification of eligible catch (etc)	19 September 2002	19 September 2002
Objection period	20 September 2002 – 13 December 2002	20 September 2002 – 13 December 2002
Objection assessment complete	21 March 2003	21 March 2003
Notification of PCH (etc)	3 April 2003	3 April 2003
Appeal period	4 April 2003 – 3 July 2003	4 April 2003 – 3 July 2003
PCH transfer period	4 July 2003 – 31 July 2003	4 July 2003 – 31 July 2003
TACCs notified in gazette	31 July 2003	31 July 2003
Notification of preliminary quota allocation*	8 August 2003	-
Quota transfer period*	11 August 2003 – 22 August 2003	-
Notification of buyback and compensation*	8 September 2003	-
Notification of quota allocation	8 September 2003	8 September 2003
QMS introduction	1 October 2003	1 October 2003

\* Required if total amount of Provisional Catch History (PCH) for a stock, excluding PCH held by the Crown, exceeds the quota weight equivalent of 80 million shares in the stock.

# FRESHWATER EEL (ANG10) – CHATHAM ISLANDS

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## Species Characterisation

- 1 MFish proposes that the Chatham Islands freshwater eel fishery be introduced into the QMS as either a single stock (ANG), combining both longfin and shortfin eels, with a continuation of species-specific reporting on fishing returns, or as two separate species using the SFE (shortfin) and LFE (longfin) codes, which would require separate TACs and TACCs for each species. Either option will ensure that differences in terms of biology and fisheries characteristics of each species can be managed and, where necessary, different sustainability measures introduced.

## *Biological information*

- 2 Worldwide there are 15 species of freshwater eel. Three species occur in New Zealand; *Anguilla australis* (shortfin), *A. dieffenbachii* (longfin), and *A. reinhardtii* (Australian longfin). The latter species has not been recorded in the Chatham Islands.
- 3 The longfin and shortfin species both occur in abundance throughout New Zealand, including the Chatham Islands, and have overlapping habitat preferences with shortfins predominating in lowland lakes and muddy rivers, while longfins prefer stony rivers and can penetrate further inland to high county lakes.
- 4 All species breed at sea only once, at the end of their life, but the spawning grounds of only three species are known with any certainty. The longfin eel is endemic to New Zealand, and is thought to spawn east of Tonga. The shortfin eel is found in New Zealand, South Australia, Tasmania, and New Caledonia; spawning is thought to occur northeast of Samoa. Larvae (leptocephali) are transported to New Zealand via the South Equatorial Current, and the metamorphosed juveniles (glass eels) enter freshwater from August to November.
- 5 The age and growth of New Zealand freshwater eels was reviewed in 1996. Growth is variable and dependent on food availability, water temperature, and the density of eels. Growth rates determined from commercial catch sampling programmes through 1995-96 and 1996-97 indicate that in both the North and South Islands rates are highly variable within and between catchments. Shortfin eels often grow considerably faster than longfin eels. South Island shortfins take, on average, nearly 13 years to reach the minimum commercial legal size of 220 grams, compared with 17½ years for longfins. While in the North Island the equivalent times are nearly six years and nine years respectively. No comparable data exists for the Chatham Islands, although it is thought that the time taken to reach 220 grams would be closer to the averages in the South Island.
- 6 Eel stocks in New Zealand are not considered to be recruitment limited, although some questions have been raised over the possible gap in recruitment in some years for longfins in certain areas. Data from commercial catch sampling has indicated poor recruitment of longfin eels, with few adult female longfins above the minimum size at migration. This data, however, may not represent unfished populations and current research is directed at establishing the contribution areas closed to fishing might make

to the spawning escapement of this species. Information shows that recruitment of glass eels and elvers is highly variable between seasons and between areas. Recruitment into any particular catchment is dependent on spawning success of the total spawning populations, which results from escapement of eels from throughout the country including the Chatham Islands.

### Catch Summary

- 7 Although there is a considerable amount of information on the biology and ecology of these species, there is relatively little that can be used to assess the status of exploited stocks. There have been no assessments of sustainable yield nor are there estimates of biomass or trends in relative abundance for either fishstock.
- 8 A summary of reported catch for FMA4 is shown in Table 1. Note there was no commercial take from 1991-92 through to 1997-98.

**Table 1: Total reported landed catch (t greenweight) of freshwater eel (LFE/SFE) for FMA4 by fishing-year by all methods and target species taken from the landed section of the CELR. Fishing-years extend from October to September the following year.**

Fishing Year	LFE	SFE	Total
1990-91	2.488	7.325	9.813
1998-99	11.274	11.333	22.607
1999-00	3.021	6.559	9.580
2000-01	0.120	1.310	1.430

### Stocks and Areas

- 9 Longfin eels are endemic to New Zealand and are assumed to be a single stock. Biochemical evidence suggests that New Zealand and Australian shortfins are a single biological stock. Within a catchment, adult eels undergo limited movement until their seaward spawning migration. Therefore, once glass eels have entered a catchment, each catchment effectively contains a separate population of eels.
- 10 As noted there are two species of freshwater eel found at the Chatham Islands—shortfin and longfin. Each species is reported using unique codes—SFE and LFE respectively. The distribution of eel at the Chatham Islands and the relatively low level of landings are such that separate species allocation is not considered necessary for this fishery. Catch records show that the landings of shortfin outweigh those of longfin by a factor of 6 to 4. However, just over 30 percent of the total catch in 1998-99 was longfin, while in the following year it was just under 10 percent.
- 11 Irrespective of these figures, it is critical that any management regime has the ability to manage each species separately, particularly in respect to the longfin eel. In accepting this key principle, the South Island freshwater eel fishery was introduced into the QMS as a combined stock on the understanding there would be separate species reporting.

- 12 As a result, the Fisheries (Recordkeeping) Regulations were amended to ensure that licensed fisher receivers, when furnishing purchase invoices to fishers, provide separate greenweight entries for all longfin and shortfin eels that are subject to the QMS. In turn commercial fishers are required to use these separate codes (i.e., SFE and LFE), when completing freshwater eel catch effort returns and freshwater eel catch landing returns. When reporting against quota (i.e., monthly harvest returns), fishers are obliged to use the appropriate 'ANG' code.
- 13 It is intended that the Chatham Islands freshwater eel will be introduced into the QMS by way of a single quota allocation (i.e., ANG), but reporting by the commercial sector on catch effort and catch landing returns will require the use of species specific codes (i.e., SFE and LFE), or by way of two quota allocations based on the SFE and LFE codes. Either option should ensure that each species is managed separately.
- 14 As in other parts of New Zealand, the freshwater eel fishery at the Chatham Islands is concentrated on streams, rivers, lakes and lagoons. Their population is reasonably continuous over these inland and coastal waterways.
- 15 One of the primary sources of freshwater eel on Chatham Island, Te Whanga Lagoon and the rivers and streams flowing into it, is closed by regulation to all commercial fishing. Due to transport difficulties between the two inhabited islands, Chatham and Pitt, commercial fishing is concentrated on Chatham Island.

## Proposed Quota Management Areas

- 16 As mentioned in the introduction section, QMAs proposed by MFish are based on the following key principles listed in their order of importance:
  - a) The management areas should be based principally on the known biological nature of the species;
  - b) The stock boundaries should take into account the existing characteristics of the fishery (i.e., known fisheries, relevant fisheries management issues);
  - c) Where practicable, QMAs for species that are taken together in the same fisheries should be aligned;
  - d) Where practicable the same QMAs should be set for different species;
  - e) A separate QMA should be set for the water surrounding the Chatham Islands if the stock can be managed effectively as a unit;
  - f) QMAs with new boundaries may be appropriate for species with populations whose distributions do not align with existing QMA boundaries; and
  - g) Subject to the principles noted above QMAs should be as large as possible.
- 17 NIWA's recommendation on a QMA boundary for the Chatham Islands freshwater eel fishery is not available.
- 18 MFish considers key issues in determining QMAs for freshwater eel are as follows:
  - a) QMAs for South Island freshwater eel stocks have been determined, given their earlier introduction into the QMS on 1 October 2000;

- b) MFish notes that preferred harvesting techniques for freshwater eel may include rotational harvesting and harvesting at the level of small spatial scales;
- c) MFish notes there is little relevant biological information available to indicate appropriate boundaries for freshwater eel stocks;
- d) For relatively sedentary stocks, such as freshwater eel, MFish preference is to start with relatively large stock boundaries, adaptively moving to smaller stock management over time if required, using fisheries plans, finer scale reporting, alteration of QMAs and other tools; and
- e) There is likely to be greater emphasis on use of the freshwater eel resource for social and cultural reasons in the Chatham Islands, and accordingly harvesting behaviours may differ to that observed in the South Island.

19 The Chatham Islands freshwater eel fishery operates with a unique statistical reporting area number—as does the rest of New Zealand. Up until September 2000, the Chatham Islands eel statistical area was known as ESA 22, the boundaries of which were described as: “the group of 10 islands, known as the Chatham Islands, lying in the South Pacific Ocean about 700 km south-east of Wellington, and 800 km east of Lyttelton, in latitude 44S and longitude 176.20W, comprising some 965 sq km of total land area.

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- From October 2000, when the South Island freshwater fishery was introduced into the QMS, the statistical area was renamed ESA ‘AZ’ and redefined as all New Zealand fisheries waters enclosed by a line —
- commencing at a point in the South Pacific Ocean, being a point at 43°30.0’S and 177°00.0’W; then
- proceeding due east by right line to a point at 43°30.0’S and 176°00.0’W; then
- proceeding due south by right line to a point at 44°30.0’S and 176°00.0’W; then
- proceeding due west by right line to a point at 44°30.0’S and 177°00.0’W; then
- proceeding due north by right line to the point of commencement.

20 In essence ESA ‘AZ’ is a rectangle box within FMA4 that encompasses all the islands that make up the Chatham Islands.

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21 In terms of a QMA for the Chatham Islands freshwater eel fishery, there are two clear-cut possibilities. One is to define the area as the current eel statistical reporting area (i.e., ESA ‘AZ’). The other is to define it as the current FMA 4. The latter option follows principles when the QMAs were set for the introduction of the South Island eel fishery into the QMS on 1 October 2000. At that time it was noted that a QMA that extends out to FMA boundaries or the edge of the EEZ ensures that all freshwater eel taken in estuarine and marine areas are landed against quota. It was also noted then that fisheries management boundaries would be used to separate the South Island QMAs from the North Island and the Chatham Islands.

| 22 Following these generic and specific principles, it is proposed that the QMA for the Chatham Islands freshwater eel mirror the current boundary of FMA4.

## Fishing Year

| 23 Historically, the fishing year for freshwater eel throughout New Zealand, apart from Lake Ellesmere, has run from 1 October through to 30 September in the following year. This standard fishing year has suited this fishery, as the freshwater eel lies dormant over winter, particularly in colder climates, and fishing usually gets underway in October. Accordingly, there is no compelling reason to alter the current fishing year from 1 October to 30 September should the Chatham Islands freshwater eel fishery be introduced into the QMS.

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## Unit of Measure

| 24 Again, historically, the use of greenweight has been used for management purposes in the freshwater eel fishery throughout New Zealand. When the South Island eel fishery was introduced into the QMS on 1 October 2000 it was decided then to allocate quota based on greenweight and to retain this unit of measure for reporting purposes. MFish sees no reason to change this unit of measure should the Chatham Islands freshwater eel fishery be introduced into the QMS.

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## Assessment of Costs and Benefits

| 25 As mentioned, section 19(8) of the 1996 Act requires the Minister of Fisheries to have regard to the costs and benefits of introducing a stock into the QMS. For this reason, MFish undertook an initial assessment of the costs and benefits of introducing the Chatham Islands freshwater eel fishery into the QMS.

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| 26 The introduction section of this document outlines the methodology used in the assessment, including a description of the assumptions and the four primary criteria categories (Environmental Sustainability, Treaty of Waitangi, Economic, and Social), and their respective sub-criteria. Because these four categories cover a reasonable and practical range of possible arguments for and against introducing a species into the QMS, MFish considers the assessment of expected costs and benefits to be consistent with the purpose of the 1996 Act as expressed in section 8.

| 27 When reviewing the results of the assessment, you should keep in mind that the assessment made use of the best available information and expert judgment, aided with the help of a decision-support system, which quantifies the results for each primary criterion category and the overall score out of a possible 1.0. This approach provides a structure to organise and evaluate the importance of various objectives when making a final decision as to whether or not the Chatham Islands freshwater eel fishery should be introduced into the QMS.

| 28 The assessment of the costs and benefits of QMS introduction occurred on the basis of separate species (i.e., LFE and SFE), but for the score of one criterion category (Environmental Sustainability) for LFE, the two species were considered equivalent.

29 The assessment of the costs and benefits favours the QMS alternative with an overall score of .701 compared to the non-QMS alternative score of .299, resulting in a priority ratio of 2.345. This indicates that the QMS alternative is more than 130 percent higher than the non-QMS alternative, and hence is preferred for the management of the freshwater eel fishery at the Chatham Islands. The overall score and the results of each primary criterion category are outlined in Table 2, and an explanation of each criterion category follows.

**Table 2: Assessment of Costs and Benefits:**

Scores	QMS	Non-QMS
Overall	.701	.299
Environmental Sustainability	.691	.309
Treaty of Waitangi	.789	.211
Economic	.600	.400
Social	.703	.297

### *Environmental Sustainability*

30 Management within the QMS is strongly favoured in order to better achieve sustainability goals. The setting of a TAC provides an incentive for all sectors to consider the amount of either shortfin or longfin eels taken in the Chatham Islands on an annual basis for any purpose, and should encourage participation and compliance with the management goals for this fishery. This may be of particular importance for the longfin eel given that it lives longer than the shortfin eel, and the range of habitat on the islands for this species may be less than that for shortfin eel. Furthermore, the addition of more longfin eel stocks into the QMS will be beneficial to improving the overall status of this species throughout the country.

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31 While historically there has been limited commercial access to the freshwater eel fishery on the Chatham Islands, there has been no CCL put in place for either fishery. Although unlikely, a commercial fisher could fish one or both fisheries beyond a level considered sustainable over the longer term without any fishing reference point being in place. There is less incentive for commercial fishers to overrun harvesting entitlements in the QMS environment in comparison to a non-QMS environment, even if TACCs for each fishery are quite modest. The QMS provides administrative penalties for the over-running of CCLs, whereas there is no comparable incentive to encourage commercial fishers to carefully monitor their fishing activities in the non-QMS management environment.

32 The QMS environment may also facilitate the enhancement of the eel fishery given the benefits that may accrue to all users of the resource in terms of available catch.

33 The QMS environment is also favoured for the reason that it is expected to improve the quality and quantity of information on the fishery. QMS introduction should provide the incentive for the capture and recording of local knowledge. The uptake of this information should result in better management directions being followed that encompass the interests of all parties. Specifically, provision of information on non-commercial use of the resource can be taken into account prior to the Minister setting or varying a TACC.

34 The expected impacts on associated and dependent species and the aquatic environment may slightly favour the QMS alternative. Catch limits set under the QMS environment are likely to be more attuned to assessments on inter-related species. Nevertheless, the fishing methods used for eel fishing are unlikely to change in either a non-QMS or QMS environment, and are generally considered reasonably benign in terms of impacts on the environment. However, the QMS environment may encourage stakeholders to collectively act, given the shared interests that they are likely to hold, and the benefits that may flow on to all parties from their collective action. Similarly, commercial fishers may be more responsive to the development of a fishery plan, which addresses environmental concerns, given their investment in the fishery.

### *Treaty of Waitangi*

35 This criterion very strongly favours QMS introduction because it would facilitate the entry of Māori into the commercial sector. This may be at a modest level as it relates to the freshwater eel fishery on the Chatham Islands, but may be significant in an area where employment opportunities are sometimes seasonal in nature, or a range of employment avenues are required to support the livelihood of a person living there. QMS introduction may also provide the opportunity for further participation in the management of the fishery. In contrast, direct commercial access to Māori under the non-QMS environment is not available.

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36 The freshwater eel fishery remains an important customary fishery, and the introduction of the Chatham Islands fishery into the QMS would provide for improved specification of quantitative allowances for customary fishing, and hence better certainty over long-term customary access. The quantitative allowance for customary fishing will be addressed when the Minister makes final decisions about the TAC and allowances for customary, recreational and commercial interests.

37 Further, Tangata Kaitiaki/Tiaki administering the customary fishing regulations on the Chatham Islands should have a further incentive to ensure that the quantity of customary take authorised is taken into account for future decisions on customary fishing allowances within the QMS environment. Such an incentive may not be as strong in the non-QMS management environment.

38 Similarly, as Māori will hold no less than 20 percent of the quota for a particular stock, they should be in a better position to manage and co-ordinate both their commercial and customary harvesting practises. As harvesting activities are likely to be managed at a small scale, there is likely to be better recognition of localities of importance to customary fishing.

### *Economic*

39 This criterion strongly favours the introduction of the freshwater eel fishery into the QMS. The costs of introduction are expected to be very low, given that much of the systems work has already been undertaken, or is being undertaken, as part of the consideration for the introduction of other eel stocks into the QMS. Furthermore, the assessment of provisional catch history is relatively straightforward, given the proposed QMA is quite discreet from the others, the use of the fishery on a

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commercial basis has been intermittent and restricted to one party, and it is a target specific fishery.

- | 40 Although the cost of managing the non-QMS fishery is unlikely to be high in the current environment of limited or intermittent commercial participation, this could change should a commercial fisher elect to utilise permitting authority in a manner that caused local concerns. More generally, it is expected that commercial interests are likely to act more cooperatively under the QMS environment, particularly on the Chatham Islands. Ongoing management costs should be reduced with the establishment of harvesting rights and a mechanism to access the fishery within an overall framework that provides better tools for ensuring sustainability.
- 41 The fisheries output benefits strongly favour the QMS alternative because the secure harvesting rights would provide for improved incentives to enhance the fishery. Increased or secure harvesting potential may facilitate further investment in processing or infrastructure. Similarly, fishing patterns may change with a focus on the harvest of either species only when in high quality condition.
- | 42 The QMS alternative is strongly favoured on the basis of benefits associated with allocation of harvesting rights, because QMS introduction could allow new entrants into the fishery (e.g., the Chatham Islands Enterprise Trust). Any such participants would have secure rights on which to base future investment decisions upon QMS introduction.
- | 43 Neither the QMS nor the non-QMS alternatives are favoured in relation to the indirect consequences on fishing capacity. This is because historical commercial use of the resource has been intermittent, and, therefore, there is no excess capacity. However, QMS introduction may rationalise the latent effort that potentially exists, and provide a more direct means for local people to access harvesting rights, resulting in an uncertain impact on fishing capacity.

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### *Social*

- | 44 This criterion very strongly favours the QMS alternative. The Chatham Islands support an important recreational fishery for the freshwater eel fishery. In setting a TACC for a fishstock under the QMS, the Minister must make a quantitative allowance for recreational fishers. While the Minister must similarly take this provision into account when setting a CCL for a non-QMS stock, such a limit is currently not in place, nor is it likely to be reviewed in the foreseeable future.
- | 45 Furthermore, while CCLs are not currently in place for either shortfin or longfin eel, it is possible that any fishing activities for these species left unchecked could impact on the overall abundance of the resource. QMS introduction may encourage more control over recreational harvesting given the desire to ensure that these activities are consistent with the TAC and allowances for recreational fishing.
- | 46 Similarly, the current non-QMS environment does not necessarily encourage commercial fishers to have regard to recreational fishers' interests when seeking to maximise the commercial catch taken. The improved specification of commercial harvesting rights in this fishery, through the allocation of quota, is likely to provide an incentive for improved consideration of a range of stakeholder interests. Harvesting

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strategies developed cooperatively by stakeholders could address recreational fishers' interests in accessing the resource at particular sites, or at particular times of the year.

- | 47 The QMS alternative is strongly favoured when considering the impacts on coastal communities. The opportunity for further commercial access is likely to provide extended employment opportunities on the Chatham Islands. While the extent of any commercial opportunity is likely to be modest, and perhaps seasonal, this may still prove to be significant where employment opportunities remain limited. Similarly, QMS introduction could provide more opportunities for local participation within the fishery by way of the 1996 Act stipulating that unallocated quota in respect of stocks held by the Crown would be transferred to the Chatham Islands Enterprise Trust.
- | 48 Consideration of the potential impacts on recreational use of the resource favours the QMS alternative. The 1996 Act provides for a number of tools to address or avoid circumstances that may be deemed undesirable for recreational interests, in addition to the setting of appropriate allowances for the non-commercial sectors.
- | 49 Consideration of future generations ability to meet their reasonably foreseeable needs favours the QMS alternative. The QMS alternative provides for the application of sustainable catch limits for each species, as may be further complemented by appropriate controls for each sector. QMS introduction is likely to provide incentives for different interests to participate further in the management of the fishery, and this should assist in reaching agreement on goals that meet the foreseeable needs of future generations.

### *Sensitivity Analysis*

- | 50 The results of the sensitivity analysis demonstrate that there is no feasible set of weights (level of importance) for the four primary criteria that could reverse the decision in favour of the introduction of either the longfin or shortfin eel stocks into the QMS. Although changes to weights at the sub-criteria level will not reverse the decision to introduce the Chatham Islands freshwater eel fishery stocks into the QMS, it could result in the QMS and non-QMS alternatives having equal scores.

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### **Summary of Proposals**

- | 51 The Chatham Islands freshwater eel fishery is currently managed within FMA4. MFish proposes that should this fishery be introduced into the QMS its QMA be based on the existing FMA. However, an alternative QMA boundary is the eel statistical area 'AZ'.
- | 52 MFish proposes that the Chatham Islands freshwater eel fishery be introduced into the QMS as either a single stock (ANG), combining both longfin and shortfin eels, with a continuation of species-specific reporting on fishing returns, or as two separate species using the SFE (shortfin) and LFE (longfin) codes, which would require separate TACs and TACCs for each species.
- | 53 MFish proposes to retain the current standard fishing year of 1 October to 30 September should the Chatham Islands freshwater eel fishery be introduced into the QMS. The alternative fishing year is 1 April to 31 March.

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| 54 For the purpose of expressing the TACC and ACE, MFish proposes to retain the current standard of greenweight should the Chatham Islands freshwater eel fishery be introduced into the QMS. The alternative unit of measure is meatweight.

| 55 MFish proposes that the freshwater eel fishery at the Chatham Islands be introduced into the QMS on 1 October 2003 based the assessment of costs and benefits as outlined in this section.

56 MFish requests your comments on the above proposals and alternative options.

# KINA (SUR) – NORTH ISLAND

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## Species Characterisation

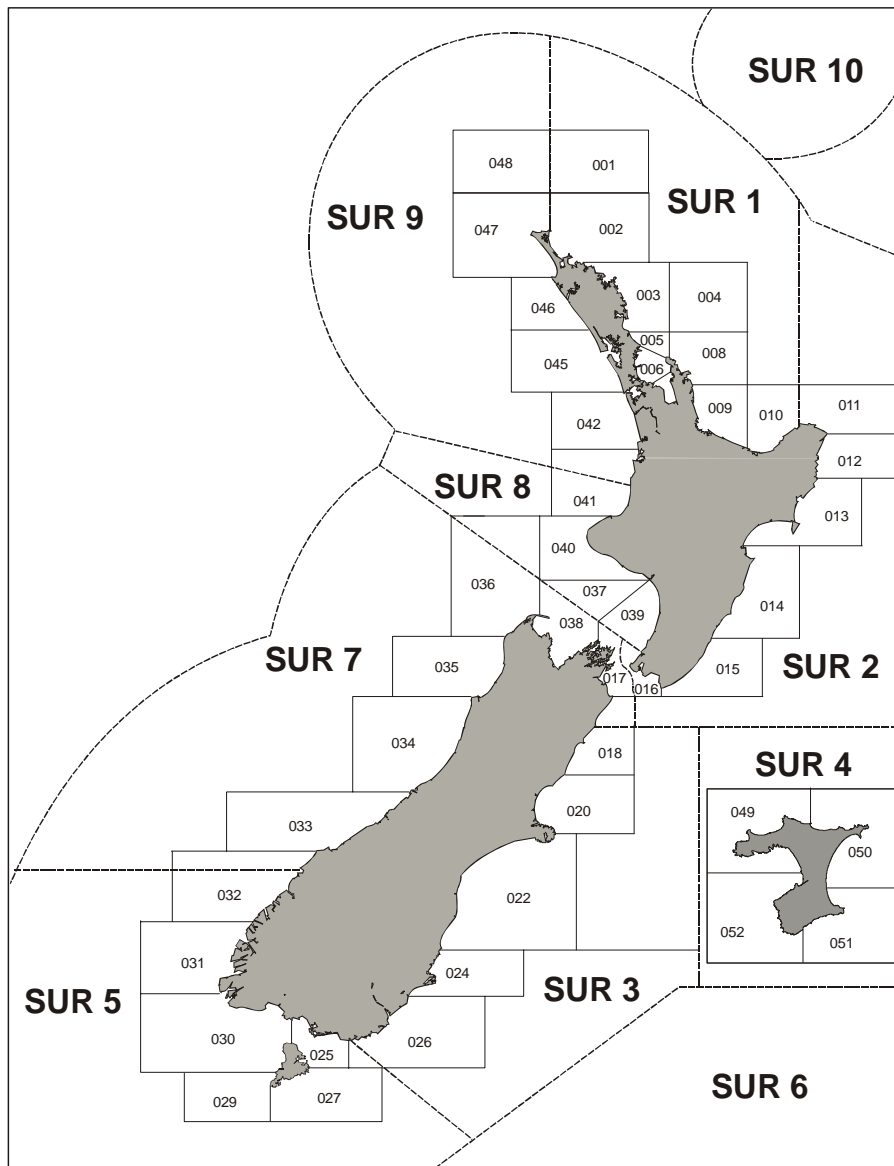
### *Biological Information*

- 1 The New Zealand kina (*Evechinus chloroticus*) is also known as sea urchin and sea egg. Of the 10 species of sea urchin recorded as a bycatch in commercial fisheries, kina is the only one commercially targeted; it accounts for more than 99 percent of the recorded catch. Kina is the only sea urchin species considered for QMS introduction on 1 October 2003, as it relates to northern New Zealand. The kina fishery in the South and Chathams Islands is scheduled for QMS introduction on 1 October 2002.
- 2 There is a relatively high degree of consistency in the timing of the reproductive cycle of kina along New Zealand's coastline. Kina has an annual reproductive cycle, which culminates in spawning between November and March. Spawning may reduce the volume of the gonad by 40–50 percent. In the months after spawning the gonads slowly increase in size as nutrient stores are replenished and the gametogenic phase of the cycle begins. Kina with ripe gonads may be found from October each year. Some Maori believe that the on-set of kina gonad development coincides with the flowering of the pohutukawa tree in parts of the North Island. Size at maturity appears to vary considerably among locations in New Zealand and may be as small as 30 mm and as large as 75 mm test diameter (TD).
- 3 Large differences in gonad volume and gametogenic stage have been found among populations separated by relatively small distances. Under experimental conditions, gonad volume can significantly differ between different stocking densities and diets. In as much as gonad volume is related to roe quality, it is apparent that roe quality will vary considerably over small distances, and that these differences are unlikely to be consistent through time. Until these small-scale patterns are understood, variability in roe quality will cause problems for a developing fishery.
- 4 Kina take 4–6 weeks to develop through their larval stages and to settle onto reefs. Within Fiordland, larvae are likely to be retained in the Sound in which they originated. Despite this ecological evidence, it has been found that few genetic differences in kina populations exist from Leigh (North Auckland) and Stewart Island, which suggests that there is at least some mixing among populations.
- 5 There is little information available on the interactions between kina and its predators and competitors. Although a wide range of fish and invertebrate predators consume kina, there is no evidence that any of these species control or limit populations of kina. Recent work in a marine reserve, where large predators such as reef fishes and crayfish are abundant, indicates that predators can control numbers of kina surviving the transition from crevice-bound to open substratum grazing. A direct link has been drawn between the increases in snapper and crayfish populations and the long-term decline in kina populations in the Leigh Marine Reserve. It is likely, however, that changes in the abundance of kina, and the consequent changes in habitat representation, are part of a complex set of interacting processes, including but not exclusively, increased predation. There is no evidence that high kina densities limit crayfish populations.

- 6 It is estimated that kina grow 8–10 mm in their first year of life. Growth rate will vary considerably depending on local conditions, but kina may take 8–9 years to reach 100 mm TD and very large individuals may reach ages of 20+ years.

### *Catch Summary*

- 7 Although there is a considerable amount of information on the biology and ecology of this species, there is relatively little that can be used to assess the status of exploited stocks. There have been no assessments of sustainable yield nor are there estimates of biomass or trends in relative abundance for any fishstock.
- 8 Of the five northern FMAs currently used as default management areas for kina (ie, SUR 1, 2, 8, 9 and 10), commercial harvesting is concentrated in SUR1 (refer to Figure 1, Table 1).
- 9 Commercial catch in SUR1 has steadily increased during the 1990s, with much of the fishing effort occurring in the eastern Coromandel and Great Barrier Island area. Similarly, recreational harvest estimates indicate that SUR1 is an important area for recreational harvesting (refer to Table 2), mainly in the Bay of Plenty and East Northland. While no Maori customary fishing information is currently available, it is well known that kina are important elements of customary fishing practises, particularly in Northland, the Bay of Plenty. Commercial fishers are prohibited from fishing kina in the Eastern Bay of Plenty in recognition of the importance of kina to local Maori communities.
- 10 Commercial catches from SUR2 have undergone some fluctuation during the 1990s in response to phases of interest in further harvesting of the resource. Some of this increase in catches coincided with both a harvesting trial using underwater breathing apparatus (i.e., scuba) that is otherwise illegal, and investment in a kina export processing facility in Gisborne. Much of the commercial activity is centred in the East Coast region. Maori in the East Coast region regard kina as an important food resource, however, no customary fishing information for this species is currently available. A regulated closure on commercial fishing activity is in place around parts of Mahia Peninsula, the Cape Kidnappers coast and parts of the Wellington coast, including Wellington Harbour.
- 11 Commercial catch in SUR8 and SUR9 is negligible on the basis that very few people have access to these waters, but also because the habitat is unlikely to support kina populations to the level observed on the east coast of the North Island. Maori customary and recreational fishing of kina in these areas is known to be of importance in some localities, particularly where the habitat is suitable for the species. Commercial fishing of kina is prohibited in SUR8 from Paraparaumu Beach to Porirua Harbour, and on to Rock Point.
- 12 Kina are not taken in SUR10, the Kermadec Fishery Management Area. A marine reserve, established in 1990, extends 12 nautical miles around the Kermadec Islands, preventing any harvesting in the area.



**Figure 1: Fishery Management Areas (FMAs) and Statistical Reporting Areas for the New Zealand kina fishery. For clarity, Statistical Area 007, the Firth of Thames, is not shown. Note that the Chatham Island map is not drawn to the same scale as the remainder. The offshore Areas 019, 021, 023 and 028 are not shown.**

**Table 1: Total reported landed catch (t greenweight) of kina (SUR) by FMA and fishing year by all methods and target species. Fishing years extend from October to September the following year. Data from 1988/89 and 1989/90 are combined from the FSU and CELR databases. Blank cells indicate no recorded catch. Data relating to SUR 6, 8, 9 have been pooled because too few permit holders recorded catches in these FMAs to report them singly; note that there is unlikely to have been any catch against SUR 6 (Sub-Antarctic Islands).**

Fishing Year	SUR1	SUR2	SUR6,8,9	SUR 10
1982/83	66.2	33.0	3.6	-
1983/84	81.4	180.3	0.3	-
1984/85	64.5	83.8	0.9	-
1985/86	72.0	139.1	2.0	-
1986/87	52.1	142.6	0.1	-
1987/88	22.1	154.1		-
1988/89	35.5	92.8	1.5	-
1989/90	10.0	282.4	6.5	-
1990/91	71.5	87.2	4.4	-
1991/92	78.7	37.3	5.0	-
1992/93	89.7	170.4		-
1993/94	150.7	176.7	2.3	-
1994/95	155.9	129.7	89.5	-
1995/96	174.5	41.2	0.1	-
1996/97	161.6	49.9	0.2	-
1997/98	134.8	36.5	1.4	-
1998/99	201.4	20.2	0.5	-
1999/2000	223.6	10.3	0.1	-

**Table 2: Recreational harvest of kina for 1993-94 and 1996. CV's are indicated only for those samples with adequate sample sizes. Data compiled from Bradford (1996, 1998) and Fisher and Bradford (1998).**

Fishing Year	Fishing Area	Number of kina (x 1,000)	Estimate of error - c.v. (%)	Catch (t)*
1993/94	East Northland	109	60	27.1
1993/94	Hauraki Gulf	14	-	3.5
1993/94	Bay of Plenty	648	49	160.9
1993/94	SUR1	801	41	198.9
1993/94	SUR9	30	72	7.4
1996	SUR1	316	24	78.5
1996	SUR2	61	-	15.1
1996	SUR8	43	-	10.7
1996	SUR9	30	-	7.4

\* For this summary, catches in numbers of kina have been converted to catch in tonnes by assuming an average whole weight of 248.3 g per kina. In the absence of size specific catch statistics, it is assumed that kina are caught in equal proportion across a size range of 60 to 110 mm test diameter (TD). The lower size in this range is approximately the size-at-maturity and the upper size is close to maximum harvested size. Weight-at-size was calculated using a test diameter-weight relationship ( $W = (6.27 \times 10^{-4})TD^{2.88}$ ) derived for kina 60-110 mm TD from Dusky Sound (n= 1,063, unpublished data). The estimates of total catch in tonnes should be considered as indicative only.

## Stocks and Areas

- 13 Kina fisheries in the North Island are mostly found on the eastern and southern coasts between North Cape and Wellington. Their population is reasonably continuous over this area, yet limited to rocky shores. West coast North Island populations are likely to be less abundant, and in some places disjointed given habitat preferences.
- 14 In a research report prepared for MFish, NIWA recommends that ensuring sustainable use of the kina fishery is most likely to be achieved at a small scale. Such management outcomes may be enhanced with the use of QMAs that may be generally smaller than existing FMAs; and/or where incentives are appropriate to ensure that harvest activities are managed at a fine scale (e.g., via implementation of a Fishery Plan).
- 15 A further constraint is that the sub-division of some present FMAs on boundaries other than the present General Statistical Areas (refer to Figure 1) may cause problems in allocating catch history to participants in the commercial fishery. NIWA also recognises the desirability of having continuity in the management framework applied, as it may affect the ability to monitor stocks in the future.

## Proposed Quota Management Areas

### Principles

- 16 As mentioned in the introduction section, QMAs proposed by MFish are based on the following key principles listed in their order of importance:
  - a) The management areas should be based principally on the known biological nature of the species;
  - b) The stock boundaries should take into account the existing characteristics of the fishery (i.e., known fisheries, relevant fisheries management issues);
  - c) Where practicable, QMAs for species that are taken together in the same fisheries should be aligned;
  - d) Where practicable the same QMAs should be set for different species;
  - e) A separate QMA should be set for the water surrounding the Chatham Islands if the stock can be managed effectively as a unit;
  - f) QMAs with new boundaries may be appropriate for species with populations whose distributions do not align with existing QMA boundaries;
  - g) Subject to the principles noted above QMAs should be as large as possible.
- 17 NIWA recommendations on North Island kina QMA boundaries are not available.
- 18 MFish considers key issues in determining QMAs for kina are as follows:
  - a) QMAs for the South Island and Chatham Island kina stocks have been determined, given their earlier scheduled introduction into the QMS on 1 October 2002;
  - b) MFish notes that preferred harvesting techniques for kina may include rotational harvesting and harvesting at the level of small spatial scales;

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- c) MFish notes there is little relevant biological information available to indicate appropriate boundaries for kina stocks;
- d) For sedentary stocks, such as kina, MFish's preference is to start with relatively large stock boundaries, adaptively moving to smaller stock management over time if required, using fisheries plans, alteration of QMAs and other tools; and
- e) There is likely to be greater emphasis on use of the kina resource for social and cultural reasons in the North Island, and accordingly harvesting behaviours may differ to that observed in the South Island.

### Proposals

- 19 Kina, like the majority of non-QMS species, is currently managed within 10 FMAs. MFish proposes that the management of kina be based, in most areas, on existing FMAs. However, in the South Island, FMA7 will be managed as two separate stocks on introduction into the QMS. SUR7A encompasses the Nelson-Marlborough region and SUR7B the west coast south to Fiordland.
- 20 Preferred long-term approaches to harvesting kina include rotational harvesting or harvesting across small spatial scales. However, the view of MFish is that QMAs should provide the boundaries within which quota holders and stakeholders can practise small-scale rotational or other harvest techniques, but should not attempt to set the actual boundaries for these harvesting techniques. Furthermore, there is currently insufficient information to establish what these actual boundaries should be. Smaller-scale harvests can be implemented within a broader QMA, for example, by way of section 11 catch limits, or under the provisions of a fisheries plan.
- 21 While some subdivision of FMAs may be sensible upon introduction into the QMS (which is proposed for FMA1 and FMA2), it is not feasible in the short-term to subdivide General Statistical Areas for kina because many General Statistical Areas do not follow logical boundaries for kina. MFish notes that quota holders can also adaptively move to alter QMA boundaries post-QMS introduction, if required, using tools within the 1996 Act.

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Kina 1A (SUR1A) (FMA1: East Northland)

- 22 This area encompasses the waters between North Cape and Bream Tail, extending in an eastward direction to Needles Point at the northern tip of Great Barrier Island, and then in a straight line due north until it intersects with the boundary of the EEZ. Bream Tail is a General Statistical Area boundary, as well as being a natural boundary point to distinguish between kina populations. Specifically, there are large sandy beaches on either side of this point (i.e., Bream Bay and Pakiri Beach) that are not suitable kina habitat.
- 23 An alternative boundary commences just to the south at Te Arai Point (Pakiri Beach), using the existing defined boundary for rock lobster stocks. This line proceeds in a northwest direction to the boundary of the EEZ at latitude 33 degrees 20.0' S and 177 degrees 51.0' E. The only difference the use of this line would make would be the exclusion of the Moko Hinau Islands from the East Northland stock. However, this alternative line would not be consistent with current General Statistical Areas. This may not be a problem in that it can be assumed that all kina catch taken in the Statistical Area (i.e., GSA 005) intersected by this alternative line would have been

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taken to the south of the proposed QMA line. This is because little habitat for kina exists between Te Arai Point and Bream Tail, an area of exposed ocean sandy beach.

- | 24 The East Northland area is characterised by many harbour and similar coastal reef environments that support habitat of preference to kina. The area is influenced by the East Auckland current and by water temperatures warmer than elsewhere. Further, there are a number of common interests amongst the people of this area as it relates to the use of the kina resource. Non-commercial interests mostly harvest kina in this area. A limited amount of commercial fishing occurs in the proposed QMA. As the species is sedentary, and prone to local depletion, the subdivision of the FMA at the point suggested may act as a useful starting point for stakeholders common to the respective areas to discuss the basis for management at a smaller scale.

Kina 1B (SUR1B) (FMA1: Hauraki Gulf – Bay of Plenty))

- | 25 This area encompasses the waters between Bream Tail (northern boundary described in SUR1A paragraph above, alternatively Te Arai Point) and Cape Runaway, encompassing the Hauraki Gulf, Great Barrier Island, other eastern offshore islands, the Coromandel Peninsula and Bay of Plenty. While the northern boundary coincides with the General Statistical Area boundary, the eastern boundary at Cape Runaway also coincides with the FMA boundary. This is an extensive area in its own right, although there is little habitat for kina in the central Bay of Plenty, and commercial fishing of kina is prohibited in the eastern Bay of Plenty. Much of the commercial fishing activity within FMA1 occurs around the eastern Coromandel Peninsula and adjacent offshore islands to the east.

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Kina 2A (SUR2A) (Part FMA2: Gisborne)

- | 26 This area encompasses the waters between Cape Runaway and Napier, and takes in extensive areas of suitable habitat within the proposed QMA. There are large kina populations that are utilised by non-commercial and commercial fishers alike. The placement of a boundary at Napier is biogeographic in nature, with kina populations being a conspicuous feature north of the Mahia Peninsula, rather than in the slightly differing habitat found in the Hawke Bay. Commercial fishing is also currently prohibited around parts of Mahia Peninsula, and consequently it is envisaged that much, if not all, future commercial fishing activity will continue north of Mahia Peninsula.

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Kina 2B (SUR2B) (Part FMA2: Wairarapa - Wellington)

- | 27 This area encompasses the waters between Napier and the FMA2 boundary where it adjoins FMA8 (i.e., near the Porirua Harbour entrance). This includes the Wairarapa and Wellington coasts. Southern water currents and weather patterns that differ from more northern localities influence this coastline. MFish considers it reasonable to assume that the biological communities associated with kina around the southern North Island differ from other North Island localities. The habitat to the west of the proposed QMA (i.e., the Paraparaumu coast north) is generally less suitable for kina, and is appropriately considered as a separate QMA. In addition, the known commercial fishery for kina is principally based in the Gisborne region rather than the Wairarapa-Wellington coast.

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28 Furthermore, the proposed Napier QMA boundary is also an appropriate boundary given a combination of unsuitable habitat immediately to the south of the town, and the presence of an area that prohibits commercial fishing for kina, or commercial fishing generally. The closed area specific to commercial kina fishing extends from the Tukituki River mouth, around Cape Kidnappers, to the Waipuka Stream (adjacent to Ocean Beach). The general area closed to commercial fishing generally includes the area south of Ocean Beach commencing at Waimarama and extending south to a point past Karamea Island. Coupled with the unsuitability of the habitat to the immediate south of Napier, and these areas being closed to commercial fishing, either specifically for kina or more generally, there is unlikely to be any prospect of commercial fishing of kina populations for approximately 50 kilometres south of the proposed QMA boundary at Napier.

29 Similarly, parts of the coast around the Wellington region are also prohibited for commercial kina fishing. This includes the boundary area between the Waikanae River and Rock Point approximately four nautical miles to the south of the Porirua Harbour, as well as the Wellington Harbour and its entrance. These closures limit much commercial activity in the current boundary area adjacent to, or a part of, FMA8. Accordingly, these restrictions on commercial fishing access further delineate harvesting activities between the proposed adjoining QMAs based on the existing FMA boundary.

Kina 8 (SUR8: Taranaki)

30 SUR8 is based on the existing FMA8. This extends from Tirua Point in the north to near Porirua in the south. The southern boundary is subject to a commercial fishing closure between Waikanae Beach and Porirua. Habitat suitable for kina populations is limited in the area north of Paraparaumu until southern Taranaki is reached. The relative abundance of kina populations are not comparable to populations found on the east coast of the North Island, although some localised populations with reasonable numbers are found in the Taranaki region north to Tirua Point. While commercial harvest is practically non-existent, some non-commercial harvest occurs.

Kina 9 (SUR9: West Auckland)

31 SUR9 is based on the existing FMA9. This extends from Tirua Point in the south to North Cape, including a number of harbour areas. The habitat across much of the area, including several of the harbour areas, is generally not suitable to support large kina populations. Nevertheless, there are some populations that are important sources of food for both customary and recreational interests in this proposed stock area. Commercial fishing is largely absent across this proposed stock area.

Kina 10 (SUR10: Kermadec)

32 The Kermadec FMA is sufficiently isolated from the mainland to justify a QMA in its own right. There has been no commercial fishing for kina in this area prior to 1990. A marine reserve was established in 1990 that extends 12 nautical miles from all islands in the FMA. This precludes any further fishing activities in the area, as there is no suitable habitat for kina in the waters beyond this boundary.

## Fishing Year

- 33 Historically, the fishing year for the kina fishery has run from 1 October through to 30 September in the following year. This standard fishing year has suited this fishery. Accordingly, there is no compelling reason to alter the current fishing year from 1 October to 30 September should the North Island kina fishery be introduced into the QMS. The alternative fishing year is 1 April to 31 March.

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## Unit of Measure

- 34 Again, historically, the use of greenweight has been used for management purposes in the kina fishery. MFish sees no reason to change this unit of measure should the North Island kina fishery be introduced into the QMS. The alternative unit of measure is meatweight.

## Assessment of Costs and Benefits

- 35 As mentioned, section 19(8) of the 1996 Act requires the Minister of Fisheries to have regard to the costs and benefits of introducing a stock into the QMS. For this reason, MFish undertook an initial assessment of the costs and benefits of introducing North Island kina stocks into the QMS.
- 36 The introduction section of this document outlines the methodology used in the assessment, including a description of the assumptions and the four primary criteria categories (Environmental Sustainability, Treaty of Waitangi, Economic and Social), and their respective sub-criteria. Because these four categories cover a reasonable and practical range of possible arguments for and against introducing a species into the QMS, MFish considers the assessment of expected costs and benefits to be consistent with the purpose of the 1996 Act as expressed in section 8.
- 37 When reviewing the results of the assessment, you should keep in mind that the assessment made use of the best available information and expert judgment, aided with the help of a decision-support system, which quantifies the results for each primary criterion category and the overall score out of a possible 1.0. This approach provides a structure to organise and evaluate the importance of various objectives when making a final decision as to whether North Island kina stocks should be introduced into the QMS.
- 38 The assessment of the costs and benefits of QMS introduction favour the QMS alternative with an overall score of .678 compared to the non-QMS alternative score of .322, resulting in a priority ratio of 2.106. This indicates that the QMS alternative is more than 100 percent higher than the non-QMS alternative and hence is preferred for the management of kina. The overall score and the results of each primary criterion category are outlined in Table 3, and an explanation of each criterion category follows.

**Table 3: Assessment of Costs and Benefits:**

Scores	QMS	Non-QMS
Overall	.678	.322
Environmental Sustainability	.708	.292
Treaty of Waitangi	.625	.375
Economic	.732	.268
Social	.569	.431

### *Environmental Sustainability*

- 39 This criterion strongly favours the QMS for the reason that introduction is expected to provide improved quality and quantity of information on the fishery. As mentioned, much is known about the biology and ecology of this species, however, there is relatively little information that can be used to assess sustainable yield, estimates of biomass or trends in relative abundance for any fishstock.
- 40 Data collected from commercial fishers on their catch and effort in the fishery may not be adequate to monitor trends against the likely or actual stocks. QMS introduction should provide the incentive for management at a small scale to be progressed by stakeholders that are better able to capture and record their local knowledge in managing the fishery. Furthermore, the uptake of this information should be faster and easier in considering management directions of interests, including research, to all parties. Provision of information on non-commercial use of the resource can also be taken into account prior to the Minister setting or varying a TACC limit.
- 41 Management within the QMS is strongly favoured in order to better achieve sustainability goals. There is less incentive for commercial fishers to overrun harvesting entitlements in a QMS environment than a non-QMS environment. At present, daily catch limits (300 kilograms) that apply to commercial fishers in FMAs 1 and 9 are only partially effective in ensuring sustainability. The limits imposed are dependent on the number of participants not exceeding what is considered an overall sustainable catch. Although entry into the commercial fishery has been restricted for more than 15 years, the appropriateness and effectiveness of the current daily bag limit remains uncertain. Furthermore, daily limits impose economic inefficiencies that may affect harvesting strategies, with the consequence that some kina populations may be adversely effected.
- 42 In FMAs 2 and 8, while a daily limit of 900 kilograms currently applies to commercial harvesting, an annual competitive CCL is also in place (350 tonnes and 50 tonnes respectively). Whereas the QMS provides administrative penalties for the over-running of a TACC, there is no comparable incentive in these FMAs to encourage commercial fishers to carefully monitor their kina fishing activities against their harvesting entitlement under the non-QMS management regime (either on a daily or annual basis).
- 43 The expected effect on associated and dependent species and the aquatic environment may slightly favour the QMS alternative. Catch limits set under a QMS environment, where limits are related to a more deliberately defined area considered appropriate for kina management, may also be more attuned to assessments on inter-related species. More generally, the QMS provides a framework for the management of multi-species

issues, including trade-offs, which may not be available in the non-QMS environment. Ownership of commercial harvesting rights, and the subsequent incentive to undertake management of the kina fishery at a small scale, yet within a relatively large QMA, may also ensure that harvesting practises are sensitive to the aquatic environment. Commercial fishers may be more responsive to developing fisheries plans that address environmental concerns, given their investment in the fishery.

### *Treaty of Waitangi*

- 44 This criterion strongly favours QMS introduction because it will facilitate the entry of Māori into the commercial sector. There has been expressions of interest that this species be introduced into the QMS, with expectations that it will develop into a commercially viable fishery. This interest is likely to be qualified by the similar interest in the resource as a customary fishery in the North Island. Direct commercial access to Māori under the non-QMS management environment is not available. QMS introduction may also provide opportunity for vertical integration of access and marketing within Māoridom, in addition to further employment opportunity and participation in management of the fishery.
- 45 Kina remains an important customary fishery, and the introduction of the fishery into the QMS will provide for improved specification of quantitative allowances for customary fishing, and hence better certainty over long-term customary access. Māori may express the view that the introduction of kina into the QMS could adversely effect current levels of customary harvest. However, this matter will be addressed when the Minister makes final decisions about the TAC and allowances for customary, recreational and commercial interests for each of the proposed QMAs. Kaitiaki administering the customary fishing regulations within an area have an incentive to ensure that the quantity of customary take authorised is taken into account for future decisions on customary fishing allowances under the QMS environment. Such an incentive may not be as strong in the non-QMS environment.
- 46 Similarly, as Māori will hold no less than 20 percent of the quota for a particular stock, they will be in a position to manage both their commercial and customary harvesting to reduce the potential for conflict. As harvesting activities are likely to be managed at a small scale within a QMA, there is likely to be better recognition of localities of importance to customary fishing.

### *Economic*

- 47 This criterion strongly favours the introduction of kina into the QMS. The costs of introduction are expected to be relatively low, given the relatively modest number of people currently involved in the North Island kina fishery. Furthermore, the target nature of the fishery should make the calculation of provisional catch histories relatively straightforward. The costs of managing the non-QMS fishery in the North Island is unlikely to have been as high as the South Island in the past, however, this could change should similar access issues arise in the North Island in the future. QMS introduction should ensure that these issues are managed using the mechanism for access provided by secure harvesting rights.

- 48 The number of QMAs proposed is unlikely to affect the overall costs of management, either at the time of introduction, or thereafter. Any costs would be offset by the benefits of more appropriate management boundaries for the fishery, and the enhancements to management options arising from incentives for quota holders to actively participate in the fishery's management. Further, it is expected that ongoing management costs should be reduced with the establishment of harvesting rights and a mechanism to access the fishery within an overall framework that provides better tools for ensuring sustainability.
- 49 The QMS alternative is strongly favoured on the basis of benefits associated with the allocation of harvesting rights, because QMS introduction will allow new entrants into the fishery, and existing participants will have secure rights on which to base future investments. Some stocks may be able to support increased harvest levels.
- 50 Historically the commercial fishery has experienced a 'boom and bust' cycle driven largely by variability in the volume and quality of available roe. There is a significant development opportunity if the volume and quality requirements for roe in the Japanese market can be consistently met. The development of export market capability should increase and stabilise the fishery's commercial value. The domestic market is insignificant in volume and value relative to the potential development for the Japanese market.
- 51 The fisheries output benefits strongly favour the QMS alternative because the secure property rights will provide for improved incentives to enhance the fishery. Increased or secure harvesting potential may facilitate further investment in processing or infrastructure in regional centres. Similarly, fishing patterns may change with a focus on selecting kina in high quality condition, as well as enhancing roe condition through translocation protocols.
- 52 The QMS management environment is slightly favoured in terms of assessing fishing capacity, even though there is probably no excess capacity. However, it is expected that QMS introduction should bring about some rationalisation of the commercial fishery, reducing the latent effort that currently exists by way of under-utilised permits, or through the sale of harvesting rights between existing permit holders and their employees or agents.

### *Social*

- 53 This criterion slightly favours the QMS alternative. In setting a TACC for a fishstock under the QMS, the Minister of Fisheries must make a quantitative allowance for recreational fishers. While the Minister must similarly take this provision into account when setting a CCL for a non-QMS stock, these limits are either currently not in place (i.e., FMAs 1 and 9), nor likely to be reviewed (i.e., FMAs 2 and 8) in the foreseeable future.
- 54 Similarly, the CCLs in place in FMAs 2 and 8 are competitive in nature, and do not necessarily encourage commercial fishers to have regard to recreational fishers' interests when seeking to maximise their proportion of the commercial catch available. The greater specification of commercial harvesting rights in the kina fishery, through the allocation of quota, is likely to provide an incentive for management of the fishery at a smaller scale, as well as encourage better participation

of a range of stakeholder interests in managing the use of the fishery. To avoid potential conflicts between stakeholders harvesting strategies would need to consider the constraints that recreational fishers have in accessing the resource.

- 55 The QMS alternative is more favourable when considering the impacts on coastal communities. The opportunity for further commercial access is likely to provide employment opportunities, particularly in areas where Māori are a significant proportion of the population. Any rationalisation of existing commercial operations may also provide better security to those who continue in the commercial fishery. There may be some potential for impacts on non-commercial use of the resource with any increase in commercial use, however, a number of tools within the 1996 Act could be used to address or avoid circumstances that may adversely effect non-commercial interests.
- 56 In terms of the potential effects on future generations' ability to meet their reasonably foreseeable needs, the QMS alternative is favoured. The QMS environment provides for more appropriate definition of stock boundaries and the application of sustainable catch limits in those areas, as may be further complemented by appropriate controls for each sector. QMS introduction is likely to provide incentives for different interests to participate further in the management of the fishery, and this should assist in reaching agreement on goals that meet the foreseeable needs of future generations.

### *Sensitivity Analysis*

- 57 The results of the sensitivity analysis demonstrate that there is no feasible set of weights (level of importance) for the four primary criteria that could reverse the decision in favour of the North Island kina stocks' introduction into the QMS. Although changes to weights at the sub-criteria level will not reverse the decision to introduce the stocks into the QMS, it could result in the QMS and non-QMS alternatives having equal scores.

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### **Summary of Proposals**

- 58 MFish proposes the following QMA boundaries for North Island kina (SUR):
- SUR1A (FMA1 East Northland),
  - SUR1B (FMA1 Hauraki Gulf – Bay of Plenty),
  - SUR2A (Part FMA2 Gisborne),
  - SUR2B (Part FMA2 Wairarapa – Wellington),
  - SUR8 (FMA8),
  - SUR9 (FMA9), and
  - SUR10 (FMA10).
- 59 MFish proposes to retain the current standard fishing year of 1 October to 30 September should the North Island kina fishery be introduced into the QMS. The alternative fishing year is 1 April to 31 March.

- 60 For the purpose of expressing the TACC and ACE, MFish proposes to retain the current standard of greenweight should the North Island kina fishery be introduced into the QMS. The alternative unit of measure is meatweight.
- 61 MFish proposes that the North Island kina fishery be introduced into the QMS on 1 October 2003 based on the assessment of costs and benefits as outlined in this section.
- 62 MFish requests your comments on the above proposals.

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# KINGFISH (KIN)

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## Species Characterisation

### *Biological Information*

- 1 The New Zealand kingfish (*Seriola lalandi*) is sometimes referred to by its common names of kingi, yellowtail kingfish, or yellowtail. It should not be confused with the southern kingfish or gemfish (*Rexea solandri*).
- 2 Kingfish has a largely pelagic early life history, with juveniles usually associated with fish aggregating devices, both natural 'rafts' and man-made structures. Adult kingfish are large predatory fish that can exceed one and a half metres in length. They usually occur in schools ranging from a few fish to well over one hundred animals. Kingfish tend to occupy a semi-pelagic existence and occur mainly in open coastal waters, preferring areas adjacent to rocky outcrops, reefs and pinnacles. However, kingfish is not restricted to these habitats and is sometimes caught or observed in open sandy bottom areas and within shallow enclosed bays.
- 3 In New Zealand, kingfish is predominantly found in the northern half of the North Island, but also occurs from latitude 29° to 46° S (Kermadec Islands to Foveaux Strait), and to depths of 200 metres. Kingfish is highly mobile, and Gamefish Tagging Programme records (900 returns) include movements of fish from Australia to New Zealand, from New Zealand to Australia, moderate to long distances within New Zealand, and short distances within New Zealand. However, by far the greatest number of returns relate to short distance movements (even over many years at liberty) within New Zealand waters.<sup>2</sup>
- 4 New Zealand kingfish is often found in association with schools of trevally and koheru, circling the outskirts of schools in search of prey. Kingfish is also known to prey on small pelagic species, such as pilchard and anchovy, as well as squid and yellow-eyed mullet.
- 5 Biological information on the growth, reproduction and longevity of kingfish is limited, hence the stock productivity of the species is imprecisely known. Age determination using hard-structures such as otoliths have yet to be validated for New Zealand kingfish, and growth estimates have been derived from less precise mark and recapture methods. Results from those methods suggest that kingfish is a fast growing species. No published estimates of natural mortality are available for New Zealand kingfish. There is one record of a tagged New Zealand kingfish being recovered after 14 years at liberty.
- 6 Reproductive information suggests that the smallest length at which kingfish reach sexual maturity is 75 cm for males and 78 cm for females. The length at which 50 percent of the kingfish have reached maturity is 81 cm in males and 94 cm in females.

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<sup>2</sup> 76 percent of returns were made 5 nautical miles or less from where they were released and 93 percent were made within 50 nautical miles.

## Catch Summary

- 7 Commercial landings of kingfish are reported largely as bycatch of inshore setnet, trawl and bottom longline fisheries. Since 1991, targeting of non-QMS species, including kingfish, has been prohibited unless the species is authorised on a fisher's permit. A few permit holders are authorised to target kingfish, and most of their catch is taken using setnets. Reported target landings are currently less than 1 percent of total landings. There is currently no limit on the catch of kingfish, but a minimum legal size (MLS) of 65 cm has been in place since October 1993. Between 1993 and 2000, the MLS did not apply to kingfish taken by trawling. Since December 2000, the MLS has applied to trawl-caught kingfish. A minimum net mesh size of 100 mm applies to both commercial and non-commercial netting for kingfish.
- 8 Commercially, kingfish is a relatively high value species and, as a commodity, is usually sold as fillets or whole chilled. In recent years, about a quarter of the commercial catch has been exported, the main markets being the United States and Australia.
- 9 The main commercial fishing areas for kingfish are the east (FMAs 1 and 2) and west coast (FMAs 8 and 9) of the North Island. The largest commercial catches generally come from FMA 1, and most likely reflect the relative abundance of kingfish compared with other areas. Total reported kingfish landings (for all FMAs combined) from the fishing years 1990-91 through to 2000-01 are shown in Table 1.

**Table 1: Total reported commercial landings (tonnes) of kingfish by fishing year from 1990-91 to 1999-00.**

	Fishing year <sup>1</sup>										
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>Landing</b>	448	512	532	288	302	380	427	326	323	270	304

Note: Fishing year '1991' is fishing year 1990-91.

- 10 Kingfish is highly regarded by recreational fishers in New Zealand for its sporting attributes and large size. Kingfish is caught most often by recreational fishers from private boats and from charter boats, and is a prized catch for spearfishers and land-based game fishers. Kingfish is recognised internationally as a sport fish, and kingfish caught in New Zealand waters hold 20 of the 22 International Game Fish Association (IGFA) World Records.
- 11 Recreational fishers have voiced concerns over a marked decline in the size of kingfish available to them in recent years. Many clubs and charter boats have implemented a voluntary daily limit of one kingfish per person in response. Many gamefish clubs have also adopted a MLS of 1 metre. Representatives of recreational fishing interests have noted that kingfish is an 'icon' species for customary and recreational fishers, including visitors from overseas. Because of the importance of kingfish to the recreational sector, those representatives have proposed that the kingfish fishery should be managed as a recreational fishery exclusively. MFish acknowledges the importance of kingfish to the recreational sector, and notes that the species is also highly valued as a commercial product. MFish considers that the QMS provides a secure framework to ensure the sustainable utilisation of the resource by all sectors (recreational, customary and commercial).

- 12 Obtaining estimates of recreational catch for kingfish and other species is difficult. Since 1987 there have been a number of telephone and diary surveys conducted to estimate national recreational catch levels. The total annual recreational catch of kingfish in the 1991-94 period was estimated to be 100 tonne. A national survey conducted in 1996 produced an estimate of 350-410 tonne in FMA1. Recreational surveys also indicate 85 percent of the recreational kingfish catch is taken in the northern FMAs 1 and 9.
- 13 Kingfish is an important traditional food fish for Māori, but no quantitative estimate of customary catch is currently available. The extent of the traditional fisheries for kingfish is described in the Muriwhenua Fishing Report (Waitangi Tribunal 1988). Because of the coastal distribution of the species and its inclination to strike lures, it is likely that Māori caught considerable numbers.
- 14 The current catch of kingfish using customary permits is unknown. In 1999, new regulations applied to the taking of fisheries resources for traditional customary purposes from any New Zealand fisheries waters. Tangata tiaki/kaitiaki now cover parts of the fishery, and traditional customary harvest authorised by permits will be recorded.

#### Catch and Landing by Region

- 15 Reported commercial landing summaries of kingfish for each FMA for the fishing years 1990-91 to 2000-01 are outlined in Table 2.

**Table 2. Reported commercial landings (tonnes) of kingfish by FMA from 1990-91 to 2000-01:**

Fishing year	FMA									
	1	2	3	4	5	6	7	8	9	10
1990-91	295	85	4	<1	1	<1	2	37	*	<1
1991-92	362	93	2	<1	2	0	2	32	*	9
1992-93	378	81	3	0	<1	0	1	56	*	<1
1993-94	184	67	1	<1	<1	0	4	24	5	<1
1994-95	196	73	1	0	1	0	6	16	9	<1
1995-96	214	120	1	<1	<1	0	7	26	19	<1
1996-97	240	114	2	<1	4	<1	11	25	23	6
1997-98	155	106	1	<1	<1	0	7	21	21	1
1998-99	159	94	2	<1	<1	0	16	18	31	<1
1999-00	111	93	2	<1	<1	<1	10	23	28	0
2000-01	138	83	3	<1	<1	<1	11	49	20	<1

Note: '\*\*' denotes that data for FMA9 is included in FMA 1 value

- 16 Kingfish landings were relatively large in 1983-84, especially in FMA1, and were probably due to the greater number of vessels in the fishery prior to the implementation of the QMS in 1986 (data not shown). In addition, there was increased effort and better reporting as fishers sought to establish a catch history for the main species in anticipation of the implementation of the QMS. By 1988-89, catches of kingfish had reduced to their lowest levels across most FMAs. This was most likely due to the under-reporting of less common species in the catch, which includes kingfish, and the introduction of non-QMS restrictions. An increase in kingfish landings in FMA1 between 1988-89 and 1992-93, and in FMA2 between 1988-89 and 1991-92, may have been due to a number of factors. Those include:

(a) better reporting of catches; (b) changes in fishing patterns with increased catch by setnet; (c) increased numbers of vessels reporting kingfish catch, and (d) increased targeting of kingfish.

- 17 The total reported catch across all FMAs peaked in 1992–93 at 532 tonne, with 73 percent of the catch from FMA1. However, by 1993–94, the reported catch of kingfish for all FMAs decreased considerably, mainly because of the reduced catch from FMA1. Possible reasons for this decrease include: (a) the effect of the October 1993 introduction of a MLS of 65 cm on all methods other than trawl; (b) changes in fishing patterns in the snapper and trevally target set net, trawl, and bottom longline fisheries, which are responsible for most of the bycatch of kingfish; (c) decreased target fishing for kingfish, and (d) set net area closures in FMA1 from October 1993. The trawl exemption with respect to the MLS was removed in December 2000.
- 18 The annual reported commercial catch of kingfish from FMA1 has fluctuated between 100 and 250 tonnes since 1993-94. The kingfish catch from FMA2 over the last five years has remained stable nearing 100 tonnes, while landings from FMAs 8 and 9 have generally been in the region of 20 to 30 t per year (refer to Table 2).

#### Catch by Method

- 19 Total kingfish catch (tonnes) by main commercial fishing method for all FMAs combined from 1990-91 to 1999-00 is shown in Table 3.

**Table 3: Total kingfish catch (tonnes) by main commercial method for all FMAs combined, for fishing years 1990–91 to 1999–00:**

	Fishing year									
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<b>Bottom longline</b>	59	69	79	35	48	56	45	24	24	20
<b>Bottom pair trawl</b>	14	12	12	6	1	0	0	0	0	0
<b>Bottom trawl</b>	100	121	124	79	74	128	156	150	177	120
<b>Beach seine</b>	9	11	17	13	11	7	5	6	3	3
<b>Danish seine</b>	3	5	7	5	5	8	9	4	4	4
<b>Purse seine</b>	11	8	6	9	13	8	25	3	27	0
<b>Setnet</b>	188	256	255	106	125	139	151	112	78	45
<b>Trolling</b>	30	12	22	14	13	22	7	13	4	2

Note: Fishing year '1991' is fishing year 1990–91.

- 20 Setnet, bottom trawl, and bottom longline accounted for 36 percent, 33 percent, and 15 percent respectively of the kingfish commercial catch on average between 1983-84 and 1999-00 (data before 1990-91 not shown). The largest catches have been by setnet. Trolling, purse seine, bottom pair trawl, beach seine, and Danish seine each accounted for lesser amounts (between 1 to 4 percent).
- 21 The total setnet catch peaked at 256 tonnes in 1991-92, decreasing to 106 tonnes in 1993-94 as a result of the introduction of the MLS and setnet area closures. Since then, annual catches have fluctuated between 45 to 151 tonnes, with most of the catch coming from FMAs 1 and 2.

- 22 The annual catch of kingfish taken by trawling remained relatively stable across all FMAs until the 1995-96 fishing year, and has gradually increased since that time.
- 23 Most of the bottom longline kingfish catch comes from FMA1. Landings have remained relatively stable through time, decreasing in more recent years to around 20 tonnes per year. The reported catch of kingfish by bottom longline reduced from 79 tonnes in 1992-93 to 35 tonnes in 1993-94. That is likely to be due to the introduction of the MLS.

#### Targeted Catch and Bycatch

- 24 Kingfish commercial catches by nominated target species for all FMAs combined in fishing years 1990-91 to 1999-00 are shown in Table 4.

**Table 4: Kingfish catch (tonnes) by nominated target species for all FMAs combined, fishing years 1990-91 to 1999-00:**

	Fishing year									
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<b>Kingfish</b>	68	50	43	23	30	30	17	32	8	6
<b>Snapper</b>	103	135	129	66	74	100	75	50	54	32
<b>Trevally</b>	70	75	120	40	47	48	102	75	52	34
<b>Tarakihi</b>	47	49	52	29	29	34	39	34	36	28
<b>Warehou</b>	21	61	22	21	20	38	45	16	23	16
<b>Gurnard</b>	13	18	20	8	6	16	14	19	16	14
<b>Other<sup>1</sup></b>	See	note	below							

Note:1. Other species listed as target include rig, hāpuka/bass, barracouta, school shark, pilchard, albacore, and others with annual bycatch for all FMAs combined of typically < 5 tonnes.

- 25 Most kingfish is taken as a bycatch of the snapper, trevally, and tarakihi fisheries. Target caught kingfish is the fourth most important component of the total catch, but the amount caught has declined since 1997-98. Targeting of kingfish by particular methods can be relatively successful. Target fisheries for blue warehou, red gurnard, spotted dogfish or rig, hāpuku and bass, barracouta, school shark, pilchard, albacore tuna, and blue moki also catch moderate amounts of kingfish.
- 26 The increase in kingfish catch that occurred between 1990-91 and 1992-93 was mainly due to increased reported catch from setnetters targeting tarakihi and trevally in FMA1, and, to a lesser extent, kingfish and blue warehou.
- 27 Targeting of kingfish in FMAs 2 and 8 by setnet has been declining since the early 1990s, the exception being the 1997-98 fishing year in FMA2. Kingfish catches in FMA2 continued to remain high in subsequent years because the species was taken as a bycatch to the tarakihi trawl fishery, and more recently the blue warehou setnet fishery. Setnet fisheries in FMA8 have also landed quantities of kingfish that was bycatch to other target species. As trawling was exempt from the MLS, landings of kingfish by trawling would have been unaffected by the 1993 MLS introduction.
- 28 The catch of kingfish by methods other than trawl or setnet is relatively small. The purse seine fishery for pilchard in FMA1 reported 26 tonnes of kingfish in 1998-99. However, that fishery reported less than 8 tonnes of kingfish in any other year. Lesser

amounts of kingfish were taken by purse seine targeting trevally, trolling for albacore, and bottom longlining for snapper.

#### Number of Vessels Catching and Landing Kingfish

29 The number of vessels that reported catches or landings of kingfish are outlined in Table 5. Table 5 shows that a relatively large number of vessels reported catch or landing of kingfish between 1990-91 and 2000-01, consistent with the largely bycatch nature of the fishery. Relatively few vessels by comparison reported kingfish as the target species. The number of vessels reporting kingfish as either target or bycatch has decreased considerably since the early 1990s, with only 9 vessels reporting target catch in 2000-01.

**Table 5: Number of vessels reporting catch or landing of kingfish for the fishing years 1990-91 to 1999-00:**

No. vessels reporting:	Fishing year									
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<b>Catch or landing</b>	635	654	704	637	589	516	516	439	403	398
<b>Target catch</b>	56	57	53	36	29	27	19	12	11	9

## Stocks and Areas

30 The stock structure of New Zealand kingfish is unknown, however, tagging results suggest that most adult kingfish do not move outside local areas, with many tag returns close to the release site. The biology and behaviour of kingfish indicate that although recruitment and adult exchange may occur at the level of a New Zealand, or Australasian population, kingfish may be susceptible to localised depletion by target fishing, and may suit a finer scale localised management regime, especially in the northern half of their distribution.

## Proposed Quota Management Areas

### *Principles*

- 31 MFish proposes, in general, that QMAs should be based on the following key principles, listed in their order of importance:
- a) The management areas should be based principally on the known biological nature of the species;
  - b) The stock boundaries should take into account the existing characteristics of the fishery (i.e., known fisheries, relevant fisheries management issues);
  - c) Where practicable, QMAs for species that are taken together in the same fisheries should be aligned;
  - d) Where practicable the same QMAs should be set for different species;

- e) A separate QMA should be set for the water surrounding the Chatham Islands if the stock can be managed effectively as a unit;
- f) QMAs with new boundaries may be appropriate for species with populations whose distributions do not align with existing QMA boundaries; and
- g) Subject to the principles noted above QMAs should be as large as possible.

32 NIWA recommendations for kingfish QMA boundaries are not available.

33 The Pelagic Fisheries Assessment Working Group (PELWG) has noted the following comments regarding kingfish in relation to the MFish criteria:

- The only known biological characterisation that is useful in a management sense is the localised range of adult fish, thus small QMAs are more appropriate;
- The existing characteristics of the fishery (commercial non-target catch and recreational prized target species) also suggest discrete relatively localised management;
- As kingfish is targeted on a very local basis, and taken as non-target catch in a variety of fisheries, most likely it would not be feasible to align kingfish QMAs with those of other species;
- The same indicative QMAs as are used for similar species have been recommended where appropriate (see in particular snapper and trevally);
- The PELWG does not believe that a separate management or biological stock is likely to exist for the Chatham Islands; however, the PELWG is not particularly expert with respect to the Chatham Islands;
- No information exists with which to alter existing QMA boundaries specifically for kingfish, although for management purposes the use of sub-areas within QMAs may be appropriate for kingfish with respect to local fisheries; and
- The PELWG proposes that indicative QMAs are as large as possible, given all of the above.

34 The PELWG recommends the following QMAs for kingfish:

- FMAs 1, 2 and 10 should become KIN1, KIN2 and KIN10, respectively. The bulk of the kingfish catch comes from FMAs 1 and 2, and given the potential for localised depletion, they should remain separate. PELWG contends that FMA10 has 'always' been managed separately;
- FMAs 3, 4, 5 and 6 should become KIN3. The current catches, and potential catches of kingfish in all these areas are very small;
- Initially, the PELWG noted that although the catches in FMAs 7 and 8 are small, discrete, seasonally important recreational fisheries occur in both these areas. Given the potential for localised depletion, they should probably remain separate as KIN7 and KIN8. The commercial catches in FMA9 are small, however, an important and developing recreational fishery occurs in this area. FMA9 is also geographically large and tends to be influenced by a different ocean current system to the east coast of the

North Island, and thus may be subjected to a different pattern of recruitment to the east coast – this comment also applies to FMAs 7 and 8;

- In the second round of review, the PELWG recommended that FMAs 8 and 9 should be amalgamated because: (a) this would create a QMA representative of the entire west coast of the North Island; (b) FMA8 is small and has no congruence with existing statistical areas; (c) amalgamation is likely to alleviate, to some extent, a variety of historic data issues; and (d) amalgamation would be consistent with SNA8.

35 MFish supports the recommendations of the PELWG as outlined above. MFish notes that recreational fishing representatives have raised their concerns regarding the possible susceptibility of kingfish to localised depletion. For that reason, they have proposed that kingfish should be managed on the basis of smaller areas. Specifically, the NZ Recreational Fishing Council has proposed that FMA1 be divided into three sub-areas on the basis of groups of statistical areas to separate the Northland, Hauraki Gulf, and Coromandel/Bay of Plenty fisheries; and FMA2 be subdivided into two areas to separate the East Cape/Gisborne and Hawke Bay fisheries. MFish considers that the increased costs of more numerous smaller QMAs would not be justified, since there are alternative measures available under the 1996 Act to address the management issues raised (i.e., the dispute resolution process in Part VII of the 1996 Act, and the use of fisheries plans to achieve detailed management objectives).

### *Proposals*

36 MFish proposes two options for kingfish QMA boundaries, outlined as follows:

Option one

37 Kingfish, like the majority of non-QMS species, is currently managed within 10 FMAs. Tagging results indicate that there is potential for managing kingfish at a regional scale. The best available information suggests that kingfish QMA boundaries be set coincident with the FMA boundaries for KIN 1, 2, 7, and 10, and that FMAs 3, 4, 5, and 6 be amalgamated into KIN3, and FMAs 8 and 9 be amalgamated into KIN8 (MFish preferred option).

Option two

38 MFish also notes that the PELWG does not believe that a separate management or biological stock is likely to exist for the Chatham Islands, although the PELWG acknowledges that it is not particularly expert with respect to the Chatham Islands. It should be noted that some small catch of kingfish is reported from FMA4, and so it is possible that there could be unknown development potential around the Chatham Islands. The only deviation from Option one is that FMA4 becomes KIN4, and KIN3 is made up of FMAs 3, 5, and 6.

### **Fishing Year**

39 Historically, the fishing year for kingfish has run from 1 October through to 30 September in the following year. This standard fishing year has suited this fishery. Accordingly, there is no compelling reason to alter the current fishing year from 1 October to 30 September should kingfish be introduced into the QMS. The alternative fishing year is 1 April to 31 March.

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## Unit of Measure

- 40 Again, historically, the use of greenweight has been used for management purposes in the kingfish fishery. MFish sees no reason to change this unit of measure should kingfish be introduced into the QMS. The alternative unit of measure is meatweight.

## Assessment of Costs and Benefits

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- 41 As mentioned, section 19(8) of the 1996 Act requires the Minister of Fisheries to have regard to the costs and benefits of introducing a stock into the QMS. For this reason, MFish undertook an initial assessment of the costs and benefits of introducing kingfish into the QMS.
- 42 The introduction section of this document outlines the methodology used in the assessment, including a description of the assumptions and the four primary criteria categories (Environmental Sustainability, Treaty of Waitangi, Economic and Social), and their respective sub-criteria. Because these four categories cover a reasonable and practical range of possible arguments for and against introducing a species into the QMS, MFish considers the assessment of expected costs and benefits to be consistent with the purpose of the 1996 Act as expressed in section 8.
- 43 When reviewing the results of the assessment, you should keep in mind that the assessment made use of the best available information and expert judgment, aided with the help of a decision-support system, which quantifies the results for each primary criterion category and the overall score out of a possible 1.0. This approach provides a structure to organise and evaluate the importance of various objectives when making a final decision as to whether kingfish should be introduced into the QMS.
- 44 The assessment of the costs and benefits of QMS introduction favours the QMS alternative with an overall score of .626 compared to the non-QMS alternative score of .374, resulting in a priority ratio of 1.674. This indicates that the QMS alternative is 67.4 percent higher than the non-QMS alternative, and hence is preferred for the management of kingfish. The overall score and the results of each primary criterion category are outlined in Table 6, and an explanation of each criterion category follows.

**Table 6: Assessment Of Costs And Benefits:**

Scores	QMS	Non-QMS
<b>Overall</b>	0.626	0.374
<b>Environmental Sustainability</b>	0.577	0.423
<b>Treaty of Waitangi</b>	0.750	0.250
<b>Economic</b>	0.606	0.394
<b>Social</b>	0.664	0.336

### *Environmental Sustainability*

- 45 Sustainability is moderately to strongly favoured under the QMS management alternative in comparison to the non-QMS alternative. This is because commercial catch is not constrained at present, even though much of the kingfish catch is derived as bycatch to other fishing operations. Under the QMS, a sustainable catch limit can

be set, and consequently there are disincentives to commercial over-harvesting activities (e.g., deemed values) once harvesting rights within a TACC have been determined. Even if CCLs were introduced outside of the QMS, there is the prospect that such catch limits could be exceeded as the disincentives to prevent this from occurring are considered less effective.

- | [46](#) A large amount of kingfish catch is taken by the recreational sector, particularly in FMA1. The recreational sector has in place catch-and-release practices, the MLS, and daily bag limits. Such efforts, in combination with the QMS setting sustainable catch limits and allowances for the various sectors, would ensure the sustainability of kingfish stocks.
- | [47](#) Addressing the quality and quantity of information about stocks and harvest effort is considered to be slightly favoured under the QMS alternative. The rights-based framework of the QMS would provide the incentives for commercial fishers to provide local information on kingfish populations and harvest effort given the likelihood that kingfish may be prone to local depletion. Similarly, many recreational and customary interests could engage in discussions with commercial interests about the fishery and the data collection requirements applicable to a local area and across a stock.
- | [48](#) Similarly, the QMS environment should provide improved incentives to determine the extent and spatial distribution of customary and recreational catches so that the Minister can consider those factors when setting or varying a TAC and/or the TACC for a stock. That information would also facilitate the consideration of localised sustainability issues in management discussions between all stakeholders.
- | [49](#) Impacts on associated and dependent species and the aquatic environment, including biodiversity, do not favour either the QMS nor non-QMS alternatives. However, in determining a TAC and TACC under the QMS environment, these matters are explicitly taken into account. Consideration of these matters may be further enhanced if stock boundaries are at a similar scale to key associated and dependent species. Similarly, the QMS provides a framework to better manage a multi-species fishery, in part, because fishers would need to factor the catch of inter-related species into their portfolio of harvesting rights.

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### *Treaty of Waitangi*

- 50 This criterion very strongly favours QMS introduction because it will facilitate the entry of Māori into the commercial sector. Māori will be allocated 20 percent of the TACC for each stock introduced into the QMS. QMS introduction may also allow for small-scale niche fisheries to develop. In comparison, Māori participation in this fishery remains encumbered in the non-QMS environment given that access is restricted to persons who held a fishing permit authorisation for the stock as at 30 September 1992, and fished the relevant stock at some time in the preceding two fishing years.
- | [51](#) It is expected that customary fisheries issues will be better served under the QMS environment. An explicit allowance is made for customary fishing prior to a decision on the TACC applicable to a fishery. The provision of harvesting rights provides further certainty over who has commercial access to a stock, and the responsibility to

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ensure harvesting activities are carried out with regard to other interests. In the QMS environment, Māori will hold a portion of the commercial rights to the fishery, providing opportunities to be directly involved in decisions about kingfish harvests, both commercial and non-commercial.

### *Economic*

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- | [52](#) This criterion favours the introduction of kingfish into the QMS. Costs associated with QMS introduction will not be any higher than other comparable species, and once introduced, ongoing costs should be reduced in comparison to the costs of managing the fishery in the non-QMS environment. Ongoing management costs within the QMS will largely be a function of the QMAs and catch limits set. TACCs will not be set until just before QMS introduction. However, MFish notes that the socio-economic impact of any proposed TACCs is a factor relevant to the Minister's consideration of any proposed catch limit.
- | [53](#) Under the QMS environment compliance would be simpler in the sense that the focus would be on ensuring that commercial catch is limited to the harvesting rights held, as opposed to determining whether the catch is in accordance with a targeting authority, or taken as a bycatch to other commercial fishing operations. Permitting constraints would be rationalised, given that access would be determined by quota holdings. This would contribute a modest reduction towards the overall costs of management.
- | [54](#) Fisheries output benefits also favour the QMS alternative. With a restriction on the quantity of kingfish that may be taken, commercial fishers will have an incentive to increase the quality of the catch to maximise the price received, as opposed to the incentives created where no catch limits apply. In contrast with the QMS environment, a competitive CCL in the non-QMS environment provides incentive to maximise individual catch.
- | [55](#) Furthermore, with the certainty of rights associated with a QMS environment, the various sectors involved in the kingfish fishery would have greater opportunities and incentives to invest in the possibility of wild fishery enhancement. With that in place, as well as a management strategy that presumably increases the availability of kingfish, the interests of all could be improved.
- | [56](#) QMS introduction is strongly favoured in relation to the property rights benefits. Given that the commercial capture of this species is principally fishing operations for other target species, and by a number of commercial fishers, there should be an associated demand for the purchase of quota or ACE to cover bycatch. Commercial fishers should be willing to pay for access to these harvesting rights so that they hold an appropriate portfolio of harvesting rights for the range of species that they expect to catch. The possession of harvesting rights for a range of species should provide better assurance that fishing operations are economically viable and sufficiently flexible. In comparison, the non-QMS environment does not provide the same level of assurance or incentives that the commercial sector might expect for the kingfish fishery.
- | [57](#) There is no discernable preference for either the QMS or the non-QMS alternatives in relation to fishing capacity. Because kingfish is generally a bycatch of commercial fishing operations, it is unlikely that any changes would be made to the number of

fishing vessels commercially fishing kingfish should kingfish be introduced into the QMS. However, it may be that some economically marginal operations may leave the commercial sector. Alternatively, the certainty in a recreational allowance provided by the QMS may provide incentives to increase investment in recreational fishing equipment and use of charter operations.

### *Social*

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- | [58](#) Overall, QMS introduction is favoured in terms of expected improvements to social wellbeing. The QMS alternative is strongly favoured as it relates to the impact on recreational fishers. Upon QMS introduction, the recreational sector would be provided with an explicit quantitative allowance prior to determination of the TACC, while the commercial fishers would limit their catch to their harvesting rights. This arrangement should provide appropriate incentives for all sectors to work together for mutual benefit, in terms of agreeing to a management plan that would define an overall harvesting strategy on either a spatial or temporal basis, and in ways that minimise costs and resolve any disputes that may arise.
- | [59](#) MFish is of an initial view that there is no discernable difference between the QMS and non-QMS alternatives as they relate to the impact on coastal communities. The predominant interest in the kingfish resource by coastal communities is the non-commercial sector. The importance of the kingfish resource around the country, and the resulting impacts on coastal communities, will vary, as kingfish is primarily a northern species.
- | [60](#) Nevertheless, as mentioned, it is expected that the introduction of kingfish into the QMS may provide the incentives for all sectors to discuss management strategies for the fishery. Accordingly, the QMS environment may enable the localised needs of coastal communities to be considered amongst identifiable interests (including quota holders), and perhaps better recognised in a fisheries plan, or through any agreed harvesting strategy.
- | [61](#) As previously noted, the enhancement of the wild fishery may be better undertaken in a QMS environment, and such activities would presumably be undertaken in high quality water sites adjacent to coastal communities. The farming of kingfish stock could be undertaken quite separately from wild fishery management. Although enhancement could take place within either the QMS or non-QMS environments, it is expected that the QMS environment provides better definition of rights, and, therefore, greater incentives for enhancement to occur.
- | [62](#) The QMS alternative is moderately favoured as it relates to the potential effects on the ability of future generations to meet their reasonably foreseeable needs. The QMS environment provides more effective tools for ensuring sustainable utilisation of the resource by way of explicit allowances for both non-commercial and commercial interests. As mentioned, QMS introduction would also provide opportunities for Māori participation in the commercial sector, and with this would come opportunities to engage and participate in management discussions with the various sectors, all of which could help ensure future generations can meet their reasonably foreseeable needs.

## Sensitivity Analysis

63 The results of the sensitivity analysis demonstrate that there is no feasible set of weights (level of importance) for the four primary criteria that could reverse the decision in favour of the kingfish stocks' introduction into the QMS. Although changes to weights at the sub-criteria level will not reverse the decision to introduce kingfish into the QMS, it could result in the QMS and non-QMS alternatives having equal scores.

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## Summary of Proposals

64 MFish proposes two options for kingfish QMA boundaries, outlined as follows:

Option 1	Option 2
KIN1 (FMA1)	KIN1 (FMA1)
KIN2 (FMA2)	KIN2 (FMA2)
KIN3 (FMAs 3, 4, 5 and 6)	KIN3 (FMAs 3, 5 and 6)
KIN7 (FMA7)	KIN4 (FMA4)
KIN8 (FMAs 8 and 9)	KIN7 (FMA7)
KIN10 (FMA10)	KIN8 (FMAs 8 and 9) KIN10 (FMA10)

65 MFish proposes to retain the current standard fishing year of 1 October to 30 September should the kingfish fishery be introduced into the QMS. The alternative fishing year is 1 April to 31 March.

66 For the purpose of expressing the TACC and ACE, MFish proposes to retain the current standard of greenweight should the kingfish fishery be introduced into the QMS. The alternative unit of measure is meatweight.

67 MFish proposes that the kingfish fishery be introduced into the QMS on 1 October 2003 based the assessment of costs and benefits as outlined in this section.

68 MFish requests your comments on the above proposals and alternative options.

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# LEATHERJACKET (LEA)

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## Species Characterisation

### *Biological Information*

- 1 The New Zealand leatherjacket (*Parika scaber*) is present around much of New Zealand, but is most common in the north. Trawl survey records show it to be widespread over the inner shelf north of East Cape and Cape Egmont, in the South Taranaki Bight, in Tasman and Golden Bays, Pegasus Bay and the South Canterbury Bight, extending to depths beyond 100 m, but with greatest abundance in 40–60 m. It was less commonly caught along the east coast of the North Island south of East Cape, off the northeast South Island (Cook Strait to Pegasus Bay), northwest South Island (Cape Farewell to Cape Foulwind), and around the South Otago and Southland coast. It has not been taken by trawl on the west coast south of Cape Foulwind.
- 2 *Parika scaber* also occurs in Australia, from New South Wales to the southern coast of West Australia. In the Australian southeast trawl fishery it is the main leatherjacket caught. It was once believed that two similar species of leatherjacket occurred in New Zealand; ‘rough’ and ‘smooth’, but these are now considered a single species with variable colouring. Kokiri is the Maori name, but is not in common usage. Creamfish is a New Zealand trade name for the processed (headed/gutted/skinned) product, rather than the fish itself.
- 3 Leatherjacket is usually described as being most common near reefs and over rough seafloor, but it also occurs over sand, and it may at times be found some distance above the bottom. It is not a schooling species, but may occur in small groups. It is not a strong swimmer, and movements are likely to be localised.
- 4 It has been clearly shown that at least some leatherjackets spawn in seafloor nests, which are then left unguarded by the parents. However, some species in the family Monacanthidae are free-spawners. This range of reproductive behaviour in the family, the different courtship strategies in *Parika scaber* that have been noted, and the similarity of their eggs to pelagic eggs, suggests that it is not impossible for some spawning of pelagic eggs to occur, perhaps by those fish away from the coastline. The relevance of this is that recruitment from seafloor nests would create very localised populations, while the wider dispersal of pelagic eggs and larvae would lessen the risk of localised overfishing.
- 5 There are no published studies of age and growth. It has been reported that New Zealand leatherjackets may reach a length of more than 20 cm at an age of about 2 years.
- 6 There have been no biological studies directly relevant to the recognition of separate stocks, or to yield estimates.
- 7 Longevity estimates are in the range of 6 to 7 years. There are few studies on comparable species elsewhere, although maximum ages between 7 and 13 years have been reported. True maximum ages may be higher.

- 8 Leatherjacket is loosely associated with many other reef-dwelling species when in that habitat, and with a variety of more open water fishes when occurring over the flat seafloor further offshore. Consequently, leatherjacket is vulnerable to many fishing methods (particularly inshore bottom trawl, Danish seine, and setnet) and taken in several fisheries. They are unlikely to be strongly preyed upon.

### Catch Summary

- 9 Very small landings were first reported in 1948, but almost certainly had been made prior to this. From only a few tonnes in the mid-1960s, landings increased to 200–400 tonnes in the 1970s and 1980s (reaching almost 500 tonnes in 1980), and then in the 1990s increased further with major fluctuations between 400 tonnes and 1300 tonnes (refer to Table 1). It is possible that market demand was low until the 1970s, and catches were much higher, but discarded.

**Table 1: Total reported commercial landings (tonnes) of leatherjacket, 1948 to fishing year 2000–01.**

Year	(t)	Year	(t)	Year	(t)	Year	(t)	Year	(t)	Year	(t)
1948	15	1958	< 1	1968	30	1978	226	1988	406	1998	387
1979	15	1959	< 1	1969	41	1979	161	1989	323	1999	561
1950	7	1960	< 1	1970	45	1980	486	1990	374	2000	1333
1951	< 1	1961	< 1	1971	61	1981	348	1991	368	2001	1054
1952	6	1962	< 1	1972	65	1982	229	1992	347		
1953	7	1963	3	1973	77	1983	196	1993	309		
1954	7	1964	3	1974	98	1984	264	1994	289		
1955	4	1965	16	1975	76	1985	305	1995	387		
1956	< 1	1966	17	1976	216	1986	365	1996	555		
1957	< 1	1967	5	1977	213	1987	407	1997	1107		

**Notes:**

1. Source: Annual Reports on Fisheries to 1974, various reports 1975–86, Licensed Fish Receiver Reports (LFRRs) from fishing year 1986–87.
2. The first recorded landings were in 1948. Small landings made prior to this would have been included in the category 'mixed roundfish'. It is likely that larger catches were made, but discarded.
3. Year '2001' is fishing year 2000–01.

### Catch and landing by region

- 10 Moderate, consistent commercial catches and landings of leatherjacket were reported from FMA1 (the northeast coast), with estimated catches being 60–70 percent of reported landings. Smaller, but also reasonably consistent catches and landings were taken from FMA3 (east coast South Island), catches being 70–80 percent of landings. Large, but inconsistent catches and landings were taken from FMAs 7 and 8, with some annual catches being either much higher or much lower than reported landings. Most of the catches in these two FMAs were taken from the South Taranaki Bight, a fishing ground bisected by the FMA boundary. It is probable that some catches were taken from one FMA, with the resulting landings reported from the adjacent FMA, particularly from wide-ranging vessels targeting squid, barracouta, and trevally. Data for leatherjacket from the 1990s (fishing years 1989–91 to 2000–01) are shown in Table 2.

**Table 2: Estimated commercial catch and reported landings (tonnes) of leatherjacket by FMA, fishing years 1989–90 to 2000–01.**

FMA	Fishing year												
	Catch	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1	69	89	118	92	136	129	106	95	98	69	78	83	
2	2	1	1	1	4	3	2	1	3	1	1	1	
3	34	28	62	33	24	38	23	55	48	17	14	20	
5	5	6	18	3	2	2	6	7	6	4	3	13	
7	77	96	40	42	17	70	177	381	53	179	734	400	
8	60	70	28	47	19	26	131	359	64	193	337	347	
9	3	2	6	8	8	10	8	6	4	8	5	2	
<b>Land</b>													
1	114	143	160	154	184	177	145	123	143	102	108	120	
2	3	2	3	2	4	4	3	2	2	1	2	2	
3	41	38	99	39	36	49	29	65	60	25	27	27	
5	1	23	1	2	1	1	9	5	6	5	8	14	
7	75	72	58	51	32	109	75	99	37	55	34	42	
8	91	104	24	45	26	35	218	807	126	357	1100	822	
9	0	0	0	0	4	9	7	5	8	8	7	9	

Catch by method

11 Estimated commercial catches are summarised by method in Table 3.

**Table 3: Estimated commercial catch (tonnes) of leatherjacket by method, for all FMAs combined, fishing years 1989–90 to 2000–01.**

Method	Fishing year											
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>Single Trawl</b>	225	230	220	190	154	232	420	895	265	473	1175	861
<b>Pair Trawl</b>	21	55	40	22	41	46	17	13	1	2	2	3
<b>Danish seine</b>	2	5	8	14	13	7	10	10	11	5	6	4
<b>Lobster pot</b>	2	2	5	2	1	1	1	1	1	1	1	1
<b>Cod pot</b>	< 1	< 1	1	< 1	1	1	4	3	2	2	2	1
<b>Other</b>	1	3	1	1	2	< 1	7	< 1	1	< 1	4	< 1

12 Most of the catch was taken by single bottom trawl, with some moderate bottom pair trawl catches in the early 1990s, and small catches by Danish seine. Minor catches were reported from lobster pots and cod pots. Estimated commercial catches by method and by FMA are summarised in Table 4. Single trawl catches were made in all areas; pair trawl and Danish seine catches were reported in FMA1. The rock lobster pot and cod pot catches were reported mainly from FMA5.

**Table 4: Estimated commercial catch (tonnes) of leatherjacket by method, and FMA, cumulative total from fishing years 1989–90 to 2000–01.**

	FMA1	FMA2	FMA3	FMA5	FMA7	FMA8	FMA9	Total
Single Trawl	925	16	420	59	2275	1652	60	5470
Pair Trawl	199	0	0	0	12	38	11	270
Danish seine	89	< 1	< 1	0	< 1	< 1	< 1	94
Lobster pot	< 1	< 1	1	14	2	1	< 1	19
Cod pot	< 1	0	1	16	< 1	< 1	0	17
Other	5	5	< 1	4	6	3	< 1	23

**Note:** 1. A total of 78 t could not be allocated to FMAs.

Targeted catch and bycatch

- 13 Estimated commercial catches are reported by target species in Table 5. Only a few tonnes of leatherjacket are reported as targeted, although this may be incorrect because of ambiguities in the catch forms. Almost all of the targeted catch was trawled.

**Table 5: Estimated commercial catch (tonnes) of leatherjacket by target species, fishing years 1989–90 to 2000–01. After nominally targeted leatherjacket catches, bycatches of leatherjacket are listed in order of cumulative catch size over this time period.**

Target <sup>1</sup>	Fishing year											
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
LEA <sup>2</sup>	61	17	7	6	3	< 1	1	1	< 1	19	1	5
SQU	0	3	0	< 1	1	< 1	1	0	0	115	643	546
GUR	10	13	24	18	16	13	195	407	44	102	109	47
TRE	34	92	34	60	24	20	36	65	44	29	230	158
SNA	59	79	77	59	97	103	83	56	77	40	43	30
BAR	14	29	36	18	7	31	43	271	13	122	71	17
FLA	39	30	41	29	17	28	44	52	33	17	18	25
RCO	7	9	29	10	13	42	14	28	32	10	7	13
JDO	6	5	4	8	20	27	29	22	24	16	15	22
TAR	5	10	7	6	7	10	2	2	1	2	8	3
BCO	7	2	1	1	1	1	4	3	2	2	3	1
JMA	< 1	1	< 1	8	0	0	1	1	7	4	0	< 1
CRA	2	2	5	2	1	1	1	1	1	1	1	1
ELE	2	< 1	3	0	< 1	1	1	3	< 1	1	< 1	< 1
Other	6	4	7	4	6	11	3	9	3	5	39	2

**Notes:** 1. Species codes: BAR, barracouta; BCO, blue cod; CRA, rock lobster; ELE, elephant fish; FLA, flatfish; GUR, red gurnard; JDO, John dory; JMA, jack mackerels; RCO, red cod; SNA, snapper; SQU, squid; TAR, tarakihi; TRE, trevally.

2. Leatherjacket (LEA) nominated as target species.

- 14 The largest bycatch was taken with targeted squid, but only in the three years 1998–99 to 2000–01; this seems unusual, and is described in more detail below. More consistent bycatches were taken with targeted gurnard, trevally, snapper, barracouta, flatfish, red cod, and John dory.

Catch by area, target species, and method

- 15 To describe the estimated bycatch of leatherjacket more clearly, it is necessary to consider area (fishing statistical area), target species, and (to a lesser extent) method and year together. Two main fishing regions are important - the northeast coast (North Cape to central Bay of Plenty, and central New Zealand (Cook Strait to Cape Farewell and Cape Egmont). There is a less important southeast area (Canterbury to Southland). The main target fisheries in which leatherjacket comprises a bycatch are described in Table 6.

**Table 6: Location and relative importance of the eight main commercial target fisheries in which leatherjacket occurs as a bycatch.**

Target	Catch by region			Main statistical areas		
	Northeast	Central	Southeast	Northeast	Central	Southeast
SQU	Nil	Large	Nil		37, 39, 40	
GUR	Moderate	Large	Nil	3, 5, 8, 9	37, 39, 40, 41	
TRE	Moderate	Large	Nil	2, 8, 9	37, 39, 40	
SNA	Large	Small	Nil	2, 3, 5, 6, 8, 9	37, 39, 40, 41	
BAR	Small	Large	Nil	2, 9	37, 38, 39, 40	
FLA	Minor	Moderate	Moderate	3, 7	17, 37, 38	22, 24, 30
RCO	Nil	Minor	Large		38	22
JDO	Moderate	Nil	Nil	3, 5, 6, 8, 9		

- 16 Trawling is the main method in all these fisheries, with some Danish seining for snapper and gurnard in the northeast. Of the other (smaller) trawl fisheries, that for tarakihi is dispersed, jack mackerel is in the central region, and elephant fish is off Canterbury. The bycatch with blue cod is taken by trawl in the central region, and by cod pots in the southeast (areas 24, 25, 27, 30). The bycatch recorded with rock lobster is taken by lobster pot in the south (areas 25, 27, 30).
- 17 The large bycatch reported taken with squid was taken by single bottom trawl (plus a few tonnes by midwater trawl) in the South Taranaki Bight, mainly in the three fishing years 1998-99, 1999-2000, and 2000-01. Nine fishing vessels were involved, five in these three years, but only one took the majority (90 percent) of the leatherjacket catch in the trawl fishery targeting squid. As this single vessel's catch represents 57 percent of the estimated catch of leatherjacket from areas 37, 39, and 40 (most of the central region) for these three years, the possibility of reporting error needs investigation before catch histories are finalised. This vessel's leatherjacket catch was three times that of the next vessel, and more than 10 times that of most trawlers fishing these areas. It appears to have targeted squid and barracouta, whereas most vessels targeted gurnard, trevally, and barracouta. Although the situation appears anomalous, it is not implausible. This vessel's estimated catch agrees closely with its reported landings of leatherjacket for these years, and for the partial year 2001-02. One other vessel also caught most of its leatherjacket (though a much smaller amount) when targeting squid. It is possible that one or more large trawlers targeting squid in the South Taranaki Bight take moderate bycatches of leatherjacket.)

Number of vessels catching and landing leatherjacket

- 18 The number of commercial vessels that reported catches or landings of leatherjacket are outlined in Table 7.

**Table 7: Number of vessels making an estimated catch or landing of leatherjacket, fishing years 1989–90 to 2000–01.**

	Fishing year											
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Catching	192	203	214	199	185	211	198	202	188	164	153	152
Landing	237	253	267	272	269	264	258	261	243	226	198	203
Landing:												
< 1t	172	182	196	203	207	193	179	177	177	163	132	138
1t – 10t	60	64	65	67	58	63	72	68	61	55	53	55
10t – 100t	5	7	6	2	4	8	7	13	5	7	11	9
> 100 t	0	0	0	0	0	0	0	3	0	1	2	1

- 19 During the 1990s, about 200 vessels reported a catch of leatherjacket in any one year, declining to about 150 in 2000; 240–270 vessels reported a landing during the 1990s, declining to about 200 in 2000. Most landings (the more reliable value) were small. About three quarters of the vessels reported a of landing less than 1 tonne, and about one quarter landed between 1 tonne and 10 tonnes. Only 1–6 percent of vessels landed between 10 tonnes and 100 tonnes, and 1 to 3 vessels landed over 100 tonnes in a year in 1996–97 and 1998–99 to 2000–01.

## Stocks and Areas

- 20 There is no information on the existence of natural stock boundaries, and no biological information on whether large or small QMA boundaries would be most appropriate for leatherjacket. The distribution of natural leatherjacket populations is unknown, but the boundaries proposed by NIWA (refer to Table 8) are considered appropriate to separate at least a northern, central, and southern population, if they do exist.
- 21 NIWA advice is that the existing characteristics of the fishery suggest a separation of the fishery into three areas that comprise some 60–70 percent of landings - a moderate fishery in the north, centred on the Hauraki Gulf and western Bay of Plenty; a large central fishery in the South Taranaki Bight and Tasman Bay; and a small fishery along the South Canterbury, Otago, and Southland coast. A nominal Chatham Islands fishery is geographically separate. The former use a combination of existing FMAs.
- 22 The species biology (nest spawning, early larval settlement, assumed limited migration of adults), however, suggests that localised overfishing could occur, particularly if there was a shift towards more targeted fishing for leatherjacket. Although leatherjacket may have a rapid growth rate, it is not known whether recruitment from a remnant local population would be adequate to replenish a stock, or whether slower immigration from adjacent areas would be required.

**Table 8: NIWA suggested QMAs for leatherjacket stocks, based on standard FMAs.**

QMAs	FMAs
<b>Northern</b>	1 (northeast North Island) and 9 (northwest North Island)
<b>Central</b>	2 (east North Island), 7 (west and north South Island) and 8 (southwest North Island)
<b>Southern</b>	3 (east South Island) and 5 (southern South Island)
<b>Chatham</b>	4 (Chatham Island)

## Proposed Quota Management Areas

### *Principles*

- 23 As mentioned in the introduction section of this document, QMAs proposed by MFish are based on the following key principles listed in their order of importance:
- The management areas should be based principally on the known biological nature of the species;
  - The stock boundaries should take into account the existing characteristics of the fishery (i.e., known fisheries, relevant fisheries management issues);
  - Where practicable, QMAs for species that are taken together in the same fisheries should be aligned;
  - Where practicable the same QMAs should be set for different species;
  - A separate QMA should be set for the water surrounding the Chatham Islands if the stock can be managed effectively as a unit;
  - QMAs with new boundaries may be appropriate for species with populations whose distributions do not align with existing QMA boundaries; and
  - Subject to the principles noted above QMAs should be as large as possible.
- 24 NIWA's recommendations are based on the available biological information and information from the fishery. While NIWA considers that the reproductive strategy of the species could render it susceptible to localised depletion, there is some uncertainty about the species reproductive biology. Factors such as larval drift, rapid growth, and an assumed short life span would favour rapid recovery of depleted populations. Because leatherjacket is predominantly a small bycatch with a variety of target species, it is not possible to align all QMA boundaries, but the three proposed mainland QMAs have boundaries compatible with most fisheries. Three relatively large mainland QMAs have been proposed, based on three quite distinct regions where leatherjacket is caught in moderate quantity. It would be difficult to monitor these three regions if they were combined.
- 25 MFish considers key issues in determining QMAs for leatherjacket are as follows:
- There is no biological information available on this species to indicate separate stocks, or to suggest whether larger or smaller QMAs are more appropriate;

- b) A considerable proportion of the catch is taken as a bycatch of other important inshore species such as snapper, gurnard, and trevally; and
  - c) Separate existing fisheries were determined by NIWA from catch by statistical area – a northern fishery including FMAs 1 and 9, a central fishery including FMAs 2, 7, and 8, and a southern fishery including FMAs 3 and 5. Leatherjacket is present at the Chatham Islands, but the catch is negligible.
- 26 Given that much of the leatherjacket catch is taken as a bycatch of the west coast trawl fisheries for snapper and trevally, an alternative arrangement of existing fisheries could combine FMAs 7, 8, and 9 into a west coast QMA. Such a QMA would be more congruent with the western QMAs for snapper and trevally than those proposed by NIWA. Similarly, FMAs 1 and 2 could be combined to establish a North Island east coast QMA, and FMAs 3, 5, and 6 could be combined to create a southern QMA. A fishery surrounding the Chatham Islands could be defined within FMA4.
- 27 MFish considers that translation of the existing ten FMAs into ten QMAs for leatherjacket would impose unnecessary management costs on fishers and MFish, in the absence of clear management benefits. Given the characteristics of the species, MFish supports the use of a smaller number of QMAs and amalgamation of FMAs where practical.

### *Proposals*

- 28 MFish proposes two options for leatherjacket QMAs. The first option follows the NIWA recommendations as described below:

Leatherjacket 1 (LEA1) (FMAs 1 and 9)

- 29 MFish considers that FMAs 1 and 9 should be amalgamated. The fishery on the east coast of the north island (FMA1) is substantial, while the west coast fishery (FMA9) appears to be small and have unknown development potential.

Leatherjacket 2 (LEA2) (FMAs 2, 7 and 8)

- 30 The catch information indicates that the most significant fisheries are on the west coast in FMAs 7 and 8. Landings in FMA2 are small. Given the characteristics of the species, particularly that it is caught in association with other inshore mixed species trawling, MFish believes that it is prudent to manage this (central) fishery as a single QMA.

Leatherjacket 3 (LEA3) (FMAs 3, 5 and 6)

- 31 There is no catch information to indicate a significant fishery in FMAs 3, 5, or 6, however, there are small catches in FMA3. Given the small catches of the species, and the limited biological information to support other stock boundaries, MFish considers it appropriate to manage the southern areas as a single stock.

Leatherjacket 4 (LEA4) (FMA4)

- 32 The biology of the species indicates that leatherjacket tend to be taken in areas of rough ground in the shallower waters and are, therefore, unlikely to move across the Chatham Rise from the South Island. It is, therefore, likely that a stock based on FMA4 (the waters surrounding the Chatham Islands) could be managed separately.

Leatherjacket 10 (LEA10 ) (FMA10)

- 33 MFish notes that there is unlikely to be any development of a leatherjacket fishery within FMA10. However, given the important characteristics of this FMA (which includes the Kermadec Islands), MFish believes that it would be prudent to maintain a separate QMA for leatherjacket based on FMA10.

- 34 MFish's second proposed option is described as follows:

Leatherjacket 1 (LEA1) (FMAs 1 and 2)

- 35 MFish considers that FMAs 1 and 2 could be amalgamated. The fishery on the northern east coast of the north island (FMA1) is substantial, while the southern east coast fishery (FMA2) appears to be small and have unknown development potential.

Leatherjacket 3 (LEA3) (FMAs 3, 5 and 6)

- 36 There is no catch information to indicate a fishery in FMA6, however, there are relatively small catches in FMAs 3 and 5. Given the small catches of the species, and the limited biological information to support other stock boundaries, MFish considers it appropriate to manage the southern and south eastern areas as a single stock.

Leatherjacket 4 (LEA4) (FMA4)

- 37 The biology of the species indicates that leatherjacket tend to be taken in areas of rough ground in the shallower waters and are, therefore, unlikely to move across the Chatham Rise from the South Island. It is, therefore, likely that a stock based on FMA4 (the waters surrounding the Chatham Islands) could be managed separately.

Leatherjacket 7 (LEA7) (FMAs 7, 8, and 9)

- 38 The catch information indicates that the most significant fisheries are on the west coast in FMAs 7 and 8. Landings in FMA9 are small. Given the characteristics of the species, particularly that it is caught in association with other inshore mixed species trawling (specifically snapper, trevally, and gurnard), MFish believes that it would be prudent to manage this west coast fishery as a single QMA.

Leatherjacket 10 (LEA10 ) (FMA10)

- 39 MFish notes that there is unlikely to be any development of a leatherjacket fishery within FMA10. However, given the important characteristics of this FMA (which includes the Kermadec Islands), MFish believes that it would be prudent to maintain a separate QMA for leatherjacket based on FMA10.

## Fishing Year

- 40 Historically, the fishing year for leatherjacket has run from 1 October through to 30 September in the following year. This standard fishing year has suited this fishery. Accordingly, there is no compelling reason to alter the current fishing year from 1 October to 30 September should leatherjacket be introduced into the QMS. The alternative fishing year is 1 April to 31 March.

## Unit of Measure

- 41 Again, historically, the use of greenweight has been used for management purposes in the leatherjacket fishery. MFish sees no reason to change this unit of measure should leatherjacket be introduced into the QMS. The alternative unit of measure is meatweight.

## Assessment of Costs and Benefits

- 42 As mentioned, section 19(8) of the 1996 Act requires the Minister of Fisheries to have regard to the costs and benefits of introducing a stock into the QMS. For this reason, MFish undertook an initial assessment of the costs and benefits of introducing leatherjacket into the QMS.
- 43 The introduction section of this document outlines the methodology used in the assessment, including a description of the assumptions and the four primary criteria categories (Environmental Sustainability, Treaty of Waitangi, Economic, and Social), and their respective sub-criteria. Because these four categories cover a reasonable and practical range of possible arguments for and against introducing a species into the QMS, MFish considers the assessment of expected costs and benefits to be consistent with the purpose of the 1996 Act as expressed in section 8.
- 44 When reviewing the results of the assessment, you should keep in mind that the assessment made use of the best available information and expert judgment, aided with the help of a decision-support system, which quantifies the results for each primary criterion category and the overall score out of a possible 1.0. This approach provides a structure to organise and evaluate the importance of various objectives when making a final decision as to whether or not leatherjacket should be introduced into the QMS.
- 45 The assessment of the costs and benefits of QMS introduction favour the QMS alternative with an overall score of .644 compared to the non-QMS alternative score of .356, resulting in a priority ratio of 1.81. This indicates that the QMS alternative is 81 percent higher than the non-QMS alternative, and hence is preferred for the management of leatherjacket. The overall score and the results of each primary criterion category are outlined in Table 9, and an explanation of each criterion category follows.

**Table 9: Assessment of Costs and Benefits:**

Scores	QMS	Non-QMS
Overall	.644	.356
Environmental Sustainability	.716	.284
Treaty of Waitangi	.571	.429
Economic	.632	.368
Social	.479	.521

### *Environmental Sustainability*

- 46 This criterion strongly favours QMS introduction because failure to do so could result in the fishery being constrained by a CCL, which could interfere with the associated

target trawl fishery. When targeting other species, the non-QMS option may leave the existing mixed trawl fishery unable to cover the expected bycatch of leatherjacket, or prevent harvesting rights from moving into the trawl fishery.<sup>3</sup>

- 47 QMS introduction is expected to provide improved quality and quantity of information on the fishery. As noted, little is known about the biology of this fishery, which is generally taken as bycatch in the mixed trawl fishery. The allocation of property rights should create incentives for better reporting and the undertaking of research, as well as possible adaptive management programmes. Overall, the QMS provides a better process for the collection and uptake of local information into the management decision-making framework.
- 48 The expected impact on associated and dependent species and the aquatic environment moderately favours the QMS alternative because of this species' association with a mixed trawl fishery. The ability to effectively regulate catches within the QMS environment should provide benefits for the management of inter-related stocks, therefore, enhancing the ability to regulate the effects of fishing on the aquatic environment, including on the biodiversity.

### *Treaty of Waitangi*

- 49 This criterion moderately favours QMS introduction because it will facilitate the entry of Māori into the commercial fishery by gaining access to 20 percent of the TACC. Although Māori have not expressed specific commercial interest in this particular fishery, it should be remembered that it is taken as part of an existing QMS mixed trawl fishery, which accords this fishery a higher score for this sub-criterion.
- 50 The QMS is slightly favoured for the purpose of safeguarding Māori customary fishing. There is no data on the level of customary harvest of this species, but any harvest is thought to be small. MFish notes that QMS allocation policy requires that current customary harvest needs be met first from the TAC before allowances are made for other stakeholders, and this is anticipated to provide a slightly better outcome than that provided by the non-QMS environment.

### *Economic*

- 51 This criterion favours the introduction of the fishery into the QMS. The initial marginal costs of introduction are expected to be low. While targeted catches of leatherjacket have been taken, most catches have been bycatch in the snapper, gurnard and more recently squid fisheries. However, small catches of leatherjacket have been made in most years. Given leatherjacket's association with the mixed trawl fishery and the impediments to effective and efficient management of this fishery outside the QMS, direct fisheries management costs are likely to be moderately lower within the QMS environment.
- 52 However, it is expected that QMS introduction will cause a slight increase in business compliance costs associated with fishers' ACE portfolio management. Ongoing

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<sup>3</sup> As is outlined in the Introduction section, the exception to the requirement to take fish only under the authority of and in accordance with a current fishing permit, which allows non-QMS fish to be taken as an inevitable consequence of the taking of fish under a current fishing permit, expires on 1 October 2004 (refer to section 89(2A) of the 1996 Act).

management costs within the QMS will largely be a function of the QMAs and catch limits set. TACCs will not be set until just before QMS introduction. However, MFish notes that the socio-economic impact of any proposed TACCs is a factor relevant to the Minister's consideration of any proposed catch limit.

- 53 The expected fisheries output benefits moderately favour introduction into the QMS because of the opportunity for development of the fishery, both as a potential target fishery and bycatch by providing security of access not available under the non-QMS alternative.
- 54 The QMS option is moderately favoured in relation to fishing capacity because the current capacity targets other species. There may be some rationalisation of fishing capacity in the mixed trawl fishery, but this is likely to be offset by opportunities to value-added products and possible target fishing opportunities within the QMS environment.

### *Social*

- 55 The National Recreational Marine Recreational Fishing Surveys do not include assessment of non-commercial catch of leatherjacket. Recreational take is assumed to be low. QMS introduction is not likely to affect the fishing opportunities for recreational fishers, given their low level of participation in this fishery, other than benefits accrued by way of improved definition of property rights within the QMS environment.
- 56 Given the likelihood of a marginal increase in business compliance costs and possible rationalisation of the commercial fishery, particularly in the west coast of the North Island, the impact on coastal communities slightly favours the non-QMS alternative.
- 57 The QMS alternative is favoured in terms of the potential effect on future generations' ability to meet their reasonably foreseeable needs, given the improved ability to ensure sustainability of leatherjacket and those species that make up the mixed trawl fishery.

### *Sensitivity Analysis*

- 58 The results of the sensitivity analysis demonstrate that there is no feasible set of weights (level of importance) for the four primary criteria that could reverse the decision in favour of leatherjacket's introduction into the QMS. Although changes to weights at the sub-criteria level will not reverse the decision to introduce leatherjacket into the QMS, it could result in the QMS and non-QMS alternatives having equal scores.

### **Summary of Proposals**

- 59 MFish proposes two options for leatherjacket (LEA) QMA boundaries, outlined as follows:

Option 1	Option 2
LEA1 (FMAs 1 and 9)	LEA1 (FMAs 1 and 2)
LEA2 (FMAs 2, 7 and 8)	LEA3 (FMAs 3, 5 and 6)
LEA3 (FMAs 3, 5 and 6)	LEA4 (FMA4)
LEA4 (FMA4)	LEA7 (FMAs 7, 8 and 9)
LEA10 (FMA10)	LEA10 (FMA10)

60 MFish proposes to retain the current standard fishing year of 1 October to 30 September should the leatherjacket fishery be introduced into the QMS. The alternative fishing year is 1 April to 31 March.

61 For the purpose of expressing the TACC and ACE, MFish proposes to retain the current standard of greenweight should the leatherjacket fishery be introduced into the QMS. The alternative unit of measure is meatweight.

62 MFish proposes that the leatherjacket fishery be introduced into the QMS on 1 October 2003 based the assessment of costs and benefits as outlined in this section.

63 MFish requests your comments on the above proposals and alternative options.

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## ROUGH SKATE AND SMOOTH SKATE (RSK, SSK)

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### Species Characterisation

- 1 MFish proposes to manage rough skate (*Dipturus nasutus*) and smooth skate (*D. innominatus*) as separate species within the QMS, as there are believed to be sufficient differences in terms of the biology and fisheries characteristics of these two species to warrant different sustainability settings. However, for the purpose of this document they are sufficiently similar to be described together.

### *Biological Information*

- 2 Rough and smooth skates are large, flattened fishes that spend most of their time on the seabed. They feed mainly on benthic invertebrates and small fishes.
- 3 Rough and smooth skates reproduce by laying yolky eggs, enclosed in leathery cases, on the seabed. Little is known about the reproductive biology of either species. Rough skates lay their eggs in spring–summer, at least. In both species, two eggs are laid at a time, but the number of eggs laid annually by a female is unknown. A single embryo develops inside each egg case, and the young hatch at about 10–15 cm pelvic length (body length excluding the tail).
- 4 Rough skate grow to at least 79 cm pelvic length, and females grow larger than males. The greatest reported age is 9 years for a 70 cm pelvic length female, and females may live longer than males. There are no apparent differences in growth rate between the sexes. Males reach 50 percent maturity at about 52 cm and 4 years, and females at 59 cm and 6 years.
- 5 Smooth skate grow to a larger size than rough skate and are believed to be longer lived. The greatest reported age of a smooth skate is 24 years for a 133 cm pelvic length female, but because smooth skates grow to at least 158 cm, longevity probably exceeds that. Females grow larger than males, and also appear to live longer. There are no apparent differences in growth rate between the sexes. Males reach 50 percent maturity at about 93 cm and 8 years, and females at about 112 cm and 13 years.
- 6 Rough and smooth skates usually occur on open mud bottom, and they are, therefore, associated with numerous other demersal fishes. They are mainly caught as bycatch in trawl fisheries that target a number of other species, especially flatfish and red cod, and in longline fisheries that target ling.
- 7 Both rough and smooth skates range from the Three Kings Islands to Campbell Island and the Chatham Islands, including the Challenger Plateau, Chatham Rise (rarely in the case of rough skate, and Bounty Plateau). They have not been recorded from QMA10. There are no clear latitudinal trends in the abundance of either species (as determined from research vessel trawl surveys), though catch rates are low south of 49° S, on the Campbell Plateau. There is no clear separation of the depth ranges inhabited by the two species, and both species are often caught in the same trawl tows; however, smooth skate tend to occur slightly deeper than rough skate.

- 8 Rough and smooth skates are commonest in depths of 0–500 m, with some individuals occurring down to 800 m. Immature and mature fish have similar distributions. Records of both species deeper than this may represent misidentifications of the deepwater skates, Bathyrāja shuntovi and Raja hyperborea.
- 9 There is no stock assessment available for rough or smooth skate. Catch per unit effort data is difficult to interpret for rough and smooth skates. Trawls surveys provide some information on relative biomass of both species of skates, but are subject to large inter-annual fluctuation, due to changes in catchability. There has been a steady downward trend in the biomass estimates for the largest fishery (FMA3) in recent years.

### Catch Summary

- 10 Three species codes are used by fishers and Licensed Fish Receivers (LFRs) to report skate catches and landings: RSK (rough skate), SSK (smooth skate) and SKA (unspecified skates). SKA is believed to consist almost entirely of rough and smooth skates, though small quantities of Arctic skate (*Amblyrāja hyperborea*) may be included. Fishers and LFRs are required to use the specific codes (RSK or SSK), but historically there have been problems with species identification, especially after skates have been processed to the “wings” state.
- 11 Before 1979, skates were generally discarded, and reported landings were less than 50 tonnes per year. Export markets then developed, and total New Zealand landings of both species combined increased steadily to about 1000 tonnes in 1986–87 and 3000 tonnes in 1992–93 (refer to Tables 1 and 2). Subsequently, annual landings have varied between 2300 tonnes and 3000 tonnes. Data from LFRs (reported on LFRRs) and fishers (CELR landings and CLR) show reasonable agreement, though the latter indicates higher landings since 1997–98.

**Table 1:** Total New Zealand skate landings reported by Licensed Fish Receivers (source: LFRRs)

Fishing Year	Landings (t)				Percentage (%)		
	SKA	RSK	SSK	Total	SKA	RSK	SSK
1986–87	1014		5	1019	99.5	0.0	0.5
1987–88	1446		278	1725	83.9	0.0	16.1
1988–89	1151	3	359	1513	76.1	0.2	23.7
1989–90	1330	6	432	1769	75.2	0.4	24.4
1990–91	1434	44	342	1820	78.8	2.4	18.8
1991–92	1879	155	586	2620	71.7	5.9	22.4
1992–93	2085	79	787	2951	70.6	2.7	26.7
1993–94	2022	66	909	2997	67.5	2.2	30.3
1994–95	1682	69	1039	2790	60.3	2.5	37.2
1995–96	1567	119	1107	2793	56.1	4.3	39.6
1996–97	1597	160	723	2480	64.4	6.5	29.1
1997–98	1142	530	655	2326	49.1	22.8	28.1
1998–99	929	764	941	2633	35.3	29.0	35.7
1999–00	1110	709	892	2710	40.9	26.2	32.9
2000–01	1089	1042	594	2725	40.0	38.2	21.8

**Table 2:** Total New Zealand skate landings reported by fishers (source: CELR (landed) and CLR):

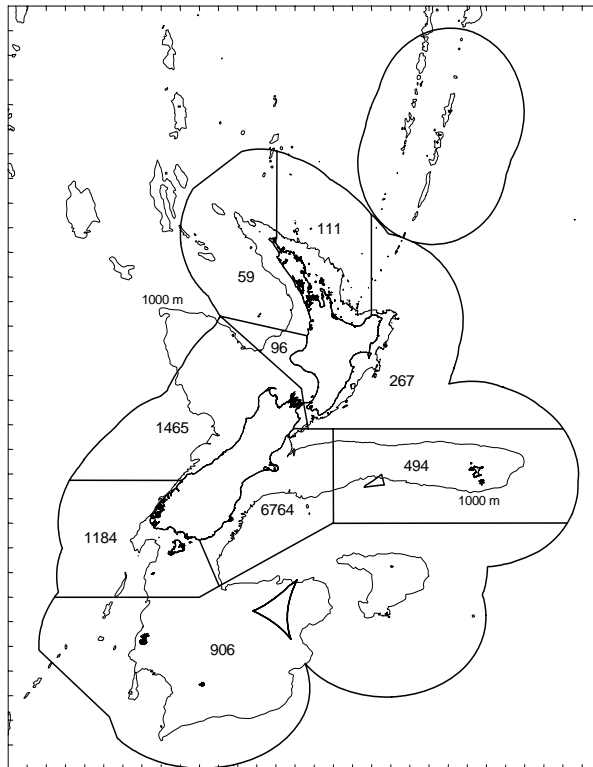
<u>Fishing year</u>	<u>Landings (t)</u>			<u>Total</u>	<u>Percentage (%)</u>		
	<u>SKA</u>	<u>RSK</u>	<u>SSK</u>		<u>SKA</u>	<u>RSK</u>	<u>SSK</u>
<u>1989-90</u>	<u>932</u>	<u>207</u>	<u>389</u>	<u>1528</u>	<u>61.0</u>	<u>13.6</u>	<u>25.4</u>
<u>1990-91</u>	<u>927</u>	<u>272</u>	<u>473</u>	<u>1671</u>	<u>55.5</u>	<u>16.3</u>	<u>28.3</u>
<u>1991-92</u>	<u>1513</u>	<u>386</u>	<u>725</u>	<u>2623</u>	<u>57.7</u>	<u>14.7</u>	<u>27.6</u>
<u>1992-93</u>	<u>1989</u>	<u>391</u>	<u>910</u>	<u>3290</u>	<u>60.4</u>	<u>11.9</u>	<u>27.7</u>
<u>1993-94</u>	<u>1525</u>	<u>433</u>	<u>939</u>	<u>2898</u>	<u>52.6</u>	<u>14.9</u>	<u>32.4</u>
<u>1994-95</u>	<u>1350</u>	<u>418</u>	<u>1097</u>	<u>2865</u>	<u>47.1</u>	<u>14.6</u>	<u>38.3</u>
<u>1995-96</u>	<u>1276</u>	<u>331</u>	<u>1159</u>	<u>2767</u>	<u>46.1</u>	<u>12.0</u>	<u>41.9</u>
<u>1996-97</u>	<u>1364</u>	<u>361</u>	<u>807</u>	<u>2532</u>	<u>53.8</u>	<u>14.3</u>	<u>31.9</u>
<u>1997-98</u>	<u>1095</u>	<u>575</u>	<u>1018</u>	<u>2688</u>	<u>40.7</u>	<u>21.4</u>	<u>37.9</u>
<u>1998-99</u>	<u>1089</u>	<u>669</u>	<u>1132</u>	<u>2890</u>	<u>37.7</u>	<u>23.1</u>	<u>39.2</u>
<u>1999-00</u>	<u>1195</u>	<u>784</u>	<u>976</u>	<u>2954</u>	<u>40.4</u>	<u>26.5</u>	<u>33.0</u>
<u>2000-01</u>	<u>1332</u>	<u>652</u>	<u>979</u>	<u>2962</u>	<u>45.0</u>	<u>22.0</u>	<u>33.0</u>

- 12 Recreational fishing surveys indicate that recreational fishers rarely catch skates. While no customary Maori fisheries are known, this may be, in part, due to the special significance skates have to Maori in some areas. In these areas skates and rays (whairepo) are considered to be kaitiaki, and are not fished.

Catch and Landing by Region

- 13 In recent years (1997-98 to 2000-01), most of the landings (59 percent) have come from the east coast of the South Island (refer to FMA3 in Table 1). Estimated catch data indicate that Pegasus Bay and Canterbury Bight produce most of the catch in FMA3. Substantial landings have also come from the southern and western South Island (refer to FMAs 5 and 7 in Figure 1), with smaller quantities coming from the Campbell Plateau and Chatham Rise (FMAs 6 and 4). Landings have been relatively low around the North Island.

**Figure 1:** Skate landings (tonnes) by FMA for the four-year period 1997-98 to 2000-01 (SKA, RSK and SSK combined). See Table 1 for breakdown by individual fishing years (source: CELR and CLR (landed)):



**Table 3:** Skate landings (tonnes) by FMA for the four-year period 1997-98 to 2000-01 (SKA, RSK and SSK combined) (source: CELR (landed) and CLR, ET, outside New Zealand EEZ):

<u>FMA</u>	<u>Fishing year</u>				<u>Total</u>	<u>Percentage</u>
	<u>1997-98</u>	<u>1998-99</u>	<u>1999-00</u>	<u>2000-01</u>		
<u>1</u>	<u>32</u>	<u>16</u>	<u>23</u>	<u>41</u>	<u>111</u>	<u>1.0</u>
<u>2</u>	<u>48</u>	<u>59</u>	<u>77</u>	<u>84</u>	<u>267</u>	<u>2.3</u>
<u>3</u>	<u>1 572</u>	<u>1 672</u>	<u>1 772</u>	<u>1 748</u>	<u>6 764</u>	<u>58.9</u>
<u>4</u>	<u>159</u>	<u>124</u>	<u>97</u>	<u>113</u>	<u>494</u>	<u>4.3</u>
<u>5</u>	<u>208</u>	<u>342</u>	<u>318</u>	<u>316</u>	<u>1 184</u>	<u>10.3</u>
<u>6</u>	<u>299</u>	<u>236</u>	<u>193</u>	<u>178</u>	<u>906</u>	<u>7.9</u>
<u>7</u>	<u>310</u>	<u>360</u>	<u>364</u>	<u>431</u>	<u>1 465</u>	<u>12.7</u>
<u>8</u>	<u>30</u>	<u>22</u>	<u>25</u>	<u>18</u>	<u>96</u>	<u>0.8</u>
<u>9</u>	<u>10</u>	<u>10</u>	<u>18</u>	<u>21</u>	<u>59</u>	<u>0.5</u>
<u>10</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0.0</u>
<u>ET</u>	<u>5</u>	<u>36</u>	<u>64</u>	<u>0</u>	<u>104</u>	<u>0.9</u>
<u>Not stated</u>	<u>14</u>	<u>12</u>	<u>5</u>	<u>13</u>	<u>44</u>	<u>0.4</u>
<u>Total</u>	<u>2 688</u>	<u>2 890</u>	<u>2 954</u>	<u>2 962</u>	<u>11 494</u>	<u>100.0</u>

**Table 4:** Percentage of landings by FMA and species code for the four-year period 1997-98 to 2000-01. Data for recommended QMAs shown in bold (source: CELR (landed) and CLR):

<u>FMA</u>	<u>SKA</u>	<u>RSK</u>	<u>SSK</u>
<u>1</u>	<u>79.6</u>	<u>8.4</u>	<u>12.1</u>
<u>2</u>	<u>61.7</u>	<u>34.4</u>	<u>3.9</u>
<u>1 and 2</u>	<u>66.9</u>	<u>26.8</u>	<u>6.3</u>
<u>3</u>	<u>37.0</u>	<u>30.6</u>	<u>32.4</u>
<u>4</u>	<u>63.3</u>	<u>10.8</u>	<u>25.9</u>
<u>5</u>	<u>27.4</u>	<u>15.0</u>	<u>57.6</u>
<u>6</u>	<u>20.3</u>	<u>9.0</u>	<u>70.6</u>
<u>3, 4, 5 and 6</u>	<u>35.6</u>	<u>25.5</u>	<u>39.0</u>
<u>7</u>	<u>62.9</u>	<u>10.6</u>	<u>26.5</u>
<u>8</u>	<u>52.8</u>	<u>15.0</u>	<u>32.1</u>
<u>9</u>	<u>77.4</u>	<u>1.3</u>	<u>21.3</u>
<u>8 and 9</u>	<u>62.2</u>	<u>9.8</u>	<u>28.0</u>

14 The proportions of each species code reported by FMA in CELR/CLR landings are shown in Table 4. LFRR data are not available by FMA. The proportions of SKA, RSK and SSK in the recent landings vary markedly among FMAs. Furthermore, the ratio of RSK to SSK also varies markedly. It is not known if these variations are real or a result of incorrect or incomplete species identification.

Catch by Method, Targeted Catch and Bycatch.

15 The skate fishery is a bycatch fishery. Recent catch data indicate that more than half of the catch of both species combined is taken by the flatfish and red cod trawl fisheries, with substantial amounts also being taken by the ling longline fishery, and the hoki trawl fishery (refer to Table 5).

**Table 5:** Percentage of estimated catch (RSK, SSK and SKA combined) taken as bycatch of various target species in the four-year period 1997-98 to 2000-01. Other minor target species accounted for the remaining 6% of the skate catch (source: CELR (estimated) and TCEPR)

<u>Target</u>	<u>1997-98</u>	<u>1998-99</u>	<u>1999-00</u>	<u>2000-01</u>	<u>Total</u>
<u>FLA</u>	<u>27.5</u>	<u>33.9</u>	<u>32.5</u>	<u>28.5</u>	<u>30.8</u>
<u>RCO</u>	<u>28.7</u>	<u>17.0</u>	<u>19.7</u>	<u>25.1</u>	<u>22.3</u>
<u>LIN</u>	<u>18.6</u>	<u>14.4</u>	<u>14.9</u>	<u>12.5</u>	<u>15.0</u>
<u>HOK</u>	<u>10.6</u>	<u>9.7</u>	<u>11.5</u>	<u>9.7</u>	<u>10.4</u>
<u>SQU</u>	<u>2.6</u>	<u>7.0</u>	<u>3.9</u>	<u>5.6</u>	<u>4.9</u>
<u>BAR</u>	<u>3.0</u>	<u>4.5</u>	<u>5.7</u>	<u>5.1</u>	<u>4.6</u>
<u>STA</u>	<u>1.1</u>	<u>3.1</u>	<u>3.1</u>	<u>3.8</u>	<u>2.8</u>
<u>TAR</u>	<u>2.0</u>	<u>2.7</u>	<u>1.9</u>	<u>2.2</u>	<u>2.2</u>
<u>GUR</u>	<u>0.6</u>	<u>0.8</u>	<u>0.8</u>	<u>1.9</u>	<u>1.0</u>

## Stocks and Areas

- 16 NIWA notes there is no information on whether separate biological stocks of rough skate and smooth skate occur in New Zealand. Adults of both species are large and powerful, and are probably good swimmers. However, nothing is known of their movements. There is, therefore, no biological basis for defining management areas.
- 17 Research trawl catch rates, recent commercial catches, and catch per unit effort (CPUE) are greatest along the east coast of the South Island (FMA3). Commercial catches and CPUE are markedly lower off Otago and Southland, off the west coast South Island, and on the Campbell Plateau, Bounty Plateau and the Chatham Rise. Commercial catches are very low around the North Island. It appears that stock abundance of both species is greatest on the continental shelf and upper continental slope around the South Island.
- 18 There may be only one biological stock of each skate species in New Zealand. However, in the absence of suitable information, a precautionary approach should be adopted towards establishing management boundaries. Management areas should be smaller than the whole EEZ to allow for the possibility that multiple stocks may exist. Such stocks might be over-fished if they are managed incorrectly as a single stock. Multiple management areas will also help avoid any localised depletion that might result from taking too much of the catch from a small part of a stock range.

## Proposed Quota Management Areas

- 19 MFish proposed QMAs, as outlined below, are based on the following principles:
- The management areas should be based principally on the biological nature of the stock;
  - The stock boundaries should take into account the existing characteristics of the fishery (i.e., existing fisheries, relevant fisheries management issues);
  - Where practicable, QMAs for species that are taken together in the same fisheries should be aligned;
  - Where practicable the same QMAs should be set for different species;
  - A separate QMA should be set for the water surrounding the Chatham Islands if the stock can be managed effectively as unit;
  - QMAs with new boundaries may be appropriate for species with populations whose distributions do not align with existing QMA boundaries; and
  - Subject to the principles noted above QMAs should be as large as possible.
- 20 MFish considers key issue in determining QMAs for rough skate and for smooth skate are as follows:
- There is no biological information available to indicate separate stocks of rough skate and smooth skate occur. However, multiple stocks may exist, and there is a risk that such stocks might be overfished if they are managed incorrectly as a single stock.
  - Skates are primarily caught as a bycatch of the target species flatfish and red cod.

**Deleted:** MFish proposed QMAs, as outlined below, are based on the following principles: ¶  
The management areas should be based principally on the biological nature of the stock;¶  
The stock boundaries should take into account the existing characteristics of the fishery (i.e., existing fisheries, relevant fisheries management issues);¶  
Where possible, QMAs for interrelated stocks should be the same;¶  
Where practical the same QMAs should be set for different species;¶  
A separate QMA should set for the water surrounding the Chatham Islands if the stock can be managed effectively as unit; and¶  
Subject to the principles noted above QMAs should be as large as possible to ensure efficient and cost effective management. In areas where a species has low abundance and low development potential MFish intends to set larger QMAs to reduce management costs.

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- 21 The same factors are relevant to both smooth and rough skates, therefore, MFish proposes the same QMAs should be applied for both species. MFish proposes that there be five QMAs to allow for the possibility that multiple stocks exist, and that these QMAs be similar to QMAs for the interrelated stocks, flatfish and red cod.

### **Proposals**

Smooth skate 1, rough skate 1 (SSK1, RSK1) (FMA 1 and 2)

- 22 It is proposed that North Island FMAs be combined, to provide longitudinal stock divisions into eastern North Island and western North Island, rather than the latitudinal divisions used for flatfish and red cod. This approach reflects that skate movement is unlikely to occur between the east and west coasts of the North Island.

Smooth skate 3, rough skate 3 (SSK3, RSK3) (FMA 3, 4, 5 and 6)

- 23 There is no evidence that large quantities of either skate species occur around the Chatham Islands, or on the Campbell Plateau, but moderate catches have been taken on the Bounty Plateau. Catches by research vessels on the Chatham Rise have consisted mainly of smooth skate. These regions may be stocked primarily by recruits migrating from the east coast of the South Island. If this is true, then MFish proposes that allocation of separate QMAs to FMA 4 and 6 is not warranted.

Smooth skate 7, rough skate 7 (SSK7, RSK7) (FMA 7)

- 24 Given the moderate catches and spatial separation from the east coast and northern fisheries, MFish proposes retaining FMA7 as a stock boundary.

Smooth skate 8, rough skate 8 (SSK8, RSK8) (FMA 8 and 9)

- 25 As for SSK1 and RSK1, longitudinal stock divisions are proposed for the North Island, rather than the latitudinal divisions used for flatfish and red cod. This approach reflects that skate movement is unlikely to occur between the east and west coasts of the North Island.

Smooth skate 10, rough skate 10 (SSK10, RSK10) (FMA 10)

- 26 MFish notes there is unlikely to be any development of a skate fishery within FMA10. Given the important characteristics of this FMA (which includes the Kermadec Islands) MFish believes it prudent to maintain a separate QMA.

### **Proposed Species Catch Allocations**

- 27 MFish notes that a proportion of landings of rough skate and smooth skate have been reported using the unspecified skate code of SKA, rather than RSK or SSK, which are the codes for the species proposed for QMS introduction. MFish proposes that for the purpose of calculating provisional catch history under Part IV of the 1996 Act, the rules outlined in Table 6 below be used to attribute catch reported under the SKA code during the qualifying fishing years of 1990-91 and 1991-92. The proposed rules are based on the average proportion of RSK and SSK caught in trawl surveys during the last 10 years for each FMA. While the rules could be based on the proportions of RSK and SSK reported by commercial fishers, this option is not preferred given the uncertainty of misreporting bias.

**Table 6: Proposed rules attributed to catch reported under SKA code during the years 1990-91 and 1991-92:**

FMA	RSK	SSK
1	0.75	0.25
2	0.75	0.25
3	0.60	0.40
4	0.01	0.99 <sup>4</sup>
5	0.67	0.33
6	0.25	0.75
7	0.40	0.60
8	0.50	0.50
9	0.50	0.50
10	0	0

## Fishing Year

- 28 Historically, the fishing year for rough and smooth skates has run from 1 October through to 30 September in the following year. This standard fishing year has suited these fisheries. Accordingly, there is no compelling reason to alter the current fishing year from 1 October to 30 September should rough and smooth skates be introduced into the QMS. The alternative fishing year is 1 April to 31 March.

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## Unit of Measure

- 29 Again, historically, the use of greenweight has been used for management purposes in the rough and smooth skate fisheries. MFish sees no reason to change this unit of measure should these species be introduced into the QMS. The alternative unit of measure is meatweight.

## Assessment of Costs and Benefits

- 30 As mentioned, section 19(8) of the 1996 Act requires the Minister of Fisheries to have regard to the costs and benefits of introducing a stock into the QMS. For this reason, MFish undertook an initial assessment of the costs and benefits of introducing rough skate and smooth skate into the QMS.
- 31 The introduction section of this document outlines the methodology used in the assessment, including a description of the assumptions and the four primary criteria categories (Environmental Sustainability, Treaty of Waitangi, Economic and Social), and their respective sub-criteria. Because these four categories cover a reasonable and practical range of possible arguments for and against introducing a species into the QMS, MFish considers the assessment of expected costs and benefits to be consistent with the purpose of section 8 in the 1996 Act.
- 32 When reviewing the results of the assessment, you should keep in mind that the assessment made use of the best available information and expert judgment, aided with the help of a decision-support system, which quantifies the results for each

<sup>4</sup> Trawl surveys indicate RSK is rare in FMA4. Refer to paragraph 23 for discussion.

primary criterion category and the overall score out of a possible 1.0. This approach provides a structure to organise and evaluate the importance of various objectives when making a final decision as to whether rough skate and smooth skate should be introduced into the QMS.

- 33 The assessment of the costs and benefits for rough skate favours the QMS alternative with an overall score of .694 compared to the non-QMS alternative score of .306, resulting in a priority ratio of 2.268. This indicates that the QMS alternative is more than 120 percent higher than the non-QMS alternative, and hence is very strongly preferred for the management of rough skate. The overall score and the results of each primary criterion category for rough skate are outlined in Tables 7. An explanation of each criterion category follows.

**Table 7: Rough Skate: Assessment of Costs and Benefits:**

Scores	QMS	Non-QMS
Overall	.694	.306
Environmental Sustainability	.744	.256
Treaty of Waitangi	.706	.294
Economic	.600	.400
Social	.476	.524

- 34 The assessment of the costs and benefits for smooth skate favours the QMS alternative with an overall score of .696 compared to the non-QMS alternative score of .304, resulting in a priority ratio of 2.289. This indicates that the QMS alternative is almost 130 percent higher than the non-QMS alternative, and hence is very strongly preferred for the management of smooth skate. The overall score and the results of each primary criteria category for smooth skate are outlined in Tables 8. An explanation of each criteria category follows.

**Table 8: Smooth Skate: Assessment of Costs and Benefits:**

Scores	QMS	Non-QMS
Overall	.696	.304
Environmental Sustainability	.748	.252
Treaty of Waitangi	.706	.294
Economic	.600	.400
Social	.489	.511

### *Environmental Sustainability*

- 35 This criterion strongly favours the QMS alternative, for the purpose of stock sustainability, particularly for smooth skate. Skate's reproductive biology (oviparous with relatively few young), large size and life span make them susceptible to recruitment failure from overfishing. This point is substantiated by the fact that several overseas skate fisheries have undergone dramatic population declines as a result of overfishing. In recent years CCLs in the major fishery (FMA3) have been breached because skates can be caught and landed as an inevitable bycatch of target species, predominately red cod and flatfish. For this reason, the current non-QMS environment has not been feasible in constraining catches of skates, while the QMS environment provides incentives that ensure catches of skates remain within the

TACCs.<sup>5</sup> Such incentives include economic penalties for fishing beyond entitlement thresholds.

- 36 The quality and quantity of information about rough and smooth skate stocks and harvest effort are expected to improve slightly within the QMS environment, as well as the management of impacts on associated and dependent species, and on the aquatic environment. The ability to effectively regulate catches within the QMS environment should provide benefits for the management of inter-related stocks, therefore, enhancing the ability to regulate the effects of fishing on the aquatic environment, including on the biodiversity.

### *Treaty of Waitangi*

- 37 This criterion strongly favours QMS introduction because it will facilitate the entry of Māori into the commercial sector by gaining access to 20 percent of the TACC. However, to date Māori have expressed little if any interest in this fishery's introduction into the QMS.
- 38 MFish notes that in some areas Māori consider skates (whairepo) to be kaitiaki, and, therefore, have special significance. Although there is no data available on Māori customary catches from this fishery, the QMS is likely to better safeguard customary rights by providing better recognition of areas of importance to customary fishing.

### *Economic*

- 39 This criterion favours QMS introduction because of the benefits provided by the allocation of a secure, proportional, transferable property right. Such benefits should accrue primarily by increasing incentives to invest in the skate fishery.
- 40 Fisheries management costs favour neither the QMS nor non-QMS alternatives. While overall management costs are expected to decrease under the QMS, this is likely to be offset by higher business compliance costs for commercial fishers. Ongoing management costs within the QMS will largely be a function of the QMAs and catch limits set. TACCs will not be set until just before QMS introduction. However, MFish notes that the socio-economic impact of any proposed TACCs is a factor relevant to the Minister's consideration of any proposed catch limit.
- 41 Similarly, fisheries output benefits favour neither the QMS nor non-QMS alternatives because there is little expectation of increased development of the fishery, however, the QMS environment may provide better opportunities for adding value to skate products. In theory the issue of fishing capacity should be neutral, because skates are an inevitable bycatch of target species, predominately red cod and flatfish. However, some rationalisation of the commercial sector is expected, due to increased business compliance costs for participation in the fishery under the QMS. For this reason, the QMS alternative is only slightly favoured.

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<sup>5</sup> As is outlined in the Introduction section, the exception to the requirement to take fish only under the authority of and in accordance with a current fishing permit, which allows non-QMS fish to be taken as an inevitable consequence of the taking of fish under a current fishing permit, expires on 1 October 2004 (refer to section 89(2A) of the 1996 Act).

## *Social*

- 42 This criterion slightly favours the non-QMS alternative because of the potential for rationalisation of the commercial sector, and the risk that this may have a negative impact on coastal communities. There is believed to be little recreational fishery for the two skate species, and so neither the QMS nor non-QMS alternatives are favoured. However, the QMS alternative is strongly favoured in terms of the potential effect on future generations' ability to meet their reasonably foreseeable needs, given the improved ability to ensure sustainability of both species within the QMS environment.

## *Sensitivity Analysis*

- 43 The results of the sensitivity analyses demonstrate that there are no feasible sets of weights (level of importance) for the four primary criteria that could reverse the decisions in favour of both species' introduction into the QMS. Although changes to weights at the sub-criteria level will not reverse the decision to introduce both species into the QMS, they could result in the QMS and non-QMS alternatives having equal scores.

## **Summary of Proposals**

- 44 MFish proposes the following QMA boundaries for rough (RSK) and smooth (SSK) skates:
- RSK1, SSK1 (FMA 1 and 2),
  - RSK3, SSK3 (FMA 3, 4, 5 and 6),
  - RSK7, SSK7 (FMA 7),
  - RSK8, SSK8 (FMA 8 and 9), and
  - RSK10, SSK10 (FMA 10).
- 45 MFish proposes to retain the current standard fishing year of 1 October to 30 September should rough and smooth skates be introduced into the QMS. The alternative fishing year is 1 April to 31 March.
- 46 For the purpose of expressing the TACC and ACE, MFish proposes to retain the current standard of greenweight should rough and smooth skates be introduced into the QMS. The alternative unit of measure is meatweight.
- 47 MFish proposes that the rough and smooth skate fisheries be introduced into the QMS on 1 October 2003 based on the assessment of costs and benefits as outlined in this section.
- 48 MFish proposes that for the purpose of calculating provisional catch history under Part IV of the 1996 Act, the rules outlined in Table 6 (page 69) be used to attribute catch reported under the SKA code during the qualifying fishing years of 1990-91 and 1991-92.
- 49 MFish requests your comments on the above proposals.

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