

National Rock Lobster Management Group

Annual Report for 2001

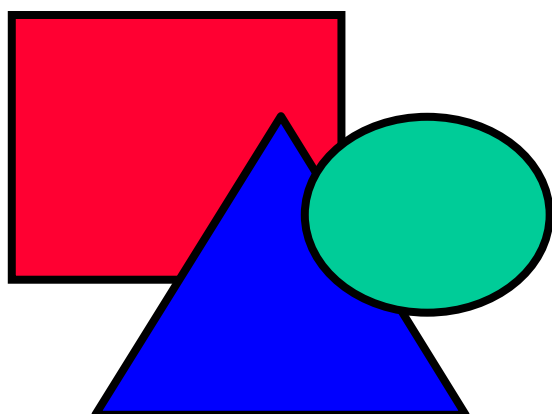


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Part One

Introduction

1.1 PURPOSE

- 1 The purpose of the NRLMG report is to provide primary advice on sustainability measures and management controls for the rock lobster fishery to the Minister of Fisheries. The report also outlines other matters considered by the National Rock Lobster Management Group (NRLMG) during the 2001 calendar year.
- 2 The report fulfils the role of the Ministry of Fisheries Initial Position Paper and forms the basis of the Minister's statutory consultation with stakeholders on rock lobster issues.

1.2 NRLMG BACKGROUND

- 1 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 which at that time were considered to be seriously depleted by overfishing. The NRLMG has since made nine annual reports, which contained recommendations consistent with the sustainable management of this most important inshore fishery.
- 2 The NRLMG has not only played an important 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. 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.
- 3 The Group continues to persevere with its efforts to formulate a robust and enduring harvest strategy 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 'decision rules' which are designed to guide management actions.
- 4 During 2001, the NRLMG attempted to continue the consolidation of the co-operative user group forum, to seek technical advice from experts, and to refine and improve the management plan for rock lobster fisheries and the quality of advice to be given to the Minister of Fisheries to assist in the statutory sustainability and utilisation decisions.

2001 Work Programme

- 5 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 presenting this annual report and recommendations to the Minister of Fisheries by 14th December 2001.
- 6 In addition, some members of the NRLMG have attended and participated in the Rock Lobster Fisheries Assessment Working Group (RLFAWG) meetings held during 2001 and the Stock Assessment Plenary convened by MFish in November 2001.

Organisational Arrangements

- 7 Costs of participation in the NRLMG are borne by the representative organisations, and the NZ Rock Lobster Industry Council (NZ RLIC) supplies venues and facilities. Secretarial and administrative duties are shared by the NZ RLIC and the Ministry of Fisheries (MFish).

Representation During 2001

- 8 The NRLMG comprises:

- a) Industry (New Zealand Rock Lobster Industry Council–NZ RLIC);
 - b) Maori (Iwi representatives resourced by the Te Ohu Kaimoana–ToKM);
 - c) New Zealand Recreational Fishing Council representation (NZ RFC);
 - d) Environmental & Conservation representation;
 - e) Ministry of Fisheries (Fisheries Management, Science Group, and Compliance);
 - f) NIWA, Trophic Research, and StarrFish (as stock assessment research advisers).
- 9 When required, the NRLMG has sought and received specialist advice.

Personnel

- 10 For 2001, the NRLMG interim chairman, Dr Michael Harte (SeaFIC Science Group Manager) resigned his duties in New Zealand to take an overseas posting. The NRLMG invited the SeaFIC Chief Scientist, Dr Kevin Stokes to preside as Chairman.
- 11 Scott Williamson (MFish Fisheries Management) joined the NRLMG in November 2001.
- 12 Dr Kevin Sullivan (MFish Science Group) chaired the Research Planning meetings held under the auspices of the NRLMG.

Role of the NRLMG

- 13 The NRLMG continues the important role of being a co-operative user group forum with specific focus on rock lobster fisheries issues. The NRLMG is perceived as a model for future multi-sector management of fisheries. The NRLMG encourages co-operation between user groups at local and regional levels, and undertakes a co-ordinating role to ensure that the informed views of the represented sectors are incorporated into management and planning considerations.
- 14 The NRLMG seeks technical advice from experts, and develops refinements and improvements to the management regimes currently in place for rock lobster fisheries. The NRLMG strives to provide quality advice to the Minister to assist in the statutory decisions on Total Allowable Catches (TACs), Total Allowable Commercial Catches (TACCs), and other management controls.
- 15 The NRLMG advises 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.

Recommendation

- 16 The NRLMG recommends that the Minister:
- a) **confirm** the NRLMG as the primary source of TAC, TACC and management advice for rock lobster fisheries; and
 - b) **recognise** the NRLMG as an appropriate body to consult on any matters relevant to the management of rock lobster fisheries.

1.3 FISHERY PLANS AND THE ROLE OF THE NRLMG

- 17 In September 1999, the Fisheries Act 1996 was amended to provide for the Minister to approve Fishery Plans. The legislative provisions are very broad in terms of scope, allowing Fishery Plans to relate to *‘one or more stocks, fishing years, areas, or any combination of those things’*.
- 18 The Ministry has advised the NRLMG that in essence Fishery Plans are a statement of how the purpose and principles of the Fisheries Act 1996 will be achieved for particular stocks or areas. Fishery Plans will focus on matters relevant to ensuring sustainability. In particular, Fishery Plans allow for the transparent balancing of management measures and levels of risk, through linking information and compliance requirements and corresponding measures to achieve legislative obligations. Fishery Plans are intended to provide a framework within which stakeholders can assume responsibility for delivering particular outcomes, such as harvesting strategies, research strategies, or particular levels of compliance, within the constraints that achieve sustainability as defined in the Act.
- 19 The NRLMG understands that stakeholders will be encouraged to develop and implement Fishery Plans with assistance and advice from MFish. MFish is developing a generic framework for a Fishery Plan and the concept is supported in principle by several stakeholder groups in rock lobster fisheries. However, progress on the development of formal Fishery Plans for rock lobster fisheries has been constrained by stakeholder concerns over the unresolved issues relating to the organisation and mandate of non-commercial sector groups, and the uncertainty over the scope of amateur fishing rights, an issue which is currently undergoing an extensive public consultation process.
- 20 In 2000 the NRLMG reported to the Minister that it intended to undertake a review the role and objectives of the Group in the context of the Fishery Plan provisions of the 1996 Act. The intended objectives of the review were to:
- a) refine a structure and process for rock lobster fisheries that will enable stakeholders to play a greater role in management at a fishery, or area level;
 - b) encourage the formation of co-operative rock lobster stakeholder group organisations at a regional (CRA region) level;
 - c) provide for better input and participation of tangata whenua in the rock lobster management process;
 - d) determine how co-operative stakeholder groups can integrate with the NRLMG; and
 - e) determine the future role of the NRLMG in rock lobster management.
- 21 In 2001 the NRLMG did review its role and function in the context of the current regulatory, legislative and policy environment, and in anticipation of the progressive resolution of outstanding issues in relation to Fishery Plans. At the May 24th NRLMG meeting discussion was directed at confirming the role of the NRLMG, the membership of the NRLMG, and the roles and responsibilities of members and participants.
- 22 The Role of the NRLMG was agreed as follows:
- a) To maintain the Group 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.
- 23 Noting a preference for membership/participant numbers kept at current levels with some flexibility accorded to need and circumstance, the NRLMG also agreed the roles and responsibilities of the participating members and advisers as follows –
- a) **Sector Representatives** – ToKM, NZ RLIC, NZ RFC, ECO
 - i) 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”*... (Hodgson, March 2001)
 - b) **MFish** – Fisheries Management, Compliance, Science
 - i) Facilitate and coordinate information and advice to and from the NRLMG
 - ii) Ensure consistent information and advice to MFish personnel and to tangata whenua.
 - iii) To enable science (including stock assessment and biological), economic, social policy, and other advice deemed necessary by the NRLMG.
 - c) **Advisory members** – Stock Assessment, Biology and Behaviour, Economic, Social
 - i) 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, and/or regional harvest initiatives.
 - d) **Chairman**
 - i) To facilitate NRLMG meetings and to oversee the development and delivery of the NRLMG Annual Report.

Recommendation

- 24 The NRLMG recommends that the Minister:
- a) **note** that pending the availability of an agreed Fishery Plan framework, the Group has undertaken a preliminary review of its structure and process.
 - b) **note** that a more comprehensive review to be undertaken by the Group will include preparation of a discussion document for rock lobster stakeholders on regional user groups, rock lobster Fishery Plans, and the prospective role of the NRLMG.

- c) **note** that the Group will continue to operate the current management framework outlined in this document in the interim and will work within the roles and responsibilities confirmed in the most recent review.

Part Two

Strategic Vision and Framework for Rock Lobster Fisheries

2.1 STRATEGIC VISION

- 25 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 such as:
- a) rock lobster stocks will be managed effectively (including cost effectively) to maintain the status of the stocks at or above the biomass producing the maximum sustainable yield;
 - 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, eg, 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.

2.2 FRAMEWORK FOR MANAGING ROCK LOBSTER FISHERIES

- 26 The framework for managing rock lobster and the attendant recommendations of the Group is 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 is also consistent with the statutory obligations enshrined in the Fisheries Act 1996.

Goal

- 27 The rock lobster fisheries should be managed and be maintained at or above the biomass producing the maximum sustainable yield, using a comprehensive approach that recognises a range of commercial, customary non-commercial, amateur and environmental concerns and values.

Strategies to Achieve Goal

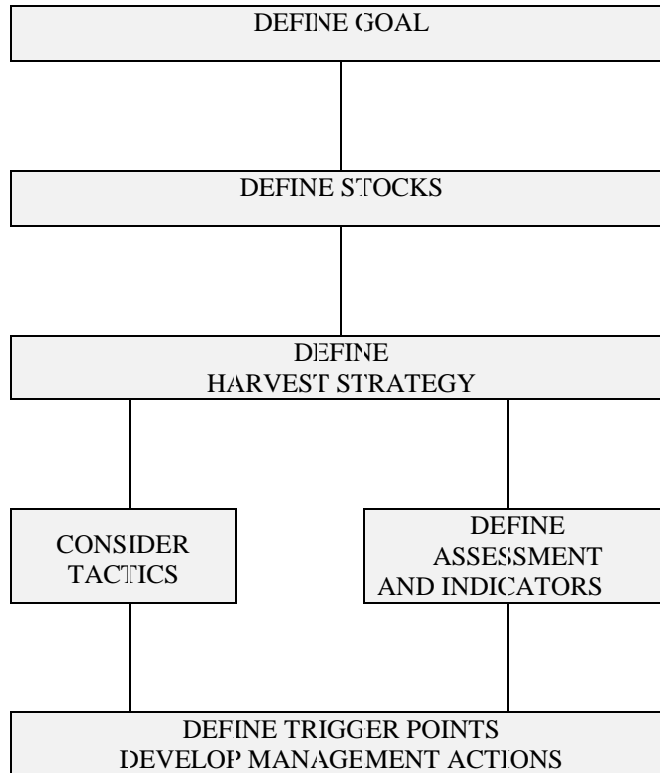
- 28 The strategies will allow the population size to:
- a) increase in each fishing year that it is below the level which will support MSY; or
 - b) be maintained at that level or above.
- 29 The extent of change in population size that can be sought will be determined after consideration of:
- a) economic 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; and
 - iii) the economic return from the fishery.
 - 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.
 - c) the timeframe over which the management options will have effect.
- 30 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

- 31 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 the 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.
- 32 The NRLMG will provide a timely annual report containing recommendations for management, research and compliance of rock lobster fisheries to the Minister.

Framework

- 33 The framework used to develop the management actions for the rock lobster fishery is provided below:



Harvest Strategy

- 34 The NRLMG has been encouraged by Ministers of Fisheries to persevere with its efforts to formulate a robust and enduring harvest strategy which will not require annual review, rather only fine tuning when new information indicates that some adjustment is necessary.
- 35 In response to that challenge the NRLMG proposed a constant catch strategy, which was endorsed, together with ‘decision rules’, as a basis for any adjustment in total removals from the fisheries consistent with that constant catch strategy.
- 36 The NRLMG has reduced its dependence on a single strategy in favour of a more dynamic harvest strategy. The Group is not averse to recommendations for adjustments to TACs so long as it can be demonstrated from stock modelling that stock abundance will continue to increase towards B_{MSY} within reasonable timeframes, or at least not decline to less than B_{MSY} . In situations of less certainty, that is where stock sizes are less than optimum and no decision rule has been developed to aid management recommendations, the Group retains a preference for the constant catch strategy being applied.

Assessment and Indicators

- 37 In accordance with the goal of the framework for managing rock lobster fisheries, stock assessment research will continue to be an important component of the management framework. The RLFAWG continues to refine and improve stock assessment techniques and to identify areas of uncertainty and information needs.

- 38 For a number of years, MFish has commissioned a major rock lobster stock assessment project and an extensive rock lobster recruitment project. These projects were agreed as Fisheries Required Services. The National Institute of Water and Atmospheric Research (NIWA) is contracted to undertake the recruitment work, based on monitoring puerulus settlement at selected sites around the New Zealand coast.
- 39 The NZ RLIC was contracted to provide the 1997–1998, 1998–1999, 1999–2000 and 2001–2003 assessments in collaboration with NIWA, Trophica Research, StarrFish, and for the first two periods, the SeaFIC Science Group. Within the overall project, The NZ RLIC has contracted NIWA and Trophica Research to undertake some of the catch sampling and data entry, and to construct databases for the tagging projects.
- 40 Vessel logbook data are now routinely incorporated into the stock assessment process. Logbook programmes supervised by technicians are established in CRA 2, CRA 5, CRA 8, and CRA 9.
- 41 All industry-funded research projects are planned in close co-operation with NIWA and stock assessment consultants and MFish officials. Intensive catch sampling (including Logbooks) and tagging are undertaken to MFish agreed standards and specifications.
- 42 NIWA, Trophica Research, and StarrFish 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. In the last two years significant advances in the models used for stock assessment have been made.
- 43 An independent peer review of rock lobster stock assessment methodology was commissioned by MFish in 2001. The reviewer concluded that key aspects of the current assessment represent state-of-the-art methodology and are appropriate for assessments of the rock lobster stocks.
- 44 The review identified several areas where additional research or modifications to the assessment were required, and these were subsequently incorporated into the CRA 3 model presented to the RLFAWG in 2001.

Decision Rules and Trigger Points

- 45 The NRLMG has established a decision rule for CRA 7 and CRA 8 linked to the annual assessment that contains specified actions if the ‘trigger’ indicates significant change in population sizes from one year to the next.
- 46 The NRLMG recommended the development of similar decision rules for other rock lobster stocks as part of the stock assessment research contract CRA 1999–01. In response the science advisors to the NRLMG have developed a “Choice Frontier” decision rule matrix which could have application to those stocks that are at or above a level that can support the maximum sustainable yield (eg, CRA 1, CRA 2, CRA 4, and CRA 5). The matrix enables stakeholder groups in those fisheries to consider management goals that comprise one or more of biological, economic, social, and environmental outcomes at varying levels of risk.

Tactics

- 47 There are a number of mechanisms by which total removals from the fishery can be adjusted if circumstances dictate:

- a) reducing the TAC;
- b) changes in minimum legal size (MLS) limits;
- c) closed seasons;
- d) fishing method restrictions;
- e) effort controls;
- f) closed areas;
- g) reductions to commercial quotas and amateur bag limits;
- h) limitations on the numbers of participants in the fishery;
- i) effective enforcement which provides a greater deterrent to illegal fishing;
- j) effective compliance services, such as education, which encourages voluntary compliance;
- k) maximised voluntary compliance with fisheries laws by fishers;
- l) adjustments to escapement provisions;
- m) improved handling to reduce sub-legal mortality; and,
- n) protection of soft-shelled lobsters and berried females.

Recommendation

48 The NRLMG recommends that the Minister:

- a) **confirm** the framework for managing rock lobster fisheries contained in this Report.

Part Three

Matters Considered by NRLMG in 2001

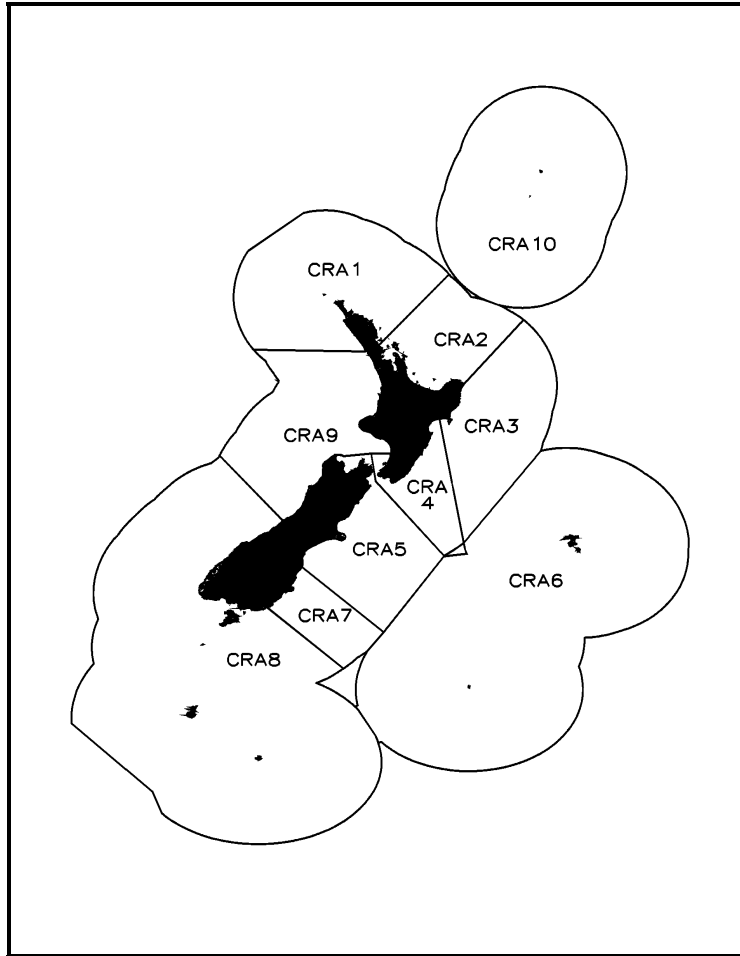
3.1 INTRODUCTION

- 49 The NRLMG has given consideration to a number of rock lobster fisheries management issues during 2001. The most important of these are:
- a) the 2001 stock assessment outcomes, including the CRA 3 model,
 - b) an industry review of the current CRA 3 regime accompanied by proposals to amend existing Regulations pertaining to the CRA 3 fishery. Information to assist the NRLMG in its deliberations only became available in November 2001 and the issues are discussed more fully elsewhere in this Report.
 - c) a package of Regulatory amendments pertaining to amateur rock lobster fishing proposed by NZ RFC representatives.
- 50 The Group convened to review roles, functions, accountability, and responsibilities in anticipation of the completion of the Fishery Plan framework, and in the hope of a resolution to the outstanding definition of amateur fishing rights.
- 51 The Group clarified a number of Regulatory matters related to bag limits for Packhorse rock lobsters and “Slipper” lobsters.
- 52 In 2001 a primary function of the NRLMG was to conduct Rock Lobster Research Planning, and in that role considered the full range of short, medium, and long term research activities relevant to the agreed plan and strategic vision for rock lobster fisheries.
- 53 The Group had a minor role in contributing to a Threat Assessment for rock lobster fisheries being developed by MFish.

3.2 STOCK DEFINITIONS

- 54 There are two rock lobster species in New Zealand, *Jasus edwardsii* (commonly referred to as quota management stocks CRA 1–10) and *Jasus verreauxi* (commonly referred to as quota management stock Packhorse rock lobster stock (PHC)).
- 55 No genetic subdivision has yet been detected for *Jasus edwardsii* within Australasia, but geographic discontinuities do exist for several other factors including morphology, physiology, behaviour, catch and effort, and abundance patterns.
- 56 The RLFAWG and the NRLMG have agreed to an overall management strategy that recognises New Zealand red rock lobster (*Jasus edwardsii*) as a single species, but substocks and regional differences are taken into account when considering management options.
- 57 The Working Group defines three *Jasus edwardsii* substocks in its analyses. These substocks are:
- a) **NSN** — CRA 1 and CRA 2;
 - b) **NSC** — CRA 3, CRA 4, and CRA 5; and
 - c) **NSS** — CRA 7 and CRA 8.
- 58 In 2001 CRA 3 was assessed.
- 59 CRA 9 is considered as a separate entity but was not assessed. CRA 10 was not assessed because no catch has been taken from the area.
- 60 The Chatham Islands (CHI–CRA 6) stock appears to be genetically the same as the New Zealand stocks. Changes in the CHI stock abundance are unlikely to affect the NSI stocks. CRA 6 is considered separately for stock assessment purposes.
- 61 There is only one species of packhorse rock lobsters (PHC) in New Zealand and it appears to be genetically distinct from that in Australia. No assessment has been undertaken for this stock.

Rock Lobster Quota Management Areas



Species	Quota Management Area	Fishstock
Spiny Rock Lobster	Northland	CRA 1 } NSN
	Bay of Plenty	CRA 2 }
	Gisborne	CRA 3 }
	Wellington/Hawkes Bay	CRA 4 } NSC
	Canterbury/Marlborough	CRA 5 }
	Chatham Islands	CRA 6 CHI
	Otago	CRA 7 } NSS
	Southern	CRA 8 }
	Westland/Taranaki	CRA 9
	Kermadec	CRA 10
Packhorse Rock Lobster	All NZ Fisheries waters	PHC 1

3.3 STOCK ASSESSMENT OVERVIEW

Status of the Stocks

Introduction

62 Stock assessments were not updated in 2001 for the NSN substock (CRA 1 & CRA 2), the NSS substock (CRA 7 & CRA 8), the CRA 4 and CRA 5 fisheries, CRA 6, CRA 9, and the PHC fisheries. The CRA 3 stock assessment was reported to the Mid-Year Fishery Assessment Plenary in November 2001.

Jasus edwardsii, NSN substock (CRA 1 & CRA 2)

63 An earlier version of the length-based model was applied to this stock in 1999. Uncertainties in the 1998 assessment were reduced, but uncertainties remained, particularly with respect to the levels of traditional, amateur and illegal catches. The assessment suggested that the current biomass is well above B_{MSY} . However, at an assumed level of catch for the next five years equal to the current catch, and with recruitment varying about its estimated average, the stock was likely to decline. The model estimated three years of poor recruitment, 1994–96. At the beginning of 2004–2005 the stock, although smaller, was considered likely to remain above the estimated B_{MSY} .

64 The 1999 model results were not highly sensitive to the exclusion of CPUE, length frequency or tag-recapture data, nor to modification of the assumed selectivity curve. These results suggested that the assessment was reasonably robust, and that CPUE and length frequency data contained the same basic information about trends in the stock. Good agreement between growth estimates using fishery data and those from tag-recapture suggest that the assessment was not sensitive to the growth estimates.

Jasus edwardsii, NSC substock

CRA 3

65 The revised length-based model was applied to this stock in 2001. The assessment [~~described above~~] suggests a stock that increased sharply from 1993 to 1997 and has since decreased in vulnerable biomass. The current vulnerable biomass is high (mean = 238%) when compared with a reference period, 1974–79, the earliest period where there are good data available to estimate biomass.

66 CPUE rose steadily after a package of measures was implemented in 1993. It peaked in 1997 or 1998 and has begun to decline. The model has no trouble fitting the increase, which was caused by a mixture of good recruitment, decreased removals, and altered MLS and fishing patterns. However the decline is difficult to fit with the model's assumptions, suggesting a problem with those assumptions, with the data, or possibly an additional population process not captured in the modelling.

67 The base case assessment shows a median expectation that the stock will increase slightly in five years at the current levels of catch, but the 5th and 95th percentiles of future stock level are 44% and 188% of the current level, so the stock could increase or decrease. Additional uncertainty in the projections comes from several sources. Levels of recreational (amateur), illegal and traditional catches are poorly determined. These catches, especially historical

illegal catches, are substantial in some years and errors in estimation translate directly into uncertainty in the projections. Further, these non-commercial catches could change, with unpredictable effects on the stock.

- 68 The projections rely on an assumption about recruitment - it was assumed that recruitment would be similar, on average, to that in the period 1988–97 and with variability as seen in the past ten years. However, recruitment in the past ten years is not necessarily a good basis for prediction of future recruitment. A sensitivity trial fitted the model to settlement data and used recent settlement indices to predict future recruitment. This trial showed a median expectation that the vulnerable biomass would decrease to about half the 2001 level by 2006, with 5th and 95th percentiles of 17% and 93%. If settlement at Castlepoint is a reliable index of future recruitment to the population in CRA 3, then the results suggest that continuing stock decreases are likely at the current level of catch. This issue is explained in more detail in the CRA 3 TAC/TACC discussion later in this document. (par.134)
- 69 It is unclear to what extent a new Marine Reserve in CRA 3 will affect the modelled population.

CRA 4 & CRA 5

- 70 An earlier version of the length-based model was applied to combined CRA 4 & 5 QMAs in 1999. It remains unknown whether this grouping is appropriate. Uncertainties in the 1998 assessment were reduced, but uncertainties remained, particularly with respect to the levels of traditional, amateur and illegal catches.
- 71 The 1999 assessment suggested that the current biomass was well above B_{MSY} . This conclusion was sensitive to the exclusion of CPUE data, changes to the assumed selectivity curve and to the weight given to the prior probability on M , but was robust to other sensitivity trials. M appeared to be poorly determined by the data.
- 72 The assessment concluded that, at an assumed level of catch for the next five years equal to the current catch, and with recruitment varying about its estimated average, the stock was likely to decline. The model estimated a series of poor recruitments after 1993. At the beginning of 2005–06 the stock, although smaller, was considered likely to remain above the estimated B_{MSY} . The settlement data for NSC to the end of 1999 (based on the sites Gisborne, Napier, Castlepoint, Wellington, and Kaikoura) show that there was a strong settlement peak during the period from 1991 to 1993, depending on the site, settlement since then has been lower except for a moderate year in 1998.

***Jasus edwardsii*, NSS substock**

- 73 In 2000 the NSS decision rule was triggered by CPUE values that remain well below the rebuild trajectory. Operation of the rule required a 20% decrease in TAC for 2001-02.
- 74 A revised and improved stock assessment model was applied to this substock in 2000. Estimates of stock status were consistent with those made in previous stock assessments. The 2000 stock size was estimated at about 5% of B_0 and about half B_{MSY} , when B_{MSY} was calculated as the biomass associated with maximum deterministic equilibrium yield - a simplistic and probably unrealistic approach. The 2000 exploitation rate was close to 50%.
- 75 Under the reduced catch required by operation of the NSS decision rule, the assessment predicted a rebuild of the stock by a factor of about 2.0, with 5th and 95th percentiles 1.3 to 2.9. This increase has a good chance of taking the stock above B_{MSY} , but the simplistic nature of

B_{MSY} (and low stock size) must be remembered. There was estimated to be no chance that the stock after five years would be above 20% B_0 .

- 76 The projections relied on an assumption about recruitment - it was assumed that recruitment would be similar, on average, to that in the period 1987–96 and with variability as seen in the past ten years. However, recruitments in the past ten years are not necessarily a good basis for prediction of future recruitments. This assumption resulted in lower than average recruitment for NSS being used in the projections.

***Jasus edwardsii*, CHI stock**

- 77 The stock assessment for this substock has not been updated since 1996. The status of this stock is uncertain. Catches have been less than the TACC for some time and CPUE has shown a declining trend since 1979 which has flattened out in recent years. These observations suggest a declining standing stock. However, size frequency distributions in the lobster catch have not changed, with a continuing high frequency of large lobsters. Large lobsters would have been expected to disappear from a stock declining under fishing pressure. This discrepancy could be caused by immigration of large lobsters into the area being fished. The models investigated assume a constant level of annual productivity which is independent of the standing stock.
- 78 Removals in the 1998–99 fishing year (326 t) were within the range of estimates for *MSY* (300-380 t). The recently reduced TAC (370 t) also lies within the range of the estimated *MSY*.

***Jasus verreauxi*, PHC stock**

- 79 The status of this stock is unknown.

Recommendation

- 80 The NRLMG recommends that the Minister:
- a) **note** that assessments were not updated in 2001 for CRA 1 and CRA 2 (NSN), CRA 6, CRA 7 and CRA 8 (NSS), CRA 9 and PHC stocks;
 - b) **note** the revised model used to assess the CRA 3 stock;
 - c) **note** the stock assessment results in the Mid-Year Fishery Assessment Plenary Report (November 2001);
 - d) **note** that for CRA 3 the assessment suggests the current vulnerable biomass is high compared with a reference period, 1974-79, the earliest period where there are good data available to estimate biomass;
 - e) **note** that previous assessments for CRA 1, CRA 2, CRA 4 and CRA 5 in 1999 indicated that stocks are likely to be above B_{MSY} as this indicator is defined in the stock assessment;
 - f) **note** that populations in CRA 1, CRA 2, CRA 4 and CRA 5 were projected to decline over five years, given the current levels of removal and average recruitment, but that they will likely remain above B_{MSY} ;
 - g) **note**, based on the stock assessment, no sustainability issues for any stock require action for the 2002–2003 fishing year.

3.4 DESCRIPTION OF ‘DECISION RULES’

- 81 In 1993, the NRLMG recommended a ‘decision rule’ in recognition of the need for a fixed decision point, defined and agreed to in advance, at which certain management action occurs should the fisheries deteriorate. The NRLMG recommended a trigger point based on commercial CPUE as an index of abundance. The NRLMG commissioned an evaluation of the effectiveness of the ‘decision rule’ during 1996, and as a consequence was able to recommend new ‘decision rules’ for use in future TAC and management decisions. It is those rules that were used in 2001, and a further refinement of decision rules for rock lobster fisheries is due to be reported from the CRA 2001 research project early in 2002.
- 82 As previously reported, if apparent abundance of a substock increased, or did not decrease significantly, as reflected in commercial catch rates and measured as standardised CPUE, then the NRLMG recommended that there should be no change to the total levels of removals from that substock. If, however, abundance appeared to decrease significantly for a substock, then the NRLMG would request a comprehensive substock assessment, seek estimates of the total removals that would allow the stock size to increase in the following year, and finally, recommend management actions that would constrain total removals to that level.
- 83 In 1995, NIWA scientists suggested further research work to determine the efficiency of that rule. During 1996 NIWA and SeaFIC scientists undertook a rigorous evaluation of that rule, and of a new rule developed specifically for CRA 7 and CRA 8 (NSS substock) in response to concerns about greater certainty of rebuild within specific time frames.
- 84 The results of those analyses along with recommendations for the use of two new ‘decision rules’ were reported by the NRLMG in September 1996 and subsequently endorsed by the Minister of Fisheries in 1997.
- 85 The recommended decision rule for the NSS substock can be briefly summarised as follows. The underlying assumption is that CPUE is a relative index of stock abundance:
- a) the decision rule for NSS uses the predicted trajectory of rebuild from the 1997 age structured model which was based on the then current TACC;
 - b) the rule is triggered if the deviation from the predicted rebuild trajectory (averaged over three years) is more than 25%;
 - c) if the rule is triggered, the TAC is either raised or lowered by 20%, depending on the direction of the deviation; and
 - d) the rule does not allow TAC adjustments in two consecutive years.
- 86 The decision rule for CRA 1 and CRA 2 (NSN) and CRA 3, CRA 4, and CRA 5 (NSC) substocks was constructed to allow for increases in TACs where rebuild would not be significantly delayed by taking such an action. The application of these decision rules will result in management action consistent with the Minister’s legal obligations.
- 87 During 2000 and 2001 the NRLMG and the RLFAWG have developed and refined more sophisticated decision rule matrices for use in lobster fisheries. This has been done partly in response to industry concerns over whether the current NSS management regime is appropriate to the CRA 7 and CRA 8 fisheries.

- 88 Industry is currently participating in a detailed review of the NSS Decision Rule and its application to those fisheries and is working with stock assessment scientists evaluating alternative management approaches using agreed decision rules.

Recommendation

- 89 The NRLMG recommends that the Minister:
- a) **note** that the current NSN, NSC, and NSS decision rules are consistent with the Minister's legal obligations;
 - b) **note** that the decision rules continue to be refined and evaluated in order to provide greater certainty to the management decisions undertaken to ensure the sustainability of rock lobster stocks;
 - c) **approve** the use of appropriate decision rules for sustainability decisions in 2002–2003.

Part Four

Sustainability Measures Review

4.1 CRA 3 MANAGEMENT REGIME REVIEW

Introduction

- 90 The full text of the CRA 3 Industry Association Review and Proposals for CRA 3 is attached to this Report as Annex Three.
- 91 The suite of input and output controls that constitutes the current CRA 3 management regime is noted in Appendix 1 (par. 168)

Proposals

- 92 Following discussions between the CRA 3 industry, amateur fishing representatives, tangata whenua and the Ministry of Fisheries (MFish), it is proposed that the Total Allowable Catch (TAC) of 453 tonnes remains unchanged for the 2002–2003 fishing year.
- 93 The CRA 3 Industry Association Inc (CRAMAC 3) propose that the Fisheries (Central Area Amateur) Fishing Regulations 1986 and the Fisheries (Central Area Commercial) Fishing Regulations 1986 be amended to:
- a) remove the closed seasons which currently prohibit commercial fishing from 1 May to 31 May and 1 September to 31 January and amateur fishing from 1 September to 30 November; and,
 - b) remove the regulations prohibiting the landing of legal sized female lobsters by fishers during the months of June, July and August in any year.
- 94 CRAMAC 3 propose to implement a voluntary closure to commercial operators during 15 December to 15 January when recreational fishing is at its peak.
- 95 CRAMAC 3 propose that other closures, when and if proposed and agreed by all stakeholders, will be implemented via contractual arrangements with Licensed Fish Receivers.
- 96 MFish propose that stakeholders review the Minimum Legal Size regime for the CRA 3 fishery during 2002 with a view to providing options for evaluation by the Rock Lobster Fishery Assessment Working Group (RLFAWG) in 2003.
- 97 The NRLMG propose that stakeholders develop an agreed set of management objectives for the CRA 3 fishery to be incorporated into a management strategy for evaluation by the RLFAWG in 2003.

Background

- 98 The existing CRA 3 management regime was implemented in April 1993. It was an outcome from a combined user group which considered the management actions to address the then current circumstances in the fishery. One of the components of the regime is an annual review of the stock and management of the fishery. A full outline of the CRA 3 regime is attached as Appendix One.

- 99 Of particular interest over the last two years has been the suite of closed seasons that dictate the temporal distribution of commercial fishing. In July 2000 the CRA 3 Industry Association sought an extension to the CRA 3 commercial season to include the month of September 2000 to mitigate the impacts of bad weather that had prevented fishing for substantial periods during the winter season. Due to the timing of the request, the Association (and subsequently MFish) could only undertake limited consultation with the CRA 3 User Group representatives.
- 100 After consideration of the issues, including difficulties with consultation over the proposal, the Minister of Fisheries decided to approve the extension. In a letter to stakeholders the Minister noted the rationale for the extension and stated that he wished the 2000 review of the fishery to provide for a greater degree of input and participation from tangata whenua and other users of the resource.
- 101 In order to ensure that tangata whenua in the CRA 3 area were aware of the processes of research and fisheries management and the opportunities for input into those processes, MFish undertook discussion of these issues with tangata whenua outside of the CRA 3 User Group as part of the 2000 review.
- 102 In 2001 CRAMAC 3 again requested an amendment to regulations to extend commercial fishing into September 2001. However the Minister declined the request on the basis that:
- insufficient time was available to progress the amendment, and
 - the Minister's desire to see the regulation reviewed as part of the annual review of the CRA 3 management process.
- 103 In November 2001 the CRAMAC 3 (representing all commercial interests in the fishery) convened a group of experienced industry personnel, including Maori, to examine the current CRA 3 regime and to "test" the intent and purpose of the regulatory package.
- 104 The intent of this review was to enable industry proposed changes to be consulted with customary and amateur fishing representatives and delivered to the NRLMG for inclusion in the 2001 Annual Report and Recommendations to be made to the Minister of Fisheries based on the outcome of the consultative process.
- 105 CRAMAC 3 has undertaken consultation with customary fisheries representatives nominated by tangata whenua and with amateur fishing representatives directly in 2001 after seeking advice on appropriate contacts from MFish.

Allocations to sector groups

- 106 A TAC of 453 tonnes was set for this fishery on 1 April 1999. Separate allowances of 20 tonnes each were made for amateur fishing and customary fishing. Allowances for other sources of mortality including illegal removals were made at 86 tonnes. The Total Allowable Commercial Catch (TACC) was set at 327 tonnes. No changes were made to allowances for the 2001–02 fishing year.
- 107 Commercial catch from the CRA 3 fishery is detailed by *Table 1* below.

Table 1: TACCs, season duration (months) & Catches 1988/99 to 1999/2000

Season	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00	00/01
TACC	n/a	n/a	437	412	331	164	164	164	205	225	327	327	327
Months	12	12	12	12	12	6	6	6	6	6	6	6	6
CATCH	277	372	328	272	191	181	161	155	204	223	326	326	328

Data obtained from Rock Lobster Fishery Assessment Working Group 2001 and MFish

- 108 Estimates of amateur fishing catch have been made based on telephone and diary surveys completed in the Central region during 1992–93. Information has also come from the 1996 National Diary Survey. Numbers from survey results are converted to weight using the mean weight observed in catch sampling and voluntary logbook programs. The 1992–93 survey estimated that 8 000 lobster were caught by amateur fishers. The 1996 diary survey estimated this number at 27 000. The stock assessment reported in 2001 uses an estimate of 14.1 tonnes of amateur harvest from the CRA 3 fishery. A 20 tonne allowance is provided within the TAC.
- 109 The current CRA 3 stock assessment uses an estimate of 30 tonnes for customary harvest based on advice from MFish. A 20 tonne allowance is provided within the TAC.
- 110 The illegal catch estimate for the 2000-2001 fishing year supplied by MFish compliance is 80 tonnes. The estimate used in 2000 stock assessment was 100 tonnes.
- 111 The current stock assessment model also takes into account a handling mortality as a proportion of overall fishing mortality to the stock. No quantitative figure has been produced from the CRA 3 stock monitoring, although the model assumes that handling mortality is 10%.

Stock assessment results for 2001

- 112 Modelling was undertaken in 2001 using a new length based model. For the 2001 assessment the Rock Lobster Fishery Assessment Working Group (RLFAWG) re-examined the performance indicators used in previous assessments. The status of the stock relative to B_{MSY} is not estimated because estimates of virgin biomass are very uncertain. To assess the status of the stock, the RLFAWG chose two estimates of “vulnerable biomass” (vulnerable biomass refers to rock lobster that are available to be legally harvested) as reference points:
- a) Vulnerable biomass for the period 1974-79 (the earliest period where there are data available to estimate biomass); and,
 - b) Vulnerable biomass as at 1 April 1992 (the period of lowest estimated vulnerable biomass in the fishery).
- 113 The period 1974-1979 was chosen as a reference point, after inspecting some early model fits, because:
- i) it was the earliest period where there are good data available from which to estimate biomass, and the current biomass relative to this reference level is well estimated by the model.

- ii) the fishery was well developed, but by no means fully developed, by this time. Although the fishery was well developed by 1974 (2,000 tonnes had been taken from it in the previous 6 years), it cannot have been fully exploited because 5,600 tonnes of commercial catch were taken over the next 10 years.
 - iii) biomass was relatively stable; and
 - iv) exploitation rate was about 25%. The exploitation rate of 25% is relatively low compared with other lobster fisheries world-wide. The exploitation rate is estimated as the ratio of catch to the biomass of lobsters above the minimum legal size.
- 114 Modelling suggests that the current vulnerable biomass is 238% of vulnerable biomass in the period 1974-79 (5th percentile to 95th percentile of probabilities are 221% to 257%) and 727% (5th percentile to 95th percentile of probabilities are 675% to 784%) of the vulnerable biomass present on 1 April 1992.
- 115 Forward projections were also used to estimate biomass in 2006-2007 (based on average recruitment over the period 1988-97). The median vulnerable biomass for 2006-07 was 108% of current biomass. However, the range between the 5th percentile and 95th percentile is very large (44% of current biomass to 188%) indicating significant uncertainty in the projections.

Uncertainty from the data

- 116 The CRA 3 assessment is highly uncertain in several respects. Most uncertainty is associated with the declines in CPUE that began in 1998 for the autumn-winter and 1999 for the spring-summer. The model demonstrates some difficulty in fitting declining CPUE in recent years. This difficulty is shown by:
- i) high estimated natural mortality rate compared with other lobster assessments and earlier CRA 3 assessments when recent CPUE is fitted,
 - ii) low estimated natural mortality rate when recent CPUE is not fitted,
 - iii) the incompatibility of fits to size and CPUE data, and
 - iv) the shift in biomass trajectories when the 2000 CPUE data are added to the fitting.
- 117 The RLFAWG used retrospective analyses to test the robustness of the 2001 model and results. Retrospective analysis involves using the 2001 stock assessment model with data up to 1999 to see if the results of the assessment change. The results of the analysis suggest that the 2001 stock assessment is substantially different than the results from the model using the data up to 1999. The addition of the two CPUE data points (AW-SS) from the 1999-2000 fishing year results in the model estimating a much lower level of vulnerable biomass than that suggested by the 1999 data.
- 118 Given the RLFAWG prior belief of a low natural mortality rate (with a mean of 0.12) in CRA 3 the vulnerable biomass should not be declining with current catches. The model can fit declining CPUE only by increasing the natural mortality rate and changing the growth parameters.
- 119 There are many alternative explanations for the results of the modelling, including:
- i) that mortality has increased in CRA 3 to cause the declining CPUE (the model assumes constant survival rates over time);

- ii) that recent fishing mortality has been higher than that assumed (i.e., that the non-commercial catches have been greater than estimated);
- iii) that growth has decreased (the model assumes constant rates of growth over time), effectively decreasing the productivity of the fishery;
- iv) larger lobsters become unavailable to the gear, as shown by the model in a sensitivity trial; or
- v) that vulnerable biomass has emigrated from the fishery (the model assumes no emigration).

120 The alternative explanations are difficult to evaluate. However, despite uncertainty shown by the sensitivity tests and the lack of robustness of the retrospective analyses, the conclusion is that the stock size is probably well above that in the reference period 1974-79.

Uncertainty in the projections

121 The second source of uncertainty comes from the projections of biomass to 2006-2007. Projections made from the base case have a wide range of outcomes when the change in vulnerable biomass is examined over five years. The future biomass could be less than half the current biomass or almost double. Recruitment in these projections has been randomly chosen from a recent 10-year period. The variation in estimated recruitment was very wide, therefore the range of outcomes is not unexpected. A sensitivity analysis carried out using puerulus settlement data was more pessimistic.

122 There are a number of caveats surrounding the sensitivity analysis. These are:

- i) the Castlepoint series may or may not be indicative of recruitment to the population in CRA 3,
- ii) there may be no relation between recruitments to the population and the fishery, and
- iii) results are a sensitivity trial, not an alternative assessment – for a true assessment one would choose a base case differently from the choice made for the sensitivity trial.

Impact of the Marine Reserve

123 The effect of the new marine reserve in CRA 3 was also investigated in the model based on the assumption that 10% of the stock (both new recruitment and adults) was fully protected in the reserve and not available to the fishery. Some members of the Plenary believed that this assumption was at the extreme of possible effects that may have resulted from the establishment of the reserve. Five-year projections using current catch showed an average 20% reduction in the final projected vulnerable biomass compared to the base case.

Preliminary Consultation

Customary Fisheries Interests

124 Initial consultation with tangata whenua has taken place on the proposals put forward by CRAMAC 3. Customary fisheries representatives received a copy of the proposals and a series of informal meetings were held with those representatives commencing December 7th. A further meeting was convened in Gisborne by MFish on 13th December 2001 to facilitate additional consultation.

The Amateur Fishing Interests

- 125 Industry note that consultation with amateur fishing interests is problematical because of the absence of any single regional representative group with a mandate. The most extensive consultation that can be undertaken essentially entails distribution of management proposal discussion documents to local fishing clubs with an encouragement to them to respond, preferably with an endorsement of the proposal.
- 126 CRA 3 Industry Association has distributed a comprehensive discussion document to all local fishing clubs in the area of CRA 3 and met representatives to discuss the industry review and proposals for removal of regulated seasonal closures. Amateur fishing representatives were invited and encouraged to attend the MFish consultation meeting on 13th December.

Consultation and Process Proposed

- 127 The Minister of Fisheries is required to consult with those groups with an interest in the CRA 3 fishery. CRAMAC 3 has already initiated discussions with those groups. MFish is holding a meeting on 13th December to facilitate further consultation. In addition, the NRLMG Report and a consultation letter from the Minister of Fisheries will be sent to major stakeholder groups in the area and to customary fisheries representatives nominated by tangata whenua. Written submissions will be accepted up until 1st February 2002. Final advice on the proposals will be presented to the Minister by 15th February 2002.

Discussion

Environmental considerations

- 128 The provisions of the Fisheries Act 1996 contain specific obligations relating to the aquatic environment and the effects of fishing. The statutory obligations are in the form of generic principles that need to be taken into account, namely:
- a) adverse effects of fishing on aquatic environment are to be avoided, remedied, or mitigated;
 - b) biological diversity of the aquatic environment should be maintained;
 - c) habitats of particular significance for fisheries management should be protected; and
 - d) associated or dependent species should be maintained above a level that ensures their long term viability.
- 129 Potting is the only method used by commercial fishers to harvest rock lobster in CRA 3. There is little information available on the impact of this method on the aquatic environment. However, it is considered unlikely that this method has a demonstrable adverse effect on the environment in CRA 3. Research undertaken in South Australia¹ and Western Australia² suggests that there is little or no impact on seaweed and other benthic communities, including fragile coral reef ecology, from rock lobster potting.
- 130 There is little information available on the impact of rock lobster fisheries on associated and dependent species, biodiversity or habitats of significance. Catch Effort Landing Return

¹ D Casement & Ib Svane – SARDI publication Oct 1999

² C Chubb – Report to RLIAC Oct 2000

(CELR) information indicates that there is no bycatch of any associated and dependent species in CRA 3 greater than 1 tonne.

- 131 No habitats of particular significance for fisheries management have been identified within CRA 3.

TAC/TACC Considerations

- 132 The Fisheries Act 1996 contains an obligation for the Minister of Fisheries to consider the status of a stock relative to the biomass that can produce the maximum sustainable yield and to make adjustments to removals to ensure that a stock is maintained at or above that level. The RLFAWG has not used B_{MSY} as a reference point in the 2001 assessment because B_{MSY} requires estimation of virgin biomass (the biomass prior to exploitation) and this is very difficult to calculate from available data. Accordingly it has been necessary to assess the status of the stock against other reference points. The RLFAWG has chosen two such reference points with which to compare the state of the current biomass. These are the biomass in 1992 and the biomass in 1974-79.
- 133 The 1992 reference point provides a useful comparison of the current status of the stock against the lowest recorded level of biomass. The recovery evidenced since 1992 indicates that the stock can recover from a reduction to biomass down to 1992 levels. However, the amount of yield that could be taken from the stock at this level to allow a rebuild was substantially lower than current removals. Reduction of the biomass to this level would have severe economic impacts on commercial fishers and result in much lower catching opportunity for stakeholders. Ongoing management action should be designed to ensure that current biomass is maintained well above this level. The stock assessment estimates that the current biomass is 727% (median) above the level of biomass in 1992 (5th percentile to 95th percentile of probabilities are 675% to 784%).
- 134 The NRLMG note that in the absence of agreed objectives for management of the fishery, and an estimate of the biomass that can produce the maximum sustainable yield, there is no agreed target level for biomass in this fishery. In the absence of an agreed management strategy for this fishery, the NRLMG believes that the 1974-79 reference point provides an appropriate alternative for management consideration for the reasons outlined in paragraph 115.
- 135 Despite the uncertainties in the stock assessment noted in the previous section, the current vulnerable biomass is 238% of the biomass in 1974-79. This suggests that there are no short term sustainability issues for this stock. Accordingly the NRLMG propose that there be no adjustment to the TAC or TACC for the 2002-03 fishing year.
- 136 In order to try to resolve some of the uncertainty in the assessment and also to enable the status of the stock to be re-evaluated, MFish propose that a new stock assessment is undertaken in the CRA 3 fishery in 2002.
- 137 To provide for better management of the fishery the NRLMG propose that the stakeholders agree on a set of management objectives for the fishery to be incorporated into a management strategy. This issue is discussed in more detail in the “Future Management Action” section outlined below.

Other management controls

- 138 The CRA 3 management regime contains a number of input controls implemented by regulation. A full list of measures that form part of the CRA 3 management regime are attached as Appendix 1 (p.41).

Closed Seasons

- 139 CRAMAC 3 note that the regulations were implemented in 1993 as part of a management regime which included an initial reduction to the TACC from 331 tonnes to 163 tonnes. Industry note that the regulatory measures are not designed to ensure sustainability of the fishery; the TAC is the principal sustainability control. Accordingly, CRAMAC 3 believe that industry should be able to make their own economic decision about when to harvest quota within the bounds of the TACC.
- 140 In order to maximise harvesting efficiency CRAMAC 3 propose removal of existing regulatory prohibitions on:
- a) Commercial fishing during 1 May to 31 May and 1 September to 31 January;
 - b) Recreational fishing during 1 September to 30 November; and,
 - c) The landing of legal sized female lobsters during June, July and August in any year.
- 141 One of the effects of the CRA 3 regime has been to shift the commercial fishery into the winter period. Under a 163 tonne TACC the majority of the catch could be taken during this period. However, since 1993 the TACC has increased in three steps (1995, 1997, 1998) from 163 tonnes to 327 tonnes. In recent years, adverse weather conditions during winter have compounded the impact of the restricted fishing season meaning that a substantial portion of the catch is taken in February to March when the commercial fishery re-opens. Prices during February to March are considerably lower than the peak export months that occur during winter.
- 142 Two recent Winter seasons of adverse weather and sea conditions, the loss of catch from an area designated a marine reserve in 1999, in combination with the increased TACC has resulted in requests from industry for an extension to the commercial season into the month of September in 2000 and 2001.

Analysis

- 143 The NRLMG note that none of the regulations proposed for removal are intended to ensure sustainability. The main sustainability control is the TAC.
- 144 The purpose of the 1 May to 31 May closed season was to provide protection against the potential for commercial operators stockpiling lobsters with a 52mm tail width in anticipation of the June winter season commencing when male lobsters can be harvested with a tail width of this size rather than 54 mm. This closure applies to commercial fishers only.
- 145 The total fishery closure to all users from 1 September until 30 November was intended to remove commercial pots from the water to prevent illegal operators using those pots to harvest rock lobsters. (Female rock lobsters are in berry at this time of the season).
- 146 The continued closure to commercial fishing until 31 January was intended to improve amateur fishing opportunity when amateur effort is at its peak.

- 147 The purpose of the prohibition on landing female lobsters during the period 1 June to 31 August was designed to further protect berried females and maximise egg production from the fishery.
- 148 CRA 3 is the only management area where fishing is prohibited, in part, to protect berried females. In all other rock lobster fisheries a regulation prohibits the landing or possession of females in berry throughout the year. Removal of the existing CRA 3 regulations may result in increased handling mortality of female lobsters in berry and may provide the opportunity for scrubbing (removal of eggs). However, handling mortality of berried females is not considered to be a significant factor in management of other rock lobster fisheries where the prohibition on fishing does not exist.
- 149 The NRLMG do not consider that there will be a significant impact on egg production as a result of the proposed amendment to the CRA 3 regulations. Further, it is not known how egg production from individual fisheries contributes to overall settlement and recruitment in rock lobster in New Zealand. It is likely that settlement in CRA 3 is the result of egg production from a number of fisheries throughout New Zealand and as such any small reduction in egg production from CRA 3 would be unlikely to have any impact on overall egg production and subsequent settlement.
- 150 The removal of current regulations will enable industry to maximise the economic value of catch in periods when prices are high. Currently, commercial fishing can only take female rock lobsters during February and March. The incentive to maximise returns may result in an increase in the catch of female lobsters if the current winter prohibition and the closed seasons are removed. The NRLMG believe that an increase in catch of females will not result in increased sustainability risk to the stock.
- 151 The seasonal closure to commercial fishing until 31 January is an allocation measure designed to provide greater opportunity to amateur fishers because they will not be competing with commercial fishers for available lobster. The NRLMG notes that commercial catch will not increase as a result of the proposed amendment because catch will remain restrained by the TACC. However, there may be increased competition between stakeholders. This competition will be partially mitigated by the proposed voluntary closed season to commercial fishing during 15 December to 15 January when recreational fishing is generally at its peak.
- 152 The NRLMG supports the opportunity for commercial stakeholders to maximise economic returns from the fishery within the bounds of the TACC. The NRLMG supports the removal of the regulations relating to the closed seasons as proposed given that the regulatory proposals do not impact on sustainability.

Minimum Legal Size (MLS)

- 153 The CRA 3 Industry Association is proposing removal of the closed seasons that currently constrain commercial fishing opportunity in CRA 3. However, the Association does not propose any change to the TAC, to the TACC, or to the current minimum legal size (MLS) regime.
- 154 The NZRFC representatives on the NRLMG note that the 52mm tail width MLS for commercial fishing during winter in CRA 3 was part of a “package” implemented in 1993 in which closed seasons were an integral factor. They also note the difficulties being encountered in discussion with the region’s recreational sector when considering the

proposal to remove the closed seasons. Based on this the NZRFC representatives record their concerns at the removal of some aspects of the package and retention of the winter MLS for commercial fishing.

- 155 In principle, MFish would prefer that allocation issues were resolved at a regional level between stakeholders. MFish note that there have been difficulties in getting recreational input into the CRA 3 User Group process in recent years. MFish propose that stakeholders review the existing minimum legal sizes over the coming fishing year.
- 156 Currently commercial fishers are able to harvest male rock lobster of 52 mm tail width during the period 1 June to 31 August. The male MLS reverts to 54mm tail width for the months of February, March, April. The intent of the reduced MLS for the winter period was to offset the economic impact of the 50% TACC reduction that occurred in 1993 by enabling industry to take more catch in those months when export prices were highest. Since introduction of the regime in 1993 the TACC has increased in three steps (1995, 1997, 1998) from 163 tonnes to 327 tonnes.
- 157 In all regions except CRA 3 and CRA 7 the MLS for male rock lobster is 54 mm tail width for commercial fishing. In all regions except CRA 7 and CRA 8, the MLS for female rock lobsters is 60 mm tail width for commercial fishing. For all regions the MLS for amateur fishing is 54mm tail width (males) and 60mm tail width (females).

Analysis

- 158 The MLS regime in CRA 3 is factored into the stock assessment and the size of the TAC and TACC. There is no data to suggest that the reduction to the MLS for males in Winter has had any negative biological impact on the stock. Scientific advice suggests that rock lobsters in the Gisborne region still have considerable opportunity to breed before reaching the 52mm MLS.
- 159 The size reduction does advantage commercial operators by providing the opportunity in June, July, and August to harvest male lobsters at a size when they are not available to amateur fishing. However, as noted, the commercial removals are constrained by the TACC. There is no data to suggest that the reduced size limit has resulted in a drop in abundance of lobster available to amateur fishers.
- 160 It is not certain what impact any change in the size limit for commercial fishers would have on amateur catch or opportunity. If the size limit was increased then commercial fishers would increase their catch of lobsters of a larger size. They would also likely be more dependent on the summer fishery (October to February inclusive) because they could not take as much catch in winter if the male MLS was increased. This could lead to increased competition for the available catch between commercial and non-commercial fishers, and an overall reduction in the economic value of the landed catch due to market price differentials between summer and winter.
- 161 MFish note that any proposal to adjust the current MLS will require evaluation to determine any impact on sustainability and utilisation. MFish propose that any options for alteration of the size limit be developed in 2002 and evaluated by the working group in 2003.
- 162 Subject to the outcome of the current consultation, and on the understanding that the review proposed by MFish will be carried out, the NZRFC representatives would support the retention of the winter MLS for commercial fishing.

Future management action

- 163 The NRLMG support movement toward a regime where the stock is more directly managed by output controls and voluntary agreements by stakeholders and note that this approach is consistent with the Ministry policy in regard to overall fisheries management. However, the NRLMG notes that removal of the input controls that formed part of the CRA 3 regime places greater emphasis on ensuring that the TAC/TACC are set at an appropriate level and that a long term management strategy for the fishery is in place.
- 164 Although there is a decision rule for the NSC substock (CRA 3, 4, and 5), the current rule does not provide any guidance on management action in the CRA 3 fishery. The NRLMG consider that regional stakeholders should work on development of a decision rule to meet agreed management objectives. These management objectives would need to be agreed in 2002 so that any decision rule could be evaluated in 2003.

Recommendation

- 165 The NRLMG recommends that the Minister:
- a) **retain** the existing TAC and TACC for CRA 3;
 - b) **note** that the industry proposal to remove seasonal closures in favour of voluntary closures implemented as an outcome of agreements by stakeholders;
 - c) **note** that current regulations in relation to seasonal closures are not essential to the sustainability of the CRA 3 stock;
 - d) **note** that the industry proposal is currently subject to more detailed consultation which will be reported in the NRLMG Final Advice Paper in February 2002.
 - e) **note** the MFish proposal that stakeholders review the minimum legal size regime for the CRA 3 fishery during 2002, and
 - f) **note** the NRLMG proposal that stakeholders develop an agreed set of management objectives for the CRA 3 fishery.

APPENDIX 1: OUTLINE OF THE CRA 3 REGIME

- 166 In response to a decline in stock abundance the CRA 3 User Group was established in 1992 at the instigation of the commercial sector. That Group consisted of representatives of all stakeholders (commercial, amateur and customary) with an interest in the fishery.
- 167 The 1993 rock lobster stock assessment³ indicated significant problems with the CRA 3 stock. Catches in the two seasons prior to 1992 had been 25% and 34% below the TACCs of 437 tonnes and 412 tonnes respectively. Catch for the 1992–93 fishing year was 42% below the 331 tonne TACC. Modelling of the stock suggested that there was considerable growth over-fishing of males and possible egg over-fishing of females. The same data suggested that fishing mortality was between two and ten times the internationally accepted reference point. The level of illegal unreported removals from the fishery was estimated to be in the order of 220 tonnes.
- 168 In 1993 the CRA 3 User Group proposed an agreed management plan for the fishery to the Ministry and the National Rock Lobster Management Group. The measures in the plan were:
- a) a 50% TACC reduction to 163.916 tonnes;
 - b) from 01 June until 31 August a 52mm tail width minimum legal size (MLS) for male rock lobster taken by commercial fishers;
 - c) from 1 September until 30 November a total fishery closure to all users;
 - d) an additional closure to commercial operators from 1 December until 31 January;
 - e) a further commercial closure from 1 May until 31 May;
 - f) a prohibition on commercial fishers removing female lobsters from 1 June until 31 August;
 - g) the fishing industry to undertake catch sampling and stock monitoring to agreed standards and specifications at regular intervals during the commercial fishing season; and
 - h) use of 54 mm steel welded mesh for rock lobster pots.
- 169 The intent of the package was to reduce overall removals from the fishery; maximise egg production from the available breeding stock; allow greater detection of illegal activity and reduce user group conflict.
- 170 The management plan was implemented for a period of three years, at which time it was agreed that the management regime would be reviewed. In August 1996 an amended management regime was agreed and implemented in the CRA 3 fishery. The revised regime contained the same elements as the plan implemented in 1993 but included a requirement for an annual review to be conducted by the CRA 3 User Group.

³ Report from the Mid-Year Fishery Assessment Plenary, November 1993. p.19 – MAF Fisheries

Part Five

Other Rock Lobster Issues

5.1 RESEARCH ISSUES

Research Commissioned by MFish

- 171 The NZ RLIC successfully tendered to provide the three year CRA 2001 Fisheries Required Service stock assessment programme in collaboration with NIWA, Trophia Research and StarrFish.
- 172 NIWA successfully tendered to provide the recruitment project for 2001-2003.
- 173 MFish commissioned work to examine and validate recent estimates of amateur and customary Maori catch.
- 174 MFish commissioned an independent audit and review of the stock assessment model used for rock lobster fisheries.

Review of the Rock Lobster Stock Assessment

- 175 The review was conducted during June 2001 by Dr Andre Punt, School of Fishery and Aquatic Sciences, University of Washington Seattle. The review involved first over-viewing two key background documents (Bentley, Breen, Starr and Kendrick – Assessment of the CRA 3 and NSS stocks of red rock lobster (*Jasus edwardsii*) for 2000; Bentley, Breen and Starr – An individual based model of the New Zealand rock lobster fishery) as well as the computer programme used to conduct the assessment.
- 176 The reviewer concluded that the key aspects of the current assessment represent state-of-the-art methodology and are appropriate for assessments of the rock lobster stocks of New Zealand.
- 177 The review identified several areas where additional research or modifications to the assessment were required. The three areas of greatest importance were:
 - a) modifying the approach used to weight the catch-rate and size-frequency data to avoid unintentionally impacting the estimates of uncertainty;
 - b) agreeing on a set of diagnostic tools to enable an evaluation of whether the model provides an adequate fit to the data and biologically realistic results to be conducted;
 - c) agreeing on a set of statistics to assess convergence of the MCMC algorithm and methods for reparameterising the assessment model when failure to achieve convergence is detected.
- 178 These issues were resolved by stock assessment scientists in the CRA 3 assessment presented in November 2001.

Stock Monitoring

- 179 Industry logbook data from CRA 2, CRA 5, and CRA 8 continues to be incorporated into the stock assessment process. These programmes are supported by individual lobster fishermen who voluntarily measure all lobster in four designated pots each fishing day. Over the years it has become apparent that these data, which are designed to be

representative of the respective fisheries, are providing reliable and consistent information for stock assessment.

- 180 Sequences of stock monitoring are undertaken as Fisheries Required Services in CRA 1, CRA 2, CRA 3, CRA 4, CRA 5, CRA 7 and CRA 8. Industry has also completed an elective escape gap experiment in CRA 5 and pre-recruit potting trials in CRA 7 and CRA 8 during the 2001 season.
- 181 Industry-funded technicians and administrative support staff continue to be employed in the Northland, Bay of Plenty, Canterbury-Marlborough, Otago, and Southern rock lobster fisheries. One Bay of Plenty technician is directly employed by the CRA 2 Rock Lobster Company Ltd, the other is contracted to the NZ RLIC. The CRA 8 Technician is contracted by the CRA 8 Management Committee Inc. For the remaining regions, technical support is contracted by the NZ RLIC. Regional administrative and support staff are also contracted and supervised by the NZ RLIC on behalf of industry. The NZ RLIC contracts Trophica Research to maintain the Vessel Logbook database and to analyse and report logbook data to the annual assessment process.

Research Planning

- 182 In 2001, MFish again designated the NRLMG as the forum for the Rock Lobster Research Planning process. This process contributes to the MFish Fisheries Services Plan on the nature and extent of Fisheries Required Research Services. 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 of Fisheries when seeking TAC and management advice.
- 183 The NRLMG sought and actively encouraged additional participants to the Rock Lobster Research Planning process that commenced in August to October 2001. These included interest groups not directly represented on the NRLMG, and potential service providers.
- 184 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 2000-2001.
- 185 The NRLMG has previously confirmed a range of immediate and medium term research needs, the results of which will inform the Minister when making TAC and sustainability decisions, and may assist stakeholders wanting to develop and implement Fishery Plans.
- 186 The projects that are considered essential to the stock assessment and modelling, to the 'decision rule' evaluation and analysis, and management decisions are:
- a) stock assessment;
 - b) stock monitoring;
 - c) recruitment survey;
 - d) better catch estimates and estimates of illegal removals.

Recommendation

- 187 The NRLMG recommends that the Minister:
- a) **note** the scope of current rock lobster fisheries research;

- b) **note** the positive outcome of the independent review of rock lobster stock assessment commissioned by MFish;
- c) **note** the level of industry involvement in self-funded research initiatives undertaken to MFish agreed standards and specifications; and
- d) **note** the role of the NRLMG in the Rock Lobster Research Planning Process, the results of which form the basis of required fisheries research services described in the MFish Fisheries Services Plan.

5.2 UNCERTAINTY IN ESTIMATES OF TOTAL REMOVALS

Overview

188 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 less well developed. The lack of accurate information on non-commercial and illegal catch contributes to the uncertainty of the stock assessment, and to the effectiveness of agreed harvest strategies.

Customary Harvest

189 There is minimal information on customary non-commercial harvest. Customary fishing regulations have been promulgated. In the South Island the *Fisheries (South Island Customary Fishing) Regulations 1998* became law 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.

190 The regulations provide for quarterly reporting of permits issued for customary fishing purposes. Information derived from the permits was intended to improve the estimates of the level of customary harvest but no new information was available to the RLFAG or to the NRLMG during 2001.

Amateur Harvest

191 MFish telephone, diary and ramp surveys have provided amateur landing data. Estimates of amateur harvest exist only for recent years and the results of the most recent surveys are highly uncertain. Previous (1996) estimates were used in the CRA 3 assessment done in 2001.

Illegal Take

192 MFish Compliance has previously provided estimates of ‘unreported’ illegal removals in the order of 398 tonnes in 1996/97 although the reliability of these estimates is unknown. Estimates of illegal take for recent fishing years are highly uncertain. The Rock Lobster Fishery Assessment Working Group has very little confidence in the estimates.

Recommendation

193 The NRLMG recommends that the Minister:

- a) **acknowledge** that accurate and reliable data for all sectors are essential to the stock assessment and management process.

5.3 COMPLIANCE ISSUES

Illegal Removals

- 194 The level of illegal removals from the rock lobster fisheries previously estimated to be 398 tonnes remains of concern to the NRLMG. The NRLMG has agreed 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.
- 195 Industry, iwi, environmental, 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.
- 196 All user groups represented on the NRLMG are generally agreed that better compliance could be attained if rock lobster compliance strategies were improved.
- 197 In 2001 the NRLMG has assisted MFish in the development of a Threat Assessment for rock lobster fisheries. The final product of the MFish Compliance project is anticipated to guide more effective, including cost effective, enforcement and compliance regimes in rock lobster fisheries.

Recommendation

- 198 The NRLMG recommends that the Minister:
- a) **note** the significance of the illegal catch component and its negative effect on the stock and legitimate extractive users; and
 - b) **note** that all user groups recommend that the Minister take steps to ensure that compliance strategies and services (including enforcement and education services) are sufficient to minimise illegal catch.
 - c) **note** that the NRLMG has contributed to a comprehensive Threat Assessment for rock lobster fisheries being developed by MFish Compliance to guide future compliance strategies.

5.4 ALLOCATION PRINCIPLES

- 199 The NRLMG is generally agreed that the current fisheries management regime aims to achieve sustainable utilisation by controlling total removals to levels which allows stocks to move towards optimum levels. Total removals are expressed as the TAC.
- 200 The Fisheries Act requires that when recommending any variation in the TACC after having regard to the TAC, the Minister must allow for non-commercial interests in the fishery. However, the Act does not provide guidance as to amount that should be allowed.
- 201 Courts have determined that legislation does not require the Minister to give priority to amateur fishing over commercial interests or that the allowance must fully satisfy amateur requirements, but that it is not outside or against the purposes of the Act for the Minister to allow a preference to non-commercial fishing when setting TACCs.
- 202 Courts have also determined that a Minister should not reduce the TACC for conservation reasons unless able to take, and taking, reasonable steps to avoid the reduction being rendered futile through increased amateur fishing.
- 203 Consistent with those Court decisions, MFish holds the view that, when a TAC is set, the Minister will have an obligation to consider controls to constrain amateur fishing limits within that allowance, but that it is not intended to constrain customary harvest.
- 204 The Court held that there was no implied duty for you to fix or vary the amateur allowance at any particular proportion of the TACC or the TAC. The appropriate allocation is a matter for your assessment bearing in mind all relevant considerations on each occasion you revisit the issue.
- 205 Unconstrained increases in legitimate take by any sector, or illegal take by fish thieves, will potentially have a number of consequences. These are:
- a) a risk is that the TAC will be exceeded;
 - b) an erosion of other sector group fishing opportunity;
 - c) an erosion of the value and utility of the quota fishing right; and
 - d) a possible failure of an agreed management plan.
- 206 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.
- 207 The NZ RFC representatives wish to ensure that the amateur fishing right is not further eroded and therefore any increase in TACC needs to incorporate a concurrent increase in the amateur allowance required by the Act. In addition to such an increase they consider that the bag limits need upward adjustment to allow those fishers who take their limit to benefit from the increased abundance. They note that in the past the bag limit was reduced from ten to six rock lobsters for sustainability reasons and for that reason the reverse must occur.
- 208 Amateur fishing representatives consider that the legislation (s 28D) gives customary Maori rights and amateur fishing interests precedence over commercial rights. It is their submission that when setting a TAC the Minister must first satisfy all Maori and amateur expectations of catch allowance, then make allowance for 'other sources of mortality'

including illegal catch, and having attended to those matters, allocate any remaining portion of the TAC to commercial users as the TACC for the fishstock.

- 209 Industry, iwi, and MFish representatives do not agree with that interpretation because it fails to give adequate recognition to the security of fisheries property rights already held by commercial users, including Maori, and the associated husbandry incentives. They do not believe that the amateur fishing view is consistent with the determination of the Courts.
- 210 Industry contends that by its very nature the TAC/TACC setting process allocates defined ‘shares’ of available harvest to extractive user groups. Further, the principle of proportional allocation of explicit catch allowances has been partially pre-determined by the very existence of quota rights and a TAC. However, MFish notes that the Courts held that there was no requirement for proportionality in allocative decisions.
- 211 Industry is concerned that in the absence of sufficient information and the implementation of appropriate measures to constrain amateur catch to an allowance, and adequate constraints on illegal removals, a Minister of Fisheries may consider recourse to reducing TACCs in an attempt to hold total removals within the limit (TAC) required to ensure sustainability. If total non-commercial catch is not constrained, any TACC reduction may only, facilitate an increase in non-commercial catch and illegal activity, through a relative increase in stock availability .
- 212 For this reason, industry representatives advocate a proportional allocation arrangement which allows each extractive user group to share in the available stock abundance and would therefore provide each legitimate sector with an incentive to protect and enhance their respective harvest opportunities.
- 213 These issues apply to other than rock lobster fisheries. Nonetheless, the debate has raised issues of fairness and equity. In those rock lobster fisheries such as CRA 1 and CRA 2 where industry suggest an increasing proportion of the total catch is being taken by non-commercial fishers, allocation policies are of strong interest to commercial fishers. In the absence of allocation principles, industry is concerned that any future actions required to maintain stock sizes could come at the expense of commercial operators and erode the property rights which are the foundation of the QMS.
- 214 Industry representatives acknowledge that rock lobster fisheries are ‘shared’ fisheries which have significant social and cultural, as well as economic values. However, industry cannot support other than a proportional aggregate amateur fishing allowance within the constraints of a TAC. Industry also submits that the initial allowances made in the TAC setting process establish a ‘benchmark’ for shares of the available yield which can then become the basis for negotiation between user groups at a regional level as to future levels of access and use of rock lobster fisheries.
- 215 Industry submits that a formal allocation of ‘shares’ to amateur fishing provides an incentive required to bind that stakeholder group into an ongoing co-operative management, compliance, and research planning process at a regional level.
- 216 The NZRFC has noted the admission by the Minister and MFish that the amateur fishing right is poorly defined and poorly managed. They further note the admission that over a period the amateur fishing right has been eroded. The NZRFC accepted a challenge by the Minister and MFish to jointly work towards properly defining that right and setting an appropriate management structure.

- 217 Representatives of the NZRFC and officials from MFish formed the Recreational Rights Working Group to define the nature and extent of the amateur fishing right. The Rights Working Group report was released for widespread consultation. The Group then reported to Cabinet with an analysis of the public submissions and recommendations. The Minister then established a Ministerial Consultative Group (MCG) which discussed the outcomes of public consultations and possible solutions.
- 218 Following consideration through the MCG process the Minister has reported to Cabinet who have agreed objectives to provide a basis for continuing discussion and development of options for further public consultation.
- 219 The decisions made by the Minister and Cabinet have not materially changed the uncertainty related to the nature and extent of amateur fishing rights.

Recommendation

- 220 The NRLMG recommends that the Minister:
- a) **note** that as the TAC should constrain total catch, a lack of constraint on individual catch components may:
 - i) impede the rate of rebuild of stocks currently less than B_{MSY} ;
 - ii) accelerate the fishing down of stocks at or above B_{MSY} ; and
 - iii) raise equity issues between sectors at the time TAC and TACC changes are recommended.
 - b) **note** that a more explicit allocation policy within the TAC will create incentives for user groups to act co-operatively at a regional level to ensure effective management, compliance and research activities.

Part Six

Regulatory Proposals

6.1 IDENTIFICATION OF AMATEUR REMOVALS FROM ROCK LOBSTER FISHERIES - TELSON CLIP.

Proposal

- 221 The NZ Recreational Fishing Council (NZRFC) has proposed that the Fisheries (Amateur Fishing) Regulations 1986 be amended to require amateur fishers to identify all rock lobsters caught and retained by them, by the clipping of approximately one third of the telson (central tail fin). This clipping shall be carried out at the time that the decision is made to retain a legal rock lobster as part of the amateur daily bag limit.
- 222 In addition to the current regulations governing rock lobsters taken by amateur fishers, it is proposed that it shall be illegal for an amateur fisher to possess any rock lobster that does not have the telson clipped in the approved manner.
- 223 It is proposed that it shall also be illegal for the owners and operators of any commercial premises, including Licensed Fish Receivers, fish retailers, hospitality service providers, to possess any rock lobsters with the telson clipped.

Background

- 224 The purpose of the Fisheries Act 1996 is to provide for utilisation of fisheries resources while ensuring sustainability. The primary mechanism for controlling overall take of fisheries stocks is the setting of a TAC. Within the TAC, allowances are made for customary fishing, amateur fishing, other sources of mortality, and for commercial fishing.
- 225 Individual amateur fishers are able to take their share of the aggregate TAC allowance within the constraints of daily bag limits. Daily bag limits are specified in regional regulations either in the form of a general bag limit, inclusive of a range of species, or specific limits for species.
- 226 The daily bag limit for rock lobster is specified in the Amateur Fishing Regulations that apply throughout New Zealand. The regulations specify that six (6) legal rock lobsters may be taken per person, per day.
- 227 The purpose of the daily bag limit is :
- a) To constrain the overall amateur catch to a level consistent with the allowance made in setting the TAC; and
 - b) To ensure that all amateur fishers have a reasonable opportunity to participate in the harvest.
- 228 A range of conditions is applicable to the harvest of most popular fish and shellfish species. In the rock lobster fishery, protections include a Minimum Size Limit, capture methods limited to potting and hand gathering, provision of escape gaps in pots, amateur pot limits in some regions, and prohibitions on lobsters being landed whilst in berry or whilst in their soft shell stage.

- 229 Currently, in the areas of CRA 2, 3, and 4, there is a regulated limit of 3 pots per person and 6 pots per vessel carrying 2 or more persons. These limits apply to the coastal marine area that extends from Te Awai Pt around the south of the North Island up to the Manawatu River,
- 230 A concurrent Regulatory proposal from the NRLMG is aimed at extending this requirement across all CRA areas.

Problem definition

- 231 The spiny rock lobster *Jasus edwardsii* and *Jasus verreauxi* support the most valuable inshore fishery in New Zealand with commercial landings of 2,784 tonnes in 2000/2001. Rock lobsters support an important non-commercial fishery for amateur potters and divers. Rock lobsters are also extremely important for traditional customary users.
- 232 Estimates of illegal catch are as high as 25% of the total catch in some rock lobster fishery areas. There is a substantial black market for rock lobsters supplied by fishers who fail to report catch against quota or who harvest rock lobsters in excess of the daily bag limit and/or sell or barter their catch.
- 233 The daily bag limits underpin the amateur fishing regime. Their purpose is to ensure that all people can fairly participate in the harvest and to ensure the collective harvest is contained within the TAC allowance in that fishery. People who take more than their daily bag limit in order to sell rock lobster are thieving from all legitimate users of the resource.
- 234 The NZRFC submits that lack of clear identification of rock lobsters that constitute all or part of an amateur daily bag limit allows an opportunity for excessive numbers of rock lobsters to be taken. This increases the opportunity/incentive for rock lobsters to be sold on the black market or bartered for personal commercial gain.
- 235 The NZRFC submits that telson clipping is a means of distinguishing legitimate amateur catch enabling a more effective deployment of compliance and enforcement resources directed at constraining illegal unreported removals from rock lobster fisheries. Telson clipping is being used successfully in Western Australia to constrain blackmarket activity, and is a no cost, pragmatic catch identification mechanism.

Options for Achieving the Desired Result

Regulatory Measures

- 236 The amateur daily bag limit for rock lobsters should be complied with because it is the main control on the aggregate level of amateur removals from the fisheries.
- 237 The Regulatory regime must be robust enough to prevent or at very least deter people from taking more than their daily bag limit. Routine at-sea or shoreside inspection of amateur catch by Fisheries Officers is infrequent, and telson clipping will assist random inspection and enforcement activity.
- 238 The NZRFC submits that the requirement for amateur catches of rock lobsters to be telson clipped will enable Fisheries Officers to make prompt identification of lobsters taken with the intent of keeping them for personal use. Telson clipping will reduce the possibility of amateur catches being traded on the blackmarket. Telson clipping will enable Fisheries

Officers to better direct their enquiries as to the source and audit trail of lobsters held on commercial premises.

Non-regulatory Measures

- 239 The NZRFC notes that this proposal will require an education programme to educate the community on the requirement for the regulations and the method of telson clipping which will enable compliance with the regulations. The programme will be equivalent of that undertaken to inform the public of the Infringement Notice regime now in operation.

Costs and Benefits of the Proposal

- 240 The NZRFC submits that the costs in this instance arise from not adequately constraining illegal unreported removals and blackmarket activities. The benefits arise from having an aid to compliance that enables better directed auditing and monitoring of legitimate product flow.
- 241 The NZRFC believes that implementing the regulation as proposed will improve the ability to enforce the Amateur Fishing Regulations as they pertain to rock lobsters.
- 242 Rock lobster is a species that is highly valued by all legitimate harvesting sectors. Any measures taken that will constrain illegal unreported removals from rock lobster fisheries will provide long-term benefits to the rock lobster stocks and to all legitimate users of the resource.
- 243 Stakeholders groups on the NRLMG believe that illegal unreported removals from rock lobster fisheries deprive legitimate users of the full benefit of well managed fisheries. The failure to constrain illegal fishing is an effective re-allocation of catch away from legitimate extractive users. The benefits of harvest plans intended to increase stock abundance and/or maintain high catch rates are diminished by illegal fishing.
- 244 Stakeholders groups agree that illegal unreported removals and the blackmarket drive significant compliance and enforcement costs paid by Government (and by industry). Where illegal fishing activity leads to localised depletion of stocks there is greater cost incurred in taking a legitimate amateur and/or customary catch. Localised depletion exacerbates tensions between legitimate extractive users which can lead to additional bureaucratic and administrative complexity and cost.
- 245 The NZRFC submits that the cost to amateur fishers of compliance with the proposed regulation is negligible. No special tools or devices are required to clip a telson in the approved manner.
- 246 The NZRFC submits that the cost to MFish in enforcing the proposed regulation is negligible given that telson clipping will be one in a suite of conditions pertaining to amateur rock lobster fishing that would be routinely monitored by Fisheries Officers.
- 247 The NZRFC believes that the cost to MFish in publicising and promoting a new amateur rule should be neutral. MFish have a budgeted communications strategy which includes press releases and contributions to all media, newsletters, and occasional publications. The proposed telson clipping rule can be promoted as a matter of course.
- 248 Industry representatives on the NRLMG support measures to better identify amateur catches whilst noting their intention to ensure that telson clipping should not disadvantage future

catches available to commercial fishers operating under the constraints of quota/ACE for the stocks.

Administrative Implications

249 There are no additional administrative implications. The current compliance effort gains another tool to curb illegal activity in the rock lobster fisheries. There is no extra activity required of Fisheries Officers checking amateur catches to also check that all rock lobsters are clipped.

Conclusion

250 The NZRFC submits that this proposal is a simple, cost effective option that has considerable potential to isolate, identify and reduce black market activity.

251 The public awareness programme should be utilised for a general improvement in the community knowledge and understanding of all amateur fishing regulations.

Recommendation

252 The NRLMG recommends that the Minister:

- a) **note** that MFish advises that the timetable for further evaluation of this proposal will be determined following consideration of the proposal in the context of the Rock Lobster Threat Assessment and subsequent development of compliance strategies for rock lobster fisheries.

6.2 RESTRICTION OF THE NUMBER OF ROCK LOBSTER POTS ALLOWED TO BE USED OR POSSESSED, PER INDIVIDUAL AND VESSEL.

Proposal

- 253 The NZ Recreational Fishing Council (NZ RFC) has proposed that the Fisheries (Amateur Fishing) Regulations 1986 be amended to extend the regulation that is currently in effect in the waters of the areas of CRA 2, 3 & 4, to all New Zealand coastal waters.
- 254 Specifically:
- a) No person shall use or possess more than three legal rock lobster pots per person.
 - b) No persons shall use or possess more than six legal rock lobster pots per vessel carrying two or more persons.

Background

- 255 The purpose of the Fisheries Act 1996 is to provide for utilisation of fisheries resources while ensuring sustainability. The primary mechanism for controlling overall take of fisheries stocks is the setting of a TAC. Within the TAC, allowances are made for customary fishing, amateur fishing, other sources of mortality, and for commercial fishing.
- 256 Individual amateur fishers are able to take their share of the aggregate TAC allowance within the constraints of daily bag limits. Daily bag limits are specified in regional regulations either in the form of a general bag limit, inclusive of a range of species, or specific limits for species.
- 257 The daily bag limit for rock lobster is specified in the Amateur Fishing Regulations that apply throughout New Zealand. The regulations specify that six (6) legal rock lobsters may be taken per person, per day.
- 258 The purpose of the daily bag limit is to:
- a) Restrict the overall catch to a level consistent with the allowance that has been set; and
 - b) Ensure that all amateur fishers have a reasonable opportunity to participate in the harvest.
- 259 A range of conditions is applicable to the harvest of most popular fish and shellfish species. In the rock lobster fishery, protections include a Minimum Size Limit, capture methods limited to potting and hand gathering, provision of escape gaps in pots, amateur pot limits in some regions, and prohibitions on lobsters being landed whilst in berry or whilst in their soft shell stage.
- 260 Currently, in the areas of CRA 2, 3, and 4, there is a regulated limit of 3 pots per person and 6 pots per vessel carrying 2 or more persons. These limits apply to the coastal marine area that extends from Te Awai Pt around the south of the North Island up to the Manawatu River.

Problem definition

- 261 The spiny rock lobster *Jasus edwardsii* and *Jasus verreauxi* support the most valuable inshore fishery in New Zealand with commercial landings of 2,784 tonnes in 2000/2001. Rock lobsters support an important non-commercial fishery for amateur potters and divers. Rock lobsters are also extremely important for traditional customary users.
- 262 Estimates of illegal catch are as high as 25% of the total catch in some rock lobster fishery areas. There is a substantial black market for rock lobsters supplied by fishers who fail to report catch against quota or who harvest rock lobsters in excess of the daily bag limit and/or sell or barter their catch.
- 263 The NZRFC submits that reports of non-commercial fishers deploying excessive numbers of rock lobster pots suggest a considerable over-catch capability far in excess of what might be expected to be reasonable given the amateur bag limits and the current status of the stocks.
- 264 The NZRFC submits that the daily bag limit underpins the amateur fishing regime. The purpose is to ensure that amateur fishers have an opportunity to harvest rock lobsters within the constraints of the aggregate TAC allowance. Effort deployed by amateur fishers to obtain the bag limit should be consistent with the size of that limit. The ability to use unlimited numbers of pots provides a competitive advantage to amateur fishers that is not intended by the current regulations. It also creates the opportunity for excessive numbers of rock lobsters to be taken and increases the opportunity/incentive for these rock lobsters to be sold on the black market.

Options for Achieving the Desired Result

Non-regulatory Measures

- 265 The NZRFC contends that persons utilising high numbers of pots to take more than their daily bag limit and who may participate in the black market are unlikely to be active participants in any voluntary agreement to limit pot numbers.
- 266 The NZRFC notes that while an increased MFish presence at boat ramps, and improved education on what the bag limits are and the reasons for them, could improve compliance, most persons operating in the black market know that they are breaking the law and are adept at avoiding compliance and enforcement effort.
- 267 NZRFC and Industry representatives submit that a regulated limit on the numbers of rock lobster pots used by non-commercial fishers is another tool for MFish to utilise in effectively constraining illegal unreported removals and blackmarket activity in rock lobster fisheries.
- 268 NZRFC and Industry representatives submit that amateur pot limits will also enable the public to identify and report obvious infringements, aiding a more targeted MFish response to possible illegal fishing.

Regulatory Measures

- 269 The changes proposed by the NZRFC aim to strike a balance between providing a fair opportunity for legitimate amateur fishers to take a legal bag limit while ensuring an effort limitation robust enough to prevent people taking more than their daily bag limit.

270 After a successful passage through the statutory and regulatory processes, amateur pot limits have already been successfully implemented in most of the North Island as a useful tactic to limit illegal rock lobster fishing opportunity. The NRLMG stakeholder group representatives believe that an extension of the current regulations is appropriate for the remainder of the rock lobster fishery areas.

Costs and Benefits of the Proposal

271 Rock lobster is a species that is highly valued by all legitimate harvesting sectors. It has a high commercial value and there is an extensive domestic blackmarket known to operate. Therefore incentives exist for people to breach the regulations. In some areas the illegal harvest is up to 25% of the TAC. The NRLMG stakeholder group representatives believe that any change to the regime to improve enforceability and increase compliance will provide long-term benefits to the rock lobster stocks and to other legitimate users of the resource.

272 There will be some costs in educating the community of the implementation of this regulation but they will be minimal using the current communication methods of making the Amateur Regulations known to the fishing public, e.g. website, pamphlets, etc.

273 The NRLMG stakeholder group representatives believe that the benefits arise from having the opportunity for more directed and effective enforcement and compliance activities undertaken by MFish.

Administrative Implications

274 The NRLMG stakeholder group representatives believe that there are no additional administrative implications from the proposed regulation change because it is just another tool for MFish to use in their current efforts to reduce illegal activity in the rock lobster fisheries.

Conclusion

275 This regulation has been deemed by stakeholder groups to be useful in most of the North Island rock lobster fishery areas to reduce the capacity and the likelihood of illegal non-commercial harvest. It seems appropriate to extend it over the rest of New Zealand.

276 Sector group members of the NRLMG support this proposal.

277 MFish submit that this proposal requires further consideration and consultation with stakeholders which cannot be completed within the required timeframe for the 1st April regulatory process. Therefore MFish propose that this measure is deferred for consideration as part of the 1st October review of sustainability measures and management controls.

Recommendation

278 The NRLMG stakeholder group representatives recommend that the Minister:

- a) **amend** the Amateur Fishing Regulations to specify that for all rock lobster management areas:
 - i) No person shall use or possess more than 3 legal rock lobster pots per person.

- ii) No persons shall use or possess more than 6 legal rock lobster pots per vessel carrying 2 or more persons.

279 MFish recommend that the Minister:

- a) **agree** to defer consideration of this proposal for the October 2002 review of sustainability measures and management controls.

Part Seven

Stock Summary

7.1 INTRODUCTION

- 280 This section summarises the principal rock lobster fishing activities in each of the quota management areas. User groups informed the NRLMG of the activities and issues in each fishery, throughout the year.
- 281 The NRLMG has continued to encourage the formulation of fishery specific regional initiatives consistent with the guidelines established by the NRLMG in 1992. The Group is continuously revising and updating those guidelines to ensure consistency with new fisheries legislation and compatibility with the move to greater devolution of management responsibility to stakeholder groups.
- 282 The *Jasus edwardsii* species of rock lobster is managed in areas CRA 1–10; the *Jasus verreauxi* species (PCH) is managed in a single quota management area PHC. No summary is provided for CRA 10 comprising of the Kermadecs as the QMA has a TACC of 0.1 tonnes.

7.2 CRA 1

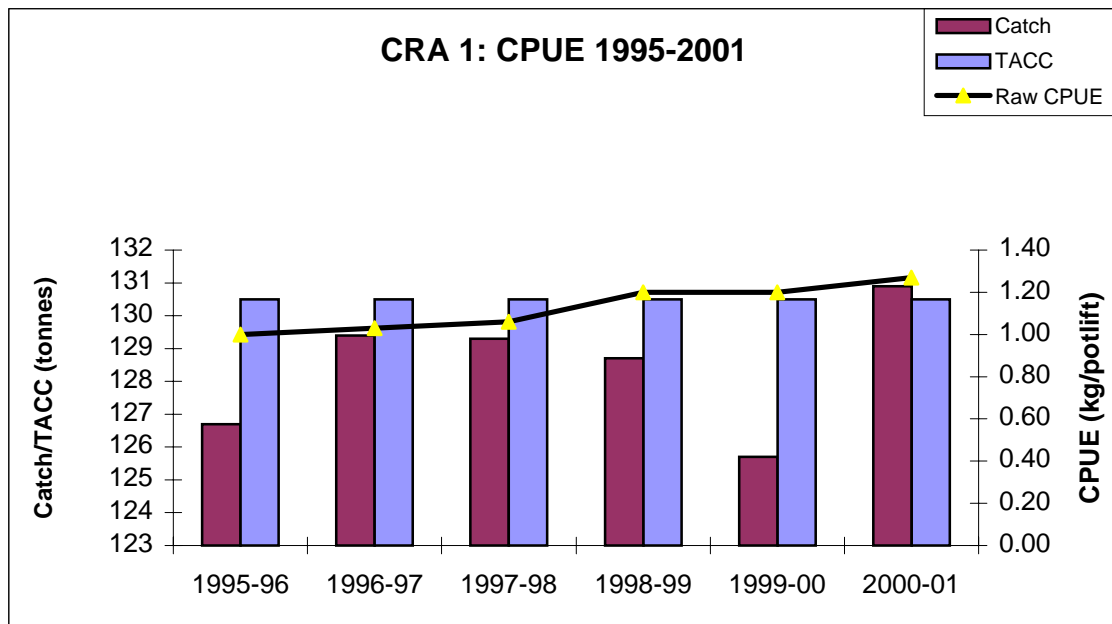


Figure 1: Catch against TACC and CPUE in CRA 1

- 283 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. No TAC has been set for this fishery. The 130.46 tonnes TACC has remained unchanged since April 1993. The commercial fishery extends offshore to the Three Kings, but the bulk of the commercial harvest is taken from waters adjacent to the mainland.
- 284 CRA 1 is assessed as part of the NSN substock using commercial catch and effort and quota monitoring report data. In addition, the CRA 1 commercial stakeholders group has commissioned intensive catch sampling sequences for the fishery in the 1997–98 and 1998–99 seasons. CRA 1 stock monitoring was part of the CRA 1999–01 and 2000–2001 Required Services and 30 catch samples and 5 000 rock lobster tag and releases were completed during the two most recent fishing years.
- 285 The 130.46 tonne CRA 1 TACC is distributed amongst 27 quota share owners. The TACC is harvested by approximately 17 permit holders. The landed value of commercial catch in CRA 1 is \$3.8 million (based on average port price paid to fishermen), making rock lobster an important contributor to the local and regional economy.
- 286 Amateur catch of rock lobster is estimated at 51 tonne (Mfish 1996). Diving using UBA is the predominant method used by amateur fishermen and women, although hand gathering, ring potting, and potting from vessels contributes to the amateur catch.
- 287 No reliable estimates are available for customary catch. The progressive implementation of reporting procedures within the North Island Customary Regulations will assist in future evaluations of customary harvest for the CRA 1 fishery. A large Maori population in the Northland region ensures that rock lobster retains significant customary value.

7.3 CRA 2

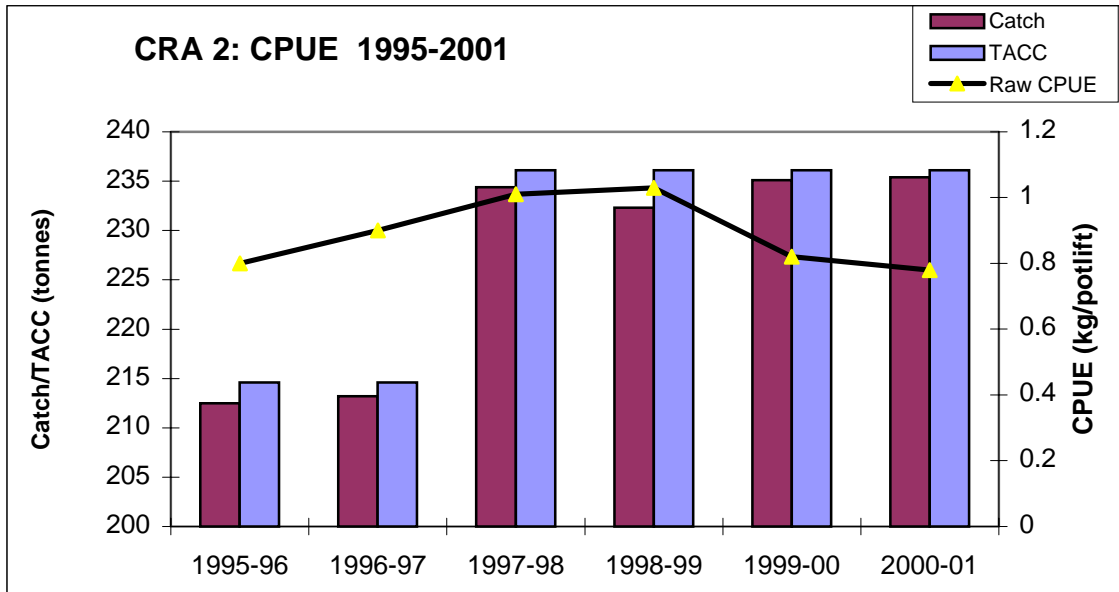


Figure 2: Catch against TACC and CPUE in CRA 2

- 288 The CRA 2 fishery extends from Waipu through the Hauraki Gulf and Bay of Plenty to East Cape. The 452.6 tonne TAC for the fishery was set in 1997. The TAC is made up of 140 tonnes for amateur catch, 16.5 tonnes for customary harvest and 60 tonnes for illegal removals. The current TACC is 236.1 tonne.
- 289 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 of 12,000 rock lobsters, and sequences of intensive catch sampling to MFish standards and specifications. This data continues to be collected for use in the NSN assessment. The CRA 2 Rock Lobster Company Ltd has established a regional co-operative stakeholder committee comprised of commercial, amateur, and tangata whenua representatives. The committee has endeavoured to develop agreed compliance strategies for the CRA 2 fishery, and strengthen working relationships between sector groups.
- 290 Research intended for the 2001–2002 season includes the continuation of logbook coverage, intensive catch sampling sequences within season, and tag recapture reporting.
- 291 The 236.1 tonne TACC is distributed amongst 52 quota share owners. There are approximately 40 vessels in the CRA 2 rock lobster fleet and the commercial season generally extends from June to October. The landed value of the CRA 2 catch is \$7.06 million (based on average port price paid to fishermen) and the industry sustains a number of processing and export companies in Tauranga, Coromandel, and Auckland.
- 292 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.

- 293 Customary catch is conservatively estimated at 16.5 tonne. Anecdotal evidence in recent seasons suggests that the actual harvest is much greater. A large Maori population in the Bay of Plenty region ensures that rock lobster retains significant customary value.
- 294 No regional harvest initiative has been proposed for 2002–03. The stock assessment results support the maintenance of the current TAC and TACC.

7.4 CRA 3

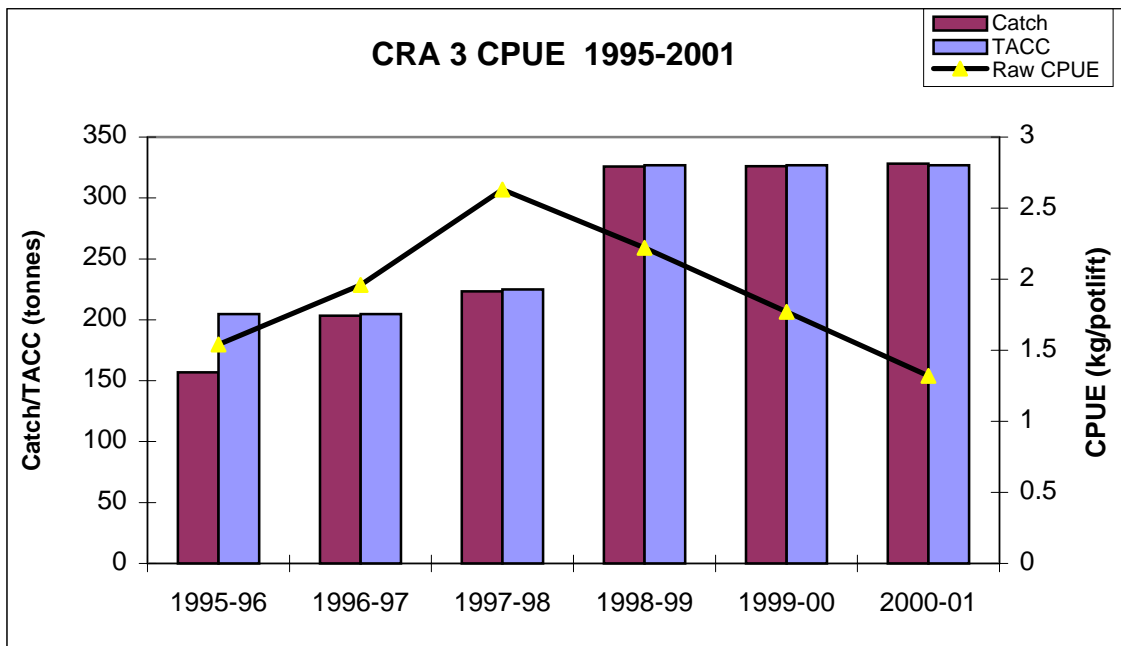


Figure 3: Catch against TACC and CPUE in CRA 3

- 295 The CRA 3 Users Group, representing amateur fishing, Maori, and commercial interests in the region, agreed a management regime for this fishery in 1992–93 which has endured and has been successful in rebuilding what was until then a badly depleted stock.
- 296 The CRA 3 fishery extends from East Cape south to the Wairoa River. The 453 tonne TAC was set in 1998. The TAC is made up of a 20 tonne allowance for amateur catch, a 20 tonne allowance for customary harvest, a 86 tonne allowance for illegal removals and a TACC of 327 tonnes.
- 297 The TACC is distributed amongst 35 quota share owners. The fleet numbers approximately 36 vessels. There is significant iwi involvement in quota share ownership and fishing. The commercial season is set by regulation from June to August inclusive and for February, March and April. The commercial harvest has a landed value of \$9.1 million (based on average port price paid to fishermen). There are two processing plants in Gisborne, and product is also shipped to Wellington and Auckland for processing and export.
- 298 Amateur catch is currently estimated at 14 tonnes (RLFAWG 2001), although an allowance of 20 tonnes was made in the 1998 TAC decision. Potting and hand gathering are the preferred methods.
- 299 Rock lobsters have great cultural significance to local Maori and there is a very high level of customary harvest activity. Customary removals are estimated at 30 tonnes (RLFAWG 2001) although an allowance of 20 tonnes was made in the 1998 TAC decision.

7.5 CRA 4

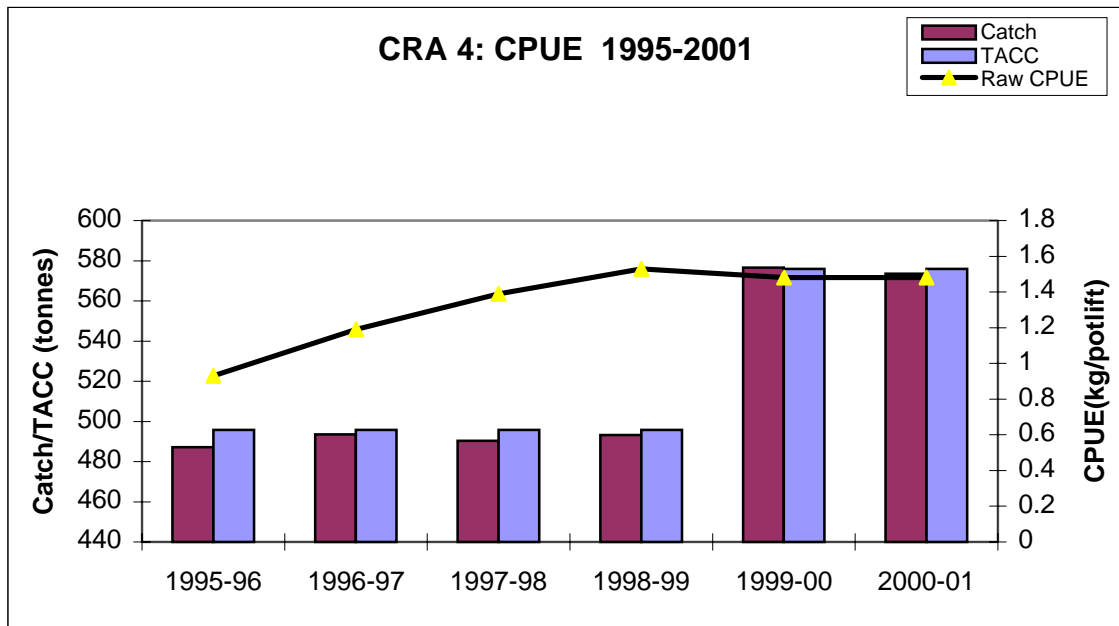


Figure 4: Catch against TACC and CPUE in CRA 4

- 300 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.
- 301 The CRA 4 TAC remains at 771 tonnes, set in April 1999. In that decision the TACC was increased from 495.3 tonnes to 576 tonnes. Prior to 1999 the TACC remained unchanged since April 1993. A total of 85 tonnes was set aside for amateur catch and 35 tonnes was provided for customary catch.
- 302 The CRA 4 and CRA 5 stock assessment reported by the RLFAWG in November 1999 indicates a stock that is currently greater than B_{MSY} and predicts that it will remain above B_{MSY} at the current levels of catches.
- 303 The 576 tonnes TACC is distributed amongst 89 quota share owners. The fleet comprises approximately 65 vessels at the peak of the commercial season, which generally extends from May to November. The majority of vessels in the fleet operate from coastal bases in isolated rural areas. The CRA 4 commercial catch has a landed value in excess of \$18.4 million (based on average port price paid to fishermen) and supports several processing and export operations in Napier and Wellington, Auckland and Canterbury.
- 304 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 when commercial lobster vessels are not operating. The region sustains a recreational fishing and dive charter industry during those months.
- 305 Customary harvest estimates for CRA 4 are not available, but the reporting requirements associated with the implementation of the North Island Customary Regulations will enable more informed decision making in future.

- 306 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 the Napier and Castlepoint localities, and more recently from Cape Palliser. This series was extended in the 2001–02 season with a total of 35 sample days completed for the period May to November. Tag recapture data is being routinely reported by commercial fishermen.

7.6 CRA 5

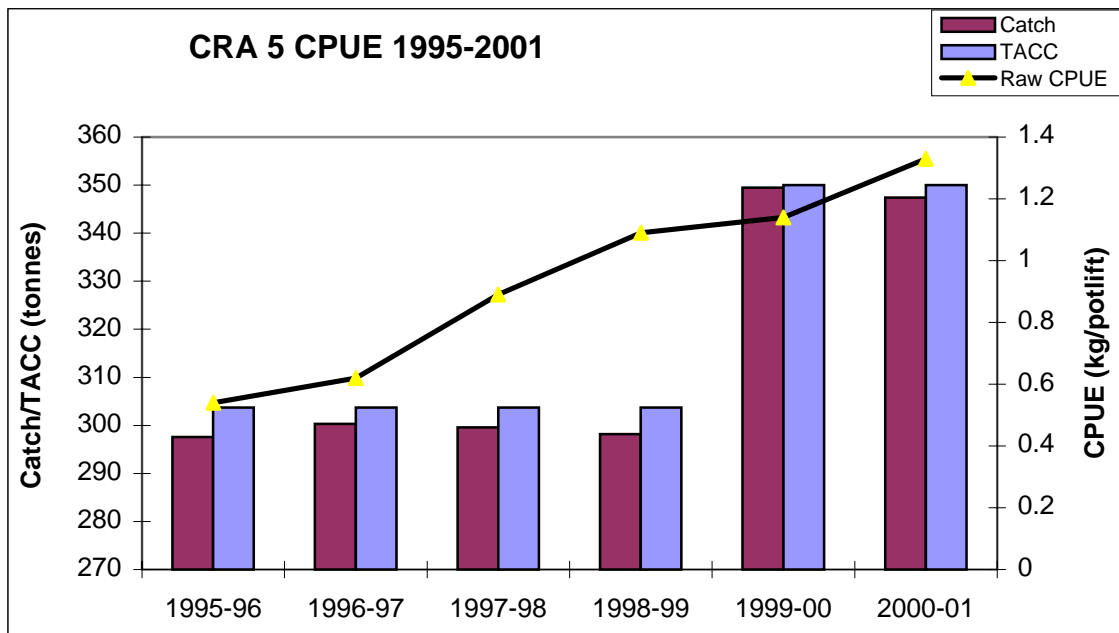


Figure 5: Catch against TACC and CPUE in CRA 5

- 307 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 some 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.
- 308 Since the 1999–00 fishing year a TAC of 467 tonnes has been set. A total of 40 tonnes is set aside for amateur catch and 40 tonnes provided for customary catch. The TACC was increased from 303.7 tonnes to 350 tonnes.
- 309 There are 55 quota share owners in CRA 5. The fleet comprises approximately 45 vessels, many of which work off beaches between Port Underwood and Motunau. The landed value of the commercial catch was estimated at \$11.2 million (based on average port price paid to fishermen) in 2001–2002, and the fishery supports processing and export facilities in Nelson, Ward, Kaikoura, and Christchurch
- 310 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. In 2000, and in collaboration with MFish, CRAMAC 5 produced a recreational charter vessel logbook programme, designed in collaboration with regional charter vessel owners and Trophica Research.
- 311 Amateur catch is estimated at 35 tonnes (MFish 1996). The preferred methods for amateur fishing are potting and diving with UBA. The recreational fishing and dive charter industry

is 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.

- 312 There are no estimates for customary harvest in CRA 5.
- 313 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 Voluntary Logbook programme that provides data to the stock assessment process. The 2001 research programme included 15 days of intensive sampling, a Logbook programme with 20% fleet coverage, 6 000 lobsters tagged and released, and tag recapture reporting.

7.7 CRA 6

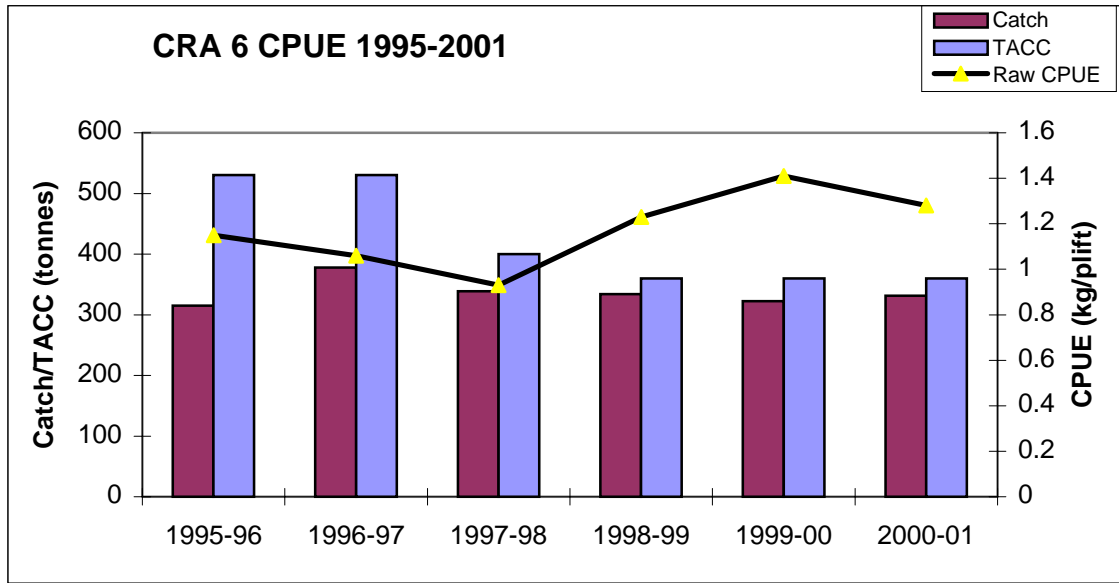


Figure 6: Catch against TACC and CPUE in CRA 6

- 314 The region designated as CRA 6 is geographically very large, being all waters within a 200 nautical mile (n. mile) radius of the Chatham Islands, but the area being fished is restricted to a relatively narrow coastal margin adjacent to the Chatham Islands coastline.
- 315 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 reasons for the decline in catch and CPUE are unknown, and length frequencies of the landed catch have changed little since the development of this fishery. Previous RLFAWG reports have noted that the CRA 6 data is consistent with a stock model in which the biomass being fished is much smaller than the biomass of the contributing stock.
- 316 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.
- 317 An analysis of CPUE and catch against TACC was undertaken in 1998. The analysis indicated that when CPUE was standardised (takes into account changes in fishing patterns and numbers of vessels operating etc), as opposed to the use of raw data, catch rates in the fishery had not significantly declined over recent years.
- 318 The abundance of the standing stock in CRA 6 is likely to be more dependent on immigration of larger lobsters into the area than it is on recruitment and growth. This reduces the likely effectiveness of management interventions.
- 319 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 dive permits issued for the fishery and divers take large quantities of lobsters in the summer months.

- 320 There are 49 CRA 6 quota share owners. The majority of quota is owned by mainland New Zealand interests. There are approximately 38 vessels in the fleet and the number of divers may be as high as 55 although only 11 of the original dive permits issued between 1990 and 1993 currently exist. The additional divers operate under the authority of some of those dive permits. There has been ongoing tension between divers and pot fishermen over several years. The landed value of the commercial catch in 2000–01 was approximately \$8.5 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.
- 321 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.
- 322 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 has commenced a trial of Vessel Logbooks, such as used in CRA 2, CRA 5 and CRA 8, to collect size frequency and abundance information at sea.
- 323 CRA 2001 Required Services research includes a project to conduct a desktop analysis of processors records to corroborate the trends in previous stock monitoring work that show no significant decline in the average size of rock lobsters landed in CRA 6.
- 324 In 1999 the CRA 6 Industry Association and the MFish collaborated to commission an independent socio-economic impact report and fishery characterisation of the CRA 6 fishery. The purpose of the report was to investigate the impact of historical management action on the Chatham Islands economy and society and to aid in predicting the impacts of any future management action. The report also examined the fishing patterns and behaviour of fishers to provide more information on reasons for under catch in the TACC. The report was delivered to the CRA 6 industry and the NRLMG in March 2000.
- 325 The report provided a limited but useful characterisation on which to base future management decisions, and also highlighted the difficulties of trying to integrate fishermen's economic data into an evaluation of the economic position of the Chatham Islands community. The lessons learned from the project will be useful in guiding any similar initiatives in this or other fisheries.
- 326 No management changes for CRA 6 are proposed for the 2001–02 fishing year.

7.8 CRA 7

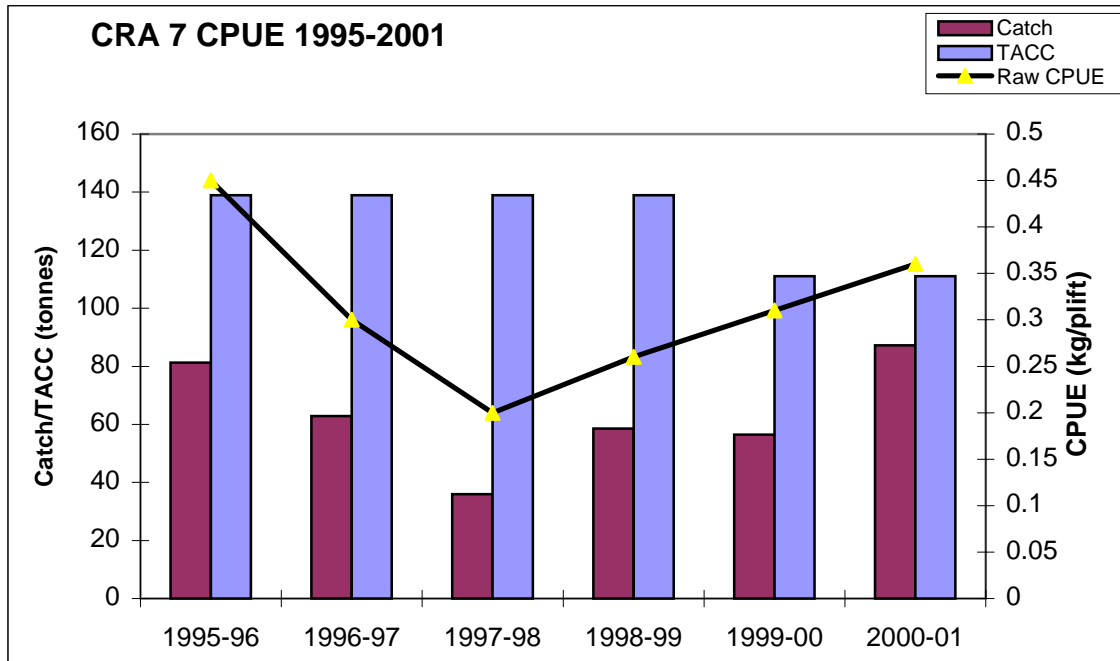


Figure 7: Catch against TACC and CPUE in CRA 7

- 327 The CRA 7 fishery extends from the Waitaki River south along the Otago coastline to Long Point. The CRA 7 fishery is included in the NSS assessment and decision rule analysis.
- 328 For the 1999–00 fishing year the TAC was set at 131 tonnes. A total of 5 tonnes was set aside for amateur catch and 10 tonnes was provided for customary catch. The TACC was set at 111 tonnes, a reduction from the previous 138.93 tonnes which was set originally in 1993–94. The TACC reduction was undertaken in response to the triggering of the NSS decision rule. The TAC and TACC was unchanged in 2001–2002.
- 329 The CRA 7 commercial season runs from 21 June to 19 November inclusive and the MLS is a tail length of 127mm for both male and female lobsters. The fishery is open to amateur fishing all year with a MLS regime of 54mm tail width for males and 60mm tail width for females. The CRA 7 fishery is unique in that a ‘buffer zone’, closed to commercial rock lobster fishing has been incorporated into the regional harvest initiative agreed by amateur and commercial users in 1993.
- 330 There are 35 CRA 7 quota share owners. There are approximately 27 vessels operating during the season. The landed value of the catch is estimated at \$1.6 million (based on average port price paid to fishermen). The CRA 7 catch is processed and exported by several Dunedin fishing companies.
- 331 CRA 7 commercial interests are represented by the Otago Rock Lobster Industry Association. The association has a paid regional co-ordinator and also funds stock monitoring sequences to supplement work done as Fisheries Required Research Services. Intensive catch sampling is done in three 5 day sequences during the commercial season.
- 332 There is no estimate of amateur catch. The preferred methods for amateur fishing are potting and diving with UBA.

333 There are no estimates for customary harvest in CRA 7.

7.9 CRA 8

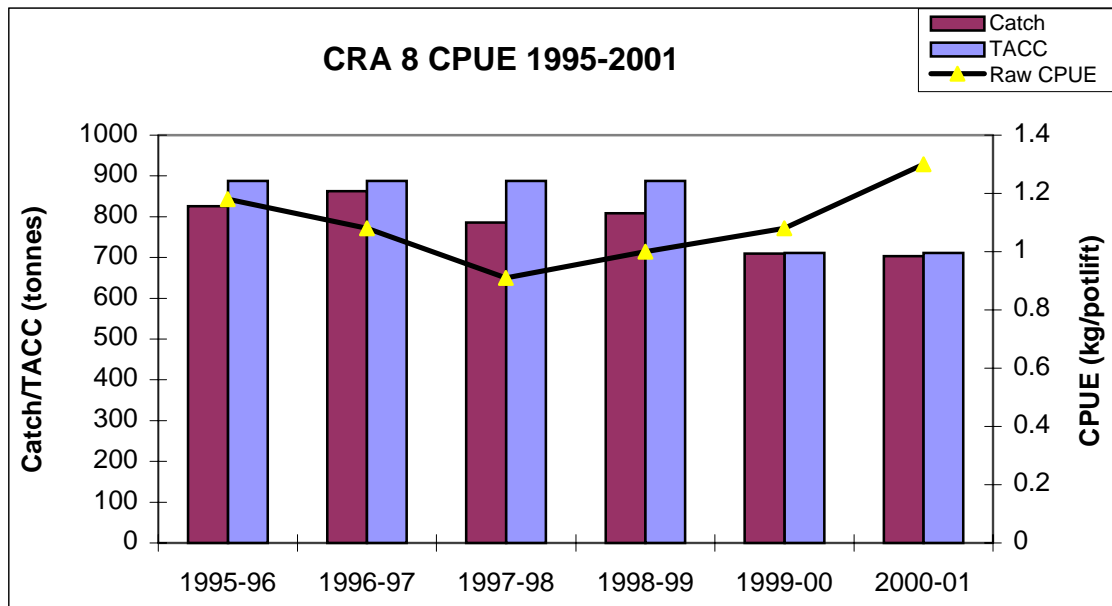


Figure 8: Catch against TACC and CPUE in CRA 8

- 334 The CRA 8 fishery is the largest fishery geographically, has the highest TACC, and the most extensive rock lobster fleet. 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. The CRA 8 fishery is included with CRA 7 in the NSS assessment and decision rule analysis.
- 335 A TAC of 798 tonnes was set for the 1999–00 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 711 tonnes, a reduction from the previous 888.1 tonnes which was set originally in 1993–94. The TACC reduction was undertaken in response to the triggering of the NSS decision rule. The TAC and TACC has remained unchanged.
- 336 The MLS for commercial catch incorporates a 54mm tail width for male lobsters and 57mm tail width for females. The equivalent measures for amateur catch is 54mm tail width for male lobsters and 60mm tail width for females.
- 337 The CRA 8 Management Committee Inc is the regional representative organisation for commercial interests. The Association employs an Chief Executive and a seasonal field technician. The Association has funded an extensive Voluntary Logbook programme until 1998 when the Logbook programme was incorporated as a Fisheries Required Service. The Association also contracts to the NZ RLIC to provide intensive catch sampling and lobster tag and release as part of the Fisheries Required Research Services.
- 338 The CRA 8 Industry 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.

- 339 There are 124 CRA 8 quota share owners. There are approximately 74 vessels in the fleet, many of which operate in the most remote coastal areas of South Westland and Fiordland. The estimated value of the landed catch is \$21.5 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.
- 340 Amateur catch is estimated at 16 tonnes (MFish 1996). The preferred methods for amateur fishing are potting and diving with UBA.
- 341 There are no estimates for customary harvest in CRA 8.

7.10 CRA 9

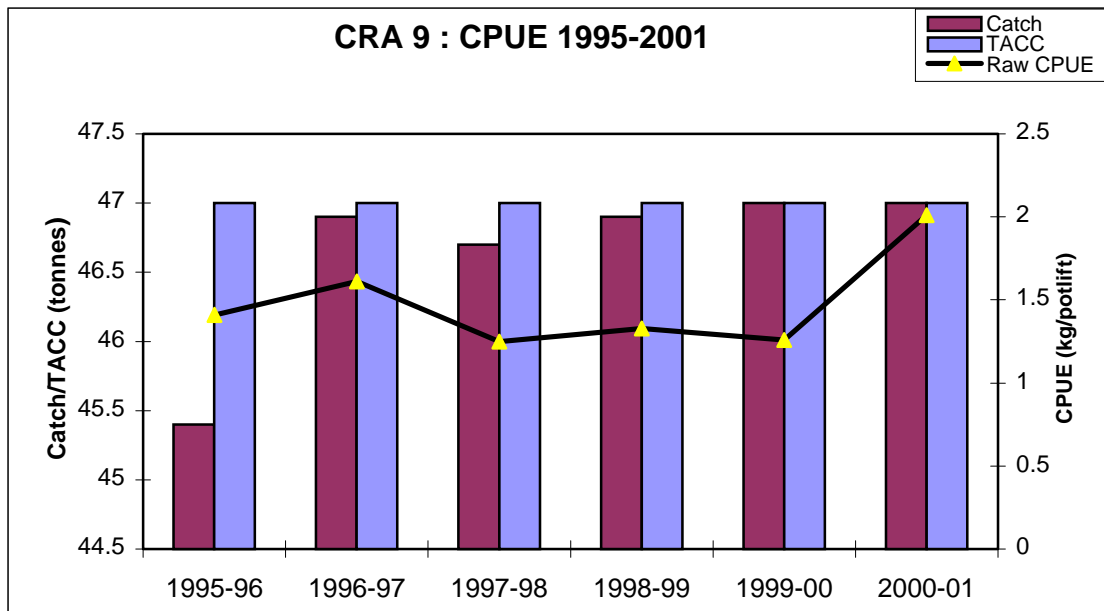


Figure 9: Catch against TACC and CPUE in CRA 9

- 342 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. No TAC has been set for this fishery and the 47 tonne TACC has remained unchanged since 1992.
- 343 There are 20 CRA 9 quota share owners. There are approximately 12 vessels in the fleet. The estimated value of the landed catch is \$1.5 million (based on average port price paid to fishermen). The industry supplies processing and export operations in Marlborough, Nelson, New Plymouth, Wellington and Auckland.
- 344 The CRA 9 Industry Association Inc. is the representative organisation of the commercial interests in the fishery. The Association has initiated a Voluntary Logbook programme but the project has limited potential because of the relatively short commercial season and the small number of vessels in the fleet. The Association has contracted a regional liaison officer to co-ordinate access to fishing vessels by technicians undertaking the final sequences of a 5,000 lobsters tag and release project.
- 345 There are no estimates of amateur or customary catch for the CRA 9 fishery.
- 346 There are no utilisation or sustainability issues evident in this fishery other than concern by both amateur fishing and commercial sectors over the proposed area closures of reef systems in North Taranaki (Paraninihi) and South Taranaki (Nga Motu) which if established will end historical access to a large and important rock lobster fishing area.

7.11 PACKHORSE ROCK LOBSTER – PHC

- 347 The packhorse rock lobster is a different species (*Jasus verreauxi*). The management area extends to all of New Zealand. Packhorse lobsters grow to a significantly larger size than red rock lobsters (CRA) and have different shell colourations and appearance.
- 348 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 one fisherman did successfully target the species prior to 1990 and dependent on environmental conditions has attempted to do so in several seasons since.
- 349 Commercial catches have fluctuated since 1990, reaching a peak of 24 tonnes in the 1995–96 season. The 1998–99 landings were 16 tonnes. It is thought that the shortfall of catch against quota reflects the low levels of effort currently being directed at the fishery which is known to have variations in abundance possibly determined by weather and sea temperatures.
- 350 Due to the different biology and behaviour of this species the MLS is set at 216mm 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 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.
- 351 There are 26 PHC quota share owners. Less than five quota share owners are known to be target fishing the species, all of these operating in the CRA 1 region. The value of the landed catch is estimated at \$500,000.
- 352 There are no estimates of amateur catch 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.

Recommendation

- 353 The NRLMG recommends that the Minister:
- a) **note** the progress being made by commercial interests in establishing stakeholder groups with a commitment to regional management autonomy and self-determination;
 - b) **note** that the 2001 stock assessment indicates no urgent sustainability issues for any stocks;
 - c) **agree** to retain the current TACs, the TACCs and the existing allowances for customary, amateur, and commercial fisheries in all CRA management areas, and in PHC for the 2001–02 fishing year.

Part Eight

Summary of Recommendations

8.1 SUMMARY OF RECOMMENDATIONS

1.2 NRLMG Background

The NRLMG recommends that the Minister:

- d) **confirm** the NRLMG as the primary source of TAC, TACC and management advice for rock lobster fisheries; and
- e) **recognise** the NRLMG as an appropriate body to consult on any matters relevant to the management of rock lobster fisheries.

1.3 Fishery Plans and the role of the NRLMG

The NRLMG recommends that the Minister:

- f) **note** that pending the availability of an agreed Fishery Plan framework, the Group has undertaken a preliminary review of its structure and process.
- g) **note** that a more comprehensive review to be undertaken by the Group will include preparation of a discussion document for rock lobster stakeholders on regional user groups, rock lobster Fishery Plans, and the prospective role of the NRLMG:
- h) **note** that the Group will continue to operate the current management framework outlined in this document in the interim and will work within the roles and responsibilities confirmed in the interim review.

2.2 Framework for managing rock lobster fisheries

The NRLMG recommends that the Minister:

- i) **confirm** the framework for managing rock lobster fisheries contained in this Report.

3.3 Stock Assessment Overview

The NRLMG recommends that the Minister:

- j) **note** that assessments were not updated in 2001 for CRA 1 and CRA 2 (NSN), CRA 6, CRA 7 and CRA 8 (NSS), CRA 9 and PHC stocks;
- k) **note** the revised model used to assess the CRA 3 stock;
- l) **note** the stock assessment results in the Rock Lobster Fishery Assessment Working Group Report;
- m) **note** that for CRA 3 the assessment suggests the current vulnerable biomass is high compared with a reference period, 1974-79, the earliest period where there are good data available to estimate biomass;
- n) **note** that previous assessments for CRA 1, CRA 2, CRA 4 and CRA 5 in 1999 indicated that stocks are likely to be above B_{MSY} as this indicator is defined in the stock assessment;

- o) **note** that populations in CRA 1, CRA 2, CRA 4 and CRA 5 were projected to decline over five years, given the current levels of removal and average recruitment, but that they will likely remain above B_{MSY} ;
- p) **note**, based on the stock assessment, no sustainability issues for any stock require action for the 2002–2003 fishing year.

3.4 Description of “Decision Rules”

The NRLMG recommends that the Minister:

- q) **note** that the current NSN, NSC, and NSS decision rules are consistent with the Minister’s legal obligations;
- r) **note** that the decision rules continue to be refined and evaluated in order to provide greater certainty to the management decisions undertaken to ensure the sustainability of rock lobster stocks;
- s) **approve** the use of appropriate decision rules for sustainability decisions in 2002–2003.

4.1 CRA 3 Management regime review

The NRLMG recommends that the Minister:

- t) **retain** the existing TAC and TACC for CRA 3;
- u) **note** that the industry proposal to remove seasonal closures in favour of voluntary closures implemented as an outcome of agreements by stakeholders;
- v) **note** that current regulations in relation to seasonal closures are not essential to the sustainability of the CRA 3 stock;
- w) **note** that the industry proposal is currently subject to more detailed consultation which will be reported in the NRLMG Final Advice Paper in February 2002.
- x) **note** the MFish proposal that stakeholders review the minimum legal size regime for the CRA 3 fishery during 2002, and
- y) **note** the NRLMG proposal that stakeholders develop an agreed set of management objectives for the CRA 3 fishery.

5.1 Research Issues

The NRLMG recommends that the Minister:

- z) **note** the scope of current rock lobster fisheries research;
- aa) **note** the positive outcome of the independent review of rock lobster stock assessment commissioned by MFish;
- bb) **note** the level of industry involvement in self-funded research initiatives undertaken to MFish agreed standards and specifications; and
- cc) **note** the role of the NRLMG in the Rock Lobster Research Planning Process, the results of which form the basis of required fisheries research services described in the MFish Fisheries Services Plan.

5.2 Uncertainty in estimates of total removals

The NRLMG recommends that the Minister:

- dd) **acknowledge** that accurate and reliable data for all sectors are essential to the stock assessment and management process.

5.3 Compliance Issues

The NRLMG recommends that the Minister:

- ee) **note** the significance of the illegal catch component and its negative effect on the stock and legitimate extractive users; and
- ff) **note** that all user groups recommend that the Minister take steps to ensure that compliance strategies and services (including enforcement and education services) are sufficient to minimise illegal catch.
- gg) **note** that the NRLMG has contributed to a comprehensive Threat Assessment for rock lobster fisheries being developed by MFish Compliance to guide future compliance strategies.

6.1 Identification of amateur removals from Rock Lobster Fisheries – Telson Clip

The NRLMG recommends that the Minister:

- hh) **note** that MFish advises that the timetable for further evaluation of this proposal will be determined following consideration of the proposal in the context of the Rock Lobster Threat Assessment and subsequent development of compliance strategies for rock lobster fisheries.

6.2 Restriction of the number of rock lobster pots allowed to be used or possessed, per individual and vessel.

The NRLMG stakeholder group representatives recommend that the Minister:

- ii) **amend** the Amateur Fishing Regulations to specify that for all rock lobster management areas:
 - i) No person shall use or possess more than 3 legal rock lobster pots per person.
 - ii) No persons shall use or possess more than 6 legal rock lobster pots per vessel carrying 2 or more persons.

MFish recommend that the Minister:

- jj) **agree** to defer consideration of this proposal for the October 2002 review of sustainability measures and management controls.

7 Stock Summary

The NRLMG recommends that the Minister:

- kk) **note** the progress being made by commercial interests in establishing stakeholder groups with a commitment to regional management autonomy and self-determination;
- ll) **note** that the 2001 stock assessment indicates no urgent sustainability issues for any stocks;
- mm) **agree** to retain the current TACs, the TACCs and the existing allowances for customary, amateur, and commercial fisheries in all CRA management areas, and in PHC for the 2001–02 fishing year.

Annex One

Membership of the NRLMG

THE NATIONAL ROCK LOBSTER MANAGEMENT GROUP 2001

Dr Kevin Stokes	Chairman
Steven Halley	MFish
Lee Robinson	MFish
Dr Kevin Sullivan	MFish
Scott Williamson	MFish
Ron Brady	NZ Rock Lobster Industry Council
Daryl Sykes	NZ Rock Lobster Industry Council
Alan Riwaka	Iwi/Treaty of Waitangi Fisheries Commission
Stan Pardoe	Iwi/Treaty of Waitangi Fisheries Commission
Max Hetherington	NZ Recreational Fishing Council
Peter Ellery	NZ Recreational Fishing Council
Barry Weeber	Environmental and Conservation Organisations

Science Advisers to the Group

Dr Paul Breen	NIWA
David Banks	NIWA
Paul Starr	StarrFish
Nokome Bentley	Trophia Research

Secretarial and Administrative Services

Helen Regan	NZ RLIC
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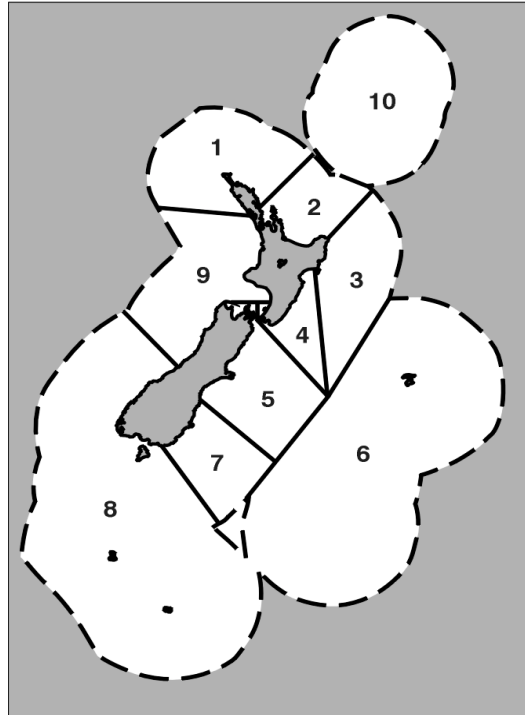
Annex Two

2001 Mid-Year Fishery Assessment Plenary Report

2001 Mid-Year Fishery Assessment Plenary Report

ROCK LOBSTER (CRA and PHC)

(*Jasus edwardsii*, *Jasus verreauxi*)



1 FISHERY SUMMARY

The rock lobster fishery takes two species. The red rock lobster (*Jasus edwardsii*) supports nearly all the landings and is caught all around the North and South Islands, Stewart Island, and the Chatham Islands. The packhorse rock lobster (*Jasus verreauxi*) is taken mainly in the north of the North Island.

The rock lobster fishery was brought into the Quota Management System (QMS) on 1 April 1990. Before this, catch levels were managed by input controls, including minimum legal size (MLS) regulations, a prohibition on the taking of berried females and soft-shelled lobsters, and some local area closures.

Historically, three rock lobster stocks were recognised for stock assessment purposes: the North and South Island (including Stewart Island) red rock lobster stock (NSI); the Chatham Islands red rock lobster stock (CHI); and the New Zealand packhorse rock lobster stock (PHC). In 1994, the Rock Lobster Fishery Assessment Working Group agreed to divide the NSI stock into three substocks: northern (NSN), central (NSC), and southern (NSS).

Time series of commercial landings and CPUE (catch per unit effort) data are provided for NSI, NSN, NSC, NSS, and CHI for comparison with earlier years. The fishing year runs from 1 April to 31 March.

The NSI stock is composed of QMAs 1–5 and 7–9, each with a separate Fishstock and TACC (Total Allowable Commercial Catch). The sum of the TACCs for the NSI stock was set at 3 200 t for the year commencing 1 April 1990. This total was reduced in each year until 1993–94 to reach 2 380 t (taking into account some increases in individual ITQs resulting from appeals over catch histories by fishers). The total has fluctuated since with TACC increases and decreases and is now 2 324 t for the 2001–02 season. NSN consists of CRA 1 and CRA 2; NSC of CRA 3, CRA 4, and CRA 5; and NSS of CRA 7 and CRA 8. CRA 9 has not been assigned to a substock.

The TACC for the CHI stock (QMA 6) was set at 503 t in 1990 but increased through appeals to 530.6 t at the beginning of the 1993–94 fishing year. The CHI TACC was subsequently reduced to 400 t in 1997–98 and to 360 t in 1998–99. QMA 10 comprises the Kermadec Islands, and has a nominal TACC of 0.1 t. The TACC for PHC increased from 27 t in 1990 to its current value of 40.3 t at the beginning of the 1993–94 fishing year following appeals.

TACs (Total Allowable Catch including non-commercial catches) were set for the first time in 1997–98 for CRA 2 (452.6 t), CRA 3 (379.4 t) and CRA 6 (480 t). Setting TACs is a new requirement under the Fisheries Act 1996. Within the 1997–98 TAC, TACCs were set at 236.1 t for CRA 2 (increase of 21.5 t or 10%), at 224.9 t for CRA 3 (increase of 20.2 t or 10%) and at 400 t for CRA 6 (decrease of 25%). For 1998–99 TACs were set for CRA 3 (453 t) and CRA 6 (370 t). Within these TACs, TACCs were set for CRA 3 at 327 t (increase of 39%) and for CRA 6 at 360 t (decrease of 10%). For 1999–2000 TACs were set for CRA 7 (131 t) and CRA 8 (798 t). Within these TACs, TACCs were set for CRA 7 at 111 t (decrease of 20%) and for CRA 8 at 711 t (decrease of 20%). No TAC and TACC changes were made for the 2000–01 season. For the 2001-02 season, the decision rule was triggered in NSS and as a result there were further 20% decreases in TACCs in CRA 7 and 8; the CRA 7 TAC was reduced to 109 t (TACC 89 t), and for CRA 8 the TAC was reduced to 655 t (TACC 568 t).

MLS in the commercial fishery for red rock lobster is based on tail width (TW), except in the Otago fishery. For Otago (CRA 7), the MLS is a tail length (TL) of 127 mm which applies to both sexes during the period 21 June to 19 November, which is the full commercial season. The female MLS in all other QMAs except Southern (CRA 8) has been 60 mm TW since mid-1992. For Southern (CRA 8), the female MLS has been 57 mm TW since 1990. The male MLS has been 54 mm TW since 1988, except in Otago (MLS described above) and Gisborne where it is 52 mm for the June-August period.

Special conditions have applied to the Gisborne (CRA 3) fishery since 1993–94. During June, July, and August, commercial fishers are permitted to retain males at least 52 mm TW but females cannot be taken. The fishery has then closed to all users from September to the end of November, but in 2000 it closed from 1 October instead of 1 September. It remains closed to commercial fishers in December and January. These measures have changed the commercial CRA 3 fishery to a mainly winter fishery for male lobsters.

For recreational fishers, the red rock lobster MLS has been 54 mm TW for males since 1990 and 60 mm TW for females since 1992. The commercial and recreational MLS measure for packhorse rock lobster is 216 mm TL for both sexes.

a) Commercial fisheries

Table 1 provides a summary by fishing year of the reported commercial catches and TACCs by QMA. The Quota Management Reports (QMRs) provide the most accurate information on landings. Other sources of annual catch estimates include the Licensed Fish Receiver Returns (LFRRs) and the Catch, Effort, and Landing Returns (CELRs). In recent years, catches reported by LFRRs have been close to the QMR totals.

Table 1. Reported commercial catch (t) from QMRs and commercial TACC (t) of *Jasus edwardsii* by rock lobster QMA for each fishing year since the species was included in the QMS on 1 April 1990.

Fishing Year	CRA 1		CRA 2		CRA 3		CRA 4		CRA 5	
	Catch	TACC	Catch	TACC	Catch	TACC	Catch	TACC	Catch	TACC
1990–91	131.1	160.1	237.6	249.5	324.1	437.1	523.2	576.3	308.6	465.2
1991–92	128.3	157.0	229.7	241.3	268.8	411.9	530.5	545.7	287.4	433.7
1992–93	110.5	138.0	190.3	216.6	191.5	330.9	495.7	506.7	258.8	337.7
1993–94	127.4	130.5	214.9	214.6	179.5	163.9	492.0	495.7	311.0	303.7
1994–95	130.0	130.5	212.8	214.6	160.7	163.9	490.4	495.7	293.9	303.7
1995–96	126.7	130.5	212.5	214.6	156.9	204.7	487.2	495.7	297.6	303.7
1996–97	129.4	130.5	213.2	214.6	203.5	204.7	493.6	495.7	300.3	303.7
1997–98	129.3	130.5	234.4	236.1	223.4	224.9	490.4	495.7	299.6	303.7
1998–99	128.7	130.5	232.3	236.1	325.7	327.0	493.3	495.7	298.2	303.7
1999–2000	125.7	130.5	235.1	236.1	326.1	327.0	576.5	576.0	349.5	350.0
2000–01	130.9	130.5	235.4	236.1	328.1	327.0	573.6	576.0	347.4	350.0

Fishing Year	CRA 6		CRA 7		CRA 8		CRA 9		Total ¹	
	Catch	TACC	Catch	TACC	Catch	TACC	Catch	TACC	Catch	TACC
1990–91	369.7	518.2	133.4	179.4	834.5	1 152.4	45.3	54.7	2 907.4	3 793.0
1991–92	388.3	530.6	177.7	167.1	962.7	1 077.0	47.5	51.5	3 020.9	3 615.7
1992–93	329.4	539.6	131.6	154.5	876.5	993.7	45.7	47.1	2 629.9	3 264.9
1993–94	341.8	530.6	138.1	138.9	896.1	888.1	45.5	47.0	2 746.2	2 913.0
1994–95	312.5	530.6	120.3	138.9	855.6	888.1	45.2	47.0	2 621.5	2 913.0
1995–96	315.3	530.6	81.3	138.9	825.6	888.1	45.4	47.0	2 548.6	2 953.8
1996–97	378.1	530.6	62.9	138.9	862.4	888.1	46.9	47.0	2 690.4	2 953.8
1997–98	338.7	400.0	36.0	138.9	785.6	888.1	46.7	47.0	2 584.2	2 864.9
1998–99	334.2	360.0	58.6	138.9	808.1	888.1	46.9	47.0	2 726.0	2 927.0
1999–2000	322.4	360.0	56.5	111.0	709.8	711.0	47.0	47.0	2 748.5	2 848.7
2000–01	331.2	360.0	87.2	111.0	703.6	711.0	47.0	47.0	2 784.5	2 848.7

¹ TACC totals excludes CRA 10 (TACC=0.1 t); catch totals exclude CRA 10 and ET catches (outside EEZ)

i) Issues with rock lobster catch and effort data

There are two types of data on the CELR form: the top part of each form contains the effort and an estimated catch associated with that effort. The bottom part of the form contains the actual landed catch which may span several units of effort. Estimated catches from the top part of the CELR form may show differences from the catch totals on the bottom part of the form, particularly in some QMAs such as CRA 5 and CRA 8 (Vignaux & Kendrick 1998; Bentley *et al.* in prep.). Substantial discrepancies were identified in 1997 between the estimated and weighed catches in CRA 5 (Vignaux and Kendrick 1998) and were attributed to fishers including all rock lobster catch in the estimated total, including those returned to the sea. This led to an overestimate of CPUE in this QMA, but appeared to be confined to CRA 5. In other QMAs the estimated catch totals are often lower than the landed catch totals, especially in QMAs which have extended trips, such as CRA 8.

Since 1998, all CELR catch data have been corrected to reflect the actual landed catch (bottom of form) rather than the estimated catch (top of form). This has resulted in changes to the CPUE values compared to those reported before 1998. The catch data correction procedures implemented in 1998 were reviewed in 2001 and compared with the procedures recommended in Booth *et al.* (1994). As a result, these procedures have now been standardised across all CRA areas which has resulted in some additional changes in the reported totals (Bentley *et al.* in prep.). The CPUE estimates in Tables 2 and 3 have been subjected to the same error screening as those used for standardised CPUE analysis and in all cases, CPUE is calculated from the sum of catch divided by the sum of pots for each stock or sub-stock by fishing year.

Another potential problem with CPUE data as an abundance index has been identified by the Working Group. Fishers may sort their catch and discard that part not expected to provide a reasonable economic return. This “high-grading” (permitted by regulation) could lead to negative biases in the estimated CPUE relative to previous years when sorting did not occur. The practice has become more prevalent in recent years, especially in areas where rock lobster abundance is increasing. The Working Group agreed to flag this issue for further investigation.

The 2001 Working Group report has continued the decision made in the previous Working Group report to report rock lobster catch and CPUE on the basis of the rock lobster fishing year only.

Table 2. Reported commercial landings (t) to 31 March 2001 and CPUE (kg per pot lift) for *Jasus edwardsii* NSI and CHI stocks, and NSN, NSC and NSS substocks, for the 1979–80 to 2000-01 fishing years. Sources of data: catch and CPUE data from 1979-80 to 1985-86 from the QMS-held FSU data; catch data from 1986-87 to 2000-01 from QMR reports held by the Ministry of Fisheries (total catches in 1986-87 and 1987-88 have been divided among substocks using the FSU data because the QMR did not report individual CRA areas in those years); CPUE data from 1986-87 to 1988-89 from the QMS-held FSU data; CPUE data from 1989-90 to 2000-01 from the CELR data held by the Ministry of Fisheries corrected for actual landings. See Booth *et al.* (1994) for a discussion of problems with the QMS-held FSU data.

Year	NSI Substocks						NSI		CHI	
	NSN		NSC		NSS		Landings	CPUE	Landings	CPUE
1979-80	408	0.57	1385	0.85	2258	1.58	4141	1.06	401	2.33
1980-81	632	0.69	1718	0.88	1841	1.49	4288	1.02	356	2.18
1981-82	575	0.66	1665	0.85	1692	1.48	4012	0.99	465	2.19
1982-83	550	0.59	2213	0.91	1688	1.35	4510	0.96	472	1.78
1983-84	506	0.55	2303	0.84	1659	1.09	4539	0.86	548	1.73
1984-85	482	0.51	2294	0.76	1757	1.09	4614	0.81	492	1.35
1985-86	556	0.54	2227	0.71	2197	1.21	5061	0.83	604	1.41
1986-87	479	0.48	2113	0.72	1975	1.07	4658	0.79	572	1.66
1987-88	445	0.45	1794	0.57	1974	1.12	4305	0.71	451	1.48
1988-89	401	0.45	1399	0.51	1262	0.80	3087	0.58	450	1.40
1989-90	427	0.57	1457	0.56	1352	0.96	3262	0.65	318	1.41
1990-91	369	0.58	1156	0.50	968	0.89	2538	0.61	370	1.40
1991-92	358	0.52	1087	0.43	1140	1.12	2633	0.60	388	1.34
1992-93	301	0.47	946	0.41	1008	0.81	2300	0.54	329	1.15
1993-94	342	0.57	983	0.50	1034	1.07	2404	0.66	342	1.11
1994-95	343	0.69	945	0.63	976	0.98	2309	0.76	313	1.13
1995-96	339	0.86	942	0.81	907	0.99	2233	0.88	315	1.15
1996-97	343	0.95	997	1.01	925	0.92	2312	0.96	378	1.06
1997-98	364	1.03	1013	1.36	822	0.84	2246	1.07	339	0.93
1998-99	361	1.08	1117	1.56	867	0.89	2392	1.17	334	1.23
1999-2000	361	0.93	1252	1.43	766	0.93	2426	1.14	322	1.41
2000-01	366	0.91	1249	1.40	791	1.01	2453	1.15	331	1.28

ii) *Jasus edwardsii*, NSI stock

NSI landings were relatively stable from about 1960 until the late 1980s, when landings declined (Table 2). CPUE was around 1.0 kg per potlift in the late 1970s and early 1980s, and decreased slowly until the late 1980s.

Unstandardised catch per pot lift in the NSI declined to 0.54 kg 1992–93, reached a peak of 1.17 kg in 1998–99, and has remained near that level (Table 2). Possible reasons for the decline in unstandardised CPUE from 1979–80 to 1992–93 were outlined in previous Plenary reports.

iii) *Jasus edwardsii*, NSN substock

Landings in the NSN substock were high in the early 1980s but CPUE was less than 1.0 kg per potlift. Both measures gradually declined into the early 1990s. Recent commercial catches have been constrained by the TACC. From 1994, CPUE increased to levels considerably higher than those observed at the beginning of the time series. Unstandardised catch per pot lift was around 0.7 kg in the early 1980s but the period from 1986–87 to 1992–93 had catch rates around 0.5 kg (Table 2). The most recent catch rate was 0.91 kg per potlift, a decline from the peak seen in 1998–99 but similar to the value for 1999–2000.

iv) *Jasus edwardsii*, NSC substock

Landings in the NSC substock were very high up to the mid 1980s, exceeding 2 000 t per fishing year for five fishing years in succession. During that time CPUE dropped from 0.9 kg per potlift to 0.7 kg (Table 2). Commercial catches then gradually dropped below 1 000 t by the early 1990s and CPUE dropped below 0.5 kg per potlift. In 1993–94, CPUE began to increase in (Table 2) and was 1.4 kg per potlift last year. CPUE has increased steadily in CRA 5 since the 1995–96 fishing year; the CRA 3 CPUE peaked in the 1997–98 fishing year and CRA 4 in the next year (Table 3).

v) *Jasus edwardsii*, NSS substock

Catches and CPUE were high for this substock (greater than 1 500 t per fishing year and well over 1.0 kg per potlift) throughout most of the 1980s. However, both measures gradually declined during that period, dropping below 1 000 t per fishing year and below 1.0 kg per potlift by the early 1990s (Table 2). CPUE remained below 1.0 kg per potlift for the past six years, but has just reached 1.0 kg/potlift again in 2000–01 (Table 2). Catches and CPUE are particularly low in CRA 7 compared with that in other QMAs (Table 3). Table 4 shows the catch rates for all statistical areas for the last 4 years; catches in statistical areas 920 and 921 make up most of the CRA 7 catches.

vi) *Jasus edwardsii*, Westland/Taranaki (CRA 9)

Unstandardised catch per pot lift ranged from 0.75 to 1.16 kg per potlift from the 1979–80 to the 1992–93 fishing years. It varied between 1.25 and 1.60 kg between 1995–96 and 1999–2000, then increased to 2 kg in 2000–01 (Table 3).

vii) *Jasus edwardsii*, CHI stock

CPUE in this fishery was higher than in the other New Zealand QMAs up to the mid 1990s (Table 2). However, unstandardised CPUE declined consistently after 1979 to levels similar to those in other QMAs. Landings were around 400 to 500 t per fishing year in the 1980s but fell below 400 t per year in the 1990s. The lowest catch was just over 300 t in 1995–96, but both CPUE and catches have risen since then (Table 2). The reasons for the decline and subsequent increase in catch and in CPUE are unknown. Size frequencies of landed catch have changed little since the development of this fishery.

viii) *Jasus verreauxi*, PHC stock

Reported catches of this species to the QMS were 16.2 t in 1998–99, 12.6 t in 1999–2000, and 9.5 t in 2000–01. Reasons for these declining and low level of landings relative to the TACC (40 t) are unknown.

Table 3. Estimated CPUE (kg/potlift) for each QMA for the six most recent fishing years. Data are from the MFish CELR database and estimated catches have been corrected by the amount of fish landed from the bottom part of the form (see Section 1(a)i in text for explanation)

	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01
CRA 1	1.00	1.03	1.06	1.20	1.20	1.27
CRA 2	0.80	0.90	1.01	1.03	0.82	0.78
CRA 3	1.54	1.96	2.63	2.22	1.77	1.32
CRA 4	0.93	1.19	1.39	1.53	1.48	1.48
CRA 5	0.54	0.62	0.89	1.09	1.14	1.33
CRA 6	1.15	1.06	0.93	1.23	1.41	1.28
CRA 7	0.45	0.30	0.20	0.26	0.31	0.36
CRA 8	1.18	1.08	0.91	1.00	1.08	1.30
CRA 9	1.41	1.61	1.25	1.33	1.26	2.01

Table 4. Estimated CPUE (kg/potlift) for each statistical area for the five most recent fishing years. Data are from the MFish CELR database and estimated catches have been corrected by the amount of fish landed from the bottom part of the form (see Section 1(a)i in text for explanation)

Statistical Area	96/97	97/98	98/99	1999 /2000	00/01	Statistical Area	96/97	97/98	98/99	1999 /2000	00/01
901	2.57	2.33	2.68	2.88	2.83	923	0.81	0.70	0.77	0.84	1.38
902	1.09	1.47	1.28	1.64	1.50	924	1.20	0.95	0.89	1.11	2.02
903	0.84	1.13	0.89	0.48	0.82	925	1.33	1.11	1.16	0.82	1.77
904	0.70	0.54	0.52	0.41	0.44	926	1.17	1.03	1.16	1.38	1.54
905	0.94	1.11	1.31	1.03	0.82	927	1.15	1.11	1.27	1.33	1.24
906	0.80	0.85	0.85	0.74	0.67	928	0.90	0.73	0.84	0.71	0.73
907	1.92	2.33	1.83	1.16	0.93	929	2.12	0.96	0.71	0.92	0.72
908	0.77	0.74	0.82	0.60	0.86	930	1.17	0.91	1.03	0.96	1.10
909	2.75	2.66	1.92	1.94	1.60	931	1.67	1.13	2.13	1.49	2.09
910	1.91	2.71	2.21	1.73	1.00	932	0.69	0.58	0.95	1.78	-
911	1.78	2.46	2.54	1.75	1.85	933	0.87	1.09	1.04	1.13	1.19
912	1.43	2.02	2.05	1.75	1.39	934	0.59	-	-	0.84	1.13
913	1.09	1.67	2.73	1.97	2.41	935	2.00	1.80	1.66	2.09	4.81
914	1.25	1.18	1.24	1.24	1.31	936	1.23	0.94	-	1.59	2.44
915	0.85	0.80	0.88	1.23	1.20	937	1.12	1.22	1.16	1.14	1.86
916	0.66	1.14	1.86	2.17	4.43	938	-	-	2.07	-	0.83
917	0.50	0.67	0.91	0.88	0.87	939	1.34	1.18	1.48	1.18	1.05
918	0.66	1.53	1.21	0.96	1.65	940	0.92	0.85	1.00	1.12	1.04
919	1.21	-	-	0.71	-	941	0.93	0.79	1.05	1.16	1.03
920	0.22	0.21	0.23	0.22	0.27	942	1.27	1.10	1.60	2.03	1.83
921	0.61	0.18	0.34	0.77	0.52	943	1.08	0.93	1.30	1.12	0.93
922	1.47	1.32	2.17	2.14	2.57						

b) Recreational fisheries

Recreational catches have been estimated from telephone and diary surveys completed in the South region (1991–92), Central region (1992–93) and North region (1993–94) and are shown in Table 5 (Bradford 1997, Teirney *et al.* 1997). The results from the 1996 National Diary Survey were reported by Bradford 1998 (Table 6). From these surveys, the total NZ recreational catch was estimated by scaling up the reported catch by diarists by the ratio of diarists to the total estimated NZ population. The catch in numbers was then converted to catch in weight using an estimated mean weight for the catch. When available, the mean weight estimates were obtained either from a sampled mean weight from ramp surveys or from reported weights from the diary surveys. Otherwise mean weights were obtained from other sources or were assumed.

In 2001, a new survey of the recreational catch was carried out. Final estimates are not yet available but the preliminary catch estimates were much larger than previously estimated and were larger than the commercial catches for some area/species combinations. The accuracy of these new estimates has not been determined and they have not been used in the new assessment of CRA 3.

Table 5. Estimates of the recreational rock lobster harvest (t) from regional telephone and diary surveys in 1992, 1993 or 1994 (-, not available). For CRA 1 and CRA 2, two estimates of catch in tonnes are presented based on two sources of mean weight: from the diary survey and from the Industry Logbook Program for CRA 2 (Bradford 1997). Mean weights used in the other CRA areas are based either on weights reported in the diaries or from boat ramp surveys (Teirney *et al.* 1997).

Fishstock	Estimated Number of lobsters	Mean weight (gm)	Estimate (t)
CRA 1	56 000	871 ¹ or 674 ²	48 or 38
CRA 2	142 000	871 ¹ or 674 ²	123 or 95
CRA 3	8 000	-	2 to 8
CRA 4	65 000	-	25 to 60
CRA 5	67 000	-	23 to 117
CRA 7	6 000	-	1 to 6
CRA 8	32 000	-	15 to 60
CRA 9	6 000	-	2 to 6

¹ diary estimate of mean weight

² logbook estimate of mean weight

Table 6. Estimates of the recreational rock lobster harvest (t) from the 1996 National telephone and diary survey (-, not available). Because the sex of the sampled lobster was not determined when measured in the boatramp surveys, the mean weight is based on the average size measured assuming a 50-50 sex ratio (Bradford 1998).

Fishstock	Estimated Number of lobsters	Mean weight (gm)	Estimate (t)
CRA 1	74 000	686	51
CRA 2	223 000	618	138
CRA 3	27 000	-	-
CRA 4	118 000	618	73
CRA 5	41 000	858	35
CRA 7	3 000	-	-
CRA 8	22 000	700 ¹	16
CRA 9	26 000	-	-

¹ assumed

The method used to calculate the recreational catch for stock assessment changed slightly in 1999 (see Annala & Sullivan 1999). Numbers from the surveys described above are converted to weight using the mean weight observed in catch sampling and voluntary logbook programs. The estimated recreational catch by weight is then applied to all model years from 1980 onwards (including projection years). A linear interpolation from 20% of this level in 1945 to 100% in 1980 is assumed. The estimate by weight of the recreational catch used in the stock assessment for CRA 3 is provided in Table 7.

Table 7. Estimate of annual recreational catch for the period 1980 to 2000 used in the 2001 assessment project.

Substock or QMS	Recreational Catch Estimate
CRA 3	14.1 t

c) Maori customary fisheries

The Ministry of Fisheries provided estimates of the Maori customary catches for some Fishstocks for the 1995–96 fishing year. Updates of these estimates are not available.

The estimates for the 1995–96 fishing year were CRA 1 (2.0 t), CRA 2 (16.5 t), CRA 8 (0.2 t), CRA 9 (2.0 t) and PHC 1 (0.5 t). The CRA 3 stock assessment used an estimate of Maori customary catch of 30 t based on advice from MFish.

d) Illegal catches

The Ministry of Fisheries provided estimates in 1997 of the illegal catches by Fishstock applicable to the 1996–97 fishing year. The Working Group discussed these figures with Ministry Compliance staff to determine the quantities of this illegal catch which had been reported against quota (see Annala & Sullivan 1999). For CRA 3, it was assumed that 5.5% of the illegal catch was reported against quota. This breakdown is required to enable estimates of the catches that respect or do not respect the legal size limit and berried female restrictions. Table 8 shows the illegal catch estimates assumed for the 2001 assessment.

Table 8. Estimates of illegal catches (t) for 2001 assessment for CRA 3. For the years not listed, the assessment interpolated linearly.

Year	CRA 3	Year	CRA 3
1979	30.4	1995	60.0
1987	228.7	1996	80.0
1990	228.7	1997	85.0
1992	228.7	1998	90.0
1993	40.0	1999	100.0
1994	40.0	2000	80.0

The Working Group members have very little confidence in the estimates of illegal catch. However, because these figures cannot be verified, the Working Group is not in a position to modify them or determine their acceptability.

e) Other sources of mortality

Other sources of mortality include the return of under-sized and berried female lobsters to the water, causing handling mortality, and predation by *Octopus* and other predators within pots. These cannot be quantified. The assessment assumes that handling mortality is 10%.

2 BIOLOGY

Rock lobsters are thought to be slow-growing and long-lived. *J. edwardsii* and *J. verreauxi* occur both in New Zealand and southern Australia. The following summary applies only to *J. edwardsii* in New Zealand.

Sexual maturity in females is reached at about 34–77 mm TW (about 60–120 mm carapace length), depending on locality. Mating takes place in autumn, and the egg hatches in spring into the short-lived naupliosoma stage. Most of the phyllosoma development takes place in oceanic waters tens to hundreds of kilometres offshore over a period of at least 12 months. Near the edge of the continental shelf the final-stage phyllosoma metamorphoses into the settling stage, the puerulus. Puerulus settlement takes place mainly at depths less than 20 m, but not uniformly over time or between regions. Larval recruitment indices measured on collectors fluctuate widely from year to year.

Most females in the south and southeast of the South Island do not breed before reaching MLS.

Some rock lobsters undertake long-distance migrations in some areas. During spring and early summer, variable proportions of usually small males and immature females move various distances against the current from the east and south coasts of the South Island towards Fiordland and south Westland.

Values used for some biological parameters in the stock assessment are shown in Table 9.

Table 9: Values used for some biological parameters

1. Natural mortality (M) ¹

Area	Both Sexes
NSS and CRA 3	0.12

¹ This value was used as an informative prior; M was estimated as a parameter of the model

2. Fecundity = a * TW^b (TW in mm) (Breen & Kendrick 1998)²

Area	a	b
NSN	0.21	2.95
CRA 4 & CRA 5	0.86	2.91
NSS	0.06	3.18

² Fecundity was not used by post-1999 assessment models

3. Weight = a TW^b (weight in kg, TW in mm) (Breen & Kendrick, MFish unpublished data)

Area	Females		Males	
	a	b	A	B
CRA 3	1.30 E-05	2.5452	4.16 E-06	2.9354
NSS	1.04 E-05	2.6323	3.39 E-06	2.9665

a) Growth modelling

Before the 1999 assessment, growth increments from tagging data collected in the late 1970s and early 1980s were used to estimate growth rates for *J. edwardsii*. Growth rates were estimated from the estimated frequency of moulting by size and sex and the estimated increment-at-length for each sex. In assessments before 1998, these estimates were converted to a von Bertalanffy equation, then size data from catch sampling were used in length-converted catch curves to estimate total mortality. This procedure did not address the variability of growth. The 1998 assessment moved from an age-structured model to a length-based model (Starr *et al.* 1999; Breen & Kendrick 1999). This was re-written completely in 1999 and further refined in 2000 and 2001. Growth-at-size is represented stochastically by growth transition matrices for each sex. The growth increments of lobsters are assumed to be normally distributed with a mean and variance determined from model parameters. Each row in these transition matrices represents a starting size category and each cell in the row is the probability that a lobster will move into another specific size bin.

In 2001, the underlying growth model is based on two parameters for each sex, describing the expected growth increments of lobsters of 50 and 80 mm TW. Another parameter describes the CV of the increment and one describes the magnitude of observation error. It is assumed, based on analysis of the tag-recapture data, that males moult twice yearly and that females moult once yearly, in autumn. Tagging data have been included into the model fitting procedure, so the model estimates growth from tagging, size frequency and CPUE data.

b) Settlement indices

Annual levels of puerulus settlement have been measured for periods ranging from 6 to 19 years at 9 sites from Gisborne south to Otago and around to Stewart Island and Chalky Inlet in Fiordland. New sites are being established at Jackson's Bay on the west coast South Island, at Houhora in CRA 1 and at Bowentown in CRA 2.

The settlement data for NSC to the end of 2000 (based on the sites Gisborne, Napier, Castlepoint, Wellington, and Kaikoura) show that there was a strong settlement peak during the period from 1991 and 1992 (and into 1993 at some sites). Settlement since then has been lower except for a moderate year in 1998. Dive observations carried out in Wellington show high abundance of juveniles following the high settlement of pueruli (Booth *et al.* 1998; Booth *et al.* 1999; Booth *et al.* 2000). The recruitment of lobsters from the high 1991 to 1993 settlements to the

fishery may have contributed to the recent increase in CPUE in the NSC fishery (the fishery is now mostly for males which take at least 5 years to reach MLS from settlement).

The years 1981, 1983, 1987, 1991, 1992 and 1993 were high settlement years over broad areas of the east coast. The breadth of these areas suggests that factors which drive larval recruitment are widespread. This is also the case in other rock lobster fisheries such as Western Australia.

For the east coast of NSS (settlement sites Moeraki and Halfmoon Bay), the puerulus settlement indices are correlated with unstandardised CPUE from CRA 7. For the west coast of NSS (Chalky Inlet), settlement since 1987 has been high compared with the east coast of NSS, with lowest values in 1992-93 and 1995.

Settlement indices were used in the 2001 stock assessment modelling for CRA 3, using the Castlepoint CPT001 index, as a sensitivity test to the basecase results.

3 STOCKS AND AREAS

There is no evidence for genetic subdivision of lobster stocks within New Zealand based on biochemical genetic and *mtDNA* studies. The observed long-distance migrations in some areas and the long larval life probably result in genetic uniformity among areas. Gene flow may also occur to New Zealand from populations in Australia.

Subdivision of the NSI stock on other than genetic grounds has been considered (Booth & Breen 1992; Bentley & Starr 2001). There are geographic discontinuities in the frequency of antennal banding, size at onset of maturity in females, migratory behaviour, some fishery catch and effort patterns, phyllosoma abundance patterns, and puerulus settlement levels. These observations have led to division of the NSI stock into three substocks (NSN, NSC, and NSS) for assessment. Cluster analysis based on similarities in CPUE trends between rock lobster statistical areas provides support for the current substock definitions (Bentley & Starr 2001).

Although considered separately for stock assessment purposes, the CHI stock (CRA 6) also appears to be genetically the same as the NSI stock. It may depend upon the NSI stock as a source of recruitment, but changes in abundance within the CHI stock are unlikely to affect the NSI stock.

J. verreauxi forms one stock centred in northern New Zealand, and appears to be genetically subdivided from populations of the same species in Australia.

4 DECISION RULES

All the decision rules in 2001 have been evaluated on the basis of catch summarised by fishing year (1 April to 31 March). This is a change from the approach used before 1998 which was based on an "assessment year" defined from 1 September to 31 August. The most recent information in the 2001 decision rule evaluation is from March 2001 and is based on catch and effort data obtained from the Ministry of Fisheries in June 2001 and should be reasonably complete.

The catch data used in each of these analyses have been corrected to reflect the landing data rather than using the estimated catch (as discussed in Section 1(a)i). The method used for correction is described in Bentley et al. (*in prep*).

a) Decision Rule for NSN and NSC

The decision rule described by Breen *et al.* (1994) has been modified by the National Rock Lobster Management Group (NRLMG) for the NSN and NSC substocks to allow for a consideration of TAC increases. The original decision rule required that a substock be assessed whenever a "standardised CPUE analysis" (Maunder & Starr 1995) showed a "significant" decrease in the CPUE for a given year relative to the CPUE estimate for 1992-93. A year index would be considered "significantly different" from the 1992-93 year index if the standard error bars of the two years did not overlap.

Table 10. Decision rule indices for 1992-93 and 2000-01 fishing years (1 April to 31 March) for the NSN and NSC substocks. The index is the relative year effect from a standardised CPUE analysis. The table also shows the upper and lower bounds, which are the index plus and minus one standard error respectively. The final column indicates the significance of change between the two years (* = significant increase).

Substock	1992-93	1992-93	1992-93	2000-01	2000-01	2000-01	Result
	Index	Lower	Upper	Index	Lower	Upper	
NSN	1.107	1.070	1.146	2.197	2.106	2.293	*
NSC	0.412	0.404	0.420	1.794	1.746	1.843	*

i) NSN

The standardised CPUE for the NSN substock increased significantly between the 1992–93 and 2000–01 fishing years (Figure 1 and Table 10). Figure 2 compares the unstandardised (simple arithmetic mean) with the standardised analyses from 2000 and 2001 which have been scaled to the CPUE in kilograms per potlift in the reference year. The Working Group notes that the use of the arithmetic mean CPUE is potentially misleading because it is more affected by extreme outliers in the distribution than the means obtained in the standardisation procedure.

ii) NSC

The standardised CPUE for the NSN substock increased significantly between the 1992–93 and 2000–01 fishing years (Figure 3 and Table 10). Figure 4 compares the unstandardised (simple arithmetic mean) with the standardised analyses from 2000 and 2001 which have been scaled to the CPUE in kilograms per potlift in the reference year. The Working Group notes that the use of the arithmetic mean CPUE is potentially misleading because it is more affected by extreme outliers in the distribution than the means obtained in the standardisation procedure.

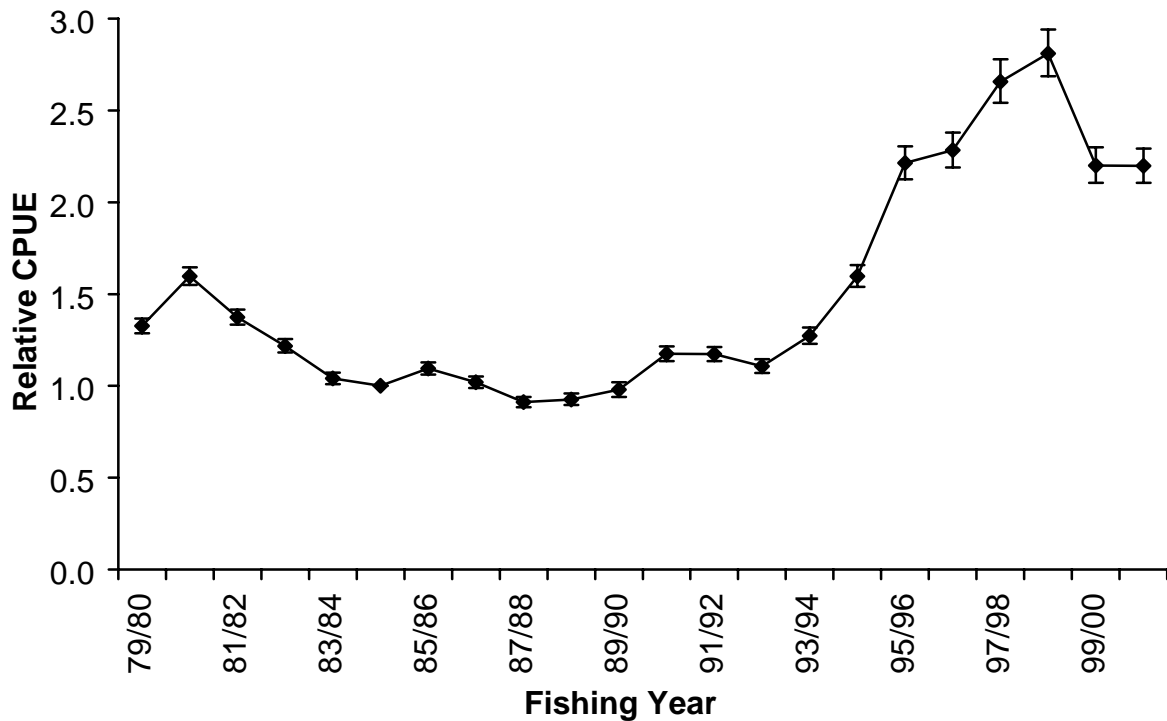


Figure 1. Values of the year index from the standardised CPUE analysis for the NSN substock showing plus and minus one standard error for each year. The year index is normalised to one for the 1984-85 fishing year (the year with the lowest standard error). Input catch data used in this analysis were corrected for differences between estimated and landed catches.

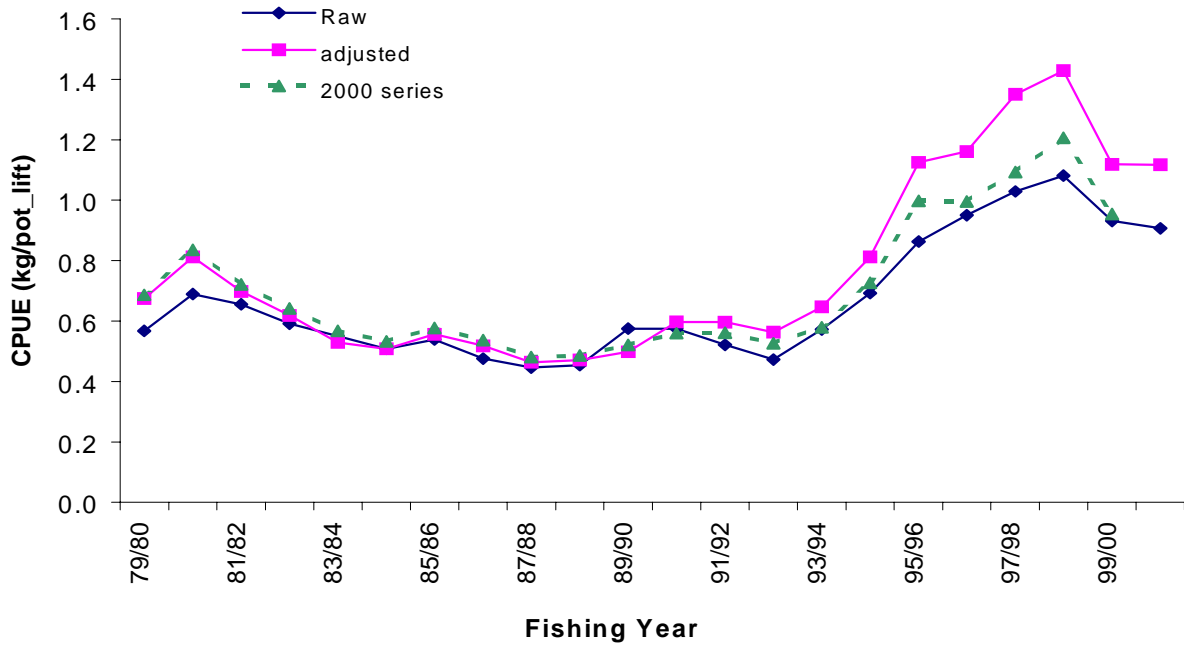


Figure 2. Values of the absolute year index (in kg/potlift) from the standardised CPUE analysis for the NSN substock compared with the equivalent analysis from 2000 and the unstandardised CPUE trend.

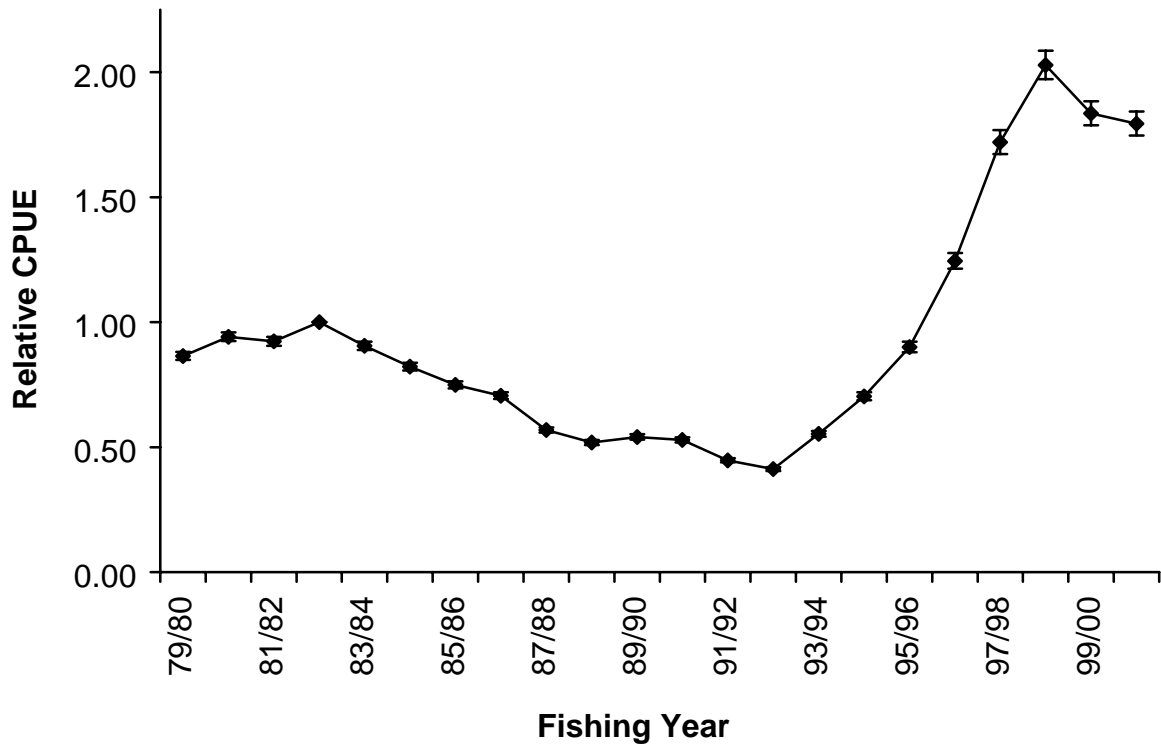


Figure 3. Values of the year index from the standardised CPUE analysis for the NSC substock showing plus and minus one standard error for each year. The year index is normalised to one for the 1982-83 fishing year (the year with the lowest standard error). Input catch data used in this analysis were corrected for differences between estimated and landed catches.

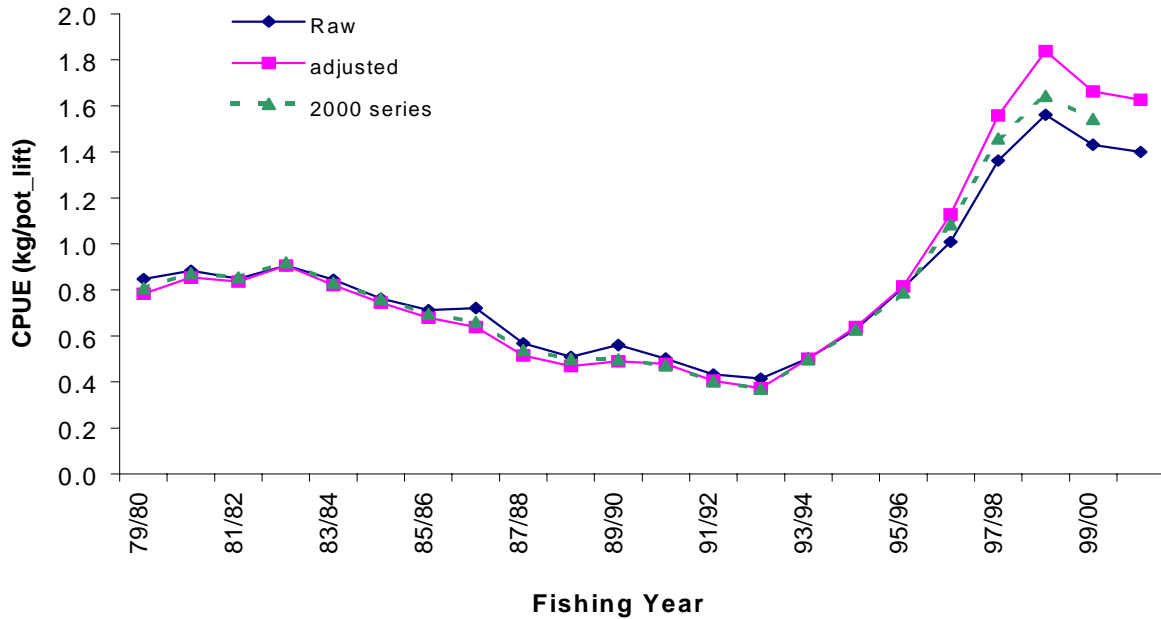


Figure 4. Values of the absolute year index (in kg/potlift) from the standardised CPUE analysis for the NSS substock compared with the equivalent analysis from 2000 and the unstandardised CPUE trend.

b) Decision Rule for NSS

In 1996, the NRLMG recommended a new decision rule for the NSS substock (see Starr *et al.* 1997 for a detailed description of the evaluation of the new decision rule):

- a) this decision rule uses the predicted deterministic trajectory of rebuild from the NSS stock assessment model;
- b) the rule is triggered if the mean deviation from the predicted rebuilding trajectory (over three years) is more than 25%. The underlying assumption of this rule is that CPUE is proportional to abundance, but is observed with error;
- c) if the rule is triggered, the TAC is either raised or lowered by 20%, depending on the direction of the deviation;
- d) the rule does not allow TAC adjustments in two consecutive years.

The 2001 NSS decision rule was evaluated against the rebuilding trajectory derived from the 1997 “base case” NSS stock assessment. This continues the practice established by the Rock Lobster Fishery Assessment Working Group in 1998.

The results of the 2001 NSS decision rule evaluation are presented in Table 11. Note that the ratios of the observed to predicted catch rates have increased in the most recent year as has the overall index.

Observed CPUE data were compared to the target rebuilding trajectory (which rebuilds to B_{MSY} by 2015–16) based on the 1997 NSS age-structured model (Figure 5). The mean 1997–98 to 2000–01 deviation from the predicted rebuilding trajectory was estimated to be -34% which is a “significant” difference as defined by (b) of the decision rule (Table 11). Even though this is a significant drop, clause (d) of the decision rule indicates that this is a “latent” year not requiring a decrease in TACC. It is not possible to predict at this time if the NSS decision rule will be invoked in 2002.

Figure 6 compares the unstandardised (simple arithmetic mean) with the standardised analyses from 2000 and 2001 which have been scaled to the CPUE in kilograms per potlift in the reference year. The Working Group notes that the use of the arithmetic mean CPUE is potentially misleading because it is more affected by extreme outliers in the distribution than the means obtained in the standardisation procedure.

Table 11: Evaluation of NSS decision rule for 2000--01.

	Observed Standardised CPUE	Predicted Model CPUE	Ratio	Decision rule
1998-99	0.720	1.131	0.637	
1999-2000	0.754	1.200	0.628	
2000--01	0.909	1.281	0.710	0.658

Table 12. Results of the NSS Decision Rule evaluation for the most recent three assessment years. The NSS Decision Rule is triggered when the calculation is below the threshold value of 0.75 (unless there had been a reduction in the previous year).

Year of Assessment	Decision Rule Result
2001 Assessment	0.658
2000 Assessment	0.540
1999 Assessment	0.642

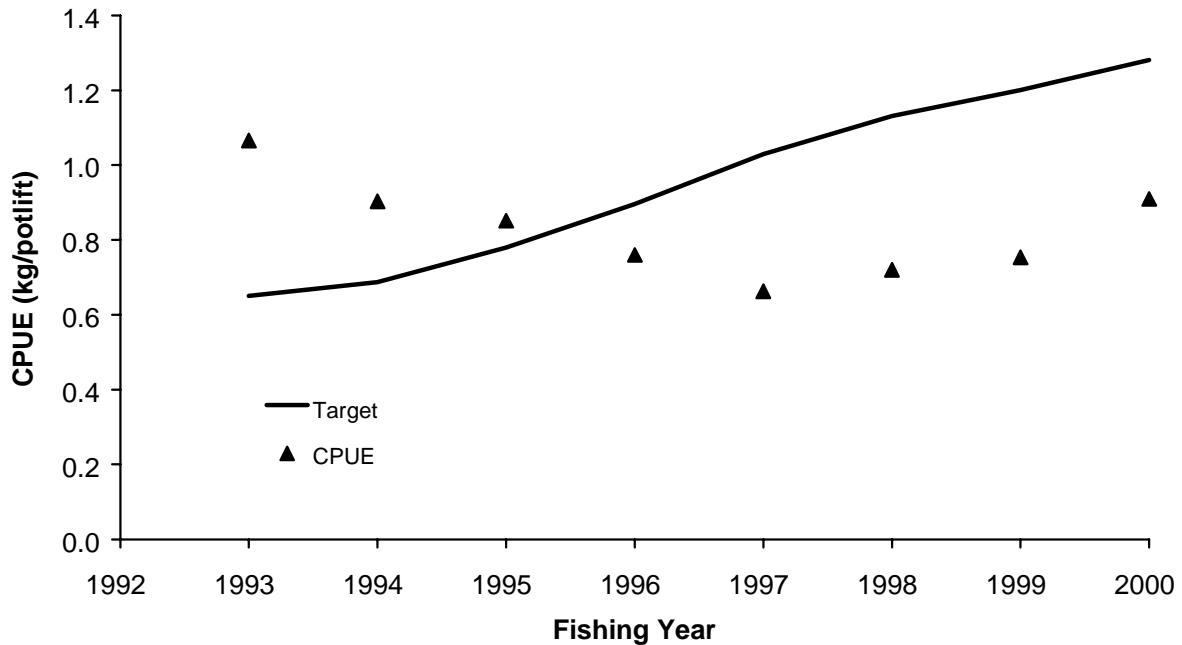


Figure 5: Values of the CPUE year index expressed as kg/potlift from the standardised CPUE analysis and the target trajectory from the 1997 NSS stock assessment. Note that the rebuilding trajectory is based on an assessment year (1 September –31 August) while the CPUE data points are based on a fishing year.

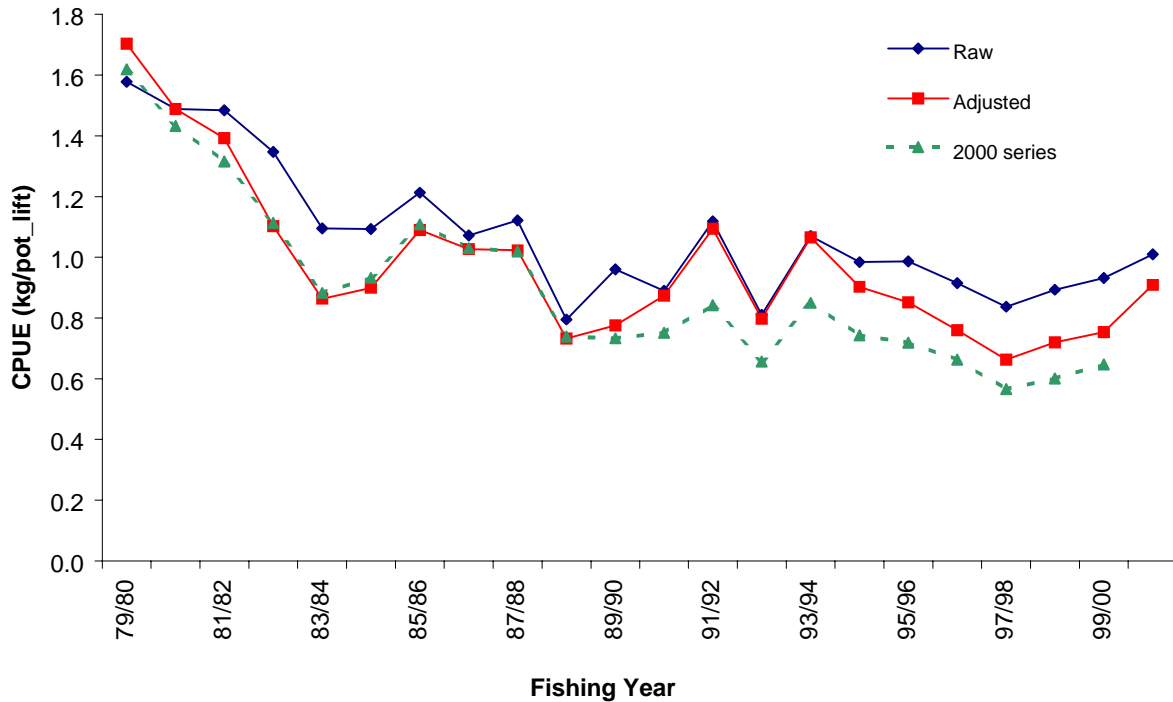


Figure 6. Values of the absolute year index (in kg/potlift) from the standardised CPUE analysis for the NSS substock compared with the equivalent analysis from 2000 and the unstandardised CPUE trend.

5 STOCK ASSESSMENT

This section reports a new assessment for *J. edwardsii* for the CRA 3 QMA from the NSC substock.

a) Revised size-based model

i) Model structure

The size-based model used in 1999, which was fully described by Starr *et al.* (in prep.), has been revised and improved for the 2001 assessment. Many of the revisions were suggested by an external review of the model by Dr. Andre Punt, University of Washington, in June 2001 (Punt 2001). The model is fitted to two indices of catch rate from different periods, to size frequency and tagging data, and (in sensitivity trials) to puerulus settlement data.

An important structural feature of the model is the division of the year into two seasons (autumn-winter: April to September, and spring-summer: October to March). This captures more accurately several biological processes: a) season- and sex-specific moult patterns; b) possible differential vulnerability of both sexes between each other and between the two seasons; and c) a reduction in the vulnerability of mature females in the autumn-winter season because of their egg-bearing status. The seasonal structure is important to incorporate because several fisheries have changed from predominantly spring/summer fisheries to autumn/winter fisheries which catch mostly male lobsters.

For CRA 3, significant exploitation history occurred in the early part of the time series. Different MLS regulations existed at this time and pots were not required to have escape gaps. We therefore incorporated much historical information for CRA 3: a time series of sex-specific MLS regulations, additional parameters to describe selectivity prior to escape gap regulations, time series of catch per day estimates for the 1960s and early 1970s, and early size frequency data, including market sampling data. These data and their sources are listed in Table 13. As a result of including these historical data sources, it was possible to estimate recruitment deviations beginning in 1960.

Other major changes incorporated in 2001 included: revising the selectivity function, calculating CPUE based on mid-season biomass, changing the likelihood function for the proportion-at-length data, and estimating a common component of the standard deviation for observation error for all data sets.

The initial population in 1945 is assumed to be in equilibrium with average recruitment and with no fishing mortality. Each season the number of male, immature female and mature female lobsters within each size class is updated as a result of:

- a) **Recruitment.** Each year, new recruits are added equally for each sex and both seasons, into the smallest size classes, beginning with the autumn-winter season. The proportion of individuals entering each size class is modelled as a normal distribution with a mean size (32 mm) and standard deviation (2 mm), and is truncated at the smallest size class (30 mm). The magnitude of annual recruitment in a specific year is determined by the parameter for average recruitment and (for all but the early years) a parameter representing the deviation from average recruitment. The vector of recruitment deviations is assumed to be normally distributed with a mean of zero. The years for which recruitment deviations were estimated were 1960 to 1999.
- b) **Mortality.** Natural, fishing and handling mortalities are applied to each sex category (male, immature female and mature female) in each size class. Natural mortality is estimated, but assumed to be constant and independent of sex category and age. Fishing mortality is determined from observed catch and model biomass, modified by legal sizes, sex-specific vulnerabilities and selectivity curves. Fisheries that respect size limits (SL fisheries - legal commercial and recreational) are differentiated from those which do not (NSL fisheries - part of the illegal fishery plus the Maori traditional fishery). It is assumed that size limits and the prohibition of taking of berried females apply only to the SL fisheries. Otherwise, the selectivity and vulnerability functions are the same for the SL and NSL fisheries. Relative vulnerability is calculated by assuming that the males in the spring-summer season have the highest vulnerability and that the vulnerability of all other sex categories by season are equal to or less than the spring-summer males. Mature females have no legal vulnerability in the autumn-winter, when all are assumed to be ovigerous. The annual rate of SL fishing mortality is calculated as the ratio of SL catch to the SL biomass. SL biomass is defined as the weight of males and females in the size classes above the MLS limits, adjusted for their relative vulnerability as defined above. Handling mortality rate is assumed to be proportional to legal fishing mortality at 10% of all lobsters that are released.
- c) **Fishery selectivity curves:** A three-parameter fishery selectivity function is assumed, with parameters describing increasing vulnerability from the initial size class to a maximum, followed by decreasing vulnerability. The three parameters describe the shapes of the ascending and descending limbs and the size at which vulnerability is maximum. Changes in regulation over time (for instance, changes in escape gap regulations) are modelled by estimating separate selectivity parameters appropriate to each period of the fishery (two separate periods).
- d) **Growth and maturity.** For each size class and sex category in a season, a transition matrix specifies the probability of an individual remaining in the same size class or growing into each of the other size classes. The transition matrices for each sex category are derived and estimated as specified in Section 2(a). Maturity for females is estimated as a two-parameter logistic curve from the maturity-at-size information in the size frequency data.

ii) Model fitting

A total negative log likelihood function was minimised using AD Model Builder™. The model was fitted to standardised CPUE indices estimated by season from the 1979–80 to 2000-01 fishing years. The model was also fitted to an additional seasonal catch rate index based on daily catch and effort data for the period 1963 to 1973 (Annala & King 1983). A lognormal error structure was assumed and a catchability constant (q) was calculated analytically for each CPUE series.

The model was fitted to size data taken from commercial pots. These data were available either from research sampling conducted on commercial vessels or from voluntary logbooks maintained by rock lobster fishers in CRA 3. Estimates of the seasonal size frequency were obtained by collating data that had been summarised by area/month strata and weighted by the commercial catch taken in each stratum, the number of lobsters measured and the number of days sampled. Size data from each source (research sampling or voluntary logbooks) were fitted separately. A fundamental assumption is that the size frequency data are representative of the commercial lobster catch. The size proportions within each season summed to one across all three sex categories: males, immature females, and mature females. This provides the model with seasonal estimates of the relative proportion by sex category in the catch.

In 2001, market sampling data were used for the first time in the fitting procedure. These data are available only as carapace lengths from males and females, without maturity information. The carapace lengths were converted to tail width, and the model made predictions for the size classes beginning at one size class above the MLS.

Another change in 2001 is that the model now estimates a common component of observation error standard deviation for all five data sets. The model for CRA 3 was fitted to the settlement index for Castlepoint (CPT001) as a sensitivity trial.

A summary of the data used in each assessment, the data sources and the applicable years is provided in Table 13.

Table 13. Data types and sources for the 2001 assessment in CRA 3. Year codes apply to the first 9 months of each fishing year, viz 1998-99 is called 1998. NA – not applicable or not used; MFish - NZ Ministry of Fisheries; RLIC – Rock Lobster Industry Council; NIWA – National Institute of Water and Atmospheric Research

Data Type	Data Source	CRA 3	
		Begin Year	End Year
Historical catch rate	Annala & King (1983)	1963	1972
CPUE	FSU & CELR	1979	2000
Historical catch sample	Kaberry & Pike (1967)	1961	
Historical catch samples	Mfish	1977	1977
Market samples	Various	1973	1983
Research size frequencies	Mfish	1986	2000
Logbook size frequencies	RLIC	1993	1998
Settlement indices ¹	MFish (Booth <i>et al.</i> 2001, pers. comm.)	1983	2001
Historical tag recovery data	MFish various	1975	1983
Current tag recovery data	RLIC & MFish	1995	2000
Historical MLS regulations	Annala (1983)	1945	2000
Escape gap regulation changes	Annala (1983)	1945	2000

¹ Castlepoint (CPT001) for CRA 3

The parameters estimated in each model and the priors used are provided in Table 14. Fixed parameters and their values are given in Table 15. CPUE, the historical catch rate, settlement data, the priors and the tagging data were weighted directly by a relative weighting factor.

Table 14. Parameters estimated and priors used in basecase assessments for CRA 3. Prior type abbreviations: U – uniform; N – normal; L – lognormal

	Prior Type	Bounds	Mean	CV
Log R ₀ (ln mean recruitment)	U	1-50	-	-
M (natural mortality)	L	0.01-0.35	0.12	0.04
Recruitment deviations	N ¹	-2.3-2.3	0	0.4
Increment at TW=50 (male & female)	U	1-8	-	-
Increment at TW=80 (male & female)	U	-10-3	-	-
CV of growth increment	U	0.01-1.0	-	-
TW at 50% probability female maturity	U	30-80	-	-
(TW at 95% probability female maturity) – (TW at 50% probability female maturity)	U	0-60	-	-
Relative vulnerability: males autumn-winter ²	U	0-1	-	-
Relative vulnerability: immature females autumn-winter	U	0-1	-	-
Relative vulnerability: immature and mature females spring-summer	U	0-1	-	-
Relative vulnerability: mature females autumn-winter	U	0-1	-	-
Shape of ascending limb of vulnerability ogive	U	1-50	-	-
Variance of descending limb of vulnerability ogive (males & females) ³	L	1-100	-	-

¹ Normal in logspace = lognormal (bounds equivalent to -10 to 10)

² Relative vulnerability of males in spring-summer was fixed at one

³ Fixed at 50 in basecase assessment.

Table 15. Fixed parameter values used in basecase assessment for CRA 3

	<u>CRA 3</u>
Minimum std dev of growth increment	1.5
std dev of observation error of increment	3
Historical catch per day CV	0.30
Settlement CV ¹	0.30
Maximum exploitation rate	80%
Handling mortality	10%
Current male size limit	54 ²
Current female size limit	60
Size at maximum selectivity, females	58-60
Size at maximum selectivity, males	52
First year for recruitment deviations	1960
Last year for recruitment deviations	2000
Relative weight for length frequencies	9
Relative weight for CPUE	2
Relative weight for other data	1

¹ Sensitivity trial only

² 52 mm in winter

iii) Model projections

Bayesian estimation procedures were used to estimate uncertainty in model estimates of current biomass, and in future projections. This procedure was conducted in the following steps:

- a) Model parameters were estimated using maximum likelihood and the prior probabilities. These point estimates represent the mode of the joint posterior distributions of the parameters, and are called the MPD estimates;
- b) Samples from the joint posterior distribution of parameters were generated using the Markov chain - Monte Carlo procedure (MCMC) using the Hastings-Metropolis algorithm;
- c) For each sample of the posterior, 5-year projections (encompassing the 2001–02 to 2006–07 fishing years) were generated by assuming the catches indicated in Table 16. Future annual recruitment was randomly sampled with replacement from the model's estimated recruitments from the period 1988-1997;
- d) A marginal posterior distribution was found for each quantity of interest by integrating the product of the likelihood and the priors over all model parameters; the posterior distribution was described by the mean, median, and 5th and 95th percentiles.

Table 16. Catches (t) used in the five-year projections. Projected catches are based on the current TACC for CRA 3, and the current estimates of recreational, customary and illegal catches.

Population modelled	Commercial	Recreational	Reported Illegal	Unreported Illegal	Customary
CRA 3	327.0	14.1	4.4	75.6	30.0

iv) Performance indicators

The Plenary agreed to use a number of performance indicators as measures of the status and risk for CRA 3. These performance indicators were calculated using the current catch levels. The WG did not consider that virgin biomass or B_{MSY} were appropriate reference points, given the difficulty of accurately estimating these quantities. Therefore the Plenary agreed to use performance indicators based on two alternative biomass levels: one which represents a target biomass level (1974 to 1979) and the other a lower threshold (1992).

1. $BVULN_{01}/BVULN_{74-79}$
2. $BVULN_{01}/BVULN_{92}$
3. $BVULN_{06}/BVULN_{01}$
4. $BRECT_{01}/BRECT_{74-79}$
5. $BRECT_{01}/BRECT_{92}$
6. $BRECT_{06}/BRECT_{01}$
7. U_{01}
8. U_{06}
9. $P(BVULN_{06} > BVULN_{01})$

Current vulnerable biomass, $BVULN_{01}$, is defined as the beginning season vulnerable biomass on 1 April 2001 which is the beginning of the autumn-winter season for the 2001-02 fishing season. Similarly, projected vulnerable biomass $BVULN_{06}$ is defined as the beginning season vulnerable biomass on 1 April 2006, which is the beginning of the autumn-winter season for the 2006-2007 fishing season. Vulnerable biomass was also calculated for two periods in the past: $BVULN_{74-79}$ is defined as the mean of beginning AW vulnerable biomass from 1974 through 1979, the earliest period where there are good data available to estimate biomass. $BVULN_{92}$ is defined as the beginning season vulnerable biomass on 1 April 1992, the year of the lowest estimated vulnerable biomass in this fishery.

$BRECT_{01}$ is defined as the current recruited biomass (this includes all lobsters above the MLS but ignores vulnerability). This indicator is also calculated for the 5-year projection and the two historical periods described above.

U_{01} is the ratio of catch to recruited biomass at 1 April 2001 (similarly for U_{06} in 2006), and the last performance indicator is the probability that vulnerable biomass will increase from 2001 to 2006.

b) Stock assessment results using the revised size-based model

The following section presents the new stock assessment for the CRA 3 QMA.

i) *Jasus edwardsii*, CRA 3 QMA

The basecase CRA 3 assessment was made using the estimated and fixed parameters given in Tables 13 and 14. This basecase was chosen by experimenting with the relative weights for CPUE and length frequencies to find a credible fit to CPUE balanced by an acceptable fit to length frequencies. It was necessary to use a small CV for the prior on M to keep this parameter away from the upper bound.

Basecase MPD results indicated that the vulnerable biomass declined until 1993, then increased rapidly until 1999 and has recently declined. The exploitation rate was near the assumed maximum of 80% in the mid-1980s; the present exploitation rate is estimated to be 26%.

Some of the MPD indicators changed markedly during sensitivity trials. Exclusion of CPUE data led to pessimistic results compared with the basecase results; exclusion of the length frequency data had the converse effect; exclusion of tagging data had little effect. Manipulating the relative weights for the length frequency and CPUE data sets had strong and unpredictable effects. Estimating the right-hand limb of the selectivity function led to the creation of a large cryptic (recruited but invulnerable) biomass, but results involving vulnerable biomass were little changed. Fitting to settlement data had little effect on estimates of current biomass.

The results (Table 17) are based on the posterior distributions of the indicators. These were obtained with Markov chain - Monte Carlo (MCMC) simulations from the base case and two sensitivity trials. The base case results suggest that current vulnerable biomass is more than twice that in the reference period, 1974-79. With randomly re-sampled recent recruitment, the stock has a median expectation of slight increase in the next five years at current catch levels; however, the 5th and 95th percentiles are 44% and 188% of the current level, so conclusions about future vulnerable biomass are very uncertain.

Table 17. Performance indicator results for base case CRA 3 assessment. Expected value results are the mean, median, and 5% and 95% percentiles from the Bayesian posteriors, based on 4950 samples from 2.5 million simulations. Probability is the count of the indicated test divided by the number of posterior samples.

Performance indicator	Mean	Median	5%	95%
1. $BVULN_{01}/BVULN_{74-79}$	238%	238%	221%	257%
2. $BVULN_{01}/BVULN_{92}$	728%	727%	675%	784%
3. $BVULN_{06}/BVULN_{01}$	111%	108%	44%	188%
4. $BRECT_{01}/BRECT_{74-79}$	299%	298%	278%	322%
5. $BRECT_{01}/BRECT_{92}$	347%	344%	298%	406%
6. $BRECT_{06}/BRECT_{01}$	109%	107%	63%	162%
7. U_{01}	26%	26%	24%	28%
8. U_{06}	26%	24%	16%	42%
9. $P(BVULN_{06} > BVULN_{01})$	0.58			

The trajectory of vulnerable biomass derived from the posterior (Figure 7) shows that the biomass from 1945 to 1955 is estimated with high uncertainty compared with biomass in the years for which data are available, and that

projections are very uncertain. The biomass trajectory shows large fluctuations of the stock, over many years, during the exploited phase.

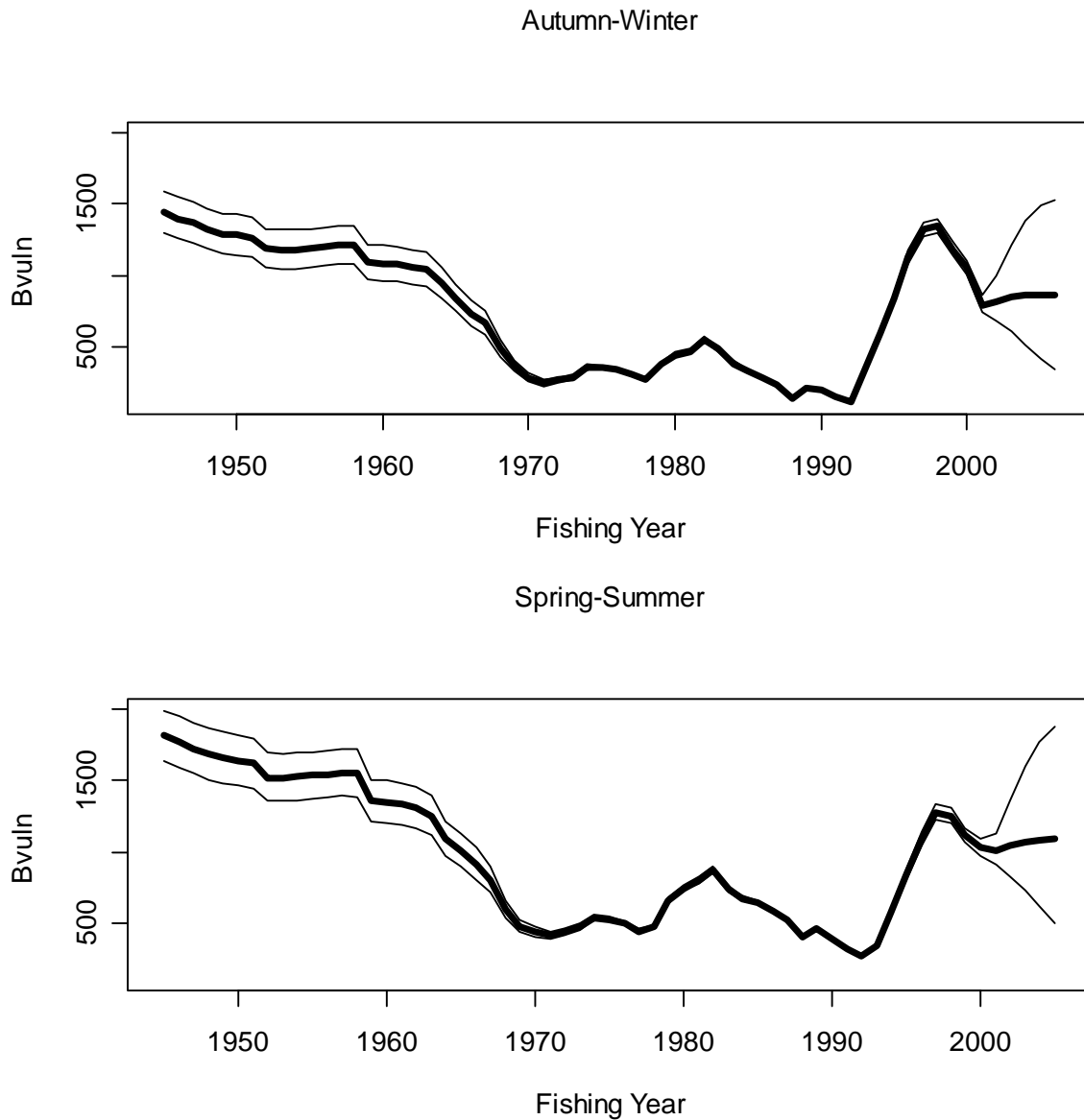


Figure 7. The median trajectory for vulnerable biomass (t) from the MCMC simulations from the base case (solid line) with 5% and 95% percentiles.

The vulnerable biomass is more tightly estimated than either recruited or total biomass. The vulnerable biomass is a small proportion - about one-half to one-third - of the recruited biomass, which in turn is a small proportion of the total biomass. This suggests that much of the recruited biomass is unavailable to the fishery, especially in the autumn-winter season used as the basis for these indicators, and that much of the total biomass lies below the MLS because of high natural mortality and relatively slow growth.

Retrospective analyses revealed a marked shift in the 2001 assessment from previous years. This appeared to be caused by the addition of the CPUE data points from the most recent year. It appears that, in order to fit these two data points, the model estimated a higher value for M despite the penalty on the prior and consequently estimated a much lower level of vulnerable biomass. The retrospective model fits using data through 1998 or 1999 did not fit the declining CPUE that began in 1998 (AW) or 1999 (SS). The assumptions of the model or the other data appear to be in conflict with the most recent declines in CPUE. As a result, projections from the 1999 data were much more optimistic than projections from the 2000 data. Thus, the retrospective analysis shows that the model projections and the absolute value of vulnerable biomass are uncertain. However, despite the lack of robustness of the model shown by the retrospective analyses, the conclusion remains that current stock size is well above that in the reference period from 1974-79.

The first sensitivity trial run with MCMC simulations showed that the cryptic biomass would be much larger if selectivity declines with size. However, the conclusions and projections involving vulnerable biomass were not materially affected.

The second sensitivity trial, in which the model had been fitted to the settlement indices from Castlepoint, and future recruitment was estimated from settlement, was much more pessimistic with respect to future vulnerable biomass. The median expectation of biomass in 5 years was 48%, compared with 108% from the base case, and the 95th percentile was 163% compared with 188% in the base case. This suggests that, if the settlement indices are a reliable indicator of recruitment to the fishery in CRA 3, the biomass will decline at current catch levels.

The effect of the new marine reserve in CRA 3 was also investigated in the model based on the assumption that 10% of the stock (both new recruitment and adults) was fully protected in the reserve and not available to the fishery. Some members of the Plenary believed that this assumption was at the extreme of possible effects which may have resulted from the establishment of the reserve. Five year projections using the same future catch levels as in the basecase showed an average 20% reduction in the final projected biomass compared to the basecase.

6 YIELD ESTIMATES

a) Estimation of Maximum Constant Yield (MCY)

i) *Jasus edwardsii*, all stocks

MCY was not estimated.

ii) *Jasus verreauxi*, PHC stock

MCY was estimated using the equation $MCY = cY_{av}$ (Method 4). Mean annual landings for 1979–96 were 20.0 t. The best estimate of M is 0.1, so the value of c was set at 0.9.

$$MCY = cY_{av} = 0.9 * 20 = 18 \text{ t}$$

It is not possible to assess the level of risk to the stock of harvesting the population at the estimated MCY value.

b) Estimation of Current Annual Yield (CAY)

i) *Jasus edwardsii*, all stocks

CAY was not estimated for any stock.

ii) *Jasus verreauxi*, PHC stock

CAY was not estimated because no biomass estimates are available for this stock.

7 STATUS OF THE STOCKS

a) *Jasus edwardsii*, NSN substock

An earlier version of the length-based model was applied to this stock in 1999. Uncertainties in the 1998 assessment were reduced, but uncertainties remained, particularly with respect to the levels of traditional, recreational and illegal catches. The assessment suggested that the current biomass is well above B_{MSY} . However, at an assumed level of catch for the next five years equal to the current catch, and with recruitment varying about its estimated average, the stock was likely to decline. The model estimated three years of poor recruitment, 1994–96. At the beginning of 2005–06 the stock, although smaller, was considered likely to remain above the estimated B_{MSY} .

The 1999 model results were not highly sensitive to the exclusion of CPUE, length frequency or tag-recapture data, nor to modification of the assumed selectivity curve. These results suggested that the assessment was reasonably robust, and that CPUE and length frequency data contained the same basic information about trends in the stock. Good agreement between growth estimates using fishery data and those from tag-recapture suggest that the assessment was not sensitive to the growth estimates.

b) *Jasus edwardsii*, NSC substock

i) CRA 3

The revised length-based model was applied to this stock in 2001. The assessment described above suggests a stock that increased sharply from 1993 to 1997 and has since decreased in vulnerable biomass. The current vulnerable biomass is high (mean =238%) compared with a reference period (1974-79), the earliest period where there are good data available to estimate biomass.

CPUE rose steadily after a package of measures was implemented in 1993. It peaked in 1997 or 1998 and has begun to decline. The model has no trouble fitting the increase, which was caused by a mixture of good recruitment, decreased removals, altered MLS and fishing patterns. The decline is difficult to fit with the model's assumptions, suggesting a problem with those assumptions, with the data, or possibly by an additional population process not captured in the modelling.

The base case assessment shows a median expectation that the stock will increase slightly in five years at the current levels of catch (Table 17), but the 5th and 95th percentiles of future stock level are 44% and 188% of the current level, so the stock could increase or decrease. Additional uncertainty in the projections comes from several sources. Levels of recreational, illegal and traditional catches are poorly determined. These catches, especially historical illegal catches, are substantial in some years and errors in estimation translate directly into uncertainty in the projections. Further, these non-commercial catches could change, with unpredictable effects on the stock.

The projections rely on an assumption about recruitment - it was assumed that recruitment would be similar, on average, to that in the period 1988-97 and with variability as seen in those ten years. However, recruitment in the past ten years is not necessarily a good basis for prediction of future recruitment. A sensitivity trial fitted the model to settlement data and used recent settlement indices to predict future recruitment. This trial showed a median expectation that the vulnerable biomass would decrease to about half the 2001 level by 2006, with 5th and 95th percentiles of 17% and 93%. If settlement at Castlepoint is a reliable index of future recruitment to the population in CRA 3, then the results suggest that continuing stock decreases are likely at the current level of catch.

It is unclear to what extent a new Marine Reserve in CRA 3 will affect the modelled population.

ii) CRA 4 & CRA 5

An earlier version of the length-based model was applied to combined CRA 4 & 5 QMAs in 1999. It remains unknown whether this grouping is appropriate. Uncertainties in the 1998 assessment were reduced, but uncertainties remained, particularly with respect to the levels of traditional, recreational and illegal catches.

The 1999 assessment suggested that the current biomass was well above B_{MSY} . This conclusion was sensitive to the exclusion of CPUE data, changes to the assumed selectivity curve and to the weight given to the prior probability on M , but was robust to other sensitivity trials. M appeared to be poorly determined by the data.

The assessment concluded that, at an assumed level of catch for the next five years equal to the current catch, and with recruitment varying about its estimated average, the stock was likely to decline. The model estimated a series of poor recruitments after 1993. At the beginning of 2005-06 the stock, although smaller, was considered likely to remain above the estimated B_{MSY} . The settlement data for NSC to the end of 1999 (based on the sites Gisborne, Napier, Castlepoint, Wellington, and Kaikoura) show that there was a strong settlement peak during the period from 1991 to 1993, depending on the site, settlement since then has been lower except for a moderate year in 1998.

c) *Jasus edwardsii*, NSS substock

In 2000 the NSS decision rule was triggered by CPUE values that remain well below the rebuild trajectory. Operation of the rule required a 20% decrease in TAC for 2001-02.

A revised and improved stock assessment model was applied to this substock in 2000. Estimates of stock status were consistent with those made in previous stock assessments. The 2000 stock size was estimated at about 5% of B_0 and about half B_{MSY} , when B_{MSY} was calculated as the biomass associated with maximum deterministic equilibrium yield - a simplistic and probably unrealistic approach. The 2000 exploitation rate was close to 50%.

Under the reduced catch required by operation of the NSS decision rule, the assessment predicted a rebuild of the stock by a factor of about 2.0, with 5th and 95th percentiles 1.3 to 2.9. This increase has a good chance of taking the stock above B_{MSY} , but the simplistic nature of B_{MSY} (and low stock size) must be remembered. There was estimated to be no chance that the stock after five years would be above 20% B_0 .

The projections relied on an assumption about recruitment - it was assumed that recruitment would be similar, on average, to that in the period 1987–96 and with variability as seen in the past ten years. However, recruitments in the past ten years are not necessarily a good basis for prediction of future recruitments. This assumption resulted in lower than average recruitment for NSS being used in the projections.

d) *Jasus edwardsii*, CHI stock

The stock assessment for this substock has not been updated since 1996. The status of this stock is uncertain. Catches have been less than the TACC for some time and CPUE has shown a declining trend since 1979 which has flattened out in recent years. These observations suggest a declining standing stock. However, size frequency distributions in the lobster catch have not changed, with a continuing high frequency of large lobsters. Large lobsters would have been expected to disappear from a stock declining under fishing pressure. This discrepancy could be caused by immigration of large lobsters into the area being fished. The models investigated assume a constant level of annual productivity which is independent of the standing stock.

Removals in the 1998–99 fishing year (326 t) were within the range of estimates for *MSY* (300-380 t). The recently reduced TAC (370 t) also lies within the range of the estimated *MSY*.

e) *Jasus verreauxi*, PHC stock

The status of this stock is unknown.

Summary of yield estimates (t), TACCs and TACs (t), and reported 1999-2000 commercial landings. Yield estimates are the mean *MSY* estimates from the Bayesian posteriors except for CRA 6, which is the range of yield estimates from the production model, and for PHC, which is an *MCY* estimate. (-, not available)

Fishstock	QMA	Yield estimate	2000-01			
			2000-01 TACC	Commercial Landings	2001-02 TACC	2001-02 TAC
CRA 1	Northland	] 575 ¹	130.5	130.9	130.5	
CRA 2	Bay of Plenty	]	236.1	235.4	236.1	452.6
CRA 3	Gisborne		327.0	328.1	327.0	453.0
CRA 4	Wairarapa-Hawke's Bay	] 1 366 ²	576.0	573.6	576.0	771.0
CRA 5	Canterbury-Marlborough	]	350.0	347.4	350.0	467.0
CRA 6	Chatham Islands	300-380	360.0	331.2	360.0	370.0
CRA 7	Otago	] 1 325 ³	111.0	87.2	89.0	109.0
CRA 8	Southern	]	711.0	703.6	568.0	655.0
CRA 9	Westland-Taranaki	-	47.0	47.0	47.0	
CRA 10	Kermadec	-	0.1	0	0.1	
Total			2 848.7	2784.5	2683.7	
PHC 1	All QMAs	18	40.3	9.5	40.3	

¹ NSN: combined CRA 1 and CRA 2

² combined CRA 4 and CRA 5

³ NSS: combined CRA 7 and CRA 8

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Annex Three

CRA 3 INDUSTRY ASSOCIATION:

Review of CRA 3 Regime and Proposals for 2002-2003

CRA 3 MANAGEMENT REGIME REVIEW

OUTLINE

The CRA 3 Industry Association Inc (CRAMAC 3) is proposing a revised CRA 3 regime which takes account of the current rather than the historical status of the stock and which gives expression and opportunity to future management roles and responsibilities of sector groups.

[Following discussions and consultation between the CRA 3 industry and non-commercial user groups including representatives of Customary interests, it is proposed that the existing CRA 3 Management regime be amended as the first phase of the progressive development of a CRA 3 Fishery Plan.]

PROPOSAL

- A. Specifically, it is proposed that the CRA 3 Regulations be amended -
- to remove all references to closed seasons so that the rock lobster fishing year reverts to a 01 April to 31 March period as in most other CRA areas of New Zealand, and
 - to remove the Regulations which prohibit the landing of legal female rock lobsters in the months of June, July, and August
- B. It is proposed that there be no other changes to the current CRA 3 Regulations pending further development of an agreed CRA 3 Fishery Plan.
- C. The CRA 3 industry proposes that it will facilitate an opportunity for non-commercial extractive use during the Summer holiday period by implementing a voluntary agreement not to fish commercially for the period 15 December to 15 January inclusive.
- D. The CRA 3 industry proposes that it will institute voluntary commercial fishing arrangements by way of contracts between Licensed Fish Receivers and commercial fishermen that will enable a reorganisation of the time currently available to commercial fishermen to harvest quota in order to achieve a greater economic and biological efficiency.
- E. The CRA 3 Industry notes six factors that drive the need for a revision of the current CRA 3 Regulations:
- the TACC is higher than can reasonably be expected to be caught in the time currently allotted to commercial fishing given the economic incentives that exist to harvest the TACC in the Winter period;
 - a significant catch has been denied to the industry for two seasons since the November 1999 marine reserve declaration;
 - the fishery is experiencing a predicted decline in the underlying stock abundance which is effecting the quality of commercial fishing activity as measured by catch rates;
 - legitimate fishermen are competing against a persistent level of illegal unreported catch taken by fish thieves;
 - there have been changes to the export market opportunities over the duration of the CRA 3 regime and the current regulatory procedures and timetables lack sufficient flexibility to enable timely seasonal responses to those opportunities;
 - industry initiatives to get better efficiencies into the commercial harvest procedures are being confounded because of the difficulties encountered by industry in obtaining consensus agreement from non-commercial representative groups, and because such options are apparently conditional upon non-commercial agreement even though no sustainability issues are at stake.

BACKGROUND

1. The existing CRA 3 management regime was implemented in April 1993 as an outcome of a combined user group consideration of management actions that would address the then current circumstances in the fishery. The management regime agreed and recommended by the CRA 3 User Group (comprised of customary, recreational

and commercial representatives) was both unique and innovative and until recent years was perceived to be demonstrably effective in rebuilding a depleted fishery and improving the quality of fishing by commercial and non-commercial interests.

2. The CRA 3 User Group itself was perceived as a model for other stakeholder groups in other fisheries. The Group itself functioned well because of the close personal associations that developed between industry sector group representatives at the time.
3. Despite a progressive weakening of the foundation support for some key elements of the CRA 3 regime, the objectives of the regime were generally being met from 1993 to 1999 inclusive as a consequence of increased stock abundance and particularly favourable fishing conditions in the June to August (Winter) season.
4. The intent and purpose of the suite of regulations and arrangements that comprise the CRA 3 regime began to unravel in 1995/96 when the Regulation 27 provisions enabled customary fishing at any time in the fishing year, including the closed season from September to November inclusive.
5. The Regulation 27 opportunity unfortunately enabled a widespread abuse of customary harvest rights by some unscrupulous operators and the amount of illegal unreported removals from the CRA 3 fishery began to increase significantly towards 100 tonnes in 1999/2000 after being effectively constrained from an estimated 228 tonnes in 1992/93 down to an estimated 40 tonnes in 1993/94 and 1994/95.
6. In the period 1996 through to 1999 there was tension between legitimate users and those who wilfully abused the customary fishing right with apparent impunity. There were (and continue to be) perceived inequities in the CRA 3 fishery which put strains on the working alliances which underpinned the CRA 3 User Group. There was and is a growing frustration on the part of both commercial and customary representatives that whilst commercial fishing activity has been effectively monitored, audited and managed since the commencement of the CRA 3 regime, there has been no truly effective management of non-commercial extractive use.
7. However it is essential to note that the working relationship between commercial and customary representatives to the CRA 3 User Group was and is neither compromised nor unduly effected by the problems experienced in relation to the abuse of customary rights. Following consideration of a stock assessment and a review of the CRA 3 regime in September 1999, it was unanimously agreed by the sectors that any application for an increase in the CRA 3 TAC (supported by the stock assessment outcome) would be deferred in recognition of an anticipated high level of customary harvest for the millennium celebrations in the region. Subsequent to that agreement the estimated customary removals for 1999/2000 were 106 tonnes - an increase of 86 tonnes over the allowance made in the April 1999 TAC setting process.
8. A further complication for the CRA 3 regime arose in November 1999 when a 2600 hectare no-take marine reserve was declared at Pouawa, north of Gisborne city. The marine reserve incorporates a reef system that has sustained around 10% of the commercial landings for CRA 3 over time, possibly as high as 40% of the landings for the statistical area in which the reserve is sited. Fishermen excluded from the marine reserve had to deploy their effort onto new fishing grounds (for them) in direct competition with the incumbent fishermen in the attempt to take an additional 30 tonnes of catch from those grounds. The results of that displacement became very evident in the 2000/2001 and 2001/2002 seasons.
9. An almost immediate response to the declaration of the marine reserve came from iwi groups with coastal marine areas in proximity to the reserve boundaries. Fearing that commercial effort displaced from the reserve would lead to depletion of "local" fisheries, a number of *rahui* were invoked and enforced - causing additional disruption to long established commercial fishing activity.
10. The most publicised response to the dislocation of commercial effort from within the marine reserve boundaries came from the Mahia area, where local commercial fishermen and community groups petitioned the Minister of Fisheries to prevent any transfer of quota and/or vessels from the Gisborne/East Cape fleet into the Mahia fishery.
11. The 1999 CRA 3 stock assessment (since revised) predicted a slow decline in stock abundance to levels above *B_{msy}* conditional upon average recruitment and no increase to the (then) current levels of removals. Whilst there were no sustainability issues at stake in that assessment result, it was evident even before the declaration of the marine reserve that the "quality" of fishing as measured by catch rates could decline. The loss of access to an estimated 30 tonnes of commercial catch in the 2000/2001 CRA 3 season and a similar amount in 2001/2002 could only exacerbate that situation.
12. Subsequent to that stock assessment, and concurrent with the progressively increasing abuse of customary fishing and the dislocation of commercial effort from within the marine reserve boundaries, the CRA 3 fishery experienced

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a sequence of adverse weather and sea conditions in the period June/July 2000. In July 2000 industry representatives requested the Minister of Fisheries to extend the commercial season into the month of September.

13. This request was eventually agreed by the Minister despite some acknowledged defaults in the consultation and application process at the time, and that issue became the catalyst for the Minister to request the NRLMG to have oversight of a review of the CRA 3 regime.
14. The CRA 3 industry understood the “review” to be of the same extent as provided for in the CRA 3 regime itself - that is, an annual review by the participatory stakeholders (the CRA 3 User Group) to ensure that the rules and regulations associated with the regime were properly functioning in relation to stock assessment outcomes and in relation to sector groups’ expectations of catch and catch rates.
15. However the “review” requested by the Minister took on a different connotation in July 2001 when the CRA 3 Industry made another request for a September seasonal extension - this time properly canvassed with all commercial, customary, and recreational stakeholder representatives - and was refused by the Minister because the application was allegedly not timely enough to meet the Regulatory timetable.
16. This decision gave the CRA 3 industry cause to reconsider the relevance of the existing CRA 3 regime and provided an incentive for the industry to initiate its own “review” of the CRA 3 situation.
17. The delay in presenting a request for a September extension in 2001 arose from the difficulties in assembling a non-commercial response to the proposal. The “test” of consultation placed by MFish on what in effect was and is a simple business decision proved to be difficult because of apparently conflicting opinions (between MFish and iwi, and within MFish) of who and/or what constitutes “tangata whenua” and the lack of organisation and accountability on the part of the recreational fishing sector.
18. The CRA 3 industry has “local knowledge” and understanding of the sensitivities in regard to customary rights and representation, but more importantly also has confidence in the regional iwi to determine their own representation, authority, and mandate.
19. The CRA 3 industry remains absolutely committed to the concept and the reality of co-operative user group participation in developing research and management arrangements for the fishery. However, the CRA 3 industry is not persuaded that decisions related to the commercial harvest of CRA 3 lobsters within the sustainable limits defined in stock assessments must by necessity be conditional upon the agreement of tangata whenua and recreational fishermen. The industry regards such decisions as being “business decisions” which it should be free to make in order to get the most economically efficient use from the available fishing opportunity whilst having regard to the quality of fishing enjoyed by legitimate customary and recreational users.
20. In November 2001 the CRA 3 Industry Association (representing all commercial interests in the fishery) convened a group of experienced industry personnel, including Maori, to examine the current CRA 3 regime and to “test” the intent and purpose of the regulatory package.
21. The intent of this review was to develop proposals for industry agreed changes to be consulted with customary and recreational representatives and delivered to the NRLMG for inclusion in the 2001/2002 Annual Report and Recommendations to be made to the Minister of Fisheries.
22. There is one final consideration made by the CRA 3 industry that is certainly accepted by them but may be more intangible for other interest groups. In addition to all the factors described in the paragraphs above that may or may not have some impact on the recent trends in CPUE there is still the greater uncertainty of the fishery itself. Cyclical variations in catch and catch rates are unpredictable and difficult to explain, particularly when they cannot be explicitly linked to any significant decline in stock abundance. Lobsters choose to enter pots and therefore catches and catch rates are at least partially dependent on the alternatives available to the lobster or the factors that might influence potting behaviour. Of these not a great deal is known and of that, no human intervention would improve the situation. Sometimes, no matter what you might expect, you just get a bad season. Nothing to panic about, just an annoyance, and proof that nature will inevitably triumph over man.

EVALUATING THE CRA 3 REGIME - THE COMPONENT PARTS

The TAC/TACC

23. In April 1993 the TACC was set at 163.7 tonnes, a 50% reduction on the previous years, and a level which forced a significant restructure of the commercial fleet. The CRA 3 commercial fishing season was reduced from a possible 12 month duration (April to March inclusive) to a strict 6 month duration. The TACC was progressively increased

in April 1995 (204.7 tonne), in April 1997 (223.4 tonne) and finally in April 1998 (327 tonne). The commercial fishing season was not adjusted as TACC increases were made.

24. The 327 tonne TACC has proven to be too high for the Winter fishery (June/July/August) - due to the combination of factors noted in E (page 1) - and the shortfall of Winter catch against TACC has been fished in the February/March commercial season in 1999, 2000, and 2001.
25. The industry perception is that a large proportion of catch taken in February and March is catch that otherwise could have been taken in the subsequent April, May, June or July.
26. Whilst the 327 tonne TACC is sustainable in the context of the most recent stock assessments, the CRA 3 industry considers that the TACC is no longer being utilised in the most economically efficient manner. The inefficiencies arise from the time-limited commercial fishing opportunity and the current timing of the commercial closures.

The seasonal closures to commercial fishing

27. In hindsight it was unreasonable to expect the fishery to produce a 327 tonne commercial catch from a time-limited fishing opportunity. The economic incentives exist for fishermen to catch as much of the TACC as possible in the Winter months. However the Winter fishery has historically never accounted for 327 tonne of catch and there is no reason to expect that it can do so in future.
28. In stock assessment terms the 327 tonne TACC is sustainable, but the sustainability is not conditional upon the TACC being harvested only within the two commercial periods specified in the CRA 3 Regulations. The stock assessment notes that the 327 tonne TACC can be harvested at any time over the duration of the fishing year and not jeopardise sustainability.
29. Industry believes that it should be able to harvest the TACC in the most economically efficient manner. In order to do so the industry needs to take full advantage of market opportunities over the course of the fishing year by having greater flexibility in planning harvest sequences. The existing Regulatory procedures deny that flexibility.
30. The CRA 3 Industry therefore examined the rationale for the seasonal closures in the CRA 3 regime.

The closed season to all users from September to November inclusive

31. was intended to remove all commercial pots from the water during a period when female lobsters are in berry and therefore constrain the removals of egg bearing lobsters by fish thieves using commercial pots. In conjunction with the removal of pots it was agreed that all users would be excluded from the fishery in order to isolate illegal fishing activities and enable effective use of enforcement resources. As a consequence of the customary fishery provisions overriding the closure regulations all users are no longer excluded from the fishery.
32. The closure itself is not necessary to protect egg bearing lobsters - there are general Regulations which prevent the landing and possession of berried lobsters.
 - The closure has not materially reduced the level of illegal unreported removals from the fishery. Instead of using commercial pots the fish thieves are using their own gear including pots stolen from commercial fishermen.
 - The closure has not materially assisted compliance and enforcement activities in the fishery and has not reduced the compliance costs nor reduced the need for compliance resources - in fact the need has probably increased as a consequence of the closed season.
33. The industry concludes that the closure no longer has a beneficial impact on the fishery. Industry proposes that commercial fishing activity within the constraints of the TACC will in future be determined by the most cost effective harvest options underpinned by contractual arrangements between Licensed Fish Receivers (LFRs) and fishermen.

The additional closed season for commercial fishermen from December to January.

34. The intention was to enhance the ability of non-commercial extractive users to take a legitimate catch at a time of year that they would be most likely to fish. There is no information on which to evaluate the success of otherwise of the closure. It is reasonable expectation that non-commercial fishing might be better when commercial fishing activity is not present, but it is also a fact that there will be areas of coastline where commercial and non-commercial interaction would be minimal at any time of the season.

35. The industry concludes that in the interests of ongoing good relationships with non-commercial sectors a voluntary seasonal closure to commercial fishing will be invoked for the period 15 December to 15 January inclusive for the 2002/2003 season.

The closure to commercial fishing in May of each year.

36. This closure was agreed and implemented to remove the possibility of 52mm male lobsters caught during the Summer months (February/March) or in April (and May if it was not closed) being held over for landing from 01 June, the date on which the 52mm MLS regime commences.
37. The value of the May closure depends on a perception of the maturity and integrity of the industry rather than any empirical evidence of benefit to the fishery. The closure is a public relations exercise rather than any meaningful contribution to the sustainability of the stock. Removing the closure will have no detrimental effect on the status of the stock nor unduly interfere with non-commercial fishing. The Regulation pertaining to possession of illegal (including undersized) rock lobster is retained and must be observed in any event. The seasonal closure does not materially assist enforcement, nor reduce the level of enforcement activity.
38. The closure does create significant operational difficulties for fishermen and lobster processors. Deploying and retrieving pots in the time allowed, setting up live lobster handling facilities only to have them closed for a month before having to re-commission them for the Winter season, are costly and time consuming procedures.
39. The industry concludes that the costs and inconveniences far outweigh any benefits that might arise from placing an obstacle (not insurmountable) in the way of one or two unscrupulous operators who might choose to cheat the MLS regime. The industry further concludes that the MLS issue inherent in this closure is irrelevant so long as all landed catch is counted against quota (or as currently applies, balanced with ACE).

The MLS regime

40. The industry concedes that there may be a non-commercial stakeholder perception of preferential arrangements for commercial fishing in relation to the current CRA 3 MLS regime. No preference is given to commercial fishing activity by the 52mm TW. There is no reason why the recreational sector could not use the 52mm TW regime other than the compliance and enforcement issues that arise from not knowing who, when, where, and how often recreational catch is taken. The customary harvest is not conditioned by any MLS other than decided by customary users.
41. The 52mm male TW measure is factored into the stock assessment and into the TAC/TACC setting process. The TACC is correlated to the MLS regime - if the MLS was different then the TACC would likely be adjusted.
42. Industry concludes that the Winter MLS regime is robust in terms of enabling an optimal economic return from the available TACC. The 52mm MLS regime does not create additional enforcement tasks and the cost of additional compliance responsibilities are borne 100% by the commercial sector.

The ban on taking female lobsters in June/July/August

43. This was a component of the CRA 3 regime which as intended to recognise the customary interest in protecting breeding female lobsters. Fisheries Regulations prohibit the possession and landing of berried rock lobsters, and most lobsters at or above MLS are berried in the period May to mid-September inclusive. Industry supports the retention of the Regulations.
44. However industry does not support a continued prohibition on landing legal female lobsters at MLS or above. In each season there will be "clean" legal female lobsters showing up randomly in catches throughout the months of June/July/August and fishermen should be able to land those lobsters. There is no net loss to the overall level of egg production to the fishery, nor any potential adverse effect on future puerulus settlement and recruitment to the fishery if legal female lobsters are removed.
45. An extensive stock monitoring programme is undertaken in the CRA 3 fishery each season as part of a research contract to the Minister of Fisheries. Whilst there is no evidence of a lack of breeding success in the CRA 3 fishery, concerns have been expressed by some fishermen and biologists that an imbalance in the male to female lobster population could have an impact on future levels of egg production. There is no inherent danger to the fishery in removing legal female rock lobsters.

A New Balance

46. The new balance has to be achieved if the CRA 3 fishery is to continue to deliver on reasonable expectations of catch and catch rates. The original CRA 3 Regime produced some of the anticipated outcomes, but the circumstances that now confront the fishery in 2001, are different, and are no less challenging than in 1992.
47. Recent research highlights the uncertainty of puerulus settlement and recruitment to the fishery. The decline in stock abundance predicted by the recent stock assessments may become evident even more quickly if actual removals in recent years have been higher than those estimated, or if recruitment has been less than average since the implementation of the CRA 3 regime. If the fishery cannot replenish itself by recruitment and growth at a rate greater than the removals from it then all sector groups will share the consequences.
48. Extractive users - both commercial and non-commercial - have become comfortable with the high catch rates and the size frequency of catches taken in recent years, particularly in the period 1994/95 through to 1998/99. Many extractive users have no personal experience of a "bad" season in CRA 3, so any noticeable decline in fishing success is particular cause for concern. The CRA 3 industry view is that although catch rates (as measured by commercial CPUE) have declined since the 1998/99 season there is no immediate concern over the long term sustainability for the CRA 3 stock.
49. However, if the quality of the fishing experience is valued as much as the quantity, it is timely for sector groups to contemplate what is known about the current status of the CRA 3 fishery and to support initiatives that will ensure ongoing sustainable utilisation at acceptable catch rates.
50. Any action taken in regard to the CRA 3 fishery has to be shared by the legitimate and responsible extractive user groups. For example, the CRA 3 industry might contemplate reductions in commercial catches (and there are ways other than TACC reductions that could be utilised) in order to buffer against predicted stock declines. However in the current situation it would be foolish to do so because there can be no guarantee of uncaught rock lobsters accruing to the standing stock and not being removed by other extractive users. In that circumstance the CRA 3 industry could forego catch yet accrue no benefit to the fishery nor to themselves in future.
51. For customary, recreational, and commercial interests, both the quality and quantity of fishing is predicated by the underlying abundance of the stock and the ability to access fishing grounds. Re-allocating catch away from the commercial sector to maintain or improve customary and/or recreational fishing is not an option as management strategy. The challenge is to develop agreed objectives for the fishery which become a shared responsibility on the sector groups.
52. The common enemy is illegal unreported removals. Recent estimates of 80 tonnes are generally agreed to be realistic, possibly conservative. Given that much of the illegal unreported catch is under MLS and possibly berried females, the tonnage is misleading in terms of trying to judge the damage caused by fish thieves. An 80 tonne catch taken by fish thieves understates the true impact of that illegal activity on current and future legitimate fishing activity.
53. A persistent theme for this industry review of the CRA 3 Regime is *you can only catch it once*, where "catch" is a reference to removal from the stock. An undersized or illegal rock lobster stolen from the fishery or killed during fishing by being poorly handled, is a lobster that is lost to the fishery for all time. An undersized rock lobster removed under the authority of a customary permit is one less lobster available for future recreational and commercial harvest. The CRA 3 rock lobster fishery cannot sustain being fished at both ends and the middle - *we can only catch it once*.

Decision rules and triggers:

54. The CRA 3 Industry Association recommends consideration of seasonal closures of the CRA 3 fishery to all users if agreed trigger points are invoked during the course of the season.
55. Some - not all - industry personnel propose that the fishery should be closed to all extractive use from 15 January to 31 March inclusive, if the TAC was undercaught by a pre-determined amount and commercial CPUE for the period April to December inclusive was less than a pre-determined and agreed reference point.
56. At this time this is an option for consideration, not a proposal.
57. The advocates of this measure choose "triggers" based on commercial fishing activity only because commercial catch and effort is strictly monitored and audited on a monthly basis - unlike all other extractive use.

58. A closure would necessarily apply to all extractive use because all users would benefit from the “banking” of uncaught lobsters to the standing stock, and from the possible benefit of an undisturbed lobster moulting and mating sequence from late February through to April in each year.
59. Commercial fishing on its own will not determine the future stock abundance in CRA 3. The total removals from the fishery might.

ALLOCATIONS TO SECTOR GROUPS

60. The TAC for CRA 3 currently sits at 453 tonnes. Within the TAC allowances have been made for customary fishing (20 tonnes), recreational fishing (20 tonnes), other sources of mortality (86 tonnes), and the TACC is set at 327 tonnes.
61. The allowances within the TAC have not been revised since April 1998 although it is likely that non-commercial removals exceeded non-commercial allowances as a consequence of the CRA 3 User Group agreed increase in customary removals in 1999, a small increase again in 2000, and the increased illegal unreported removals in 1998 and 1999.

STOCK ASSESSMENT RESULTS FOR 2001

62. The revised length-based model was applied to this stock in 2001. The assessment suggests a stock that increased sharply from 1993 to 1997 and has since decreased in vulnerable biomass. The current vulnerable biomass is high (mean=238%) compared with a reference period (1974-79), the earliest period where there are good data available to estimate biomass.
63. The vulnerable biomass is small relative to recruited biomass (vulnerable biomass being those lobsters at or above MLS that are available for capture by commercial fishermen). The recruited biomass comprises all lobsters (male and female) at or above MLS including berried females.
64. CPUE rose steadily after a package of measures was implemented in 1993. It peaked in 1997 or 1998 and has begun to decline. The model has no trouble fitting the increase, which was caused by a mixture of good recruitment, decreased removals, altered MLS and fishing patterns. The decline is difficult to fit with the model's assumptions, suggesting a problem with those assumptions, with the data, or possibly by an additional population process not captured in the modelling.
65. The base case assessment shows a median expectation that the stock will increase slightly in five years at the current levels of catch (Table 17), but the 5th and 95th percentiles of future stock level are 44% and 188% of the current level, so the stock could increase or decrease.
66. Additional uncertainty in the projections comes from several sources. Levels of recreational, illegal and traditional catches are poorly determined. These catches, especially historical illegal catches, are substantial in some years and errors in estimation translate directly into uncertainty in the projections. Further, these non-commercial catches could change, with unpredictable effects on the stock.
67. The projections rely on an assumption about recruitment - it was assumed that recruitment would be similar, on average, to that in the period 1988-97 and with variability as seen in those ten years. However, recruitment in the past ten years is not necessarily a good basis for prediction of future recruitment. A sensitivity trial fitted the model to settlement data and used recent east coast settlement indices to predict future recruitment. If puerulus settlement at Castlepoint is a reliable index of future recruitment to the population in CRA 3, then the results suggest that continuing stock decreases are likely at the current level of catch.
68. It is unclear to what extent a new Marine Reserve in CRA 3 will affect the modelled population. The effect of the reserve was investigated in the model using the assumption that 10% of the stock (both new recruitment and adults) was fully protected in the reserve and not available to the fishery (not vulnerable to capture). Members of the Working Group believed that this assumption was at the extreme of possible effects which may have resulted from the declaration of the marine reserve. Five year projections using the same future catch levels as in the basecase showed an average 20% reduction in the final projected biomass compared to the basecase.
69. The uncertainty about future stock abundance in the CRA 3 stock assessment arises from two sources - (a) the assumptions that levels of catch used in the model are reasonably accurate and that future catches will remain the same as modelled, and more significantly (b) that recruitment will be similar on average to that in the period 1988 to 1997 and with the variability seen in those years.

70. There is sufficient uncertainty in the model projections for all sector groups to accept that the assessment delivers a caution that continuing stock decreases are likely at current levels of catch.

CONSULTATION WITH SECTOR GROUPS

Customary Interests

71. Consultation with customary interests will be undertaken between CRA 3 Industry Association representatives and those persons acknowledged by local iwi as being representative of customary fishery interests in the region. The CRA 3 Industry Association is looking to local Maori for guidance in relation to this consultation and has not requested assistance or advice from any other parties.
72. The CRA 3 Industry does not pretend to be the sole arbiter of an appropriate level of consultation with Maori in this instance. The only course of action open to the Industry is to compile a management proposal that is consistent with the requirements of the Fisheries Act in all respects, and whilst being available to explain and/or justify the industry proposal, allow Maori and recreational interests the courtesy of contributing to the final outcome - be that by an endorsement and/or amendment of the industry proposal, or by the presentation of alternatives that are consistent with the Act and take account of commercial rights and interests.
73. Recognition of Customary rights is an agreed priority for the CRA 3 Industry. Customary rights are defined both in legislation and in Regulations, and the right to harvest has a priority allowance when setting the TAC. The customary allowance is unique in that it need not be constrained by closed seasons, closed areas, or by minimum legal size and gear restrictions. It is left to Maori to define the nature and extent of their customary harvest rights within the constraints imposed by legislation and regulation. The ability of Maori to exercise an exclusive control and use of specific fishing grounds for the purpose of gathering seafood is a dimension of the customary rights that is also unique.
74. The CRA 3 Industry submits that the customary rights to the CRA 3 fishery are neither demeaned nor compromised by this new management proposal given that the overall level of removals envisaged by the proposal falls within, and could possibly be less than, the sustainable limit represented by the TAC.
75. The CRA 3 Industry submits that the overall quality of the customary rights to the CRA 3 fishery are protected by ensuring the sustainable utilisation of the stock, by constraining overall removals to less than those allowed for in the TAC setting process (with the emphasis on reducing illegal unreported removals), and by ensuring a proper distribution of fishing effort to avoid localised depletion of rock lobster fishing grounds.
76. An equally important aspect of the customary right is provided for in that Maori have the opportunity through the CRA 3 User Group to be fully participatory in the research and management planning for the CRA 3 fishery.

The Recreational Sector

77. Consultation with recreational interests is problematical because of the absence of any single properly constituted recreationally representative group with a mandate. The most extensive consultation that can be undertaken essentially entails distribution of management proposal discussion documents to local fishing clubs with an encouragement to them to respond in some manner, preferably with an endorsement.
78. However the fact is that in the absence of any properly constituted and mandated recreational fishing organisation there is little input to the management planning process from recreational fishermen other than occasional complaints from individuals about the quality of fishing. The CRA 3 Industry is concerned that the influence of the recreational viewpoint has until now been in excess of their contribution to the research, management, and enforcement of the fishery.
79. The recreational allowance within the TAC has been set at 20 tonnes and on the basis of the best available information provided to the Working Group and the NRLMG that allowance has been and is sufficient to the needs of the sector. The current industry proposals for amendments to the CRA 3 regime will not materially alter the ability of recreational fishermen to operate in the fishery, nor adversely effect their opportunity to harvest the aggregate allowance.
80. The CRA 3 Industry submits that both customary and recreational interests should evaluate the most recent proposals for the CRA 3 fishery knowing that their respective fishing rights and opportunity are predicated by the overall abundance of the fishery, and knowing that the existing allowances made within the TAC are not compromised in any way. If the issue for customary and recreational sectors is the quality of fishing rather than the aggregate quantities provided for in the TAC/TACC setting process, then materially assisting in constraining the high level of illegal unreported removals has to be regarded by them as a priority task.

81. The CRA 3 Industry notes that in the history of the CRA 3 regime to date, the suite of rules and regulations has been far less demanding on non-commercial participation in the CRA 3 fishery than it has been on commercial participation. The corollary is that demands for accountability on the part of the commercial sector have been well in excess of those imposed on non-commercial sectors. The CRA 3 Industry is concerned to see this imbalance corrected as a dedicated CRA 3 Fishery Plan progressively unfolds.

RECOMMENDATION:

That the following Fisheries Regulations be revoked effective 01 April 2002

- Fisheries Central Area Commercial Fishing Regulations 1986 - amendment #9 - S.3(14j)(5)
- Fisheries Central Area Amateur Fishing Regulations - relevant parts
- Fisheries Central Area Commercial Fishing Regulations 1986 - S.14j 1(a) and (b)
- Fisheries Central Area Amateur Fishing Regulations – relevant parts

The CRA 3 Industry Association Inc. November 2001
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