



Review of Rock Lobster Sustainability Measures for 1 April 2014

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Contents

Page

1	Introduction	1
2	Background information	3
2.1	Management procedures	3
2.2	November 2013 Rock Lobster Fisheries Plenary Report	5
2.3	Definition of stock indicators (<i>Bmsy</i> , <i>Bref</i> , <i>Bmin</i> , <i>SSB</i>)	5
2.4	The MPI Harvest Strategy Standard	6
2.5	Draft National Fisheries Plan for Inshore Shellfish Fisheries	6
3	Proposal to use new CRA 2 & CRA 9 management procedures to guide TAC setting	7
3.1	Summary	7
3.2	Reasons for new management procedures	7
3.3	Options	8
3.4	Analysis of options	9
3.5	Other considerations	11
3.6	Initial consultation	11
4	Proposed TACs, allowances and TACCs for CRA 2, CRA 3, CRA 4, CRA 7 & CRA 9	12
4.1	Summary	12
4.2	Reason for reviewing TACs	12
4.3	CRA 2 rock lobster fishery	14
4.4	CRA 3 rock lobster fishery	18
4.5	CRA 4 rock lobster fishery	22
4.6	CRA 7 rock lobster fishery	26
4.7	CRA 9 rock lobster fishery	30
8	Appendix 1: New CRA 2 management procedure specifications	36
9	Appendix 2: CRA 3 management procedure specifications	37
10	Appendix 3: CRA 4 management procedure specifications	38
11	Appendix 4: CRA 7 management procedure specifications	39
12	Appendix 5: New CRA 9 management procedure Specifications	40

1 INTRODUCTION

The National Rock Lobster Management Group (NRLMG) is the primary advisor to the Minister for Primary Industries (the Minister) on catch limit, regulatory and other management actions that apply specifically to rock lobster fisheries.

The NRLMG is a national level, multi-stakeholder group comprising representatives of customary, recreational and commercial fishing sectors, and the Ministry for Primary Industries (MPI).

The multi-stakeholder approach of the NRLMG allows representatives from all fishing sectors and MPI to work together to:

- Foster the utilisation of rock lobster fisheries while ensuring sustainability;
- Develop and implement innovative management strategies for rock lobster stocks within the Quota Management System;
- Enable all sectors, both non-commercial and commercial, to maximise the benefits from a shared fishery;
- Identify and build on opportunities to add value to rock lobster fisheries.

This document provides the NRLMG's initial considerations on proposals to:

1. Use new management procedures to guide Total Allowable Catch (TAC) setting in CRA 2 (Bay of Plenty) and CRA 9 (Westland/Taranaki) rock lobster fisheries;
2. Set TACs, allowances and Total Allowable Commercial Catches (TACCs) for:
 - a) CRA 3 (Gisborne), CRA 4 (Hawkes Bay/Wellington), and CRA 7 (Otago) rock lobster fisheries using current management procedures;
 - b) CRA 2 and CRA 9 rock lobster fisheries using new management procedures.

The views outlined in this document are preliminary and are provided as a basis for consultation with stakeholders as required under the Fisheries Act 1996 (the Act).

In March 2014, and after considering submissions from interested parties, the NRLMG will compile the Final Advice Paper (FAP) for the attached proposals. The FAP will summarise tangata whenua and stakeholder views on the sustainability measures being reviewed, and provide NRLMG final advice and recommendations to the Minister.

The FAP and the Minister's final decision letter will be posted on the MPI website as soon as they become available. Hard copies will be available on request.

Deadline for submissions

MPI (on behalf of the NRLMG) welcomes information and comments from tangata whenua, fishery stakeholders and other interested parties on the proposals. All written submissions must be received by MPI no later than 5pm on Friday, 21 February 2014.

Written submissions should be sent directly to:

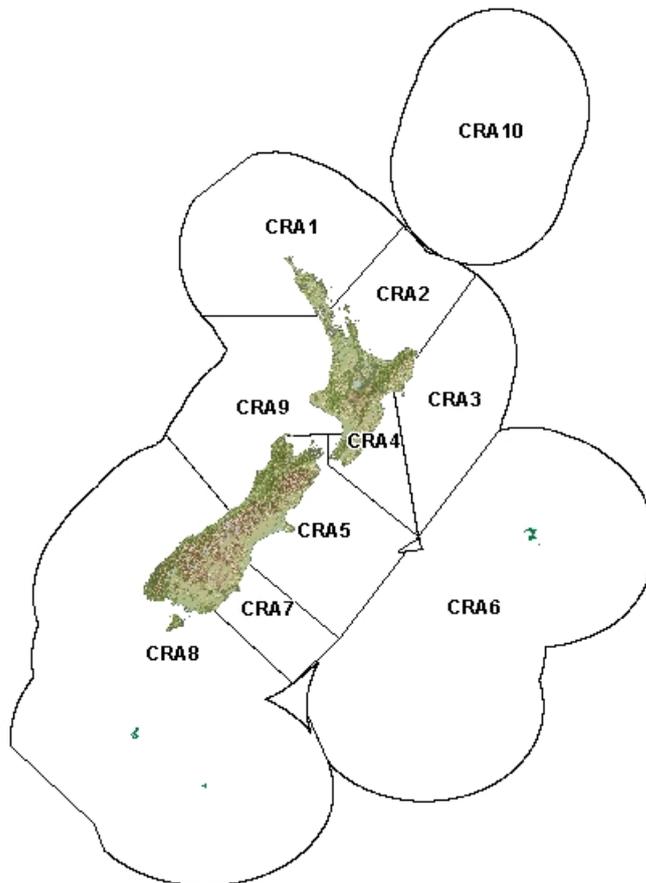
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Ministry for Primary Industries
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Official Information Act 1982

All submissions are subject to the Official Information Act 1982 and can be released (along with personal details of the submitter) if requested, under that Act. If you have specific reasons for wanting to have (any part of) your submission or personal details withheld, please set out your reasons in the submission. MPI will consider those reasons when making any assessment under the Act.

Figure 1.1 Map of rock lobster Quota Management Areas



2 BACKGROUND INFORMATION

The NRLMG's management goal is for all rock lobster fisheries:

“to be managed and maintained at or above the assessed and agreed reference levels, using a comprehensive approach that recognises a range of customary Maori, amateur, commercial and environmental concerns and benefits”.

2.1 Management procedures

A management procedure is a tool used to guide the setting of catch limits, within the scope of the statutory structure of the Act. Management procedures are becoming more widely used, especially in South Africa, Australia, Europe, North America, and 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, which is a mathematical equation that determines what the specific output of the procedure will be, such as the exact TAC or TACC, given the data;
- d) Has been thoroughly simulation tested with a robust operating model.

2.1.1 Evaluation

Management procedures are evaluated with a modified stock assessment model, known as the 'operating model'. Data used in the stock assessment model include: customary, recreational, commercial and illegal catch, length frequencies of the catch from observer and industry logbook data, tag-recapture data (i.e. growth information) and juvenile settlement levels. However, the most important inputs to the assessment are the abundance indices (catch-per-unit-effort) which are considered to be proportional to abundance.

Extensive peer-review of stock assessment models and management procedures occurs at the Rock Lobster Fisheries Assessment Working Group (RLFAWG) and at the November Plenary. Each management procedure is also extensively simulation tested, which includes testing for robustness to uncertainties in model assumptions (e.g. variable levels of recruitment and non-commercial catches) and modelling choices.

2.1.2 Main data input

Standardised catch-per-unit-effort (CPUE) up to September each year is used as input to a management procedure to determine the TAC or TACC for the fishing year that begins in the following April.

CPUE is used as the main input because it is considered to be a reliable indicator of relative stock size in rock lobster fisheries. CPUE has been successfully used in several management procedures to rebuild stocks from low to high abundance levels.

2.1.3 Management procedure benefits

The traditional approach used to set catch limits in many of New Zealand's fisheries is to undertake a stock assessment and then to provide recommendations on the TAC, sector allowances and the TACC. This approach has some disadvantages: stock assessment capacity is limited, and for rock lobster only one or two assessments can be carried out each year. Delays in updating a stock assessment can cause management action to be delayed and for catch limits to be set inappropriately for a fishery.

A management procedure approach has a number of advantages over the traditional stock assessment approach. These include:

- a) The establishment of a management regime that can respond to changes in stock abundance in the fishery on an annual basis;
- b) An explicit definition of management goals (e.g. maximising yield, maximising stability, minimising risk);
- c) Greater certainty of achieving management goals;
- d) The involvement of fishery stakeholders in the choice of a management procedure (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);
- e) The ability to address uncertainty in all facets of the assessment and management process;
- f) The opportunity to free up resources for other research: management procedures reduce the need for regular stock assessments.

2.1.4 History of management procedure use in New Zealand

Management procedures are currently in place for the following New Zealand rock lobster fisheries; CRA 3, CRA 4, CRA 5, CRA 7 and CRA 8.

Management procedures have been used by Ministers to guide statutory TAC setting in rock lobster fisheries for varying periods. The oldest example of the use of management procedures is in CRA 7 and CRA 8, where they have been used to guide TAC setting since 1997, first to rebuild the stocks and then to maintain them above reference levels with high probability.

Management procedures are generally reviewed every five years. The review aims to ensure that TAC setting remains compliant with the statutory structure set out in the Act. It involves the development of a new stock assessment model and new management procedure evaluations.

Table 2.1 provides an outline of the use of current management procedures and when they are scheduled for review.

Table 2.1: History of current management procedure use and their review schedule

	CRA 3	CRA 4	CRA 5	CRA 7	CRA 8
First year the current management procedure was used	2010	2012	2012	2013	2013
Year of scheduled review	2014	2016	2016	2017	2017

2.2 November 2013 Rock Lobster Fisheries Plenary Report

For further technical information on fishery, biological, stock assessment and stock status information for New Zealand’s rock lobster fisheries refer to the MPI “Fisheries Assessment Plenary November 2013, Stock Assessment and Yield Estimates Volume 2: Rock Lobster to Yellowfin Tuna”. This document is available on the MPI website at: www.mpi.govt.nz/news-resources/publications.aspx.

2.3 Definition of stock indicators (*Bmsy*, *Bref*, *Bmin*, *SSB*)

Four stock indicators are relevant to evaluation of the proposals presented in this document¹:

- a) The statutory reference level, ***Bmsy***. Section 13 of the Act 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 at a level that is not inconsistent with this objective. The stock size that can produce the maximum sustainable yield is commonly called *Bmsy*.
- b) The conceptual proxy, ***Bref***². The use of *Bref* is a way of assessing a stock that is not inconsistent with the objective of maintaining a stock at or above, or moving the stock towards a level that can maintain the maximum sustainable yield. This “not inconsistent” approach is set out in section 13(2A) of the Act where the Minister considers that current biomass or *Bmsy* cannot be estimated reliably using best information. *Bref* is generally a stock size at or above the 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 the stock size associated with lowest abundance in the observed history of the fishery.
- d) Spawning stock biomass, ***SSB***. *SSB* is the weight of all mature females in the autumn-winter, without regard to the minimum legal size (MLS), selectivity or vulnerability.

For each of the rock lobster stocks discussed in this document, there are some differences in the indicators that are reported. This is because the RLFAGW has continually improved the way indicators are calculated over time.

¹ Stock size is measured in terms of autumn-winter vulnerable biomass for the *Bmsy*, *Bref* and *Bmin* indicators. “Vulnerable biomass” is the biomass that is available to be caught legally: above the minimum legal size and not egg bearing if female.

² The Guidelines for Harvest Strategy Standards 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]

2.4 The MPI Harvest Strategy Standard

In October 2008, MPI (then the Ministry of Fisheries) released the Harvest Strategy Standard (HSS) for New Zealand fisheries. The HSS specifies performance standards for Quota Management System species and also provides guidance for TAC setting under the Act.

The HSS specifies that management procedures should be designed to ensure that the probability of:

- Achieving the MSY-compatible target or better is at least 50%;
- Breaching the soft limit does not exceed 10%;
- Breaching the hard limit does not exceed 2%.

For rock lobster:

- 'MSY-compatible target' reference points include those that relate to stock biomass (*B_{msy}*) as well as conceptual proxies (*B_{ref}*);
- The soft limit is defined as 20% of the unfished SSB level or 50% *B_{ref}*;
- The hard limit is defined as 10% of the unfished SSB level or 25% *B_{ref}*.

Extensive simulation testing suggests that all of the management procedures discussed in this document are consistent with the HSS.

2.5 Draft National Fisheries Plan for Inshore Shellfish Fisheries

Rock lobsters are 'Group 1' stocks in the Draft MPI National Fisheries Plan for Inshore Shellfish Fisheries. Stocks in this group are highly desired by all sectors and tend to be fully utilised. Objectives for this group are to maximise the overall social, economic and cultural benefit obtained from each stock, and to maintain biomass of each stock at or above *B_{msy}* (or an accepted proxy i.e. *B_{ref}*). The management approach for these stocks is to monitor and manage them closely to ensure full utilisation can continue in a sustainable way.

The use of responsive management procedures and regular review of rock lobster TACs is consistent with this management approach.

3 PROPOSAL TO USE NEW CRA 2 & CRA 9 MANAGEMENT PROCEDURES TO GUIDE TAC SETTING

3.1 Summary

The NRLMG is seeking tangata whenua and stakeholder views on proposals to use new management procedures to guide TAC setting in the CRA 2 and CRA 9 rock lobster fisheries from 1 April 2014. This includes comments and information on any utilisation, economic, social, or cultural factors that may be relevant to the following management options.

The options considered are outlined in Table 3.1.

Table 3.1: Summary of IPP options for CRA 2 and CRA 9

Stock	Option	Description
CRA 2	CRA2_A	Agree to use the <u>new Rule 4</u> CRA 2 management procedure to guide TAC setting in CRA 2
	CRA2_B	Agree to use the <u>new Rule 6</u> CRA 2 management procedure to guide TAC setting in CRA 2
	CRA2_C	Continue to use periodic stock assessments to guide TAC setting in CRA 2 (<i>status quo</i>)
CRA 9	CRA9_A	Agree to use the <u>new Rule 4041</u> CRA 9 management procedure to guide TAC setting in CRA 9
	CRA9_B	Agree to use the <u>new Rule 4144</u> CRA 9 management procedure to guide TAC setting in CRA 9
	CRA9_C	Continue to use periodic 'informal' stock assessments to guide TAC setting in CRA 9 (<i>status quo</i>)

A central consideration when choosing whether to use a management procedure to guide TAC setting in a fishery is whether the procedure enables the Minister to set a TAC that complies with section 13 of the Act.

Application of the new CRA 2 and CRA 9 management procedures are expected to move stock biomass to, or maintain stock biomass at, a size at or above *B_{msy}*.

Simulation testing of the proposed new CRA 2 and CRA 9 management procedures indicates that their application should:

- Improve CRA 2 abundance and result in improved utilisation benefits for all sectors;
- Maintain a high CRA 9 abundance and provide high utilisation benefits for all sectors.

3.2 Reasons for new management procedures

Management procedures are not currently in place for CRA 2 or CRA 9. As discussed in the background information section above, the NRLMG considers that the use of management procedures in rock lobster fisheries has a number of advantages over the traditional management approach.

The CRA 2 fishery has had infrequent stock assessments, in part due to limited recreational harvest information up until now. CRA 2 was last assessed in 2002 before a new version of the multi-stock length-based stock assessment model was developed. The 2013 CRA 2 stock assessment model was used as the basis for the operating model for evaluating new CRA 2 management procedures.

No formal stock assessment has been performed for CRA 9. In 2013 an informal CRA 9 assessment was performed with a surplus-production model. This assessment model was simpler than the complex length-based model that has been used for other rock lobster fisheries.

The utility of the simple assessment model for evaluating management procedures was explored in 2011. This was done by comparing the performance of a surplus-production model and a multi-stock length-based model for the CRA 5 (Canterbury/Marlborough) rock lobster fishery. This comparative study concluded that the simple surplus-production model performed adequately for developing management procedures³.

3.3 Options

3.3.1 CRA 2 Options

- Under **Option CRA2_A**, the new *Rule 4* CRA 2 management procedure would be used to guide TAC setting in CRA 2 for five years from the 2014-15 to 2018-19 fishing years;
- Under **Option CRA2_B**, the new *Rule 6* CRA 2 management procedure would be used to guide TAC setting in CRA 2 for five years from the 2014-15 to 2018-19 fishing years;
- Under **Option CRA2_C**, periodic stock assessments would continue to guide TAC setting in CRA 2 (the *status quo*).

Specifications of the new CRA 2 management procedures are described in Appendix 1.

3.3.2 CRA 9 Options

- Under **Option CRA9_A**, the new *Rule 4041* CRA 9 management procedure would be used to guide TAC setting in CRA 9 for five years from the 2014-15 to 2018-19 fishing years;
- Under **Option CRA9_B**, the new *Rule 4144* CRA 9 management procedure would be used to guide TAC setting in CRA 9 for five years from the 2014-15 to 2018-19 fishing years;
- Under **Option CRA9_C**, periodic 'informal' stock assessments would continue to guide TAC setting in CRA 9 (the *status quo*).

Specifications of the new CRA 9 management procedures are described in Appendix 5.

³ Breen, P. A. 2011. Operational management procedure evaluations for CRA 5 using a surplus-production operating model. Unpublished Final Research Report for Ministry of Fisheries Research project CRA2009-01, Objective 5. NZ RLIC Ltd. 15 December 2011. 34 pp.

3.4 Analysis of options

This part analyses the approaches proposed for the Minister to use to guide TAC setting in CRA 2 and CRA 9.

3.4.1 The new CRA 2 management procedures

Sustainability

Use of the new CRA 2 management procedures (Options CRA2_A and CRA2_B) to guide CRA 2 TAC setting should not pose a risk to stock sustainability. *Rule 4* and *Rule 6* have similar performance with respect to stock indicators (Table 3.2).

Ongoing application of the CRA 2 management procedures is expected to meet MPI Harvest Strategy Standard requirements by maintaining the stock above *Bmsy* with greater than 50% probability and *Bmin* with greater than 90% probability.

Table 3.2: Indicator results from base case evaluations for CRA 2 *Rule 4* and *Rule 6* (based on 1000 20-year runs for each rule)

	Option CRA2_A <i>Rule 4</i>	Option CRA2_B <i>Rule 6</i>
Stock Indicators⁴		
The proportion of years in which biomass was <u>less</u> than:		
- <i>Bmsy</i>	4.2 %	7.3 %
- <i>Bmin</i>	2.1 %	4.5 %
The proportion of years in which SSB was <u>less</u> than 20% <i>SSB0</i>		
	0 %	0 %
Catch Indicators		
Minimum commercial catch	199.9 tonnes	209.8 tonnes
Average commercial catch	208.1 tonnes	215.1 tonnes
Average recreational catch	72.0 tonnes	69.2 tonnes
Average CPUE	0.48 kg/potlift	0.46 kg/potlift
Stability – the average annual change in TACC	3.0%	2.5 %

Utilisation

Simulation testing of the new CRA 2 management procedures suggests they will improve the current utilisation benefit of the CRA 2 fishery for all sectors by increasing the stock from its current size. This is demonstrated by the average CPUE indicator. 2013 standardised offset year CPUE was 0.37 kg/potlift and it is predicted that average CPUE should be 0.48 kg/potlift under ongoing application of *Rule 4* and 0.46 kg/potlift under *Rule 6*.

The major difference between the two options is in the ‘plateau’ feature, where the TACC is held constant over a range of CPUE values (from 0.3 to 0.5 kg/potlift). *Rule 4* has a plateau height of 200 tonnes, whereas *Rule 6* has a plateau height of 210 tonnes. A higher plateau tends to give higher average commercial catch, but lower average stock biomass and CPUE (refer Table 3.2 above).

⁴ An explanation of the stock indicators is provided in the background section on page 5.

There is also a trade-off between recreational catch and commercial catch. Modelling suggests that any decrease in commercial catch results in greater average catch for recreational fishers, because of increased stock abundance. In the CRA 2 example, *Rule 6* has a higher average commercial catch than *Rule 4* (by about 7 tonnes), but a lower average recreational catch (by about 3 tonnes).

3.4.2 The new CRA 9 management procedures

Sustainability

Use of the new CRA 9 management procedures (Options CRA9_A and CRA9_B) to guide CRA 9 TAC setting should not pose a risk to stock sustainability. Ongoing application of the CRA 9 management procedures is expected to meet MPI Harvest Strategy Standard requirements by maintaining the stock above *Bmsy* with greater than 50% probability and *Bmin* with greater than 90% probability (Table 3.3)

Table 3.3: Indicator results from base case evaluations for CRA 9 *Rule 4041* and *Rule 4144* (based on 2500 50-year runs for each rule)

	Option CRA9_A <i>Rule 4041</i>	Option CRA9_B <i>Rule 4144</i>
<i>Stock Indicators</i> ⁵		
The proportion of years in which biomass was <u>less</u> than:		
- <i>Bmsy</i>	6.4 %	5.9 %
- <i>Bmin</i>	1.1 %	1.0 %
<i>Catch Indicators</i>		
Minimum commercial catch	40.0 tonnes	40.0 tonnes
Average commercial catch	48.4 tonnes	46.8 tonnes
Average recreational catch	27.9 tonnes	28.1 tonnes
Average CPUE	2.02 kg/potlift	2.04 kg/potlift
Stability – the average annual change in TACC	8.8 %	15.6 %

Utilisation

Simulation-testing of the new CRA 9 management procedures suggests they will provide a high utilisation benefit of the CRA 9 fishery for all sectors by maintaining stock abundance well above *Bmsy*.

Rule 4041 and *Rule 4144* have similar performance with respect to catch indicators (Table 3.3), except for lower stability in the TACC under *Rule 4144*.

3.4.3 Continue to use periodic stock assessments in CRA 2 and/or CRA 9

The NRLMG notes that, compared to a management procedure approach, using periodic stock assessments to guide TAC setting for CRA 2 and CRA 9 (Options CRA2_C and CRA9_C):

- Would be less responsive to observed changes in stock abundance in the fishery;
- Would provide less certainty of achieving desired sustainability and utilisation outcomes;
- Might result in less cost efficient management of the fishery.

⁵ An explanation of the stock indicators is provided in the background section on page 5.

If the use of management procedures to guide TAC setting in CRA 2 and CRA 9 is considered inappropriate, the NRLMG advises that recent CRA 2 and CRA 9 assessments could be used to inform TAC setting in these fisheries. However, this would not occur for April 2014 TAC setting because further consultation and assessment of the TAC options would be required first.

3.5 Other considerations

For the 2014-15 fishing year, operation of either of the new CRA 2 management procedures would result in a CRA 2 TAC decrease, while operation of either of the new CRA 9 management procedures would result in a CRA 9 TAC increase.

Refer to Section 4 for details on the proposed allocation of the TAC for these fisheries.

3.6 Initial consultation

In May 2013, MPI held a multi-stakeholder meeting in Tauranga with tangata whenua and fishing representatives from the CRA 2 fishery. Information on the CRA 2 fishery, stock assessment and management procedures were described in non-technical presentations.

At this meeting the following joint sector aspirations were identified by MPI:

- Higher abundance (including a wide size distribution of rock lobsters);
- Improved stability;
- Improved CPUE;
- Improved information on non-commercial catches and recruitment dynamics.

The first three aspirations were used to guide development of the new CRA 2 management procedures.

In November and December 2013, MPI also sought feedback from specific Iwi forums and Regional Recreational Forums about the NRLMG's initial proposals for CRA 2 and CRA 9. This feedback was considered in developing this advice.

4 PROPOSED TACs, ALLOWANCES AND TACCs FOR CRA 2, CRA 3, CRA 4, CRA 7 & CRA 9

4.1 Summary

The NRLMG is seeking tangata whenua and stakeholder views on proposals to review TACs allowances and TACCs for CRA 2, CRA 3, CRA 4, CRA 7 and CRA 9 rock lobster fisheries for the 2014-15 fishing year, beginning 1 April 2014. This includes comments and information on any utilisation, economic, social, or cultural factors that may be relevant to the following management options.

The options considered are outlined in Table 4.1 below.

The NRLMG supports the use of management procedures to guide TAC setting for rock lobster fisheries because they allow for much more rapid management responses than does the conventional approach of periodic stock assessments followed by decision making. The delay caused by having infrequent stock assessments can cause TAC levels to lag behind stock abundance.

4.2 Reasons for reviewing TACs

Management procedures are currently in place for CRA 3, CRA 4, CRA 5, CRA 7 and CRA 8 rock lobster fisheries. New management procedures have been evaluated for CRA 2 and CRA 9 in 2013. These new management procedures are described further in Section 3 above.

Each year, management procedures are operated to deliver a TAC result that is consistent with the Minister's statutory obligations. Operation of the CRA 2, CRA 3, CRA 4, CRA 7 and CRA 9 management procedures result in proposed TAC changes. Operation of the CRA 5 and CRA 8 management procedures result in no change to the TAC⁶.

⁶ The current CRA 5 and CRA 8 management procedures are not discussed further in this document because there is no proposal to change the management procedure approach, or change the TAC, allowances or TACC for the 2014-15 fishing year.

Table 4.1: Summary of TAC, allowance and TACC proposals for CRA 2, CRA 3, CRA 4, CRA 7 & CRA 9

Stock	Option	TAC	Customary	Recreational	Other mortality	TACC
CRA 2	CRA2_01: Be guided by the <u>new Rule 4</u> CRA 2 management procedure and decrease the TAC and TACC	416.5 t ↓	16.5 t	140 t	60 t	200 t ↓
	CRA2_02: Be guided by the <u>new Rule 6</u> CRA 2 management procedure and decrease the TAC and TACC	426.5 t ↓	16.5 t	140 t	60 t	210 t ↓
	CRA2_03: Retain the current CRA 2 TAC, allowances and TACC	452.583 t	16.5 t	140 t	60 t	236.083 t
CRA 3	CRA3_01: Be guided by the CRA 3 management procedure and increase the TAC and TACC	389.95 t ↑	20 t	20 t	89 t	260.95 t ↑
	CRA3_02: Retain the current CRA 3 TAC, TACC and allowances	354.5 t	20 t	20 t	89 t	225.5 t
CRA 4	CRA4_01: Be guided by the CRA 4 management procedure and decrease the TAC and TACC	662 t ↓	35 t	85 t	75 t	467 t ↓
	CRA4_02: Retain the current CRA 4 TAC, allowances and TACC	694.7 t	35 t	85 t	75 t	499.7 t
CRA 7	CRA7_01: Be guided by the CRA 7 management procedure and increase the TAC and TACC	86 t ↑	10 t	5 t	5 t	66 t ↑
	CRA7_02: Retain the current CRA 7 TAC, allowances and TACC	64 t	10 t	5 t	5 t	44 t
CRA 9	CRA9_01: Be guided by the <u>new Rule 4041</u> CRA 9 management procedure, set a TAC of 91.8 tonnes and increase the TACC	91.8 t	5 t	25 t	1 t	60.8 t ↑
	CRA9_02: Be guided by the <u>new Rule 4041</u> CRA 9 management procedure, set a TAC of 115.8 t and increase the TACC	115.8 t	20 t	30 t	5t	60.8 t ↑
	CRA9_03: Be guided by the <u>new Rule 4144</u> CRA 9 management procedure, set a TAC of 98.6 t and increase the TACC	98.6 t	5 t	25 t	1 t	67.6 t ↑
	CRA9_04: Be guided by the <u>new Rule 4144</u> CRA 9 management procedure, set a TAC of 122.6 t and increase the TACC	122.6 t	20 t	30 t	5t	67.6 t ↑
	CRA9_05: Retain the current CRA 9 TACC (no TAC or allowances have been previously set for CRA 9)	N/A	N/A	N/A	N/A	47.008 t

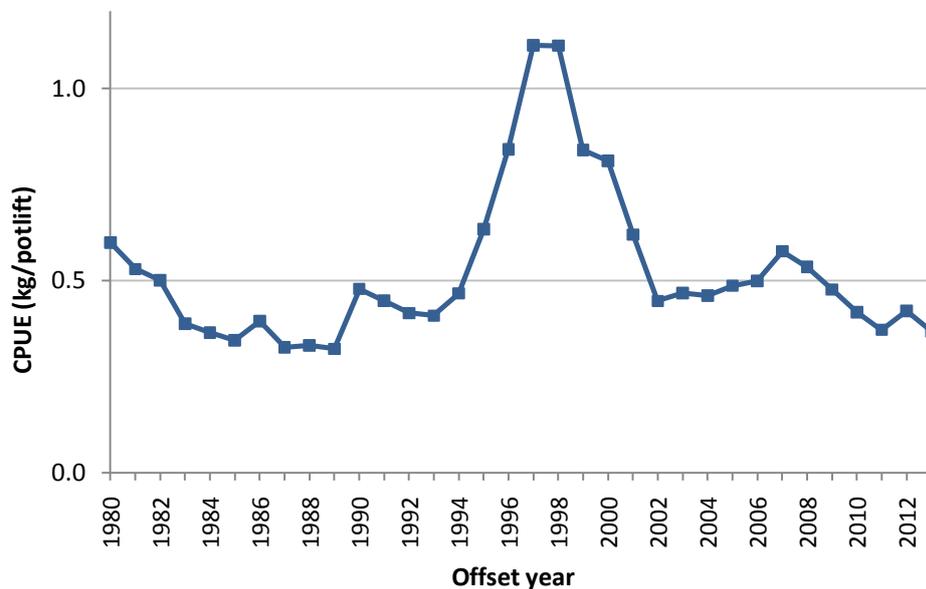
4.3 CRA 2 rock lobster fishery

4.3.1 CRA 2 stock status

The 2013 CRA 2 stock assessment results indicated that 2012 stock biomass was 43% above *B_{min}*, 36% above *B_{msy}* and 21% below *B_{ref}*⁷. CRA 2 spawning stock biomass in 2012 was above 20% of its unfished level with greater than 99% probability. With 2012 catch levels and recent recruitments, the assessment predicted that average projected stock biomass in 2016 would be roughly the same as current biomass.

Standardised CPUE is considered to be a reliable indicator of relative stock size in CRA 2 and is the abundance indicator used in the new CRA 2 management procedures. The history of offset year (i.e. October through September) CRA 2 commercial CPUE is shown in Figure 4.1. Since 2007, CRA 2 CPUE has generally decreased.

Figure 4.1: The history of offset CPUE in CRA 2⁸



4.3.2 Analysis of CRA 2 options

A summary of TAC, allowance and TACC options for CRA 2 is provided in Table 4.1 on Page 13.

TAC Setting

Best available information suggests the current CRA 2 stock is above *B_{msy}*. Accordingly the Minister may set or vary the CRA 2 TAC to maintain the stock at or above *B_{msy}* (section 13(2)(a)).

⁷ *B_{ref}* for CRA 2 is based on the years 1979-81, as suggested by the Rock Lobster Fisheries Assessment Working Group in October 2013.

⁸ Based on the 2012 F2-LFX procedure for preparing data for CPUE standardisation.

Options CRA2_01 and CRA2_02 – Be guided by a new CRA 2 management procedure and decrease the TAC

For the 2014-15 fishing year it is proposed that the CRA 2 TAC would be set at:

- 416.5 tonnes under Option CRA2_01; or
- 426.5 tonnes under Option CRA2_02.

Each proposed TAC variation is guided by results from the operation of two proposed new CRA 2 management procedures (*Rule 4* and *Rule 6*). Important elements of the new CRA 2 management procedures are set out further below, in Section 3 above and in Appendix 1. There are slight differences in the parameters of each management procedure.

Ongoing application of the CRA 2 management procedures is expected to meet MPI Harvest Strategy Standard requirements by maintaining the stock above *Bmsy* with greater than 50% probability and *Bmin* with greater than 90% probability. Simulation testing indicates the new procedures would maintain the stock above *Bmsy* with greater than 93% probability.

Each of the proposed TAC decrease options will reduce the current utilisation benefit of the fishery. How the reduction is shared amongst the fishery sectors will depend on allocation decisions, which are discussed further below.

Overall it is expected that ongoing application of either CRA 2 management procedure will improve fishing opportunities for all sectors by increasing the stock from its current size.

Option CRA2_03 – Retain the current CRA 2 TAC

Under Option CRA2_03, the current CRA 2 TAC of 452.583 tonnes would be retained for the 2014-15 fishing year.

This option is not preferred by the NRLMG. Maintaining the current TAC could result in a further decline in CRA 2 stock abundance and this could affect the utilisation benefit for all fishing sectors. At a multi-stakeholder meeting in Tauranga in May 2013, all fishery participants expressed a desire to improve abundance in the CRA 2 fishery.

Setting of non-commercial allowances and the TACC

Allowances for customary Maori, recreational interests and other mortality

A comparison of model assumptions of non-commercial catch and the current allowances for CRA 2 are shown in Table 4.2 below.

Table 4.2: Current CRA 2 allowances and model assumptions of non-commercial catches

CRA 2	Customary	Recreational	Other mortality	Total
Current allowances	16.5 tonnes	140 tonnes	60 tonnes	216.5 tonnes
Non-commercial catch assumptions for the 2013 stock assessment	10 tonnes (constant)	Assumed to vary with changes in biomass. Estimated 56.37 tonnes for 2012.	88 tonnes (constant)	154.37 tonnes in 2012

Under Options CRA2_01 and CRA2_02, the NRLMG proposes that the allowances set for customary Maori, recreational interests and other sources of fishing-related mortality (e.g. illegal fishing) do not change at this time for the following reasons:

1. Best available information suggests existing customary Maori catch is within the allowance allocated for this interest at this time. Although incomplete, reported customary catches under the Fisheries (Kaimoana) Regulations 1998 and regulation 50 of the Fisheries (Amateur Fishing) Regulations 2013⁹ suggest between 100 to 1000 rock lobsters (below 1 tonne) were harvested per year from 2005-2012.
2. Model assumptions of recreational catch suggest that current recreational removals are within the allowance allocated for this interest at this time. Also, the large-scale multi-species survey estimated CRA 2 recreational catch at 40.86 tonnes for the period 1 October 2011 to 30 September 2012.
3. The allowances made for customary Maori and recreational interests do not constrain their overall harvest.
4. The existing other mortality allowance may be smaller than current removals. There is, however, considerable uncertainty associated with the 88 tonne illegal catch estimate that was used in the stock assessment model to calculate illegal catches from 1996 to 2012. This is because there is currently no robust or defensible methodology that MPI can use to accurately estimate illegal catches and the catches cannot be verified. In the model, a sensitivity test was carried out using lower illegal catch and this had generally small effects on the model results. The NRLMG proposes no change to the other mortality allowance until illegal catches can be better quantified.

Other allowance considerations

The NRLMG is not proposing to vary the CRA 2 recreational allowance for the 2014-15 fishing year. However, the NRLMG sector representatives advise that they did reach agreement on a proposal to decrease the CRA 2 recreational allowance from 140 to 120 tonnes.

The NRLMG sector representatives considered that a 20 tonne recreational allowance decrease was appropriate for the following reasons:

1. A recreational allowance decrease in conjunction with a decrease to the TACC reflects the shared fishery nature of CRA 2 and the desire for fishery participants to enhance stock abundance, of which was communicated at a CRA 2 multi-stakeholder meeting in May 2013;
2. It is doubtful that CRA 2 recreational fishers are currently catching the 140 tonne allowance, therefore, it is not unreasonable for recreational fishers to receive a 20 tonne decrease to their allowance;
3. The allowance made for recreational fishers does not constrain their actual harvest;
4. There were no proposals to vary the CRA 2 recreational daily bag limit or minimum legal size.

The NRLMG welcomes views from tangata whenua and stakeholders on principles that the group should follow when considering any future change to the CRA 2 recreational allowance.

⁹ Previously regulation 27A of the Fisheries (Amateur Fishing) Regulations 1986.

TACC

The NRLMG proposes to reduce the CRA 2 TACC by 36.083 tonnes under Option CRA2_01 and by 26.083 tonnes under Option CRA2_02.

Reducing the TACC provides greatest certainty of benefit to the stock, particularly because catch from the commercial sector can be more directly controlled. The industry is supportive of the proposed TACC decreases and they consider that they are putting the fishery first and are acting to rebuild abundance in the fishery for the benefit of all sectors.

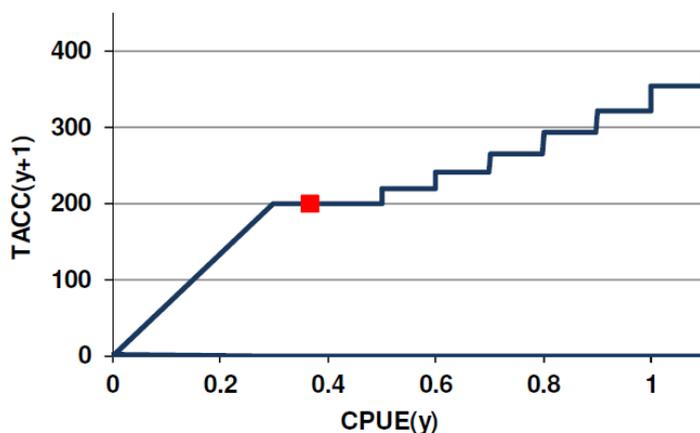
No change is proposed to the TACC under Option CRA2_03. This option is not preferred by the NRLMG or commercial representatives.

Option CRA2_01 – Be guided by the new Rule 4 CRA 2 management procedure and decrease the TACC by 36.083 tonnes

A graphical representation of the new *Rule 4* CRA 2 management procedure is provided in Figure 4.2. The graph shows the proposed TACC for the next year as a function of offset-year CPUE in the current year. The 2013 standardised offset year CPUE was 0.37 kg/potlift. When the harvest control rule was operated with this CPUE it resulted in a TACC of 200 tonnes (shown by the square in the graph).

The proposed 36.083 tonne TACC decrease has the potential to reduce the revenue for the commercial sector by approximately \$2.4 million (based on average 2013 port price information).

Figure 4.2: The new *Rule 4* CRA 2 management procedure, showing the TACC resulting from the rule evaluations performed in 2013 for 2014-15 fishing year.

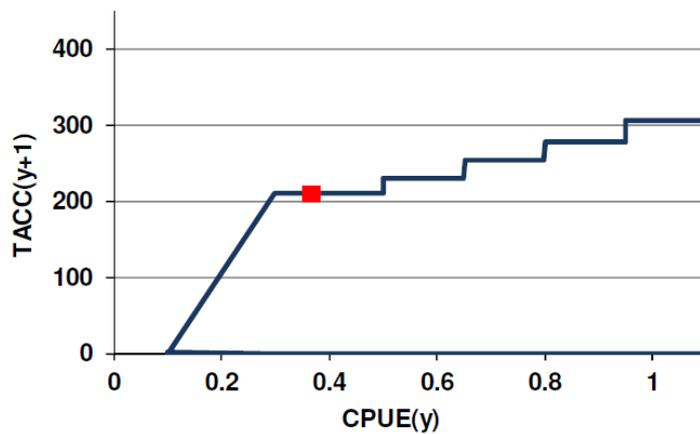


Option CRA2_02 – Be guided by the new Rule 6 CRA 2 management procedure and decrease the TACC by 26.083 tonnes

A graphical representation of the new *Rule 6* CRA 2 management procedure is provided in Figure 4.3. When the harvest control rule was operated with a CPUE of 0.37 kg/potlift it resulted in a TACC of 210 tonnes (shown by the square in the graph).

The proposed 26.083 tonne TACC decrease has the potential to reduce the revenue for the commercial sector by approximately \$1.7 million (based on average 2013 port price information).

Figure 4.3: The new *Rule 6* CRA 2 management procedure, showing the TACC resulting from the rule evaluations performed in 2013 for 2014-15 fishing year.



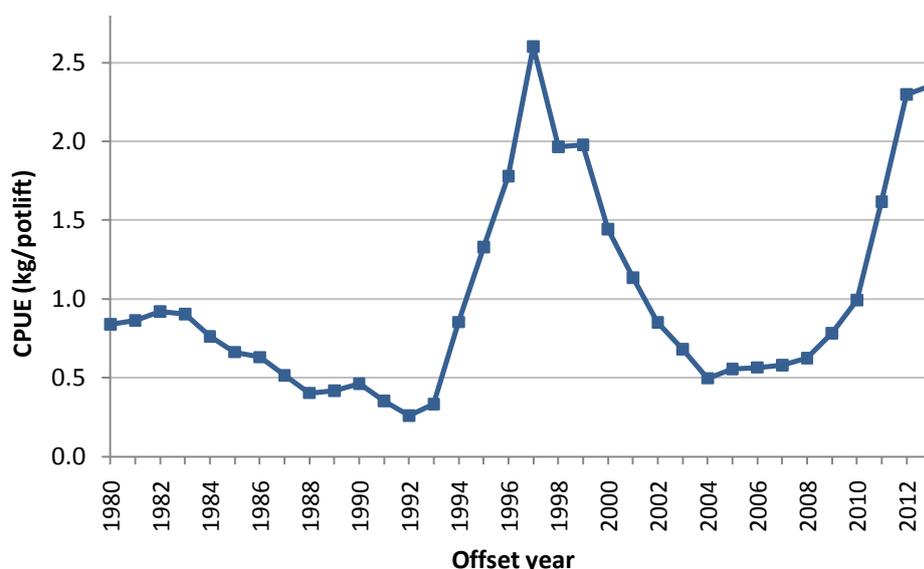
4.4 CRA 3 rock lobster fishery

4.4.1 CRA 3 stock status

CRA 3 stock biomass in 2013 was very likely (> 90%) to be above *B_{msy}* and very unlikely to be below both the soft and hard limits (i.e. 20% and 10% of the unfished spawning stock biomass levels).

Standardised CPUE is considered to be a reliable indicator of relative stock size in CRA 3 and is the abundance indicator used in the CRA 3 management procedure. The history of offset year (i.e. October through September) CRA 3 commercial CPUE is shown in Figure 4.4. Since 2008, CRA 3 CPUE has increased steadily and is now 10% below the 1996/97 peak.

Figure 4.4: The history of offset CPUE in CRA 3¹⁰



The CRA 3 management procedure is evaluated against a desired target stock level (90% *B_{ref}*), which has a CPUE equivalent of 1.14 kg/potlift in the autumn-winter season. CRA 3 autumn-winter standardised CPUE was 2.35 kg/potlift in 2013 (this is well above the target).

¹⁰ Based on the 2003 *B4_L* procedure for preparing data for CPUE standardisation.

4.4.2 Analysis of CRA 3 options

A summary of TAC, allowance and TACC options for CRA 3 is provided in Table 4.1 on Page 13.

TAC setting

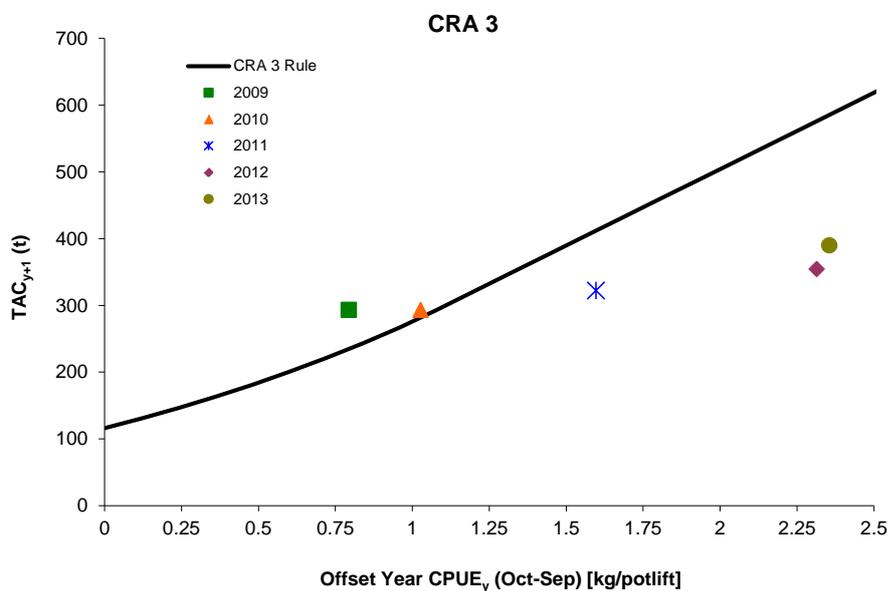
Best available information suggests the current CRA 3 stock is well above *Bmsy*. Accordingly the Minister may set or vary the CRA 3 TAC to maintain the stock at or above *Bmsy* (section 13(2)(a)).

Option CRA3_01 – Be guided by the CRA 3 management procedure and increase the TAC

The CRA 3 TAC would be set at 389.95 tonnes under Option CRA3_01. The proposed TAC increase is specified by the CRA 3 management procedure that the Minister agreed to use in March 2010 to guide TAC setting in the fishery until the 2015-16 fishing year. It is proposed that a stock assessment is performed for CRA 3 in 2014 and that new management procedures are evaluated.

A graphical representation of the CRA 3 management procedure is provided in Figure 4.5 (refer to Appendix 2 for further technical details). The graph shows the proposed TAC for the next year as a function of offset-year CPUE in the current year, after operation of all components of the management procedure including minimum and maximum change thresholds.

Figure 4.5: The CRA 3 management procedure, showing the TACs resulting from the rule evaluations performed in 2009 through 2013 for the 2010-11 through 2014-15 fishing years (shown as coloured shapes).



Standardised offset year CPUE was 2.36 kg/potlift in 2013. When the harvest control rule was operated with this CPUE it resulted in a TAC of 585.54 tonnes. This was a greater increase than the maximum increase of 10% allowed under the rule, so the TAC could increase only by 10% to 389.95 tonnes (shown by the circle in the graph).

Table 4.3 provides further information on the history of the CRA 3 management procedure for the 2010-11 through 2014-15 fishing years.

Table 4.3: History of the CRA 3 management procedure. 'Rule result' is the result of the management procedure after operation of all its components including thresholds; '-' to be determined by the Minister.

Year of analysis	Applied to Fishing Year	Offset-year CPUE at time of analysis (kg/potlift)	Rule result: TAC (t)	TAC (t) set by the Minister	TACC (t) set by the Minister
2009	2010-11	0.794	293	293	164
2010	2011-12	1.027	293	293	164
2011	2012-13	1.597	322.3	322.3	193.3
2012	2013-14	2.314	354.53	354.5	225.5
2013	2014-15 (Option CRA3_01)	2.355	389.95	-	-

The operation of the CRA 3 management procedure enables the stock to be maintained above the target, 90% *Bref*. Ongoing application of the CRA 3 management procedure is expected to meet MPI Harvest Strategy Standard requirements by moving the stock towards and then maintaining it above the target, 90% of *Bref*, and above *Bmin* with greater than 90% probability.

Option CRA3_01 should increase the current utilisation benefit of the fishery. How the benefits are accrued will depend on allocation decisions. Historically, only the TACC has been varied to give effect to variations in the TAC. If this occurs, the commercial sector will benefit from receiving an explicit share of the proposed TAC increase.

Utilisation benefits for customary Maori and recreational interests should be at least maintained under this option because best available information suggests CRA 3 stock size is increasing (as expected under application of the CRA 3 management procedure). Experience has shown that as stock size increases, non-commercial fishing success generally improves.

Option CRA3_02 – Retain the current CRA 3 TAC

Under Option CRA3_02, the current CRA 3 TAC of 354.5 tonnes would be retained for the 2014-15 fishing year.

Retaining the current TAC could result in increased short-term abundance in the CRA 3 fishery. This may result in:

- Higher CPUE for commercial fishers which may reduce harvesting costs (but there would be a loss of overall revenue from not being able to take advantage of a higher TACC);
- Increased non-commercial catch rates compared to Option CRA3_01.

The NRLMG considers once a management procedure has been agreed for use, its result should be followed unless there are compelling reasons in a particular case not to follow it. Departing from a management procedure result could mean that its performance in relation to stock sustainability indicators can become uncertain. Also, choosing not to follow an accepted management procedure could have consequences for the acceptability of management procedures in other fisheries.

Setting of non-commercial allowances and the TACC

Allowances for customary Maori, recreational interests and other mortality

A comparison of model assumptions of non-commercial catch and the current allowances for CRA 3 are shown in Table 4.4 below.

Table 4.4: Current CRA 3 allowances and model assumptions of non-commercial catches

CRA 3	Customary	Recreational	Other mortality	Total
Current allowances	20 tonnes	20 tonnes	89 tonnes	129 tonnes
Non-commercial catch assumptions for the 2008 stock assessment	20 tonnes	20 tonnes	89.5 tonnes	129.5 tonnes

Under option CRA3_01, the NRLMG proposes that the allowances set for customary Maori, recreational interests and other sources of fishing-related mortality (e.g. illegal fishing) do not change at this time for the following reasons:

1. Information suggests existing CRA 3 customary Maori catch is within the allowance allocated for this interest at this time. Although incomplete, reported customary catches under the Fisheries (Kaimoana) Regulations 1998 and regulation 50 of the Fisheries (Amateur Fishing) Regulations 2013¹¹, from 2000 to 2008, suggest the maximum catch in any fishing year was roughly 10 tonnes.
2. Model assumptions of recreational catch suggest that current removals are in the vicinity of the existing recreational allowance.
3. The large-scale multi-species survey estimated CRA 3 recreational catch at 8.07 tonnes for the period 1 October 2011 to 30 September 2012. There is considerable uncertainty associated with CRA 3 recreational catch estimates, however. The NRLMG does not propose to vary the recreational allowance for CRA 3 until better information on recreational catches is available.
4. The allowances made for customary Maori and recreational fishers do not constrain their overall harvest.
5. There is no reliable information on levels of other sources of fishing-related mortality. The RLFAWG used available MPI estimates for illegal catches from 1990 to 2003 to determine an appropriate estimate for other mortality (e.g. illegal fishing). There is little confidence in the estimates of illegal catch because the estimates cannot be verified. The NRLMG sector members are concerned about the high level of estimated illegal take in the CRA 3 fishery and again recommend that every effort is made to reduce this. If illegal catches can be effectively constrained this should result in benefits of increased abundance for all legitimate users of the fishery.

¹¹ Previously regulation 27A of the Fisheries (Amateur Fishing) Regulations 1986.

TACC

The NRLMG proposes that the TAC increase proposed under Option CRA3_01 should result in an increase only of the TACC, with allowances remaining at current levels. The proposed 35.45 tonne TACC increase has the potential to generate approximately \$2.4 million in additional revenue for the commercial sector (based on average 2013 port price information).

No change is proposed to the TACC under Option CRA3_02. This option would constrain utilisation in the commercial fishery and result in a loss of additional revenue (compared to Option CRA3_01).

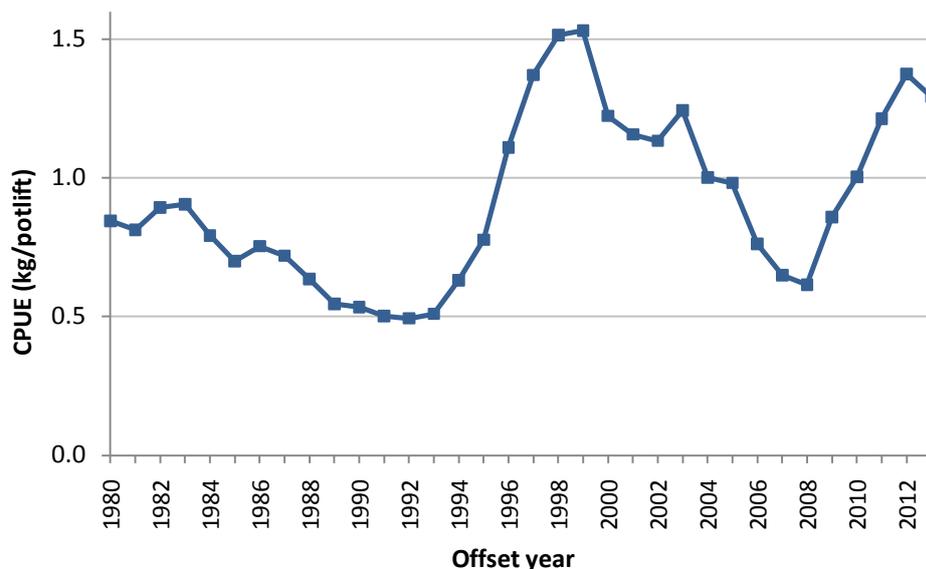
4.5 CRA 4 rock lobster fishery

4.5.1 CRA 4 stock status

CRA 4 stock biomass in 2013 was virtually certain (> 99%) to be above *B_{ref}*¹² and very likely (> 90 %) to be above the mature female biomass associated with *B_{msy}*. The CRA 4 stock is exceptionally unlikely to be below both the soft and hard limits (i.e. 20% and 10% of the unfished spawning stock biomass levels).

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. The history of offset year (i.e. October through September) CRA 4 commercial CPUE is shown in Figure 4.6. Since 2008 CRA 4 CPUE has increased steadily, except for a 6% decrease in 2013. The 2013 CPUE decrease is considered by industry to be related to poor fishing in autumn-winter due to weather and market prices, rather than a reflection of available abundance.

Figure 4.6: The history of offset CPUE in CRA 4¹³



¹³ Based on the 2003 *B4_L* procedure for preparing data for CPUE standardisation.

4.5.2 Analysis of CRA 4 options

A summary of TAC, allowance and TACC options for CRA 4 are provided in Table 4.1 on Page 13.

TAC setting

Best available information suggests the current CRA 4 stock is well above *Bmsy* (and the agreed proxy *Bref*, which is larger than *Bmsy*). Accordingly the Minister may set or vary the CRA 4 TAC to maintain the stock at or above *Bmsy* (section 13(2)(a)).

Option CRA4_01 – Be guided by the CRA 4 management procedure and decrease the TAC

The CRA 4 TAC would be set at 662 tonnes under Option CRA4_01. The proposed TAC decrease is specified by the CRA 4 management procedure that the Minister agreed to use in March 2012 to guide TAC setting in the fishery until the 2017-18 fishing year. Important elements of the CRA 4 management procedure are set out below and in Appendix 3.

The operation of the CRA 4 management procedure enables the stock to be maintained above *Bref*. Ongoing application of the CRA 4 management procedure is expected to meet MPI Harvest Strategy Standard requirements and maintain the stock above *Bref* with greater than 50% probability and above *Bmin* with greater than 90% probability. Simulation testing indicates it would maintain the stock above *Bref* with 99% probability.

Option CRA4_01 will decrease the current utilisation benefit of the fishery. Historically, the TACC has been varied to give effect to variations in the TAC. If this occurs, the commercial utilisation would be constrained and there would be a loss of revenue (compared to Option CRA4_02).

Utilisation benefits for customary Maori and recreational interests are expected to be at least maintained over time because ongoing application of the CRA 4 management procedure is designed to maintain stock size well above *Bref*.

Option CRA4_02 – Retain the current CRA 4 TAC

The current CRA 4 TAC of 694.7 tonnes would be retained for the 2014-15 fishing year under Option CRA4_02.

The NRLMG considers that retaining the current CRA 4 TAC for the 2014-15 fishing year is unlikely to pose a risk to stock sustainability in the short-term. However, if the Minister chooses not to follow the results of the CRA 4 management procedure in 2014, the procedure will not be able to be used to guide TAC setting in future years. This may pose a risk to stock sustainability in the future if CPUE decreases because there would no good information to advise on management of the stock until a stock assessment is performed (currently scheduled for 2016).

The NRLMG considers once a management procedure has been agreed for use, its result should be followed unless there are compelling reasons in a particular case not to follow it. Also, choosing not to follow an accepted management procedure could have consequences for the acceptability of management procedures in other fisheries.

Setting of non-commercial allowances and the TACC

Allowances for customary Maori, recreational interests and other mortality

A comparison of model assumptions of non-commercial catch and the current allowances for CRA 4 are shown in Table 4.5 below.

Table 4.5: Current CRA 4 allowances and model assumptions of non-commercial catches

CRA 4	Customary	Recreational	Other mortality	Total
Current allowances	35 tonnes	85 tonnes	75 tonnes	195 tonnes
Non-commercial catch assumptions for the 2011 stock assessment	20 tonnes (constant)	Assumed to vary with changes in biomass. Estimated 54.4 tonnes for 2010.	40 tonnes (constant)	114.4 tonnes for 2010

Under Option CRA4_01, the NRLMG proposes that the allowances set for customary Maori, recreational interests and other sources of fishing-related mortality (e.g. illegal fishing) do not change at this time for the following reasons:

1. Information suggests existing CRA 4 customary Maori catch is within the allowance allocated for this interest at this time. Although incomplete, reported customary catches under the Fisheries (Kaimoana) Regulations 1998 and regulation 50 of the Fisheries (Amateur Fishing) Regulations 2013¹⁴, from 2000 to 2008, suggest the maximum annual catch was roughly 6 tonnes.
2. Model assumptions of recreational catch assume current recreational removals are within the allowance allocated for this interest at this time. Also, the large-scale multi-species survey estimated CRA 4 recreational catch at 44.17 tonnes for the period 1 October 2011 to 30 September 2012.
3. The allowances made for customary Maori and recreational fishers do not constrain their overall harvest.
4. There is no reliable information on levels of other sources of fishing-related mortality. The RLFAWG used available MPI estimates for illegal catches from 1990 to 2004 to determine an appropriate estimate for other mortality (e.g. illegal fishing). There is little confidence in the estimates of illegal catch because the estimates cannot be verified.

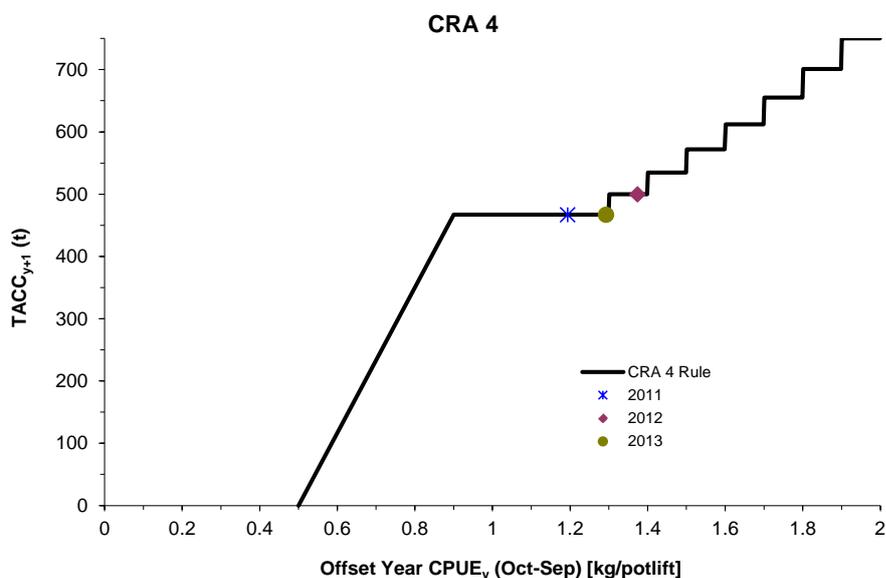
TACC

The NRLMG proposes reducing only the TACC under Option CRA4_01. The CRA 4 industry in the past has received both increases and decreases to the TACC, while allowances to other sectors have remained constant. Varying only the TACC is considered an appropriate approach at this time, particularly given that assumptions of non-commercial catch are below set allowances.

A graphical representation of the CRA 4 management procedure is provided in Figure 4.7. The graph shows the proposed TACC for the next year as a function of offset-year CPUE in the current year.

¹⁴ Previously regulation 27A of the Fisheries (Amateur Fishing) Regulations 1986.

Figure 4.7: The CRA 4 management procedure, showing the TACCs resulting from the rule evaluations performed in 2011 through 2013 for the 2012-13, 2013-14 and 2014-15 fishing years (shown as coloured shapes).



The 2013 standardised offset year CPUE was 1.29 kg/potlift. When the harvest control rule was operated with this CPUE it resulted in a TACC of 467 tonnes (shown by the circle in the graph).

Table 4.6 provides further information on the history of the CRA 4 management procedure for the 2012-13 through 2014-15 fishing years.

Table 4.6: History of the CRA 4 management procedure. 'Rule result' is the result of the management procedure after operation of all its components including thresholds; '-' to be determined by the Minister.

Year of analysis	Applied to Fishing Year	Offset-year CPUE at time of analysis (kg/potlift)	Rule result: TACC (t)	TAC (t) set by the Minister	TACC (t) set by the Minister
2011	2012-13	1.194	466.9	661.9	466.9
2012	2013-14	1.374	499.69	694.7	499.7
2013	2014-15 (Option CRA4_01)	1.293	467.0	-	-

The proposed 32.7 tonne TACC decrease has the potential to result in a loss of revenue for the industry by approximately \$2.2 million (based on average 2013 port price information).

No change is proposed to the TACC under Option CRA4_02. Although this option would maintain the current utilisation benefit of the commercial fishery, not following the results of the CRA 4 management procedure could create uncertainty in future stock sustainability. This option is not preferred by the NRLMG.

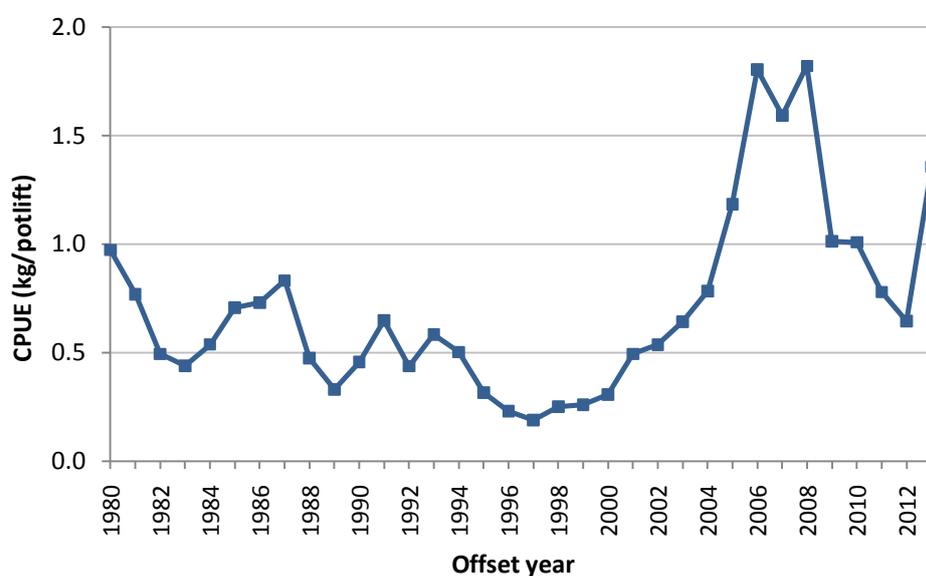
4.6 CRA 7 rock lobster fishery

4.6.1 CRA 7 stock status

CRA 7 stock biomass in 2013 was about as likely as not (40-60%) to be above B_{ref}^{15} and was unlikely to be below both the soft and hard limits (i.e. 50% and 25% B_{ref}).

Standardised commercial CPUE is considered to be a reliable indicator of relative stock size in CRA 7 and is the abundance indicator used in the CRA 7 management procedure. The history of offset year (i.e. October through September) CRA 7 commercial CPUE is shown in Figure 4.8. Between 2008 and 2012 CRA 7 CPUE declined by 67%, but increased substantially in 2013.

Figure 4.8: The history of offset CPUE in CRA 7¹⁶



4.6.2 Analysis of CRA 7 options

A summary of TAC, allowance and TACC options for CRA 7 are provided in Table 4.1 on Page 13.

TAC Setting

There is a reliable estimate of current biomass, but no reliable estimate of B_{msy}^{17} . Because of this the Minister must set a TAC for CRA 7 under section 13(2A)¹⁸.

¹⁵ B_{ref} for CRA 7 is the pre-season autumn-winter vulnerable biomass associated with the period 1979-81. 1979-81 was a period when the stock showed good productivity and was demonstrably safe.

¹⁶ Based on the 2012 $F2_LFX$ procedure for preparing data for CPUE standardisation.

¹⁷ The RLFAGW agreed that B_{msy} and SSB indicators were not useful for CRA 7 because of the high level of out-migrations estimated for the stock and that B_{ref} should be used for CRA 7.

¹⁸ Section 13(2A) requires the Minister to set a TAC using the best available information and that is not inconsistent with the objective of maintaining the stock at or above, or moving the stock towards or above, B_{msy} . B_{ref} is used as a proxy for B_{msy} .

Options CRA7_01 – Be guided by the CRA 7 management procedure and increase the TAC

The CRA 7 TAC would be set at 86 tonnes under Option CRA7_01. The proposed TAC increase is specified by the CRA 7 management procedure that the Minister agreed to use in March 2013 to guide TAC setting in the fishery until the 2018-19 fishing year. Important elements of the CRA 7 management procedure are set out below and in Appendix 4.

The TAC resulting from the operation of the CRA 7 management procedure is “not inconsistent” with the objective of maintaining the stock at or above the accepted proxy, *Bref*. Ongoing application of the CRA 7 management procedure is expected to meet MPI Harvest Strategy Standard requirements and maintain the stock above *Bref* with greater than 50% probability and above *Bmin* with greater than 90% probability. Simulation testing indicates it would maintain the stock above *Bref* with greater than 89% probability.

Option CRA7_01 should increase the current utilisation benefit of the fishery. How the benefits are accrued will depend on allocation decisions. Historically the TACC has been varied to give effect to variations in the TAC. If this occurs, the commercial sector will benefit from receiving an explicit share of the proposed TAC increase.

Utilisation benefits for customary Maori and recreational interests are expected to improve under the CRA 7 management procedure approach. Best available information suggests CRA 7 stock size is increasing (as expected under application of the CRA 7 management procedure) and this can result in an increase in non-commercial fishing success.

CRA7_02 – Retain the current CRA 7 TAC

Under Option CRA7_02, the current CRA 7 TAC of 64 tonnes would be retained for the 2014-15 fishing year.

Retaining the current TAC could result in increased short-term abundance in the CRA 7 fishery. This may result in:

- Higher CPUE for commercial fishers which may reduce harvesting costs (but there would be a loss of overall revenue from not being able to take advantage of a higher TACC);
- Increased non-commercial catch rates compared to Option CRA7_01.

The NRLMG considers once a management procedure has been agreed for use, its result should be followed unless there are compelling reasons in a particular case not to follow it. Departing from a management procedure result could mean its performance in relation to stock sustainability indicators can become uncertain. Also, choosing not to follow an accepted management procedure could have possible consequences for the acceptability of management procedures in other fisheries.

Setting of non-commercial Allowances and the TACC

Allowances for customary Maori, recreational interests and other mortality

A comparison of model assumptions of non-commercial catch and the current allowances for CRA 7 are shown in Table 4.7 below.

Table 4.7: Current CRA 7 allowances and model assumptions of non-commercial catches

CRA 7	Customary	Recreational	Other mortality	Total
Current allowances	10 tonnes	5 tonnes	5 tonnes	20 tonnes
Non-commercial catch assumptions for the 2012 stock assessment	1 tonne (constant)	Assumed to vary with changes in biomass. Estimated 8.7 tonnes for 2011.	1 tonne (constant)	10.7 tonnes for 2011

Under Option CRA7_01, the NRLMG proposes that the allowances set for customary Maori, recreational interests and other sources of fishing-related mortality (e.g. illegal fishing) do not change at this time for the following reasons:

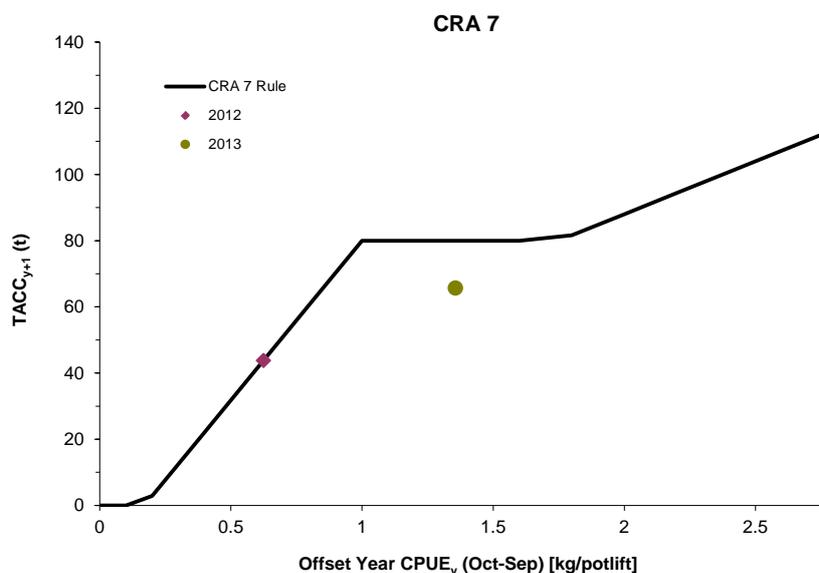
1. Information suggests existing CRA 7 customary Maori catch is within the allowance allocated for this interest at this time. Reports of customary harvest under the Fisheries (South Island Customary Fishing) Regulations 1999 suggest there are low levels of rock lobster harvest from CRA 7.
2. Model assumptions of recreational catch suggest that the existing allowance may be smaller than current removals. There is considerable uncertainty associated with the recreational catch estimate, however, because it is based on uncertain historical recreational harvest surveys (1992, 1996, 2000 and 2001). A change to the recreational allowance may be considered when new quantitative recreational catch information becomes available.
3. The allowances made for customary Maori and recreational fishers do not constrain their actual harvest.
4. There is no reliable information on levels of other sources of fishing-related mortality. The RLFAWG used available MPI estimates for illegal catches from 1990 to 2002 and a constant illegal catch of 1 tonne/year from 2003 to 2010 to determine an appropriate estimate for other mortality (e.g. illegal fishing). There is little confidence in the estimates of illegal catch because the estimates cannot be verified.

TACC

The NRLMG proposes that the TAC increase proposed under Option CRA7_01 should result in an increase of only the TACC, with allowances remaining at current levels. The proposed 22 tonne TACC increase has the potential to generate approximately \$1.5 million in additional revenue for the commercial sector (based on average 2013 port price information).

A graphical representation of the CRA 7 management procedure is provided in Figure 4.9. The graph shows the proposed TACC for the next year as a function of offset-year CPUE in the current year.

Figure 4.9: The CRA 7 management procedure, showing the TACC resulting from the rule evaluations performed in 2012 and 2013 for the 2013-14 and 2014-15 fishing years (shown as a coloured shapes).



The 2013 standardised offset year CPUE was 1.36 kg/potlift. When the harvest control rule was operated with this CPUE it resulted in a TACC of 80 tonnes. This was a greater increase than the maximum increase of 50% allowed under the rule, so the TACC could increase only to 66 tonnes (shown by the circle in the graph).

Table 4.8 provides further information on the history of the CRA 7 management procedure for the 2013-14 and 2014-15 fishing years.

Table 4.8: History of the CRA 7 management procedure. 'Rule result' is the result of the management procedure after operation of all its components including thresholds; '-' to be determined by the Minister.

Year of analysis	Applied to Fishing Year	Offset-year CPUE at time of analysis (kg/potlift)	Rule result: TACC (t)	TAC (t) set by the Minister	TACC (t) set by the Minister
2012	2013-14	0.625	43.96	64.0	44.0
2013	2014-15 (Option CRA7_01)	1.356	66.0	-	-

No change is proposed to the TACC under Option CRA7_02. This option would constrain utilisation in the commercial fishery and result in a loss of additional revenue (compared to Option CRA7_01).

4.7 CRA 9 rock lobster fishery

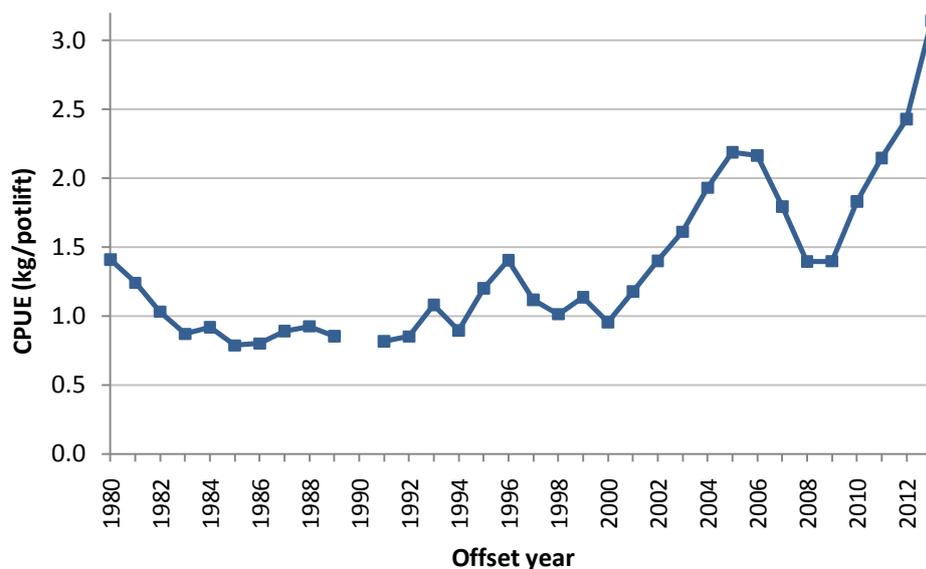
4.7.1 CRA 9 stock status

2013 CRA 9 surplus-production modelling results indicated that 2012 stock biomass was well above *B_{min}* and 40% above *B_{msy}*. The model also estimated that current fishing intensity is low (12%), which is consistent with the numerous large rock lobsters that have been observed in commercial log book sampling and through sector catches.

Standardised commercial CPUE is considered to be a reliable indicator of relative stock size in rock lobster fisheries. For CRA 9 there is a small amount of commercial catch data available for CPUE analysis¹⁹, which may result in CPUE indices that are sensitive to different catching patterns rather than changes in stock size. Despite this sensitivity, CRA 9 CPUE has been used as the abundance indicator in the new CRA 9 management procedure.

The history of offset year (i.e. October through September) CRA 9 commercial CPUE is shown in Figure 4.10. Since 2009 CRA 9 CPUE has increased strongly.

Figure 4.10: The history of offset CPUE in CRA 9²⁰



4.7.2 Analysis of CRA 9 options

A summary of TAC, allowance and TACC options for CRA 9 are provided in Table 4.1 on Page 13.

TAC setting

Best available information suggests the current CRA 9 stock is above *B_{msy}*. Accordingly the Minister may set or vary the CRA 9 TAC to maintain the stock at or above *B_{msy}* (section 13(2)(a)).

¹⁹ In 2012-13 the CPUE analysis was limited to just five commercial vessels that reported more than 1 tonne of rock lobster landings from CRA 9.

²⁰ Based on the 2012 *F2_LFX* procedure for preparing data for CPUE standardisation.

Options CRA9_01, CRA9_02, CRA9_03 and CRA9_04 – Be guided by a new CRA 9 management procedure and set a CRA 9 TAC for the first time

No TAC has been previously set for CRA 9. For the 2014-15 fishing year it is proposed that the CRA 9 TAC would be set at:

- 91.8 tonnes under Option CRA9_01;
- 115.8 tonnes under Option CRA9_02;
- 98.6 tonnes under Option CRA9_03; or
- 122.6 tonnes under Option CRA9_04.

Each proposed TAC variation is guided by results from the operation of two proposed new CRA 9 management procedures (*Rule 4041* and *Rule 4144*). Important elements of the new CRA 9 management procedures are set out further below, in Section 3 and in Appendix 5. There are considerable differences in the parameters of each management procedure.

Ongoing application of the CRA 9 management procedures is expected to meet MPI Harvest Strategy Standard requirements by maintaining the stock above *Bmsy* with greater than 50% probability and *Bmin* with greater than 90% probability. Simulation testing indicates the new procedures would maintain the stock above *Bmsy* with greater than 93% probability.

Each of the proposed TAC options has the potential to increase the current utilisation benefit of the fishery. If the TACC is varied to give effect to the variations in the TAC, the commercial sector will benefit the most from the proposed TAC increase.

Utilisation benefits for customary Maori and recreational interests should be maintained over time because ongoing application of either management procedure is expected to maintain stock biomass well above *Bmsy*.

Option CRA9_05 – Retain the status quo

Under Option CRA9_05, the *status quo* would be maintained. The CRA 9 fishery would continue to have no set TAC, which has been this way since rock lobster entered the Quota Management System in April 1990.

Setting of non-commercial allowances and the TACC

Allowances for customary Maori, recreational interests and other mortality

No non-commercial allowances have been previously set for CRA 9. Under Options CRA9_01 to CRA9_04 it is proposed that the TACC should be increased, which would result in non-commercial allowances being proposed for the first time.

Model assumptions of non-commercial catch for CRA 9 are shown in Table 4.9 below along with non-commercial allowance proposals.

Table 4.9: Current CRA 9 model assumptions of non-commercial catches and proposed non-commercial allowance options for CRA 9

CRA 9	Customary	Recreational	Other mortality	Total
Non-commercial catch assumptions for the 2013 surplus production model	1 tonne (constant)	Assumed to vary with changes in biomass. Estimated 25.21 tonnes for 2011 ²¹	1 tonne (constant)	27.21 tonnes in 2011
Non-commercial allowances proposed under Options CRA9_01 and CRA9_03	5 tonnes	25 tonnes	1 tonne	31 tonnes
Non-commercial allowances proposed under Options CRA9_02 and CRA9_04	20 tonnes	30 tonnes	5 tonnes	55 tonnes

Under Options CRA9_01 to CRA9_04, the NRLMG proposes that the allowances for customary Maori, recreational interests and other sources of fishing-related mortality (e.g. illegal fishing) are set as follows.

Customary Maori allowance

Little is known about customary Maori catch in CRA 9 apart from reported customary catches under the Fisheries (Kaimoana) Regulations 1998, Fisheries (South Island Customary Fishing) Regulations 1999 and regulation 50 of the Fisheries (Amateur Fishing) Regulations 2013²². Information from these sources suggests between 40 to 380 rock lobsters (below 1 tonne) were harvested per year from 2007-2012.

The NRLMG proposes to set the customary Maori allowance at a higher level than reported catches due to the incomplete nature of the customary catch information. The two customary Maori allowance options are:

- 5 tonnes under Options CRA9_01 and CRA9_03; or
- 20 tonnes under Options CRA9_02 and CRA9_04.

A customary Maori allowance of 5 tonnes is supported by NRLMG commercial representatives because it is considered sufficient to cover current assumptions of customary Maori catch. The commercial representatives contend that a reasonable allowance creates incentives for improved customary permit reporting by tangata whenua who consider that the allowance should be higher.

A customary Maori allowance of 20 tonnes is supported by the NRLMG customary and recreational representatives. These representatives assert that if there were 100 marae along the CRA 9 coastline and if every marae harvested 200 kg of rock lobster per season this would equate to 20 tonnes. This simple equation suggests to customary and recreational representatives that it is not unreasonable to consider that current customary Maori harvest could currently be in the vicinity of 20 tonnes.

²¹ This estimate reflects the un-revised large-scale multi-species estimate for CRA 9. In September 2013, MPI became aware of an error made by the recreational survey research provider in assigning CRA 9 catch. The RLFAGW agreed to let the work stand as reported because the effect of the error on total catch was small, there was no time to re-work the project, and the revised CRA9 catch estimate was greater than the low catch sensitivity trial.

²² Previously regulation 27A of the Fisheries (Amateur Fishing) Regulations 1986.

Customary representatives also note in support for a customary Maori allowance of 20 tonnes that:

- The Te Taihauauru Iwi Forum moved a resolution at a November 2013 hui to support a 20 tonne customary Maori allowance for CRA 9;
- It is risky to make inferences about current CRA 9 customary Maori catches from incomplete information when considering the level of which the allowance should be set at;
- A large part of CRA 9 is not covered by the Kaimoana or South Island Customary Regulations. Therefore, there is no mandatory reporting of customary catches to MPI for areas that fall outside the regulations.

The NRLMG advises that the allowance made for customary Maori interests does not constrain actual harvest.

Recreational allowance

The NRLMG proposes to set the CRA 9 recreational allowance at:

- 25 tonnes under Options CRA9_01 and CRA9_03; or
- 30 tonnes under Options CRA9_02 and CRA9_04.

The large-scale multi-species survey estimated CRA 9 recreational catch at 17.96 tonnes for the period 1 October 2011 to 30 September 2012. There is considerable uncertainty associated with this estimate, however, because of the low number of fishers and fishing events that were captured in the survey and the high CV (coefficient of variation).

A recreational allowance of 25 tonnes is supported by NRLMG commercial representatives because it reflects model assumptions of CRA 9 recreational catch. A recreational allowance of 30 tonnes is supported by NRLMG customary and recreational representatives because they consider that the recreational allowance needs to be set at a slightly higher level than model assumptions to cover the uncertainty in the estimate.

The NRLMG advises that the allowance made for recreational interests does not constrain actual harvest, it is instead meant to reflect current harvest levels.

Other mortality allowance

The NRLMG proposes to set the allowance for other sources of fishing-related mortality (e.g. illegal fishing) at:

- 1 tonne under Options CRA9_01 and CRA9_03; or
- 5 tonnes under Options CRA9_02 and CRA9_04.

There is no reliable information on levels of other sources of fishing-related mortality. The RLFAWG used available MPI estimates for illegal catches from 1989 and a constant illegal catch of 1 tonne/year from 2001 to determine an appropriate estimate for other mortality (e.g. illegal fishing). There is little confidence in the estimates of illegal catch because the estimates cannot be verified.

An allowance of 1 tonne for other mortality is supported by NRLMG commercial representatives because it reflects model assumptions of CRA 9 illegal catch. While an allowance of 5 tonnes for other mortality is supported by NRLMG customary and recreational representatives, because they consider that the other mortality allowance needs to be set at a slightly higher level than model assumptions to cover the uncertainty in the estimate.

TACC

The NRLMG proposes to increase the CRA 9 TACC by 13.792 tonnes under Options CRA9_01 and CRA9_02 and by 20.592 tonnes under Options CRA9_03 and CRA9_04.

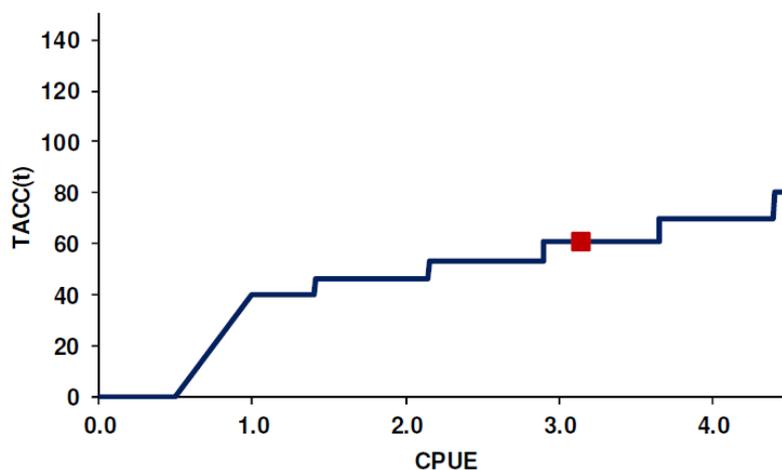
No change is proposed to the TACC under Option CRA9_05.

Options CRA9_01 and CRA9_02 – Be guided by the new Rule 4041 CRA 9 management procedure and increase the TACC by 13.792 tonnes

A graphical representation of the new Rule 4041 CRA 9 management procedure is provided in Figure 4.11. The graph shows the proposed TACC for the next year is a function of offset-year CPUE in the current year. The 2013 standardised offset year CPUE was 3.14 kg/potlift. When the harvest control rule was operated with this CPUE it resulted in a TACC of 60.8 tonnes (shown by the square in the graph).

The proposed TACC increase has the potential to generate approximately \$920K in additional revenue for the commercial sector (based on average 2013 port price information).

Figure 4.11: The new Rule 4041 CRA 9 management procedure, showing the TACC resulting from the rule evaluations performed in 2013 for 2014-15 fishing year.

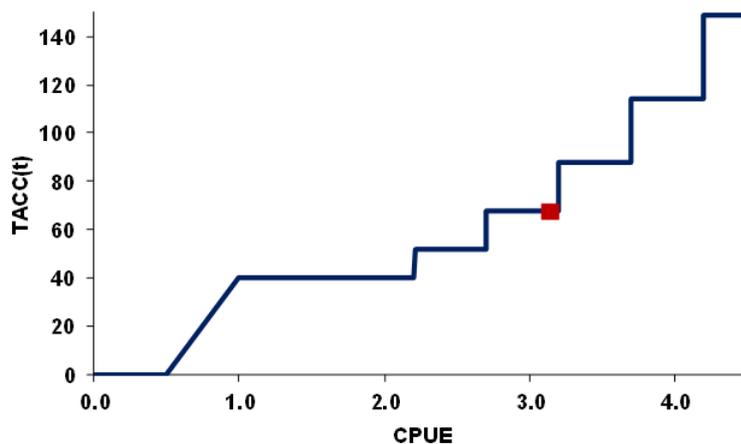


Options CRA9_03 and CRA9_04 – Be guided by the new Rule 4144 CRA 9 management procedure and increase the TACC by 20.592 tonnes

A graphical representation of the new *Rule 4144* CRA 9 management procedure is provided in Figure 4.12. When the harvest control rule was operated with a CPUE of 3.14 kg/potlift it resulted in a TACC of 67.6 tonnes (shown by the square in the graph).

The proposed TACC increase has the potential to generate approximately \$1.4 million in additional revenue for the commercial sector (based on average 2013 port price information).

Figure 4.12: The new *Rule 4144* CRA 9 management procedure, showing the TACC resulting from the rule evaluations performed in 2013 for 2014-15 fishing year.



5 APPENDIX 1: NEW CRA 2 MANAGEMENT PROCEDURE SPECIFICATIONS

In 2013 a new version of the multi-stock length-based stock assessment model was developed for CRA 2. This assessment model was used to set the operating model for evaluating new CRA 2 management procedures.

Nine different CRA 2 management procedure options were considered by the NRLMG in November 2013. The NRLMG have put forward two of these 'final' rules for consideration which when operated result in a TACC decrease for the 2014-15 fishing year. These rules are called *Rule 4* and *Rule 6*.

Some important elements of the CRA 2 management procedures are:

- a) The output variable is TACC (tonnes);
- b) Offset-year standardised CPUE is used as an input to the rule to determine the TACC for the fishing year that begins in the following April;
- c) CPUE is calculated using the 2012 *F2_LFX* procedure which uses:
 - landings to a licensed fisher receiver, along with recreational landings from a commercial vessel and the amount of rock lobsters returned to the water in accordance with Schedule 6 of the Act (i.e. highgraded rock lobsters),
 - estimates, by vessel, of the ratio of annual landed catch divided by annual estimated catch to correct every landing record in a quota management area for the vessel;
- d) The management procedure is to be evaluated every year (no "latent year"), based on offset-year CPUE;
- e) The minimum change threshold for the TACC is 5%.

The CRA 2 management procedures are based on a generalised 'step' rule.

For *Rule 4*: between a CPUE of zero and 0.3 kg/potlift, the TACC increases linearly with CPUE to a plateau of 200 tonnes, which extends to a CPUE of 0.5 kg/potlift. As CPUE increases above 0.5 kg/potlift, the TACC increases in steps with a width of 0.1 kg/potlift and a height of 10% of the preceding TACC.

For *Rule 6*: between a CPUE of zero and 0.3 kg/potlift, the TACC increases linearly with CPUE to a plateau of 210 tonnes, which extends to a CPUE of 0.5 kg/potlift. As CPUE increases above 0.5 kg/potlift, the TACC increases in steps with a width of 0.15 kg/potlift and a height of 10% of the preceding TACC.

6 APPENDIX 2: CRA 3 MANAGEMENT PROCEDURE SPECIFICATIONS

In March 2010 a Minister agreed to use the *Rule 2a* CRA 3 management procedure from the 2010-11 fishing year.

Some important elements of the CRA 3 management procedure are:

- a) It proposed a TAC of 293 tonnes for 3 years (2010–11, 2011–12 and 2012–13) unless offset-year CPUE fell below 0.75 kg/potlift or increased above 1.08 kg/potlift. If the CPUE fell outside these limits, the harvest control rule equations would lead to a TAC recommendation (this occurred for the 2012-13 fishing year);
- b) After the 2012–13 fishing year it is proposed that the harvest control rule equations will lead to a TAC recommendation;
- c) Offset-year standardised CPUE is used as an input to the rule to determine the TAC for the fishing year that begins in the following April;
- d) CPUE is calculated using the 2003 *B4_L* procedure. This procedure sums all landings (to a licensed fisher receiver) and effort for a vessel within a calendar month and allocates the landings to statistical areas based on the reported area distribution of the estimated catches;
- e) The management procedure is to be evaluated every year (no “latent year”), based on offset-year CPUE;
- f) When the conditions referred to in a) above do not apply: if the procedure results in a TAC that does not change by more than 5%, no change will be made; and if the procedure results in a TAC that changes by more than 10%, the TAC will be changed by 10% only.

The CRA 3 management procedure is based on a generalised plateau rule with a plateau of zero width.

7 APPENDIX 3: CRA 4 MANAGEMENT PROCEDURE SPECIFICATIONS

In March 2012 a Minister agreed to use the *Rule 28a* CRA 4 management procedure from the 2012-13 fishing year.

Some important elements of the CRA 4 management procedure are:

- a) The output variable is TACC (tonnes);
- b) Offset-year standardised CPUE is used as an input to the rule to determine the TACC for the fishing year that begins in the following April;
- c) CPUE is calculated using the 2003 *B4_L* procedure. This procedure sums all landings (to a licensed fisher receiver) and effort for a vessel within a calendar month and allocates the landings to statistical areas based on the reported area distribution of the estimated catches;
- d) The management procedure is to be evaluated every year (no “latent year”), based on offset-year CPUE;
- e) It has no thresholds for minimum and maximum change, except a maximum 25% increase limit below the first plateau.

The CRA 4 management procedure is based on a generalised ‘step’ rule. Below a CPUE of 0.5 kg/potlift, the TACC is zero; between a CPUE of 0.5 and 0.9 kg/potlift, the TACC increases linearly with CPUE to a plateau of 467 tonnes, which extends to a CPUE of 1.3 kg/potlift. As CPUE increases above 1.3 kg/potlift, TACC increases in steps with a width of 0.1 kg/potlift and a height of 7% of the preceding TACC.

8 APPENDIX 4: CRA 7 MANAGEMENT PROCEDURE SPECIFICATIONS

In March 2013 the Minister agreed to use the *Rule 39* CRA 7 management procedure from the 2013-14 fishing year.

Some important elements of the CRA 7 management procedure are:

- a) The output variable is TACC (tonnes);
- b) Offset-year standardised CPUE is used as an input to the rule to determine the TACC for the fishing year that begins in the following April;
- c) CPUE is calculated using the 2012 *F2_LFX* procedure which uses:
 - landings to a licensed fisher receiver, along with recreational landings from a commercial vessel and the amount of rock lobsters returned to the water in accordance with Schedule 6 of the Act (i.e. highgraded rock lobsters),
 - estimates, by vessel, of the ratio of annual landed catch divided by annual estimated catch to correct every landing record in a quota management area for the vessel;
- d) The management procedure is to be evaluated every year (no “latent year”), based on offset-year CPUE;
- e) The minimum change threshold for the TACC is 10% and the maximum change threshold is 50%.

The CRA 7 management procedure is based on a generalised plateau rule. Below a CPUE of 0.17 kg/potlift, the TACC is zero; between a CPUE of 0.5 and 1.0 kg/potlift, the TACC increases linearly with CPUE to a plateau of 80 tonnes, which extends to a CPUE of 1.75 kg/potlift. As CPUE increases above 1.75 kg/potlift, TACC increases linearly.

9 APPENDIX 5: NEW CRA 9 MANAGEMENT PROCEDURE SPECIFICATIONS

In 2013 a surplus-production model was developed for CRA 9. This model was used to set the operating model for evaluating new CRA 9 management procedures.

Five different CRA 9 management procedure options were considered by the NRLMG in November 2013. The NRLMG have put forward two of these 'final' rules for consideration which when operated result in a TACC increase for the 2014-15 fishing year. These rules are called *Rule 4041* and *Rule 4144* and are based on a generalised 'step' rule.

Some important elements of the CRA 9 management procedures are:

- a) The output variable is TACC (tonnes);
- b) Offset-year standardised CPUE is used as an input to the rule to determine the TACC for the fishing year that begins in the following April;
- c) CPUE is calculated using the 2012 *F2_LFX* procedure which uses:
 - landings to a licensed fisher receiver, along with recreational landings from a commercial vessel and the amount of rock lobsters returned to the water in accordance with Schedule 6 of the Act (i.e. highgraded rock lobsters),
 - estimates, by vessel, of the ratio of annual landed catch divided by annual estimated catch to correct every landing record in a quota management area for the vessel;
- d) The management procedure is to be evaluated every year (no "latent year"), based on offset-year CPUE;
- e) The minimum change threshold for the TACC is 5%.

For *Rule 4041*: below a CPUE of 0.5 kg/potlift the TACC is zero. Between a CPUE of 0.5 kg/potlift and 1.0 kg/potlift, the TACC increases linearly with CPUE to a plateau of 40 tonnes, which extends to a CPUE of 1.4 kg/potlift. As CPUE increases above 1.4 kg/potlift, the TACC increases in steps with a width of 0.75 kg/potlift and a height of 15% of the preceding TACC.

For *Rule 4144*: below a CPUE of 0.5 kg/potlift the TACC is zero. Between a CPUE of 0.5 kg/potlift and 1.0 kg/potlift, the TACC increases linearly with CPUE to a plateau of 40 tonnes, which extends to a CPUE of 2.2 kg/potlift. As CPUE increases above 2.2 kg/potlift, the TACC increases in steps with a width of 0.5 kg/potlift and a height of 30% of the preceding TACC.