

NATIONAL ROCK LOBSTER MANAGEMENT GROUP



NRLMG 2009 ANNUAL REPORT

To

The Minister of Fisheries

HON. PHIL HEATLEY

NEW ZEALAND ROCK LOBSTER FISHERY MANAGEMENT AREAS

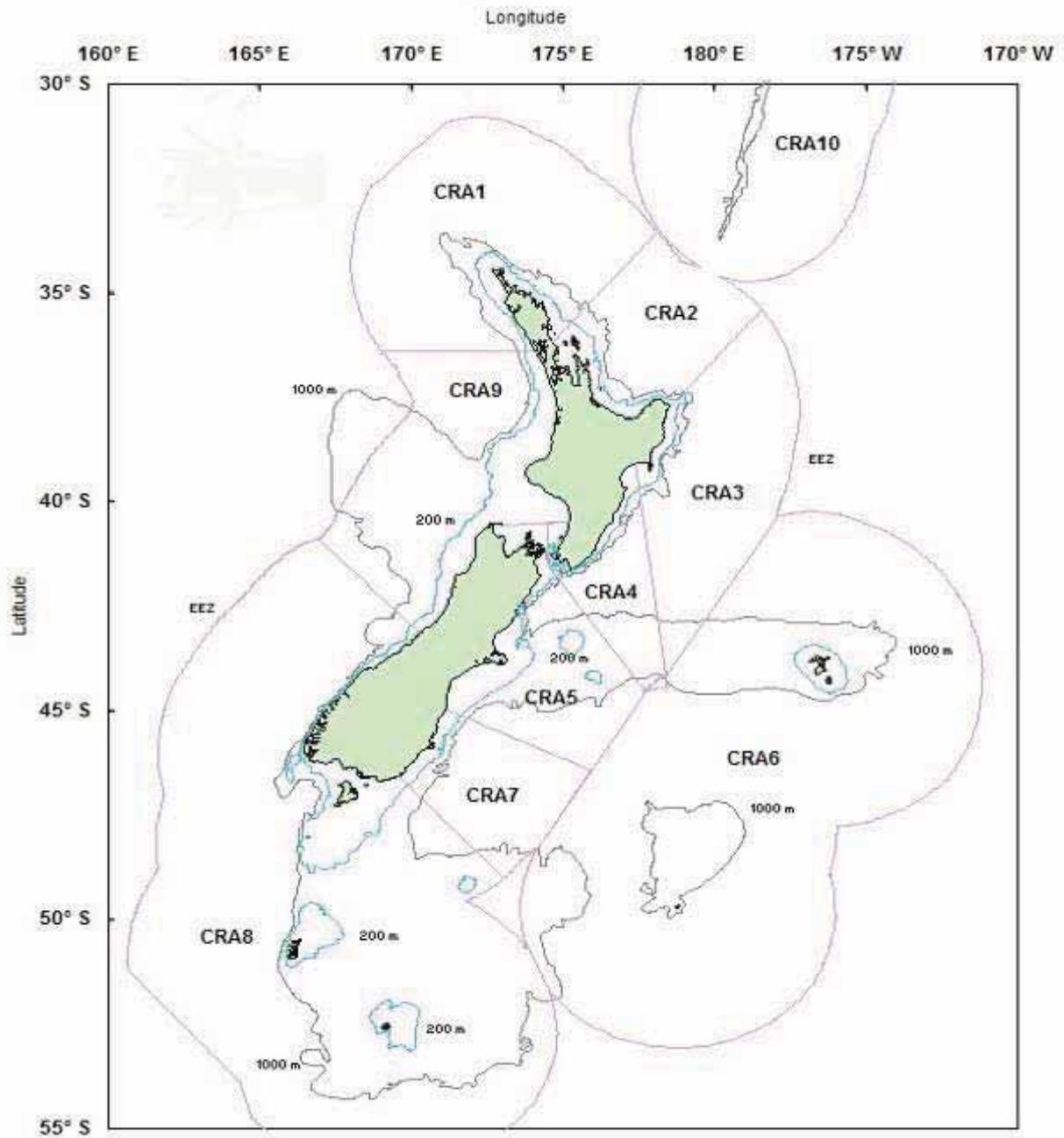


TABLE OF CONTENTS

1.	SUMMARY OF THE NRLMG REPORT	5
2.	PURPOSE OF THE NRLMG ANNUAL REPORT	7
3.	PROPOSAL TO ADOPT A MANAGEMENT PROCEDURE FOR CRA 3	9
4.	CATCH LIMIT REVIEWS FOR CRA 3, CRA 4 AND CRA 7 AS A RESULT OF OPERATION OF MANAGEMENT PROCEDURES.....	30
5.	ROLE AND FUNCTION OF THE NRLMG	63
6.	STRATEGIC VISION	70
7.	FRAMEWORK FOR MANAGING ROCK LOBSTER FISHERIES.....	72
8.	SUMMARY OF RESEARCH ACTIVITIES	78
9.	STOCK ASSESSMENT OVERVIEW	80
10.	UNCERTAINTY IN ESTIMATES OF TOTAL REMOVALS	84
11.	COMPLIANCE AND ENFORCEMENT ISSUES	87
12.	ROCK LOBSTERS	88
13.	STOCK SUMMARIES	107
14.	CRA 1.....	108
15.	CRA 2.....	110
16.	CRA 3.....	112
17.	CRA 4.....	114
18.	CRA 5.....	116
19.	CRA 6.....	118
20.	CRA 7.....	120

21.	CRA 8.....	122
22.	CRA 9.....	124
23.	PACKHORSE ROCK LOBSTER – PHC	125
24.	SUMMARY OF ROCK LOBSTER FISHERIES REGULATIONS	127

1. SUMMARY OF THE NRLMG REPORT

1. This report from the National Rock Lobster Management Group (NRLMG) is primarily an information document. The NRLMG would like to bring your attention, in particular, to:
 - a) the ongoing review of the NRLMG, including its role, function, strategic vision, and framework for managing fisheries;
 - b) the development of a CRA 3 Management Procedure for use in guiding TAC decisions for that fishery;
 - c) the operation of Management Procedures for CRA 3, CRA 4, CRA 7 and CRA 8 and the NRLMG initial advice on management interventions for the 2010/11 fishing year beginning 1 April 2010; and
 - d) the priority issues relating to uncertainty in estimates of total removals and compliance and enforcement identified by the NRLMG.

2. The NRLMG recommends that you:
 - a) **reconfirm** your endorsement of the role and function of the NRLMG;
 - b) **direct** MFish to coordinate release of the NRLMG initial advice on management interventions for public consultation; and
 - c) **note** that the NRLMG will provide you with final advice on management interventions in February 2010.

INTRODUCTION TO THE 2009 ANNUAL REPORT

2. PURPOSE OF THE NRLMG ANNUAL REPORT

3. The purpose of the NRLMG Annual Report is to provide information on rock lobster fisheries and a comprehensive background to NRLMG advice and recommendations on sustainability measures and management controls for rock lobster fisheries to the Minister of Fisheries.
4. The Report reviews a range of topics considered and activities undertaken by the NRLMG during 2009. The report includes:
 - a) NRLMG initial advice on management interventions for rock lobster fisheries for the 2009-10 fishing year;
 - b) a description of the role and function of the NRLMG;
 - c) a description of the framework for managing rock lobster fisheries;
 - d) an explanation of stock assessments and management procedures;
 - e) an outline of priority management issues; and
 - f) a description of New Zealand rock lobster fisheries.
5. The NRLMG initial advice on rock lobster fisheries fulfils the role of a Ministry of Fisheries (MFish) Initial Position Paper (IPP) and is the basis for the Minister's statutory consultation with stakeholders on rock lobster issues. The NRLMG initial advice is set out in this report but a separate Public Consultation Document has also been produced to facilitate the consultation process.
6. This year, the NRLMG is proposing adoption of a management procedure to guide statutory TAC setting in the CRA 3 fishery and variations to the TACs and allowances set for the CRA 3, CRA 4, and CRA 7 rock lobster fisheries.

**INITIAL ADVICE ON
MANAGEMENT INTERVENTIONS
FOR 2010/11 FISHING YEAR**

3. PROPOSAL TO ADOPT A MANAGEMENT PROCEDURE FOR CRA 3

EXECUTIVE SUMMARY

7. The National Rock Lobster Management Group (NRLMG) proposes that the Minister adopt a management procedure to guide his Total Allowable Catch (TAC) setting in the Gisborne rock lobster fishery (CRA 3).
8. When the Minister of Fisheries (the Minister) reduced the CRA 3 TAC and Total Allowable Commercial Catch (TACC) in April 2009 he considered that the TAC cut, when combined with a management procedure to guide future TAC setting, should secure the necessary rebuild in the CRA 3 stock to the benefit of all fishery participants. The Minister noted that he would be provided with a management procedure to guide TAC setting in CRA 3 from April 2010.
9. The CRA 3 Multi-stakeholder Fishing Forum (the CRA 3 Forum), a group comprising customary Maori, amateur and commercial fishing stakeholders in CRA 3, initiated development of a CRA 3 Management Procedure. During 2009, the CRA 3 Working Group (a smaller group of Forum representatives) worked with the stock assessment scientists and the Rock Lobster Fisheries Assessment Working Group (RLFAWG) to develop a management procedure to guide TAC setting decisions for CRA 3 from 1 April 2010.
10. Two alternative CRA 3 Management Procedure options are proposed to guide CRA 3 TAC setting. The two CRA 3 Management Procedure options, called "Rule 2a" and "Rule 5", both:
 - a) use offset year (1 October to 30 September) commercial catch per unit effort (CPUE) to drive the procedures;
 - b) specify the management objective as being to rebuild the stock abundance to an acceptable level at or above the agreed sustainability indicators, while delivering an acceptable annual catch;
 - c) contain a harvest control rule that calculates a provisional TAC for each fishing year the procedures are operated; this provisional TAC varies with changes in the abundance indicator;
 - d) contain minimum change, maximum change and initial TAC components; and
 - e) would be used for five years to guide TAC setting and would then be reviewed.

11. The NRLMG believes that using either of the proposed CRA 3 Management Procedures to guide TAC setting is consistent with the Fisheries Act 1996 (the Act). The central consideration is whether the procedures meet the TAC setting requirements of s 13 of the Act. Section 13 requires the Minister to set a TAC that moves the stock to, or maintains the stock at, a size at or above a level that can produce the maximum sustainable yield or that is not inconsistent with this objective. This stock size that can produce the maximum sustainable yield is commonly called *Bmsy*.
12. The NRLMG is confident the CRA 3 Management Procedures are consistent with s 13 because the procedures are expected to rebuild the stock size towards or above a target stock size currently accepted by the Ministry of Fisheries (MFish) as a proxy for *Bmsy* (called *Bref*).
13. Rock lobsters are important taonga to tangata whenua in CRA 3, are prized by amateur fishers, and have high commercial value. Therefore the second key consideration is the impact of the proposed procedure on utilisation.
14. The distinguishing factors between the two proposed CRA 3 Management Procedure (Rule 2a and Rule 5) are the way in which and the rate at which stock targets will be met, and the social, cultural and economic impacts associated with TAC changes that may be invoked by either rule over its five year term of operation.
15. The NRLMG believes that customary Maori, amateur and commercial utilisation values would increase with application of either of the CRA 3 Management Procedures. This is because the procedures would improve fishing opportunities for all sectors by increasing the stock from its current size. The procedures would also improve the “safety” of the CRA 3 stock by increasing TAC responsiveness to changes in abundance of the stock.
16. CRA 3 Working Group members and the NRLMG would like to adopt an approach to TAC setting that is more responsive to changes in observed abundance in the CRA 3 fishery than the current approach which relies on periodic stock assessments. However, sector members of both groups are divided on which of these two management procedure options should be adopted.
17. CRA 3 Working Group commercial representatives and one customary representative are in favour of Option 1: adopt the “Rule 2a” CRA 3 Management Procedure to guide TAC setting in CRA 3. On the other hand, CRA 3 Working Group recreational representatives and one customary representative are in favour of Option 2: adopt the “Rule 5” CRA 3 Management Procedure to guide TAC setting in CRA 3. The NRLMG has a majority preference for the “Rule 2a” CRA 3 Management Procedure (Option 1).

PURPOSE OF THIS PAPER

18. This paper sets out the NRLMG’s initial advice on proposals to adopt a CRA 3 Management Procedure (Rule 2a or Rule 5) to guide TAC setting in CRA 3. It includes the best information available to the NRLMG to inform decision-making.

19. The purpose of the paper is to seek information and comments from CRA 3 tangata whenua, CRA 3 fishery stakeholders and other interested parties on the proposals.

TERMINOLOGY IN THE PAPER

Management Procedures

20. A management procedure is a tool used to guide the setting of catch limits. Management procedures are becoming more widely used, especially in South Africa, Australia, Europe and North America, and in New Zealand. A management procedure:
 - a) specifies what data will be used to make catch limit decisions;
 - b) specifies how the data will be collected and analysed;
 - c) contains a harvest control rule (a mathematical equation that determines what the specific output of the procedure will be, such as the exact TAC or TACC); and
 - d) has been extensively simulation-tested using an operating model that is a model of the fishery system being managed.
21. Under a management procedure approach, agreement is obtained among managers and stakeholders before the procedure is implemented: they agree about the data inputs, the way the inputs will be treated to make inferences, the harvest control rule and the period for which the management procedure will be used. Extensive simulation testing of the procedure is undertaken to ensure it will deliver the desired outcomes.
22. The advantages of a management procedure approach, over the conventional approach of periodic stock assessments followed by decision making, are:
 - a) the process leads to explicit definition of management objectives;
 - b) all participants in the fishery can become involved in the choice of procedure;
 - c) uncertainty in all facets of the assessment and management process can be addressed;
 - d) greater certainty of achieving outcomes is provided;
 - e) management procedures reduce the need for regular stock assessments, freeing resources for other research; and

- f) the process is more understandable to fishers than the conventional approach.

Sustainability Indicators (Bmsy, Bref, Bmin)

23. The NRLMG uses sustainability indicators to report on stock health and to evaluate the effectiveness of management options. For most rock lobster stocks, performance is reported against a “target” stock size and a “minimum” stock size.
24. Three sustainability indicators are relevant to evaluation of the two alternative CRA 3 Management Procedures (Rule 2a and Rule 5):
- a) The statutory target stock size, **Bmsy**. Section 13 of the Act requires the Minister to set a TAC for a rock lobster stock that move the stock to, or maintains the stock at, a level at or above Bmsy, or that is not inconsistent with this objective. *Bmsy* is not straightforward to estimate and is uncertain when estimated.

A *Bmsy* reference point was calculated for CRA 3 in 2008. The *Bmsy* calculation was sensitive to the period chosen to represent mean recruitment, which varies substantially over the period for which estimates are available; which in turn caused uncertainty in *Bmsy*. The NRLMG and MFish Plenary therefore considered this *Bmsy* estimate unreliable for use as a target biomass level for this stock.

- b) The proxy target stock size, **Bref**. When a *Bmsy* estimate is absent or unreliable, alternative and proxy targets are used. In 2009 the RLFAWG agreed to use the historical target period, previously used in the 2000 and 2001 CRA 3 stock assessments, as the management procedure target because it could be estimated with greater reliability and described a period when the stock was considered to be healthy. This target stock size is the autumn-winter (April through September) vulnerable stock size associated with the reference period 1974-79. CRA 3 stakeholders collectively agreed on this target level because 1974-79 was a period when the stock showed good productivity and was demonstrably safe, having gone below this level and then recovered.

*Bref*₁₉₇₄₋₇₉ needed adjustment because the growth rate of rock lobsters in CRA 3 has changed significantly since 1974-79 (as demonstrated in the 2008 assessment) and the target biomass needed to reflect the current growth rate, legal size and escape gap regulations. A technical procedure based on fishing mortality rates was used to adjust *Bref*₁₉₇₄₋₇₉ to reflect these changes. This adjustment procedure has been reviewed and accepted by the RLFAWG.

The RLFAWG then agreed that the CRA 3 Management Procedure rules should be evaluated against 90% of the *adjusted Bref* (called *Bref*_{90%} hereafter), to address the potential that a ‘regime shift’ resulting in lower productivity may have occurred and that reference points based on historically higher productivity may be inappropriate if recruitment were to continue at this historically low level. The CPUE associated with the *Bref*_{90%} is a standardised autumn-winter CPUE of 1.14 kg/potlift.

- c) The minimum stock size, ***Bmin***. *Bmin* is the stock size associated with lowest abundance in the observed history of the fishery. The CRA 3 stock has previously recovered from this low point.
25. For all these indicators, CRA 3 stock size is measured in terms of the autumn-winter vulnerable biomass. "Vulnerable" biomass is the total quantity of lobsters available to the fishery (i.e., it does not include lobsters that cannot be harvested such as undersize lobsters and berried female lobsters).
26. The desired performance in relation to these sustainability indicators is:
- a) stock size that fluctuates around the target (*Bref*) with at least 50% probability of achieving the target;
 - b) stock size remains above the minimum (*Bmin*) with 90% probability; and
 - c) spawning stock size remains above 20% of its unfished level.
27. In October 2008, MFish released the Harvest Strategy standard for New Zealand fisheries (the HSS) that specifies performance standards for Quota Management System species. The NRLMG considers the management procedures proposed for CRA 3 are consistent with the HSS. All management procedures tested maintained the spawning stock biomass well above the 20% unfished level.
28. The Guidelines for Harvest Strategy Standards (MFish 2008) describe the *Bref* concept as follows: "Conceptual proxies for BMSY, FMSY and MSY are qualitative surrogates that can be used in the absence of adequate information to directly estimate these reference points themselves. The conceptual interpretation embraces the spirit and intent of section 13 of the Act. It can be used in cases where there is insufficient information to estimate BMSY, FMSY or MSY explicitly, or where such estimates may be unreliable because, for example, there is little or nothing known about the stock recruitment relationship. Conceptual BMSY: In cases where the relationship between CPUE and abundance can be assumed to be more or less proportional, or where some other form of relationship has been derived from data, it may be reasonable to select an appropriate historical period when both CPUE and catches were relatively high and to use this CPUE level as a target. *The best example in current use in New Zealand is that for rock lobster.*" [emphasis added]

SUMMARY OF PROPOSED MANAGEMENT OPTIONS

29. The NRLMG is seeking comments on the following management options for CRA 3:

Option	Description
Option 1	Adopt the “Rule 2a” CRA 3 Management Procedure to guide TAC setting in CRA 3
Option 2	Adopt the “Rule 5” CRA 3 Management Procedure to guide TAC setting in CRA 3

30. If the Minister chooses not to adopt the alternative CRA 3 Management Procedures proposed above, periodic stock assessments (which are relatively infrequent because of resource constraints) would continue to guide TAC setting for CRA 3.

Option 1 – Adopt the “Rule 2a” CRA 3 Management Procedure to Guide TAC Setting in CRA 3

31. Under Option 1, the Minister would use the “Rule 2a” CRA 3 Management Procedure to guide statutory TAC setting decisions for CRA 3. The “Rule 2a” CRA 3 Management Procedure is described in detail in *Attachment 1* to this consultation paper.
32. Under this option the Minister would be guided by the operation of the “Rule 2a” Management Procedure when setting the TAC for CRA 3 until the 2015-16 fishing year. During 2014, the management procedure would be reviewed.

Option 2 – Adopt the “Rule 5” CRA 3 Management Procedure to Guide TAC Setting in CRA 3

33. Under Option 2, the Minister would use the “Rule 5” CRA 3 Management Procedure to guide statutory TAC setting decisions for CRA 3. The “Rule 5” CRA 3 Management Procedure is described in detail in *Attachment 1* to this consultation paper.
34. Under this option the Minister would be guided by the operation of the “Rule 5” Management Procedure when setting the TAC for CRA 3 until the 2015-16 fishing year. During 2014, the management procedure would be reviewed.

RATIONALE FOR MANAGEMENT OPTIONS

CRA 3 Stock Status

35. A stock assessment was last undertaken for CRA 3 in 2008. The 2008 stock assessment results indicated that stock size was just above *Bmin* and well below its target level. Under 2007 catches and recent recruitments, the 2008 assessment predicted a 75% probability that stock size would decline over the four years up to 2012.
36. On the basis of this assessment, the Minister reduced the CRA 3 TAC from 319 tonnes to 293 tonnes from April 2009.
37. CPUE is considered to be a reliable indicator of relative stock size in CRA 3. The NRLMG notes that, based on recent CPUE information, stock size may have increased more than predicted by the 2008 stock assessment model. Autumn-winter CPUE increased from 0.60 kg/potlift in 2007 to 0.68 in 2008, and then to 0.94 kg/potlift in 2009. Offset year CPUE also increased from 0.59 kg/potlift in 2007 to 0.63 in 2008, and then to 0.80 kg/potlift in 2009. CPUE is still below the CPUE associated with *Bref90%* - a standardised autumn-winter CPUE of 1.14 kg/potlift.
38. There is considerable uncertainty with respect to the level of current recruitment and some uncertainty with respect to current growth rates in CRA 3. As noted above, two adjustments to the *Bref* target have been made to address the potential that slow growth and low recruitments will persist into the future. These adjustments will be reviewed at the time of future stock assessments and management procedure reviews. The model's estimated recruitment in CRA 3 shows a declining trend since 1979, with a lot of short-term volatility. The cause is not known, but larval settlement also shows a declining trend since 1991 with much short-term volatility. The cause of slow growth seen in the tag-recapture data from 1996-2008 compared to earlier data is also unknown: it does not appear to relate to density of the stock or handling of lobsters, nor is it present in adjacent rock lobster fisheries (CRA 2 and CRA 4). The base case model used to evaluate rules therefore has low stock productivity, caused by assuming that the low recruitments in the last 10 years will persist into the future as will the slow growth observed from 1996-2008. These assumptions result in a level of productivity that may not be able to sustain future catches as high as historical catches.

Rationale for Option 1 and Option 2

39. The CRA 3 Forum developed a draft CRA 3 Fisheries Management Plan (the Plan) in 2008. Although the Plan has not been finalised and approved by the Minister, the CRA 3 Working Group are progressing priority elements of the Plan because they are likely to have a positive impact on the health of the fishery and would therefore benefit all fishing sectors. One of the priority elements of the Plan is to develop a management procedure to guide TAC setting in the CRA 3 fishery.
40. During 2009, the CRA 3 Working Group worked with the stock assessment scientists and the RLFAWG to develop a management procedure to guide TAC setting decisions for CRA 3 from 1 April 2010. When the Minister reduced the CRA 3 TAC and TACC in April 2009, he considered

that the TAC cut when combined with a management procedure to guide future TAC setting, should secure the necessary rebuild in the CRA 3 stock to the benefit of all fishery participants. The Minister noted that he would be provided with a management procedure to guide TAC setting in CRA 3 from April 2010.

41. Management procedures are in place for several New Zealand rock lobster fisheries. Management procedures have been successfully used to guide TAC setting in CRA 7 (Otago) and CRA 8 (Southern) since 1996. Management procedures were used first to rebuild the CRA 7 and CRA 8 fisheries from a state of low abundance and then to maintain the stocks at target levels with high probability. A voluntary management procedure was used by CRA 4 (Wellington/Hawkes Bay) to shelve Annual Catch Entitlement (ACE) for two years (2007-08 and 2008-09) to initiate a rebuild of the fishery and this was adopted by the Minister in 2009 to guide TAC and TACC setting in CRA 4. A recent increase in CRA 4 CPUE indicates success of this approach. A voluntary management procedure to shelve ACE if CPUE becomes low has also been adopted by CRA 5 (Canterbury/Marlborough), and the development of management procedure for CRA 6 (Chatham Islands) is well advanced.

42. Adopting either the “Rule 2a” (Option 1) or the “Rule 5” (Option 2) CRA 3 Management Procedures would provide a mechanism to rebuild the CRA 3 fishery from a state of low abundance and provide greater certainty of achieving this outcome. The CRA 3 Management Procedures are designed to move the stock towards the target, $B_{ref90\%}$, and maintain stock size above B_{min} with high probability. Use of the CRA 3 Management Procedures are viable because:
 - a) the proposed procedures were chosen from a large selection of procedures that were evaluated for performance against sustainability criteria (refer Breen *et al* (2009));
 - b) the procedures have been tested using a model of the CRA 3 fishery system based on the 2008 CRA 3 stock assessment model (which was accepted by the MFish Plenary in 2008); and
 - c) the procedures have been tested for robustness to uncertainties in information, including uncertainties in recruitment and growth, in the level of non-commercial catches and in the stock assessment results. The procedures are robust to these uncertainties in that desired performance against the sustainability and performance indicators was maintained.

ASSESSMENT OF MANAGEMENT OPTIONS

43. Assessment of the management options against statutory criteria is set out and discussed in *Attachment 2* to this consultation paper. Key considerations and impacts are discussed below.

Sustainability

44. Simulation-testing of the “Rule 2a” and “Rule 5” CRA 3 Management Procedures show them to be safe with respect to sustainability indicators. The management procedures are expected to

move the stock towards the target, $B_{ref90\%}$, and maintain stock size above B_{min} with high probability. The management procedures maintain spawning stock biomass well above 20% of its unfished level.

45. The NRLMG is confident the proposed application of the CRA 3 Management Procedures are consistent with the statutory target because $B_{ref90\%}$ has previously been accepted by the MFish Plenary as a suitable proxy for B_{msy} and the procedures are expected to rebuild the stock size towards or above this proxy target, $B_{ref90\%}$, with high probability. As noted, the procedures have been tested and are robust to uncertainties in information on the CRA 3 fishery.

Option 1 - Adopt the "Rule 2a" CRA 3 Management Procedure to Guide TAC Setting in CRA 3

46. The "Rule 2a" CRA 3 Management Procedure specifies an initial "fixed" TAC for the first three years (the fishing years 2010-11, 2011-12 and 2012-13). This "fixed" TAC is the current CRA 3 TAC of 293 tonnes (refer *Consultation Paper 2*). However, the current CRA 3 TAC is retained only whilst CPUE stays within specified upper (1.08 kg/potlift) and lower (0.75 kg/potlift) limits. This ensures that variations can be made to the TAC if CRA 3 stock size changes considerably from its current size during the three year period. This increases the safety of achieving the target stock size, $B_{ref90\%}$.
47. The NRLMG notes that seasonal autumn-winter CPUE information suggests the CRA 3 stock size may have increased more than predicted by the 2008 stock assessment.
48. "Rule 2a" provides a median rebuild year of 2016 (i.e., rebuild to a $B_{ref90\%}$ of 1.14 kg/potlift in the autumn-winter season). This is one year later, on average, than "Rule 5" (*Option 2*).

Option 2 - Adopt the "Rule 5" CRA 3 Management Procedure to Guide TAC Setting in CRA 3

49. The "Rule 5" CRA 3 Management Procedure specifies an initial "fixed" TAC for the first two years (the fishing years 2010-11, and 2011-12). This "fixed" TAC is a reduced CRA 3 TAC of 273 tonnes (refer *Consultation Paper 2*).
50. However, under Option 2, the reduced TAC of 273 tonnes is retained for two years and no response is proposed to the TAC if CPUE declines or increases in 2010 or 2011 – even if CPUE declines below the lower limit (0.75 kg/potlift) specified for "Rule 2a".
51. "Rule 5" provides a median rebuild year of 2015 (i.e., rebuild to a $B_{ref90\%}$ of 1.14 kg/potlift in the autumn-winter season). This is one year earlier than "Rule 2a" (2016).

Utilisation & Value

52. Simulation-testing of the “Rule 2a” and “Rule 5” CRA 3 Management Procedures suggests that, as well as rebuilding the stock to the target level, the CRA 3 Management Procedures would provide for good utilisation.
53. The testing indicates that the management procedures would improve fishing opportunities for all sectors over the long-term, and would improve certainty of outcomes by being more responsive to changes in abundance of the stock, which improves the “safety” of the CRA 3 stock.
54. The harvest control rules in the CRA 3 Management Procedures, with allowances made for non-commercial catches, generate recommended TACs; the recommended TACCs are the TAC minus these allowances.
55. The distinguishing factors between the two CRA 3 Management Procedure options proposed (Rule 2a and Rule 5) are the way in which and the rate at which stock targets will be met, and the social, cultural and economic impacts associated with TAC changes that may be invoked by either rule over its five year term of operation. These are discussed under each option below.

Option 1 - Adopt the “Rule 2a” CRA 3 Management Procedure to Guide TAC Setting in CRA 3

56. Under Option 1, the current CRA 3 TAC is “fixed” for the first three years, unless CPUE goes outside the specified upper and lower limits of 1.08 and 0.75kg/potlift respectively. This option would have the least short-term impact on commercial stakeholders.
57. The current utilisation value of the fishery will be maintained for three years unless CPUE falls below 0.75 kg/potlift or increases above 1.08 kg/potlift. The NRLMG notes that the ongoing application of the management procedure would increase customary Maori, amateur and commercial utilisation values. This is because the procedure would improve fishing opportunities for all sectors by increasing the stock from its current size.
58. “Rule 2a” also provides responses to observed variations in stock abundance after the initial fixed TAC expires – the rule allows for minimum 5% or maximum 10% adjustments to the TAC in any one year. The NRLMG considers these responses will provide for less variation in catch year-to-year than Option 2.

Option 2 - Adopt the “Rule 5” CRA 3 Management Procedure to Guide TAC Setting in CRA 3

59. Under Option 2, the CRA 3 TAC would be reduced from 293 tonnes to 273 tonnes from April 2010. The TAC will then be fixed for two years with no response proposed to the TAC if CPUE declines or increases in 2010 or 2011.
60. The current utilisation value of the fishery will be reduced under this option from 1 April 2010 because of the proposed reduction to the TAC. The extent of the impact of this rule on the

benefits derived from the fishery by any one sector will depend on allocations decisions (refer to *Consultation Paper 2*). The NRLMG notes the ongoing application of the management procedure would increase customary Maori, amateur and commercial utilisation values. This is because the procedure would improve fishing opportunities for all sectors by increasing the stock from its current size.

61. "Rule 5" also provides responses to observed variations in stock abundance after the initial fixed TAC expires – the rule allows for minimum 10% or maximum 25% adjustments to the TAC in any one year. The NRLMG considers these responses will provide for greater variation in catch year-to-year than Option 1.

Credibility and Acceptance

62. Management procedures are simpler for people to understand than stock assessments. They therefore tend to attract more interest and support.
63. The CRA 3 Forum initiated the development of a CRA 3 Management Procedure. Therefore, the use of a management procedure to guide TAC setting in the CRA 3 fishery from April 2010 has a very high degree of acceptance and support among CRA 3 tangata whenua and fishing stakeholders. This acceptance and support for a management procedure approach is shared by the NRLMG.
64. Adopting either of the CRA 3 Management Procedures reduces the frequency of stock assessments and frees resources for other research.

OTHER MANAGEMENT ISSUES

65. *Consultation Paper 2* provides advice on TAC setting options for CRA 3 for the 2010-11 fishing year. If "Rule 2a" Management Procedure (Option 1) is adopted, its application would result in no change to the current CRA 3 TAC, whereas if the "Rule 5" Management Procedure (Option 2) is adopted, its application would result in a TAC decrease of 20 tonnes for CRA 3.

INITIAL POSITION

66. CRA 3 Working Group members and the NRLMG would like to adopt an approach to TAC setting that is more responsive to changes in observed abundance in the CRA 3 fishery than the current approach which relies on periodic stock assessments. Either of the proposed CRA 3 Management Procedures will serve in that regard. The NRLMG notes CRA 3 fishery issues have been challenging to resolve and an approach needs to be adopted that rebuilds the fishery to the benefit of all fishery participants.
67. However, sector members of both groups are divided on which of these two management procedure options should be adopted.

68. CRA 3 Working Group commercial representatives and one customary representative are in favour of Option 1: adopt the “Rule 2a” CRA 3 Management Procedure to guide TAC setting in CRA 3. They note CPUE information is showing an upwards trend and consider it would be premature to reduce the TAC (and the TACC) unnecessarily without further information on how CPUE will perform during the next few years. CRA 3 Working Group recreational representatives and one customary representative are in favour of Option 2: adopt the “Rule 5” CRA 3 Management Procedure to guide TAC setting in CRA 3. These representatives consider a TAC reduction in April 2010 would leave some fish in the water to ensure a rebuild of the fishery with greater safety, which may result in increased fishing opportunities for non-commercial fishers.
69. The NRLMG has a majority preference for the “Rule 2a” CRA 3 Management Procedure (Option 1). This is because some NRLMG members:
- a) consider a TAC reduction in 2010 (i.e., Rule 5) would be inconsistent with an observed increase in CRA 3 stock abundance, which is confirmed by increasing CRA 3 CPUE in recent years;
 - b) are less inclined to support “Rule 5” because, after the initial application of the procedure for 2010-11, it is unresponsive to observed changes in CRA 3 stock abundance until April 2012;
 - c) do not believe that achieving the rebuild to 90% one year earlier under “Rule 5” warrants the opportunity cost to the commercial industry of the initial TAC reduction; and
 - d) prefer smaller adjustments to the TAC (i.e., Rule 2a) than larger adjustments (i.e., Rule 5) because they would provide less variation in catch year-to-year.
70. The NRLMG emphasises that this position is provided as a basis for consultation with tangata whenua and stakeholders. All submissions received on the proposal will be considered and discussed in final advice to the Minister. A copy of the final advice will be made available to iwi and stakeholders who make a submission on the proposal following announcement of the Minister’s decision.

ATTACHMENT 1:

SPECIFICATIONS OF THE PROPOSED CRA 3 MANAGEMENT PROCEDURES

71. During 2009, the CRA 3 Working Group worked with the stock assessment scientists and the RLFAWG to develop a management procedure to guide TAC setting decisions for CRA 3 from 1 April 2010.
72. A large set of management procedure evaluations were made, using an operating model based on the CRA 3 assessment model (Breen *et al.* 2009). The CRA 3 assessment model was based on a generalised state-of-the-art lobster model (Haist *et al.* 2009). Of the thousands of rules developed, nine final rule candidates were presented to the CRA 3 Working Group for consideration.
73. The CRA 3 Working Group was unable to reach agreement on one rule option for use in the CRA 3 Management Procedure. The Group instead agreed on two final rule options, called Rule 2a and Rule 5, to be considered for use in the CRA 3 Management Procedure.

The “Rule 2a” CRA 3 Management Procedure

74. The “Rule 2a” CRA 3 Management Procedure is specified as follows:
 - a) A conditional initial fixed TAC applies for 3 years, set at the current CRA 3 TAC (293 tonnes), unless offset-year CPUE falls below 0.75 kg/potlift or increases above 1.08 kg/potlift;
 - b) The conditional initial fixed TAC will expire after the 2012-13 fishing year, or when offset-year CPUE used as input to the rule falls below 0.75 kg/potlift or increases above 1.08 kg/potlift, whichever comes sooner;
 - c) Offset-year CPUE is the standardised CPUE from the period 1 October through 30 September, calculated in November for input to the rule to determine the TAC for the next fishing year, beginning in the following April;
 - d) The management procedure is to be evaluated every year (no “latent year”), based on offset-year CPUE;
 - e) The provisional TAC (before minimum and maximum change rules operate, and exclusive of considering the initial fixed TAC) determined by the rule), is given by:

$$TAC'_{y+1} = 275 \left(\frac{I_y + 3}{4} \right)^3 \quad \text{for } 0 < I_y \leq 1 \text{ and}$$

$$TAC'_{y+1} = 275 \left(1 + \frac{0.5(I_y - 1)}{0.6} \right) \quad \text{for } I_y > 1$$

where TAC'_{y+1} is the provisional TAC result from the rule and I_y is the input offset-year CPUE.

- e) After the initial fixed TAC expires, if the procedure results in a TAC that does not change by more than 5%, no change will be made; and
 - f) After the initial fixed TAC expires, if the procedure results in a TAC that changes by more than 10%, the TAC will be changed by 10% only.
75. The relation between CPUE and provisional TAC (before minimum and maximum change limits operate, and ignoring the initial fixed TAC) is illustrated in *Figure A* for “Rule 2a”.

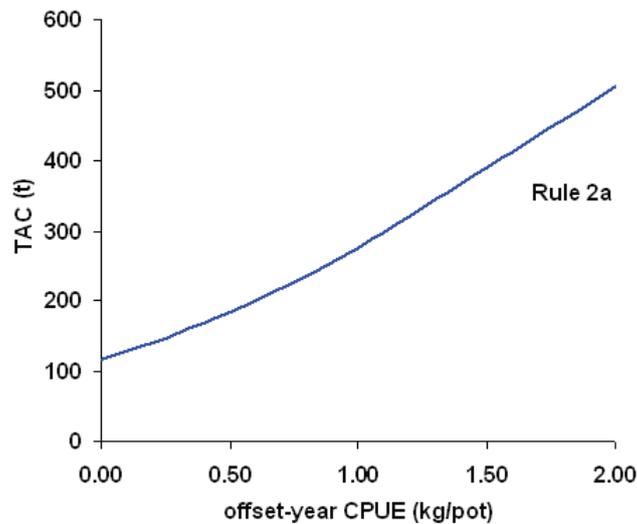


Figure A: The “Rule 2a” CRA 3 Management Procedure

The “Rule 5” CRA 3 Management Procedure

76. The “Rule 5” CRA 3 Management Procedure is specified as follows:
- a) An unconditional initial fixed TAC of 273 tonnes applies for 2 years (i.e., no response is proposed to the TAC even if CPUE declines or increases in 2010 or 2011);
 - b) The conditional initial fixed TAC will expire after the 2011-12 fishing year;

- c) Offset-year CPUE is the standardised CPUE from the period 1 October through 30 September, calculated in November for input to the rule to determine the TAC for the next fishing year, beginning in the following April;
- d) The management procedure is to be evaluated every year (no “latent year”) , based on offset-year CPUE;
- e) The provisional TAC (before minimum and maximum change rules operate, and exclusive of considering the initial fixed TAC) determined by the rule), is given by:

$$TAC'_{y+1} = 230 \left(\frac{I_y + 3}{3.9} \right)^{2.5} \quad \text{for } 0 < I_y \leq 0.9 \text{ and}$$

$$TAC'_{y+1} = 230 \left(1 + \frac{0.5(I_y - 0.9)}{0.4} \right) \quad \text{for } I_y > 0.9$$

where TAC'_{y+1} is the provisional TAC result from the rule and I_y is the input offset-year CPUE.

- f) After the initial fixed TAC expires, if the procedure results in a TAC that does not change by more than 10%, no change will be made; and
- g) After the initial fixed TAC expires, if the procedure results in a TAC that changes by more than 25%, the TAC will be changed by 25% only.

77. The relation between CPUE and suggested TAC (before minimum and maximum change limits operate, and ignoring any initial fixed TAC) is illustrated in *Figure B* for “Rule 5”.

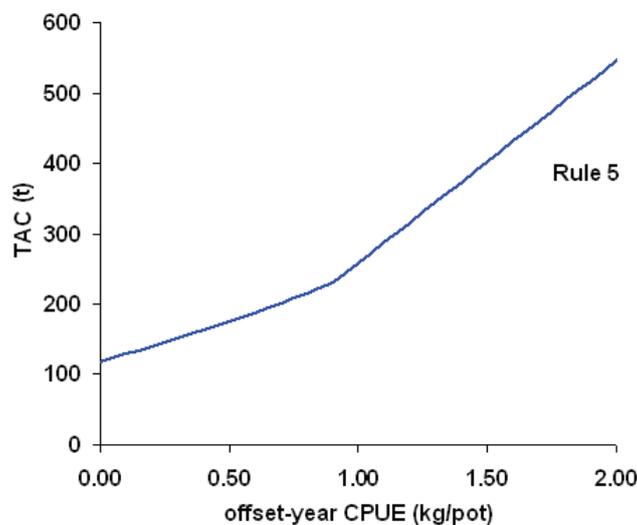


Figure B: The “Rule 5” CRA 3 Management Procedure

Comparative plots of "Rule 2a" and "Rule 5"

78. So that the CRA 3 Working Group, and other stakeholders, could compare rule options, calculations were made from each rule with the same sets of arbitrary hypothetical future CPUE values, from decreasing to static, to increasing very quickly. Three of these are shown in *Figure C* (CPUE decreasing by 0.05 per year), *Figure D* (increasing by 0.05 per year) and *Figure E* (increasing by 0.15 per year). Each figure shows the TACC (not TAC) that would result from the operation of the two rules under differing CPUE scenarios.
79. In reality, future CPUE will not be independent of the TAC. For example, setting a lower TAC would result in a higher CPUE the following year than would setting a higher TAC. Therefore the comparisons of the rule results shown here are somewhat artificial.

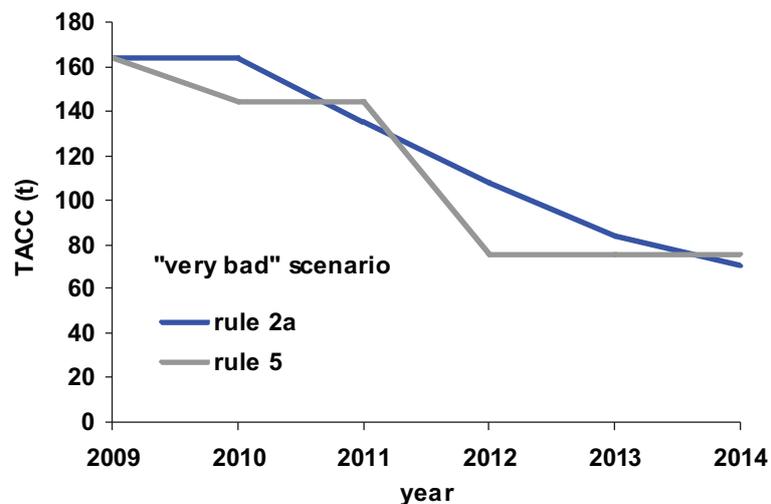


Figure C: TACCs set by the two rules from CPUE decreasing by 0.05 per year.

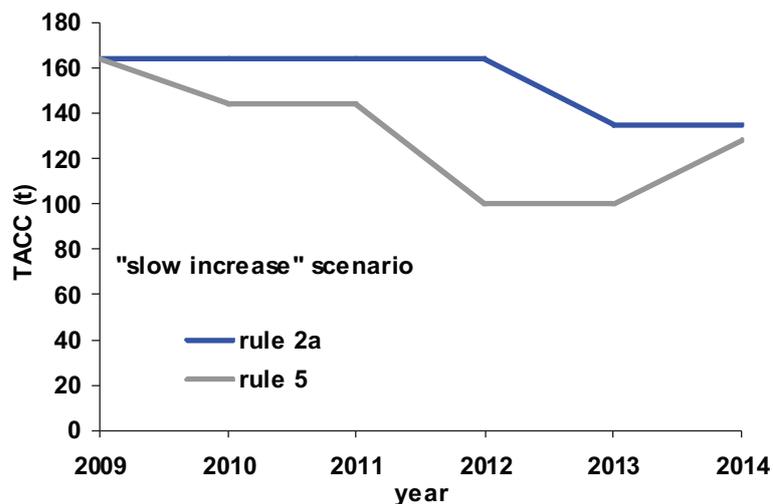


Figure D: TACCs set by the two rules from CPUE increasing by 0.05 per year.

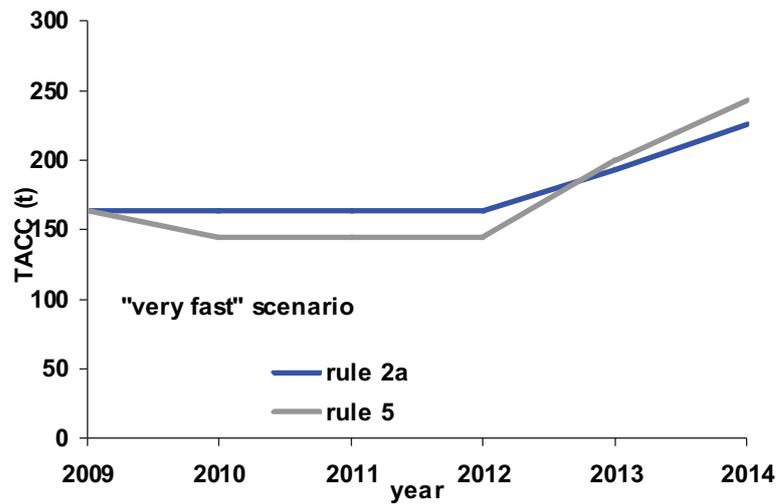


Figure E: TACCs set by the two rules from CPUE increasing by 0.15 per year.

Further Information

80. For further technical information on the Management Procedure Evaluations for CRA 3, please refer to:

Breen, P.A., V. Haist, P.J. Starr & T.H. Kendrick 2009. Development of a management procedure for the CRA 3 stock of rock lobsters (*Jasus edwardsii*). Final Research Report - CRA2006-01 Objective 4 – unpublished manuscript available from the Ministry of Fisheries, Wellington, New Zealand.

Haist, V., P.A. Breen & P.J. Starr 2009. A new multi-stock length-based assessment model for New Zealand rock lobsters (*Jasus edwardsii*). *New Zealand Journal of Marine and Freshwater Research* 43(1): 355-371.

ATTACHMENT 2:

STATUTORY CONSIDERATIONS

81. The following statutory considerations have been taken into account when forming the management options for CRA 3:

International Obligations and Treaty of Waitangi Settlement Act 1992 (s 5)

82. **Section 5** of the Act requires the Minister to act in a manner consistent with New Zealand's international obligations and Treaty of Waitangi (Fisheries Claims) Settlement Act 1992. To this end, the provisions of general international instruments such as UNCLOS and the Fish Stocks Agreement have been implemented through the provisions of the Act. The NRLMG is not aware of any specific international obligations relating to rock lobster fisheries that would be affected by the proposals.
83. The NRLMG considers the proposed options are consistent with the obligations relating to the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992. The NRLMG recognises that rock lobster (koura) is an important taonga species. The proposals seek to improve stock health and therefore improve fishing opportunities, for all sectors including commercial and customary Maori.
84. The NRLMG notes that some regional-level CRA 3 customary Maori interests have had opportunities to input into the development of the CRA 3 Management Procedures through membership of the CRA 3 Forum. The NRLMG hopes to receive more information and input in response to this consultation document.

Purpose of the Act (s 8)

85. **Section 8** of the Act describes the purpose of the Act as being to provide for the utilisation of fisheries resources while ensuring sustainability, and defines the meanings of utilisation and sustainability. The management options presented seek to achieve the purpose of the Act. The proposals seek to achieve sustainable TACs and take into account the respective costs of management versus utilisation benefits.

Environmental considerations (s 9)

86. **Section 9** of the Act prescribes three environmental principles that the Minister must take into account when exercising powers in relation to utilisation of fisheries resources and ensuring sustainability:
- a) **Section 9(a)** requires that associated or dependent species (i.e., those that are not harvested) should be maintained above a level that ensures their long-term viability. Potting and hand gathering fisheries have a relatively low level of by-catch and the

NRLMG is not aware of any interactions between the fisheries and non-harvested species of concern;

- b) **Section 9(b)** requires the maintenance of biological diversity of the aquatic environment be taken into account. The decision on whether to adopt a management procedure to guide TAC setting in CRA 3 does not directly impact on the long term viability and biological diversity of the aquatic environment in CRA 3. Analysis of the impact of a TAC reduction from application of the proposed “Rule 5” management procedure (Option 1) is undertaken in *Consultation Paper 2*; and
- c) **Section 9(c)** requires the protection of habitats of particular significance to fisheries management. The NRLMG is not aware of any such habitats that are affected by the CRA 3 fishery.

Information Principles (S 10)

- 87. **Section 10** of the Act sets out the information principles, which require that decisions be based on the best available information, taking into account any uncertainty in that information, and applying caution when information is uncertain, unreliable, or inadequate. In accordance with s 10, the absence of information should not be used as a reason to postpone, or fail to take, any measure to achieve the purpose of the Act, including providing for utilisation at levels considered to be sustainable.
- 88. A thorough review of available information has been undertaken by the NRLMG and the best available information has been used to evaluate the management options presented. The NRLMG has endeavoured to set out the relevant uncertainty in, and inadequacy of, that information so that the appropriate caution can be applied in assessing the proposed management options.

Sustainability Measures (s 11)

- 89. **Sections 11(1)(a), (b) and (c)** set out matters the Minister must take into account when varying the TAC for CRA 3, including any effects of fishing on any stock and the aquatic environment, any existing controls under the Act that apply to the stock or area concerned, and the natural variability of the stock. Such matters will be addressed directly in *Consultation Paper 2* that seeks quantum variations to the TAC as a result of application of the proposed “Rule 5” management procedure (Option 2). The NRLMG notes, however, that recruitment into rock lobster stocks is highly variable and that this variability is taken into account by stock assessment scientists when developing and testing management procedures for CRA 3. Existing controls under the Act are also considered during these processes.
- 90. **Sections 11(2)(a) and (b)** require the Minister to have regard to any provisions of any regional policy or plan under the Resource Management Act 1991 and any management strategy or plan under the Conservation Act 1997 that apply to the coastal marine area and are considered relevant when varying the TAC for CRA 3. The NRLMG is not aware of any such provisions that should be taken into account.

91. **Section 11(2A)(b)** requires the Minister to take account of any relevant and approved fisheries plans when varying the TAC in CRA 3. There is no approved fisheries plan in place for CRA 3.
92. **Sections 11(2A)(a) and (c)** require the Minister to take into account any conservation or fisheries service, or any decision not to require such services, when varying a TAC. The NRLMG is not aware of any proposed services that affect the CRA 3 stock. No decision has been made to not require such a service in CRA 3 at this time.

TAC Setting Considerations (s 13)

93. Rock lobster stocks are managed under Section 13 of the Act. Under s 13(2) the Minister must set a total allowable catch that:
- a) maintains the stock at or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks; or
 - b) enables the level of any stock whose current level is below that which can produce the maximum sustainable yield to be altered—
 - (i) in a way and at a rate that will result in the stock being restored to or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks; and
 - (ii) within a period appropriate to the stock, having regard to the biological characteristics of the stock and any environmental conditions affecting the stock; or]
 - c) enables the level of any stock whose current level is above that which can produce the maximum sustainable yield to be altered in a way and at a rate that will result in the stock moving towards or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks.

Before a TAC could be set under the above provisions the Minister must be provided with an estimate of both current biomass and the biomass that can produce the maximum sustainable yield (*Bmsy*). Current biomass estimates are available for CRA 3. A *Bmsy* estimate is also available but is considered unreliable and is not used. Instead, a reference biomass is used as a proxy for *Bmsy*. Where proxies are applied, Section 13 (2A) of the Act is used for TAC setting.

94. Section 13(2A) states that:
- (2A) For the purposes of setting a total allowable catch under this section, if the Minister considers that the current level of the stock or the level of the stock that can produce

the maximum sustainable yield is not able to be estimated reliably using the best available information, the Minister must—

- a) not use the absence of, or any uncertainty in, that information as a reason for postponing or failing to set a total allowable catch for the stock; and
- b) have regard to the interdependence of stocks, the biological characteristics of the stock, and any environmental conditions affecting the stock; and
- c) set a total allowable catch—
 - (i) using the best available information; and
 - (ii) that is not inconsistent with the objective of maintaining the stock at or above, or moving the stock towards or above, a level that can produce the maximum sustainable yield.

95. It is the NRLMG's view that the measures advanced in this paper meet the requirement of being "not inconsistent with the objective of maintaining the stock at or above, or moving the stock towards or above, a level that can produce the maximum sustainable yield."

96. In considering the way in which and rate at which a stock is moved towards or above a level that can produce maximum sustainable yield under subsection (2)(b) or (c), or (2A) (if applicable), the Minister shall have regard to such social, cultural, and economic factors as he or she considers relevant. The CRA 3 Management Procedures are rebuilding procedures and would act to move the stock quickly towards the target. The NRLMG notes that the procedures are expected to rebuild the stock size to the target level, *Bref*_{90%}, with high probability.

TACC Setting Considerations (s 20 and 21)

97. **Sections 20 and 21** specify a number of matters that must be taken into account when setting or varying a TACC. **Section 21** requires the Minister to allow for non-commercial Māori and amateur fishing interests, and other sources of fishing-related mortality when setting or varying the TACC. These allowances will be considered and provided for when quantum changes to the TAC are proposed (refer *Consultation Paper 2*).

98. **Section 21(4)** also requires that any mātaitai reserve or closures/restrictions under s 186A to facilitate customary Maori fishing be taken into account. No mātaitai reserves or s 186A closures are located within CRA 3.

99. **Section 21(5)** also requires that any regulations to prohibit fishing made under s 311 be taken into account when setting allowances for amateur fishing interests. The NRLMG is not aware of any restrictions under s 311 that have been placed on fishing in any area within CRA 3.

4. CATCH LIMIT REVIEWS FOR CRA 3, CRA 4 AND CRA 7 AS A RESULT OF OPERATION OF MANAGEMENT PROCEDURES

EXECUTIVE SUMMARY

100. The National Rock Lobster Management Group (NRLMG) proposes to vary the Total Allowable Catches (TACs) and allowances for CRA 3 (Gisborne), CRA 4 (Wellington/Hawkes Bay) and CRA 7 (Otago) rock lobster fisheries for the 2010-11 fishing year. The proposed variations are based on the operation of management procedures, and would be applied from 1 April 2010.
101. The CRA 3 TAC options presented are the result of the operation of the management procedures presented for consideration in *Consultation Paper 1*. The NRLMG has reviewed best available information and has found nothing that would warrant the Minister of Fisheries (the Minister) choosing not to be guided by one of the management procedures (Rule 2a or Rule 5) for the 2010-11 fishing year. Implementing procedure “Rule 2a” would result in an initial “fixed” TAC of 293 tonnes for the 2010-11 fishing year, whereas implementing “Rule 5” would result in a TAC decrease of 20 tonnes from 293 tonnes to 273 tonnes.
102. The proposed variation to the CRA 4 TAC is the result of the operation of a management procedure adopted by the Minister in March 2009 to guide TAC setting for this stock for the 2009-10, 2010-11 and 2011-12 fishing years. The NRLMG has reviewed best available information and has found nothing that would warrant the Minister choosing not to be guided by the procedure for 2010-11. Implementing the procedure would result in a TAC increase of 199.5 tonnes.
103. The proposed variation to the CRA 7 TAC is also the result of the operation of a management procedure adopted by the Minister in March 2008 to guide TAC setting for this stock. The NRLMG has reviewed best available information and has found nothing that would warrant the Minister choosing not to be guided by the procedure for 2010-11. Implementing the procedure would result in a TAC decrease of 104.5 tonnes.
104. An agreed management procedure has also been adopted for CRA 8. The operation of the CRA 8 Management Procedure in 2009 results in no change to the TAC. The calculation of the decision rule resulted in a 0.5% reduction, however, because this is less than the minimum change of 5%, there is no proposed change to the CRA 8 TAC for the 2010-11 fishing year.
105. The NRLMG propose that the various revised TACs for CRA 3, CRA 4 and CRA 7 be allocated as follows:
 - a) For CRA 3, if the “Rule 5” CRA 3 Management Procedure is adopted, the NRLMG recommends decreasing the Total Allowable Commercial Catch (TACC) only. If the TACC option for “Rule 5” is chosen, the NRLMG considers there is greater certainty of benefit to the stock associated with a reduction to the TACC as long as the catch reduction is not taken by other sectors.

- b) For CRA 4, the NRLMG recommends increasing the TACC only because the commercial sector received a significant reduction in catch in April 2009 while allowances to other sectors remained constant.
- c) For CRA 7, the NRLMG recommends decreasing the TACC only because the commercial sector received increases and decreases in the past while allowances to other sectors remained constant. The NRLMG considers reducing only the TACC provides greatest certainty that stock size will increase because catch from the commercial sector can be more directly controlled.

PURPOSE OF THIS PAPER

- 106. This paper sets out the NRLMG's initial advice on proposals to vary the TACs and allowances for CRA 3, CRA 4 and CRA 7 based on the operation of management procedures. It includes the best information currently available to the NRLMG to inform decision-making.
- 107. The purpose of this paper is to seek information and comments from tangata whenua, fishery stakeholders and other interested parties on the proposals.

TERMINOLOGY IN THIS PAPER

Management Procedures

- 108. A management procedure is a tool used to guide the setting of catch limits. A general description of management procedures is provided in *Consultation Paper 1*.

Sustainability Indicators (Bmsy, Bref, Bmin)

- 109. The NRLMG uses sustainability indicators to report on stock health and to evaluate the effectiveness of management options.
- 110. Three sustainability indicators are relevant to the evaluation of the proposals in this paper:
 - a) The statutory target stock size, **Bmsy**. Section 13 requires the Minister to set TACs for rock lobster stocks that move the stocks to, or maintain the stocks at, a level at or above the biomass that can produce the maximum sustainable yield (*Bmsy*), or that is not inconsistent with this objective. *Bmsy* is not straightforward to estimate and is often uncertain when estimated.
 - b) The proxy target stock size, **Bref**. When a *Bmsy* estimate is absent or unreliable, alternative and proxy targets are used. *Bref* is generally a stock size associated with a period in the fishery that showed good productivity and was demonstrably safe.

- c) The minimum stock size, ***Bmin***. *Bmin* is either the stock size associated with lowest abundance in the observed history of the fishery or $\frac{1}{2}$ *Bref*.
111. For all the stocks considered in this paper, stock size is measured in terms of the vulnerable biomass. “Vulnerable biomass” is the total quantity of lobsters available to the fishery (i.e., it does not include lobsters that cannot be harvested such as undersize lobsters and berried female lobsters).
112. The desired performance in relation to these sustainability indicators is:
- a) stock size fluctuates around the target (*Bref*) with at least 50% probability of achieving the target;
 - b) stock size remains above the minimum (*Bmin*) with 90% probability; and
 - c) spawning stock size remains above 20% of its unfished level.
113. Extensive simulation-testing based on operating models of the stocks and associated fisheries suggest that all the management procedures achieve the desired performance in relation to the sustainability indicators.
114. In October 2008, MFish released the Harvest Strategy standard for New Zealand fisheries (the HSS) that specifies performance standards for Quota Management System species. The NRLMG considers the management procedures previously agreed for CRA 4 and CRA 7, and proposed for CRA 3, are consistent with the HSS.
115. The Guidelines for Harvest Strategy Standards (MFish 2008) describe the *Bref* concept as follows: “Conceptual proxies for BMSY, FMSY and MSY are qualitative surrogates that can be used in the absence of adequate information to directly estimate these reference points themselves. The conceptual interpretation embraces the spirit and intent of section 13 of the Act. It can be used in cases where there is insufficient information to estimate BMSY, FMSY or MSY explicitly, or where such estimates may be unreliable because, for example, there is little or nothing known about the stock recruitment relationship. Conceptual BMSY: In cases where the relationship between CPUE and abundance can be assumed to be more or less proportional, or where some other form of relationship has been derived from data, it may be reasonable to select an appropriate historical period when both CPUE and catches were relatively high and to use this CPUE level as a target. *The best example in current use in New Zealand is that for rock lobster.*” [emphasis added]

SUMMARY OF PROPOSED MANAGEMENT OPTIONS

116. Tables 1 and 2 set out the variations to TACs and allowances in rock lobster fisheries proposed for the 2010-11 fishing year beginning 1 April 2010.
117. The NRLMG is seeking comments on the following proposed TACs and allowances for CRA 3:

CRA 3	Option 1 2010-11 Catch Limits from Operation of the "Rule 2a" CRA 3 Management Procedure (No Change to Current Catch Limits)	Option 2 2010-11 Catch Limits from Operation of the "Rule 5" CRA 3 Management Procedure
TAC	293 tonnes	273 tonnes
TACC	164 tonnes	144 tonnes
Customary Allowance	20 tonnes	<i>Unchanged</i>
Recreational Allowance	20 tonnes	<i>Unchanged</i>
Other Fishing Mortality	89 tonnes	<i>Unchanged</i>

Table 1: TAC and Allowance Options for CRA 3.

118. The NRLMG is seeking comments on the following proposed TAC and TACC variations for CRA 4 and CRA 7:

Stock		Option 1 Adopt Catch Limits from Operation of Management Procedures	Option 2 Retain Current Catch Limits
CRA 4	TAC	660.5 tonnes	461 tonnes
	TACC	465.5 tonnes	266 tonnes
	Customary Allowance	<i>Unchanged</i>	35 tonnes
	Recreational Allowance	<i>Unchanged</i>	85 tonnes
	Other Fishing Mortality	<i>Unchanged</i>	75 tonnes
CRA 7	TAC	104.5 tonnes	209 tonnes
	TACC	84.5 tonnes	189 tonnes
	Customary Allowance	<i>Unchanged</i>	10 tonnes
	Recreational Allowance	<i>Unchanged</i>	5 tonnes
	Other Fishing Mortality	<i>Unchanged</i>	5 tonnes

Table 2: TAC and Allowance Options for CRA 4 and CRA 7.

OPERATION OF MANAGEMENT PROCEDURES FOR THE 2010-11 FISHING YEAR

119. Three agreed (CRA 4, CRA 7 and CRA 8) and two alternative proposed (CRA 3) management procedures have been operated to guide TAC setting for the 2010-11 fishing year.
120. Operation of the CRA 8 management procedure resulted in no proposed changes to the CRA 8 TAC for 2010-11 (refer to *Attachment 3* for a detailed description of the CRA 8 Management Procedure).
121. The NRLMG believes that implementing the catch limits generated by the management procedures is consistent with the Fisheries Act 1996 (the Act). In all cases, operation of the relevant management procedure results in a TAC that will move the stock to a level at or above *B_{msy}* (or the accepted proxy), in a way and rate considered appropriate for the stock given, interdependence of stocks, biological characteristics and any environmental factors affecting the stock, and social, cultural and economic factors.
122. The Minister may, of course, choose any alternative TAC within the range consulted on. However, the NRLMG considers that there is considerable benefit in consistent implementation of TACs generated by agreed management procedures. Such an approach provides certainty to stakeholders over management actions, reduces conflict over management decision-making and meets legislative obligations.

CRA 3 (GISBORNE ROCK LOBSTER FISHERY)

Summary of Management Options and Rationale for CRA 3

123. The management options for CRA 3 are summarised in *Table 1* above. Two alternative options for TAC setting are being proposed, based on two different management procedures proposed for the CRA 3 fishery. Both of the rules meet sustainability criteria by moving the stock towards the target, *B_{ref90%}*, and maintaining stock size above *B_{min}* with high probability. The key difference between the rules is the way and the rate at which they move the stock to the agreed target level.
124. It is proposed that the Minister will be guided on the TAC option by his decision on a preferred management procedure (refer *Consultation Paper 1*). If the Minister adopts the “Rule 2a” CRA 3 Management Procedure no change to the CRA 3 TAC is proposed for 2010-11, whereas if the Minister adopts the “Rule 5” CRA 3 Management Procedure it is proposed that the CRA 3 TAC will be reduced by 6.8 % for 2010-11.
125. If the Minister chooses not to adopt one of the two CRA 3 Management Procedures proposed in *Consultation Paper 1*, periodic stock assessments (which are relatively infrequent due to resource constraints) would continue to guide TAC setting for CRA 3. A revised stock assessment was not completed in 2009, therefore there is no clear alternative basis for recommending alternative TAC setting options for CRA 3 in the 2010-11 fishing year.

126. Should the Minister not support either management procedure, the NRLMG recommends that the Minister either:
- a) adopt the 20 tonne TAC reduction as specified by the “Rule 5” Management Procedure; or
 - b) make no change to the CRA 3 TAC for the 2010-11 fishing year; and
 - c) that he request further work to be commissioned during 2010 to support consideration of alternative management measures for CRA 3 for the 2011-12 fishing year.

Option 1 – Maintain the current TAC and allowances for CRA 3 (Status quo)

127. Under Option 1, the current CRA 3 TAC and allowances would be retained for the 2010-11 fishing year (refer *Table 1*).
128. This proposal results from the operation of the proposed “Rule 2a” CRA 3 Management Procedure (refer *Consultation Paper 1*). The operation of this CRA 3 Management Procedure is based on best available information to guide TAC setting for the CRA 3 fishery in the 2010-11 fishing year using extensive simulation-testing based on an operating model that represents the CRA 3 stock and associated fishery.

Option 2 – Set the CRA 3 TAC using the “Rule 5” CRA 3 Management Procedure

129. Under Option 2, the TAC for CRA 3 would be reduced from 293 tonnes to 273 tonnes from 1 April 2010 (refer *Table 1*). The NRLMG proposes the following allocations of the TAC:
- a) Reduce the TACC from 164 tonnes to 144 tonnes only; and
 - b) Retain the current allowances for customary Maori, amateur and other fishing mortality.
130. However, the Minister may, of course, choose an alternative catch allocation of the TAC. Feedback from tangata whenua and stakeholders on alternative catch allocations for Option 2 is welcomed by the NRLMG.
131. This TAC proposal results from the operation of the proposed “Rule 5” CRA 3 Management Procedure (refer *Consultation Paper 1*). The operation of this CRA 3 Management Procedure is based on best available information to guide TAC setting for the CRA 3 fishery in the 2010-11 fishing year using extensive simulation-testing based on an operating model that represents the CRA 3 stock and associated fishery.

Assessment of Management Options for CRA 3

132. Assessment of the management options against statutory criteria is set out and discussed in *Attachment 1* to this consultation paper. Key considerations and impacts are discussed below.

CRA 3 Sustainability Indicators and Stock Status

133. A *Bmsy* reference point was calculated for CRA 3 in 2008. The *Bmsy* calculation was sensitive to the period chosen to represent mean recruitment, which varies substantially over the period for which estimates are available; which in turn caused uncertainty in *Bmsy*. The NRLMG and MFish Plenary therefore considered this *Bmsy* estimate unreliable for use as a target stock size for this stock.
134. A *Bmsy* proxy target, *Bref*, was agreed by the Rock Lobster Fisheries Assessment Working Group (RLFAWG) in 2009 as the management procedure target because it could be estimated with greater reliability and described a period when the stock was considered to be healthy. This target stock size is the autumn-winter (April through September) vulnerable stock size associated with the reference period 1974-79. CRA 3 stakeholders collectively agreed on this target level because 1974-79 was a period when the stock showed good productivity and was demonstrably safe, having gone below this level and then recovered.
135. *Bref*₁₉₇₄₋₇₉ needed further adjustment because growth had changed significantly since 1974-79 (as demonstrated in the 2008 assessment) and the target stock size needed to reflect the current growth rate, legal size and escape gap regulations. A technical procedure based on fishing mortality rates was used to adjust *Bref*₁₉₇₄₋₇₉ to reflect these changes. This adjustment procedure has been reviewed and accepted by the RLFAWG.
136. The RLFAWG then agreed that the CRA 3 Management Procedure rules should be evaluated against 90% of the *adjusted Bref* (called *Bref*_{90%} hereafter), to address the potential that a 'regime shift' resulting in lower productivity may have occurred and that reference points based on historically higher productivity may be inappropriate if recruitment were to continue at this historically low level. The CPUE associated with the *Bref*_{90%} is a standardised autumn-winter CPUE of 1.14 kg/potlift.
137. *Bmin* for CRA 3 is the stock size associated with lowest abundance in the observed history of the fishery. The CRA 3 stock has previously recovered from this low point.
138. A stock assessment was last undertaken for CRA 3 in 2008¹. The 2008 stock assessment results indicated that stock size was just above *Bmin* and well below its target level. Under 2007 catches and recent recruitments, the 2008 assessment predicted a 75% probability that stock size would decline over the four years up to 2012.

¹ The updated 2008 stock assessment model provided the basis for the operating model which was used to conduct management procedure evaluations for CRA 3.

139. On the basis of this assessment, the Minister reduced the CRA 3 TAC from 319 tonnes to 293 tonnes, from April 2009.
140. CPUE is considered to be a reliable indicator of relative stock size in CRA 3. The NRLMG notes that, based on recent CPUE information, stock size may have increased more than predicted by the 2008 stock assessment model. Autumn-winter CPUE increased from 0.60 kg/potlift in 2007 to 0.68 in 2008, and then to 0.94 kg/potlift in 2009. Offset year (1 October to 30 September) CPUE also increased from 0.59 kg/potlift in 2007 to 0.63 in 2008, and then to 0.80 kg/potlift in 2009. CPUE is still below the CPUE associated with *Bref90%* - a standardised autumn-winter CPUE of 1.14 kg/potlift.
141. There is considerable uncertainty with respect to the level of current recruitment and some uncertainty with respect to current growth rates in CRA 3. As noted above, two adjustments to the *Bref* target have been made to address the potential that slow growth and low recruitments will persist into the future. These adjustments will be reviewed at the time of future stock assessments and management procedure reviews. The model's estimated recruitment in CRA 3 shows a declining trend since 1979, with a lot of short-term volatility. The cause is not known, but larval settlement also shows a declining trend since 1991 with much short-term volatility. The cause of slow growth seen in the tag-recapture data from 1996-2008 compared to earlier data is also unknown: it does not appear to relate to density of the stock or handling of lobsters, nor is it present in adjacent rock lobster fisheries, CRA 2 and CRA 4. The base case model used to evaluate rules therefore has low stock productivity, caused by assuming that the low recruitments in the last 10 years will persist into the future as will the slow growth observed from 1996-2008. These assumptions result in a level of productivity that may not be able to sustain future catches as high as historical catches.
142. The stock assessment was not updated for CRA 3 in 2009 except that the model was updated from recent data for use as the operating model to test management procedures.

Assessment of Option 1 – Maintain the current TAC and allowances for CRA 3 (Status quo)

Sustainability

143. Under Option 1, it is proposed that the current CRA 3 TAC of 293 tonnes will be retained for the 2010-11 fishing year. The NRLMG considers this to be consistent with the Minister's statutory obligation to rebuild a stock that is below *Bmsy* or an agreed proxy target (i.e., *Bref90%*).
144. The proposed maintenance of the TAC at the current level is specified by the "Rule 2a" CRA 3 Management Procedure. The NRLMG notes that ongoing application of the management procedure is expected to meet sustainability criteria by moving the stock towards the target, *Bref90%*, and maintaining stock size above *Bmin* with high probability
145. Retaining the TAC may result in stock size increasing to *Bref90%* at a slightly slower rate than under Option 2. On average, "Rule 2a" rebuilds the stock to *Bref90%* by 2016 compared to Option 2, which rebuilds the stock to *Bref90%* by 2015.

146. The NRLMG notes that an observed increase in the autumn-winter CPUE between 2008 and 2009 suggests that the CRA 3 stock size may have increased more than predicted by the 2008 stock assessment and considers that retaining the current TAC for 2010-11 does not pose a risk to stock sustainability for CRA 3 and will likely enable the stock to increase in size towards *Bref90%*.

Utilisation & Value

147. Retaining the CRA 3 TAC and allowances maintains the current utilisation value of the fishery. Option 1 would therefore have the least short-term impact on commercial stakeholders.
148. Ongoing application of the “Rule 2a” Management Procedure would increase customary Maori, recreational and commercial utilisation values. This is because the procedure would improve fishing opportunities for all sectors by increasing the stock from its current size.
149. “Rule 2a” also specifies responses to observed variations in stock abundance after the initial period of fixed TAC expires in 2012-13 or if CPUE falls below 0.75 kg/potlift or increases above 1.08 kg/potlift before this year. The NRLMG notes that these responses, along with the lower values for minimum and maximum change associated with the rule, will provide for greater stability in catch than Option 2.

Assessment of Option 2 – Set the CRA 3 TAC using the “Rule 5” CRA 3 Management Procedure

Sustainability

150. Under Option 2, it is proposed that the CRA 3 TAC will be reduced from 293 tonnes to 273 tonnes from 1 April 2010. The NRLMG considers this reduction to be consistent with the Minister’s statutory obligation to rebuild a stock that is below *Bmsy* or the agreed proxy target (i.e., *Bref90%*).
151. The proposed reduction in TAC is specified by the proposed “Rule 5” CRA 3 Management Procedure. Ongoing application of the management procedure is expected to meet sustainability criteria by moving the stock towards the target, *Bref90%*, and maintaining stock size above *Bmin* with high probability
152. The proposed TAC reduction, under this option, may result in stock size increasing to *Bref90%* at a slightly faster rate than under Option 1 (which maintains the *status quo* if CPUE remains above 0.75kg/potlift). On average, “Rule 5” rebuilds the stock to *Bref90%* in 2015 compared to Option 1, which rebuilds the stock to *Bref90%* in 2016.
153. The NRLMG notes that the autumn-winter CPUE has increased between 2008 and 2009, which may indicate that the stock is rebuilding under the current TAC and that the difference in the rate of rebuild by one year sooner under this option, is small.

Utilisation & Value

154. Decreasing the CRA 3 TAC would reduce the current utilisation value of the fishery.
155. The NRLMG proposes reducing the CRA 3 TACC only from 164 tonnes to 144 tonnes. If this TACC option is chosen, the NRLMG considers there is greater certainty of benefit to the stock associated with a reduction to the TACC as long as the catch reduction is not taken by other sectors. This is because catch from the commercial sector can be more directly controlled.
156. The NRLMG proposes no change to the current allowances for customary Maori and recreational because best available information suggests they are not taking their current allowances and there is no new information available to recommend adjustments to the current allowances. The NRLMG notes information on customary Maori and recreational harvest is scarce and uncertain (although information on customary catch is improving).
157. This option is expected to provide greater variation in catch year-to-year than Option 1 because "Rule 5" allows for minimum 10% or maximum 25% adjustments to the TAC after the initial fixed two year TAC expires for the 2011-12 fishing year compared to a minimum 5% and maximum 10% adjustment for Option 2.
158. As with Rule 2a, ongoing application of the Rule 5 CRA 3 Management Procedure would increase customary Maori, amateur and commercial utilisation values. This is because the procedure will improve fishing opportunities for all sectors by increasing the stock from its current size.
159. Using 2009 landing price information (which is based on average port price paid to fishers), the 20 tonne decrease in commercial catch of rock lobster would result in approximately \$1.04 million loss in revenue for the commercial industry. In the 2008-09 fishing year, the CRA 3 ACE price was \$17,818.70 per tonne. The ACE price represents the price commercial fishers are willing to pay for the right to harvest rock lobster in CRA 3. Using 2008-09 ACE price information, the proposed 20 tonne decrease in TACC could potentially result in a net economic loss of approximately \$360 K to CRA 3 quota share owners.

Option 1 & Option 2 – Credibility and Acceptance

160. Management procedures can be simpler for stakeholders to understand than stock assessments. They therefore tend to attract more interest and greater support.
161. The CRA 3 Multi-stakeholder Fishing Forum (CRA 3 Forum) initiated the development of a CRA 3 Management Procedure. Therefore, the use of a management procedure to guide TAC setting in the CRA 3 fishery from April 2010 has a high degree of acceptance and support among CRA 3 tangata whenua and fishing stakeholders. This acceptance and support for a management procedure approach is shared by the NRLMG.
162. Adopting either of the CRA 3 Management Procedures reduces the frequency of stock assessments and frees resources for other research.

Initial Position on CRA 3

163. The CRA 3 Working Group (a smaller group of CRA 3 Forum representatives) and the NRLMG attempted to reach consensus on a single preferred CRA 3 Management Procedure option to guide TAC setting from April 2010. However, sector members from both groups are divided on which option to support:
- a) CRA 3 Working Group commercial representatives and one customary representative are in favour of Option 1: maintain the current TAC and allowances for CRA 3. The proposed retention in TAC is specified by the “Rule 2a” CRA 3 Management Procedure.
 - b) CRA 3 Working Group recreational representatives and one customary representative are in favour of Option 2: set the CRA 3 TAC and allowances using the “Rule 5” CRA 3 Management Procedure. They did not however have a preferred allocation of the reduced TAC.
 - c) The NRLMG has a majority preference for Option 1 (Rule 2a).
164. The NRLMG has identified no reason why the Minister should not use the results of a Management Procedure to guide statutory TAC setting decisions for CRA 3. It is recommended that the Minister adopt a CRA 3 Management Procedure based on the available information and the evaluations set out in *Consultation Paper 1*, and then choose the TAC setting option that corresponds to the adopted CRA 3 Management Procedure in this *Consultation Paper*.

CRA 4 (WELLINGTON/HAWKES BAY ROCK LOBSTER FISHERY)

Summary of Management Options and Rationale for CRA 4

165. The management options for CRA 4 are summarised in *Table 2, Page 33*. Two alternative options for TAC setting are being proposed: vary the CRA 4 TAC based on the operation of the CRA 4 Management Procedure, or maintain the current TAC and allowances for CRA 4.

Option 1 – Vary the CRA 4 TAC and TACC based on the operation of the CRA 4 Management Procedure

166. Under Option 1, the TAC for CRA 4 would increase from 461 tonnes to 660.5 tonnes from 1 April 2010. The NRLMG proposes the following allocation of the TAC:

- a) Increase the TACC from 266 tonnes to 465.5 tonnes (as specified by the CRA 4 Management Procedure); and
- b) Retain the current allowances for customary Maori, amateur and other fishing mortality.

167. The CRA 4 Management Procedure was adopted by the Minister in March 2009 to guide TAC setting in CRA 4 for the 2009-10, 2010-11 and 2011-12 fishing years. During 2011, the management procedure will be reviewed.

168. The procedure is described in detail in *Attachment 2* to this consultation paper.

Option 2 – Maintain the current TAC and allowances for CRA 4

169. Under Option 2, the current CRA 4 TAC and allowances would be retained for the 2010-11 fishing year (refer *Table 2, Page 33*).

170. If the Minister chooses not to use the CRA 4 Management Procedure to guide TAC setting for CRA 4 from 1 April 2010, there is no clear basis for recommending alternative TAC options for CRA 4 in the 2010-11 fishing year. A stock assessment was last performed for CRA 4 in 2005; consequently, under Option 2, the management approach to CRA 4 TAC setting would need to be revised in 2010.

Assessment of Management Options for CRA 4

171. Assessment of the management options against statutory criteria is set out and discussed in *Attachment 1* to this consultation paper. Key considerations and impacts are discussed below.

CRA 4 Sustainability Indicators and Stock Status

172. No reliable estimate of B_{msy} is currently available for CRA 4. The MFish Plenary has agreed a B_{msy} proxy target, B_{ref} , which is the autumn-winter vulnerable stock size associated with the period 1979-88. 1979-88 was a period when the CRA 4 stock showed good productivity and was demonstrably safe: it subsequently declined to lower levels then recovered.
173. B_{min} for CRA 4 is defined as the autumn-winter vulnerable stock size associated with the lowest observed abundance in the CRA 4 fishery.
174. A stock assessment was last performed for CRA 4 in 2005². The 2005 stock assessment results indicated stock size in 2004-05 was well above B_{min} and B_{ref} . The median expectation was that stock size would decline slightly over the subsequent three years but would remain above B_{ref} . Uncertainty around these median projections was very high.
175. Standardised CPUE is considered to be a reliable indicator of relative stock size in CRA 4 and is the abundance indicator used in the CRA 4 Management Procedure. Standardised autumn-winter CPUE has increased in the last three fishing years to 0.871kg/potlift (refer *Figure 1*).

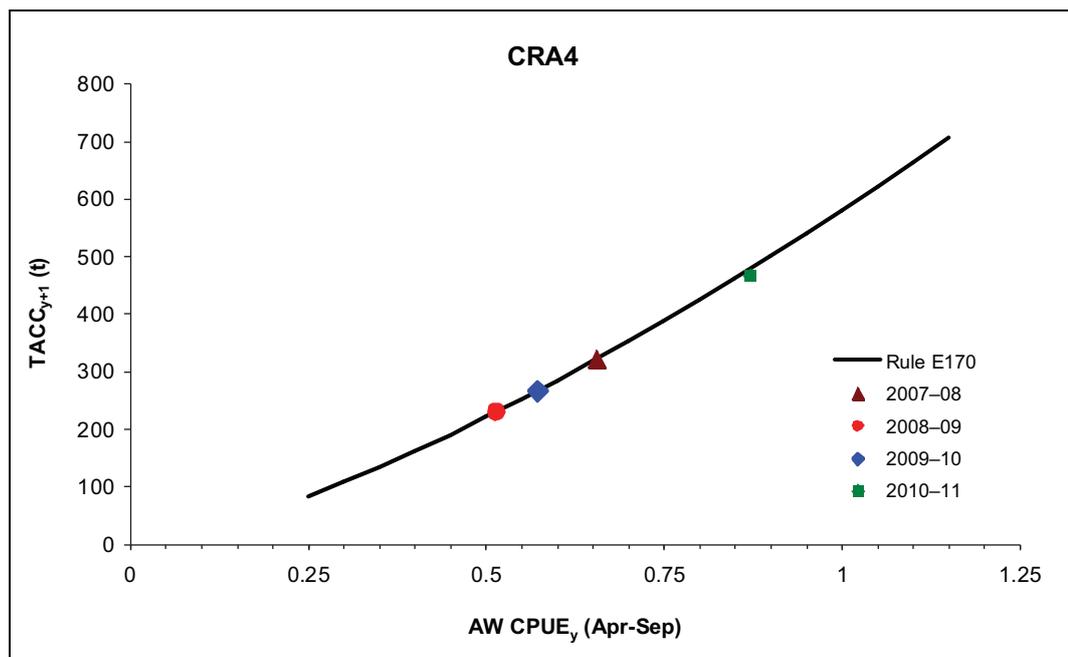


Figure 1: **Graphic representation of the CRA 4 management procedure. Catch limits in the next fishing year are a function of CPUE in the current year. For example, the catch limit generated for the 2010-11 fishing year is based on autumn-winter CPUE from the 2009-10 fishing year (0.871 kg/potlift). The CPUE values that generated the catch limit proposals for the 2007-08, 2008-09, 2009-10 fishing years are also shown.**

² The 2005 stock assessment model provided a basis for the operating model which was used to conduct management procedure evaluations for CRA 4.

176. CRA 4 commercial stakeholders operated the CRA 4 Management Procedure in 2007 and 2008 to guide voluntary commercial catch reductions with the express purpose of halting declining abundance to ensure the ongoing economic viability of the fishery. The Minister formally adopted the management procedure in March 2009, to guide the setting of the TAC and TACC in CRA 4. Based on the operation of the management procedure, the Minister reduced the CRA 4 TAC from 771 tonnes to 460 tonnes, and set a TACC of 266 tonnes from 1 April 2009.

Assessment of Option 1 – Vary the CRA 4 TAC and TACC based on Operation of the CRA 4 Management Procedure

Sustainability

177. Under Option 1, it is proposed that the CRA 4 TAC will increase from 461 tonnes to 660.5 tonnes from 1 April 2010. The NRLMG considers this increase is consistent with the Minister's statutory obligations to maintain the stock size at or above *Bmsy* or an agreed proxy target (i.e., *Bref*).
178. The proposed increase in TAC is specified by the CRA 4 Management Procedure. Ongoing application of the management procedure is expected to meet sustainability criteria by maintaining stock size above *Bmin* and *Bref* with high probability.

Utilisation & Value

179. Increasing the CRA 4 TAC would increase the current utilisation value of the fishery.
180. The NRLMG proposes allocating the full TAC increase only to the commercial sector because in 2009-10 the commercial sector received a significant reduction in commercial catch (54% decrease) while allowances to other sectors remained constant. The NRLMG notes, however, that the Zone 5 Big Game Fishing Council Clubs (Zone 5 encompasses the CRA 4 area) have implemented a voluntary bag limit reduction over the last two years (from 6 lobsters per person per day to 4) to support efforts to increase abundance in the fishery.
181. The proposed TACC increase from 266 tonnes to 465.5 tonnes does not exceed the level in place before the 2009-10 TACC reduction; therefore it is reasonable for the commercial sector to receive the full benefit of this TACC increase up to the point of the historical catch level (the previous TACC was 577 tonnes).
182. The NRLMG proposes no change to the current allowances for customary Maori and recreational because best available information suggests they are not taking their current allowances and there is no new information available to recommend adjustments to the current allowances. Zone 5 fishing clubs may wish to review their voluntary bag limit reduction, however. The NRLMG notes information on customary Maori and recreational harvest is scarce and uncertain (although information on customary catch is improving).
183. Ongoing application of the CRA 4 Management Procedure is designed to maintain stock size well above the target stock size and consequently meet customary Maori, recreational and

commercial utilisation values over time. This is because the management procedure will improve fishing opportunities for all sectors by increasing the stock size.

184. Using 2009 landing price information (which is based on average port price paid to fishers), the 199.5 tonne increase in commercial catch of rock lobster would result in approximately \$10.4 million increase in revenue for the commercial industry. In the 2008-09 fishing year, the CRA 4 ACE price was \$22,997.30 per tonne; the ACE price represents the price commercial fishers are willing to pay for the right to harvest rock lobster in CRA 4. Using 2008-09 ACE price information, the proposed 199.5 tonne increase in TACC could potentially result in a net economic benefit of approximately \$4.6 million to CRA 4 quota share owners.

Credibility and Acceptance

185. The NRLMG believes that choosing to implement the results of an agreed management procedure increases stakeholder confidence in the application of management procedures for other rock lobster fisheries.
186. CRA 4 commercial stakeholders support statutory TAC and TACC increases for the 2010-11 fishing year (as guided by the CRA 4 Management Procedure).

Assessment of Option 2 – Maintain the current TAC and allowances for CRA 4

Sustainability

187. Under Option 2, it is proposed that the CRA 4 TAC would be retained at 461 tonnes for the 2010-11 fishing year. Retaining the current TAC for CRA 4 would likely result in the stock increasing at a faster rate than under Option 1. This would not pose a risk to sustainable utilisation.

Utilisation & Value

188. Retaining the current TAC and allowances for CRA 4 would constrain utilisation in the commercial fishery and result in an opportunity cost of \$13.7 million in export revenue for New Zealand and approximately \$4.6 million in net economic benefits to CRA 4 ACE/quota holders. However, this would likely result in increased catch rates in the CRA 4 non-commercial fisheries and would also likely result in increased CPUE for commercial fishers compared to those under Option 1.

Credibility & Acceptance

189. The NRLMG believes that choosing not to implement the results of an agreed management procedure without an explicit reason would reduce stakeholder confidence in the application of management procedures for this and other rock lobster fisheries. Such a decision would also affect development and implementation of management procedures for other fisheries in New Zealand.

NRLMG Initial Position on CRA 4

190. Based on the available information and the evaluation set out above, the NRLMG's initial position is in favour of Option 1: increase the TAC for CRA 4 and allocate the increased catch to the TACC only.

191. The NRLMG has identified no reason why the Minister should not use the results of the previously agreed CRA 4 Management Procedure to guide statutory TAC setting decisions.

CRA 7 (OTAGO ROCK LOBSTER FISHERY)

Summary of Management Options and Rationale for CRA 7

192. The management options for CRA 7 are summarised in *Table 2, Page 33*. Two alternative options for TAC setting are being proposed: vary the CRA 7 TAC based on the operation of the CRA 7 Management Procedure, and maintain the current TAC and allowances for CRA 7.

Option 1 – Vary the CRA 7 TAC based on the operation of the CRA 7 Management Procedure

193. Under Option 1, the TAC for CRA 7 would reduce from 209 tonnes to 104.5 tonnes from 1 April 2010, as specified by the CRA 7 Management Procedure. The NRLMG proposes the following allocation of the TAC:

- a) Decrease the TACC from 189 tonnes to 84.5 tonnes; and
- b) Retain the current allowances for customary Maori, amateur and other fishing mortality.

194. The CRA 7 Management Procedure was adopted by the Minister in March 2008 to guide TAC setting in CRA 7. It is proposed that the CRA 7 Management Procedure will be reviewed during 2012.

195. The procedure is described in detail in *Attachment 3* to this consultation paper. The NRLMG notes that the operation of the CRA 7 Management Procedure in 2009 actually delivered a specified TAC of 80.3 tonnes. This would represent a decrease of 61.6%. However, since the maximum change allowed under the rule is +/- 50%, the proposed CRA 7 TAC for 2010-11 is 104.5 tonnes.

Option 2 – Maintain the current TAC and allowances for CRA 7

196. Under Option 2, the current CRA 7 TAC and allowances would be retained for the 2010-11 fishing year (refer *Table 2, Page 33*).

197. If the Minister chooses not to use the CRA 7 Management Procedure to guide TAC setting for CRA 7 from 1 April 2010, the NRLMG recommends that the Minister either:

- a) adopt the 104.5 tonne TAC reduction as specified by the CRA 7 Management Procedure; or
- b) make no change to the CRA 7 TAC for the 2010-11 fishing year; and

- c) that he request further work to be commissioned during 2010 to support consideration of alternative management measures for CRA 7 for the 2011-12 fishing year.

Assessment of Management Options for CRA 7

198. Assessment of the management options against statutory criteria is set out and discussed in *Attachment 1* to this consultation paper. Key considerations and impacts are discussed below.

CRA 7 Sustainability Indicators and Stock Status

199. No reliable estimate of B_{msy} is currently available for CRA 7. The MFish Plenary selected a B_{msy} proxy target, B_{ref} , which is the vulnerable stock size associated with the period 1979-81. 1979-81 was a period when the CRA 7 stock showed good productivity and was demonstrably safe. B_{ref} represents a larger stock size than the uncertain B_{msy} estimate and therefore is a more conservative target stock size.
200. The B_{min} used for stock assessment and management procedure evaluation was considered to be one half of B_{ref} .
201. A stock assessment was last performed for CRA 7 in 2006³. The 2006 stock assessment results indicated stock size in 2005-06 was well above B_{min} and was approximately 1.7 times B_{ref} .
202. Standardised CPUE is the abundance indicator used in the CRA 7 Management Procedure. Standardised offset year CPUE decreased in the last year to 0.803 kg/potlift (refer *Figure 2*).

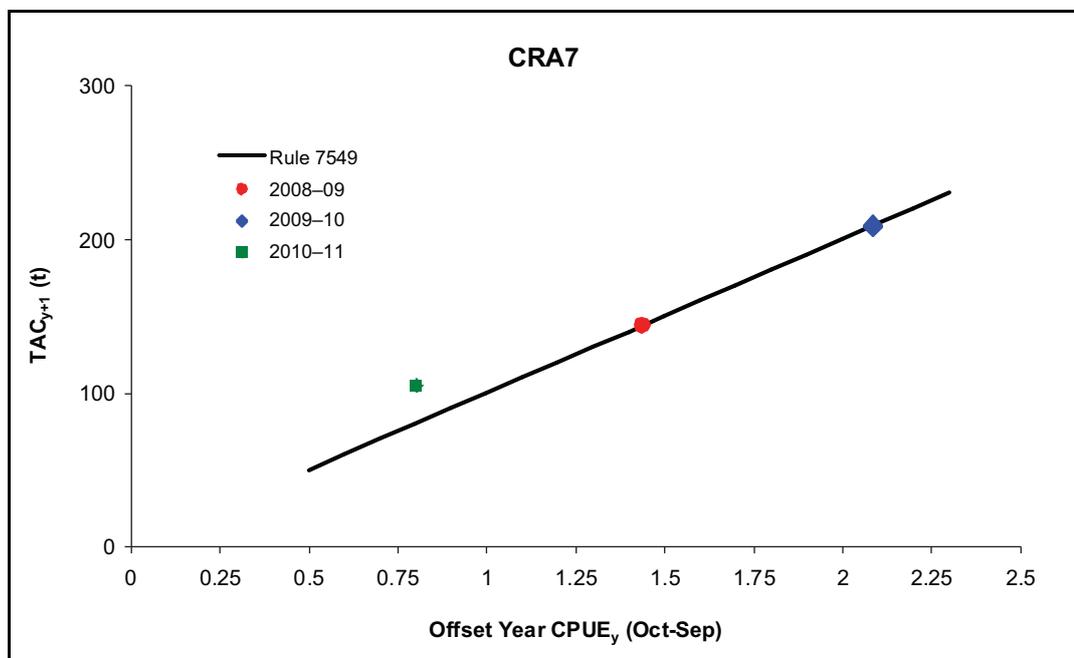


Figure 2: Graphic representation of the CRA 7 management procedure. Catch limits in the next fishing

³ The 2006 stock assessment model provided a basis for the operating model which was used to conduct management procedure evaluations for CRA 7.

year are a function of CPUE in the current year. For example, the catch limit generated for the 2010-11 fishing year is based on offset year CPUE from the period 1 October 2008 to 30 September 2009 (0.803 kg/potlift). The CPUE values that generated the catch limit proposals for the 2008-09 and 2009-10 fishing years are also shown.

Assessment of Option 1 – Vary the CRA 7 TAC based on Operation of the CRA 7 Management Procedure

Sustainability

203. Under Option 1, it is proposed that the CRA 7 TAC will decrease from 209 tonnes to 104.5 tonnes from 1 April 2010. The NRLMG considers this decrease to be consistent with the Minister's statutory obligations to maintain the stock size at or above *Bmsy* or the agreed proxy target (i.e., *Bref*).
204. The proposed decrease in TAC is specified by the CRA 7 Management Procedure. Ongoing application of the management procedure is expected to meet sustainability criteria by maintaining stock size above *Bmin* with greater than 98% probability and above *Bref* with 79% probability. On average the management procedure maintains a stock size of 1.5 times *Bref*.

Utilisation & Value

205. Decreasing the CRA 7 TAC will reduce the current utilisation value of the fishery.
206. The NRLMG proposes reducing the CRA 7 TACC only as they consider there is greater certainty of benefit to the stock associated with a reduction to the TACC. This is because catch from the commercial sector can be more directly controlled and existing customary Maori and recreational allowances form a small component of the TAC. The NRLMG is therefore proposing that no change is made to the current allowances for customary Maori and recreational.
207. The CRA 7 Industry has also agreed in the past to receive both increases and decreases in commercial catch, while allowances to other sectors have remained constant. It is proposed that the TACC will decrease from 189 tonnes to 84.5 tonnes, which is the lowest TACC since the stock was introduced to the Quota Management System in April 1990. The NRLMG consider it reasonable that the sector that faces the costs of reductions via adjustment to the allowance(s) receives the benefit from any increases to stock via adjustment to the allowance(s) (at least up the point where the allowance is restored to levels prior to the reduction).
208. Ongoing application of the CRA 7 Management Procedure is designed to maintain stock size well above the target stock size and consequently increase customary Maori, recreational and commercial utilisation values. This is because the management procedure will improve fishing opportunities for all sectors by increasing the stock from its current size.

209. Using 2009 landing price information (which is based on average port price paid to fishers), the 104.5 tonne decrease in commercial catch of rock lobster would result in approximately \$4.4 million loss in revenue for the commercial industry. In the 2008-09 fishing year, the CRA 7 ACE price was \$13,927.80 per tonne; the ACE price represents the price commercial fishers are willing to pay for the right to harvest rock lobster in CRA 7. Using 2008-09 ACE price information, the proposed 104.5 tonne decrease in TACC could potentially result in a net economic loss of approximately \$1.46 million to CRA 7 quota share owners.

Credibility & Acceptance

210. The NRLMG believes choosing to implement the results of an agreed management procedure increases stakeholder confidence in the application of management procedures for other rock lobster fisheries.
211. CRA 7 commercial stakeholders support, and are anticipating, statutory TAC and TACC reductions for the 2010-11 fishing year (as guided by the CRA 7 Management Procedure).

Assessment of Option 2 – Maintain the current TAC and allowances for CRA 7

Sustainability

212. Under Option 2, it is proposed that the CRA 7 TAC will be retained at 209 tonnes for the 2010-11 fishing year. The NRLMG considers it likely that if the current CRA 7 TAC was retained stock size could decline further. CPUE is an indicator of relative stock size in CRA 7 and has declined considerably between 2007-08 and 2008-09 fishing years (from 2.09 to 0.803 kg/potlift). Retaining the current CRA 7 TAC would therefore pose a risk to sustainable utilisation.

Utilisation & Value

213. Retaining the current CRA 7 TAC for the 2010-11 fishing year could result in a reduced stock size that would affect utilisation value by reducing fishing opportunities in the non-commercial and commercial fisheries.
214. Not responding to changes in abundance in a timely matter (as proposed under Option 1) may also create uncertainty in future stock size, which would also affect utilisation value obtained from the fishery by all fishing sectors.

Credibility & Acceptance

215. The NRLMG believes that choosing not to implement the results of an agreed management procedure without an explicit reason would reduce stakeholder confidence in the application of management procedures for this and other rock lobster fisheries. Such a decision would also affect development and implementation of management procedures for other fisheries in New Zealand.

NRLMG Initial Position on CRA 7

216. Based on the available information and the evaluation set out above, the NRLMG's initial position is in favour of Option 1: reduce the TAC for CRA 7 as specified by the CRA 7 Management Procedure by reducing only the TACC.
217. The NRLMG has identified no reason why the Minister should not use the results of the previously agreed procedure to guide statutory TAC setting decisions.

FINAL REMARKS

218. The NRLMG's initial positions are noted for each fishery. These initial positions are based on the available information and the evaluations set out above.
219. The NRLMG emphasises that this position is provided as a basis for consultation with tangata whenua and stakeholders. The NRLMG invites submitters to provide their comments, with supporting information, for inclusion in this advice. The NRLMG is particularly interested in:
- a) any information that might be relevant to the Minister's decision on whether to operate the management procedures for CRA 3, CRA 4 and CRA 7 for the 2010-11 fishing year;
 - b) any information on customary Maori and amateur catches that might provide a basis for alternative catch allocations; and
 - c) any other information that might address current uncertainties in information.
220. All submissions received on the proposals will be considered and discussed in final advice to the Minister. A copy of the final advice will be made available to iwi and stakeholders who make a submission on the proposal following announcement of the Minister's decision.

ATTACHMENT 1:

STATUTORY CONSIDERATIONS

221. In considering the proposals set out in this paper, the following statutory considerations have been taken into account.

International Obligations and Treaty of Waitangi Settlement Act 1992 (s 5)

222. **Section 5** of the Act requires the Minister to act in a manner consistent with New Zealand's international obligations and Treaty of Waitangi (Fisheries Claims) Settlement Act 1992. To this end, the provisions of general international instruments such as UNCLOS and the Fish Stocks Agreement have been implemented through the provisions of the Act. The NRLMG is not aware of any specific international obligations that would be affected by the proposed TACs and allowances.
223. The NRLMG considers the proposed options are consistent with the obligations relating to the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992. The NRLMG recognises that rock lobster (koura) is an important taonga species. All proposals seek to maintain good fishing opportunities, or improve stock health and therefore improve fishing opportunities, for all sectors including commercial and customary Maori. For CRA 3 and CRA 7 *status quo* options represent a risk to short-term and long-term customary value. These risks are set out in the main body of the paper.
224. The NRLMG notes that national-level representatives of customary fishing interests are members of the NRLMG and have contributed to the development of the proposals. Some regional-level CRA 3 customary Maori interests have helped to identify the TAC-setting options presented for CRA 3. The management procedure for CRA 4 was consulted on in 2008; and the management procedure for CRA 7 was consulted on in 2007; the NRLMG looks forward to receiving the views of tangata whenua on the operation of these procedures to guide TAC setting for the 2010 - 11 fishing year.

Purpose of the Act (s 8)

225. **Section 8** of the Act describes the purpose of the Act as being to provide for the utilisation of fisheries resources while ensuring sustainability, and defines the meanings of utilisation and sustainability. The management options presented seek to achieve the purpose of the Act. The options presented seek to achieve sustainable TACs and take into account the respective costs of management versus utilisation benefits.

Environmental considerations (s 9)

226. **Section 9** of the Act prescribes three environmental principles that the Minister must take into account when exercising powers in relation to utilising fisheries resources and ensuring sustainability.
- a) **Section 9(a)** requires that associated or dependent species (i.e., those that are not harvested) should be maintained above a level that ensures their long-term viability. Potting and hand gathering fisheries have a relatively low level of by-catch and the NRLMG is not aware of any interactions between the fisheries and non-harvested species of concern.
 - b) **Section 9(b)** requires the maintenance of biological diversity of the aquatic environment be taken into account. Potting is the only commercial fishing method used to harvest rock lobsters in CRA 3, CRA 4 and CRA 7. Some information is available on the impact of this method on the aquatic environment, and Australian research suggests there is little impact on seaweed and other benthic communities, including fragile coral reef ecology, from rock lobster potting. Consequently, the NRLMG considers it unlikely the proposed changes to the TACs and TACCs will have a demonstrable adverse effect on biological diversity in CRA 3, CRA 4 and CRA 7.
 - c) **Section 9(c)** requires the protection of habitats of particular significance to fisheries management. The proposed changes to TACs and TACCs are unlikely to affect habitats of particular significant to fisheries management.

Information Principles (S 10)

227. **Section 10** of the Act sets out the information principles, which require that decisions be based on the best available information, taking into account any uncertainty in that information and applying caution when information is uncertain, unreliable, or inadequate. In accordance with s 10, the absence of information should not be used as a reason to postpone, or fail to take, any measure to achieve the purpose of the Act, including providing for utilisation at levels considered to be sustainable.
228. A thorough review of available information has been undertaken by the NRLMG and the best available information has been used to evaluate the management options presented. The NRLMG has endeavoured to set out the relevant uncertainty in, and inadequacy of, that information so that the appropriate caution can be applied in assessing the proposed management options.

Sustainability Measures (s 11)

229. When setting or varying a sustainability measure, **Section 11(1)** of the Act requires the taking into account of: (i) any effects of fishing on any stock and the aquatic environment; (ii) the existing management controls that apply to the stock or area concerned; and (iii) the natural variability of the stock.

230. The adverse effects of fishing on the aquatic environment are discussed under the Environmental Considerations section.
231. Apart from the existing TAC, TACC and allowances, a range of management controls apply to rock lobster fisheries including minimum legal sizes, daily bag limits for amateur fishers, method restrictions, protection of egg-bearing females, closed areas and closed seasons (CRA 3 and CRA 7 only). The proposed changes to TACs and TACCs are unlikely to affect these measures.
232. Recruitment to rock lobster stocks is highly variable. This variability was taken into account by the RLFAWG and the NRLMG when developing the management procedures for CRA 3, CRA 4 and CRA 7.
233. **Sections 11(2)** requires regard to: (i) any regional policy statement, regional plan or proposed regional plan under the Resource Management Act 1991; (ii) any management strategy or management plan under the Conservation Act 1987 that apply to the area and are considered relevant; and (iii) sections 7 and 8 of the Hauraki Gulf Marine Park Act 2000.
234. There are five Regional Councils with jurisdictional boundaries covering CRA 3, CRA 4 and CRA 7 (Gisborne, Hawkes Bay, Horizons, Greater Wellington and Otago). The NRLMG is not aware of anything in the proposed coastal plans for these councils that would be affected by this proposal.
235. There are three Department of Conservation Conservancies with jurisdictional boundaries covering CRA 3, CRA 4 and CRA 7 (East Coast/Hawke's Bay, Wellington and Otago). The NRLMG is not aware of anything in the proposed strategies for these conservancies that would be affected by this proposal.
236. CRA 3, CRA 4 and CRA 7 fisheries do not intersect with the Hauraki Gulf Marine Park; therefore there are no relevant considerations under the Hauraki Marine Park Act 2000.
237. **Section 11(2A)** requires the Minister to have regard to: (i) any conservation services or fisheries services and any decision not to require conservation services or fisheries services; and (ii) any relevant fisheries plan approved under s 11(2A) of the Act.
238. The NRLMG does not consider that existing or proposed services materially affect this proposal. No decision has been made not to require a service in these fisheries. The NRLMG is not aware of any relevant fisheries plans approved under s 11 of the Act. The NRLMG is aware that Ngati Kahungunu is in the process of developing a fisheries plan relating to Ngati Kahungunu fisheries, which intersect with CRA 4, and that the CRA 3 Forum has developed a draft CRA 3 Fisheries Management Plan.

TAC Setting Considerations (s 13)

239. Rock lobster stocks are managed under **Section 13** of the Act. Under s 13(2) the Minister must set a total allowable catch that:
- a) maintains the stock at or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks; or
 - b) enables the level of any stock whose current level is below that which can produce the maximum sustainable yield to be altered—
 - (i) in a way and at a rate that will result in the stock being restored to or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks; and
 - (ii) within a period appropriate to the stock, having regard to the biological characteristics of the stock and any environmental conditions affecting the stock; or]
 - c) enables the level of any stock whose current level is above that which can produce the maximum sustainable yield to be altered in a way and at a rate that will result in the stock moving towards or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks.

Before a TAC can be set under the above provisions the Minister must be provided with an estimate of both current biomass and the biomass that can produce the maximum sustainable yield (*Bmsy*). Current biomass estimates are available for CRA 3 but are not available for CRA 4 and CRA 7. *Bmsy* estimates are available for all three fisheries, but are considered unreliable and are not used. Instead, reference biomasses are used as a proxy for *Bmsy*. Where current biomass or biomass that can produce the maximum sustainable yield estimates are not available or not directly comparable, or where proxies are applied, Section 13 (2A) of the Act is used.

240. Section 13(2A) says that:

- (2A) For the purposes of setting a total allowable catch under this section, if the Minister considers that the current level of the stock or the level of the stock that can produce the maximum sustainable yield is not able to be estimated reliably using the best available information, the Minister must —
- a) not use the absence of, or any uncertainty in, that information as a reason for postponing or failing to set a total allowable catch for the stock; and
 - b) have regard to the interdependence of stocks, the biological characteristics of the stock, and any environmental conditions affecting the stock; and

c) set a total allowable catch —

(i) using the best available information; and

(ii) that is not inconsistent with the objective of maintaining the stock at or above, or moving the stock towards or above, *Bmsy*.

241. It is the NRLMG's view that the TAC variations guided by operation of the CRA 3, CRA 4 and CRA 7 Management Procedures meet the requirement of being "not inconsistent with" the objective of maintaining the stock at or above, or moving the stock towards or above, *Bmsy*.

242. In considering the way in which and rate at which a stock is moved towards or above a level that can produce maximum sustainable yield under subsection (2)(b) or (c), or (2A) (if applicable), the Minister shall have regard to such social, cultural and economic factors as he or she considers relevant. Regard is given to social, cultural and economic factors in assessing the TAC options put forward to rebuild these fisheries.

TACC Setting Considerations (s 20 and 21)

243. **Section 20 and 21** specify a number of matters that must be taken into account when setting or varying a TACC. Section 21 requires the Minister to allow for non-commercial Maori and amateur fishing interests and other fishing mortality when setting or varying the TACC. The NRLMG notes that information on non-commercial harvest is scarce and uncertain. For CRA 3, Option 2 (the "Rule 5" CRA 3 Management Procedure) one allocation option is proposed: reduce the TACC only, which results in a greater proportion of the TAC being allocated to customary Maori and amateur fishing interests. For CRA 7, the proposal to reduce only the TACC results in a greater proportion of the TAC being allocated to customary Maori and amateur fishing interests

244. When considering allocation of the proposed TAC increases for CRA 4, best available information on the harvest needs of customary Maori and amateur fishers is considered, along with risks associated with uncertain information.

245. Allowances for other fishing mortality are left unchanged. The allowances are based on best available, but highly unreliable, information about illegal unreported catch in each of the fisheries.

246. **Section 21(4)** also requires that any *mātaimai* reserve or closures/restrictions under s 186A to facilitate customary Maori fishing be taken into account. *Mātaimai* reserves and section 186A closures are located within CRA 3, CRA 4 and CRA 7 – the Moremore (Hawke's Bay), Puna wai-Toriki (Otago) *mātaimai* reserves and the Pukerua Bay 186A closure (Wellington). The NRLMG considers that the management options presented in this paper will contribute to sustainable utilisation of rock lobster fishstocks and may benefit abundance both inside and outside *mātaimai* reserves and s 186A closures. The risks posed to sustainability and utilisation values, including customary Maori utilisation are set out in the body of the paper.

247. **Section 21(5)** also requires that any regulations to prohibit fishing made under s 311 be taken into account when setting allowances for amateur fishing interests. The NRLMG is not aware of any restrictions under s 311 that have been placed on fishing in any area within CRA 3, CRA 4 or CRA 7.

Administrative Issues

248. To implement this proposal would require the publishing of Gazette Notices under s 13 (TACs) and s 20 (TACCs) of the Act, together with some publicity to ensure fishers are aware of the changes.

ATTACHMENT 2:

SPECIFICATIONS OF THE CRA 4 MANAGEMENT PROCEDURE

249. After a stock assessment for CRA 4 (Breen *et al.* 2006), a large set of management procedure evaluations (MPEs) were done, using an operating model based on the CRA 4 assessment model (Breen & Kim 2006b).
250. The 2005-06 catch in CRA 4 was 504 tonnes; this was less than the TACC of 577 tonnes. In the latter part of 2006 it was obvious that the catch for 2006-07 would be even further below the TACC (in the event it turned out to be 445 tonnes). A series of industry meetings discussed options that included adoption of a management procedure or decision rule that would specify annually how much ACE should be voluntarily shelved.
251. The Breen & Kim (2006b) study was used as the basis for choosing a management procedure. One of the obvious requirements, not considered by Breen & Kim, was that the 2007-08 catch limit should be set low enough that it actually constrained the catch. A rule was chosen that specified a low catch limit (321 tonnes) when using the most recent CPUE estimate. This rule, E170 (Figure A), is specified as follows:

$$SCC_{y+1} = 500 \left(\frac{I_y}{0.9} \right)^{1.4}$$

where $TACC_y$ is the specified catch limit in year y and I_y is standardised CPUE from the most recent autumn-winter season. There is no latent year⁴; the maximum allowable change is 75% and the minimum change is 5%.

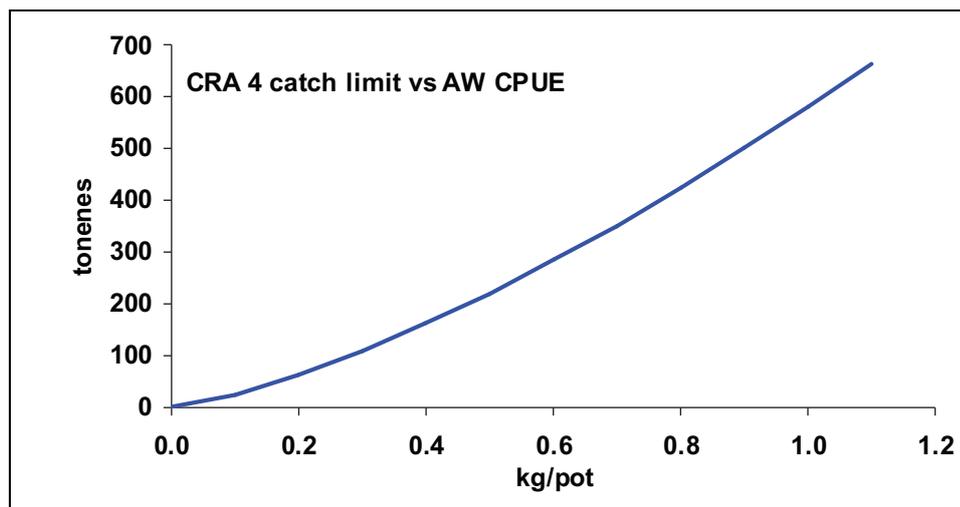


Figure A: *The CRA 4 Management Procedure.*

⁴ The original MPEs described by Breen & Kim (2006b) used an asymmetric latent year, in which a decrease could be made, but not an increase, in a year following a change. The latent year was dropped before a rule was adopted, at the request of NZ RLIC Ltd., after examination of the performance of the rule without a latent year.

252. Table A below shows the history of the rule.

Year	Applied to fishing year	Autumn-winter CPUE	Rule result	Operational limit
2006	2007-08	0.656 kg/potlift	321.1 tonnes	339 tonnes
2007	2008-09	0.515 kg/potlift	228.9 tonnes	240 tonnes
2008	2009-10	0.573 kg/potlift	265.9 tonnes	266 tonnes
2009		0.871 kg/potlift	477.59 tonnes	

Table A: History of the CRA 4 Management Procedure, showing proposed limits to the commercial fishery.

253. In late 2006, the rule delivered a specified catch limit of 321 tonnes. Not all quota owners shelved the requisite ACE, resulting in an operational limit of 339 tonnes, a 41% reduction from the TACC.
254. In late 2007, the rule delivered a specified catch limit of 228.9 tonnes. Not all quota owners shelved the requisite ACE, resulting in an operational limit of 245 tonnes, a 57% reduction from the TACC.
255. In late 2008, the rule delivered a specified catch limit of 265.9 tonnes. The Minister formally adopted the rule to guide statutory TAC setting in CRA 4 from the 2009-10 fishing year. This resulted in an operational limit of 266 tonnes, a 55 % reduction from the TACC.
256. In late 2009, the rule delivered a specified catch limit of 477.59 tonnes. This would represent an increase of 79.5%. However, the maximum change allowed under the rule is +/- 75%, thus the proposed TACC for 2010-11 becomes 465.5 tonnes under the CRA 4 Management Procedure.
257. Management procedures should not remain in place for longer than about five years without a review, because in five years the operating model used to evaluate management procedures will be obsolete and fishery performance should be re-evaluated. During 2011, it is proposed that the management procedure will be reviewed.

ATTACHMENT 3:

SPECIFICATIONS OF THE CRA 7 AND CRA 8 MANAGEMENT PROCEDURES

258. Both the CRA 7 and CRA 8 management procedure specify that:

- a) the output variable is TAC (tonnes) and that standardised CPUE (kg/pot) is to be used as the input variable;
- b) standardised CPUE is to be based on the offset year from 1 October; and
- c) CPUE is to be standardised according to the recent usage described in annual Fishery Assessment Reports (FARs), using a data extract obtained in November to ensure that sufficient data from the most recent AW season have been entered.

CRA 7 Management Procedure Specifications

259. For CRA 7, the management procedure is specified as follows:

- a) The TAC is to be set at 100 times the standardised CPUE (*Figure B*);
- b) The management procedure is to be evaluated every year (no “latent year”);
- c) If the procedure results in a TAC that changes by less than 5%, no change will be made; and
- d) If the procedure results in a TAC that changes by more than 50%, the TAC will be changed by 50% only.

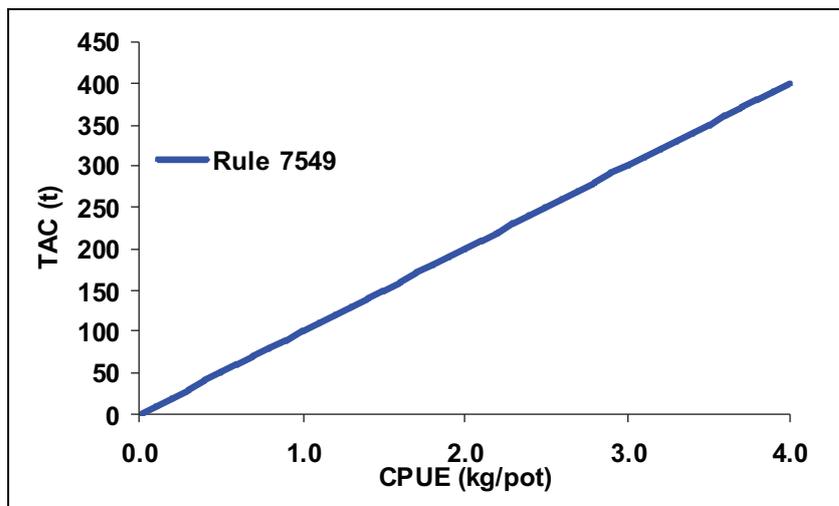


Figure A: CRA 7 Management Procedure.

CRA 8 Management Procedure Specifications

260. For CRA 8, the management procedure is specified as follows:

261. The relation between CPUE, indicated by C_y , and TAC, indicated by T_{y+1} , is given in *Figure C* and in the equations below:

$$T_{y+1} = \begin{cases} h - s_1(p_1 - C_y) \frac{h}{p_1}, & C_y < p_1, \\ h, & p_1 \leq C_y \leq p_2, \\ h + s_2(C_y - p_2) \frac{h}{p_1}, & C_y > p_2. \end{cases}$$

262. The parameters referred to in the equations above for this management procedure are:

h	p_1	p_2	s_1	s_2
1053	1.9	3.2	1.2	0.16

- a) the management procedure is to be evaluated every year (no “latent year”);
- b) if the procedure results in a TAC which changes by less than 5%, no change will be made; and
- c) there is no limit to the amount by which a TAC may change.

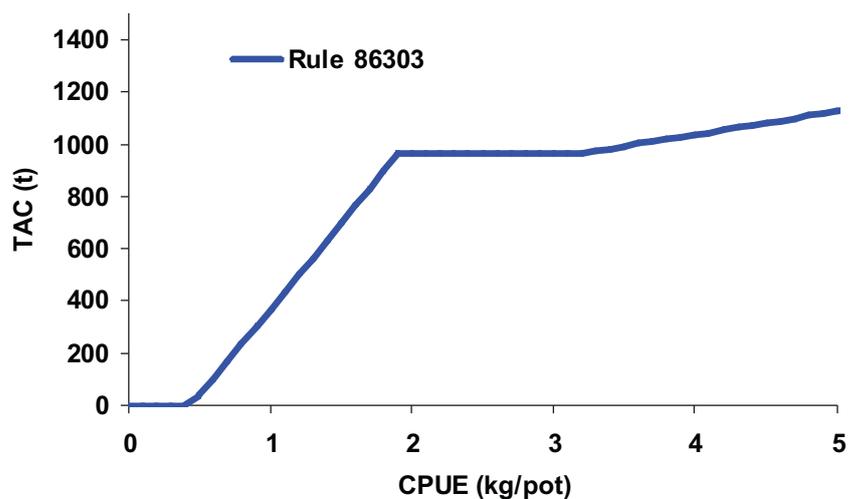


Figure B: CRA 8 Management Procedure.

263. Management procedures should not remain in place for longer than about five years without a review, because in five years the operating model used to evaluate management procedures will be obsolete, and fishery performance should be re-evaluated. Such a review was written into the 2002 NSS Management Procedure (Bentley *et al.* 2003). The NRLMG recommends that a review of the CRA 7 and CRA 8 Management Procedures take place in 2012.

NRLMG STRATEGIC VISION

AND

FRAMEWORK FOR ROCK LOBSTER FISHERIES

5. ROLE AND FUNCTION OF THE NRLMG

264. The NRLMG is the primary source of advice to the Minister of Fisheries on rock lobster fisheries issues. The NRLMG comprises representatives of the customary Maori, amateur, commercial, environment and conservation interests, and delegated MFish personnel, NIWA, SeaFIC, and other consultant science advisors also assist the NRLMG.
265. In 1992, the then Minister of Fisheries, Hon D L Kidd, endorsed the establishment of a national group, the NRLMG, to revise and develop the Rock Lobster Management Plan devised by the Rock Lobster Steering Committee (RLSC) (1991) and asked sector groups to nominate representatives. The RLSC was established by the same Minister to develop a long-term management plan for the lobster fisheries that at that time were considered to be seriously depleted by overfishing.
266. The NRLMG has since presented sixteen annual reports, containing recommendations for the sustainable management of these most important New Zealand inshore fisheries. The NRLMG seeks technical advice from experts, and develops refinements and improvements to the management regimes currently in place for rock lobster fisheries.
267. The NRLMG strives to provide quality advice to the Minister to assist in the statutory decisions on TACs, TACCs, and other management controls.

Role of the NRLMG

268. The NRLMG operates in accordance with standards and specifications drawn from an extensive review in 2001 of the role and objectives of the NRLMG in consultation with the Minister of Fisheries. The NRLMG and the Minister agreed:
- a) to maintain the NRLMG as the primary source of advice to the Minister of Fisheries;
 - b) to encourage and coordinate the development and implementation of Fishery Plans for rock lobster fisheries;
 - c) to act as a default regional planner for rock lobster research and management in circumstances where no Fishery Plan proposal was contemplated, or where a lack of organisation and coordination precludes any regional oversight by sector groups;
 - d) to retain a national coordinating body with well established and identifiable links to and from regional sector groups;
 - e) to coordinate and provide sector group input to research and information planning processes;

- f) to coordinate and provide input to, and maintain an oversight of, the relevant Working Group processes and timetables;
- g) to provide well informed, credible, and consistent research and management information and advice to sector groups, Government agencies, and Ministers.

Roles and responsibilities of members and advisers

269. Noting a preference for membership and participant numbers being kept at current levels with some flexibility accorded to need and circumstance, the NRLMG and the Minister also agreed the roles and responsibilities of the participating members and advisers as follows.
270. Sector Representatives – TOKM, NZRFC, NZ RLIC, ECO.
- a) To provide consistent expertise, experience, knowledge, networking – to and from sector constituency. “It is important that each member represents the views of their constituent groups and relays discussions from the Group back to their constituents” ... (Hon. Pete Hodgson, March 2001)
271. MFish – Fisheries Management, Compliance Advice, Science
- a) To facilitate and coordinate information and advice to and from the NRLMG;
 - b) To ensure consistent information and advice to MFish personnel and to tangata whenua;
 - c) To enable science (including stock assessment and biological), economic, social policy, and other advice deemed necessary by the NRLMG.
272. Advisory members – Stock Assessment, Biology and Behaviour, Economic, Social
- a) To maintain oversight of NRLMG deliberations and offer advice and guidance, including cautions, to assist the development and implementation of research and information plans, Fishery Plans, or regional harvest initiatives.
273. Chairman
- a) To facilitate NRLMG meetings and to oversee the development and delivery of the NRLMG Annual Report.
274. The NRLMG has not only played a role in developing a significant level of consensus among user groups, which aids the decision making process, but also has encouraged the

development of management initiatives throughout the country which have contributed to the improvement in rock lobster stocks over recent years.

275. Stock assessments since 1992 have tracked increasing abundance in most fisheries, and where stock rebuild has been less than optimum, management responses have been implemented which should ensure the sustainable utilisation of those fisheries within acceptable stock rebuild timeframes.
276. The NRLMG advises and informs regional stakeholder groups. This ensures that local issues are addressed within the context of the Fisheries Act and in a manner that is consistent with the overall harvest strategy for rock lobster fisheries.
277. The NRLMG continues to persevere with its efforts to formulate robust and enduring harvest strategies that will not require annual review, rather only fine-tuning when new information indicates that some adjustment is necessary. To that end, the NRLMG continues to develop and refine management procedures incorporating 'harvest control rules' which are designed to guide management actions.

2009 Work Programme

278. The NRLMG has given consideration to a number of rock lobster fisheries management issues during 2009. The most important of these are:
 - a) a review of the role and function of the NRLMG which is yet to be completed but which will be reported to the Minister of Fisheries in 2010. The review has not impeded the work of the NRLMG during 2009.
 - b) research programme activities, including the development and operation of a Management Procedure for CRA 3 stock assessment and the operation of Management Procedures for CRA 4, CRA 7 and CRA 8;
 - c) the ongoing CRA 3 Multi-stakeholder Fishing Forum process;
279. Also in 2009 a primary function of the NRLMG was to conduct Rock Lobster Research Planning, and in that role to consider the full range of research activities for the period 2009 to 2011 considered relevant to the agreed plan and strategic vision for rock lobster fisheries. The NRLMG again provided the core sector group participation in the annual Rock Lobster Research Planning Group process which culminates in the Research Co-ordinating Committee recommendations to the Minister of Fisheries in relation to required research services.
280. In addition, some members of the NRLMG have attended and participated in the RLFAGW meetings held during 2009. The NRLMG contributed to the development of management procedures and agreed biological reference points for incorporation into fisheries management decisions.

281. Over the past year the NRLMG convened on eight occasions to deliberate on a range of research, planning and management issues with the aim of confirming advice and recommendations for regulatory amendments to meet statutory timetables and to ensure the presentation of this annual report and sustainability recommendations to the Minister of Fisheries by 16th December 2009.

Organisational Arrangements

282. Costs of participation in the NRLMG are borne by the representative organisations, and the NZ RLIC usually supplies venues and facilities. The NZ RLIC and MFish share secretarial and administrative duties. MFish now funds the travel costs associated with recreational sector representation to the NRLMG.

ATTENDANCE DURING 2009

Representation	Meetings Attended	Apologies
Chairman / Acting Chairman	2 ⁵	-
Ministry of Fisheries	8	-
NZ Recreational Fishing Council	8	-
Te Ohu Kaimoana	8	-
Environment and Conservation Organisations	0	0
NZ Rock Lobster Industry Council	8	-
Science Advisors	8	-

IN SUMMARY

283. The NRLMG notes:

- a) that whilst supporting and encouraging the development and implementation of Fishery Plans for rock lobster, the NRLMG will continue to operate the current management framework outlined in this document and will work within the roles and responsibilities confirmed in the most recent review;
- b) the NRLMG is supporting and encouraging the development and implementation of Fishery Plans for rock lobster;
- c) that previous Ministers have endorsed the NRLMG as the primary source of TAC, TACC and management advice for New Zealand rock lobster fisheries; and
- d) that previous Ministers have endorsed the NRLMG as an appropriate body to consult on any matters relevant to the management of rock lobster fisheries.

⁵ Chairman tendered resignation early in 2009 and no replacement appointed pending outcome of ongoing review of NRLMG

284. The NRLMG recommends that you:

- a) **confirm** your endorsement of the role and function of the NRLMG.

NRLMG membership in 2009

Dr Kevin Stokes	Chairman	since retired
Dr Kevin Sullivan	MFish	
Leigh Mitchell	MFish	
Alicia McKinnon	MFish	
Steven Halley	MFish	
Santiago Bermeo-Alvear	MFish	
Alan Riwaka	Te Ohu Kaimoana Trustees Ltd	
Stan Pardoe	Te Ohu Kaimoana Trustees Ltd	
Keith Ingram	NZ Recreational Fishing Council	
Geoff Rowling	NZ Recreational Fishing Council	
Bruce Carter	NZ Recreational Fishing Council	
Malcolm Lawson	NZ Rock Lobster Industry Council	
Daryl Sykes	NZ Rock Lobster Industry Council	
<i>No nominee</i>	Environment & Conservation Organisations	

Science Advisers to the Group

- a) The NRLMG draws on a range of sources of science advice including but not restricted to the membership of the Rock Lobster Fishery Assessment Working Group convened by MFish.

6. STRATEGIC VISION

285. The NRLMG has developed a Strategic Vision for the NZ Rock Lobster Fisheries. The vision is consistent with the Fisheries Act 1996, enhances an agreed management framework, and provides a basis for consideration of short, medium, and long term research and management issues, including that:
- a) rock lobster stocks will be managed effectively (including cost effectively) to maintain the status of the stocks at or above the agreed biological reference points, consistent with the Minister's legislative responsibility;
 - b) fisheries will be managed using a property rights/ Quota Management System (QMS) regime with the principal management actions exerted via output controls (TACs) while a range of input controls will still apply where this proves appropriate to individual situations;
 - c) the strategy will provide for management flexibility, whilst ensuring sustainability, to enable all sector groups to maximise their benefits within a shared fishery;
 - d) management of the fisheries will take place within a clear policy environment, e.g., there will be clear, explicit, and agreed rules to describe property rights in the fisheries and the allocation between user group sectors. In addition, there will be explicit and agreed decision rules to prescribe management actions that result from monitoring and assessment of fisheries;
 - e) reliable and cost effective means to monitor and assess fish stocks will be in place. The catches taken and effort deployed by all extractive user groups will be effectively quantified, documented, and managed in accordance with the exercise of rights;
 - f) adverse environmental effects of fishing activities will be averted or minimised;
 - g) aquaculture of rock lobsters will be a permissible activity, governed by policies which ensure sustainable use of the wild stock within a rights based framework;
 - h) a shift of management responsibility to user groups will be promoted within the Fishery Plan framework provided for in the 1996 Fisheries Act; and
 - i) collaborative/consultative national co-ordination of research and management recommendations and development of policy will continue within the NRLMG or similar organisation; and

- j) co-operative management initiatives, which may include the development of regional user groups and Fishery Plans, will be encouraged; and
- k) sustainable management and use of rock lobster fisheries will occur in an environment where the New Zealand public are well informed and educated on matters dealing with fisheries in general and rock lobster fisheries in particular.

7. FRAMEWORK FOR MANAGING ROCK LOBSTER FISHERIES

286. The framework for managing rock lobster and the attendant recommendations of the Group are consistent with expectations of a robust and enduring harvest strategy leading to a continuing sustainability of rock lobster stocks, and in the view of the Group are also consistent with the statutory obligations enshrined in the Fisheries Act 1996.

Goal

287. The rock lobster fisheries should be managed and be maintained at or above the assessed and agreed biological reference points, using a comprehensive approach that recognises a range of commercial, customary non-commercial, amateur, and environmental concerns and values.

Strategies to Achieve Goal

288. The strategies will allow the population size to:
- a) increase in each fishing year that it is below the target in agreed management procedures; or be maintained at or above that level.
289. The extent of change in population size that can be sought will be determined after consideration of:
- a) economic and social factors including:
 - (i) the economic cost and benefits, social factors and rate of adjustment to the fishing industry,
 - (ii) the availability of rock lobster to Maori and amateur fishing groups,
 - (iii) the economic return from the fishery; and
 - b) biological and environmental factors including:
 - (i) the uncertainty in the assessment of stock size and other biological parameters, and
 - (ii) the risk to the population; and
 - c) the timeframe over which the management options will have effect.
290. The strategies will identify the effects of fishing on the aquatic environment and provide for the implementation of measures to:

- a) avoid, remedy, or mitigate any adverse effects of fishing on the aquatic environment;
- b) maintain associated or dependent species above a level that ensures their long-term viability;
- c) maintain the biological diversity of the aquatic environment; and
- d) protect habitat of particular significance for fisheries management.

Implementing the Strategies

291. The tactics or actions developed to implement the strategies will:

- a) be produced through a process that involves all sector groups, minimises conflicting views, and involves all participants in the group disclosing their positions on the issues considered in order to promote co-operation and encourage full and frank discussion;
- b) be based on advice from scientists on the steps necessary to achieve the goal within various time frames;
- c) consider available management options including but not limited to catch reductions, area closures, gear restrictions, enhancement, legal size changes, measures to maximise egg production, recruitment, and to minimise juvenile mortality;
- d) promote and enable effective, including cost effective, compliance with fishery rules;
- e) consider the costs and implications of management options including:
 - i.* the resources that are needed and currently available for research, compliance and administration;
 - ii.* the integrity of the research database;
 - iii.* whether the management alternatives can be effectively implemented;
 - iv.* how the impact of the management options are to be measured or estimated;
 - v.* the impact of the management options on industry, customary non-commercial, and amateur fishers and the degree of their acceptance of the measures; and
 - vi.* the impact on other fisheries and the aquatic environment.
- f) be based on the best available information;

- g) recognise any uncertainty in the available information and be precautionary when information is uncertain, unreliable, or inadequate; and
 - h) not use the absence of, or any uncertainty in, any information as a reason for postponing or failing to take any measure to achieve the purpose of the Fisheries Act 1996.
292. The NRLMG will provide a timely annual report containing recommendations for management, research and compliance of rock lobster fisheries to the Minister.

HARVEST STRATEGY

293. The NRLMG pursues a dynamic harvest strategy for rock lobster fisheries. It is willing to consider and accept TAC changes in two situations:
- a) where stock modelling demonstrates that, after a TAC change, abundance is likely to move towards agreed biological reference points within an agreed period; and
 - b) where a TAC change is triggered by a fully tested and accepted management procedure (including a harvest control rule), such as the ones described elsewhere in this report, designed either to rebuild a stock unit or to maintain the stock unit near an agreed biological reference point.

Assessment and Indicators

294. In accordance with the goal for managing rock lobster fisheries, stock assessment research will continue to be an important component of the management framework. The Rock Lobster Fisheries Assessment Working Group (RLFAWG) continues to refine and improve stock assessment techniques and to identify areas of uncertainty and information needs.
295. For a number of years, MFish has commissioned a major rock lobster stock assessment project incorporating extensive stock monitoring, data grooming and stock modelling, and a rock lobster recruitment project, based on monitoring puerulus settlement at selected sites around the New Zealand coast.
296. Since 1997 NZ RLIC has been contracted to provide stock monitoring and assessments in collaboration with NIWA, Trophia Research, StarrFish, Haist Consultancy and, for the first two periods, the SeaFIC Science Group. Within the overall research programme, the NZ RLIC has contracted NIWA, Lat37 Ltd, and Trophia Research and others to undertake catch sampling and data entry, and to construct and maintain databases for the tagging projects. NIWA holds the MFish contract for the rock lobster puerulus settlement project.
297. Intensive catch sampling (including logbooks) and tagging are undertaken to MFish agreed standards and specifications. Vessel logbook data are now routinely incorporated into the

stock assessment process. Logbook programmes supervised by technicians are well established in CRA 2, CRA 5, and CRA 8.

298. NIWA, StarrFish, Haist Consultancy and Trophia scientists continue to refine and improve stock assessment methods with routine oversight from the RLFAWG chaired by MFish Science Group. The SeaFIC Science Group provides a useful peer review of the process.
299. An independent peer review of rock lobster stock assessment methodology commissioned by MFish in 2007 again concluded that key aspects of the current assessment model represent state-of-the-art methodology and are appropriate for assessments of the rock lobster stocks.



Rock Lobster tag and release with electronic data recording system

Management Procedures and Decision Rules

300. The NRLMG has established two simple decision rules for the NSN and NSC substocks. Each year, the rule for each substock compares the current estimate of standardised CPUE with the index from 1992-93. The two estimates are considered significantly different if their 1-standard-error bars do not overlap. Under these rules, TAC changes are considered only when the two CPUE estimates differ significantly.
301. For the NSS substock (CRA 7 and CRA 8) the NRLMG recommended, and in 2002 the Minister accepted, a more complex and extensively tested management procedure. This procedure was designed to rebuild the CRA 8 fishstock to the target level.
302. New management procedures designed to maintain the stock near agreed target levels were tested under the stock assessment research contract (CRA2003-02) in 2007. These were designed around a decision rule matrix that enables stakeholders to consider biological, economic and other outcomes, and their associated risks, when choosing fishery goals. The rules are described as “maintenance rules” and were agreed by the Minister in 2008 and used to guide TAC/TACC decisions for both CRA 7 and CRA 8.

303. In 2005 CRA 4 commercial stakeholders collaborated with the stock assessment science team to develop and implement a Management Procedure benchmarked against reference levels used in the 2005 stock assessment. The procedure has been used in two successive seasons to guide industry decisions to voluntarily reduce the commercial catch limit in order to halt an observed decline in CRA 4 stock abundance and improve the economic performance of the industry.
304. The CRA 4 Management Procedure has since been accepted by the NRLMG as a suitable basis on which to recommend to the Minister that TAC/TACC decisions be made for CRA 4 in 2009.
305. A CRA 3 Management Procedure was developed for use during 2009 and two rule options presented to the Minister to guide his TAC decisions for that stock from 2010.

Tactics

306. There are a number of mechanisms by which total removals from the fishery can be adjusted if circumstances dictate. These are:
- a) adjusting the TAC;
 - b) changes in minimum legal size (MLS) limits;
 - c) adjustments to escapement provisions;
 - d) closed seasons;
 - e) fishing method restrictions;
 - f) effort controls;
 - g) closed areas;
 - h) adjustments to commercial quotas and amateur bag limits;
 - i) limitations on the numbers of participants in the fishery;
 - j) improved handling to reduce sub-legal mortality;
 - k) protection of soft-shelled lobsters and berried females;

- l) effective enforcement which provides a greater deterrent to illegal fishing;
- m) effective compliance services, such as education, which encourages voluntary compliance; and
- n) maximised voluntary compliance with fisheries laws by fishers.

FISHERIES 2030

- 307. In September 2009, the Minister of Fisheries released a strategy for the New Zealand fisheries sector, called "Fisheries 2030". Fisheries 2030 provides high level direction for fisheries management, and therefore provides greater certainty and clarity to stakeholders about that direction to help them make decisions about investments and activities.
- 308. The goal of Fisheries 2030 is: New Zealanders maximising benefits from the use of fisheries within environmental limits.
- 309. Two outcome statements - Use and Environment - support this goal and describe the more specific results desired for the use of fisheries and the aquatic environment. The "Use" outcome is described as "Fisheries resources are used in a manner that provides greatest overall economic, social and cultural benefit"; and the "Environment" outcome is described as "The capacity and integrity of the aquatic environment, habitats and species are sustained at levels that provide for current and future use". Sound governance arrangements that are well specified, transparent, and which support cost-effective and accountable decision-making underpin the achievement of outcomes.
- 310. During 2010, MFish will work with the NRLMG to ensure the framework for managing rock lobster fisheries aligns with the strategic direction, goals and outcomes outlined in Fisheries 2030.

8. SUMMARY OF RESEARCH ACTIVITIES

2009 ROCK LOBSTER RESEARCH PROGRAMME

311. In 2009 the NZ RLIC, in collaboration with sub-contracted stock monitoring and stock assessment providers, commenced the third sequence of the three year CRA 2006-01 research contract. This contract incorporates extensive stock monitoring coverage, stock assessments, and the maintenance and development of management procedures incorporating harvest control rules.
312. Stock assessment scientists developed and operated options for a CRA 3 Management Procedure and operated the CRA 4, CRA 7 and CRA 8 Management Procedures used to guide statutory TAC setting in these fisheries. These activities resulted in the management proposals set out in Section 4.
313. Stock assessment scientists also operated an industry Management Procedure to guide voluntary commercial catch limits for CRA 5; and reported an evaluation of a management procedure option for CRA 6.
314. NIWA continued the annual monitoring of rock lobster larval settlement. Work continues to attempt to establish correlation between settlement and future abundance that may be useful to inform management responses in anticipation of seasonal variability in stock abundance.

Stock Monitoring

315. Industry logbook data from CRA 2, CRA 5, and CRA 8 continue to be incorporated into the stock assessment process. These programmes are supported by commercial lobster fishermen who measure and record all rock lobsters in four designated pots each fishing day. The data, which are designed to be representative of the respective fisheries, are providing reliable and consistent information for stock assessments.
316. Sequences of stock monitoring are undertaken as Fisheries Research Services in CRA 1, CRA 2, CRA 3, CRA 4, CRA 5, CRA 7, and CRA 8.
317. Industry-funded technicians and administrative support staff continue to be employed in the Bay of Plenty, Canterbury-Marlborough, Chatham Islands, Otago, and Southern rock lobster fisheries.
318. Regional administrative and support staff are contracted and supervised by the NZ RLIC on behalf of industry. The NZ RLIC contracts Trophic Research to maintain the CRA Logbook database and to analyse and report logbook data to participants and to the annual assessment process.

Research Planning

319. In 2009, MFish again designated the NRLMG as the forum for the Rock Lobster Research Planning process. This process contributes to the MFish Business Plan. The NRLMG was selected as a model for fisheries research planning groups because of its multi-sector representation and participation, and the degree of recognition given by the Minister when seeking sustainability advice.
320. The NRLMG sought and actively encouraged additional participants to the Rock Lobster Research Planning process that commenced in August and concluded with the Research Co-ordinating Committee submissions in September/October 2009. These included interest groups not directly represented on the NRLMG, and potential service providers.
321. The initial focus was to identify the information needs for rock lobster fisheries. The planning process also took account of the research projects in progress during the period January 2007 to March 2010.
322. The NRLMG has previously confirmed a range of immediate and medium term research needs, the results of which will inform the Minister when making sustainability decisions, and may assist stakeholders wanting to develop and implement Fishery Plans.
323. The projects that are considered essential to the stock assessment and modelling, to the management procedures including harvest control rule evaluation and analysis, and to management decisions are:
 - a) stock assessment;
 - b) stock monitoring; and
 - c) better non-commercial catch estimates including estimates of illegal removals.

9. STOCK ASSESSMENT OVERVIEW

INTRODUCTION

324. No stock assessments for CRA stocks were done in 2009. The core stock assessment science activity was the development of management procedures for CRA 3 (Gisborne) to guide TAC/TACC recommendations and decisions for that stock. Working with the RLFAGW convened by MFish, and also with the CRA 3 Working Group (a smaller group of the CRA 3 Multi-stakeholder Fishing Forum representatives), the stock assessment science team examined alternative management procedures for CRA 3.
325. Many candidate procedures for CRA 3 were identified and tested, and after consultation with the CRA 3 Working Group these were reduced to a final two candidates. This Report contains recommendations for the implementation of a CRA 3 management procedure.

Management Procedures and Harvest Control Rules

326. Harvest control rules for rock lobster fisheries were first implemented following agreement by the Minister in 1993.
327. Generically the main benefit of harvest control rules and management procedures is that they enable the Minister's legislative obligations to be met in relation to sustainable utilisation while providing greater certainty to stakeholders over future management interventions.
328. Specifically, the benefits of harvest control rules are that:
- a) they allow users to plan rationally;
 - b) they force stakeholders and managers to define management goals clearly;
 - c) they force stakeholders and managers to agree on data used in making decisions;
 - d) they force stakeholders and managers to establish clear rules in advance to guide management interventions;
 - e) they incorporate uncertainty into the decision making process formally and objectively; and
 - f) they may act to increase the user's understanding and acceptance of decisions.

329. There are currently two types of rules in operation. One type is the rule for the NSN and NSC substocks which provides guidance, based on commercial CPUE, on when stock assessments should be undertaken. The decision rule does not provide guidance on management interventions, except that TAC changes should not be considered unless CPUE is significantly different from that in the reference year. The decision rule for NSN and NSC substocks was constructed to allow for increases in TACs where rebuild would not be significantly delayed by taking such an action.
330. The other type of rule is the CRA 4 management procedure, which specifies the exact TACC that should be set, based on an input value for CPUE, subject to minimum and maximum change rules. Under this type of rule, agreement is obtained among managers and stakeholders when the management procedure is designed: they agree about the data inputs, the harvest control rule and the period for which the management procedure will be used. Such rules are extensively tested with computer simulations. The application of these management procedures results in management action consistent with the Minister's legal obligations.
331. Examples of the second type of rule include the management procedures for CRA 7 and CRA 8 and their predecessor, the NSS decision rule, the CRA 4 management procedure and the proposed CRA 3 management procedures. The 2002 NSS Management Procedure was extremely effective in achieving its stated objective of rebuilding the CRA 7 and CRA 8 stocks within a specified time. It allowed four TAC changes to occur with high consensus and minimum controversy, and reduced the requirement for frequent stock assessments of these two stocks.

Objective Performance indicators

332. Performance indicators are used to compare rulers during simulation testing, and they incorporate the goals for the fishery. Common indicators and goals are:
- a) Yield is measured by catch (sometimes recreational and commercial catch), catch limits and the risk of falling below a threshold catch limit. A fishery goal could be to maximise annual catch, but this is not a common goal in rock lobster fisheries in New Zealand.
 - b) Stock abundance is measured by CPUE. A goal might be maintain high abundance, because there are economic, biological, and social benefits of high catch rates.
 - c) Stability is measured by the frequency of catch limit adjustments and the average size of changes (average annual variation). A goal might be to minimise change.
 - d) Safety is measured by the risk of stock abundance falling below critical threshold levels. A goal might be to maintain high safety (low risk).
 - e) Diversity is measured by the range of sizes available in the catch. The goal might be to maintain high diversity so that fishermen are able to respond to changes in market demand.

- f) Time to rebuild, for depleted stocks, is measured as the median year in which the stock has reached its target. A goal might be to rebuild within a stated period.

Reference points

333. The Act requires the Minister to set a TAC that moves the stock towards, or maintains the stock at, a level at or above *Bmsy*. *Bmsy* is not straightforward to estimate and is uncertain when estimated.
334. In the absence of a reliable *Bmsy* estimate, alternative and proxy targets are used. For some rock lobster stocks, these are “empirical” reference points (*Bref*) based on the history of the fishery. These are described in *The Guidelines for Harvest Strategy Standards* (MFish 2008) concept as follows:
335. “Conceptual proxies for BMSY, FMSY and MSY are qualitative surrogates that can be used in the absence of adequate information to directly estimate these reference points themselves. The conceptual interpretation embraces the spirit and intent of section 13 of the Act. It can be used in cases where there is insufficient information to estimate BMSY, FMSY or MSY explicitly, or where such estimates may be unreliable because, for example, there is little or nothing known about the stock recruitment relationship. Conceptual BMSY: In cases where the relationship between CPUE and abundance can be assumed to be more or less proportional, or where some other form of relationship has been derived from data, it may be reasonable to select an appropriate historical period when both CPUE and catches were relatively high and to use this CPUE level as a target. *The best example in current use in New Zealand is that for rock lobster.*” [emphasis added]
336. The choice of reference period is perforce arbitrary and open to debate. When selecting reference periods the RLFAWG and the NRLMG consider a number of important factors:
- a) a period for which good data are available from which to estimate vulnerable biomass;
 - b) a period during which the fishery is well developed, but by no means fully developed – the fishery has continued to produce catches after the end of the reference periods; and
 - c) a period in which the biomass was relatively stable (this is often difficult).
337. *Bref* is neither the highest nor lowest biomass level that has been experienced and observed in the fishery. In every case where *Bref* is used, stock abundance has fallen lower than *Bref* and then recovered.
338. Current practice is to consider also *Bmin*, which is the lowest stock abundance in the observed history of the fishery. In all stocks, the abundance has recovered from this low point. The probability of being below *Bmin* should be small (less than 5% or 10%). In simple terms the stock at limit *Bmin* is an undesirable stock status.

339. Finally, spawning stock abundance is considered, for New Zealand fisheries generally, an important reference point associated with safety.
340. When assessing the status of a stock, the RLFAWG compares the estimated stock size against these various reference points. Except for spawning biomass, they are based on “vulnerable biomass”: the biomass that is legally available and vulnerable to the fishery in the AW season (i.e., at or above the MLS, excluding berried females, and taking gear selectivity and seasonal vulnerability into account).
341. The NRLMG has tended to view *Bref* as a “target” reference point because, in the absence of estimated *Bmsy*, it provides credible and practical benchmarks of sustainability and exploitation against which management actions that are consistent with legislative obligations can be recommended to the Minister.

10. UNCERTAINTY IN ESTIMATES OF TOTAL REMOVALS

Overview

342. Accurate information about total removals is necessary to enable appropriate management decisions to ensure sustainability. Information on the level of commercial removals is collected by the QMS reporting system. However, the infrastructure for collecting information on amateur, customary, and illegal removals is poorly developed.
343. The lack of accurate information on non-commercial and illegal catch contributes to the uncertainty of the stock assessment, detracts from the effectiveness of agreed harvest strategies and undermines the incentives created by the QMS.
344. In the case of rock lobster fisheries, to allow any or all of the individual catch components to increase without control will jeopardise the rebuild strategy and erode existing harvest rights and opportunities. No control is possible if catch components are unknown. No effective control is possible if catch components are uncertain.
345. Because the catch projections contained in stock assessments are made under the assumption of constant catches fixed at levels used in the assessment, an increase in future catch levels would result in an increased probability of a decrease in biomass and likely lower future biomass.
346. Significant uncertainty is associated with non-commercial removals from rock lobster fisheries. This situation has potential to confound the reliability of stock assessments, and to confound the expectations for, and to compromise the implementation of, Management Procedures, regional harvest initiatives and Fishery Plans.
347. In the case of those stocks generally regarded as “shared fisheries”, or those where stock abundance is less than optimum and high levels of non-commercial fishing activity are evident, the need for reliable and credible non-commercial catch data is urgent.

Customary Harvest

348. There is minimal information on customary non-commercial harvest even though customary fishing regulations have been promulgated. In the South Island the Fisheries (South Island Customary Fishing) Regulations 1999 came into force on 20 April 1998. Customary fishing regulations for the North Island and Chatham Islands, the Fisheries (Kaimoana Customary Fishing) Regulations 1998 came into force on 1 February 1999. The regulations become effective in different areas as nominated representatives of the tangata whenua are appointed. Uptake of the North Island and South Island Customary Fishing Regulations has been slow. However, MFish has in recent years provided more resource to inform and educate tangata whenua about the Customary Fishing Regulations, and to encourage

discussion where disputes about boundaries exist. This has resulted in greater uptake of the regulations, particularly on the east coast of the North Island.

349. The North Island and South Island customary regulations provide for quarterly reporting of permits issued for customary fishing purposes. Information derived from those permits is intended to improve the estimates of the level of customary harvest and although all available information has been presented to the RLFAWG there is no information available from areas still managed under Regulation 27.

Amateur Harvest

350. MFish telephone, diary, and ramp surveys have provided some amateur landing data from which estimates have been derived. Estimates of amateur harvest exist only for recent years and the results of the amateur catch surveys commissioned by MFish in 2000 remain highly uncertain and are not used in stock assessments. They were rejected by the RLFAWG. For the most recent rock lobster stock assessments the RLFAWG has assumed amateur catches and the trends in those catches over time.
351. MFish has sought tenders for research contracts aimed at improving recreational harvest estimates for rock lobster.

Illegal Take

352. The level of illegal removals from NZ rock lobster fisheries is estimated to be 378 tonnes nationally.
353. Illegal estimates were last amended in 2005. At that time MFish Compliance provided updated point estimates of 'unreported' illegal removals, and advised that "MFish does not currently have a reliable robust and defensible methodology to estimate illegal fishing. Our approach uses the 'method' employed last year to provide information on the CRA 3 fishery." In 2004, MFish Compliance had advised that "Difficulties arise in trying to verify and cross check the figures provided and this is a limiting factor of the methodology. Therefore, estimates cannot be verified and have an associated low level of confidence."
354. Estimates of illegal take, and associated historical pattern, are consequently highly uncertain. The RLFAWG has very little confidence in them.
355. MFish's "Illegal Estimates Project", which is currently underway, focuses on identifying processes and methodologies to improve estimates of illegal take. The timeline for completing this project is unknown.

In Summary

356. The NRLMG notes:

- a) that accurate and reliable data for all sectors are essential to the stock assessment process;
- b) that accurate and reliable data for all sectors are essential to the fishery management decision making process, particularly in circumstances where catch reductions are considered necessary to maintain or improve stock abundance;
- c) that sufficient resources must be deployed to monitor non-commercial removals from rock lobsters fisheries to maintain the integrity of the TACs set for stocks, to maintain the integrity of the allowances made to extractive users within the TACs, and to maintain the fishing opportunity associated with those allowances;
- d) that increased emphasis should be placed on the full implementation of the North and South Customary Regulations.

11. COMPLIANCE AND ENFORCEMENT ISSUES

Illegal Removals

357. The NRLMG has consistently stated over many years that reduced illegal fishing activity will facilitate attainment of the goal of the framework for managing rock lobster fisheries and improve harvest opportunities for legitimate extractive users.
358. Industry, customary, and amateur fishing representatives on the NRLMG have consistently expressed the view that Government should make a greater contribution to the existing Compliance budget and therefore enable more resources to be deployed into minimising illegal removals from the rock lobster fisheries.
359. Industry, customary, and amateur fishing representatives on the NRLMG agree that better compliance could be attained if rock lobster compliance strategies were developed and implemented.
360. MFish representatives on the NRLMG believe that these strategies can be further developed by stakeholders and MFish within the Fisheries Plan process.

In Summary

361. The NRLMG notes:
- a. the significance of the illegal catch component and its negative effect both on the stock and on legitimate extractive users;
 - b. that all user groups recommend that the Minister takes steps to ensure that compliance strategies and services (including enforcement and education services) are sufficient to minimise illegal catch;
 - c. that sufficient resources must be deployed to constrain illegal unreported removals in the first instance to the levels of the allowances made in setting TACs, and ideally to much lower levels so as to improve the quality of the fishing experience to be enjoyed by legitimate users.

12. ROCK LOBSTERS

362. The spiny rock lobster (*Jasus edwardsii*; koura) has always been important to Maori and for much of this century has supported increasingly important commercial and amateur fisheries. Rock lobsters support one of the country's oldest commercial fisheries, and are one of the seafood industry's top export earners.
363. The commercial fishery has developed through a number of phases as catches have increased with the development of export markets. Management of the resource has changed in response to the changing status of the stocks and the expectations of stakeholder groups.
364. Since 1990 the rock lobster fishery has been managed within the Quota Management System (QMS) and governed by a mix of output controls and fishery regulations, including the provision of a minimum legal size, a prohibition against taking berried females and soft-shelled animals, method restrictions, the requirement that all pots be fitted with escape gaps, and closed seasons in some areas.
365. The current management of the rock lobster fishery is focused on moving stocks to agreed biological reference points and maintaining them at this level or above, primarily through the adjustment of Total Allowable Catches (TACs).

THE RED ROCK LOBSTER AND ITS NATURAL HABITAT

366. Lobsters are strictly marine. They all have the same basic body plan (head, tail, 2 pairs of antennae, no less than 6 pairs of mouthpart appendages and 5 pairs of legs).
367. 'Crayfish' or 'Cray' are strictly freshwater and are clawed, i.e., New Zealand's Koura. Unfortunately 'Cray' is a common term used for New Zealand's marine lobsters. Koura is the general Maori name for both (freshwater) crayfish and (marine) lobsters.
368. New Zealand has four species of rock lobsters (spiny lobsters), the most common of which is the Red Rock Lobster (*Jasus edwardsii*). In Australia this species is known as the 'Southern Rock Lobster'.
369. The other species found in New Zealand are the:
- a) Packhorse Rock Lobster /Green Rock Lobster. (*Sagmariasus verreauxi*). This lobster is less than 1% of commercial rock lobster landings. It is the world's largest rock lobster.
 - b) Deepwater Rock Lobster (*Projasus parkeri*) is taken occasionally as incidental catch from trawling but is not marketed.

c) a tropical rock lobster species (*Panulirus sp.*) found only at the Kermadec Islands.

370. The Red Rock Lobster is dark red and orange above, paler and yellowish below. The body is spiny, especially on the head. They can weigh up to 8 kg and reach lengths of about 60 cm (excluding the feelers).

371. In contrast the Packhorse lobster is green; has a distinctive 'carapace' (the protective shell of the head and thorax). The Packhorse's carapace has a distinctive shape at the front part and distinctive patterns of spines. The Packhorse also has a lack of sculpting on its tail. As the world's largest rock lobster it has been found to weigh up to 20 kg and reach lengths of 70 cm.



372. The deepwater rock lobster has a distinctive apricot colour, two prominent rows of spines on its carapace and a central ridge along the top of its tail. It is a much smaller rock lobster reaching lengths of 25 cm.

373. The tropical rock lobster species is a medium sized species of the western pacific. They have a distinctive structure at the base of each feeler that produces a sharp, rasping sound when the feelers move.

Habitat

374. Very small lobsters usually shelter alone in small cracks or holes. As they grow they become more gregarious and can be found in groups of 50 or more. This behaviour helps to protect them from predators. Once they become sexually mature their willingness to share dens varies seasonally especially for males (see section on reproduction).

375. During the day Red Rock Lobsters are normally found in rock crevices (dens), which provide shelter from predators, storms, and the sun. They generally leave the dens around dusk to forage for prey, returning just before dawn

376. The deepwater rock lobster is a very deepwater lobster, found between 500 m and at least 900 m. Our knowledge of its deep rocky habitats is very limited.

Distribution

377. The red rock lobster is found throughout New Zealand, on seamounts in the Tasman Sea and around southern Australia. In New Zealand they are found from the Three Kings Islands in the north all the way to the Auckland Islands in the south and to the Chatham Islands in the east. They are also found on shallower seamounts to about 300 m depth throughout New Zealand's Exclusive Economic Zone. The red rock lobsters found at the Auckland Islands are the southern-most rock lobsters in the world.
378. Packhorse rock lobsters are widely distributed, as far north as the Kermadec Islands, south to Foveaux Strait, and east to the Chatham Islands. They are fished mainly in the far north of NZ. (They also occur in eastern Australia – northern Victoria and New South Wales - where they are commonly called the Eastern Rock Lobster).
379. The deepwater rock lobster is widespread in the southern oceans. The species is most commonly found in the Bay of Plenty, off the Wairarapa coast and across the Chatham Rise.

ANATOMICAL FEATURES OF RED ROCK LOBSTER

External Features - location and identification

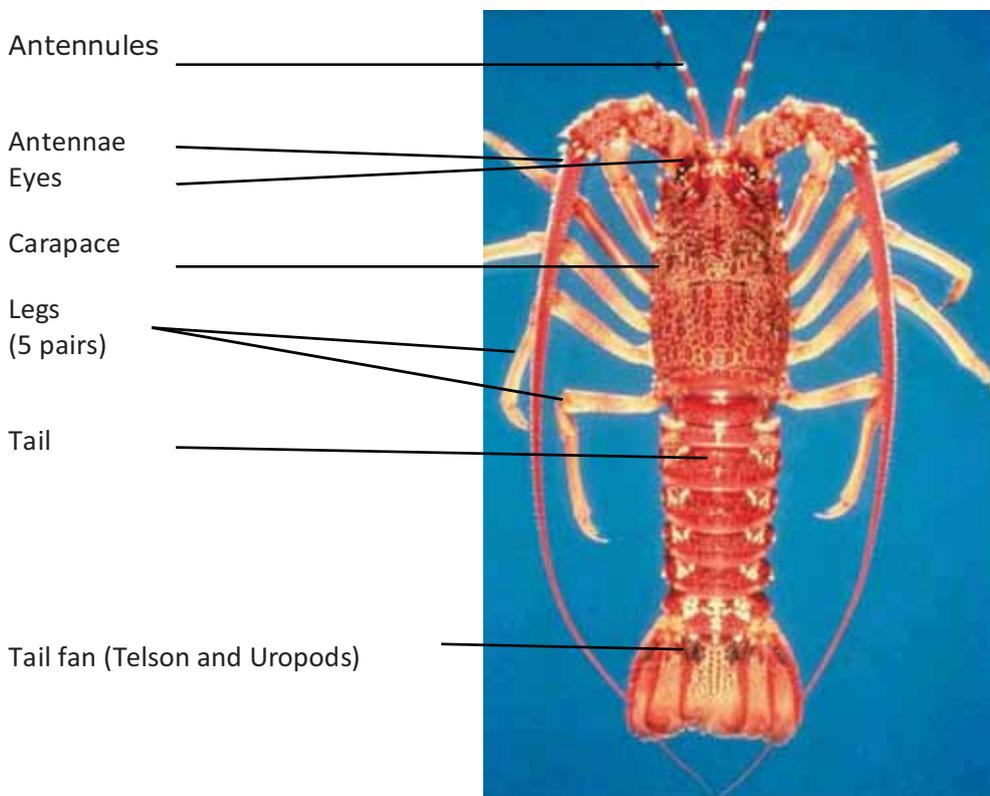


Photo: A. Blacklock

External features and their function

External Feature	Function
Eye	Compound eyes at the tip of the eye stalks
Antennae	Long "feelers" that can be rotated around to fend off predators. They also have some sensory function.
Antennules	The short slender appendages are capable of detecting food (tasting), danger, and pheromones
Legs	5 pairs of legs used for walking and feeding
Carapace (or cephalothorax, the head & thorax)	Protection of vital organs such as the liver, stomach, gonads, gills and heart by the exoskeleton case
Tail (or abdomen)	Consisting of 6 separate, moveable parts, plus the tail fan (telson and uropods). The main muscle for movement (swimming) away from danger. Under the tail are paired feather-like appendages (pleopods).

Internal Features – location and identification

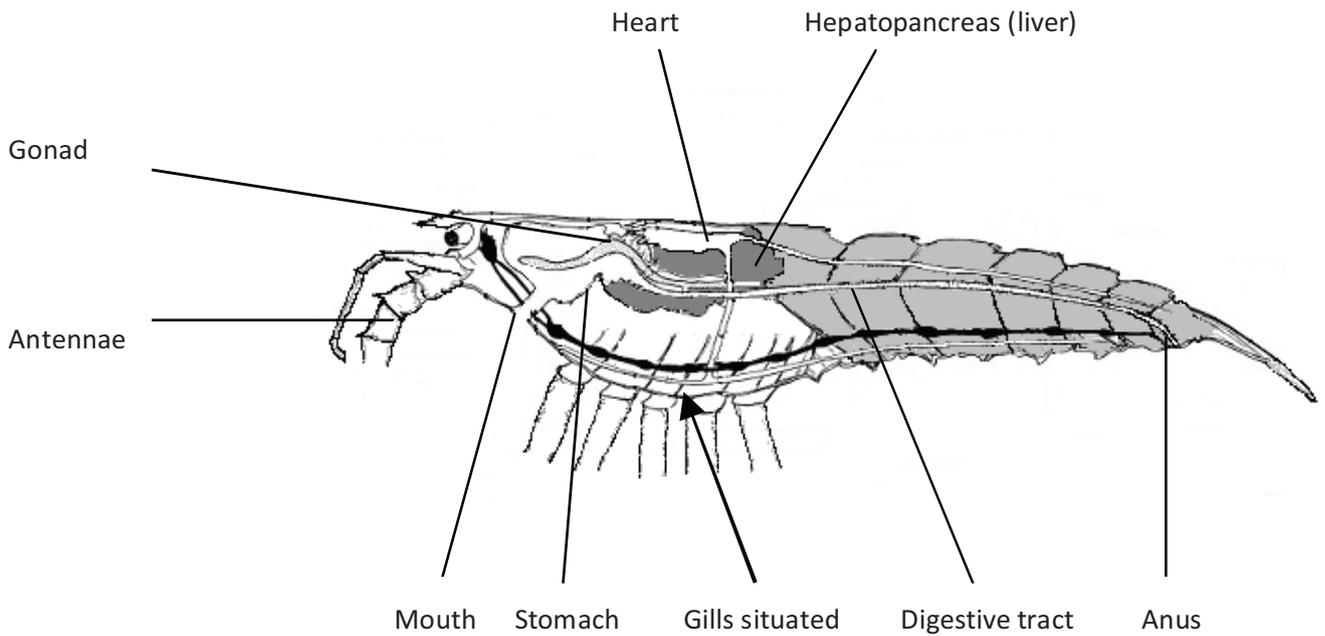
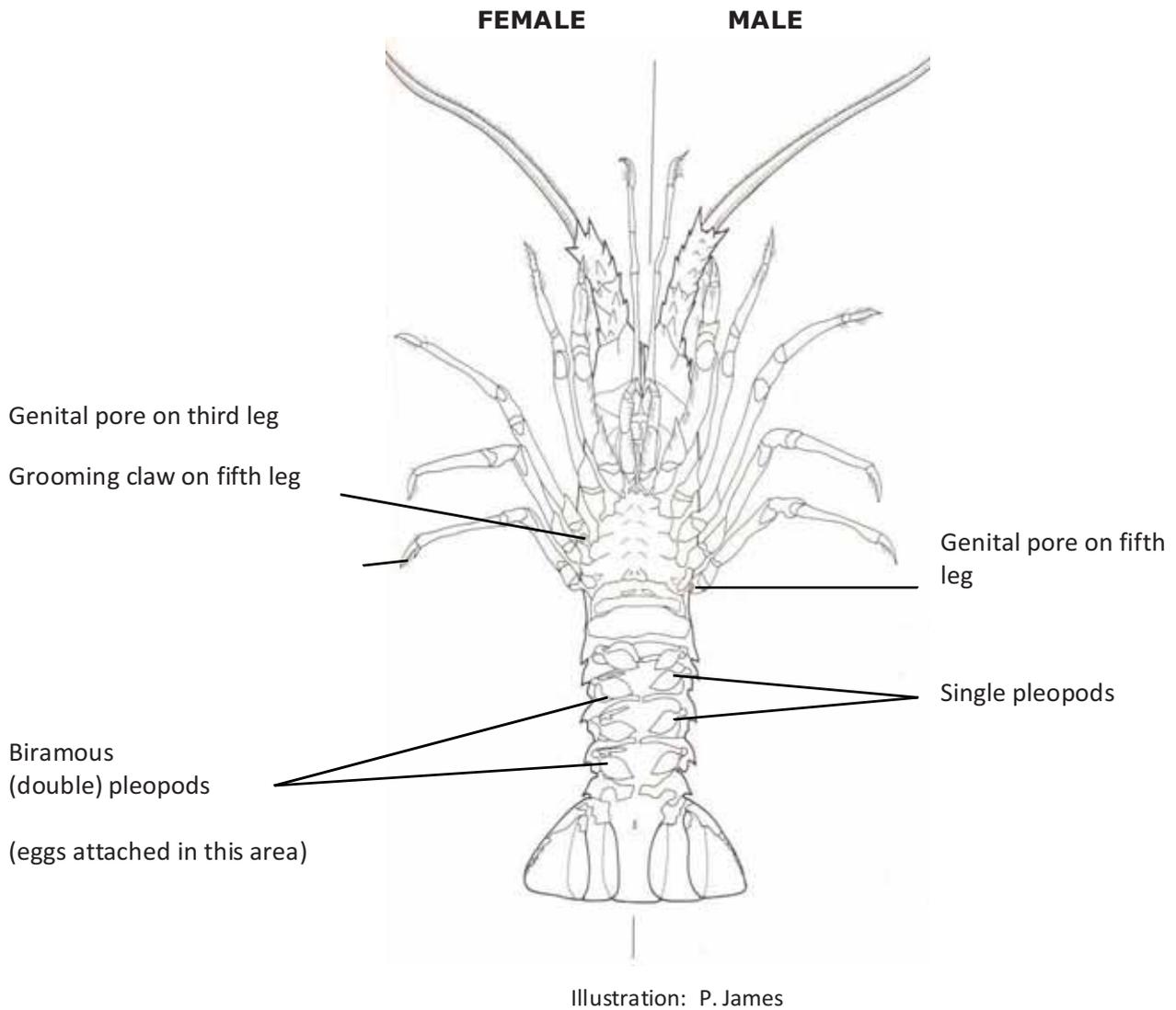


Illustration: G. Moss

Internal Feature	Function
Mouth	The mouth is for the ingestion of food. It has a series of appendages associated with it that help bring the food to the mouth and crush it before ingestion.
Gills	The gills, which sit under the carapace at the base of each leg, are used for the uptake of oxygen from the water and release of carbon dioxide
Heart	The heart pumps the blood around the body of the lobsters
Gonad	The gonad produces eggs or sperm for reproduction.
Hepatopancreas (or liver)	The hepatopancreas (or liver) produces the digestive fluids which break down the food that is eaten
Digestive tract	The digestive tract is used to absorb the nutrients from the food
Anus	The waste products of digestion are excreted through the anus

Sexual differences



Difference	Function
Genital pores	<p>Females. Positioned on the base of the 3rd walking leg for females so the eggs are extruded and pass through the sperm package the male deposits on her abdomen before attaching to the pleopods</p> <p>Males. Positioned on the base of the 5th walking leg for males so the sperm package is deposited below the female genital pores</p>
Grooming claw	<p>Present on the 5th leg of the female only, it is used for grooming the eggs when they are attached to the pleopods</p> <p>Not present on the males</p>
Pleopods	<p>Females have biramous (or double) pleopods. The innermost branches of the pleopods are covered with long hairs for the attachment of the eggs. The female keeps the eggs aerated by slowly beating her pleopods.</p> <p>Males have single pleopods</p>

Feeding, Reproductive Cycle and Life Cycle

Food and feeding

380. Lobsters feed on a wide range of small shellfish, crabs, starfish and kina, depending on local availability. They generally hold the prey with their front legs and crush it in their mandibles (or mouthparts).



Photo: A Blacklock

Moulting and mating

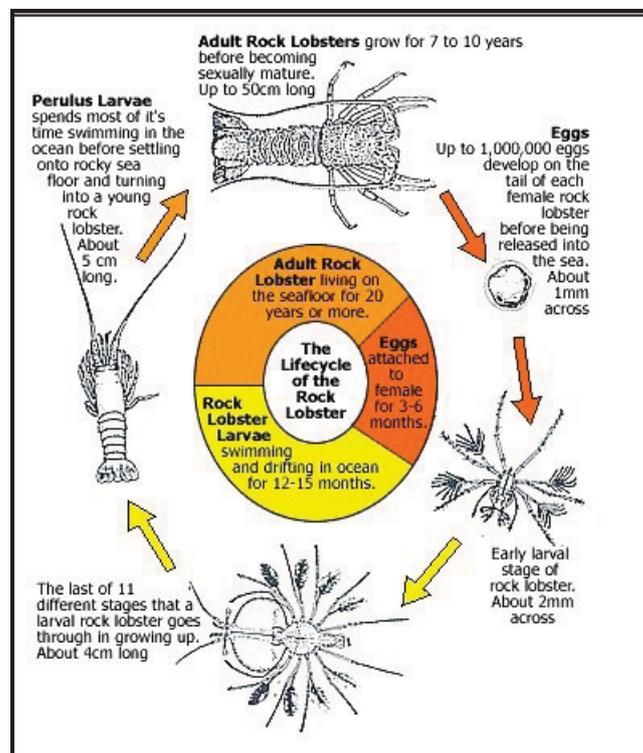
381. Female lobsters can only mate when the carapace is soft (i.e. within a few weeks of moulting). Red rock lobsters moult as early as late February in southern waters, but not until late June in warmer northern waters, and shortly after moulting (2 hours to 63 days) do they mate [2]. Lobsters are selective about who they mate with; large males prefer to mate with large females and females also prefer the largest male available.
382. Once a mate has been selected the lobsters begin courtship which may last just a few minutes or several days. When they are ready to mate they rear up, belly to belly and embrace before toppling over with the female uppermost. The male then deposits a sperm package (or spermatophore) onto the belly of the female.
383. The sperm package begins to disintegrate immediately, so the female rapidly starts to extrude her eggs. Normally she will cling to a rock face head up and form a brood chamber with her tail, spreading the tail fans to cover the genital pores and the sperm mass. Eggs are extruded from the genital pores and fertilised as they pass through the sperm package before attaching to the long hairs on the pleopods, under the tail. Small females may extrude as few as 20,000 eggs while large females may produce up to half a million. The fertilised eggs are carried for between 3 and 5 months, before hatching.
384. Large males become aggressive during the mating season, which usually results in one male per den. Females are also less likely to shelter together during mating when they are competing for the large males.



Berried female with newly deposited eggs under her tail

Photo: A. Blacklock

LIFE CYCLE OF RED ROCK LOBSTER



ROCK LOBSTER LIFE CYCLE Source: MFish 2005

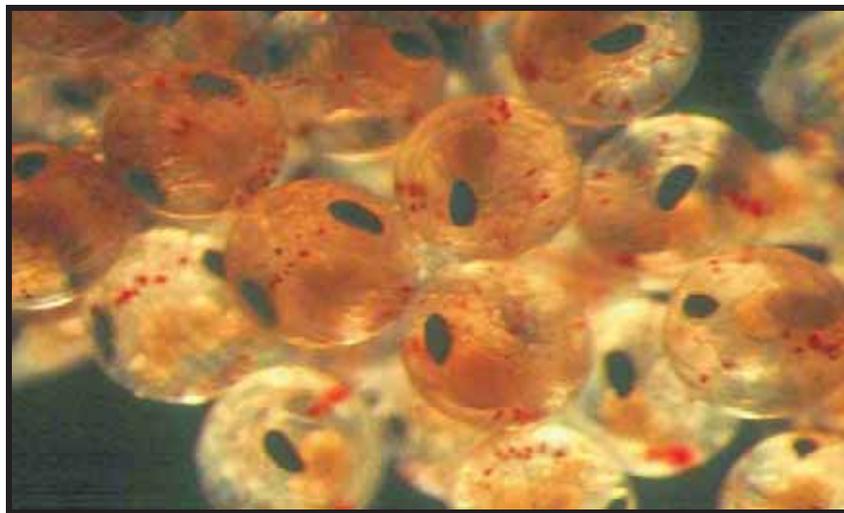
Life Cycle Summary

- a) Lobsters have a long and complex life history
- b) The adults mate and the females carry eggs (berried) for 3-5 months

- c) Larvae hatch and swim in the open ocean for 18-24 months, during which they undergo numerous moults and changes (11 phyllosoma stages)
- d) The puerulus stage settles and moults into the juvenile stage
- e) Juveniles mature and become adults after 4-5 years

Eggs and hatching

385. Females carry the eggs under the tail for 3-5 months. During this time the female keeps the eggs aerated by slowly beating the pleopods and groomed using small pincers on her rear walking legs. The embryos in the eggs develop through a number of stages, developing prominent eyes and legs (below), before becoming ready for hatching [3].



Well developed eggs just prior to hatching

Photo: L. Tong

386. Hatching occurs at daybreak during the spring. The female stands on tips of her legs with her tail held upright into the water current. She vigorously beats her pleopods for a few seconds, which releases a swarm of the first larval stage (naupliosoma). The eggs hatch into spider-like larvae which drift in the water for 12 -15 months, growing to around 50 mm in length before returning to inshore areas to settle on the seafloor.

Larval stages

387. Naupliosoma larvae swim up to the light and within minutes moult into the transparent second stage Phyllosoma larva (below left). This small spider like creature has a body about 2 mm in length.

388. The phyllosoma stages are carried seaward by ocean currents and spend the next 18-24 months growing through eleven phyllosoma stages and seventeen instars, up to 1000 km from

the shore. The long larval life and poor swimming of the phyllosomas mean that they get carried about by currents and caught up in eddies.

Phyllosoma Larva in 2 different stages

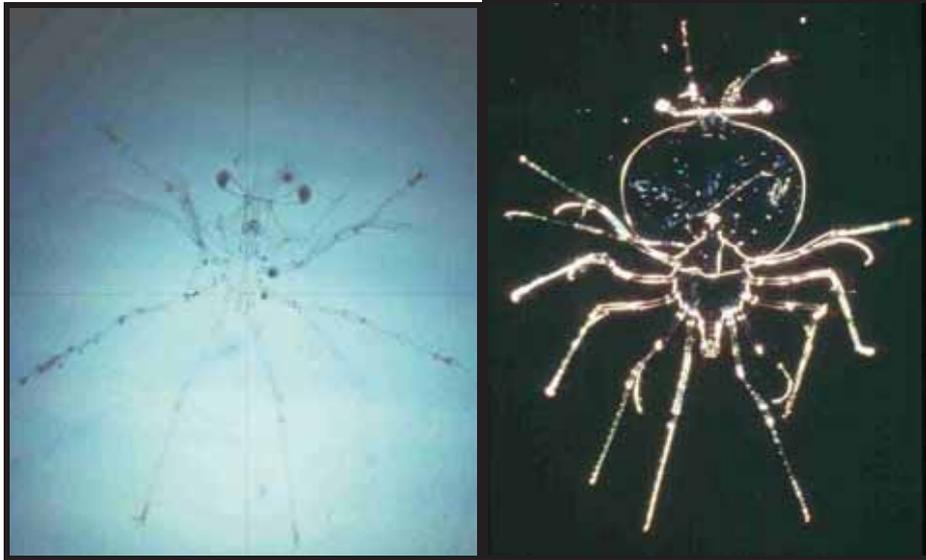


Photo: G. Moss

Photo: A. Blacklock

389. When they reach about 35-50 mm, the leaf-shaped phyllosomas (above right) metamorphose into the puerulus stage.
390. Pueruli look like small (25 mm) transparent juvenile lobsters (below). They are good swimmers and can swim up to 150 km to the shore. During this stage they do not feed and survive on fat stores laid down by the phyllosoma stages.



Puerulus stage

Photo: A. Blacklock

Settlement, juvenile stage

391. Pueruli that successfully reach the shore, settle into small holes and crevices on shallow reefs and within 2-3 weeks moult into the juvenile stage and start to feed. Juveniles mature and become adults after 4-5 years.

Moulting and growth

392. Lobsters have a hard shell (or 'exoskeleton') and in order to grow they must shed this shell (below) and replace it with a bigger one.



Intact moult from a juvenile lobster Photo: G. Moss

393. Before moulting ('ecdysis') the lobster begins to grow a new layer of exoskeleton beneath the old shell and begins to remove calcium from the old skeleton. When the lobster is ready to moult the membrane on the back of the lobster, between the carapace and the tail, splits and then the animal pulls itself out of the old shell. The lobster then takes up water, to swell up and enlarge the new shell, before re-depositing the calcium and hardening the new shell.
394. This process of shedding the shell (or 'moulting') occurs frequently in small lobsters (4-6 weeks) when they are growing rapidly but usually occurs once a year in adult lobsters. The amount of growth is dependent on the size of the lobster the temperature of the seawater in which it has been held and the amount and type of food it has eaten.

Migrations

395. In spring and early summer some juveniles migrate against the prevailing current. It is believed these migrations help counter the effect of downstream larval drift. Adult lobsters undertake seasonal inshore-offshore movements associated with moulting, breeding and feeding.

Size at onset of maturity

396. The size at onset of maturity for female rock lobsters, *J. edwardsii*, has been defined as the size or size class at which 50% of the rock lobsters in a sample are mature. Animals are regarded as mature if they are bearing external eggs attached to the pleopods or if there are well developed setae on the endopodites of the pleopods.
397. Immature females usually moult twice a year until maturity, then annually. Where size at 50% maturity is large, some females may begin moulting once a year before maturity.
398. The size at which 50% of females are mature varies considerably for *J. edwardsii* throughout New Zealand, from 72 mm Carapace Length (CL) near Gisborne to 121 mm CL in eastern Foveaux Strait. This size appears inversely related to water temperature. No data are available from the Chatham Islands.
399. Size at 50% female maturity in most areas is less than the minimum legal size of 60 mm tail width (TW) (approximately 93 - 98 mm CL). Most females from these areas breed at least once before reaching the minimum legal size. However, from Banks Peninsula through western Foveaux Strait (CRA 7 and part of CRA 8), size at 50% maturity is greater than the minimum legal size. The effects of this are not known, but these areas have sustained high catches over time.
400. At sexual maturity the female lobster's pleopods increase in size and the inner branch grows a fringe of pale hairs to which the eggs attach after mating. The males mature at about the same size but there are no obvious external changes. Large male red rock lobsters have been measured at 23 cm carapace length (54 cm body length) and weighing 5.4 kilograms. Females have reached 17 cm carapace length (45 cm body length) and weighing 2.3 kilograms [5].
401. Most mature *J. edwardsii* females moult and mate some time between February and May. Females carrying eggs occur in greatest numbers from April to October, though a few are found during any month of the year. Females bear eggs only once each year and most mature females carry eggs during the egg-bearing season. Successful reproduction requires mature male and female lobsters of similar size.
402. The number of eggs carried by *J. edwardsii* depends on size, ranging from about 125,000 for a female of 95 mm carapace length (CL) to about 540,000 for one of 170 mm CL.
403. Most mature female *S. verreauxi* moult between July and November, bear eggs during late September to January, and hatch the eggs from December to January. The number of eggs carried by *S. verreauxi* ranges from about 375,000 for a female of 152 mm CL to 2,000,000 for one of 230 mm CL.
404. Rock lobsters of both species develop through a series of stages from egg to adult. Fertilised eggs are attached to pleopods (swimmerets) on the underside of the female's tail. The eggs develop for 3 to 6 months and hatch as small nauplisoma larvae. Within a few days these metamorphose into phyllosoma larvae, which develop through 11 stages during the 10 to 20

months they spend in the ocean. The last phyllosoma stage metamorphoses into the puerulus larva, a strong swimmer that returns to the coast and moults into the first juvenile stage if it finds suitable substrate.

Larval Distribution and Recruitment

405. An extensive distribution of phyllosoma and puerulus larvae of *J. edwardsii* has been observed in areas along the east coast of the North and South Islands, and the Tasman Sea, to areas outside the EEZ boundary. Information on larval settlement patterns is available from several parts of the country.
406. Most late-stage phyllosoma larvae occur beyond the edge of the continental shelf to 1100 km from the coast. Larvae undergo diurnal vertical migration, moving into the top 150 m of the water column at night and dispersing in deeper water during the day. It is possible that late stage phyllosoma larvae delay metamorphosis to the puerulus stage, perhaps until they encounter an environmental cue such as lower salinity shelf water.
407. Puerulus larvae are most common in the plankton within the shelf edge. They are near the sea bottom during the day and rise in the water column at night. They have been observed to settle on the sea bed at depths to 10 m.
408. The puerulus settlement season varies with locality. Along the east coast of Northland and the Bay of Plenty the main settlement season is probably summer; from East Cape through Cook Strait settlement occurs in both summer and winter. Autumn appears to be the main settlement period in the north-east of the South Island; winter and spring are the main settlement seasons south of Banks Peninsula; year-round settlement is possible along the west coast of the South Island.
409. The highest larval settlements have been seen along the east coast of the North Island south of Matakaoa Point, the northeast and south coasts of the South Island and the north Taranaki coast.
410. Because of the long larval life, the origins of larvae are difficult to determine. Larvae hatched in one area may be retained in that area by local eddy systems carried to other areas by currents, or lost to New Zealand entirely. Eddy systems have been identified off the east coast North Island that may help to retain larvae within this area. However, for most areas larvae may originate a considerable distance from the settlement site.
411. The only known large breeding population of *S. verreauxi* is near Cape Reinga. The larval life is probably similar to that of *J. edwardsii*. The developing phyllosoma larvae are probably carried by the East Auckland Current towards the Bay of Plenty. The puerulus larvae probably settle out of the plankton at various sites along this coast. A few larvae may be transported south of East Cape, but most either settle out before reaching this area or are lost to the north-east, towards the Kermadec Trench.

Age and Growth

412. Rock lobsters, as do all crustaceans, increase in size by moulting. Growth rate is a function of both moulting frequency and moult increment. Because rock lobsters lack structures that would allow them to be aged, growth has been estimated from size-frequency distributions and tagging experiments.
413. Estimates of the growth rates for small *J. edwardsii* are available from the Gisborne area and Stewart Island. Males and females in Gisborne both reach about 38 mm CL one year after settlement and about 58 mm CL after two years. At Stewart Island, after one, two and three years they have reached 33 mm, 52 mm, and 68 mm CL.
414. Growth rates of larger animals have been estimated for a number of areas. The estimates of growth per moult, moult frequency, and annual growth vary between areas and between the sexes for the same area. The estimates come from ongoing tag release and recapture studies across most rock lobster management areas.
415. In most areas moulting is seasonal, with immature and mature animals of both sexes having their own distinct periods, which may vary between areas. Smaller males (between about 70 mm and 80 mm CL) from most areas generally moult twice a year. Large males moult once each year; very large males may moult even less often.
416. Information on the growth rate of *S. verreauxi* is limited mainly to animals between 120 mm and 159 mm CL. Males and females between 120 mm and 139 mm CL moult at least once a year, between July and November, and perhaps twice, with an increment of about 7 mm CL per moult. Animals between 140 mm and 159 mm CL moult once a year between July and November, with an average increment of about 6.8 mm and 6.0 mm CL for males and females respectively.

Movements

417. For management, the most important movements would be large-scale migrations or inshore-offshore movements. Extensive tagging of *J. edwardsii* has been conducted in many areas. In most areas fewer than 5% of the returns have moved more than 5 km. Such areas include Tauroa Point, Banks Peninsula, Gisborne, Wellington, and Fiordland.
418. Movement patterns in southern New Zealand appear to involve two groups of animals: “run” rock lobsters that migrate over long distances, and “resident” rock lobsters that do not. In most studies, only up to 4% tagged lobsters moved significantly from the release site. However, when “run” lobsters were tagged, between 27.6% and 38.6% recaptures showed long-distance movements.
419. The long-distance movements of *J. edwardsii* tagged in southern New Zealand tend to be directional: southward along the Otago coast and the east coast of Stewart Island, westward through Foveaux Strait and northward along the west coast of Stewart Island and the Fiordland coast, in opposition to the prevailing current systems. These movements also

appear to be seasonal, usually occurring off the Otago coast and through Foveaux Strait from September through November and along the Fiordland coast during November through January. Most migrating females are immature, moving from Otago and Foveaux Strait, which have a large size at 50% maturity to Fiordland, with a smaller size at 50% maturity. These movements may be a “contranant migration” in which animals migrate against the current that carries the larvae.

420. The long-distance movements of *S. verreauxi* in northern New Zealand also appear directional. All but two recaptures tagged at North Cape moved to the west or southwest, most to near Cape Reinga. Of the female recaptures, only 10% were mature when tagged, but 80% were mature when recaptured. Only 10% of the females tagged at North Cape had setae on the pleopods, but 80% had setae when recaptured. This may be another contranant migration, with juveniles at about the time of maturation near North Cape moving towards Cape Reinga, where the only large breeding population of this species is known.
421. There may also be a return movement towards the north against the prevailing current system along the east coast of the North Island by juvenile *S. verreauxi*. Most of the sublegal lobsters and immature females tagged between Bream Bay and Mahia moved north or west before recapture. Large numbers of sublegal animals are found on the east coast south of North Cape, but some legal-sized mature females are also found in this area. Thus juveniles from this area may also move towards Cape Reinga just before attaining sexual maturity.

Stock units and fisheries

422. The rock lobster fisheries extend from the Three Kings Islands in the north to the Snares Islands in the south, and to the Chatham Islands in the east. The main fishery is for *J. edwardsii* (CRA), which accounts for nearly all landings. There are currently ten quota management areas for CRA although one (CRA 10) is only an administrative designation and no fishing of any consequence is carried out there.
423. *S. verreauxi*; (PHC) is caught mainly in the north of the North Island and there is only one quota management area for all New Zealand waters.
424. Preliminary morphometric studies conducted on run and resident lobsters near Stewart Island show that the two groups can be distinguished on the basis of the telson length to carapace length ratio, but such differences may be environmentally induced.
425. The lack of genetic differences among areas, the long larval phase and long-distance movements of adults in some areas all suggest a single *J. edwardsii* stock around the mainland.
426. Recent stock assessments have addressed individual CRA areas (CRA 7 and CRA 8 in 2006; CRA 4 in 2003 and 2005; CRA 3 in 2001, 2004 and 2008; CRA 5 in 2003; CRA 1 and CRA 2 in 2002).
427. For earlier assessments, the seven principle mainland areas were grouped on the basis of similarities in relation to size at maturity, the timing of biological cycles, and the perceived

interchange between areas. CRA 7 and CRA 8 are designated the “NSS” sub-stock. CRA 1 and CRA 2 are called the “NSN”, and CRA 3, CRA 4, and CRA 5 are called the “NSC”.

428. Genetic and morphometric samples have not been collected at the Chatham Islands, and, because of their geographical isolation, the rock lobsters from this area are also treated as a separate stock for management purposes.
429. Genetic and morphometric samples have not been taken for *S. verreauxi*. Because of the limited distribution of mature females near Cape Reinga, and the highly directional movements of tagged animals to this area, the species is considered a single stock.

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Glossary of Terms

Term	Explanation
Carapace	The part of the shell that covers the head and body of the lobster
Carbon dioxide	The waste product of respiration it passes out of the gills. Carbon dioxide dissolves in water to form a weak acid
Compound eyes	An eye, like that of insects, made up of numerous separate light sensitive units.
Eddies	Currents of water that move in a circular motion, like giant whirlpools.
Exoskeleton	The hard external skeleton (or shell) of the lobster
Gregarious	Living together in groups
Maturity	When the lobster becomes an adult and is able to reproduce
Membrane	The skin covering a part of the body
Metamorphose	To undergo a complete change of physical form from the larval stage to the juvenile stage
Migrate	To move from one area or habitat to another
Moulting	The process of shedding the hard shell (or exoskeleton) in order to grow a new and bigger shell.
Naupliosoma	The first stage larva that hatches from the egg. It lasts only a few minutes before moulting into a phyllosoma
Phyllosoma	The majority of the larval stages of the lobster. Phyllosoma spend 18 months to 2 years floating (and swimming in the plankton).
Pueruli	The final larval stages of the lobster. Pueruli actively swim to shore to settle and become juvenile lobsters
Salinity	The amount of salt in the seawater. This can change in seawater with evaporation or inflow of freshwater from rain or rivers
Seamounts	Underwater mountains rising from the ocean floor

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Additional Information can be found at: –

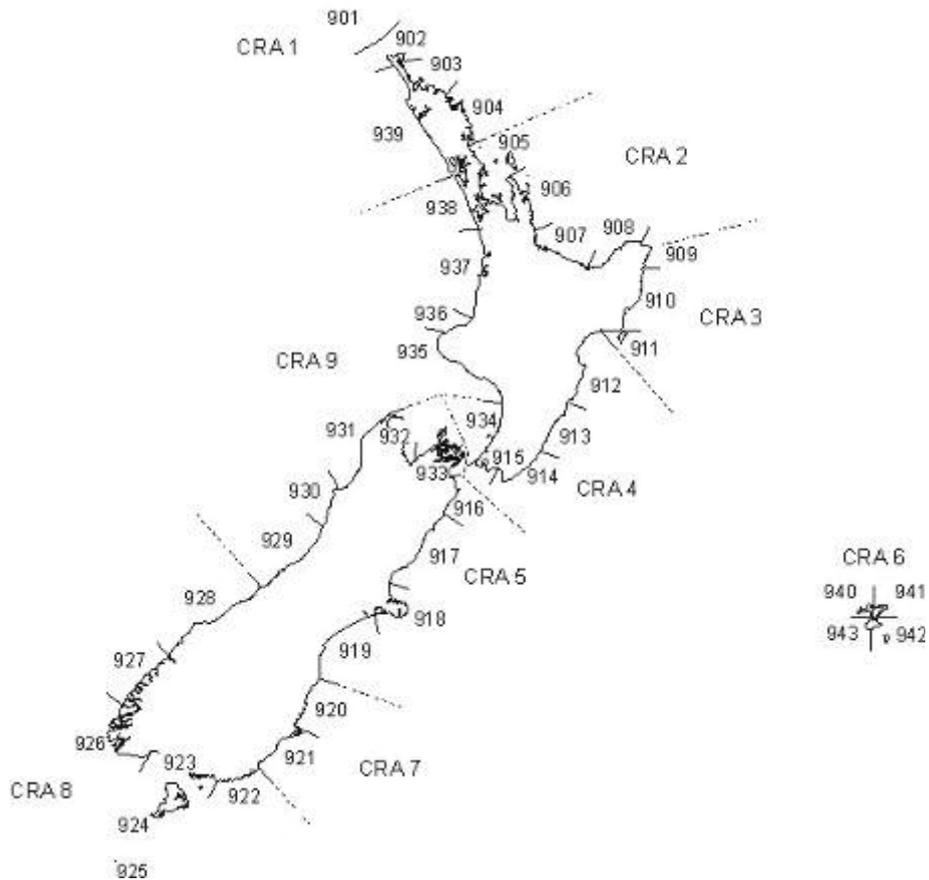
www.fish.govt.nz

www.nzrocklobster.co.nz

STOCK SUMMARIES

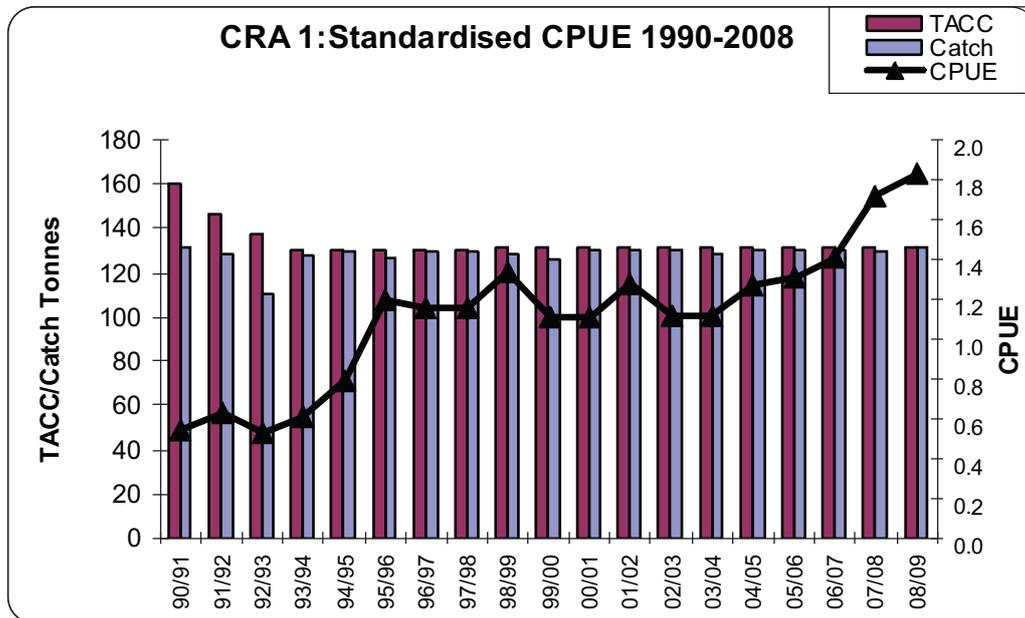
13. STOCK SUMMARIES

430. This section outlines the principal rock lobster fishing activities in each of the quota management areas and a brief summary of stock status taken from the most recent assessments.



Rock lobster fishery management areas (CRA 1 – CRA 9) and statistical areas used for commercial catch and effort reporting.

14. CRA 1

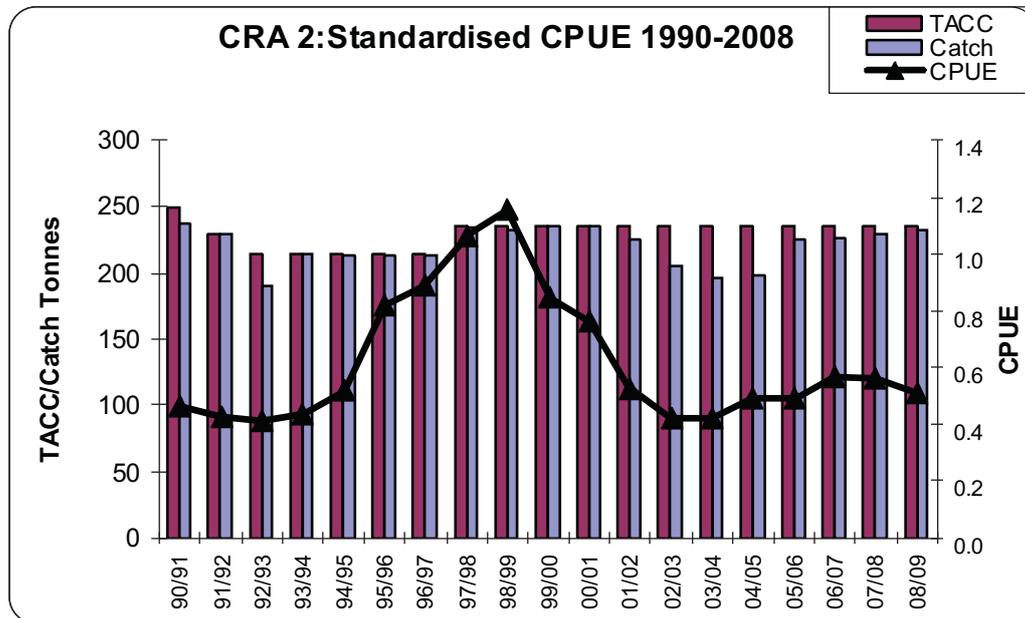


431. The CRA 1 fishery extends from the Kaipara Harbour on the west coast of the North Island around North Cape and then south to Waipu. The commercial fishery extends offshore to the Three Kings, but the bulk of the commercial harvest is taken from waters adjacent to the mainland. No TAC has been set for this fishery. The 130.46 tonnes TACC has remained unchanged since April 1993.
432. The last stock assessment for CRA 1 was made in 2002 (Starr *et al.* 2003), with the version of the Bayesian length-based rock lobster model used at that time. This was fitted to historical catch per day, daily CPUE, size data from market sampling, voluntary logbooks and observer catch sampling, and tag-recapture data. Changes in MLS and selectivity caused by escape gap regulations were taken into account.
433. The assessment used performance indicators based on biomass levels for the ten years 1979–88, a period during which biomass was relatively stable.
434. The assessment suggested that CRA 1 biomass (vulnerable biomass in autumn-winter) decreased to a low point in 1973, increased through the early 1980s, declined again until the early 1990s (but not as low as in 1973), increased strongly in the late 1990s and then declined to 2002. The assessment suggested that 2002 biomass was 150% of *Bref* (5% to 95% limits 130 to 180%) and that biomass projected over five years would stay roughly the same (but with high uncertainty, ranging from 35% decrease to 60% increase).
435. Since 1993 the TACC has remained the same, and since 2000 the TACC has been fully caught. As predicted by the stock assessment, CRA 1 CPUE showed little change for the five years after

2002, but the 2009 CPUE is 30% higher than in 2002, suggesting a recent increase in stock abundance. Combined with the previous assessment, this suggests a stock well above *Bref*.

436. The 130.46 tonnes CRA 1 TACC is distributed amongst 24 quota share owners. Thirteen permit holders reported CRA 1 catches in 2008/09. The estimated landed value of the commercial catch was \$6.4 million (based on average port price paid to fishermen), making rock lobster an important contributor to the local and regional economy.
437. Amateur catch of rock lobster is estimated at 47 tonnes (MFish 1996). Diving using UBA is the predominant method used by amateur fishermen and women, although hand gathering, ring potting, and potting from vessels are also used.
438. Rock lobsters have cultural significance to local Maori and a large Maori population in the Northland region ensures that rock lobster retains significant customary value. No reliable estimates are available for customary catch. The progressive implementation of reporting procedures within the North Island Customary Regulations might assist in future evaluations of customary harvest for the CRA 1 fishery.
439. CRA 1 stock status is assessed using commercial catch and effort and quota monitoring report data. Tag, release and recapture projects have been updated 1996. In addition, the CRA 1 commercial stakeholders enable intensive observer catch sampling sequences for the fishery. The CRA 2006-03 research contract provides for catch sampling sequences to be done annually until 2010.

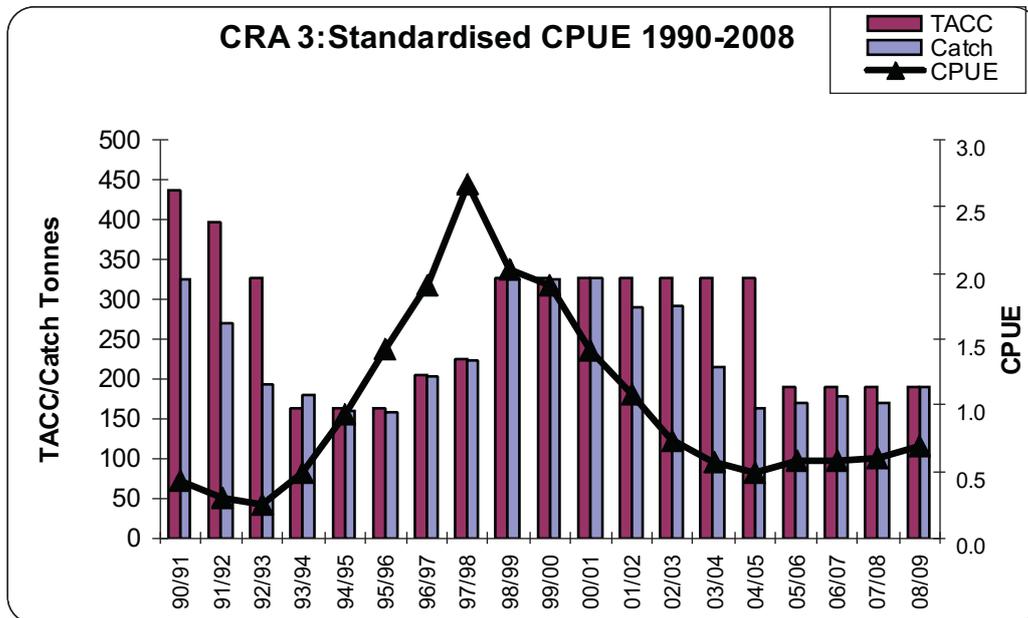
15. CRA 2



440. The CRA 2 fishery extends from Waipu through the Hauraki Gulf and Bay of Plenty to East Cape. The current 452.6 tonnes TAC for the fishery was set in 1997. The TAC is comprised of 140 tonnes for amateur catch, 16.5 tonnes for customary harvest and 60 tonnes for illegal removals. The current TACC is 236.1 tonnes.
441. The last stock assessment for CRA 2 was made in 2002 (Starr *et al.* 2003), with the version of the Bayesian length-based rock lobster model used at that time. This was fitted to historical catch per day, daily CPUE, size data from market sampling, voluntary logbooks and observer catch sampling, and tag-recapture data. Changes in MLS and selectivity caused by escape gap regulations were taken into account.
442. The assessment used performance indicators based on biomass levels for the ten years 1979–88, a period during which biomass was relatively stable.
443. The assessment suggested that biomass decreased to a low point in 1977, increased to 1980, declined slowly through 1988, increased strongly to a peak in 1998 and then declined again to 2002. The assessment suggested that biomass in 2002 was 150% of *Bref* (5% to 95% limits 130 to 170%) and that biomass projected over five years would stay roughly the same (but with high uncertainty, ranging from 35% decrease to 60% increase).
444. Since 1997 the TACC has remained the same, and since 1993 the TACC has been more than 85% caught, except for 2002–04, averaging 85%. As predicted by the stock assessment, CRA 2 CPUE showed little change for three years after 2002, then increased by about 20%. Combined with the previous assessment, this suggests a stock well above *Bref*.

445. The 236.1 tonnes TACC is distributed amongst 41 quota share owners. In 2008/09 there were 32 vessels reporting commercial catches. The main operating period for commercial vessels generally extends from June to January. The estimated landed value of the CRA 2 catch is \$12.1 million (based on average port price paid to fishermen) and the industry sustains a number of processing and export companies in Tauranga, Whitianga, and Auckland.
446. Amateur catch in this fishery is estimated at 140 tonnes (MFish 1996). Potting and diving are the preferred methods, and there is a large recreational charter vessel industry catering to the sector.
447. Customary catch is conservatively estimated at 16.5 tonnes. Anecdotal evidence in recent seasons suggests that the actual harvest may have been much greater. Rock lobsters have cultural significance to local Maori and a large Maori population in the Bay of Plenty region ensures that rock lobster retains significant customary value.
448. The CRA 2 Rock Lobster Company Ltd is the representative commercial stakeholder group for this region. The Company has made significant investments in rock lobster research since its formation in 1995, including a comprehensive vessel logbook programme, tag and release projects, and sequences of intensive catch sampling to MFish standards and specifications. These data continue to be collected. The CRA 2 Company has completed an Electronic Logbook trial intended to collect finer scale commercial catch and effort data and has recently agreed to purchase additional units for distribution to Logbook participants.
449. Stock monitoring activities for the 2009/10 season include the continuation of logbook coverage, intensive catch sampling sequences within season, and tag recapture reporting. Similar coverage is contracted forward to 2011.

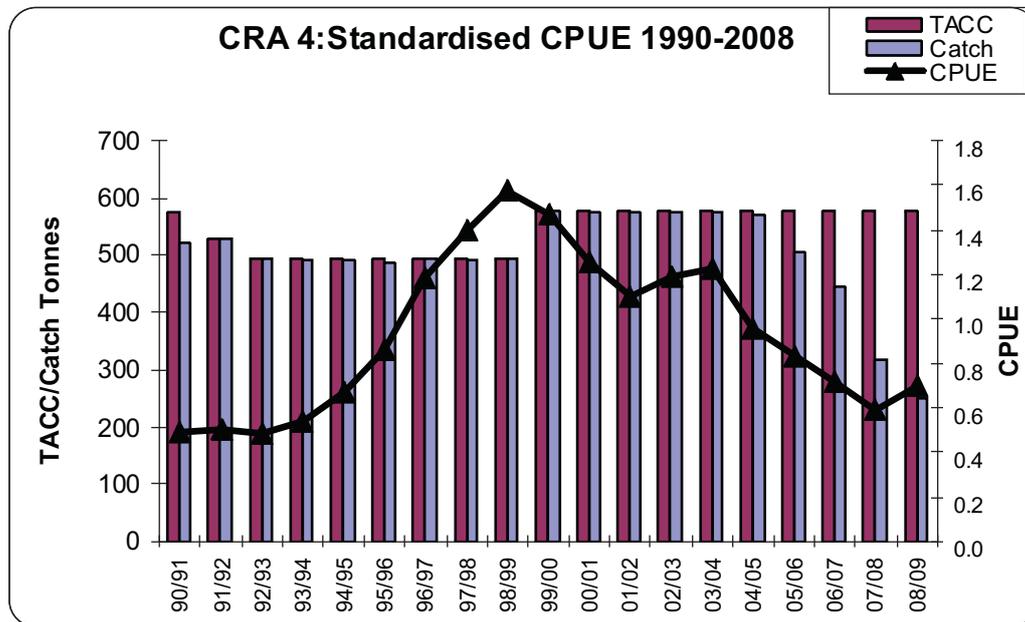
16. CRA 3



450. The CRA 3 fishery extends from East Cape south to the Wairoa River.
451. The most recent stock assessment for CRA 3 was made in 2008 (Starr *et al.* 2009; Breen *et al.* 2009a). This used the multi-stock length-based model (MSLM) of Haist *et al.* (2009), but with modifications that were necessary to address a change in growth rate that was apparent between older and newer tag-recapture data. The model was used as a single-stock model for this assessment.
452. The model was fitted to tag-recapture data from 1975–1981 and from 1995–2006, standardised CPUE from 1979–2007, historical catch rate data from 1963–1973 and length frequency data from commercial catches (log book and catch sampling data) from 1989 to 2007.
453. Indicators were based on AW vulnerable biomass and included current biomass, *B2008* and projected biomass, *B2012*. A *Bmsy* indicator was calculated with deterministic projections for 50 years that used mean recruitments from 1979-2004. There were some problems: *Bmsy* calculations were very sensitive to mean recruitment, and assumptions about non-commercial catches were necessary. In addition, the Bayesian uncertainty part of the assessment showed problems.
454. The assessment showed that biomass declined until 1989, increased strongly in the 1990s followed by a sharp decrease. The assessment suggested that 2008 biomass was 50% (5% to 95% range 40 to 65%) of *Bmsy*. At the then-current TAC, biomass was projected to decline by 25%. As a result, the TAC was reduced to a level which gave a 50% probability of increase over 5 years.

455. The assessment was not updated in 2009, but the model was updated with the most recent CPUE data in connection with development of a CRA 3 management procedure (Breen *et al.* 2009b). For this work, the RLFAWG agreed to discard the *Bmsy* indicator and adopt a target indicator *Bref* based on autumn-winter vulnerable biomass in 1974–79, adjusted for changes in MLS, selectivity and the change in growth rate. The model showed that biomass in 2008 was less than *Bref*. The 2009 autumn-winter CPUE was 0.94, while CPUE associated with *Bref* has a median of 1.14 kg/potlift. CPUE has increased over the past two years.
456. The current 293 tonnes TAC is comprised of a 20 tonnes allowance for amateur catch, a 20 tonnes allowance for customary harvest, an 89 tonnes allowance for illegal removals and a TACC of 164 tonnes.
457. The TACC is distributed amongst 41 quota share owners. In 2009 CRA 3 landings were reported by 26 commercial vessels. There is significant Iwi involvement in quota share ownership and fishing. The commercial harvest has an approximate landed value of \$9.7 million (based on average port price paid to fishermen). There are two processing plants in Gisborne, and product is also shipped to Wellington, Tauranga and Auckland for processing and export.
458. Amateur catch is currently unknown but was estimated at 14 tonnes (RLFAWG 2001), although an allowance of 20 tonnes was again made in the 2005 TAC decision. Potting and hand gathering are the preferred amateur fishing methods.
459. Rock lobsters have great cultural significance to local Maori and there is a very high level of customary harvest activity. Customary removals are uncertain although an allowance of 20 tonnes was made in the 2009 TAC decision.
460. From May 2006 a multi-sector stakeholder group in Gisborne (the CRA 3 Multi-stakeholder Fishing Forum) has been working to develop a fisheries plan focussed on improving the status of the stock and addressing competing interests between extractive users. The CRA 3 Forum, assisted by MFish, produced a draft CRA 3 Fishery Plan in 2008 and assisted in the development of a CRA 3 Management Procedure during 2009.

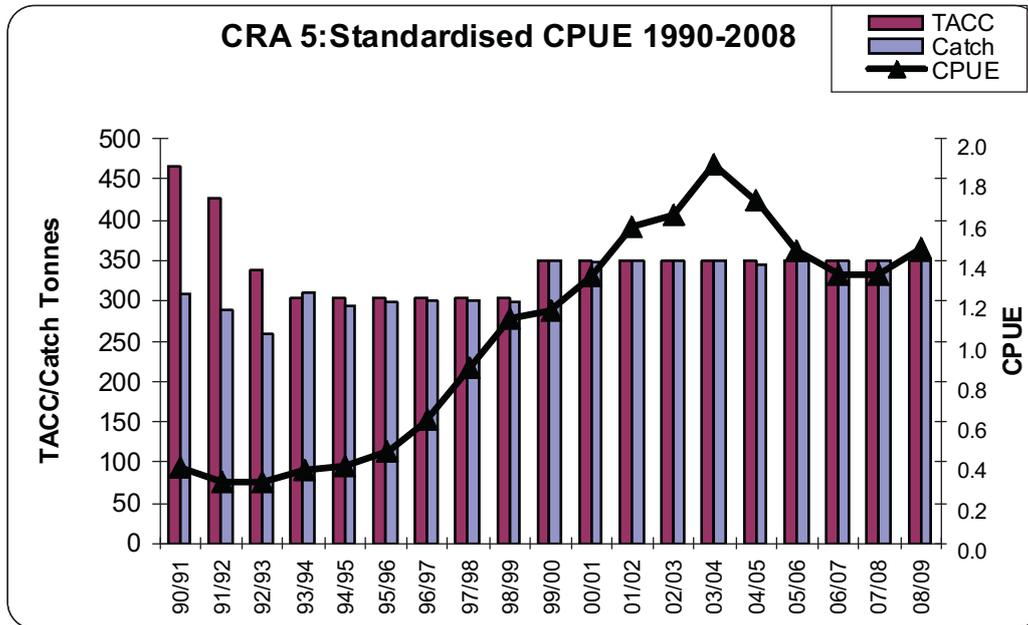
17. CRA 4



461. The CRA 4 fishery extends from the Wairoa River on the east coast, southwards along the Hawkes Bay, Wairarapa and Wellington coasts, through Cook Strait and north to the Manawatu River.
462. The most recent stock assessment for CRA 4 was in 2005 (Breen *et al.* 2006) with the version of the Bayesian length-based rock lobster model used at that time. This was fitted to historical catch per day, daily CPUE, size data from market sampling, voluntary logbooks and observer catch sampling, and tag-recapture data. Changes in MLS and selectivity caused by escape gap regulations were taken into account.
463. The assessment used performance indicators based on autumn-winter vulnerable biomass. *Bref* was the mean of 1979–88, a period when biomass was relatively stable. The assessment suggested that biomass decreased to stable but low levels throughout the 1980s and early 1990s, then increased strongly to a peak in 1998 and declined again. The assessment suggested that biomass in 2006 was 180% of *Bref* (5% to 95% limits 150 to 210%) and that biomass was likely to decline slightly in the next three years.
464. In the event, CPUE declined strongly from 2003 to 2007, and catch was less than the TAC from 2005. Industry-initiated catch reductions through ACE shelving were made in 2006 and 2007, based on a management procedure (Breen & Kim 2006), and this management procedure was adopted by the Minister of Fisheries in 2008. This initiative appears to have been successful, because autumn-winter CPUE has increased in the past two years. The current position of the stock relative to *Bref* is unknown.

465. The CRA 4 Management Procedure was used to guide the decision to adjust the TAC from 771 tonnes to 461 tonnes as from April 2009. The reduction was made by adjusting the TACC from 577 tonnes down to 266 tonnes – a level commensurate with the voluntary commercial catch limit then in place.
466. The current 266 tonnes TACC is distributed amongst 83 quota share owners. The CRA 4 commercial fleet comprised 42 vessels in 2009. The majority of vessels in the fleet operate from coastal bases in isolated rural areas on the Hawkes Bay and Wairarapa coastline. The CRA 4 commercial catch supports several processing and export operations in Napier and Wellington, and Auckland. The value of the 266 tonnes commercial catch was estimated at \$13.5 million in 2009.
467. The amateur catch is estimated at 73 tonnes (MFish 1996). Potting and hand gathering are the preferred methods for amateur fishers in this area. As in most CRA areas, the majority of amateur catch is taken in the summer months. The region sustains a recreational fishing and dive charter industry during those months.
468. During 2008 Zone 5 Big Game Fishing Council amateur fishing clubs implemented a voluntary daily bag limit reduction (from 6 lobsters per person per day to 4) to support the voluntary commercial reductions and efforts to increase abundance in the fishery. This initiative has been supported by the Te Kupenga Whiturauroa a Maui Kaitiaki Forum.
469. Aggregate customary harvest estimates for CRA 4 are not available, but the reporting requirements associated with the implementation of the North Island Customary Regulations should enable more informed decision making in future.
470. A comprehensive stock monitoring programme has been established in the CRA 4 fishery. There is a long time series of intensive catch sampling data from Napier, Castlepoint, Cape Palliser, and the Wellington south coast. This series was extended in the current season with a total of 32 sample days to be completed for the period May 2009 to February 2010 and further stock monitoring activities are confirmed through to 2011. Puerulus settlement is also monitored at several sites within CRA 4.

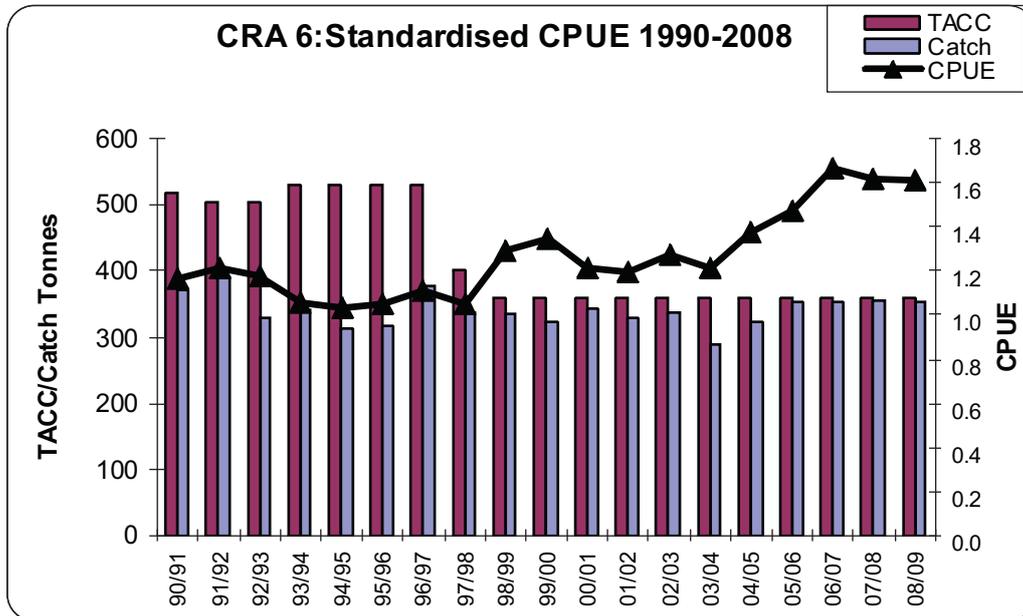
18. CRA 5



471. The CRA 5 fishery extends from the western side of the Marlborough Sounds across to Cape Jackson and then southwards to Banks Peninsula. There are three distinct regions of commercial fishing — Picton/Port Underwood, Ward-Kaikoura-Motunau, and Banks Peninsula, although a small number of commercial vessels work the area from Nelson through to D’Urville Island. The bulk of the commercial catch is taken from the area bounded by Tory Channel in the north and Motunau in the south.
472. The most recent stock assessment for CRA 5 was in 2003 (Kim *et al.* 2004) with the version of the Bayesian length-based rock lobster model used at that time. This was fitted to historical catch per day, daily CPUE, size data from market sampling, voluntary logbooks and observer catch sampling, tag-recapture data and a pre-recruit index from voluntary logbook data. Changes in MLS and selectivity caused by escape gap regulations were taken into account.
473. The assessment used performance indicators based on autumn-winter vulnerable biomass. *Bref* was the mean of 1979–88, a period when biomass was relatively stable. The assessment suggested that biomass decreased to a low point in the late 1980s, remained low through 1995, and then increased. The assessment suggested that biomass in 2003 was 200% of *Bref* (5% to 95% limits 175 to 220%) and that biomass was likely to decline by 15% over the next five years, but with very high uncertainty ranging from a 55% decrease to a 40% increase.
474. The TAC has remained the same since 1999, and TACC has been fully caught since 1993. From 2003 to 2008, CPUE declined by 15%, but increased in 2009 to 92% of the 2003 value. Combined with stock assessment, this suggests a stock well above *Bref*.

475. The current TAC of 467 tonnes was set in April 1999. In that decision 40 tonnes was allowed for amateur catch and 40 tonnes for customary catch. The TACC was increased from 303.7 tonnes to 350 tonnes. The allowance for illegal unreported removals is 37 tonnes.
476. Amateur catch is estimated at 35 tonnes (MFish 1996). The preferred methods for amateur fishing are potting and diving with UBA. Recreational rock lobster fishing and the dive charter industry are both growing in the region. Dive clubs in the region have actively reported tag recapture information and maintain an ongoing interest in the regional research programme.
477. There are low estimates of customary harvest in CRA 5.
478. There are 42 quota share owners in CRA 5. The fleet comprised 26 vessels reporting catch in 2009. Many commercial vessels work off beaches between Port Underwood and Motunau. The landed value of the commercial catch was estimated at \$18.1 million in 2008/09 (based on average port price paid to fishermen), and the fishery supports processing and export facilities in Ward, Kaikoura, and Christchurch
479. The CRA 5 industry members, through membership of their commercial stakeholder group CRAMAC 5, have encouraged and facilitated an ongoing dialogue with amateur fishing and dive clubs and with Iwi groups in the region. The responses to the process have been extremely encouraging in terms of future co-operative research and management initiatives.
480. CRA 5 has an intensive stock-monitoring regime in place. Intensive catch sampling and tag and release projects have been done as Fisheries Required Services, and CRAMAC 5 operates an extensive Vessel Logbook programme that provides data to the stock assessment process. Similar levels of stock monitoring are confirmed through to 2011.

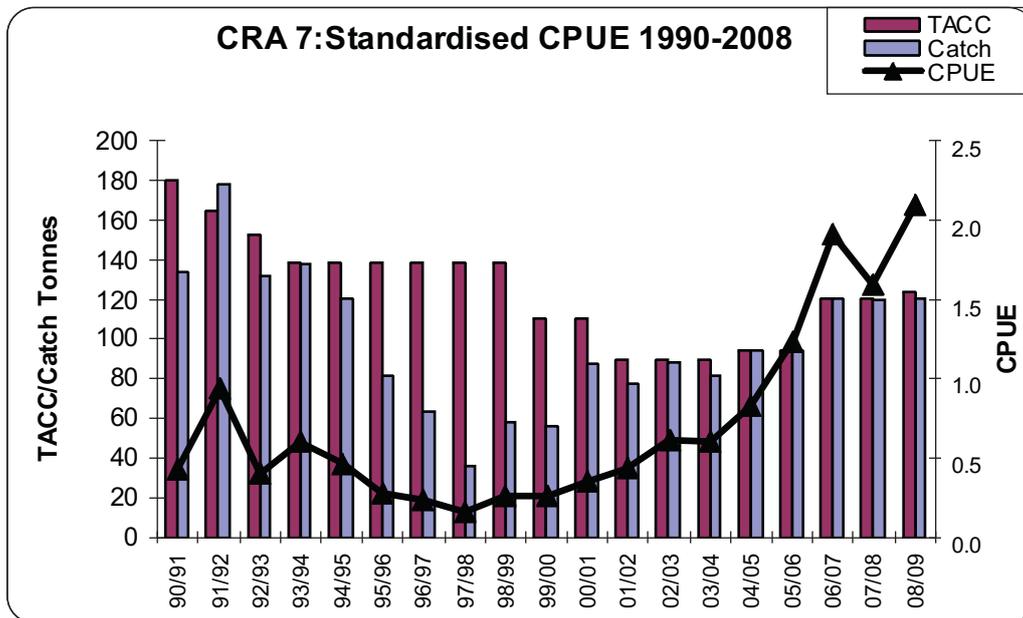
19. CRA 6



481. The region designated as CRA 6 is geographically very large, being all waters within a 200 nautical mile radius of the Chatham Islands and Bounty Islands, but the area being fished is restricted to a relatively narrow coastal margin adjacent to the Chatham Islands coastline.
482. The fishery is unique in that despite declines in landing and CPUE from historical levels; the lobsters caught generally comprise much larger size classes than are found in mainland fisheries. The length frequencies of the landed catch have changed little since the development of this fishery. Previous RLFAG reports have noted that the CRA 6 data are consistent with a stock model in which the biomass being fished is much smaller than the biomass of the contributing stock. The abundance of the standing stock in CRA 6 is possibly more dependent on immigration of larger lobsters into the area than it is on recruitment and growth.
483. The most recent formal stock assessment was in 1996 (Breen & Kendrick 1998). This used alternative methods, including a depletion model and a constant-production model. Both models assumed a constant level of annual productivity is independent of the stock size and thus outside the realm of *Bmsy* approaches.
484. In 2009, in association with management procedure development for CRA 6, both surplus-production and constant-production models were used and fitted to catch and CPUE data through 2008-09 (Breen submitted). The SP model implied that the stock is about half *Bmsy* and that yields could be doubled by rebuilding the stock to *Bmsy*. However, the constant-production model estimated production to be 376 tonnes (5% to 95% range 368 to 384 tonnes), and suggested that mean catch could be increased slightly from its current level. The catch data form a “one-way trip” and it is not possible to determine which model is better. Size structure has remained nearly the same over a long period, at least until very recently.

485. The TAC for CRA 6 has remained unchanged since 1998, but was less than 95% caught from 1990-2004 (except for 2000, on 95%). Since 2005 it has been 98% caught. CPUE has increased steadily by 25% since 1999.
486. The relation between the current stock size and a target level is unknown.
487. For the 1998/99 fishing year a TAC of 370 tonnes was set. A total of 6 tonnes was set aside for amateur catch and 4 tonnes was provided for customary catch. The TACC was reduced from 400 tonnes to 360 tonnes in response to MFish concerns over declining landings and declining CPUE. The TAC and TACC remain unchanged since April 1998 and CPUE has stabilised and continues to show incremental improvement.
488. CRA 6 is unique in that unlike all other CRA management areas, two harvest methods are allowed for commercial fishing. The bulk of the TACC is landed from vessels using pots, but there are limited numbers of method concessions issued for the fishery and divers take large quantities of lobsters in the summer months.
489. There are 50 CRA 6 quota share owners. Mainland New Zealand interests own the majority of quota. There are currently 35 vessels reporting CRA 6 landings and the number of divers is unknown although only 11 of the original method exemptions issued to qualifying persons between 1990 and 1993 were current during 2005-06. Additional divers operate under the authority of permits in the name of the consent holders.
490. The landed value of the commercial catch in 2008/09 was approximately \$15.7 million (based on average port price paid to fishermen). The fishery supplies processing and export facilities on the Chatham Islands and in Auckland, Wellington, and Christchurch.
491. The CRA 6 Industry Association established a Fishermen's Office at Waitangi in May 2000 and the NZ RLIC contracted an administrative officer trained by FishServe to co-ordinate the distribution and collation of Catch Effort Landing Returns and Monthly Harvest Reports for delivery to FishServe and to provide a range of additional administrative services to the Chatham Islands seafood industry.
492. There is no major research programme currently underway for the fishery because all previous research initiatives — intensive catch sampling, tagging, and juvenile abundance surveys — have delivered similar results. There are also high costs associated with research co-ordinated from the mainland. However, the CRA 6 Industry Association is managing a Vessel Logbook programme, such as used in CRA 2, CRA 5, and CRA 8, to collect size frequency and abundance information.

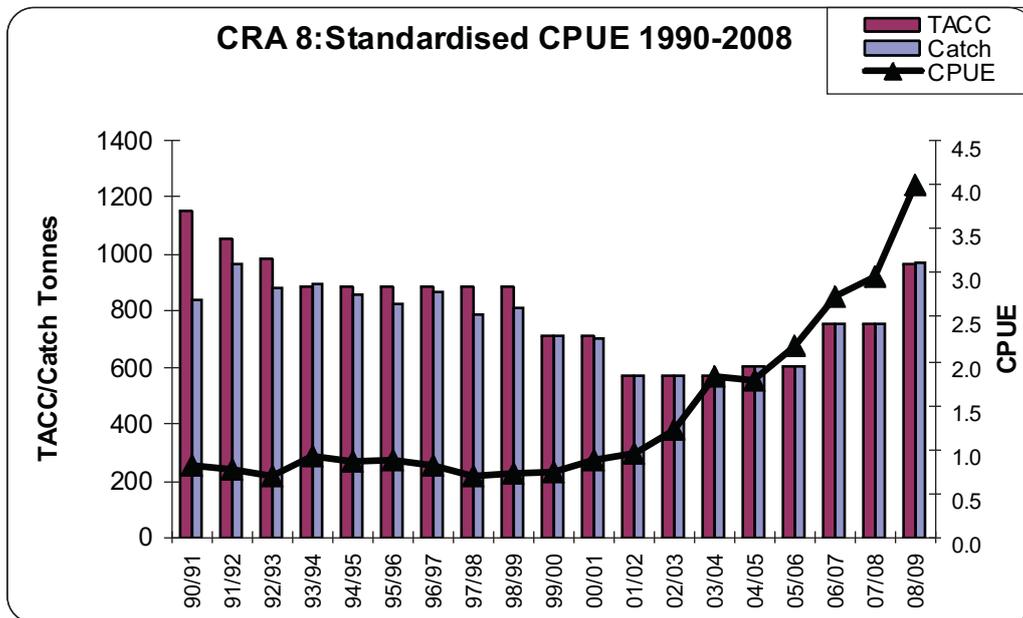
20. CRA 7



493. The CRA 7 fishery extends from the Waitaki River south along the Otago coastline to Long Point.
494. The CRA 7 fishery is one of the two fisheries that comprise the NSS sub-stock that until 2007 was used for assessment purposes. CRA 8 is the other. The TAC and allowances within the TAC are now set for CRA 7 by the operation of a management procedure which was implemented in 2008.
495. The most recent stock assessment was in 2006 (Breen *et al.* 2006; Haist *et al.* 2009), using the then-new Bayesian multi-stock length-based model (MSLM). This was fitted to CRA 7 and CRA 8 simultaneously, and estimated movements between CRA 7 and CRA 8. The model was fitted to tag-recapture data, standardised CPUE from 1979-2006, historical catch rate data from 1963-73 and length frequency data from voluntary logbooks and observer catch sampling. Changes in MLS and selectivity caused by escape gap regulations were taken into account.
496. The assessment used performance indicators based on autumn-winter vulnerable biomass. *Bref* was the mean of 1979-81, a period when the fishery showed high productivity and the biomass level was demonstrably safe, because it subsequently declined to lower levels and then recovered.
497. The assessment suggested that biomass declined steadily to 1989, then increased slightly to 1993 and declined again to 1998, when it began to increase. The assessment suggested that biomass in 2006 was 170% of *Bref* (5% to 95% limits 100 to 220%) and that biomass was likely to increase by 8% over the next three years (ranging from a 9% decrease to a 28% increase).

498. From 1996 to the present, the TAC has been controlled by management procedures. From 1990 through 2003, on average only 74% of the TACC was caught. The TACC has been fully caught from 2004 onwards. CRA 7 CPUE increased strongly by several fold from 1999-2008, but the most offset-year CPUE shows a decrease, which will trigger a TACC decrease.
499. The CRA 7 TAC is currently 209 tonnes. A total of 10 tonnes was provided for customary catch, 5 tonnes was set aside for amateur catch and 5 tonnes for illegal unreported removals. The TACC was set at 189 tonnes.
500. The CRA 7 commercial season runs from 20th June to 19th November inclusive and the MLS is a tail length of 127 mm for both male and female lobsters. The fishery is open to amateur fishing all year with a MLS regime of 54 mm TW for males and 60 mm TW for females.
501. The CRA 7 fishery is unique in that there is a 'buffer zone', closed to commercial rock lobster fishing which was incorporated into a regional harvest initiative agreed by amateur and commercial users in 1993 in response to concerns over sustainability of the stock.
502. There are 35 CRA 7 quota share owners. In 2009 15 commercial vessels reported CRA 7 landings. The landed value of the 2009/10 season catch is estimated at \$6.4 million (based on average port price paid to fishermen). The CRA 7 catch is processed and exported or sold to the domestic market by several Dunedin and Christchurch fishing companies.
503. The most recent estimates of recreational rock lobster catches from CRA 7 are less than 5 tonnes. There are no recent estimates of customary removals but for assessment purposes removals are estimated at 1 tonne for customary and 1 tonne for illegal unreported.
504. Stock monitoring coverage in CRA 7 comprises a scheduled sequence of 18 observer sampling days across all Statistical Areas in every season and during 2007 a rock lobster tag and release programme was updated with 3000 tags deployed between June and September.

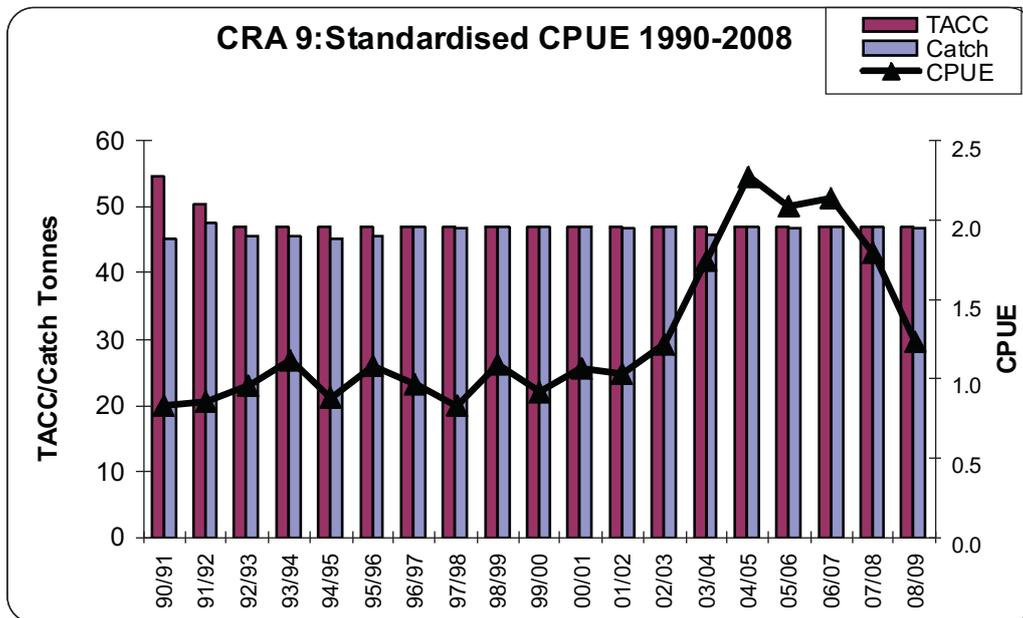
21. CRA 8



505. The CRA 8 fishery is the largest mainland fishery geographically. The region extends from Long Point south to Stewart Island and the Snares, the islands and coastline of Foveaux Strait, and then northwards along the Fiordland coastline to Bruce Bay.
506. The most recent stock assessment was in 2006 (Breen *et al.* 2006; Haist *et al.* 2009), using the then-new Bayesian multi-stock length-based model (MSLM). This was fitted to CRA 7 and CRA 8 simultaneously, and estimated movements between CRA 7 and CRA 8. The model was fitted to tag-recapture data, standardised CPUE from 1979-2006, historical catch rate data from 1963-73 and length frequency data from voluntary logbooks and observer catch sampling. Changes in MLS and selectivity caused by escape gap regulations were taken into account.
507. The assessment used performance indicators based on autumn-winter vulnerable biomass. *Bref* was the mean of 1979-81, a period when the fishery showed high productivity and the biomass level was demonstrably safe, because it subsequently declined to lower levels and then recovered.
508. The assessment suggested that biomass declined steadily to 1990, then increased slightly to 1994 and declined again to 2000, when it began to increase. The assessment suggested that biomass in 2003 was 121% of *Bref* (5% to 95% limits 97 to 150%) and that biomass was likely to increase by 50% over the next three years (35 to 80%).
509. From 1996 to the present, the TAC has been controlled by management procedures. The TACC has been fully caught from 1998 onwards. CRA 8 CPUE increased strongly nearly four-fold from 1999-2008, and the most offset-year CPUE shows an increase, although it is not large enough to trigger a TACC increase.

510. A TAC of 1110 tonnes was set for the 2009/10 fishing year. A total of 29 tonnes was set aside for amateur catch and 30 tonnes was provided for customary catch. The TACC was set at 1019 tonnes. The TAC adjustment was undertaken in response to the triggering of the harvest control rule in the CRA 8 Management Procedure.
511. Amateur catch is estimated at 16 tonnes (MFish 1996). The preferred methods for amateur fishing are potting and diving with UBA. There are no reliable estimates of customary catches.
512. There are 105 CRA 8 quota share owners. In 2009 there were 64 commercial vessels reporting CRA 8 landings. The CRA 8 fleet operates in the most remote coastal areas of South Westland and Fiordland. The value of the landed catch is estimated to be in excess of \$50 million (based on average port price paid to fishermen). The industry supplies processing and export operations in Te Anau, Riverton, Stewart Island, Invercargill, Bluff, Christchurch, and Wellington.
513. The CRA 8 Management Committee Inc. is the commercial stakeholder organisation for the fishery. The committee employs a Chief Executive. The organisation has developed and implemented codes of practice in relation to use and disposal of fishing gear and refuse, and as a founding member of the Guardians of Fiordland Fisheries, has contributed to an extensive code of practice for the waters adjacent to the World Heritage area.

22. CRA 9



514. The CRA 9 fishery is geographically large but has the smallest TACC of any region (with the exception of CRA 10). The fishery extends from north of Bruce Bay to the Kaipara Harbour but commercial lobster fishing is constrained to the north-west coast of the South Island and the area between Patea and Kawhia, in particular the Taranaki coastline.
515. No formal stock assessment has been done for CRA 9. No TAC has been set for this fishery and the 47 tonnes TACC set in 1990 has remained unchanged and has been fully caught since 1992. CPUE increased by 220% from 1999 to 2006, and since then has declined by 10%. The relation between current stock size and target biomass is unknown.
516. There are no estimates of amateur or customary catch for the CRA 9 fishery.
517. There are twenty one CRA 9 quota share owners. In the 2009 season only six commercial vessels reported CRA 9 landings. The estimated value of the landed catch is \$2.4 million (based on average port price paid to fishermen). The industry supplies processing and export operations in Marlborough, Nelson, New Plymouth, Wellington, and Auckland.
518. No stock assessment has been made for the CRA 9 fishery. CPUE was consistent over many years and has shown a significant increase then stabilised since 2001/02. The TACC has constrained commercial landings in every season from 1990, and CPUE has been stable or increasing over the same period suggesting a stable or increasing stock.

23. PACKHORSE ROCK LOBSTER – PHC

519. The packhorse rock lobster management area extends to all of New Zealand.
520. The TACC for this fishery was set at 30 tonnes in 1990, but was increased to 40 tonnes in 1992 as a result of appeals. Historically the fishery has been primarily an incidental catch for many commercial rock lobster fishermen in the Northland/Auckland and Bay of Plenty regions. However several fishermen did successfully target the species prior to 1990 and dependent on environmental conditions others have attempted to do so in several seasons since.
521. Because of different biology and behaviour of this species, the MLS is set at 216 mm tail length. Prohibitions on the taking of berried female lobsters apply. In addition, a large area of water to the north-east of North Cape was closed to commercial rock lobster fishing on a year-round basis in 1977 in an apparent effort to protect what was then thought to be a large concentration of sub-legal PHC rock lobsters.
522. Commercial catches have fluctuated since 1990, reaching a peak of 36.3 tonnes in the most recent season. The recent commercial landings are reported in Table 9:

Season	PHC Commercial Landings (tonnes)
1999-00	12.6
2000-01	9.8
2001-02	7.8
2002-03	8.6
2003-04	16.4
2004-05	20.8
2005-06	25.0
2006-07	25.4
2007-08	34.1
2008-09	36.3
2009-10	*

Table 9: Packhorse Lobster Commercial Landings

523. It was thought that the previous shortfalls of catch against quota reflected the low levels of target effort being directed at the fishery which is known to have variations in abundance possibly determined by weather and sea temperatures.
524. In 2003/04 an estimated 24 commercial vessels reported PHC catch. Less than five are currently known to be target fishing the species, all of these are operating in either CRA 1 or CRA 2. The value of the landed catch is estimated to be in excess of \$850,000.

525. There are no estimates of amateur catches for the species but divers using UBA are known to target PHC in Northland and the Bay of Plenty as “trophy” fish. There are no estimates of customary harvest.

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24. SUMMARY OF ROCK LOBSTER FISHERIES REGULATIONS

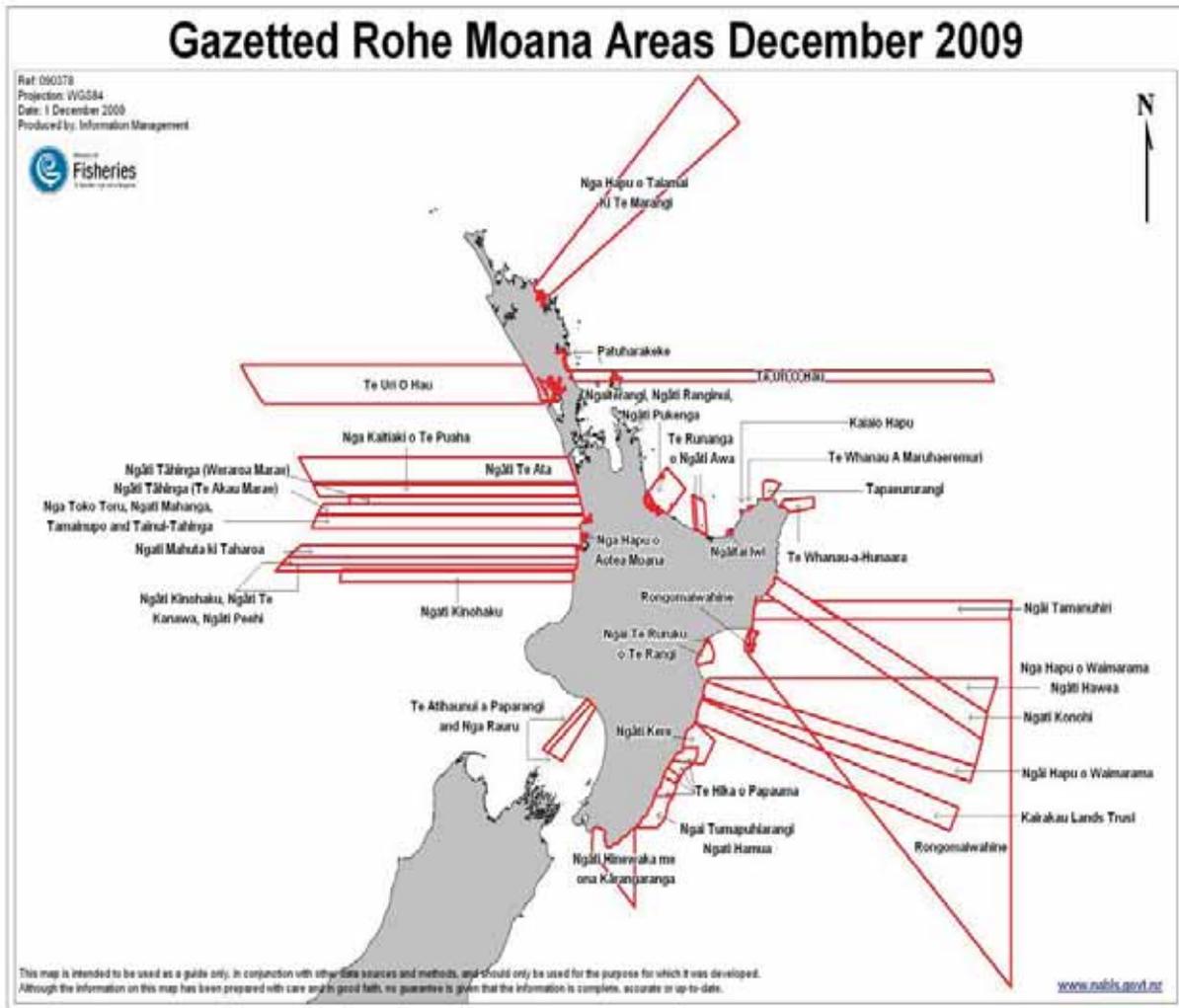
526. The following is a summary of the important regulations governing the rock lobster fishery. This is not exhaustive and concentrates on the catching sector rather than on processing or related activities.
527. Differential minimum legal sizes (MLS) apply to *J. edwardsii*.
- a) The general MLS is 54 mm tail width (TW) for male rock lobsters and 60 mm TW for females. This is the standard measure for amateur fishing in all areas.
 - b) In the Otago area (between the Waitaki River and Nugget Point), the MLS for commercial fishing is 127 mm tail length (TL).
 - c) In Southland the MLS for commercial fishing is 54 mm TW for males and 57 mm TW for females.
 - d) In the Gisborne-East Coast region the commercial fishing MLS for males is 52mm TW for the months of June, July and August only and reverts to 54 mm TW for the remainder of the fishing year. The MLS for female rock lobsters is 60 mm TW year around.
528. For each of those regions the MLS differentials are linked to the TACCs based on yield estimates that have been determined by stock assessments.
529. The minimum legal size for *S. verreauxi* (Packhorse) is 216 mm TL throughout New Zealand.
530. The taking of rock lobsters with external eggs attached, the removal of those eggs, and the removal of the pleopods (or swimmerets) from the ventral surface of the tail are prohibited.
531. The taking of rock lobsters in the soft shell stage is prohibited.
532. Rock lobsters must be undamaged and able to be measured.
533. Rock lobsters must be landed whole and alive, except in the Southland (CRA 8) fishery area, where tails may be separated from the bodies at sea and the tails only landed subject to stringent hygiene, handling and reporting requirements.
534. There are three regulatory closed seasons:

- a) All commercial rock lobster fishing is prohibited at the Chatham Islands (CRA 6) from 1 March to 30 April.
 - b) *Jasus edwardsii* less than 54/60 mm TW, but at least 127 mm tail length are permitted to be taken in Otago (CRA 7) only from 1st June to 19th November inclusive and the fishery is closed to commercial fishing for the remainder of the fishing year.
 - c) For commercial fishing there is a one month (May) regulatory closure in CRA 3 and a one month voluntary closure (15th December to 15th January inclusive). CRA 3 commercial stakeholders extended the voluntary closure to encompass September 1st to January 15th in statistical areas 909 and 910 in the current fishing year.
535. There are seven small closed areas on the North and South Islands, which are described in the Rock Lobster Regulations. There are several regulated area closures in force on the Chatham Islands. In addition, all fishing is excluded from areas designated as marine reserves and mataitai (See Annex 1).
536. Commercial fishermen must meet prescribed standards and specifications before taking rock lobsters:
- a) It is a requirement for a commercial fisherman to own a minimum quantity of ACE for the target stock before taking rock lobsters. All catch taken must be balanced with ACE for the stock. Failure to do so can result in financial penalties and permit revocation;
 - b) commercial fishermen can only sell catch to Licensed Fish Receivers, and they in turn can only buy product from legitimate commercial fishermen; and
 - c) commercial fishing can only be undertaken from a registered fishing vessel.
537. There are various requirements and restrictions governing fishing methods used by commercial fishermen:
- a) The permitted method for taking rock lobsters is potting; rock lobsters taken as a by-catch from other fishing methods must be returned to the sea alive;
 - b) The taking of rock lobsters by free diving is permitted to a small number of qualifying persons in the CRA 6 fishery;
 - c) All pots and floats must be labelled with the vessel registration number; and
 - d) All pots must be fitted with Regulation escape gaps, intended to reduce sub-legal handling and predation mortalities.

538. Amateur fishermen are prohibited from selling their catch but are permitted to catch rock lobster by any fishing method, except for the use of baited nets and explosives. Amateurs use potting, diving (freediving and underwater breathing apparatus - UBA), and handgathering to harvest rock lobsters, but they are restricted to a limit of six legal rock lobsters per person per day other than in Fiordland and amateur pot limits also apply – 3 pots per person to a maximum of six pots on any one vessel. Otherwise amateurs are governed by the same regulations pertaining to escapement and the state of landed lobsters as commercial fishermen.
539. Other than a regulatory prohibition on any commercial transactions related to customary take, rules pertaining to customary harvest are determined by the relevant Iwi authority but in general must ensure the sustainable utilisation of stocks.

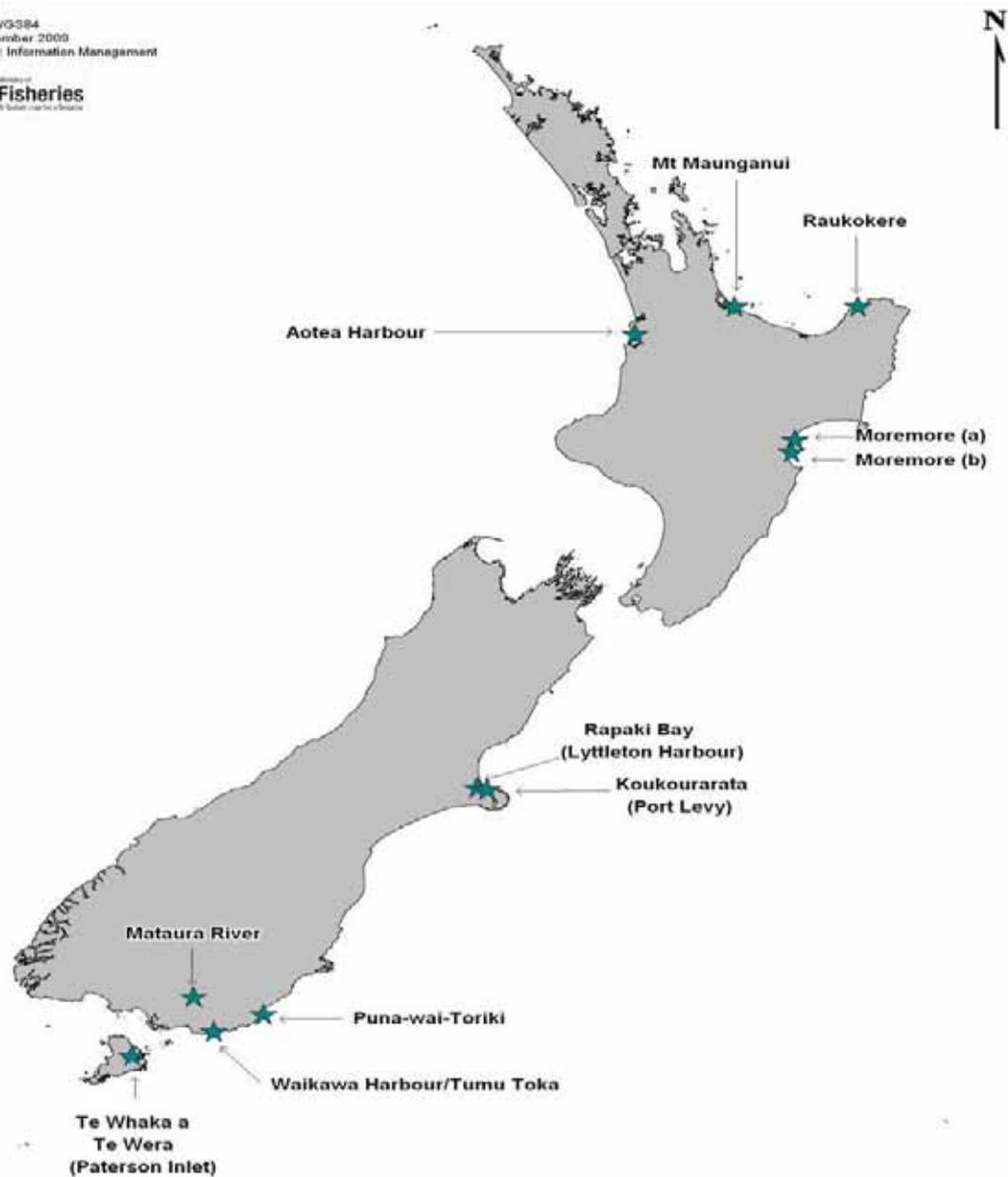


ANNEX 1: SPATIAL DESIGNATIONS



Gazetted Mātaaitai Reserves December 2009

Ref: 090378
Projection: WGS84
Date: 1 December 2009
Produced by: Information Management



This map is intended to be used as a guide only, in conjunction with other data sources and methods, and should only be used for the purpose for which it was developed. Although the information on this map has been prepared with care and in good faith, no guarantee is given that the information is complete, accurate or up-to-date.

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