



Fisheries Management Paper

Assessment of the Victorian Rock
Lobster Fishery against Commonwealth
Guidelines for the Ecologically
Sustainable Management of Fisheries

A submission to Environment Australia

**Fisheries Victoria
Management Report Series**

No. 3

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Assessment of the Victorian Rock Lobster Fishery against Commonwealth Guidelines for the Ecologically Sustainable Management of Fisheries

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Fisheries Victoria Management Report Series; No 3

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Contents

PART 1	page 5
Introduction.	5
1.1 Context of this Report	5
1.2 Biology of the Southern Rock Lobster	5
1.3 The Rock Lobster Fishery	6
1.4 Research	9
PART 2	10
Assessment of the Management Regime Against Commonwealth Guidelines for the Ecologically Sustainable Management of Fisheries.	10
General Requirements Against the Commonwealth Guidelines in Relation to the Management Regime	15
Assessment of the Management Regime Against Principles 1 and 2.	21
Principle 1. A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover.	21
Objective 1	21
<i>Information Requirements</i>	21
<i>Assessment</i>	24
<i>Management Responses</i>	31
Objective 2	41
<i>Management Responses</i>	41
Principle 2. Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem.	41
Objective 1	43
<i>Information Requirements</i>	43
<i>Assessment</i>	44
<i>Management Responses</i>	45
Objective 2	47
<i>Information Requirements</i>	47
<i>Assessment</i>	48
<i>Management Responses</i>	49
Objective 3	50
<i>Information Requirements</i>	50
<i>Assessment</i>	51
<i>Management Responses</i>	52
References & Acknowledgments	54

Acronyms	55
Appendix 1 Research Priorities for the Rock Lobster Fishery	56
Appendix 2 Rock Lobster Daily Catch Record	57
Appendix 3 Co-Management Process for Advice, Consultation & Decision Making in Relation to Annual TAC Setting	58
Appendix 4 Monthly Wildlife Interactions Form (Draft Example)	59

PART 1.

Introduction

1.1 Context of this Report

This assessment report addresses the Commonwealth Guidelines for the Ecologically Sustainable Management of Fisheries. Under the provisions of Part 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), environmental assessment of all export fisheries is required by 1 December 2003.

This report provides the basis for the assessment of the Victorian Rock Lobster Fishery under Part 13A of the EPBC Act. Each of the Commonwealth Guidelines are listed and addressed in Part 2 of this report.

1.2 Biology of the Southern Rock Lobster

Southern rock lobsters (*Jasus edwardsii*) are found on coastal reefs to depths of 200m and are distributed from the south-west coast of Western Australia to the south coast of New South Wales, including Tasmania. They are also found along the New Zealand coastline. The distribution of the southern rock lobster overlaps boundaries with the western rock lobster (*Panulirus cygus*) and the eastern rock lobster (*Jasus verreauxi*).

In Victoria, the abundance of rock lobsters decreases from west to east reflecting a decreasing area of rocky reef habitat. The distribution of southern rock lobsters are similar to giant crabs (*Pseudocarcinus gigas*), which are also taken by the fishery. Rock lobsters are abundant from the shoreline to depths up to 200m, whereas giant crabs are most abundant on soft sediments in deeper water between 150 and 350m.

The life cycle of the rock lobster is extremely complex. Fertilised eggs are carried under the tail of the female for approximately three months before being hatched, typically between September and November. Once hatched, rock lobster larvae undergo 13 developmental stages over a period of 1-2 years while being carried on ocean currents. The final stage of the lobsters' larval development is a tiny 25mm long puerulus which swim inshore and settle on reefs generally at depths of less than 40m where they grow into juvenile lobsters.

Rock lobsters grow by moulting their carapace. The frequency of the moulting cycle declines with age from five moults a year for newly settled juveniles to once a year for large adults. Males grow faster and larger than females reaching 160 mm in carapace length (CL) after 10 years. Females generally reach 120mm CL in the same period. Female rock lobsters generally mature at a larger size in the east (112mm CL) compared to those in the west (90mm CL), but at the same age. The growth rate of both sexes generally increases along the coast from west to east.

Adult rock lobsters are carnivorous and feed mostly at night on a variety of bottom dwelling invertebrates such as molluscs, crustaceans and echinoderms. Major predators include octopus and various large fish and sharks.

1.3 The Rock Lobster Fishery

The Victorian rock lobster fishery operates under a management regime based on the recently developed Rock Lobster Fishery Management Plan (RLFMP) to be discussed later,

administered by the Fisheries Division of the Department of Primary Industries (DPI) under provisions of the *Fisheries Act 1995*, the *Fisheries Regulations 1998*, other relevant legislation.

Commercial Fishery

The rock lobster fishery is Victoria's second most valuable commercial fishery. In 2000/01, the commercial sector caught 584 tonnes, valued at \$21.3 million. The fishery in both zones is now fully exploited. The current catch is limited by a total allowable commercial catch (TACC) of 510 tonnes per year, distributed between 139 Rock Lobster Fishery Access Licences (RLFAL) as individual transferable quota units.

Over the same period, the commercial value of the fishery has more than doubled. Post-harvest processing, marketing and live exportation has considerably enhanced the value of the fishery. Victoria exports over half its annual catch to the lucrative Asian market and the USA, where the high quality product and reputation of being sourced from a relatively pristine environment demands a high market price. The remainder is sold on interstate and local markets.

Victorian fishers access stock of southern rock lobster from the single population (*Jasus edwardsii*), that is managed separately by five States, the bulk being taken from Victoria, South Australia and Tasmania, and to a much lesser extent Western Australia and New South Wales. Victoria's catch forms 10% of the total landed commercial catch for Tasmania, South Australia and Victoria.

Rock lobsters have been harvested under management for more than 100 years. Fisheries Victoria is the management body for the fishery, under the broader Department of Primary Industries. The number of vessels operating in the fishery was fixed under a system of limited entry in 1968. There are more people and boats involved in the catching sector of the rock lobster fishery than any other fishery in Victoria. In acknowledging the level of economic and social value the species provides to the Victorian community, southern rock lobster is listed under the Fisheries Act's definition of a 'priority species' (the only other priority species is Abalone). Extensive rules and regulations govern the harvest, possession and sale of priority species to ensure the ongoing sustainability of the resource.

During 2001, management of the commercial fishery moved to output controls, changing the emphasis from restricting fishing effort to limiting the catch. The commercial fishery is now primarily managed through a limited number of commercial access licences allocated between two separate zones, a total allowable commercial catch (TACC) divided into individual transferable quota units (ITQs) and a quota management system (QMS). The Victorian TACC is currently set at 510 tonnes. This has not changed from the TACC for the first quota year 2001/02 which was 510 tonne.

The commercial fishery is divided into two zones, the Western zone, commencing at the South Australian border and extending to just west of Apollo Bay (143°40' East) and the Eastern zone, commencing just west of Apollo Bay and extending to the eastern border of New South Wales (see Figure 1 below). This division is based on the differing amount of suitable rock lobster habitat (extensive offshore reef areas in the west to a gradual transition of spasmodic inshore reef areas in the east) and the associated recruitment patterns, spatial distribution, stocks and overall performance of the fishery.

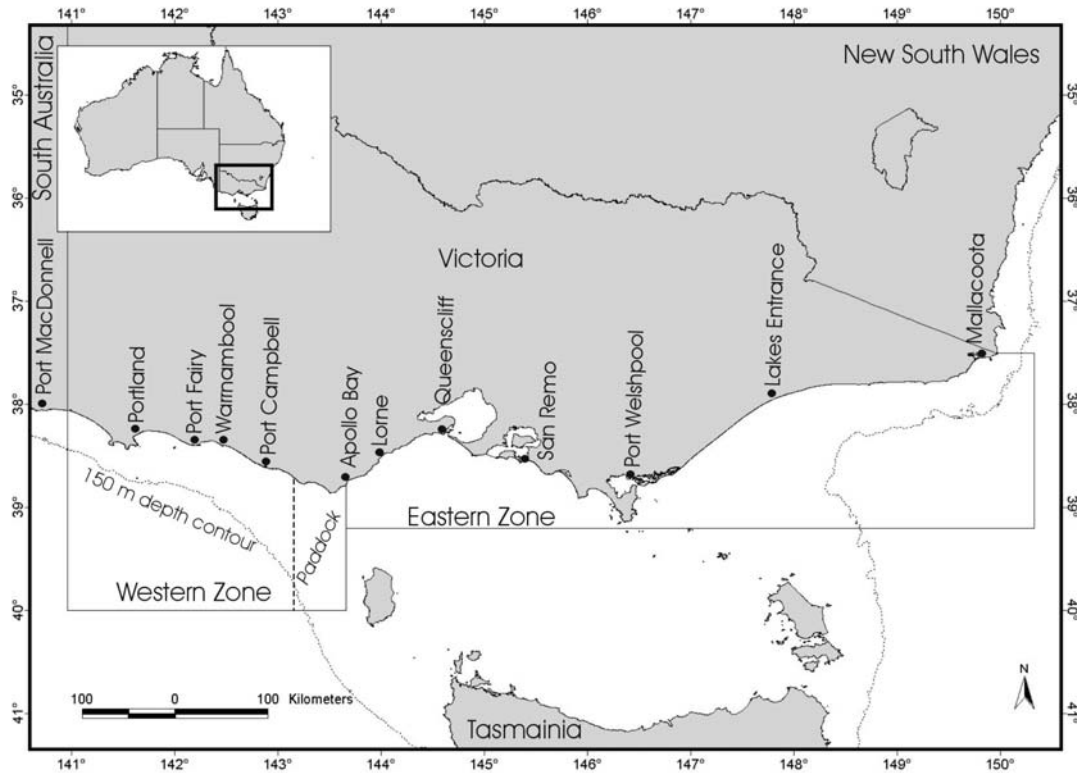


Figure 1. Rock Lobster Management Zones

The equipment used to target rock lobster is the rock lobster pot. Each pot is baited and set individually and has a surface buoy which must be marked with the vessel identification mark. The bait used in the fishery consists of a range of hake and barracouta heads frozen and mostly pre-packaged from New Zealand, some salmon, carp and wrasse. The number of pots in each zone is restricted as outlined in the table below. Pots are generally hauled daily and a fleet generally consists of approximately 60 and 40 pots in the Western and Eastern zones respectively. The average number of pot lifts over the last five years in each zone is 806,820 and 207,054 for the Western and Eastern Zones respectively.

Coffs are receptacles separate to the vessel, usually cages, used by some licence holders, predominantly used in the Eastern Zone, to keep lobsters alive until sale. Coffs are limited to a maximum of 3 per person and must be registered with DPI.

The commercial fishery has a maximum number of access licences, and catch must only be landed at a limited number of ports. The commercial fleet in 2002 consisted of 139 Victorian RLFAL holders operating mainly from twelve coastal ports, including Port Macdonnell in South Australia. A portion of Victorian western zone licence holders who operate out of Port Macdonnell in South Australia, hold licences in both Victorian and South Australian rock lobster fisheries. 42 RLFAL holders also hold licences in the giant crab fishery. A small number also hold licences in the wrasse fishery or ocean fishery.

Input controls have varied over the life of the commercial fishery, in line with emerging pressures and an increasing attention to appropriate measures to achieve sustainability objectives. Current input controls are summarised below.

Input controls	Detail
➤ Management Zones	<ul style="list-style-type: none"> The licencees may only operate in either the Western or Eastern Zone as specified on the licence (excluding Marine Protected Areas)
➤ Maximum number of licences	<ul style="list-style-type: none"> 85 in Western Zone, 54 in Eastern Zone
➤ Maximum number of pots per zone April 2003	<ul style="list-style-type: none"> 5147 in Western Zone, 2021 in Eastern Zone
➤ Maximum pot size	<ul style="list-style-type: none"> 150cm X 150cm X 120cm high
➤ Minimum 1 escape gap	<ul style="list-style-type: none"> Escape gap at least 25cm long by 6 cm high, bottom edge of orifice not less than 7cm or more than 10cm from inside surface of bottom of pot
➤ Minimum legal length (LML)	<ul style="list-style-type: none"> Females 10.5cm carapace length (CL) Males 11cm CL
➤ Closed season	<ul style="list-style-type: none"> females between 1 June to November 15 each year males between 1 September and 15 November
➤ Prohibition on taking soft shelled lobsters or egg-bearing females	
➤ Minimum quota entitlement to activate the licence	<ul style="list-style-type: none"> 10 quota units in Western Zone, 5 quota units in Eastern Zone

Recreational Fishery

The recreational fishery normally occurs in shallow water in less than 20metres depth, and is based on the capture of lobsters by hand while diving or by the use of hoop nets. Most of the recreational rock lobster fishing occurs in the central Victorian coast. Divers operate from shore or boat, mostly using SCUBA, but hookah and snorkelling equipment is also used. Hoop netting is more common off western Victoria.

Management arrangements for the recreational fishery include recreational fishing licences (RFL), fishing gear restrictions, a daily bag limit of two rock lobsters per day, a total possession limit of four rock lobsters per person, mandatory tail clipping, and the same closed seasons, LMLs and prohibition of fishing in Marine Protected Areas, as the commercial fishery.

1.4 Research

The Department's Marine and Freshwater Research Institute (MAFRI) at Queenscliff conducts a range of fishery dependent and independent research for the fishery in Victoria. A collaborative relationship for the purpose of information sharing has been established

between Fisheries Victoria (including MAFRI) and the equivalent agencies and research institutes in South Australia (SARDI) and Tasmania (TAFI) primarily, and with NSW, WA and New Zealand to a lesser extent.

Annual Fishery Assessment reports for rock lobster are published by MAFRI and distributed to all stock assessment participants and interested stakeholders to ensure that they are fully informed about the current and predicted future status of the resource, and that management advice is transparent. It is anticipated that these reports will appear on the DPIs website in the near future.

The Rock Lobster Fishery Assessment Group (RLFAG) has guided research priorities for the fishery. This group liaises with the Research Committee of the Fisheries Co-Management Council (FCC). This committee is responsible for providing advice on research and development issues, strategic research planning, and advice to the Fisheries Research and Development Corporation (FRDC) on funding research and development in Victoria.

The FCC Research Committee has developed a 5-year research plan and a process for biennial review of research priorities. The research priorities identified by the FCC Research Committee, amended to include research needs identified in the Rock Lobster Fishery Management Plan (RLFMP) are shown in Appendix 1. These are additional to the existing monitoring requirements essential to the management of the fishery and include specific research within the areas of fishery assessment and biology, habitat and ecology, socio-economic and management and aquaculture.

The research priorities have been determined from an analysis of responses from stakeholder groups including peak bodies representing commercial, conservation, recreation and aquaculture interests. There has been no attempt to formally fix schedules for the topics over the five-year duration due to uncertainties about the allocation of funding from major sources. Rather a flexible approach with a biennial review of the plan will provide the means of directing the research needs required to meet management needs (Newman and Smith, 2001). The RLFAG will liaise closely with the FCC Research Committee to assist with reviews of the priority research list.

PART 2.

Assessment of the Management Regime Against Commonwealth Guidelines for the Ecologically Sustainable Management of Fisheries.

The RLFMP was developed in accordance with the Victorian *Fisheries Act 1995*, the ESD framework proposed by the Standing Committee on Fisheries and Aquaculture, as well as other Victorian and Commonwealth legislation and policies.

The objectives of the Fisheries Act 1995 are:

- (a) to provide for the management, development and use of Victoria's fisheries, aquaculture industries and associated aquatic biological resources in an efficient, effective and ecologically sustainable manner;*
- (b) to protect and conserve fisheries resources, habitats and ecosystems including the maintenance of aquatic ecological processes and genetic diversity;*
- (c) to promote sustainable commercial fishing and viable aquaculture industries and quality recreational fishing opportunities for the benefit of present and future generations;*
- (d) to facilitate access to fisheries resources for commercial, recreational, traditional and non-consumptive uses;*
- (e) to promote the welfare of persons engaged in the commercial fishing industry and to facilitate the rationalisation and restructuring of the industry;*
- (f) to encourage the participation of resource users and the community in fisheries management.*

The *Fisheries Act 1995* in relation to Management Plans (section 28(6)) aligns with principles of the Commonwealth's Guidelines. Section 28(6) of the *Fisheries Act 1995* states (in relevant subclauses) that a management plan must—

- (e) as far as is known, identify critical components of the ecosystem relevant to the plan and current or potential threats to those components and existing or proposed preventative measures; and*
- (f) specify performance indicators, targets and monitoring methods;*
- (g) as far as relevant and practical, identify in respect of the fishery, declared noxious aquatic species or fisheries reserve, the biological, ecological, social and economic factors relevant to its management including –*
 - (i) its current status, human uses and economic value;*
 - (ii) measures to minimise its impact on non-target species and the environment;*
 - (iii) research needs and priorities;*
 - (iv) the resources required to implement the plan.*

Specifically, subclause 28(6)(f) accords with Principle 1 of the Commonwealth Guidelines, subclause (e) and subclause (g)(ii) accords with Principle 2 of the Commonwealth Guidelines.

The objectives of the RLFMP necessarily reflect the above and are summarised in total below:

Goals and Objectives of the Rock Lobster Fishery Management Plan

Goal 1. Sustainability of the rock lobster resource

- Re-build the stock biomass
- Maintain the ecological integrity of marine ecosystems

Table 1. Summary of objectives and strategies for Goal 1

Objectives	Strategies
1a) Re-build the rock lobster biomass	
Manage the fisheries within the TAC	<ul style="list-style-type: none"> • Maintain the spawning biomass in the Western Zone above 40% of 1951 levels • Ensure the spawning biomass in the Eastern Zone exceeds 20% of 1951 levels by 2007/08 • Annually review and set the TAC in each zone • Review the LML, bag limits, closed seasons and areas, and fishing methods
Minimise discard mortality	<ul style="list-style-type: none"> • Quantify discards of berried, damaged and undersized rock lobsters and estimate mortality • Review seasonal closures and develop a code of practice for discarding rock lobsters
Obtain sound scientific knowledge of the stock status	<ul style="list-style-type: none"> • Conduct research and fishery monitoring • Undertake annual stock assessments
1b) Maintain the ecological integrity of marine ecosystems	
Minimise wildlife interactions and ecological effects of rock lobster fishing	<ul style="list-style-type: none"> • Maintain or reduce the total number of pots used by the fleet • Continue to use escape gaps in pots • Develop codes of practice for minimising interactions with protected species of wildlife. • Implement a monitoring program to record bycatch and interactions with protected species of wildlife
Assess ecological risks of fishing and major threats to rock lobster habitats	<ul style="list-style-type: none"> • Obtain data to describe critical rock lobster habitats, monitor the ecological effects of fishing and other impacts on the ecosystem. • Identify the ecological risks to rock lobster stocks and habitats

Goal 2. Resource access and utilisation

- Promote commercial use for economic prosperity
- Provide recreational opportunities
- Provide opportunities for indigenous communities to access the resource for traditional purposes
- Ensure equity for future generations

Table 2. Summary of objectives and strategies for Goal 2

Objectives	Strategies
2a) Promote commercial use for economic prosperity	
Manage the commercial fishery within the TAC	<ul style="list-style-type: none"> • Set the TAC to achieve stable or increasing commercial catches • Review LMLs • Develop and monitor indicators and reference points for social and economic aspects of the fishery • Enhance commercial fishing access
Obtain export accreditation	<ul style="list-style-type: none"> • Meet Commonwealth guidelines for ecologically sustainable fishing
Maintain seafood supplies	<ul style="list-style-type: none"> • Promote the rock lobster fishing industry as seafood suppliers and contributors to the rural economy • Ensure food health standards are maintained and implement the Victorian seafood strategy • Improve utilisation and marketing of by-catch and by-product species
Encourage competition and market forces.	<ul style="list-style-type: none"> • Implement the Victorian Government’s response to NCP within the context of ESD • Maintain licensing arrangements that allow access licences, pot entitlements and quota units within each zone to be independently tradeable • Minimise restrictions on pot entitlements consistent with ESD • Remove the regulations relating to the Apollo Bay Paddock 50 pot zone by November 2007 • Consider tendering additional temporary quota units when the available biomass exceeds 40% of the 1951 stock
Identify aquaculture opportunities.	<ul style="list-style-type: none"> • Monitor and review national and international research findings • Encourage the fishing and aquaculture industry to participate in research and development
2b) Provide recreational opportunities	
Maintain resource access for divers and non-divers	<ul style="list-style-type: none"> • Improve recreational access by re-building the stocks • Continue to allow active recreational fishing methods • Encourage non-consumptive use through a code of practice and access for divers to no-take areas
Manage the recreational catch within the TARC	<ul style="list-style-type: none"> • Retain the daily bag limit of two rock lobsters per person. • Review and adjust the LMLs, bag limits, closed seasons and areas, and fishing methods as required
Quantify the recreational catch	<ul style="list-style-type: none"> • Develop licensing arrangements and a database that are suitable for recreational fishing surveys to provide better estimates of the catch • Undertake regular surveys to estimate the recreational catch and effort in both zones

Table 2 (continued)

2c) Provide opportunities for indigenous communities to access the resource for traditional purposes	
	<ul style="list-style-type: none"> • Provide equitable representation for the indigenous community in co-management • Issue General Fisheries Permits for cultural and ceremonial purposes • Provide fisheries management advice in relation to mediation of native title claims
2d) Ensure equity for future generations	
To re-build the stocks to 40% of the 1951 biomass	<ul style="list-style-type: none"> • Manage the fisheries within the TAC to prevent overfishing • Monitor rock lobster stocks on the fishing grounds and in MPAs to assess their contribution in re-building the resource
To conserve marine ecosystems	<ul style="list-style-type: none"> • Use environmentally benign fishing methods and maintain effective working relationships with other Government agencies • Establish effective compliance strategies to prevent fishing in MPAs

Goal 3. Effective fishery management

- Monitor fisheries performance and implement management arrangements
- Promote stakeholder participation in decision making
- Ensure compliance with legislation
- Provide a public information service

Table 3. Summary of objectives and strategies for Goal 3

Objectives	Strategies
3a) Monitor fisheries performance and implement management arrangements	
Continue high quality monitoring, research and assessment	<ul style="list-style-type: none"> • Review priorities and provide funding for research and fishery monitoring • Improve data collection methods for by-catch, by-product and interactions with marine wildlife, such as entanglements of cetaceans. • Encourage industry to provide accurate records and assist in research programs. • Develop licensing arrangements and a database that are suitable for recreational fishing surveys to provide better estimates of the catch. • Estimate the illegal catch • Participate in research on by-catch species, exotic species, endangered species of marine wildlife
Develop timely and cost effective. management arrangements	<ul style="list-style-type: none"> • Amend legislation according to the RLFMP and prepare regulation impact statements • Establish compliance arrangements for inter state landings • Review management based on the stock assessment, TAC Forum and trigger points, and decision rules • Prepare quota orders, renew licences with quota notices • Continue to improve methods of reporting to the QMS • Complete the consultation and planning review process during the last year of the RLFMP

Table 3 (continued)

3b) Promote stakeholder participation in decision making	
Provide opportunities for stakeholder participation	<ul style="list-style-type: none">• Ensure the co-management process is effective and transparent.• Involve stakeholders in stock assessment workshops and research.• Establish the TAC Forum with equitable representation of stakeholders.• Establish an annual management meeting for industry, managers and fisheries officers.
Encourage development of codes of practice	<ul style="list-style-type: none">• Encourage the fishing industry and the recreational sector to develop codes of practice that complements fishery and wildlife management minimises the risks of spreading or introducing exotic species, and interactions with protected species including cetaceans.
Raise community support for compliance with the law and research	<ul style="list-style-type: none">• Encourage the community to report offences.• Seek permission from all licence holders to publish lists of pot entitlements and quota holdings.• Encourage industry and recreational sector to participate in research and to attend stock assessment meetings, TAC Forum and management meetings.• Provide information on research progress, stock assessment and effectively disseminate research results.
3c) Ensure compliance with legislation	
Enforce the law and minimise illegal catches	<ul style="list-style-type: none">• Develop and implement compliance strategies for the commercial and recreational fisheries.• Frequent inspections of catches, records, coffs and landings.• Quantify and categorise the illegal catch.• Gather intelligence and undertake investigations.• Apprehend and prosecute offenders.• Prepare annual reports on compliance levels and law enforcement activities.
Raise public awareness of fisheries regulations and penalties	<ul style="list-style-type: none">• Develop and implement an effective information and communication strategy.• Publish information from court cases involving fisheries offences, convictions and fines.
3d) Provide a public information service	
	<ul style="list-style-type: none">• Produce, disseminate high quality information on fisheries management and research and effectively disseminate using the DPI website and a variety of other media.

General Requirements Against the Commonwealth Guidelines in Relation to the Management Regime

(a) Documented, publicly available and transparent

The RLFMP was advertised for public comment on DPI's website, and in two statewide and five regional newspapers, seeking submissions over a period of six weeks. All peak bodies were consulted; Seafood Industry Victoria (SIV), the Victorian National Parks Association (VNPA), VRFish, and the Victorian Aquaculture Council (VAC) representing commercial, conservation, recreation and aquaculture interests respectively, prior to the declaration of the Plan. This was consistent with the process specified by the *Fisheries Act 1995* for the development of management plans.

As part of public consultation 16 submissions were received and considered. The final RLFMP was not published or implemented until public comments on the draft, and those from peak bodies, were considered. Although the general public were invited to comment on draft Plan, the bulk of consultation on aspects of the management regime however lies mainly with industry, recreational and conservation interest groups. The RLFMP was then declared by the Minister in May 2003, and posted on the DPI website.

Annual Fishery Assessment reports for rock lobster published by MAFRI, TAC Reviews, and management decisions are not currently available on the Department's Website, however this is being addressed and many of these will begin to be available on the Website in the near future. The pending Education Strategy to be developed under the RLFMP will among other things, identify gaps in information sharing and improve the range of information to be made available to the public.

Proposed changes to management through the introduction of new regulations or the amendment of existing regulations are documented and advertised in a daily newspaper for public comment through a statutory process which includes the preparation and advertisement of a Regulatory Impact Statement (RIS). For example, the reporting arrangements associated with the introduction of quota management into the fishery introduced primarily through regulations were outlined in an RIS, including a discussion of the need, impacts, costs and benefits of the proposed changes. The Fisheries Regulations 1998 and other relevant legislation are available on the DPI website or by attached links.

(b) Developed through a consultative process providing opportunity to all interested and affected parties, including the general public

Under the *Fisheries Act 1995* the Minister recognises by notice published in the Government Gazette, organisations representing commercial, recreational, conservation and aquaculture interests as peak bodies. SIV, SIV, VRFish, the VNPA and the VAC are the nominated peak bodies and are consulted as required under a range of provisions in the Fisheries Act, including the development of changes to the existing management regime or the development of new key initiatives.

The RLFMP was developed through an extensive consultative process involving an independent chaired steering committee. Representatives from all key stakeholders groups including the commercial, recreational and conservation sectors were invited to participate on the steering committee. Minutes of the steering committee's meetings were distributed to those who had expressed an inability to be involved on the committee. Submissions to the draft received from those who were unable to participate were taken into account in the final

Plan. An open forum to which members of the community were also invited to participate and comment, was held during the development of the RLFMP. Internal meetings with regional DPI staff were also held in relation to the draft RLFMP.

Changes to the Fisheries Act are developed in line with parliamentary processes, and development of subordinate legislation such as the Fisheries Regulations includes consultation with relevant stakeholders through workshops and the RIS.

(c) Ensure that a range of expertise and community interests are involved in individual fishery management committees and during the stock assessment process

The current involvement of a range of expertise and community interests in both the assessment and the management decision-making processes is comprehensive. An objective for management of the fishery specifically stated in the RLFMP is to 'promote stakeholder participation in decision making'. This includes providing opportunities for stakeholder participation in research and management of the fishery, for example, through annual management workshops for industry, fishery researchers and managers and Fisheries Officers.

The Commercial Rock Lobster and Giant Crab Fishery Committee (CRLGCFC), established under the Fisheries Co-Management Council (FCC), is the advisory committee for management of the commercial fishery. The FCC is a Ministerial advisory committee established under the Fisheries Act based on the concept of incorporating greater stakeholder involvement in the decision making process. The CRLGCFC has an independent chair and members include one conservation member, one DPI member, two western zone industry members, and two eastern zone industry members. Recreational rock lobster advice to the FCC is through the Marine Recreational Fishery Committee.

All members of the committees are appointed by the Minister, and membership is expertise based. The committees report to the FCC and the Minister through the Council. The committees meet as necessary in relation to management issues.

In addition to the existing co-management arrangement, a TAC Forum will be established in the near future to provide all stakeholders with the opportunity to have input into the TAC setting process. The TAC forum will consist of an independent chair and members of the commercial rock lobster and giant crab fishery committee, the marine recreational fishery committee, representatives of peak bodies, observers and DPI staff (policy, enforcement, and research). The TAC setting process is based on scientific advice for the fishery, and the role of the TAC Forum in the chain is depicted in Appendix 3.

Relevant fishery research and information from other States is taken into account as part of the stock assessment process and this will be further discussed in section 1.1.2

(d) Be strategic, containing objectives and performance criteria by which the effectiveness of the management arrangements is measured

The RLFMP sets out strategic goals and objectives (see pages 11-13 of this report). Performance measures, management triggers and management actions for the fishery are specified, for example, the objective of rebuilding biomass is measured in part by spawning biomass levels and trends in available biomass and standardised catch rate trends (see Table 4). Performance of the fishery is also discussed broadly at annual stock assessments in

relation to the TAC and the effectiveness of the management arrangements, and this will be further reviewed by the pending TAC Forum.

Performance criteria with relation to industry compliance will be developed by the end of 2003 in the pending Rock Lobster Compliance Strategy, as part of implementation of the RLFMP. The Communication Strategy to be developed during 2003/04 will also include performance measures.

(e) Be capable of controlling the level of harvest in the fishery using input and/or output controls

The management regime for both the recreational and commercial rock lobster fishery controls the level of harvest primarily through the annual setting of a TAC and a range of input controls that place certain limitations on recreational and commercial rock lobster fishing activity. These are provided for under the Victorian *Fisheries Act 1995* and its subordinate legislation, summarised in the RLFMP, and the Introduction and section 1.1.7 of this report.

(f) Contain the means of enforcing critical aspects of the management arrangements

The management regime has the means of enforcing critical aspects of the management arrangements. The provisions of the Victorian *Fisheries Act 1995* and its subordinate legislation are enforced by approximately 40 Fisheries Officers located at coastal stations across the Victorian coastline, and are supplemented by 3 regional fisheries investigators. Integral to the success of a Quota Management System (QMS) is acceptance of QMS by the industry and a robust and effective compliance force. Industry has accepted QMS which has now been operating in the fishery since November 2001.

Compliance activities carried out to maximise the integrity of the QMS, adherence to legislation, and the ecologically sustainable use of the resource by the community include surveillance and inspection of both commercial and recreational fishers, verification of documentation, intelligence gathering, targeted compliance operations, including joint operations with interstate fisheries agencies. Data with regards to number of inspections within the commercial and recreational sector and the offences detected is collected, however the current rate of compliance has not been officially determined. Whilst the data has not been analysed overall to determine the compliance rate, regional reporting suggests it is high.

An internal 'Rock Lobster/Giant Crab Project Team' has been established by Fisheries Victoria to co-ordinate, among other things, the ongoing review of the new QMS and associated legislation, and the identification and implementation of improvements to overall compliance in the fishery, including an annual internal compliance workshop. This will assist the development of the pending Rock Lobster Compliance Strategy by the end of 2003 including associated performance measures, and assessment of compliance rates

(g) Provide for the periodic review of the performance of the fishery management arrangements and the management strategies, objectives and criteria

The RLFMP provides a basis for management of the fishery for a period of five years. An annual internal progress review of implementation of the RLFMP against its objectives will also be undertaken. The Rock Lobster/Giant Crab Project Team will co-ordinate the implementation of the RLFMP and monitoring of the management performance in the fishery. The CRLGCFC will also review implementation of the RLFMP annually, and report back to the FCC.

Towards the end of the 5 year period, the RLFMP will be reviewed and recommendations incorporated into an amended plan. Should there be a need for the Minister to amend the RLFMP before this time, notice of this intention will be published in the Government Gazette and there will be formal consultation with stakeholder groups.

The annual stock assessment provides for continual review and improvement of assessment of the fishery via the Rock Lobster/Giant Crab Fishery Assessment Group. DPI staff represent the range of community interests in the stock assessment process and the broad goal of sustainable management of the fishery on behalf of the community. A peer review of the stock assessment process is being considered for the future. Closed seasons and size limits will be reviewed and other scientific advice will be incorporated into management advice prepared for the Minister through the TAC setting process each year.

(h) Be capable of assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which the target species lives and the fishery operates

Current fishery dependent and independent research programs, stock assessments, industry discussions, research from other organisations, and inspection of fishing activities by Fisheries Officers during inspections provide the means to assess and monitor broad aspects of adverse impacts on the wider ecosystem. To better understand adverse real and potential impacts or risks to wildlife and the broader ecosystem, the RLFMP commits to undertaking an ecological risk analysis, including the identification of information gaps, and new programs to monitor bycatch levels and interactions with protected species, among other things. Research priorities listed for the next five years include the development of robust environmental sustainability indicators, definition and mapping of rock lobster habitats, assessment of the interaction of rock lobster with other species such as abalone and urchins and impacts on threatened, endangered and protected species (see Appendix 1).

These initiatives will provide steps towards more in-depth assessment and monitoring of adverse impacts on the wider marine ecosystem and shape the future of management and mitigation measures, including an industry Code of Practice for fishing. Current mitigation techniques for minimising and/or avoiding impacts on bycatch and the wider ecosystem include industry initiatives such as seal exclusion devices, shortening of pot lines when pots are moved inshore, and no fishing zones in certain areas during whale migration. These will be discussed later in this report.

(i) Require compliance with relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy

All relevant policies and strategies including those above will be considered and fishery management arrangements altered as necessary to facilitate compliance, as stated in the RLFMP. A monitoring program for bycatch, including independent validation will commence by 2004. Once bycatch data is collected and analysed, a bycatch action strategy will be considered for development as necessary. The soon to be finalised National Plan of Action on sharks may have relevance to the rock lobster fishery given that Draughtboard Sharks are sometimes caught as bycatch in a rock lobster pot in very small numbers and released.

The process for incorporating policies and strategies from other Government agencies will involve consultation during the annual forum, meetings of the committees of the Fisheries Co-Management Council, peak bodies and Fisheries Victoria. Likewise, Fisheries Victoria will make recommendations to the appropriate government agency in relation to environmental management and ecological integrity of rock lobster habitats. Improvements

will be achieved through the development of joint strategies and by maintaining close working relationships between the relevant agencies.

(j) Take into account arrangements in other jurisdictions, comply with any relevant international or regional management regime to which Australia is a party.

The management arrangements of other states who share the resource are not explicitly taken into account in each component of the Victorian management regime, however there are regular meetings for industry, research and management from Victoria, Tasmania and South Australia including the Southern Australian Fisheries Management meetings and the marine and coastal committee meetings of the Ministerial Council on natural resource management.

The quota management reporting systems of Tasmania and South Australia were taken into account during development of the Victorian quota management system. Regular meetings with Primary Industries and Resources South Australia are held to discuss compliance issues in relation to the fishery in the Western Victorian/southern SA waters. Differences in legal minimum lengths and closed seasons between the states in this area and the implication on the resource and compliance have been the subject of discussion over recent years. This was identified at the Southern Australian Fisheries Managers (SAFM) workshop in November 2002 and a co-operative review of these issues listed as an action item. Likewise Victoria has committed to develop mechanisms for co-ordination across southern states (southern rock lobster network) as an action item at the SAFM, and states in the RLFMP 'Fisheries Victoria is committed to continue this collaborative approach to co-operative research and management of shared stocks'. To this end, fisheries management agencies in the other states were invited to comment on the draft RLFMP and submissions received have been considered.

There are currently no international or regional management regimes to which Australia is a party that relate specifically to the Victorian rock lobster fishery, other than broad legislation such as the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* which prohibits the disposal of plastic debris in Australian waters, and Victorian marine legislation which specifies that a vessel must be seaworthy/under survey for commercial use. International conventions regulating disposal of wastes generated by vessels, such as the minimisation of marine pollution by commercial fishers under MARPOL 73/78 (the International Convention for the Prevention of Pollution from Ships) are also broadly relevant. MARPOL was adopted on 2 November 1973 and covers pollution by oil, chemicals, harmful substances in packaged form, sewage and garbage.

Assessment of the Management Regime Against Principles 1 and 2.

PRINCIPLE 1.

A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover.

Objective 1.

The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability.

Information requirements

1.1.1 There is a reliable information collection system in place appropriate to the scale of the fishery. The level of data collection should be based upon an appropriate mix of fishery independent and dependent research and monitoring.

Both fishery dependent and fishery independent data are collected as part of the fishery assessment program conducted by MAFRI. Fishery dependant information is also collected through administration and reporting requirements associated with the quota management system. In general, information on the fishery is fishery dependent and has been collected through mandatory daily catch record books.

Fishery Dependent

Catch and effort data is obtained through the administration of fishery access licences. Under the conditions of the Rock Lobster Fishery Access Licence set out in Fisheries Regulations, the Rock Lobster Daily Catch Record must be completed daily and then submitted to DPI each month. The information collected on this record includes total weight (kg) of rock lobster, the number of rock lobster, number of lobster undersize, number of lobster in berry, number of lobster dead and effort (potlifts) by a 10 minute square scale and by depth variation (see Appendix 2).

This reporting is a mandatory component of the rock lobster Quota Management System (QMS) administered by DPI. A fisher is required to record and report both manually into record books and to a voice recorded reporting system (the rock lobster notification service) the number of rock lobster taken, and the total weight amongst other things. The compulsory record book entries, the telephone reports, and catch disposal records are validated randomly by Fisheries Officers against the landed catch and are deemed to be very reliable on the whole. Information is collected and reported on a regional basis of the number of rock lobster inspections carried out and offences detected in both the commercial and recreational sectors. Although this data has not been analysed overall to determine the compliance rate, indications are that the current compliance rate is high. A centralised, statewide database system to collate detailed reporting of daily field inspections is currently being developed, and is expected to be in place by November 2003. This will provide up to date compliance rates and be useful for targeted compliance efforts, cross referencing of operators between ports etc.

The mandatory reporting and documentation requirements related to quota management for the commercial sector are summarised below.

AT SEA

Rock Lobster Daily Catch Record 📖	The operator must complete this record, (which includes both quota management and catch and effort data requirements) in accordance with regulations and record book instructions. Daily catch records must be submitted to DNRE monthly.
Prior report 📞	The operator must make a prior report by telephone to the rock lobster notification service, before entering a port or mooring area on any day fished, and report specific details including number of rock lobster on board, the estimated time of arrival and the port of landing. If the operator has a coff, and wishes to unload lobster from the coff, the operator must make a prior report to rock lobster notification service at least one hour before unloading.
Coff Register	If the operator has a coff (sea cage), the operator must complete the Coff register to detail all movement of rock lobster in and out of the coff, including the number, the time and day, and the running balance remaining in the coff.

AT PORT

Catch Disposal Record (CDR) 📖	The operator must complete a CDR in accordance with regulations and record book instructions within 20mins of landing and weighing the catch. This record details the quantity and weight of the catch and the name of the purchaser/ transporter. This original record must accompany the catch from the landing site.
Post landing report 📞	The operator must make a post landing report by telephone to the rock lobster notification service and report specific details including the weight and number of the landed catch, and the estimated time of departure. This report must be made, and a confirmation number received, before the catch can leave the place of landing.

Catch only data was collected between 1914 and 1950, whereas catch and effort data has been collected on a daily basis through commercial logbooks since 1978 (monthly between 1951-78). As in all commercial fishery data, it is prone to some error including under reporting. As such, it has been a high priority for the research program to exclude any gross errors in the data set. With the introduction of quota into the rock lobster and giant crab fisheries in November 2001, hence more stringent catch reporting arrangements and increased monitoring of catch reporting, the catch data has shown indications of improved accuracy. Historical data, and trends in catch, can be verified and adjusted where necessary as part of interviews with key industry members, as carried out recently in the giant crab fishery.

MAFRI undertakes commercial catch sampling by collecting size structure data from landed catch at processors in Port Macdonnell (SA), Portland, and Warrnambool throughout the fishing season since 1994. This is producing a good time series of length data. Historical length data also exists from opportunistic studies at major ports throughout the 1960's, 70's and 80's.

A voluntary pot sampling program was initiated in 1998 by MAFRI in order to increase the collection of length frequency and size at maturity data for the Rock Lobster Fishery.

Commercial fishers were encouraged to participate and were asked to select one of the pots from their fleet and to measure all lobsters caught in this pot on a daily basis. Over the years more than 40 fishers have been involved in this program. It is a research priority, and part of implementation of the RLFMP to improve industry participation in the voluntary pot sampling program and other research.

Fishery Independent

Tagging studies for growth, fishing mortality and movement have been undertaken by MAFRI in conjunction with some trained fishermen (often those in the voluntary logbook program) since 1993. Of the 24,000 tagged animals, 3,500 have been reported as recaptured (15%).

An annual, ongoing, fixed site, monitoring program was established during February 2002. The purpose of the survey is to gain a time series of fishery independent size structure and catch rate information for stock assessment. Each year, lobster fishers are contracted to undertake this survey over 4 days of fishing, measuring all lobsters, tagging and releasing any undersized and recording bycatch. On-board observers are present on vessels to ensure that the task, which is representative of commercial operations (except that escape gaps are closed), is performed in a scientific manner. In 2002 a total of 2,200 pot lifts resulted in 8,037 lobsters measured (many of which were undersize lobsters caught due to closed escape gaps) of which 5,440 were tagged and released.

The fixed site survey includes 11 sites and is designed to represent the main fishing grounds. The results cannot be multiplied to represent the whole fishery as many more sites would be required to be statistically sound. Rather the survey gives a window into main areas in the fishery in terms of catch rates and size/sex structure. Bycatch and byproduct are recorded and analysed and presented at the annual stock assessment.

Fishery independent surveys such as this provide long term benefits to the fishery and in time will provide validation for commercial data. Inconsistencies in data between independent and dependent surveys will be identified at stock assessment time, however validation data to amend commercial data is not possible at this stage. The best analysis for inconsistencies will be generated in coming years as a time series of independent data is compiled. The development of appropriate inconsistency triggers will then be considered as part of this ongoing process.

MAFRI has also been monitoring puerulus settlement monthly since 1994 with the aim to better understand the dynamics of settlement and recruitment, an area where there is little information currently available. In addition MAFRI is participating in a 3 year post settlement study in conjunction with SA and Tasmanian fisheries departments and is funded by the FRDC. The study is in it's first year and throughout the monitoring program will be useful for providing early warnings for recruitment failure and will assist with data for input into the catch prediction model.

This co-operative research gives rise to synergistic benefits for the fishery as a whole in the southern zone and all state management agencies involved.

Assessment

1.1.2 There is a robust assessment of the dynamics and status of the species/fishery and periodic review of the process and the data collected. Assessment should include a process to identify any reduction in biological diversity and /or reproductive capacity. Review should take place at regular intervals but at least every three years.

The status of the rock lobster resource in Victoria is different in each zone. Catch rates declined continuously from the 1950s until the early 1990s in the Western Zone and the mid-1990s in the Eastern Zone. Subsequent catch rates have been relatively stable in the Western Zone and have increased steadily in the Eastern Zone. Rock lobsters in the Eastern Zone are more heavily exploited than the Western Zone.

The status of the fishery is reviewed annually via robust, information rich, stock assessments carried out by the rock lobster Fishery Assessment Group, the first of this type of assessment being held in 1994. Members of commercial, recreational, conservation stakeholder groups and DPI staff attend. Observers from the general public are also welcome. Risk assessment of various levels of fixed catches and fishing effort in each zone are presented. Following the annual presentation and discussion, stock assessment reports are produced annually as part of an ongoing series and distributed. These reports will soon be available on DPI's Website. In general it can be said that the fishery, by fishery standards, is well understood at a local level in Victoria and also more generally within the southern region and the country as a whole.

The stock assessment demonstrates an advanced level of modelling. The length structured model has been peer reviewed (Hobday and Punt, 2001) and utilises a range of biological data to assess risk associated with various harvest strategies. Catch and effort data collected in part through telephone based catch reporting under quota management means data is 'real time' and considered more accurate. This data is used as an input into the model. Further refinement and development of stock assessment models will improve the current high level of understanding of stock dynamics (See research priorities Appendix 1).

At present the recreational catch is estimated to be around 20 tonnes and is factored into the stock assessment. This will be further discussed in section 1.1.4. Allowance can be made in the stock assessment for illegal and indigenous harvests, which are currently not factored in. Determining the illegal catch is a high priority for research (see Appendix 1) and the pending Compliance Strategy. Once estimates are determined, these will be incorporated into the next stock assessment.

The stock assessment conducted in 2002 incorporated the impacts of the newly created Marine Parks. The model has been adapted to enable the impacts of Marine Protected Areas (MPAs) to be incorporated in the assessments (allowing for a 10% migration of lobsters from the MPAs). This allowance is based on tag recapture information of movement rates in the major MPAs.

Maximum sustainable yields are reviewed annually using the surplus production model and the biomass dynamics (production) assessment model. Yield per-recruit and egg per-recruit modelling are also presented, with discussion on egg production, legal minimum lengths and fishing mortality rates. Catch rates, which are important indicators of stock status are reviewed annually. Catch rate data, based on catch and effort data, has been collected since 1978 at fine spatial resolution.

Examples of model outputs with relation to the trajectory of available biomass from 1951 to present with 15 year projections are shown below for each zone in Figures 2 and 3. The biomass at 1951 is used as a proxy for the unfished biomass, as it wasn't until 1951 that meaningful effort data to complement catch data was available to derive catch rates. Prior to 1951 the level of fishing activity was relatively low.

Figures 2 and 3 show that the Western Zone is currently at levels of 60% spawning biomass, 25% available biomass, and the Eastern zone at 20% of the spawning biomass and 18% available biomass. Although these figures depict a marked decline in biomass since 1951 it is known that one strength of the rock lobster fishery is its resilience and strong capabilities of recovery. The introduction of a TAC in 2001 to both reduce historical catch, and cap the total annual catch has already indicated positive responses in terms of stock rebuilding and increasing catch rates. The TACs for each zone of the fishery are set at a level that takes into account the need to rebuild stocks at an acceptable rate over time whilst maintaining a viable commercial fishery.

Gear surveys have been undertaken over several seasons to document technological changes to vessels and gear used in the fishery, and its influence on fishing effort estimation. Effort creep is factored into the length structured model at a rate of 1.5% for the Western Zone and 0.5% for the Eastern Zone. Gear surveys will continue to be run periodically and included in annual stock assessment, however since the introduction of quota management the estimation of effort creep is not as critical as the catch is capped by the TAC.

Fishery assessment also incorporates fishery independent data and the knowledge and expertise/works of other agencies, primarily those with jurisdiction over the shared species. These relationships have synergistic benefits for all parties and the fishery, and are particularly useful to assist in the development of recommendations for future assessment and research directions. For example, in Victoria the complex area of impacts of ecosystem and trophic relations from rock lobster fishing is poorly understood, and stands to benefit from co-operative relations.

The existing relationship between Victorian, Tasmanian, South Australian fisheries agencies, includes co-operative research projects (section 1.1.1), and dialogue and information sharing with New South Wales, Western Australian and New Zealand fisheries agencies. To further commit to this, an agreed action item from the Southern Australian Fisheries Management (SAFM) workshop in Melbourne November 2002 was to re-activate/formalise the concept of the 'tri-state' meetings held in the past between rock lobster managers from SA, Victoria and Tasmania (over 95% of the resource being located within these jurisdictions). It was proposed that such a meeting of key management, compliance and research personnel could directly precede the biennial 'Rock Lobster Congress's. This will be discussed further at the next SAFM workshop and will be open to all states which manage southern rock lobster to participate in future forums.

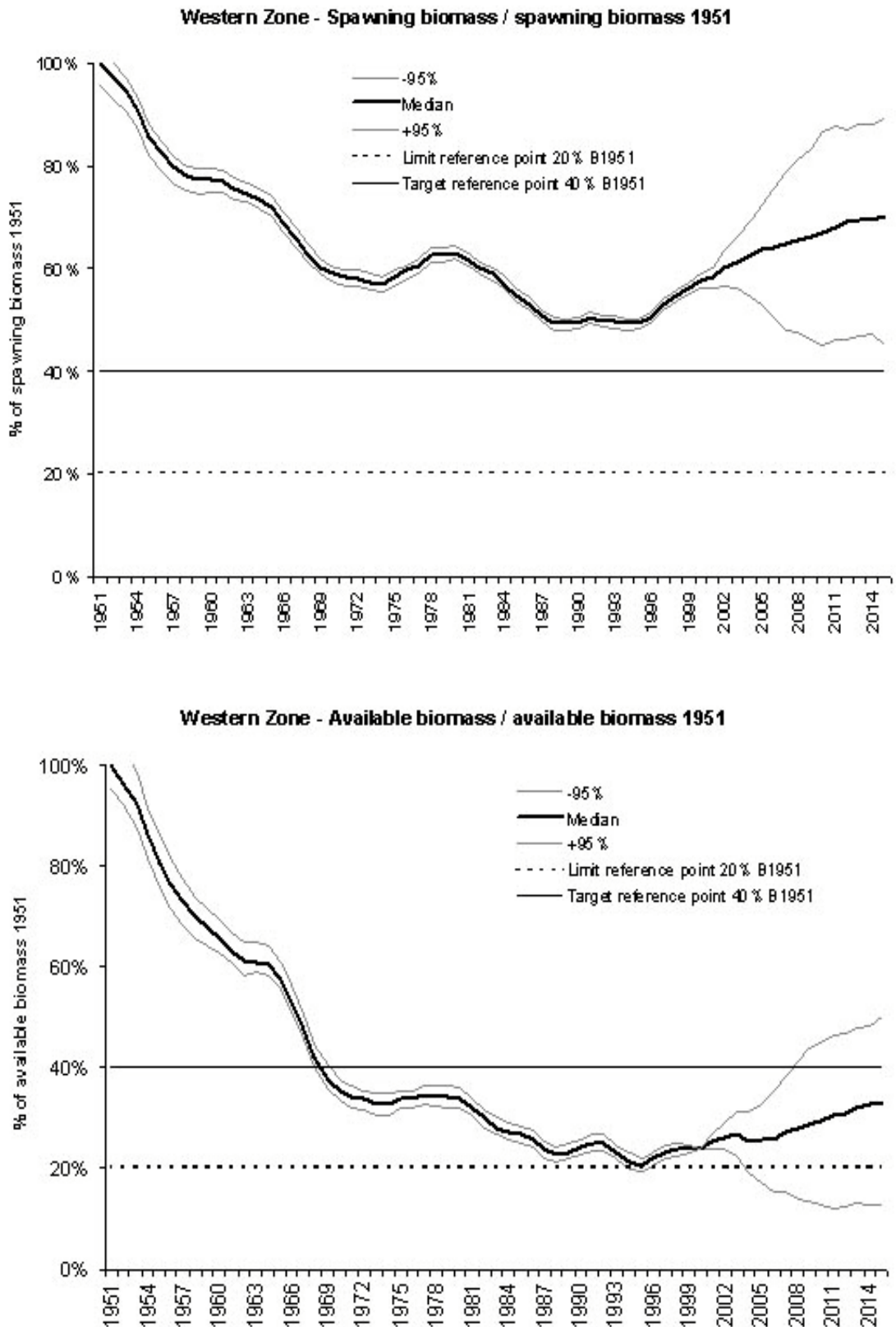


Figure 2. Predicted trends in spawning biomass (upper) and available biomass (lower) for rock lobsters in the Western Zone between 1951 and 2014, expressed as a percentage of the biomass in each year, relative to the 1951 biomass. Projections are based on a fixed TACC of 450t.

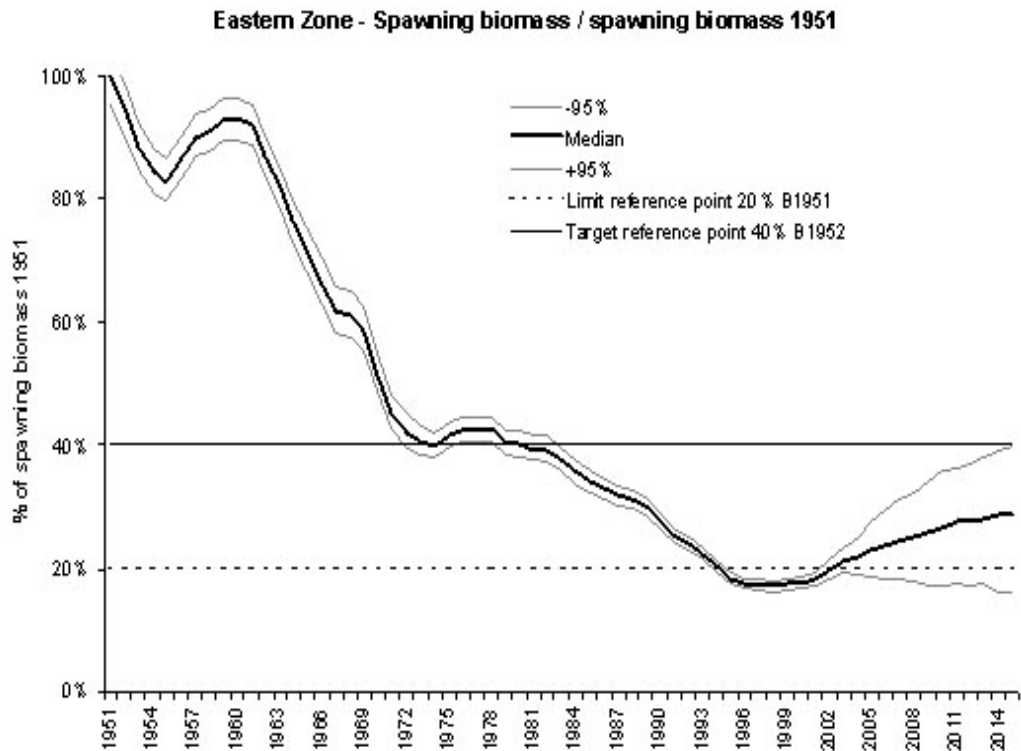


Figure 3. Predicted trends in spawning biomass (upper) and available biomass (lower) for rock lobsters in the Eastern Zone between 1951 and 2014, expressed as a percentage of the biomass in each year, relative to the 1951 biomass. Projections are based on a fixed TACC of 60t.

1.1.3 The distribution and spatial structure of the stock(s) has been established and factored into management responses.

A significant body of spatial structure data for the fishery exists, generated through research sampling such as the tagging program and voluntary pot sampling program. Existing spatial data consists of individual animal size and sex data linked to specific longitude and latitude readings giving accurate positioning and trends (data generally centred in the western and central fishing grounds). Abundance of the stock is extrapolated from catch and effort data and is also considered in relation to spatial distribution analysis as the data collected for the rock lobster fishery is spatially rich (10 minute grids and depth). Expansion of the existing body of data on spatial dynamics, including variation in growth and mortality rates is identified a research priority (see Appendix 1).

Spatial distribution of stocks varies across the State based on the differing amount of suitable rock lobster habitat (extensive offshore reef areas in the west to a gradual transition of spasmodic inshore reef areas in the east). This factor, together with historical factors influenced the division of the fishery into Western and Eastern Zones (see Figure 1). In the Eastern Zone, where suitable habitat and available biomass is significantly smaller than the Western Zone, the TAC of 60 tonnes is appropriate to the smaller size of the fishery. In the Western Zone where there is more habitat and available biomass the TAC is 450 tonnes. The TAC for each zone is based on biological data and modelling and will be discussed later in this report.

The growth rate of both sexes generally increases along the coast from west to east. It is known that female rock lobsters generally mature at a larger size in the east (112mm carapace length) compared to those in the west (90mm cl), but at the same age. Research shows that the current female legal minimum length in the eastern zone of 105cm needs to be reviewed. This will occur at the 2003 stock assessment as part of a whole of fishery legal minimum length review.

The spatial distribution of rock lobster by depth has also been established. The distribution of rock lobster at the deepest end of its range and giant crab at the most shallow end of its range, in some areas overlaps at around 120 metres depth. This has been the case historically, however giant crab grounds have tended to narrow into a band over the last decade, generally outside the range of rock lobster. The two fisheries which were once related spatially and by the use of the pot, and linked on the one licence, have now been separated from a licensing point of view into two fisheries. As a result of this split at the time of introduction of quota management, a zero byproduct for giant crab caught incidentally exists, unless the rock lobster licence holder also has a giant crab licence and giant crab quota.

Spatial data has been useful in determining the effects of Marine Parks ie. what catch had traditionally come out of proposed areas, and the significance of those areas, environmentally, socially and economically. Whilst Marine Protected Areas progressively implemented in Victoria (representing 6% of coastal waters) will provide increased protection for rock lobsters in specific areas, the basis is a whole of State decision with relation to marine ecosystems and diversity in general, rather than a specific management decision with relation to the rock lobster fishery. The rock lobster fishery in those protected areas stands to benefit,

and the effects on spatial distribution of stocks will need to be monitored over time, and built into future management decisions as necessary.

1.1.4 There are reliable estimates of all removals, including commercial (landings and discards), recreational and indigenous, from the fished stock. These estimates have been factored into stock assessments and target species catch levels.

Estimates of removals from the fished stock taken by commercial rock lobster fishing is considered reliable and is factored into stock assessments. Catch data for the commercial fishery on a monthly basis exists for the period 1951-1978 and daily from 1978 to present day in terms of total weight caught annually and the targeted catch rate (kg/potlift). This data includes the landed catch, discards are not included as rock lobster is returned to the water alive. Rock lobster retained by giant crab fishers is removed from the fishery as part of the rock lobster TAC. Once an individual's quota entitlement of rock lobster has been taken, any lobster caught incidentally whilst fishing for giant crab cannot be retained.

New daily catch record books introduced for the purpose of quota management contain both catch and effort data columns and a quota management section (see Appendix 3), and must be filled out each day fishing occurs. As a result of the increased level of monitoring of catch as part of quota management, the accuracy of daily catch information has been largely improved. Mandatory documentation requirements are validated by Fisheries Officers against the catch giving rise to confidence that the information related to the landed catch is reliable.

It is this data collected from the commercial sector which is factored into stock assessments, and as a key input to fishery modelling, this information is used as part of the TAC setting process. The TAC Forum interprets scientific advice including a range of TAC options and associated risks provided by the rock lobster Fishery Assessment Group. The TACs are set at a level that ensure stock rebuilding at an acceptable rate over time whilst maintaining a viable commercial and recreational fishery. The TACs are precautionary in that DPI is confident that only an incline in stock abundance will occur, whilst acknowledging that rebuilding towards the target will take some time. The TAC setting process (summarised in Appendix 3) is comprehensive and attracts a high degree of confidence that the TAC is set at an appropriate and precautionary level.

The recreational catch of rock lobster is estimated at around 20 tonnes. Estimates have been compiled from anecdotal evidence with industry groups, analysis of airfill surveys from SCUBA dive shops across the State over the period 1994-1996 for SCUBA based rock lobster catch estimates, creel surveys by Fisheries Officers, and individual surveys of a sample of divers. To improve reliability of recreational catch estimates, as part of the implementation of the RLFMP, it is proposed that a licensing arrangement and database for those who wish to take rock lobster, supplementary to the existing all waters recreational fishing licence, be introduced over the next two years. This would make it possible to do a more rigorous annual survey of a sample of participants in the recreational fishery to improve catch estimates, via random surveys and a diary program each year.

The recreational catch factored into the model is 7.1 tonnes in the Eastern Zone (10% of the commercial catch) and 9.7 tonnes in the Western Zone (2% of the commercial catch). As part of implementation of the RLFMP, a notional Total Allowable Recreational Catch (TARC) will be introduced and set at 5% and 10% of the TAC in the western zone and eastern zones

respectively. These are notional and are reference points that will be used to trigger management action to review the fishery.

The illegal take and sale of recreationally caught rock lobster has not been quantified. Figures on inspections and detected offences reported by regional staff, whilst not analysed overall, indicate that the number of breaches detected with regards to illegal recreational take relative to the number of coastal and boat based patrols and inspections is small. Estimation of the total illegal take is identified as a research priority (see Appendix 1), and funds for this research are currently being sought. Ongoing work by the internal Rock Lobster/Giant Crab Project Team will assist in the analysis of the illegal catch.

Removal of stock by indigenous persons is considered negligible. Any need to take more than the personal bag limit for cultural or ceremonial purposes will be authorised by permit, therefore removals from the fishery for this purpose can be monitored and quantified through the general fishery permit system. A Native Title claim from an indigenous community in the south west of Victoria for rock lobster quota entitlements has been registered.

1.1.5 There is a sound estimate of the potential productivity of the fished stock/s and the proportion that could be harvested.

A surplus production model provides good estimates of the potential productivity of stocks or the maximum sustainable yield (MSY). The more advanced and recent length structure modelling is able to provide predictions as to determination of the level of risk associated with various levels of TAC.

Modelling outputs for MSY in the western zone is only slightly above the current TAC of 450t. In the eastern zone, MSY from the surplus production model is over 100t.

As discussed earlier, the current level of harvesting (450t in Western Zone and 60t in Eastern Zone) represents a portion of what could be harvested and takes into account the ability of the stocks to rebuild at an acceptable rate whilst maintaining a viable commercial fishery.

Management responses

1.1.6 There are reference points (target and/or limit), that trigger management actions including a biological bottom line and/or a catch or effort upper limit beyond which the stock should not be taken.

The suite of performance indicators, reference points and performance measures for the rock lobster fishery have recently been either developed or refined, as part of development of the RLFMP.

Spawning and available biomass indicators

Rock lobster spawning biomass will be the principal biological indicator for assessing sustainability (Table 4 and Figures 2 and 3). The principal social and economic indicator will be the number of rock lobsters in the stock above the legal minimum length that are available to be caught by the fishery (the available biomass). The estimated biomass in 1951 (B_{1951}) is used as a proxy for the unfished biomass (B_0) as discussed in section 1.1.2, with a high degree of confidence.

These indicators of stock abundance were selected because they are easily understood and based on assessment models and the data collected by the monitoring program prior to 2002. These stock biomass indicators are “model-dependent” and cannot be measured directly, but biomass trends can be verified using other observed indicators of the stock status.

Observed indicators

The following indicators will be used to verify the model and provide information for TAC-setting and other management measures:

➤ **Standardised catch rates**

There is a close relationship between rock lobster biomass and commercial catch rates measured as the number or weight of rock lobsters per pot lift. Standardisation of catch rates involves adjustments to fishing effort that take into account the progressive advances in fishing technology and changes in fishing practices over time. Although catch rate data are incorporated in the model, trends in standardised catch rates may be used directly to justify a review of the TAC.

➤ **Puerulus settlement and pre-recruit abundance**

The abundance of puerulus and pre-recruits can provide an “early warning” of changes in recruitment.

➤ **Mean size of rock lobsters in commercial and recreational catches**

Changes in the mean size of landed rock lobsters may indicate trends in mortality and/or recruitment or changes in fishing practices.

➤ **Relationship of catch and TAC**

In TAC-managed fisheries, catch versus TAC is often used as an indicator. However, other fishery aspects such as quota trading, markets and fishing practices may influence the catch relative to the TAC independent of stock status. This indicator will be considered as part of the TAC-setting process.

Also the rate of rebuilding of stocks towards the target reference point, (or the rate of fall towards the limit reference point) will be considered as part of the determination of subsequent TACs but is not specifically listed as an indicator.

Reference Points and Performance Measures

The stocks will be maintained above well defined and appropriate minimum biologically acceptable levels, particularly the limit reference point. Consistent with national and international experience, the limit reference point for rock lobsters is set at 20% of B_{1951} , for spawning and available biomass. The target reference point is 40% of B_{1951} . The reference points refer to spawning and available biomass indicators only.

Limit reference points and target reference points in relation to total catch over time are depicted in Figures 2 and 3 on previous pages. In the Eastern Zone the spawning and available biomass is just below the limit reference point (Figure 3). However, it is sufficiently precautionary to allow fishing to continue over the next five years, given a TAC of 60 tonnes which sufficiently allows stocks to rebuild at an acceptable rate over this period. Risk assessments based on this TAC demonstrate this rebuilding projection with a high degree of confidence.

Fishery management performance will be measured by monitoring the status of the spawning and available biomass in each zone relative to the reference points, based on five-year projections. Because the limit reference point reflects the conservation “bottom line” and is set at a lower biomass level than the target, there is a need for greater confidence that the outcome will be achieved. Consequently, the performance measure for the limit reference point is a high probability (75%) of the biomass being greater than 20% of B_{1951} (Table 4). However, given the mathematical and biological uncertainties in the assessment, a lower level of probability (50%) is appropriate for the performance measure for the target reference point.

As well as indicators and reference points, the RLFMP specifies required trends in indicators, and the timeframe for recovery (Table 4). These vary between zones reflecting the status of the resource. For example, in the Western Zone the aim is to maintain the spawning biomass at or above 40% of B_{1951} with a 50% probability. In the Eastern Zone the aim is to re-build the spawning biomass with a 75% probability of being greater than 20% of B_{1951} by 2007/08. In both zones, the aim is to maintain the upward trend in available biomass in order to re-build the stock. Catch rates will also be monitored as a performance measure related to rebuilding.

Triggers and Management Actions

Where performance measures increase or fall to a pre-determined level, the RLFMP identifies specific management triggers relevant to each indicator and performance measure (Table 4). Pre-determined management actions, also called “Decision Rules”, stipulate the required response, giving clear directions to the TAC Forum. For instance, after a 3 year consecutive upward trend in the five year projections of available biomass, an increase in the TAC will be considered. If there is no increase or a declining trend in the five year projections of the available biomass in the Western Zone, then a decrease in the TAC will be considered as part of the TAC review. Any decrease in the standardised catch rate trend will trigger a TAC review. TAC reviews will take place after the stock assessment in October and implementation of recommendations will occur as soon as necessary, no later than the setting of quota orders for the next quota period beginning April 1 the following year. Variation of input controls will also be considered, as part of the review of the TAC. Trends in stock indicators and model projections, together with the views of stakeholders, will be considered in making recommendations and decisions on the appropriate level of management response.

Table 4. Summary of Stock Indicators, Reference Points, Performance Measures, Triggers and Management Actions with Respect to Changes in TAC

Stock Indicator	Limit Reference Point	Target Reference Point	Performance Measure	Management Trigger	Management Action
Spawning biomass (Model derived)	75% probability of being greater than 20% of B ₁₉₅₁	50% probability of being at 40% of B ₁₉₅₁	<i>Eastern Zone</i>		
			The spawning biomass is above 20% of B ₁₉₅₁ with a 75% probability, within five years	If projections indicate that the limit reference point will not be reached by the end of the RLFMP by (2007/08)	Reduce TAC
				When the limit reference point has been exceeded and 5 year projections indicate an upward trend	Review TAC
			<i>Western Zone</i>		
			Spawning biomass is at or above 40% of spawning biomass in 1951 with a 50% probability	Spawning biomass falls below 40% of spawning biomass in 1951 with a greater than 50% probability	Reduce TAC
Available biomass (Model derived)	75% probability of being greater than 20% of B ₁₉₅₁	50% probability of being greater than 40% of B ₁₉₅₁	<i>Eastern Zone</i>		
			Upward trend in available biomass projections	Available biomass not increasing or downward trend in 5-year projections	Review TAC
			<i>Western Zone</i>		
			Upward trend in available biomass projections	Available biomass not increasing or downward trend in 5-year projections	Review TAC

				Increasing trend in 5-year projections	Hold the 2002 TAC for 3 years (until 2005/06), then review
Standardised catch rates (observed)	None	None	<i>Eastern Zone</i>		
			Upward trend in standardised catch rate	Increase in standardised catch rate to >0.5 kg/potlift	Review TAC
				Decreasing trend in standardised catch rate	Review TAC
			<i>Western Zone</i>		
			Upward trend in standardised catch rate	Increase in standardised catch rate to >0.7 kg/potlift	Review TAC
				Decreasing trend in standardised catch rate	Review TAC

Note: 'Review TAC' means consider the management implications of maintaining, increasing or decreasing the TAC. Variation of input controls will also be considered.

1.1.7 There are management strategies in place capable of controlling the level of take.

DPI administer management regimes for both zones of the commercial fishery which incorporate the ability to control the level of catch, and the recreational fishery. This is achieved primarily by the setting of an annual commercial TAC, and supported by a range of legislated input controls for both the commercial and recreational fisheries.

Monitoring of the commercial catch is managed electronically by the rock lobster Quota Management System (see section 1.1.1) and compliance with legislation within the commercial and recreational sectors is facilitated by Fisheries Officers and other investigative officers. The Compliance Strategy to be developed in 2003/04 and implemented immediately afterwards will provide a schedule of management actions, performance measures and a monitoring and review process to ensure the objectives are achieved.

The TAC is reviewed annually and can be reduced/increased accordingly as they relate to fishery rebuilding performance measures, management triggers etc. as previously discussed (section 1.1.6).

In the instance where the fishery, or the fishery in a particular zone would immediately need to be closed (or the use of particular fishing equipment prohibited), this can be effected by the issue of a 'Fishery Notice' under the provisions of the Fisheries Act which can be in place within a matter of weeks. Also, the Minister may issue a direction on any matter relating to the management of the fishery or one or more of its zones by 'Ministerial Direction' under the provisions of the Fisheries Act. The reduction of quota can be effected by an amendment to the Quota Order for rock lobster and the RLFMP can also be amended or revoked under provisions of the Act.

Input controls in the commercial fishery include limited access licences, zoning of licences, minimum size lengths, restrictions on taking egg bearing females, closed seasons, area closures, restricted pot numbers, and definition of the size of the pot to be used, including mandatory escape gaps.

The season closure reduces effort, conserves breeding capability, and reduces mortality in rock lobsters within the peak spawning periods of the rock lobster. For females the closure extends between 1 June to 15 November (females are generally bearing eggs from June to November depending on their geographic location and water temperatures) and 1 September to 15 November for males. McGarvey et al (2000) confirms the appropriateness of the closed season for males. These closed seasons are also the same for Giant Crabs. Closed seasons and size limits management advice will be prepared by the TAC Forum for recommendation to DPI and then the Minister each year.

Female lobsters carrying eggs, or soft shelled lobsters must not be taken. The Fisheries Regulations also make it an offence to remove eggs from a female lobster. Females less than 10.5 cm or males less than 11cm must not be taken in either zone. These minimum size limits take into account the differences in size at onset of maturity and growth, and provide protection for breeding capability in the fishery. The survival rate for lobsters returned is not known however anecdotal evidence suggests it is quite high. It is understood that survival rates for unwanted lobsters is the subject of pending research by another state fisheries agency.

Restrictions on pot numbers provides protection to the resource from increased predation and mortality associated with unrestricted fleets of pots. Pot number entitlements for individual licences are specified on the licence. Fisheries Regulations will be amended to allow more than two licences to operate from one boat, and introduce maximum pot numbers for a boat of 140 in the Western Zone, and 120 in the Eastern Zone as part of implementation of the RLFMP. (Pot numbers can be traded within the zone independent of individual quota holdings). Maximum pot numbers within each zone addresses concerns about potential wastage of the resource caused by octopus predation in pots that may not be lifted each day. Containing fishing effort helps reduce the risks associated with unrestricted use of pots during winter such as overfishing of males, imbalanced sex ratios and impaired reproduction. The pot maximums are 5182 for the Western Zone and 2061 for the Eastern Zone and represent the existing pot numbers before quota management was introduced into the fishery.

The recreational catch is limited by a personal daily bag limit of 2 and possession limit of 4, (penalties for offences against take/possession limits recognise the status of rock lobster as a 'priority species') the requirement to clip/punch the tail of the lobster taken, to hold a recreational fishing licence, and to use only specified fishing methods and gear, (for example the use of snares or pots is prohibited). These restrictions are additional to the minimum size limits, closed seasons and prohibitions on egg-bearing females and soft shelled lobsters that also apply to the commercial sector as discussed above.

The establishment of MPAs means the level of catch in certain areas of the coast is controlled, even though the TAC for each of the two zones is not reduced. The MPAs across the State represent an overall closure of approximately 6% of Victorian waters to all forms of commercial and recreational fishing. The two Marine Parks and three Marine Sanctuaries in the western zone, and the seven Marine National Parks and five Marine Sanctuaries in the eastern zone represent protection of 8% and 16% of rock lobster available biomass in the two zones respectively. MPAs will be especially beneficial for rebuilding female biomass and egg production in the Eastern Zone.

1.1.8 Fishing is conducted in a manner that does not threaten stocks of by-product species. (Guidelines 1.1.1 to 1.1.7 should be applied to by-product species to an appropriate level)

The rock lobster pot is quite species specific, is fitted with at least one escape gap (mandatory), is restricted to specific dimensions by regulation (150cm length and width and 120cm height) and therefore by-product or indeed bycatch catch is low. The practice of baiting and hauling pots daily reduces the threat to stocks of by-product species as pots are tended regularly and any fish caught can be released quickly.

By-product data is monitored as part of annual stock assessment. By-product species caught in pots targeting rock lobster are limited in general to Octopus (*Octopus pallidus*, *Octopus maorum*) as the main by-product species (23 tonnes in 200/01), to a lesser extent several finfish and other species (28 tonne). There are about 30 fish species landed as by-product, but it is mostly composed of leatherjackets (see Tables 5 and 6 on the next page).

Table 5. The main species and total catch (tonnes) of octopus and fish reported as by-product in each zone on commercial fishing returns during 2000/01

Species	Western Zone	Eastern Zone	Victoria
Octopus	19.5	3.0	22.5
Leatherjacket	6.0	4.5	10.5
Cod unspecified	2.9	0.0	2.9
Wrasse unspecified	2.2	2.7	4.9
Snapper	1.6	0.6	2.2
Other (25 species)	5.2	2.5	7.7
Total	37.4	13.3	50.7

Table 6. By-product total catch reported over last 5 fishing seasons by all pot fishing, and by pot fishing targeting rock lobster only.

Species	All pot fishing (rock lobster and giant crab)		Pot fishing where targeting for lobster	
	Average reported during past 5 fishing seasons (kg)	Percentage of 2001/02 rock lobster and giant crab catch	Average reported during past 5 fishing seasons (kg)	Percentage of 2001/02 rock lobster catch
Octopus	20,396	4.7%	18,641	4.3%
Leatherjacket	8,339	1.9%	5,885	1.4%
Wrasse, Unspecified	4,545	1.1%	4,475	1.0%
Snapper	2,501	0.6%	2,457	0.6%
Cod, Unspecified	2,055	0.5%		
Cod, Southern Rock	1,584	0.4%	737	0.2%
Crab, Velvet	1,427	0.3%	1,427	0.3%
Crab, Other Unspecified	770	0.2%	651	0.2%
Perch, Ocean	728	0.2%		
Barracouta	622	0.1%	622	0.1%

The majority of octopus are retained as by-product and sold commercially, while a small proportion are returned dead to the water. Whilst stocks of octopus have not been assessed, it is known that octopus are a highly fecund and fast growing species. Stocks of octopus are thought to be abundant (anecdotal information suggests that octopus numbers are increasing) and not threatened by rock lobster fishing as the configuration of the pot, with an opening on the top and escape gaps on the side, allows octopus to escape. Some fisherman have found that attaching the hauling rope on the opposite side of the pot to the escape gap causes octopus occupying a pot to drop out whilst the pot is hauled. Due to the low market value of octopus in comparison to lobster it is not anticipated that effort will shift to increase catches of octopus. If catches of octopus were to rise by 20% or more this would trigger a management review.

Crabs (giant crab *Pseudocarcinus gigas*, sand crab *Ovalipes australiensis* and velvet crab *Nectocarcinus tuberculosis*) are also caught in lobster pots in relatively small quantities. Only

giant crabs above the legal minimum length (15cm) can be retained by those with a giant crab fishery access licence and a giant crab quota entitlement. For giant crabs the 15cm minimum size limit has been confirmed as appropriate by yield per recruit analysis (McGarvey et al, 2000).

Rock lobster pots can be used to take fish for sale (other than abalone, jellyfish, scallop or sea urchins) and in some cases a small number of pots in a fleet are often used specifically to catch scale fish for sale or use as bait. However, the conditions of an RLFAL state that no more than 8 wrasse or 2 banded morwong may be taken on any day. Minimum size limits, where listed, on all by-product species must be observed, including Bluethroat Wrasse (28cm), Rock Cod (22cm) and Snapper (27cm). No other type of trap may be used to take fish for bait.

All species retained as by-product must be recorded on the daily catch record (see relevant columns Appendix 2) as directed in column instructions for the recordbook. As some of these by-product species, particularly wrasse, are also used for bait, it is understood by DPI that fish used for bait are not recorded on daily catch records. The necessity of filling out by-product columns on the daily catch record accurately will be emphasised with industry at stock assessment and annual industry/Fisheries Victoria meetings. An assessment of industry's interpretation of by-product column instructions, and if necessary clarification of instructions in future, will assist to ensure records are entered appropriately by all licence holders. The RLFMP states that data collection methods for monitoring by-product will be improved and that fishery independent research will provide further information and validation on by-product catches.

The catch of eastern rock lobster, *Jasus verreauxi*, is unknown but considered to be less than 0.5 tonne. Minimum size limits of 10.5cm carapace length for females and 11cm for males must be observed. As part of implementation of the RLFMP, catches of eastern rock lobster will be reported on fishing returns separately as a by-product. Monitoring of by-product will be improved and catches of eastern rock lobster will be recorded separately on fishing daily catch records. If the annual catch of eastern rock lobster exceeds one tonne, a management review will be triggered. If necessary, specific controls to manage the eastern rock lobster catch will be added as licence conditions on the Eastern Zone RLFAL. Fisheries Victoria will continue to collaborate with NSW Fisheries on co-operative management of eastern rock lobster stocks.

Direct impacts of fishing and indirect ecological effects on reef communities from the mortality of by-product species will be assessed as far as practicable as part of rock lobster habitat assessment and ecological risk assessment programs to be discussed later in this report.

1.1.9 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

The range of measures discussed above, including the high degree of control over the catch, particularly in the commercial sector, the significant body of knowledge and commitment to robust annual assessments of the status of the fishery, the confidence in the advanced level of modelling and risk assessment, and demonstrated trend recently towards stock rebuilding give rise to a high degree of confidence in achieving the objective.

QMS is new to the fishery, and as such the long term effect on the fishery can only be measured over time. However, experience in other fisheries and in other jurisdictions has shown that QMS is a reliable management tool for achieving greater long term sustainability prospects.

Objective 2.

Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes.

Management responses

1.2.1 A precautionary recovery strategy is in place specifying management actions, or staged management responses, which are linked to reference points. The recovery strategy should apply until the stock recovers, and should aim for recovery within a specific time period appropriate to the biology of the stock.

The available biomass and spawning biomass projections from fishery modelling indicate that stocks of rock lobster in the eastern zone are currently just below the defined reference point (see Figure 2). The management response has been to ensure stock rebuilding, through a precautionary TAC. The current TAC of 60 tonnes in the eastern zone is precautionary when compared to historical catches of greater than 70 tonnes, representing a 16% reduction in total catch. Taking into account growth over time, this represents a cumulative positive effect that would be greater than the original 10 tonne reduction in catch. Catch rates in this zone have steadily increased since the mid 1990s.

The aim is to re-build the spawning biomass in the eastern zone with a 75% probability of being at least equal to the limit reference point (20% of B_{1951}) in three years, and greater than the limit reference point within the life of the RLFMP (5 years). There is confidence from the modelling that this will occur. The introduction of Marine Parks will delay the rebuilding of the available biomass temporarily as they are phased in over the next 2 years as indicated in Figure 2 (a minor decline in available biomass for 2002-2004) before projected rebuilding thereafter. This is due to a reduction of the rock lobster biomass available to the fishery, particularly in the eastern zone where marine protected areas include significant reefs, representing protection to approximately 16% of the available biomass. However, Marine Parks will result in an increase of the rate of rebuilding of the spawning biomass across the fishery, which is particularly important in the Eastern Zone, and will result in an increase towards the limit reference point more quickly.

Risk assessment modelling indicates a high level of confidence that rebuilding of the spawning biomass will occur in the immediate future and that available biomass will be above the limit reference point within the life of the RLFMP and will continue to build.

1.2.2 If the stock is estimated as being at or below the biological and / or effort bottom line, management responses such as a zero targeted catch, temporary fishery closure or a 'whole of fishery' effort or quota reduction are implemented.

It is not deemed necessary to close the fishery temporarily or undertake similar action at this stage. The reduction of effort in the fishery through a precautionary TAC (effectively reducing the pre quota catch by 16% in eastern zone and 10% in the western zone), the ability to reduce the TAC as necessary, and maintaining pot number restrictions, form an appropriate response given the marginal position with relation to the limit reference point, and current upward trends and model predictions for stock rebuilding.

Other more immediate or stringent measures such as closures are available for implementation if necessary (as previously discussed in section 1.1.7).

PRINCIPLE 2.

Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem.¹¹

Objective 1.

The fishery is conducted in a manner that does not threaten bycatch species.

Information requirements

2.1.1 Reliable information, appropriate to the scale of the fishery, is collected on the composition and abundance of bycatch.

Due to the relatively benign fishing method of the pot which is target specific, the practice of daily hauling, and the fact that most species are caught and released alive, the composition and abundance of bycatch caught in the rock lobster fishery is low in comparison to other fisheries.

Some bycatch data is currently collected through catch and effort reporting on the rock lobster daily catch record (Appendix 2) mainly data with regards to all dead lobsters discarded (both legal size and undersize). However, there are no other columns on the logbook in which to record discards of other bycatch species (those returned dead to the water or used as bait). The summary of by-product species in section 1.1.8 is likely to represent the range of species caught as bycatch. It is highly unlikely that species unknown to lobster fishermen would be caught by pots.

Data in relation to dead lobster discards is collected daily and analysed and discussed as part of annual fishery assessments. The RLFMP identifies quantifying discards, damaged and undersized lobsters and estimating mortality as high priority research. Whilst data on undersize lobsters or female lobsters in berry caught in pots is also collected, this is not considered to be bycatch data, as these are generally returned to the water alive.

The majority of octopus caught in a rock lobster pot is sold and therefore is mainly by-product (previously discussed in 1.1.8), however the remainder of octopus returned to the water dead is not currently recorded or known. Likewise scalefish caught in a pot and released alive as unwanted, or killed and used for bait are not recorded. Unwanted live fish releases are thought to be minimal due to the presence of escape gaps that allow undersize fish to escape (to be discussed in section 2.1.2) and the commercial value of some bycatch species of legal size which include snapper, wrasse, cod, leatherjacket. Likewise the catch of finfish used for bait is thought to be small as catches of finfish are small to begin with. For this reason the majority of bait used in the fishery is bought as packaged bait.

Bycatch is recorded as part of the fishery independent annual fixed site survey which represents the main lobster fishing grounds, and catch sampling undertaken as part of the current FRDC project. Pots used in these catch sampling programs do not have escape gaps

¹ The issues addressed under the principle are those that define components of ecosystem integrity

and therefore provide valuable information on species diversity and abundance. These programs provide reliable fishery independent data on bycatch, and will be useful as validation of fishery dependant bycatch data (undersize and dead lobsters). Bycatch data will be reported in all fishery independent research as monitoring bycatch through independent research is integral to maintaining accurate and up to date knowledge on bycatch.

A system of by-catch monitoring, including independent observation, will be introduced by 2004 as part of implementation of the RLFMP, to investigate bycatch mortalities. This will include modification of future fixed site surveys carried out by MAFRI to better record levels of bycatch and byproduct; education of fishers in relation to the importance of correctly reporting bycatch as separate to byproduct on their daily catch records, and increased emphasis on bycatch and byproduct data as part of routine compliance inspections of rock lobster fishing vessels.

Assessments

2.1.2 There is risk analysis of the bycatch with respect to its vulnerability to fishing²²

As the level of bycatch is believed to be low, there is no risk assessment for the fishery in relation to bycatch. The existence and effectiveness of escape gaps, and other controls such as pot numbers within the fishery, mean that the risk posed by the pot on bycatch species is low. This is validated by independent research which incorporates bycatch monitoring as mentioned above.

Frusher and Gibson (1999) have researched the effectiveness of escape gaps in rock lobster pots through fishery independent catch sampling. The research found that bycatch of most finfish and invertebrates is reduced by at least 80%. The mortality rates for fish released is not known, but thought to be minimal. For species such as draughtboard sharks these escape gaps will not be as effective, however these can be returned alive as pots are generally hauled each day. Tag recapture data from Tasmania suggest they may at least survive one recapture.

Hermit crabs, giant crabs, and rock lobster returned to the water have a very high chance of survival. The survival of wrasse, snapper and other species with swim bladders that are unwanted and returned to deep water is less certain however due to possible barotrauma including swim bladder distension if the bladder is not punctured. There is little data available in regards to barotrauma mortality rates of scalefish returns in deep water. However it is known anecdotally that for example, snapper caught in lobster pots on the open coast is minimal and snapper caught is generally of legal minimum size and therefore retained. The smaller sized snapper are mainly located in Port Phillip Bay which is not fished commercially for rock lobster.

'Ghost fishing' is not considered a problem in the rock lobster fishery as if pots become lost, the pots will break down and therefore not pose a risk to bycatch. This is because the pots are constructed with sacrificial anodes that if not replaced regularly will result in the rusting of iron and rapid deterioration of the pot.

²² The vulnerability of a bycatch species may be its vulnerability to fishing technology (eg its catchability), or its vulnerability in terms of ecological impact (eg loss of predators or prey)

Also, a pot needs to have bait in it to be effective. Once the bait is gone from the pot, lobsters, crabs and octopus generally leave the pot, large lobsters are able to leave the pot by climbing out through the neck and small lobsters can leave the pot through escape gaps. This is confirmed by video footage from within the commercial industry. Lobsters of legal minimum length are in general unable to leave the pot suggesting that the pot has a relative selectivity to lobsters of size in the middle range.

Although there are no regulations to specify the maximum soak time (difficult to enforce and deemed unnecessary given fishing trends), it is known that the bait used does not usually last longer than 1 day, the same period during which pots are generally hauled. Any live fish or crustaceans unwanted are to be returned to the water alive. Pots are returned to dry storage at the end of the season.

The assessment of bycatch is identified in the RLFMP as high priority research (Appendix 1). Bycatch data will be utilised as part of pending ecological risk assessments as discussed in the RLFMP and later in this report.

Management responses

2.1.3 Measures are in place to avoid capture and mortality of bycatch species unless it is determined that the level of catch is sustainable (except in relation to endangered, threatened or protected species). Steps must be taken to develop suitable technology if none is available.

Specific fisheries regulations relate directly to avoiding the capture and mortality of bycatch species. These include requirements that only pots up to a maximum size, fitted with at least one escape gap of a prescribed size are used by the licence holder to fish for rock lobster. Maximum rock lobster pot numbers per licence, and within a zone, control fishing capacity and therefore overall potential for bycatch in the fishery.

Escape gaps in pots, and total numbers of pots used are inspected by Fisheries Officers, often at the start of the season before pots are set, and at sea during the season for compliance with regulations. Anecdotal evidence suggests that crabs and other bycatch species caught in pots are considered to have a very high chance of survival when returned to the water live. Furthermore, the regulations make it an offence to fail to return fish that is not required to be returned to the water immediately with the least possible injury or damage.

In the instance where giant crab of legal minimum length are caught and the fisher does not have a giant crab fishery access licence and quota entitlement, the giant crabs must be returned to the water with the least possible damage. If the fisher has giant crab quota entitlements, the crabs may be landed. Giant crabs landed are deducted from the TAC for the fishery, the TAC having been set at a conservative level to encourage the rebuilding of stocks and the available biomass.

In order to minimise discard mortality, as part of implementation of the RLFMP, seasonal closures will be reviewed, and a code of conduct for discarding rock lobsters and all other bycatch, will be developed by 2005/06. DPI's Rock Lobster/Giant Crab Project Team will also be developing a bycatch action plan for the fishery in the next 2 years.

2.1.4. An indicator group of bycatch species is monitored.

As bycatch in the rock lobster fishery is low, and data for all bycatch species is not currently collected, there are no species of bycatch monitored as an indicator group. Rather, all species caught as bycatch in research sampling programs such as the annual fixed site survey and voluntary pot sampling program are monitored for changes in abundance. This data is also supplemented by anecdotal evidence from industry and observations through tagging programs and onboard observers.

Improved bycatch monitoring, primarily data collection, scheduled to begin within the next year will be useful for detecting increases in bycatch species. Bycatch data will be discussed at annual stock assessments, and where necessary (a significant increase of 25% for example is detected) and addressed to instigate appropriate action. This process is deemed adequate, as the costs associated with establishing a specific monitoring programs to detect changes in bycatch species would be considered as exceeding the benefit.

The impact of lobster fishing on bycatch species in general will be included as part of the pending ecological risk assessment.

2.1.5 There are decision rules that trigger additional management measures when there are significant perturbations in the indicator species numbers.

As there is currently no structured data collection process for all bycatch species, there are currently no defined 'triggers' or management responses established by DPI. Triggers that define a significant change (such as a reduction of 25% in any year or 50% in any three years or a 50 % change in the species assemblage structure in any year or similar) will be considered for development along with management actions, as bycatch data sets are accrued and analysed annually.

If anecdotal or some other evidence was to highlight a large scale change in bycatch species abundance, provisions under the Fisheries Act such as a Fishery Notice could be utilised for immediate protection of particular species. Also, an amendment to the RLFMP can be effected as necessary.

2.1.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

The measures in place, or soon to be developed to avoid the capture and mortality of bycatch species, and the relatively low risk of pot fishing in relation to bycatch discussed above provide the basis for confidence in achieving the objective.

The management response of improved data collection of bycatch and monitoring of abundance change in bycatch species is considered more effective than a monitoring program for a particular indicator group. Fishery independent research through catch sampling will provide essential information with relation to bycatch, and shape the direction of future management with regards to bycatch.

Objective 2.

The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities. ³

Information requirements

2.2.1 Reliable information is collected on the interaction with endangered, threatened or protected species and threatened ecological communities.

Protected wildlife species that inhabit Victorian waters include dolphins and whales (Southern Right Whales and Humpback Whales), the leatherback turtle (*Dermochelys coriacea*) and Australian fur seals (*Arctocephalus pusillus doriferus*). The interaction of rock lobster pots with cetaceans and other wildlife has not been researched in the past, due to the perceived low levels of interactions. Rather the subject has been discussed with industry as part of informal discussion about fishing in general at annual stock assessments.

Anecdotal information suggests that the level of interaction is minimal. One informal verbal report in the last 5 years relates to a whale entanglement in a line attached to a pot used to target rock lobster in the western part of the State. There have been no reports of mortality of whales or dolphins attributed to rock lobster fishing gear in Victorian waters. Leatherback turtles very occasionally become entangled in ropes. These are mostly released alive and only one or two are known to have died in living memory.

There are occasional interactions with the large and expanding seal population in Victorian waters. Interactions are generally linked to removal of bait by juvenile seals. The population forages throughout Bass Strait at depths of less than 100m, particularly to the west of Wilson's Promontory, where there are many colonies and haul-out sites. The conservation status of Australian fur seals are considered to be low risk but dependent on secure foraging environments and protection of breeding sites. Seal mortality rates in pots are low and estimated to be less than one seal per 100 thousand potlifts, the majority consisting of seal pups. Problems with entanglement of seals with bait packing straps in some Tasmanian and South Australian coastal areas associated with bundled frozen bait used mainly to lure rock lobster (and in other fisheries to lure sharks and tuna) have not been assessed in Victoria. This may be a problem near seal colonies in Victoria, depending on the extent of use of this type of bait and whether discarded straps are severed.

Information related to interactions with protected seabirds is not collected, however due to the nature of the pot and the depth of water in which it is set, it is not envisaged that interaction with a pot would occur whilst the pot is set on the ocean floor. Rather interactions may occur with birds roosting on vessels or eating scrap food on board the boat or discarded fish, as in any other boat based fisheries. This interaction is not thought to cause damage to birds unless indigestible substances are eaten. The extent or implications of this interaction has not been assessed.

An anonymous survey of commercial fishers undertaken by Norman (1999) indicated that small numbers of interactions with wildlife occurred in inshore areas as a result of a variety of

³ "Protected" species are those which warrant a higher degree of conservation and for which explicit legislative or other mechanisms exist, eg they may be categorised under separate legislation as "endangered", "threatened", "protected"

commercial fishing types. These were mainly restricted to Port Philip Bay (in which lobster fishing is not allowed). The study concluded from the responses, that almost all bycatches occurred in fisheries using nets. However, replies to questionnaires indicated “those using lobster pots caught a dolphin, seals and turtles (entangled in the line)” (pg 221). The study acknowledged that it is necessary to validate data obtained through mail response by on-board observation before making extrapolations regarding the extent or level of mortalities.

The assessment of threatened, endangered and protected species is recognised as high priority research (Appendix 1). To gather data on fishery interactions with protected species of wildlife, a monitoring program will be established annually from 2003/04. This is likely to include a mandatory form to be completed by licence holders to begin to capture data (see example in Appendix 4), and likely to be included in new daily catch record books issued to fishers in 2004. This type of data could alternatively be sourced by DPI through an anonymous survey of fishers. All fishery independent research undertaken will also record incidents of interactions with protected species as part of the monitoring program. The results of the monitoring program will be discussed at annual stock assessments as a dedicated agenda item.

Assessments

2.2.2 There is an assessment of the impact of the fishery on endangered, threatened or protected species.

The interaction between fishing gear and protected species of wildlife is thought to be extremely rare, however it is recognised that the potential impact of one interaction alone for example, an entanglement with a pot line, can be significant. An ecological risk assessment of the impact of the fishery on endangered, threatened or protected species in the Victorian context has not been undertaken. However, the impact of rock lobster fishing on these species will be included as part of the pending ecological risk assessment identified as an action in the RLFMP, and will utilise data collected from the monitoring program.

2.2.3 There is an assessment of the impact of the fishery on threatened ecological communities.

There are no listed ecological communities under threat identified in the range of the fishery.

Management responses

2.2.4. There are measures in place to avoid capture and/or mortality of endangered, threatened or protected species.

Measures in place to avoid interaction with protected species are centred around the use of the pot, recognising that pots and lines rising to surface buoys, whilst in relatively small numbers, inherently have the ability to be contacted by passing wildlife. The maximum pot number that a rock lobster fisher is entitled to use is specified by the licence, and the overall pot numbers in the rock lobster fishery are capped in each of the two zones. As a result the amount of gear in the water that can be contacted by wildlife is limited. Operational practices mean that pots are hauled daily, hence soak time is limited. Each pot must have the vessel number marked on the buoy and this assists compliance inspections. In 2002 the average number of pots used in the western zone was 65 per licence (85 licences), except for the 50 pot

“paddock” area, and in the eastern zone, where the maximum number per licence is 60 (54 licences), the average number of pots used was 40.

Recent innovations in fishing practices reduce the loss of bait and makes pots less attractive to seals. Some operators have developed benign seal exclusion devices and other operators use carp for bait that is less attractive to seals. Bait used includes barracouta, Australian salmon, mackerel and carp, which does not have adverse effects on wildlife. Industry initiatives to utilise endemic species from Australia for bait will be encouraged and incorporated into a code of practice. Industry are encouraged to bring all rubbish back to shore to minimise pollution and the interaction of wildlife with discarded waste.

A local initiative in the Logan’s Beach, Warrnambool area, (renowned for the presence of migrating southern right whales each year) includes an industry initiated voluntary code of practice of not setting pots in the area used by the whales for the period in which the whales pass through. Another industry led initiative is the shortening of buoy lines attached to pots when pots are moved from deeper water into more shallow water to remove any slack. These initiatives are voluntary and whilst they have not been assessed for their effectiveness, are considered to be successful, and at the very least, positive steps towards improved awareness and recognition of the importance of the issue.

To further build on this, as part of implementation of the RLFMP, during 2004/05 a management workshop with conservation groups, industry, fisheries officers and managers will be held to develop further ways to attempt to reduce fishery-wildlife interactions. These industry initiatives, and other mitigation techniques (eg. alternative bait straps/ encouraging the cutting of bait straps in case they end up washed into the sea) that improve wildlife protection will be discussed and, in consultation with industry, will be incorporated into a consolidated code of practice for the commercial sector. Maintaining industry ownership through a voluntary code of practice is deemed appropriate at this stage. However, penalties for failing to report interactions with protected species will also be reviewed by DPI.

2.2.5 There are measures in place to avoid impact on threatened ecological communities.

There is no known ecological community under threat listed in rock lobster habitat areas.

The Marine Protected Areas established in Victoria extend 3 nautical miles offshore, cover 6% of the Victorian coastline, and include rock lobster grounds. As commercial and recreational fishing for rock lobster is prohibited in these areas, any impacts of fishing on the ecological community are expected to be significantly reduced in the local area.

2.2.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

The rock lobster fishery is currently managed in such a way as to avoid adverse impact on threatened, endangered or protected species, through a number of management responses including regulations, operational practices such as daily hauling, and industry initiatives/codes of practice as described above. Improvements to this regime, based on access to better information through new monitoring programs for wildlife species interactions, and any other Australian based research, will enhance the ability to achieve the objective.

Objective 3.

The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally.

Information requirements

2.3.1 Information appropriate for analysis is collated and/or collected covering the fisheries impact on the ecosystem and environment generally.

Information in relation to the level and distribution of effort in the fishery and the type of gear used is of course collated by DPI. Information on the total biomass of lobsters is also collated. There is some information available about reef ecosystems in inshore areas in the broader southern Australian context available, however knowledge of rock lobster habitats and their distribution, particularly those in deeper water environments is limited. Likewise, information in relation to the impact of rock lobster fishing on the wider marine environment is limited, and DPI recognises that more scientific knowledge is needed in this area. The following are some of the identified research priorities for the fishery in Victoria (Appendix 1), the results of which will be useful in the aim of improving knowledge in this area.

- Definition and mapping of rock lobster habitats
- The interaction rock lobsters and other species such as abalone and urchins
- Assessment of the impact of MPAs on rock lobster sustainability and yields
- Assessment of by-product, by-catch and threatened, endangered and protected species
- Medium priority
- Medium priority
- High priority
- High priority

The recently initiated sub tidal reef monitoring program associated with MPAs, will include comparative analyses of unfished areas against fished areas. This will provide ecosystem based monitoring of the effects of rock lobster harvesting on the environment, for example, lobster fishing pressure on community structures, and possibly impacts of the use of pots on the benthos. Localised monitoring programs, such as Melbourne Water's 'Boags Rocks' monitoring program (encompasses the Nepean Peninsula region), whilst associated with specific issues, will be useful and incorporated into fishery assessments.

Assessment

2.3.2 Information is collected and a risk analysis, appropriate to the scale of the fishery and its potential impacts, is conducted into the susceptibility of ecological communities, food chains, physical environment to the fishery.

Impacts on ecological communities

- Benthic communities
- Ecologically related, associated or dependent species
- Water column communities

Impacts on food chains

- Structure
- Productivity/flows

Impacts on the physical environment

- *Physical habitat*
- *Water quality*

There is little information available or being collected in Victoria on these specific impacts. This is in part due to the fact that the nature of the fishery means rock lobster fishing is regarded as having a low risk overall to significantly impact on the marine environment. Impacts from loss or discarding of litter and vessel discharges and emissions are not known but are likely to be small. Similarly the impacts on the ecosystem of using fish from New Zealand as bait is not known, however the fish is frozen and pre-packaged and would be subject to Australian quarantine scrutiny.

The impact of a pot itself on the ocean floor and benthic organisms is minimal (Moulton 1996). As pots are hauled in a way that the vessel moves towards the pot until the line is directly below, drag on the sea floor by a pot during hauling is almost non-existent and habitat disturbance minimal. The percentage of sea bottom covered by/contacted by pots is 0.0006% in the Eastern Zone, 0.0048% in the Western zone and 0.0017% for the fishery across the state overall.⁴

The overall decline of available rock lobster biomass has been steady over the last 50 years, in comparison to other fisheries that have experienced sharp declines over a short period, and so any impacts on the environment have occurred over a period of several decades. Whilst the prey species of lobster and lobster predators are known, the relationship between all of these species in the ecosystem has not been determined, so it is difficult to ascertain the effect, if any, of the decline in rock lobsters on the broader ecosystem. Mayfield (2000) discusses some findings for interrelations among rock lobsters, sea urchins, and juvenile abalone in the South African context, suggesting that increasing numbers of lobsters are responsible for declines in sea urchins and associated juvenile abalone populations.

It is not known to what extent these relationships are reflected in southern Australian lobster communities. It is thought that in southern Australian waters, rock lobsters are not a keystone species in the ecosystem. To gain a better understanding of the relationships between species, the RLFMP identifies the interaction of rock lobsters with other reef species, particularly abalone and sea urchins and the impacts of harvest on these relationships as medium priority research.

It is accepted that the assumption that current levels of fishing are not having a detrimental impact on the ecosystem is not enough. Current management arrangements that control the number of pots in the water by licence holder and zone, and the TAC, reduce the overall risk of detrimental effects on the ecosystem from overfishing. However the effects of fishing cannot be considered in isolation alone. There are other threatening processes that may impact on what is a dynamic system, for example, rising water temperatures.

To gain a full understanding of all ecological risks and threatening processes relevant to, and as result of the fishery, it is intended as part of implementation of the RLFMP, to undertake an ecological risk assessment by 2004/05 (see RLFMP objective 1(b)). The ecological risk assessment will include an assessment of the ecological status, and assist in identifying information gaps, and cost-benefits of targeted research to fill these gaps. It may also highlight high risk areas that require monitoring. Workshops to identify the major ecological

⁴ Using an area of 1sqm for a pot and total annual potlifts averaged over the past 5 fishing seasons.

risks to rock lobster stocks and critical habitats and the preparation of habitat assessment reports will be held every three years as part of the definition and mapping of habitats research undertaken by MAFRI.

Management responses

2.3.4 Management actions are in place to ensure significant damage to ecosystems does not arise from the fishery impacts described above.

There are no specific management actions in place, however as information becomes available, for example as a result of habitat assessments, then appropriate actions can be developed accordingly. The capacity is available under the Fisheries Act to adjust management of the fishery should information become available that indicates damage to the ecosystem is occurring as a result of rock lobster fishing.

Until then, overall the precautionary approach built into the management regime aims to provide protection to ensure significant damage to ecosystems does not occur. This is reflected broadly in the RLFMP objectives and strategies based on ESD principles, and in the management framework which includes reduced fishing capacity through limited pot numbers and the TAC. The risk of ecological shift as a result of rock lobster fishing is addressed by the biomass rebuilding strategy for the fishery.

In addition to the cap on fishing effort, sensitive fishing practices including industry initiatives to utilise endemic species from Australia for bait, will be encouraged and incorporated into a code of practice to minimise effects of fishing on the marine environment. Policies of the Victorian and Commonwealth governments, for example the minimisation of the introduction or translocation of exotic species, will be implemented as they are developed.

2.3.5 There are decision rules that trigger further management responses when monitoring detects impacts on selected ecosystem indicators beyond a predetermined level, or where action is indicated by application of the precautionary approach.

There are no decision rules that trigger further management responses. The development of ecosystem performance indicators, triggers and specific management actions will be explored in 2005/06 following the risk assessment, and refined as necessary as data becomes available through monitoring programs such as the MPA program.

2.3.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

The management response recognises uncertainties in the assessment of the effects of rock lobster fishing on marine ecosystems. Despite this, DPI is confident that the current precautionary management regime which includes prevention of an increase in fishing capacity, the development of codes of practice and further research and monitoring will achieve the objective.

Acronyms

CL	Carapace Length
CRLGCFC	Commercial Rock Lobster and Giant Crab Fishery Committee (FCC)
DPI	Department of Primary Industries
EA	Environment Australia
ESD	Ecologically Sustainable Development
EZ	Eastern Zone
FCC	Fisheries Co-Management Council
FRDC	Fisheries Research and Development Corporation
FV	Fisheries Victoria
LML	Legal Minimum Length
ITQ	Individual Transferable Quota Units
MAFRI	Marine and Freshwater Resources Institute
mm	Millimeters
MPA	Marine Protected Area (Marine National Parks and Sanctuaries)
NCP	National Competition Policy Review of the Fisheries Act 1995
QMS	Quota Management System
RFL	Recreational Fishing Licence
RLFAG	Rock Lobster Fishery Assessment Group
RLFAL	Rock Lobster Fishery Access Licence
RLFMP	Rock Lobster Fishery Management Plan
RIS	Regulatory Impact Statement
SIV	Seafood Industry Victoria
TAC	Total Allowable Catch
TACC	Total Allowable Commercial Catch
TARC	Total Allowable Recreational Catch
VAC	Victorian Aquaculture Council
VNPA	Victorian National Parks Association
VRFish	Victorian Recreational Fishing Advisory Peak Body
WZ	Western Zone

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Editor

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Acknowledgments:

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Appendix 1. Research Priorities for the Rock Lobster Fishery

(Modified Rock Lobster Program of the FCC Research Committee 5-year Research Plan)

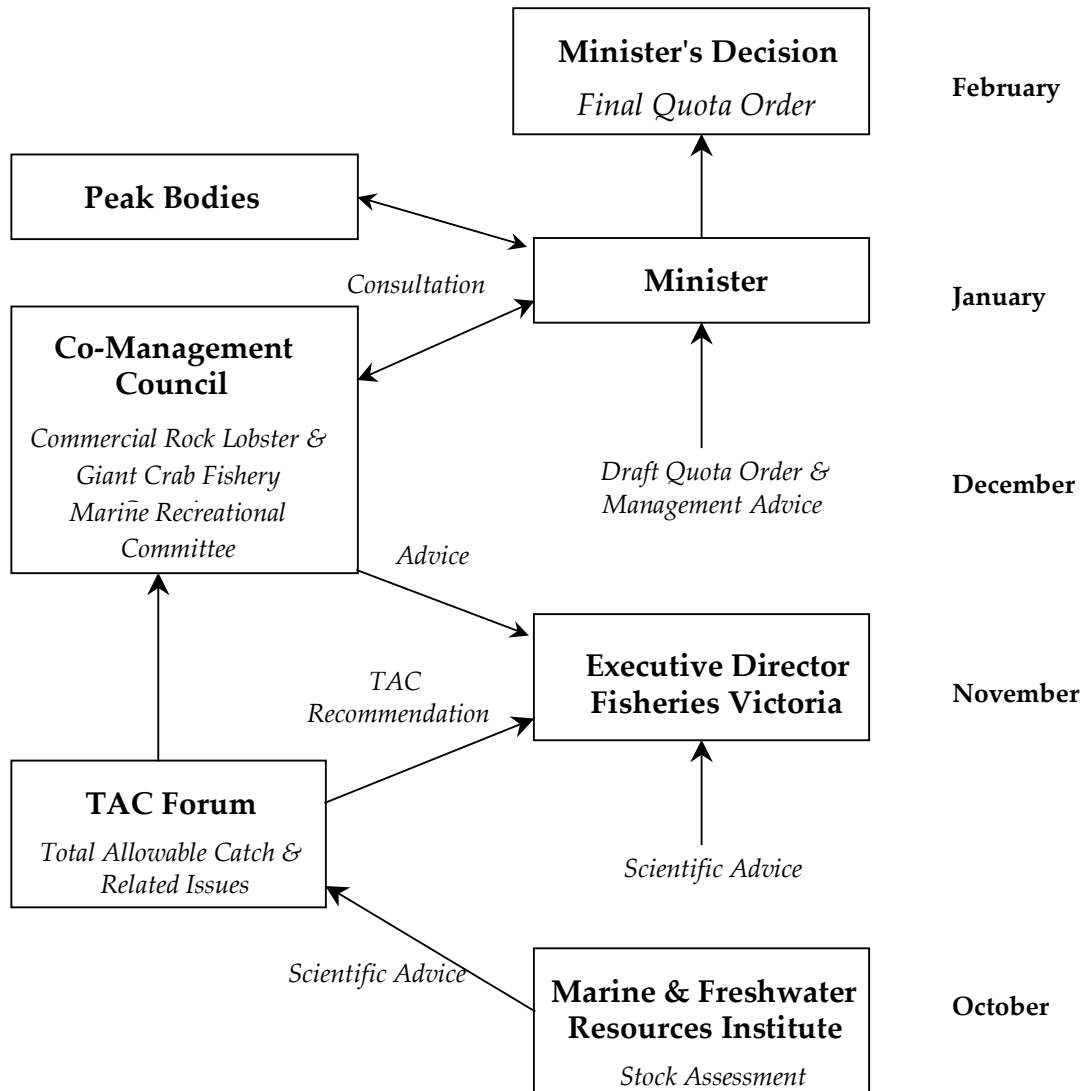
	<i>Future Research & Monitoring Needs</i>	<i>Priority</i>
<i>Sub-program: Fisheries Assessment and Biology</i>		
1	Commercial fishery monitoring including detailed analyses of catch and effort, on board and port sampling for size and sex composition, and tag and release	<i>Essential</i>
2	Cost-effective means of obtaining robust estimates of the recreational catch	<i>Essential</i>
3	Increased industry participation in data collection	<i>High</i>
4	Fishery-independent estimation of rock lobster abundance	<i>Essential</i>
5	Continued development of quantitative assessment models with emphasis on risk assessment	<i>Essential</i>
6	Rock lobster spatial dynamics, including variations in growth and mortality rates	<i>Medium</i>
7	Periodic survey of technological change in the rock lobster industry and its influence on fishing effort estimation	<i>High</i>
8	Effective puerulus collection techniques and strategies and the use of puerulus distribution and abundance as an index of recruitment	<i>Medium</i>
9	The relationship between rock lobster stock and recruitment and its incorporation into modelling and catch projection	<i>Medium</i>
10	Relationship between rock lobster recruitment and oceanographic conditions	<i>Medium</i>
11	Post puerulus rock lobster dynamics, biology and habitat preferences	<i>Medium</i>
12	Quantification of discarded and damaged rock lobsters and estimates of mortality	<i>High</i>
<i>Sub-program: Habitat and Ecology</i>		
13	Development of robust environmental sustainability indicators	<i>High</i>
14	Definition and mapping of rock lobster habitats	<i>Medium</i>
15	The interaction rock lobsters and other species such as abalone and urchins	<i>Medium</i>
16	Assessment of the impact of MPAs on rock lobster sustainability and yields	<i>High</i>
17	Assessment of by-product, by-catch and threatened, endangered and protected species	<i>High</i>
<i>Sub-program: Socio-economics and Management</i>		
18	Development of performance indicators and reference points for management objectives	<i>High</i>
19	Changes in rock lobster fishing practices following the introduction of output controls and their impact on industry efficiency and subsequent assessment	<i>Medium</i>

20	Changes in 'structure' of ownership/licenses – industry profile	<i>Medium</i>
21	Estimation of illegal harvest	<i>High</i>
22	Rock lobster management strategy evaluation modelling	<i>High</i>
23	Economic assessment and evaluation of the economic and social aspects of restructuring	<i>Medium</i>
24	Determination of community attitudes and requirements for resource allocation	<i>Low</i>
25	Periodic assessment of community awareness of Victorian fisheries management programs and the nature of the program's image	<i>Low</i>

Aquaculture

26	Monitor the development of aquaculture techniques and assess opportunities	<i>Medium</i>
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APPENDIX 3. Co-Management Process for Advice, Consultation & Decision Making in Relation to Annual TAC Setting.



APPENDIX 4. Monthly Wildlife Interactions Form (Draft Example)

Date	<input type="text"/>	Time interaction first observed	<input type="text"/>	Area Code	<input type="text"/>
<u>Common Name</u>					
Seal <input type="checkbox"/> Dolphin <input type="checkbox"/> Whale <input type="checkbox"/> Turtle <input type="checkbox"/> Seabird <input type="checkbox"/> Other <input type="checkbox"/>					
Common name (if known)		<input type="text"/>			
<u>Interaction with</u>			<u>Description of interaction</u>		
Pot <input type="checkbox"/>			<input type="text"/> <hr/> <hr/> <hr/> <hr/>		
Line/buoy <input type="checkbox"/>					
Other <input type="checkbox"/>					
<u>Condition of protected species</u> <u>Outcome/action taken</u> (when first observed)			<input type="text"/> <hr/> <hr/> <hr/> <hr/>		
Alive <input type="checkbox"/>					
Dead <input type="checkbox"/>					
Injured <input type="checkbox"/>					
<u>Bait used</u>				