



Rock Lobster Fishery

Management Plan

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Rock Lobster Fishery Management Plan

June 2003



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Foreword

I am pleased to be able to release this Management Plan for the Victorian Rock Lobster Fishery. This is the first management plan for the fishery under the *Fisheries Act 1995* and it formalises the co-management planning process within a framework of Ecologically Sustainable Development. This plan is part of the Bracks Government's vision for Victoria as a State where protecting the environment and utilising our resources sustainably is built into everything that we do.

Consistent with the Bracks Government's commitment to effective community engagement, the development of this Plan has been achieved through extensive consultation with key stakeholder groups. The planning process has been overseen by the Fisheries Co-Management Council, and effective stakeholder input was achieved through a Steering Committee with representatives from major groups who were all invited to participate. A draft Plan was released for public comment and submissions from the public have been taken into consideration in the preparation of the final Plan.

The rock lobster fishery is the second most valuable commercial fishery in Victoria and it is the most significant in terms of capital investment and employment. There are more fishing boats, crew and processors associated with the rock lobster fishery than any other State fishery. Currently, the total annual catch is limited to 510 tonnes and landings are valued at \$21 million. Post-harvest processing and live exportation to markets in Asia greatly enhance the value of the landings.

The fishery has a long history and makes an important contribution to the economy and employment of the rural coastal communities. The number of vessels operating in the fishery has been controlled under a system of limited entry since 1968. However, during the last decade, the annual catch has increased with higher levels of fishing effort. A number of output controls were introduced in 2001, which changed the emphasis of fisheries management from restrictions on fishing effort to a limit on

the total allowable catch. Fishery management is now based on an integrated approach of input and output controls including size limits, area and seasonal closures, fishing gear specifications and individual transferable quotas.

The social and economic values associated with diving for rock lobsters is recognised by the recreational fishing community and contributes to the tourist industry along the Victorian coast. Although the recreational catch of rock lobsters is only estimated to be about 10-20 tonnes, many people spend a large amount of their leisure time searching for rock lobsters and it is an important aspect of recreational diving.

The purpose of this Management Plan is to ensure that this fishery is managed on an ecologically sustainable basis in the future. It sets out the strategies and actions for managing the fishery over the next 5 years with emphasis on managing the commercial and recreational catch at levels that will allow stocks to re-build, prevent overfishing, and reduce the risks of lower stock abundance in the future. It should not, however, be regarded as inflexible as the Plan specifies an open process for annually reviewing the total annual catch limit so that management arrangements can evolve in response to new information, technologies and/or changing community attitudes.

To ensure that the views of the community are taken into account in the co-management process, the Bracks Government will continue to invite the major stakeholders and the public to participate in the implementation and refinement of this plan in the future. I take this opportunity to congratulate all those involved in the development of the Rock Lobster Fishery Management Plan.



Bob Cameron MP
Minister for Agriculture

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Executive Summary

Rock lobster is the second most valuable commercial fishery in Victoria and is important to the economies of coastal communities. The Rock Lobster Fishery Management Plan (RLFMP) specifies the policies and strategies for managing the rock lobster fishery in Victoria for the next five years.

The RLFMP has been prepared under the requirements of the *Fisheries Act 1995* and the Ministerial Guidelines published in the Government Gazette. The status of the stock and the existing management arrangements of both the commercial and recreational fisheries have been reviewed in consultation with major stakeholders. The RLFMP has been developed with consideration of Victorian and Commonwealth Government policies on ecologically sustainable management of fisheries, by-catch, native title, and national competition.

The RLFMP establishes arrangements to manage the commercial and recreational catch at levels that prevents overfishing, allows stocks to rebuild, and reduces the risk of lower stock abundance in the future. Specifically the RLFMP introduces:

- 20% of the unfished biomass as the biological “bottom line” based on international standards to prevent over-fishing of rock lobster stocks.
- 40% of the unfished biomass as the target level for re-building the stocks.
- An open process in which the total allowable catch (TAC) is reviewed annually.
- A total allowable catch for the recreational sector (TARC).

The RLFMP formalises fishery management within a framework of ecologically sustainable development and co-management with all relevant stakeholders. Key aspects are:

- Retention of the existing fisheries management zones.
- Retention of the cap on the total number of pots to meet sustainability and ecological concerns.
- Retention of independently tradeable quota units and pots within each zone that are subject to market forces within the industry.
- Removal of restrictions that apply to the Apollo Bay Paddock 50-pot zone by November 2007.
- An annual meeting between licence holders, managers and fisheries officers to improve management arrangements.
- Development of communication and compliance strategies.
- Establishment of mechanisms to provide better estimates of the recreational catch.
- Provision of opportunities for indigenous communities to access the resource for traditional purposes.
- Monitoring of global rock lobster aquaculture developments to assess opportunities for Victoria.
- Establishment of research priorities to underpin efficient and effective management of the resource.

There is a schedule and budget for implementation of this RLFMP. Annual progress reports and review points will allow fishery management strategies to be adapted to future circumstances and ensure that sustainability and inter-generational equity of this marine resource is achieved.

Introduction

The purpose of the Rock Lobster Fishery Management Plan (RLFMP) is to specify the policies and strategies for managing the rock lobster fishery in consultation with industry, recreational, indigenous and environmental organisations. The RLFMP formalises fishery management for the next 5 years within a framework of ecologically sustainable development (ESD).

The recognised peak bodies nominated in the *Fisheries Act 1995* were invited to join the steering committee and to make submissions. All were kept fully informed of the planning process and written submissions were taken into consideration after a period of public consultation.

The main aims of the RLFMP are to manage the commercial and recreational catch at levels that will allow the stock to re-build, prevent

overfishing and reduce the risk of lower abundance in the future. This will provide a more secure basis for this highly valued seafood industry that contributes to the Victorian economy and employment in coastal communities.

The RLFMP has three goals:

- Sustainability of the rock lobster resource.
- Resource access and utilisation.
- Effective fishery management.

The guidelines for the development of the RLFMP were published in the Government Gazette and are shown in Appendix 1. An analysis of the fishery's strengths, weaknesses, opportunities and threats (SWOT) used in the development of the RLFMP is provided in Appendix 2.

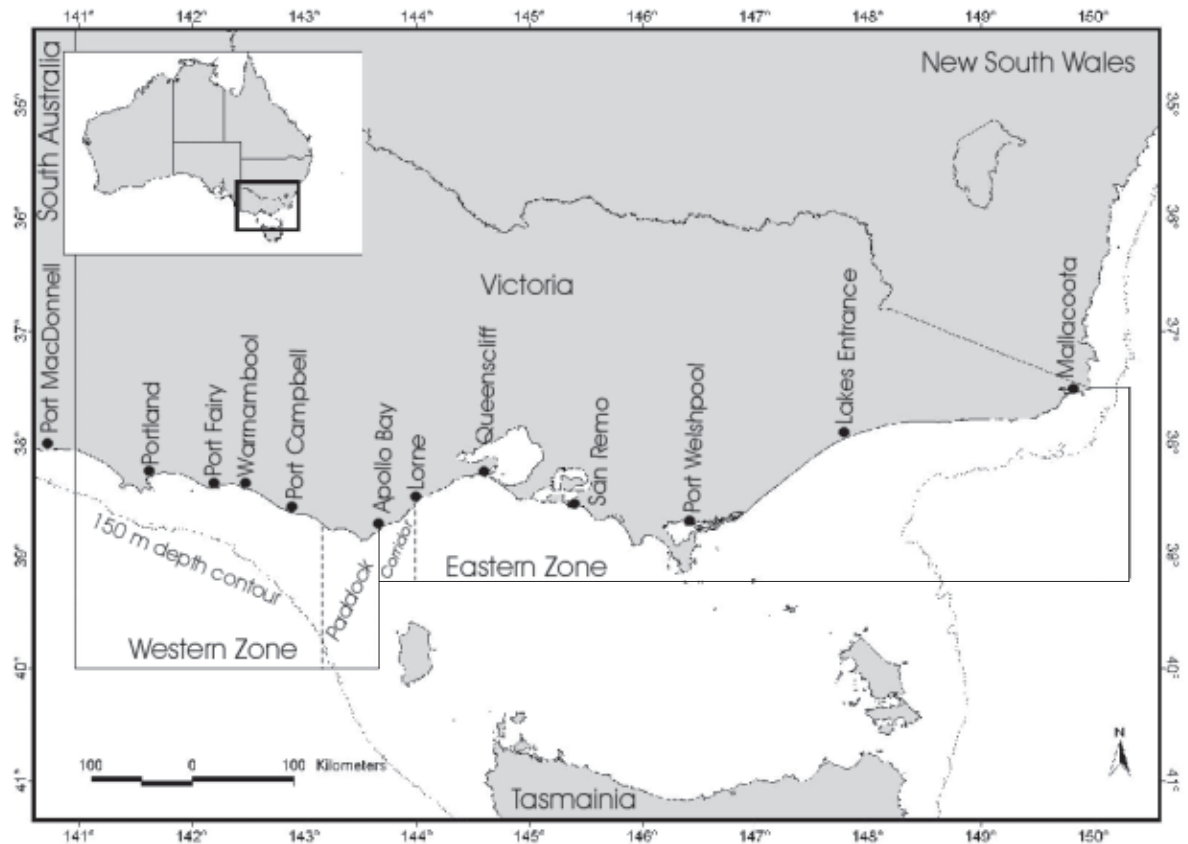


Figure 1: Rock Lobster Management Zones and the locations of the main ports of landing

To assist the reader, a list of acronyms and abbreviations that are used throughout the text is provided in Appendix 3 and terms are defined in Appendix 4. A review of the international scientific literature on rock lobster aquaculture is summarised in Appendix 5. Research priorities and references are listed in Appendix 6 and 7. Submissions received during the public consultation period are acknowledged in Appendix 8 and the membership of the steering committee is given in Appendix 9.

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 in the coastal waters of New Zealand.

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 released, typically between September and November. Once released, rock lobster larvae (called phyllosoma) undergo 11 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. At this point, the puerulus 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 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 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.

Commercial Fishery

The rock lobster fishery is Victoria's second most valuable commercial fishery. Before the introduction of quota, the commercial sector caught 584 tonnes in 2000/01, valued at \$21.3 million. During the last decade, catches have increased from 386 to 584 tonnes with increased fishing effort. Over the same period, the commercial value of the fishery has more than doubled. Post-harvest processing, marketing and live exportation have considerably enhanced the value of the fishery. More than half the catch is exported alive to international markets, mostly in Asia. The remainder is sold on interstate and domestic markets.

Rock lobsters have been harvested under management for more than 100 years. The number of vessels operating in the fishery was capped under a system of limited entry in 1968. 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).

Other management measures include legal minimum lengths (LML), closed seasons, restricted pot numbers and fishing gear regulations that define the size of rock lobster pots and escape gaps. Following the introduction of quota management, the annual TAC in 2001/02 was limited to 510 tonnes (see Table 1). The commercial fleet in 2001/02 consisted of 139 rock lobster access licence holders operating mainly from twelve coastal ports. The most important ports are shown in Figure 1.

Lobster fishers also catch other species such as octopus, leather jackets and wrasse. In 2001/2002, 51 tonnes of these species were recorded on fishing returns as by-product.

Table 1: Quota units, TAC and number of access licence holders and pots for each zone in 2001/02

Zone	No of RLFAL	Quota Units	TAC (tonnes)	No of Pots
West	85	4000	450	5162
East	54	1000	60	2081
Total	139	5000	510	7243

Recreational Fishery

The actual recreational catch of rock lobsters is unknown but is estimated to be about 10 to 20 tonnes a year. The catch is mostly taken in shallow water of less than 20m in depth and is based on the capture of rock lobsters by hand while diving and to a lesser extent by the use of hoop nets. Divers operate from shore or boat, mostly using SCUBA, but hookah and snorkelling equipment is also used. Hookah diving is common in the Eastern Zone between Port Phillip Bay and the NSW border. 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 and the same closed seasons and LMLs as the commercial fishery.

Aquaculture Industry

In 1998, the Fisheries Research and Development Corporation (FRDC) established the Rock Lobster Enhancement and Aquaculture Sub-Program (RLEAS) to coordinate rock lobster aquaculture research in Australia. There is currently no commercial rock lobster aquaculture in Victoria.

Infrastructure supporting mussel and abalone production has developed in several locations with a cultivation area of 260 hectares in 2000/01. There were 39 licence holders and 136 employees involved in both hatchery and grow-out of mussel and abalone in 2000/01. Those engaged in aquaculture require a specific licence.

Status of the Stocks

Rock lobsters in the Eastern Zone are more heavily exploited than in the Western Zone. Catch rates declined continuously from the 1950s until the early 1990s in the Western Zone and until 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.

Stock assessments ¹ are based on a sophisticated length-structured model ² that is fitted to data on catches in weight and number, catch rates and the sizes of lobsters in the catch. It includes biological information such as growth, reproductive characteristics and mortalities. The model enables projections of future stock biomass and allows the impacts of future catches on the resource to be assessed. There is confidence in these projections because the model describes the fishery well. The modelling shows that the biomass above the LML (the available biomass) in 2002 is 25% and 15% of 1951 levels in the Western and Eastern Zones, respectively.

The assessment conducted in 2002 incorporates the impacts of marine protected areas (MPAs) in Victoria. The stock, referred to as the available biomass, will re-build at the current TACs. Spawning biomass in the Western Zone is estimated at over 50% of the level in 1951, but it is much lower in the Eastern Zone at 17%. However, the spawning biomass in the Eastern Zone will increase at the current TAC.

¹ Hobday, D.K. and Smith, D. (2003)

² Hobday, D.K. and Punt, A.E. (2001).

Current Management Arrangements

Definition of a Rock Lobster

In the *Fisheries Act 1995*, rock lobster is defined as an animal of the genus *Jasus*. The majority of rock lobster caught in Victoria is the southern rock lobster, *Jasus edwardsii*. However, small numbers of eastern rock lobster, *Jasus verreauxi* are caught in eastern Victoria, particularly to the east of Cape Conran. The same management arrangements apply to both species in Victoria.

Size Limit

The size limit of rock lobsters is defined by the carapace length (CL) and measured from the front edge of the groove between the large antennae to the nearest part of the rear edge of the carapace. The LML is 110mm CL for males and 105mm CL for females.

Closed Seasons

The closed season is a period during which it is prohibited to take or attempt to take or to possess rock lobster in, on or adjacent to Victorian waters. There are several reasons for the closed season, but primarily it is to protect females during their spawning season. The closed season for females is between 1 June to 15 November.

The closed season for male rock lobsters is between 1 September to 15 November. This provides protection during the male moulting period when growth occurs and when many have soft shells.

The take or possession of soft-shelled rock lobster or female rock lobster in berry (with eggs) and the removal of the eggs, spawn, setae or fibres from females is prohibited in Victoria.

Jurisdiction

The Victorian Government has jurisdiction over the commercial rock lobster fishery in Commonwealth waters adjacent to Victoria under an Offshore Constitutional Settlement Arrangement (OCS) with the Commonwealth Government. Other States have similar OCS arrangements.

Rock lobster stocks are managed separately by each state but co-operative management arrangements have been established to ensure that the stocks in each jurisdiction are fished on a sustainable basis.

There are regular meetings for industry, research and management from Victoria, Tasmania and South Australia including the southern Australia fisheries managers workshops and the marine and coastal committee meetings of the Ministerial Council on natural resource management.

Fisheries management agencies in the other states were invited to comment on the draft rock lobster fishery management plan. Fisheries Victoria is committed to this collaborative approach to co-operative research and management of shared stocks.

Management Zones

The commercial fishery is divided into Western and Eastern Zones by longitude 143°40'E just east of Cape Otway (Figure 1). The Western Zone (WZ) extends west to the South Australian border at longitude 140°57.9'E and southwards to latitude 40°S. The Eastern Zone (EZ) extends east to the NSW border at latitude 39° 12'S.

Rock lobster fishing is excluded from MPAs and from around oilrigs and declared protected shipwrecks. Rock lobster fishing in specified bays and inlets is only permitted to holders of both a Rock Lobster Fishery Access Licence (RLFAL) and Port Phillip and Western Port Bay Access Licence.

Commercial Fishery Management Fishery access licence

There is a limited number of RLFALs in each zone (Table 1). In 2002, there were 139 licences, of which 85 were Western Zone licences and 54 were Eastern Zone licences. The RLFAL entitles the holder to use rock lobster pots to take rock lobster and fish for sale. A licence holder may employ an operator to work the licence.

Apollo Bay Paddock

The "Apollo Bay Paddock" is also known as the "50 pot zone" and is part of the Western Zone that lies between longitude 143°10'E and 143°40'E (Figure 1). This 30 nautical mile wide area extends south to latitude 40°S and is immediately to the west of Apollo Bay and includes giant crab fishing grounds. The number of pots that can be used in this area is limited to 50 per licence.

Eastern Zone corridor

The Eastern Zone Corridor is part of the Eastern Zone between longitude 143°40'E and 144°E to the east of Apollo Bay and west of Lorne. This 20 nautical mile wide area extends south to latitude 39°12'S. Conditions on 10 Western Zone licences allow operators to use up to 20 pots from their entitlement to catch rock lobster and fish in this area.

Commercial fishing gear

Rock lobsters are caught with baited pots that are generally set and retrieved once each day. Commonly used baits include barracouta, Australian salmon, mackerel, carp and some imported species. Each pot is set individually and has a surface buoy with the vessel identification mark. Circulating tanks, seawater sprays or wells in boats are used for keeping rock lobsters alive.

The size of a rock lobster pot is restricted to less than 150cm in length and width and 120cm in height. A pot can have only one entrance and one chamber. Each pot must have at least one escape gap to allow undersized lobsters to escape.

Rock lobster pots are transferable between licences within each zone. In the Western Zone, there is no maximum for the number of pots on a licence however, the average number used in 2002 was 65 pots per licence. In the Eastern Zone, there is a maximum limit of 60 pots. However, the average number used in 2002 was 40 pots per licence.

Individual transferable quota

Quota management was introduced to the rock lobster fishery in November 2001. ITQ units were allocated to licence holders on the basis of a combination of pot entitlements and catch history as recommended by an independent Allocation Advisory Panel. The maximum number of quota units that may be held by an

access licence holder is 150 units in the Western Zone and 75 units in the Eastern Zone. Pots and quota units can be traded independently. The TACC is set annually for a quota period from 1 April to 31 March the following year.

Quota management system

The quota management system (QMS) is based on telephone and written records. The number of rock lobsters caught are recorded in the daily catch record book and then reported by telephone using the interactive voice response system (IVR) within a specified minimum period prior to entering one of the 25 specified ports or mooring areas in Victoria. Licence holders may also apply for authorisation to land catches at Port MacDonnell, South Australia and Eden, New South Wales.

After landing, the catch must be weighed and reported through the IVR within 20 minutes. Catch disposal records must be completed before any rock lobster is sold or leaves the place of landing. Catches, boats, coffs and completed documentation are inspected regularly by Fisheries Officers. Daily catch records are submitted to the Department of Primary Industries (DPI) each month.

Coff registers

A "coff" is a sea cage used to store rock lobsters alive. Licence holders may be authorised to use coffs. Licence holders using coffs are required to keep a register of the number, time, date and transfer of rock lobsters.

Processing and marketing

There is no requirement for a processing licence or catch records in the marketing sector in Victoria. However, the signed catch disposal records with confirmation numbers must remain with the rock lobster as they are transferred from landing to where they are sold.

Compliance and law enforcement

Fisheries officers have the power to inspect rock lobster catches and fishing gear to verify the sizes exceed the LMLs, the number and weight of rock lobsters reported using the IVR, daily catch records, coff registers, catch disposal records and compliance with pot construction and escape gaps.

Recreational Fishery Management

Recreational fishing licence

The RFL covers all forms of recreational fishing in all of Victoria's freshwater, estuarine, and marine waters. A RFL is required to take rock lobster by any prescribed fishing method.

Exceptions include people aged less than 18 years and over 70 years of age, the holders of a Victorian Seniors Card and various categories of pensioners and veterans.

The number of RFLs is unlimited and the number of people who fish for rock lobsters cannot be determined from the current licensing system, which limits the potential to conduct surveys and to estimate recreational catches.

Recreational fishing gear

Rock lobster may only be taken by hand or by the use of up to two recreational hoop nets. The number of hoop nets in use is currently unknown. Hoop nets must be tagged and labelled above the surface of the water. It is illegal to use or possess a snare, gaff, hook or other device designed for or capable of taking rock lobster. The use of a spear or speargun to take rock lobster is prohibited.

Catch and possession limits

Catch and possession limits apply to all persons other than those engaged in commercial fishing activities. There is a bag limit of two rock lobsters per day and a possession limit of four rock lobsters. Divers are required to measure rock lobster prior to bringing them to the surface. All rock lobsters taken by recreational fishers must be tail-clipped or hole punched within five minutes of landing on a boat or onshore.

Co-management Arrangements

The *Fisheries Act 1995* established co-management arrangements for fisheries in Victoria. As part of the co-management process, the Minister receives advice by consulting with:

- Peak bodies: Seafood Industry Victoria, the Victorian Aquaculture Council, VRFish and the Victorian National Parks Association.
- Fisheries Co-Management Council (FCC) and its Fishery Committees. The most relevant are the Commercial Rock Lobster and Giant Crab Fishery Committee (CRLGCFC) and the Recreational Marine Committee (RMC).
- Government agencies principally Fisheries Victoria, Department of Primary Industries (DPI).

Environmental Issues

Rock lobster habitats

The sustainable harvest of rock lobsters is dependent on maintaining the ecological integrity of the reef habitats and adjacent marine communities along the Victorian coast. The geological substrate and relief of coastal reefs varies along the coast and with depth throughout Victorian waters. Rocky habitats with an abundance of crevices, such as limestone, sandstone or basalt reefs provide shelter for puerulus, juveniles and adults.

The associated flora and fauna of reef habitats is highly diverse. Shallower reefs are often dominated by algae, such as kelp, and inhabited by grazing animals such as abalone and sea urchins. In deeper water, reef communities are mostly dominated by sessile invertebrate species such as sponges. There is little information on the ecological relationships between rock lobsters and other species that inhabit reef ecosystems in southern Australia.

Responsibility for the management of the Victorian coast lies with several Victorian and Commonwealth Departments. The main Government agencies are the DPI, Department of Sustainability and Environment, Parks Victoria, Environmental Protection Authority, coastal boards and local authorities.

Environmental threats to marine habitats that may impact the rock lobster fishery include:

- Ocean outfalls,
- Infestation by exotic species,
- Pipeline construction,
- Multi-species effects of fishing,
- Algal blooms induced by nutrient run-off,
- Petroleum production and exploration.

Marine protected areas in Victoria

A system of marine national parks and sanctuaries has been established in Victoria covering approximately 6% of coastal waters to protect important habitats and species. Within these areas, all forms of commercial and recreational fishing are or will be prohibited under the *National Parks (Amendment) Act 2002*.

There will be two stages of implementation. Fishing will be allowed in three marine national parks (Discovery Bay, Twelve Apostles and Cape Howe) and one marine sanctuary (Point Cook)

(Point Cook) until 1 April 2004. Consequently, there will be a progressive reduction in commercial and recreational rock lobster fishing grounds in both zones. In the Western Zone, there are two Marine National Parks and three Marine Sanctuaries. In the Eastern Zone, there are seven Marine National Parks and five Marine Sanctuaries. Parks Victoria is responsible for management of these parks and sanctuaries.

Marine plan for South Eastern Australia

As part of the Australian Government's Oceans Policy, regional marine plans will be prepared at the large ecosystem level. A component of these plans will be MPAs. The first plan being developed is for the South-East Marine Region that extends from Bermagui in New South Wales to Cape Jervis in South Australia covering waters from 3 to 200 nautical miles. The importance of the fishing industry in the South East Marine Region is widely recognised and the combined value of the rock lobster fisheries from all states was estimated at more than \$100 million in 1999. This represents a third of the total value of all State and Commonwealth fisheries in the region.

Objectives of the Management Plan

A requirement of the *Fisheries Act 1995* is that a management plan must include the objectives of the plan.

Ecologically Sustainable Development

The prime objective for the RLFMP is to formalise management of the rock lobster fishery within an ESD framework that is consistent with the *Fisheries Act 1995*. To this end, the RLFMP specifies fishery objectives, indicators, reference points, triggers and management actions.

The Commonwealth Guidelines for the ecologically sustainable management of fisheries and the strategic and export requirements under the *Environmental Protection and Biodiversity Conservation Act 1999* have been taken into account in the preparation of the RLFMP. A submission addressing the Commonwealth Guidelines has been prepared as a separate specific report to Environment Australia (EA).

Economic Efficiency

The RLFMP builds on the existing regime of ITQ management for the commercial fishery, a form of management that encourages economic efficiency. The RLFMP addresses issues relating to pot limits in the fishery under an ITQ system and the relationship between pot entitlements on a RLFAL and the number of ITQ units held on that licence. The RLFMP is consistent with the Victorian Government Response to the National Competition Policy (NCP) Review of the *Fisheries Act 1995*.

Separate Management in Each Zone

The RLFMP clearly identifies the management arrangements for each management zone. The RLFMP reviews the management sub-zones in the Western and Eastern Zones and considers the possible creation of a separate 'Far Eastern Zone'. Linkages with the giant crab fishery are also clearly articulated.

TAC Forum and Co-management

The RLFMP clarifies co-management roles for TAC-setting through the establishment of an open TAC Forum and an annual meeting between RLFAL holders, managers and fisheries officers. Reporting arrangements of the groups involved in co-management are defined.

Assessing the Status of the Resource

An important objective of the RLFMP is to provide a formal process for assessing the status of the resource that leads to the TAC-setting process. The Marine and Freshwater Resources Institute (MAFRI) undertakes the assessment of the rock lobster fishery. The results are published and presented to all stakeholders at annual Stock Assessment Group workshops. The RLFMP identifies the model and risk assessments as major inputs to the TAC-setting process together with other fishery monitoring and the views of stakeholders. The RLFMP outlines the process for annual review of the TAC. The RLFMP also identifies future monitoring and research needs.

Improved Management of Recreational Fisheries

The RLFMP clarifies and strengthens management arrangements for the recreational sector, including the gear used for recreational purposes.

Cultural Use by Indigenous Australians

The RLFMP reflects the Victorian Government's current policy on resource access by indigenous Australians.

Aquaculture

The RLFMP reviews interstate and overseas policies and examines the potential for aquaculture of rock lobsters. It outlines a process to assist future development.

Fees and Levies

The RLFMP rationalises the basis for collecting fees and levies. The RLFMP recognises that the introduction of quotas will have implications for the collection of fees.

Compliance and Communication

The RLFMP identifies the need to develop communication and compliance strategies. It also addresses the issue of interstate landings of rock lobsters taken in Victorian waters.

Goal 2. Resource access and utilisation

Rock Lobster Fishery Management Plan

Duration of the Plan

The RLFMP provides a basis for management of the fishery for a period of five years from 2003 to 2008. This includes a period for review and preparation of the next plan. Should there be a need for the Minister to amend the plan prior to its review, notice of this intention will be published in the *Government Gazette* and there will be formal consultation with stakeholders.

Goals, Objectives and Strategies

The rock lobster fishery management goals, objectives and strategies are consistent with the *Fisheries Act 1995*, the ESD framework of the

Standing Committee on Fisheries and Aquaculture, the sustainability guidelines of the Commonwealth Government as well as other Victorian and Commonwealth legislation and policies. The highest priority of this integrated plan is to ensure the sustainability of the rock lobster resource and the integrity of the marine ecosystem that supports it.

Goal 1. Sustainability of the rock lobster resource

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

Table 2. 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 estimate mortality	<ul style="list-style-type: none"> • Quantify discards of berried, damaged and undersized rock and lobsters • 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 3. 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 3. (continued)

Objectives	Strategies
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	
<ul style="list-style-type: none"> • Monitor fisheries performance and implement management arrangements 	<ul style="list-style-type: none"> • Promote stakeholder participation in decision making • Ensure compliance with legislation • Provide a public information service

Table 4. 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 assessment • 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 4. (continued)

Objectives	Strategies
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, reduces the risks of spreading or introducing exotic species, and minimises 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, the TAC Forum and management meetings • Effectively disseminate research results by providing information on research progress and stock assessment
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 and disseminate high quality information on fisheries management and research and effectively disseminate using the DPI website and a variety of other media

Sustainability of the Rock Lobster Resource

Indicators of Stock Status

Spawning and available biomass indicators

Rock lobster spawning biomass will be the principal biological indicator for assessing sustainability (Table 5 and Figures 2 and 3). The principal social and economic indicator will be the number of rock lobsters in the stock above the LML that are available to be caught by the fishery (the available biomass).

The estimated available biomass in 1951 (B_{1951}) is used as a proxy for the unfished biomass (B_0). The biomass can not be reliably estimated prior to 1951 because this was the first year that reliable fishing effort data was collected to compliment catch records.

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 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 in the TAC review.

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, quota trading, markets and fishing practices may influence the catch relative to the TAC quite independently of the stock status.

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 of rock lobster fisheries, the limit reference point 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.

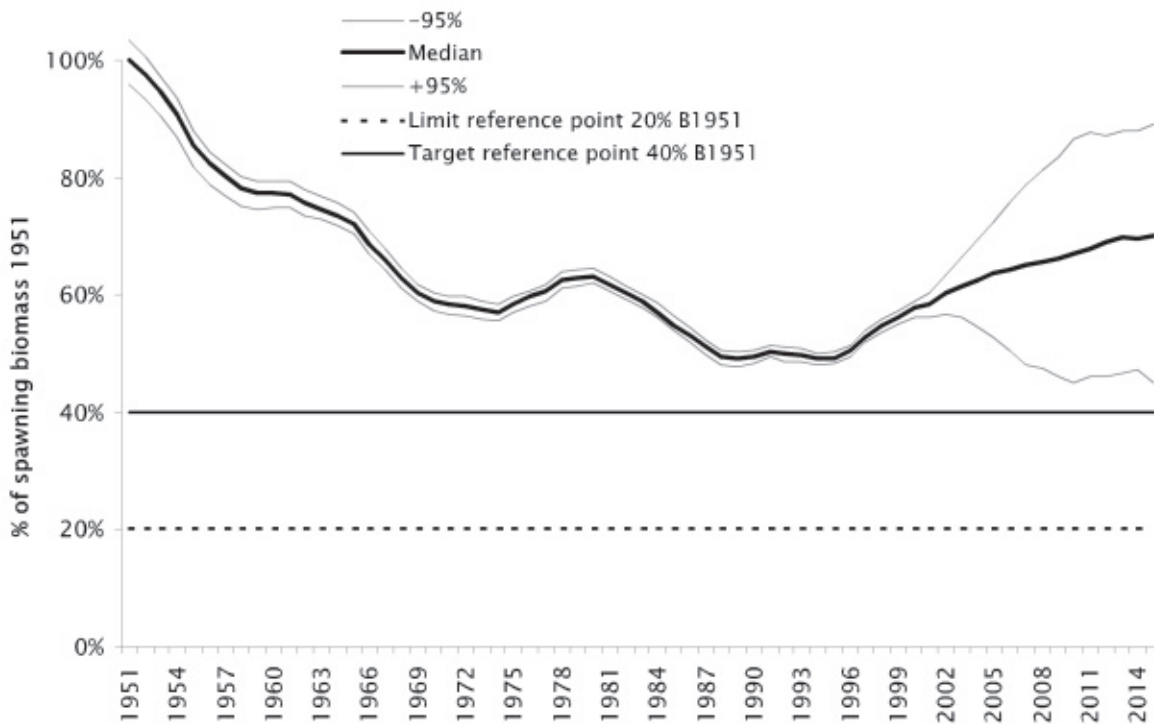
Fishery management performance will be measured by monitoring the status of the spawning and available biomass in each zone relative to the reference points, based on five-year projections. Because the limit reference point reflects the conservation “bottom line” and is set at a lower biomass level than 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 5). A lower level of probability (50%) is appropriate for the performance measure for the target reference point.

Table 5. 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 2007/08 When the limit reference point has been exceeded and 5 year projections indicate an upward trend	Reduce TAC 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 <i>Western Zone</i> Upward trend in available biomass projections	Available biomass not increasing or downward trend in 5-year projections Available biomass not increasing or downward trend in 5-year projections Increasing trend in 5-year projections	Review TAC Review TAC 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 <i>Western Zone</i> Upward trend in standardised catch rate	Increase in standardised catch rate to >0.5 kg/potlift Decreasing trend in standardised catch rate Increase in standardised catch rate to >0.7 kg/potlift Decreasing trend in standardised catch rate	Review TAC Review TAC Review TAC 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.

Western Zone – Spawning biomass / spawning biomass 1951



Western Zone – Available biomass / available biomass 1951

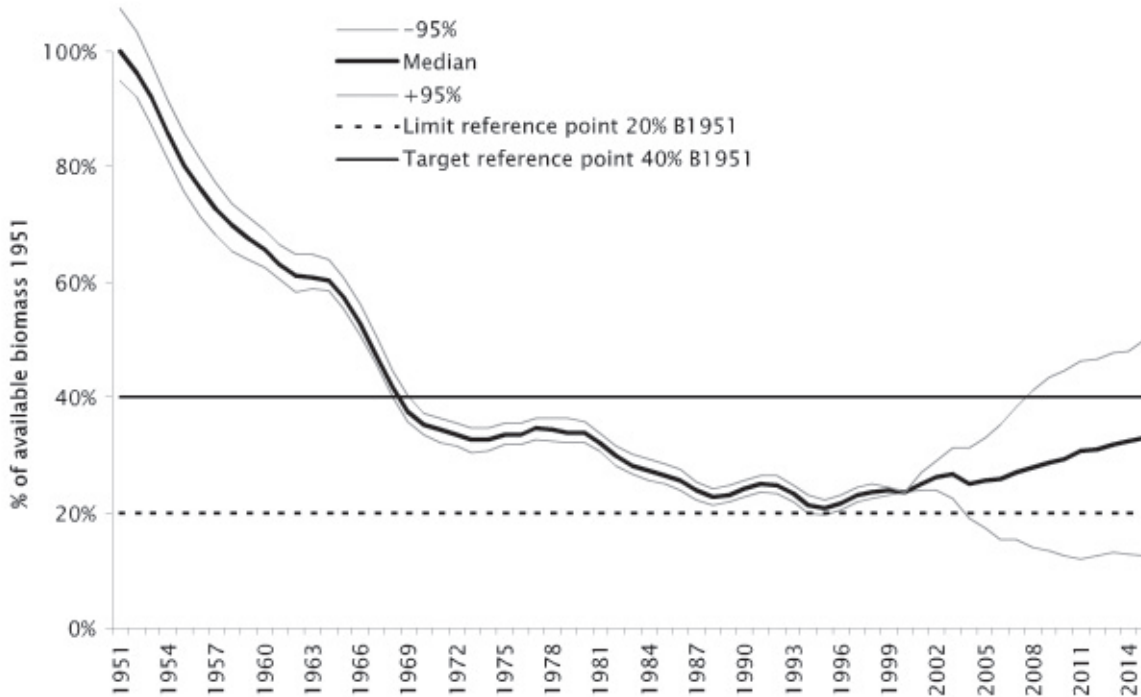


Figure 2. Predicted trends in spawning biomass (upper) and available biomass (lower) for rock lobsters in the Western Zone between 1951 and 2014, expressed as a percentage of the biomass in each year, relative to the 1951 biomass. Projections are based on a fixed TACC of 450t.

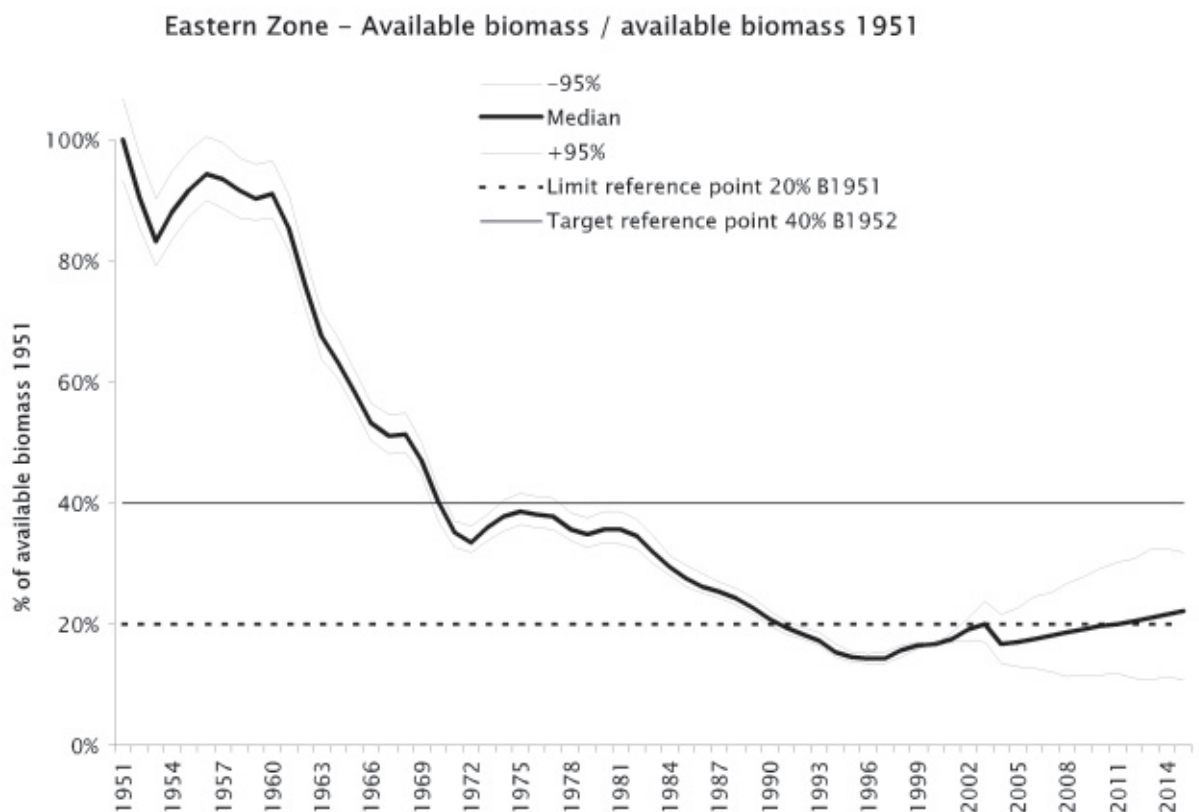
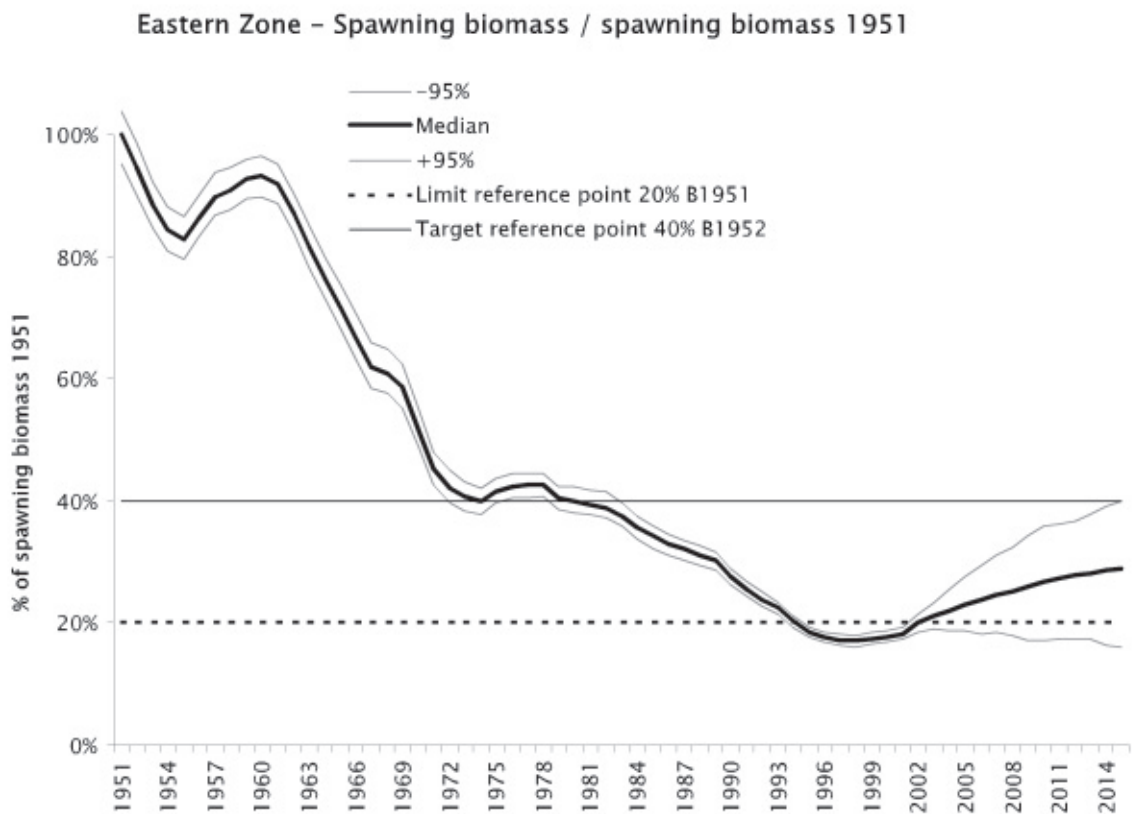


Figure 3. Predicted trends in spawning biomass (upper) and available biomass (lower) for rock lobsters in the Eastern Zone between 1951 and 2014, expressed as a percentage of the biomass in each year, relative to the 1951 biomass. Projections are based on 60 t fixed TACC .

As well as indicators and reference points, the RLFMP specifies required trends in indicators, and the timeframe for recovery (Table 5). 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.

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 5). Pre-determined management actions, also called "Decision Rules", stipulate the required response, giving clear directions to the TAC Forum (see below). 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.

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.

Stock assessment and model projections

The current stock assessment³ is based on a sophisticated length-structured model⁴ that utilises data on catches in weight and number, catch rates, the sizes of lobsters in the catch and biological information such as growth, reproductive characteristics and mortalities.

Data sets used in the assessment include: a reliable and long time series of commercial catch and effort data that have been collected since 1951; size frequency of males and females in commercial catches that have been collected systematically since 1963; preliminary estimates

of the recreational catch 1996-98; more than 3500 tag recaptures, larval settlement and pre-recruit monitoring data since 1994.

The model enables projections of future stock biomass and allows the impacts of future catches on the resource to be assessed. The model has been adapted to enable the impacts of the introduction of MPAs in Victoria to be incorporated into the assessments.

Figures 2 and 3 show examples of model outputs for the Western and Eastern Zones, respectively. Each figure shows the trajectory of spawning biomass and available biomass from 1951 to the present with 15-year projections to 2017. The projections are based on fixed TACCs of 450 tonnes in the Western Zone and 60 tonnes in the Eastern Zone. In the example shown, it is assumed that future recreational catches will remain constant.

The assessment takes into account the implementation of MPAs in each zone and allows for a 10% migration of lobsters from the MPAs. The target and limit reference points are shown in each figure. The 95% confidence intervals get wider with increasing time into the future, reflecting the decrease in certainty beyond the range of the data used in the model.

Co-management Process for Reviewing Management Arrangements

The foundations of co-management in Victoria were established by the *Fisheries Act 1995*. This concept allows for a greater level of stakeholder input into the decision making process. In addition to the existing co-management arrangements, a TAC Forum will be established 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 Fisheries Co – Management Council's Commercial Rock Lobster and Giant Crab Fishery Committee (CRLGCFC) and Recreational Marine Committee (RMC), representatives of peak bodies, observers and DPI staff (policy, compliance, and research). There will also be an annual meeting to improve fishery management, education and compliance strategies.

³ Hobday, D.K. and Smith, D. (2003)

⁴ Hobday, D.K. and Punt, A.E. (2001).

Process for setting the total allowable catch, size limits and closed season

Following the annual stock assessment workshop, the TAC Forum will provide annual TAC recommendations and other advice to the DPI, and the FCC through the Commercial Rock Lobster and Giant Crab Fishery Committee and the Marine Recreational Committee (Figure 4).

After considering the TAC recommendation, the DPI will prepare management advice including size limits, closed seasons and draft quota orders for the Minister. There will be a further formal consultation between the Minister, the FCC and the peak bodies before the Minister makes the decision. The final quota order will be signed in time for licence renewals for the next quota period.

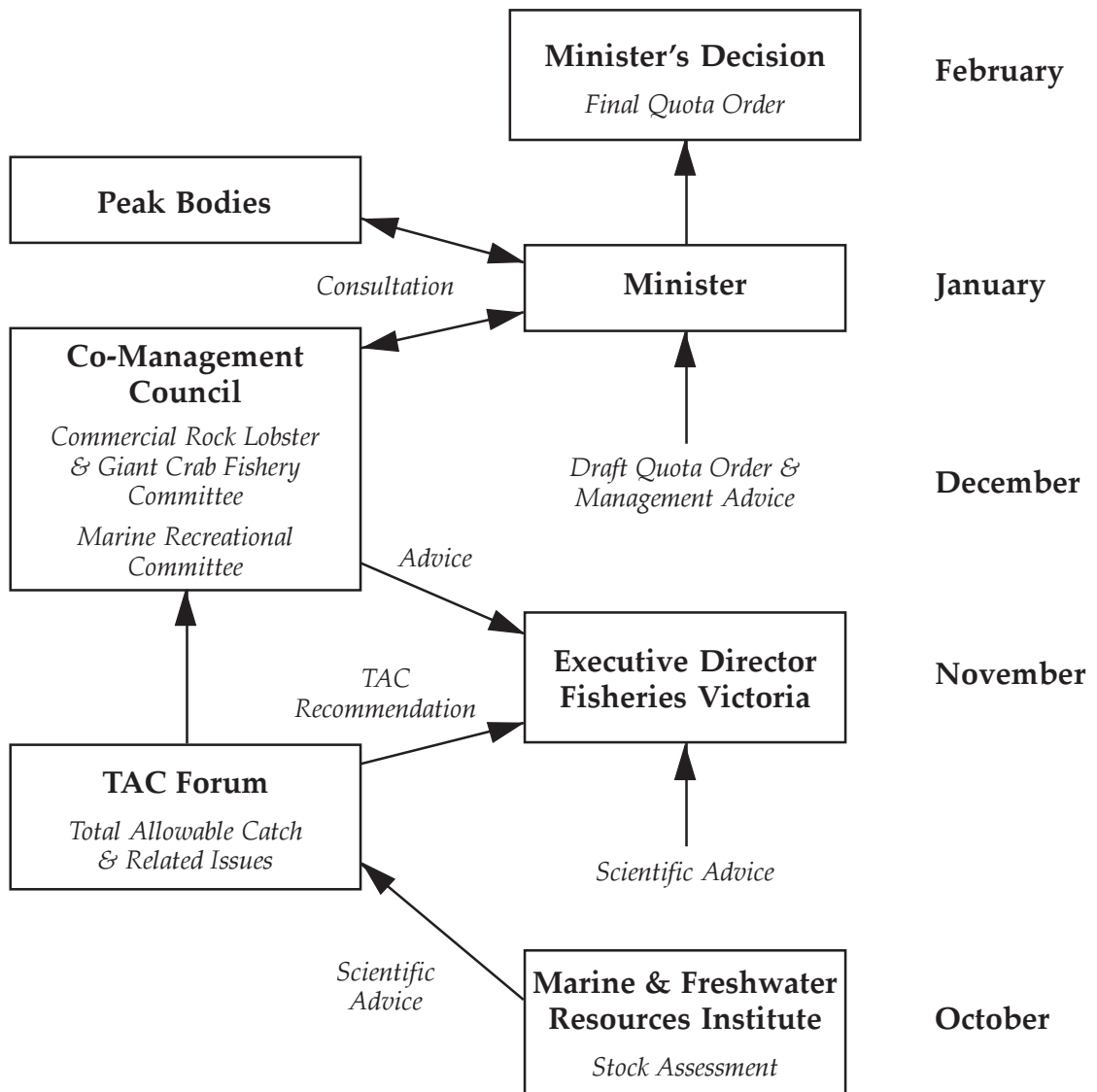


Figure 4. Co-management process for advice, consultation and decision making in relation to annual TAC setting

Commercial Fishery Management

The commercial fishery in each zone will be managed within the TACC, which is divided into ITQ units. The TACC is divided amongst 4000 quota units in the Western Zone and 1000 quota units in the Eastern Zone.

The TACC will be set for the southern rock lobster, *Jasus edwardsii*, and will not include the catches of the eastern rock lobster, *Jasus verreauxi*. Monitoring of by-product will be improved and catches of eastern rock lobster will be recorded separately on fishing returns. 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.

The LML will be reviewed as part of the TACC setting process to manage the available and spawning biomass in each zone taking into account the differences in size at onset of maturity and growth. There is potential for a lower size limit in the Western Zone because the size at onset of maturity is lower than the LML.

Input controls that are consistent with the principles of ESD will remain including fishing seasons, definitions of fishing gear and the total numbers of pots in each zone of the fishery.

Fishing Rights, Access, Quota Ownership and Entitlements

Rock lobsters are owned by the Crown with ownership passing to the licence or permit holder when they are taken from waters under Victorian jurisdiction in accordance with the conditions of the licence or permit. In each zone, the RLFAL holders with rock lobster quota are permitted to use their pot entitlements to take rock lobsters within their quota allocation. Rock lobster fishing entitlements are based on the legal ownership of RLFAL holders to quota holdings and pot entitlements as defined in the *Fisheries Act 1995*. RLFALs, quota holdings and pot entitlements are linked but may be traded

independently within each zone of the fishery. The ownership of quota units in the rock lobster fishery will remain with RLFAL holders.

Licensing Arrangements

The RLFAL will specify the licence holder, operator, boat, pot entitlement and zone. The maximum number of access licences issued will be 85 in the Western Zone and 54 in the Eastern Zone (Table 6). Licences will not be replaced when cancelled by a Court or removed from the fishery through mechanisms such as non-renewal or amalgamation. Access licences will continue to be fully transferable.

Table 6. Summary of Licensing Arrangements

Licences	Western Zone	Eastern Zone
Maximum number of licences	85	54
Maximum number of licences on a boat	no maximum	no maximum
Pots		
Total number of pots in April 2003	5147	2021
Maximum pots on a licence	no maximum	no maximum
Maximum pots on a boat	140	120
Minimum pots on a licence	no minimum	no minimum
Minimum pots to activate licence	20	15
Quota		
Maximum quota holding	no maximum	no maximum
Minimum quota holding	10 units	5 units

RLFALs expire on 31 March each year. Licences must be renewed before this date if the licence holder wishes to commence fishing at the start of a new quota period on 1 April. Licence holders will not receive a quota notice for a new quota

period until their licence is renewed. RLFALs will be issued for a year, but options for five-year licences will be considered after further consultation.

A licence holder may apply to vary the conditions on the access licence relating to the operators, boat and pot entitlements. The regulations will be amended to allow up to two operators to be named on a RLFAL so that either person may operate the licence. The same boat may be specified on more than one access licence for the same zone, but not for different zones. This will allow multiple licences to be operated from one boat within a zone. Although the fishing capacity of the fleet will continue to be contained by the total pot limit in each zone, pots may be permanently transferred between RLFAL licences within each zone. In addition, arrangements for temporary transfers of pots for one licensing year will be introduced.

Quota Holdings

Each year when a licence is renewed, a quota notice is issued with the ITQ units owned by each licence holder. Only RLFAL holders are entitled to own ITQ units. A licence holder may apply to transfer ITQ units to the holder of another RLFAL within the same zone. ITQ units may be transferred permanently, or for a quota period. There will be no maximum amount of ITQ units that can be held on a licence in either zone. The minimum holdings of ten ITQ units in the Western Zone and five ITQ units in the Eastern Zone will be retained to contain quota management costs associated with compliance (Table 6).

Pot Entitlements

The total number of pots on licences in April 2003 is 5147 in the Western Zone and 2021 in the Eastern Zone. The use of these pots represents the environmental “footprint” of the fishery. In order to minimise the “footprint” and to be consistent with the principles of ESD, the limit on the total number of pots that can be used in each zone of the fishery will be retained. This will address concerns about potential wastage of the resource caused by octopus predation of rock lobsters in pots that are not lifted each day. It also recognises that a larger number of pots in the fishery would increase the possibility of interaction with marine wildlife.

Minimum and maximum pot entitlements on a licence

There will be a change to the minimum number of pots that are required on a licence. Licence holders will be able to own quota without pots, but to operate in the fishery, active licences must have a minimum of 20 pots in the Western Zone and 15 pots in the Eastern Zone (Table 6).

There will be no maximum number of pots that may be held on a licence in either zone. This is considered to be an unnecessary restriction as there is no limit on the number of licences that a person can own or the number of licences that can be attached to one boat. However, the maximum number of pots that can be worked from one boat will be 140 and 120 pots in the Western and Eastern Zone, respectively. This reflects the maximum number of pots used in 2002, which is much greater than the average for the fleet.

National Competition Policy

Following the NCP review of the *Fisheries Act 1995*, several recommendations for the rock lobster fishery were accepted by the Victorian Government. The planned introduction of ITQ management was found to be consistent with NCP recommendations as a means of achieving a sustainable catch and correcting for excess fishing effort. The removal of pot restrictions per boat was recommended in the Government response to NCP to allow economies of scale and entry of small-scale operators taking into account compliance costs. A process of public auction, tender or ballot was recommended in the Government response to NCP in order to adopt an efficient and transparent process for the allocation of extra quota above threshold limits.

Pot limits for the fishery

For sound economic, ecological and biological reasons, the total number of pots used in the fishery will not be increased. This will help to achieve a sustainable catch, correct for excess fishing effort and prevent an increase in potential hazards for boats and wildlife. It will also reduce the risks associated with the unrestricted use of pots during winter such as overfishing of males, imbalanced sex ratios and impaired reproduction. From an environmental point of view, the advantages of not using more fishing gear to take the commercial catch is widely recognised as an important principle of ESD. The need to minimise by-catch and wildlife interactions and environmental effects of fishing will be addressed by containing the fishing capacity of the fleet.

There is also concern that the removal of restrictions on the fishing capacity of the fleet may lead to inefficiency. This may occur because of economic incentives for individuals to use large numbers of pots that will result in environmental and economic losses to the fishery as a whole. Larger pot numbers may be used to monopolise prime fishing grounds and this could lead to gear interactions and create input inefficiency. Furthermore, this may also cause higher mortality of rock lobsters from octopus predation if all pots are not lifted daily.

Pot entitlements are also recognised as valuable assets that are freely traded according to competitive market forces amongst licence holders in each zone. There is a very strong consensus within the fishing industry that the total number of pots used in the fishery should not be allowed to increase and that pot entitlements on licences should be retained.

Changes to restrictions on quota holdings and pots

Management arrangements will be changed to accommodate the Government's response to NCP. Restrictions will be removed on maximum quota holdings, maximum and minimum numbers of pots on a licence, and multiple licences on a boat. The 50-pot limit in the Apollo Bay Paddock will be withdrawn by November 2007.

In order to minimise compliance costs, there will be a minimum of ten and five quota units in the Western and Eastern Zone, respectively. Compliance costs are directly related to the number of active licences. The minimum number of quota units will discourage inactive licences, particularly in the Eastern Zone, from becoming active using very small quota holdings. There will also be a minimum of 20 pots in the Western Zone and 15 pots in the Eastern Zone for active licences.

Relationship between quota holdings and pot entitlements

Quota units and pot entitlements on access licences will remain as separate, independently tradeable commodities within the fishery. This will enable the industry to restructure in an efficient manner. It will also allow greater flexibility for licence holders.

Allocation of additional quota above threshold levels

Allocation of new quota units will only be considered when there is a 75% probability of the stocks remaining above the target reference

point (40% of the 1951 available biomass) for 3 years. Any new quota units will be temporary and valid for a single quota year, and can only be held by an existing RLFAL holder.

Apollo Bay Paddock

A review of management arrangements for the Apollo Bay Paddock 50-pot zone was specifically identified in the Minister's Guidelines and the Government's response to the NCP. The regulations relating to the 50-pot limit in the Apollo Bay Paddock are regarded as anti-competitive according to the NCP. However, if these regulations were immediately removed, local catch rates and stock abundance would decline as operators with larger pot entitlements moved on to this prime fishing ground. The recent establishment of MPAs nearby is also expected to translocate fishing pressure into the Apollo Bay Paddock. The combined impacts would disadvantage the local fleet that is still adjusting to the changes associated with the introduction of quota management.

Although it is recognised that the independent quota allocation panel took into consideration the lower numbers of pots used by Apollo Bay RLFAL holders in the past there are compelling biological, social and economic reasons for allowing a period for adjustment. A transition period will provide more time for Apollo Bay and Port Campbell operators to buy more pots or quota and become more competitive as they have had little incentive to invest in additional pots in the past.

The Apollo Bay Paddock 50 pot zone has a higher abundance of rock lobsters than adjacent fishing grounds. Providing more time for the stocks to re-build will reduce the incentive for a concentration of fishing activity in the Apollo Bay Paddock when the regulations are removed.

In order to take these special circumstances into account, the following strategies will be adopted to remove the regulations relating to the Apollo Bay Paddock:

- The 50-pot limit will be withdrawn by 15 November 2007.
- Until the 15 November 2007, licence holders will be restricted to 50 pots on each licence.
- Prior to 15 November 2007 licence holders will be able to use up to two licences on a boat and will be allowed to use 50 pots from each licence on a boat.

- Waters greater than 150m depth will be excluded from the Apollo Bay Paddock 50 pot zone (see Figure 1).

There will also be no restriction on the numbers of giant crab pots that may be carried on a boat through the Apollo Bay Paddock provided the pot limit per boat is not exceeded.

These strategies will allow giant crab access licence holders to transport their pots across the Apollo Bay Paddock and use their full pot entitlements in waters deeper than 150m. Eventually, Western Zone licence holders will be able to use their full pot entitlement throughout the Western Zone after these regulations are withdrawn.

Eastern Zone Corridor

Licence conditions relating to the Eastern Zone Corridor will be removed when these licences are transferred. However, the only licence holder with a recent rock lobster catch history in the Eastern Zone Corridor will continue to be allowed to take rock lobster in this area. The remaining licence holders with conditions that permit fishing in the Eastern Zone Corridor will not be allowed to take rock lobsters but will continue to be allowed to take fish with fish traps in this area until their licences are transferred.

Far Eastern Zone Fishery

The Far Eastern Zone will not be established due to the fact that there is no longer any support for this proposal. There is strong opposition from the industry resulting from the fact that boundary changes would adversely affect quota trading and licence values.

Commercial Fishery Compliance and Communication

Compliance Strategy

Fisheries Victoria, in consultation with the peak bodies, will develop a compliance strategy for the rock lobster fishery during 2003/04. The compliance strategy will include:

- A schedule of management actions for implementation.
- Performance measures.
- A monitoring and review process to ensure that the objectives of the compliance strategy are achieved.

The priorities for the compliance strategy will be to ensure that:

- The catches taken in Victorian waters are within the quota holding for each RLFAL so that the total catch from each zone does not exceed the commercial TAC.
- Rock lobster pots used by operators comply with regulations and pot entitlements.
- Compliance with legal minimum lengths, bag limits and possession limits.
- The taking of rock lobsters for sale by people without a RLFAL and quota is reduced.
- Rock lobsters are not taken from Marine Protected Areas.

Communication Strategy

Fisheries Victoria, in consultation with peak bodies, will develop a communication strategy for the rock lobster fishery during 2003/04. The strategy will include:

- A schedule of management actions for implementation.
- Performance measures.
- A monitoring and review process to ensure that the objectives of the education strategy are achieved.

Priorities will include :

- Holding an annual meeting for RLFAL holders, fisheries officers and managers to assist research, management, compliance and communication.
- Community awareness about offences.
- Public access to information on fisheries management and research through the DPI website and other media.

Code of Practice for Commercial Fishing

In order to encourage all aspects of commercial fishery management, a code of practice will be developed by CRLGCFC to minimise fishing impacts on the ecosystem and wildlife interactions and to enhance stock conservation, research and compliance. Implementation and extension of this code of practice will be a high priority for FCC and SIV.

Arrangements for interstate landings

Previously, rock lobster catches from Victorian waters could be landed in Port MacDonnell (SA) and in Eden (NSW), but not in Tasmania. Following discussions with Tasmanian authorities, new arrangements will be requested during the period of the RLFMP to allow with prior notice, the landing of rock lobsters caught in Victorian waters at specific Tasmanian ports,

including Currie, King Island. The additional cost of management arrangements incurred to enforce Victorian legislation relating to landings at ports in other states will be recovered from the operator.

Fees and Levies

The Victorian Government and the FCC is reviewing policies on cost recovery for fisheries management in Victoria. Subject to Government policy, it is likely that there will be progressive introduction of cost recovery that is consistent with the NCP response. Fees will continue to be charged to cover the administrative costs for licence transfer and variations.

RLFAL holders will continue to contribute to the cost of management, compliance and research through an annual levy when licences are renewed. The basis for the levy will be changed however, to be consistent with quota management. Currently, the levy for RLFALs consists of a fixed amount for each licence and a variable amount based on the number of pots. The variable amount will be changed to reflect the number of quota units and pots on the licence. Two thirds of the variable component of the levy will be based on quota units and one third on the pot entitlement.

Recreational Fishery Management

This management plan recognises the principle of resource allocation and establishes a quota for the recreational fishery. A TARC will be introduced and set at 5% and 10% of the TAC in the Western Zone and Eastern Zone, respectively. This will allow the recreational catch to be increased or decreased equitably.

Management of the Recreational Catch

The TARC, which represents an upper limit, will be the reference point to trigger a management review. The TARC requires improved knowledge of the recreational catch. RFL endorsement or other agreed methods of improved monitoring and estimation of the recreational catch will be established as a matter of high priority.

The current management regime and the current regulations applying to the recreational fishery will remain. The fishery will continue to be managed with daily bag limits, fishing gear controls and seasonal closures. In general, regulations in relation to the stock that apply to the commercial sector will apply equally to the

recreational sector. Proposals to changes in the regulation regime applying to the recreational fishery will occur through an open and transparent consultative process between FCC, the DPI, Fisheries Victoria and recognised peak bodies.

Use of hookah and other recreational fishing methods

There will be no change to recreational fishing methods for taking rock lobster, which will only be based on active fishing methods. Recreational licence holders will continue to be allowed to use two hoop nets per person, hookah diving equipment, SCUBA and snorkel gear to take rock lobster by hand. The current prohibition on the use of snares and blunt hooks in the recreational rock lobster fishery will be reviewed when reliable estimates of the recreational catch have been obtained.

Legal minimum length, bag limits and marking

In general, the LML will remain consistent with the commercial sector unless all relevant stakeholders are consulted and it is determined that it is in the interest of the fishery to do otherwise. Daily bag limit and possession limits will apply. There will be no change in the regulations that require all rock lobster taken by recreational fishers to be effectively marked within five minutes of landing rock lobster in a boat or on shore.

Code of Practice for Recreational Fishing

In order to encourage all aspects of recreational fishery management, a code of practice for recreational fishing will be developed by the Marine Recreational Committee of the FCC, VRFish and the Victorian Scuba Divers Federation to enhance stock conservation, research and compliance.

Recreational Fishery Compliance and Communication

The compliance and communication strategies will aim to improve compliance with bag limits; size limits and marking of rock lobsters by regularly checking popular diving sites, particularly on weekends. Compliance with regulations relating to fishing gear, particularly in regard to the number of hoop nets per person, will be improved through implementation of the compliance and communication strategies.

Traditional Access and Use by the Indigenous Community

Native title is based on the laws and customs of indigenous people and is recognised by the common law of Australia. Under the *Commonwealth Native Title Act 1993*, indigenous people can claim native title on Crown land and waters in their traditional lands and waters. The Victorian Government is committed to building a new understanding between Victoria's Aboriginal people and the wider community. The Government is working towards reconciliation through its *Indigenous Partnership Strategy*. The Victorian Government has indicated that its policy will be to mediate native title claims.

For specified cultural and ceremonial purposes, members of the indigenous community may be issued with general fisheries permits that allow rock lobsters to be taken beyond the recreational bag limit. These strategies will provide resource access and allow traditional use of rock lobsters by the indigenous community.

Development of Aquaculture

The potential for rock lobster aquaculture is based on the high price and large domestic and export markets for live and processed product. The conclusion of the interstate and international review (Appendix 5) found that there were four main approaches to rock lobster aquaculture including closed culture, on-growing of wild caught puerulus, on-growing of fishery caught lobsters and wild stock enhancement.

Rock lobster aquaculture of faster growing tropical species has been demonstrated to be commercially viable in other countries where labour costs are low and puerulus can be economically harvested in the wild.

Aquaculture techniques for southern rock lobster propagation and production have not yet been developed. The results of large scale industrial trials in New Zealand using southern rock lobster have clearly shown that the harvest and on-growing of puerulus from the wild is not economically viable using presently available technology. Hatchery production is not yet technically feasible and further research is needed to successfully develop commercial rock lobster aquaculture in Victoria.

Opportunities for Rock Lobster Aquaculture

In Australia, FRDC established the Rock Lobster Enhancement and Aquaculture Sub-Program (RLEAS) in July 1998 to develop a cohesive and nationally coordinated approach to the research and development issues for all commercial species of rock lobster. The objective of the program is to provide technology for use in Australian rock lobster enhancement and aquaculture systems so they can be internationally competitive and can operate in harmony with the wild fisheries. More than \$8 million has already been committed to research and development in Australia so far however, considerable technical and logistical difficulties have yet to be overcome.

The technology is intended to encourage the development of a viable rock lobster aquaculture

industry in Australia, but with specific consideration and contingency for:

- Protection of the wild fishery in terms of economic and social viability.
- Neutral or positive impact on the wild fishery in terms of stock numbers while maintaining genetic integrity.
- Commercial viability of closing the life cycle of rock lobsters.

The RLEAS Steering Committee recently reviewed the research and development priorities. It was concluded that the long-term future for rock lobster aquaculture depends on the development of propagation techniques that will enable the hatchery production and culture from eggs to juvenile rock lobsters. Lower priorities were assigned to on-growing of puerulus and wild fishery enhancement.

Rock Lobster Aquaculture Strategy

During this management plan, international developments in rock lobster aquaculture research will be monitored and reviewed again. The DPI aquaculture extension officers, VAC and FRDC RLEAS will disseminate information on rock lobster aquaculture to industry members. If there is a significant advance in technology, a report on the developments will be prepared for the DPI and stakeholders. In such an event, opportunities for aquaculture research and development projects would be considered and recommended by a working group with equal representation from the DPI and members of the fishing and aquaculture industry. Approvals for research and development permit applications will take into consideration the need for environmentally sound and economically viable rock lobster aquaculture. The issue of research permits would only allow the harvest of puerulus from the sea in such a way that there would be no negative impact on wild stocks.

Aquaculture research and development through the FRDC Sub-program into propagation techniques and broodstock manipulation will be encouraged as a high priority. Techniques for wild stock enhancement and the use of artificial reefs will also be evaluated.

Ecosystem Interactions

Ecological Impact of Rock Lobster Fishing

One of the fundamental principles of ESD is that fisheries management should minimise the impact of fishing on the structure, productivity, function and biological diversity of the ecosystem. Rock lobster pots are believed to have minimal direct effects on the seabed. For example, each year the entire fleet of pots contacts less than 0.0017% of the total area of seabed at less than 150m depth.

Discarding of undersized, damaged, soft shell and berried rock lobsters

Direct impacts of fishing through mortality of discarded rock lobsters will be assessed by implementing a monitoring program so that these effects can be taken into account in stock assessments.

Escape gaps will continue to be used in pots to minimise the by-catch of undersized rock lobsters. In order to minimise discarding mortality of those that are caught in pots, undersized rock lobsters and crabs are quickly returned to the sea alive near the habitats where they were caught. The closed season provides protection for female rock lobsters and giant crabs in berry.

Table 7. The main species and total catch (tonnes) of by-product in each zone reported 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	2.9	0.0	2.9
unspecified			
Wrasse	2.2	2.7	4.9
unspecified			
Snapper	1.6	0.6	2.2
Other	5.2	2.5	7.7
(25 species)			
Total	37.4	13.3	50.7

By-catch species

Fishery interactions with by-catch species are believed to be low because the majority of species, such as hermit crabs, are caught and released alive. However, a system of by-catch monitoring, including independent validation, will be introduced by 2004. The data collected will then be available for ecological risk assessments. Fishing effects on by-catch species will be minimised through codes of practice.

Species landed as by-product or used as bait

Twenty-three tonnes of octopus and 28 tonnes of fish were retained as by-product in 2000/01. There are about 30 fish species landed as by-product, but it is mostly composed of leatherjackets (Table 7). Crabs (giant crab *Pseudocarcinus gigas*, sand crab *Ovalipes australiensis* and velvet crab *Nectocarcinus tuberculosis*) are also caught in lobster pots and landed. Giant crabs above the legal minimum length are retained by those with access to and quota for the giant crab fishery.

The catch of eastern rock lobster, *Jasus verreauxi*, is unknown but considered to be less than 0.5 t. Catches will be reported on fishing returns separately as a by-product. Direct impacts of fishing and indirect ecological effects on reef communities from the mortality of by-product species will be assessed by implementing a monitoring program. The data collected will then be available for ecological risk assessments.

Biodiversity conservation

There is no available evidence that would support the listing of rock lobsters or any of the known by-catch or by-product species as a threatened species in Victoria under the *Flora and Fauna Guarantee Act 1988*. The management regime will monitor by-catch and by-product species in order to assess the effects of the fishery on the biodiversity values in the coastal waters of Victoria so as to minimise the environmental impacts.

Protection of wildlife

Protected wildlife species that inhabit Victorian waters include dolphins and whales (Southern Right Whales *Eubalaena australis*, Blue Whales *Balaenoptera musculus*, and Humpback Whales), the leatherback turtle (*Dermochelys coriacea*) and Australian fur seals (*Arctocephalus pusillus doriferus*).

Both the Southern Right Whale and the Blue whale are listed as “Endangered” under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*, and listed as “Critically endangered” in Victoria. The *Flora and Fauna Guarantee Act 1988* lists the Southern Right Whale.

Interaction between rock lobster fishing gear and protected species of wildlife is extremely rare in Victoria. There have been no confirmed 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.

Potential direct impacts on marine mammals and turtles from entanglement in potlines will be contained by preventing an increase in fishing capacity and by implementing codes of practice to assist wildlife protection. In order to collect more information on the interactions between fisheries and marine wildlife, a new monitoring program will be implemented. Penalties for failing to report interactions with protected species will also be reviewed.

There are occasional interactions with the large and expanding seal population in Victorian waters. 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 is 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. 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. During the RLFMP, these industry initiatives to improve wildlife protection will be encouraged and incorporated in a code of practice.

Identification of Critical Habitats for Rock Lobsters

Although it is well known that rock lobsters are predominantly a reef dwelling species, there is very little information on the habitat requirements and ecological relationships of juvenile or adults with other species in Victorian waters. Further research and monitoring will enhance scientific knowledge of reef habitat status and species interactions.

Reduction of Human Impacts on Rock Lobster Habitats

Some of the risks to the ecological integrity of reef communities have been identified below in Table 8. In order to minimise or mitigate harmful activities and avoid long-term degradation of reef ecosystems, all threatening processes will be recognised in an ecological risk assessment. Rock lobster habitat assessments for shallow and deepwater reefs will be conducted to evaluate the threatening processes. However, more scientific knowledge is needed about the complexities of the ecological interactions between rock lobsters and other exploited reef species, particularly abalone and sea urchin. The structure and function of communities on fished reefs will be compared to those reefs in MPAs.

Other ecological issues

In order to minimise the ecological threats caused by the introduction of exotic species, the policies of the Victorian and Commonwealth Governments will be implemented as they are developed. Industry initiatives to utilise endemic fish from Australia for bait will help to prevent the introduction and translocation of exotic species. This will be encouraged and incorporated in a code of practice.

Responsibility for environmental assessment and management

There are many Victorian and Commonwealth agencies that are responsible for monitoring, assessment and management of the marine environment. All relevant Government policies and strategies, such as threat abatement plans, threatened species recovery plans, National Action Plans, by-catch action strategies will be considered and fishery management arrangements altered as necessary.

The process for incorporating policies and strategies from other Government agencies will involve consultation during the annual forum

and meetings of the committees of the Fisheries Co-Management Council, peak bodies and Fisheries Victoria.

Fisheries Victoria will also 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.

Table 8. Some risks to the ecological integrity of reef communities

Ecological impact	Examples of threatening processes	Management Action
Physical damage or disturbance of reefs	Channel deepening Submarine cables or pipe laying Oil industry construction Trawl or scallop fishing near reefs	Input into preparation of Environmental Impact Statement Development of ecological indicators, performance measures, triggers and decision rules Development of a fishing code of practice
Mortality of rock lobsters and other species	Discards of undersized, damaged, softshell and berried rock lobsters Seismic surveys	Research, monitoring and by-catch assessment Input into preparation of the Environmental Impact Statement
Temporary ecosystem change	Excessive fishing of reef species such as rock lobster, abalone and sea urchins	Research, monitoring and ecological risk assessment Development of ecological indicators, performance measures, triggers and decision rules
Permanent ecosystem change	Introduction or translocation of exotic marine species and diseases	Research, monitoring and ecological risk assessment including types of bait used Input into ballast water protocols Development of ecological indicators, performance measures, triggers and decision rules and emergency responses
Environmental pollution	Effects of nutrient inputs and algal blooms from rivers and ocean outfalls Pollution from shipping	Collaboration with the Victorian Environmental Protection Agency Development of ecological indicators, performance measures, triggers and decision rules, and emergency responses

Research and Development

Research and development is a vital component of rock lobster fishery management and aquaculture development. There has been considerable investment in research on rock lobster in Australia and New Zealand at a number of research institutes and universities. International workshops on lobster biology and management are held every three years providing benchmarks for scientific advancement and opportunities for shared knowledge and research collaboration. Given this background the rock lobster resource by fisheries standards, is well monitored and understood.

The main focus for research and development during the next five years will be to provide the information required for implementing Government ESD policies for fisheries and aquaculture in Victoria. To meet this need, information is required in the following categories:

Fisheries biology and assessment

The aim is to improve the understanding of stock dynamics and evaluation of alternative management measures. This includes:

- Development of better indicators of stock status including fishery independent surveys and more robust estimates of the recreational catch.
- Further development and refinement of stock assessment models.

Ecological studies

The aim is to gain an understanding of the relationship between rock lobster stocks and the ecosystem with regard to reef habitats and the impact of fishing. This includes:

- Development of robust sustainability indicators.
- Understanding the interactions of rock lobster with other species and the impacts of harvest on these relationships.

Social and economic evaluation

The aim is to obtain information on the social and economic consequences of trends in the fishery and the implications of management actions. This includes:

- Economic assessment and monitoring of the fishery.
- More information on the social and economic aspects of the catching, post harvest and recreational sectors.
- Evaluation of management measures to ensure optimal utilisation.

Aquaculture

The aim is to monitor the development of techniques for rock lobster aquaculture and to assess opportunities for applications in Victoria.

Research Planning and Priorities

Identifying research needs and priorities is a dynamic process that requires clear mechanisms to ensure that research meets the needs of management and stakeholders.

It is appropriate that the Rock Lobster Fishery Assessment Group (RLFAG) guide research priorities for the commercial and recreational sector. Priorities for aquaculture research will be identified in conjunction with the FCC Aquaculture Committee, the VAC and the FRDC RLEAS. These groups will liaise with the FCC Research Committee that is responsible for providing advice on research and development issues, strategic research planning and advice to FRDC on funding research and development in Victoria.

The FCC Research Committee has developed a five-year research plan and a review process. This will involve close liaison between the FCC Research Committee the RLFAG, CRLGCFC, and MRC. The future research needs and priorities shown in Appendix 6 are based on those identified by the FCC Research Committee.

Research Funding

The DPI and FRDC have provided most of the research funding for rock lobster research in Victoria. Revenue derived from recreational licences represents a potential funding source. Private investment in research and development by companies interested in aquaculture and cooperative research with the fishing industry and the recreational sector are supplementary sources of funding that will be encouraged.

The FCC Research Committee will make recommendations to FRDC based on project proposals submitted by research providers. The DPI will make decisions on budget allocations for rock lobster research and monitoring programs.

Support for research proposals by the RLFAG and aquaculture committees will enhance the prospects of research funding allocations.

Management Plan Implementation

The RLFMP describes new arrangements for the management of rock lobster stocks in Victorian waters, with emphasis on:

- Ecological sustainability and resource utilisation by the commercial fishing industry.
- Development of aquaculture.
- Access for the recreational and indigenous communities, with due regard for the rights of future generations.

The RLFMP will have effect following the Minister's declaration by a notice published in the *Government Gazette*. In further support of the RLFMP it will be necessary to amend the *Fisheries Act 1995* and associated regulations. Ongoing implementation will require actions by the Government with respect to certain policy matters, by the DPI with respect to day-to-day management and by the other stakeholders.

An annual progress report of RLFMP implementation will be prepared providing details of improved management arrangements, stock assessments, research and monitoring,

education and compliance strategies. The RLFMP, stock assessments and implementation progress will be made available to the public through the internet and published reports.

Costs of Implementation

Estimates by Fisheries Victoria of the establishment and recurrent costs for the implementation of the RLFMP are listed against the identified strategies in Table 9. These costs will be met through budget allocations to DPI and implementation of cost recovery policies established by Government.

Review of the Management Plan

The review of the RLFMP and preparation of a new plan will commence in 2007 and will examine all aspects of fisheries management against the defined goals, performance indicators and reference points. Should there be a need for the Minister to amend the plan prior to its review notice of this intention will be published in the *Government Gazette*.

Table 9. Responsibility, Costs and Schedule for Implementation of the Rock Lobster Fishery Management Plan

Goals & Objectives	Strategy	Required Management Action	Schedule	Responsibility	Estimated Cost x \$,000
Goal 1 . Sustainability of the Rock Lobster Resource					
1a) Re-build the biomass					
Manage the fisheries within the TAC	Set the TAC and review the legal minimum length to maintain the spawning biomass in the Western and Eastern Zone above 40% and 20% of 1951 levels, respectively	Hold TAC Forum, annual review TAC in each zone and input controls, facilitate consultation process, encourage stakeholder participation, prepare draft quota orders, final quota orders and quota notices	Annual	FV & peak bodies	Within program budget
	Review the legal minimum length, bag limits, closed seasons and areas, and fishing methods	Facilitate consultation process, prepare RIS, change regulations as required, implement publicity and education strategy, implement compliance strategy	Annual	FV & peak bodies	15
Minimise discard mortality	Quantify discards of berried, damaged and undersized rock lobsters and estimate mortality	Establish a targeted research program for the commercial and recreational fisheries	Commence 2004/05	MAFRI	240
	Review seasonal closures and develop a code of practice for discarding rock lobsters	Facilitate consultation process and assist with the development of codes of practice	Completed 2005/06	FCC, SIV, FV	Within program budget
Obtain sound scientific knowledge of the stock status	Conduct research and fishery monitoring	Review and allocate funding for research and monitoring, implement research plan, prepare and distribute reports, and implement publicity and education strategy	Annual	MAFRI	Within program budget
	Conduct annual fishery independent monitoring surveys	Continue fixed site monitoring program in both zones	Annual	MAFRI	Within program budget
	Undertake annual stock assessments	Hold annual stock assessment workshop, encourage stakeholder participation, prepare and distribute reports, and implement publicity and education strategy	Annual	MAFRI	Within program budget

Table 9. (continued)

Goals & Objectives	Strategy	Required Management Action	Schedule	Responsibility	Estimated Cost x \$,000
Goal 1 . Sustainability of the Rock Lobster Resource					
1b) Maintain the ecological integrity of marine ecosystems					
Minimise wildlife interactions	Maintain or reduce the total number of pots used by the fleet. Identify and quantify interactions between fishery and protected species of wildlife	Monitor pot numbers, implement a monitoring program to collect data on fishery interactions with protected species of wildlife Hold a management workshop with conservation groups, industry, fisheries officers and managers to develop ways to reduce fishery-wildlife interactions. Facilitate consultation process and assist with the development of codes of practice	Annually from 2003/04 Complete 2005/06	FV, FCC, SIV FV, FCC, SIV, EA	65
Assess ecological risks of fishing and identify major threats to rock lobster habitats	Continue to use escape gaps in pots and implement a bycatch monitoring program	Determine and quantify by-catch	Commence 2003/04	MAFRI	100
	Obtain data to describe critical rock lobster habitats, monitor the ecological effects of fishing and other impacts on the ecosystem	Conduct high priority research to describe critical habitats and species interactions	Complete 2005/06	MAFRI	250
	Undertake an ecological risk assessment	Hold habitat assessment workshops every 3 years and prepare habitat assessment reports. Identify the ecological risks to rock lobster stocks, habitats and ecosystems Identify ecological information gaps Develop ecosystem performance indicators, triggers and decision rules	Complete 2004/05	MAFRI MAFRI	60
			Commence 2005/06	FV, DSE	

Table 9. (continued)

Goals & Objectives	Strategy	Required Management Action	Schedule	Responsibility	Estimated Cost x \$,000
Goal 2. Resource Access and Utilisation					
2a) Promote commercial use for economic prosperity					
Manage the commercial fishery within the TAC	Set the TAC to achieve stable or increasing commercial catches, review LML, develop indicators and reference points for social and economic aspects of the fishery	Hold TAC Forum, review TACs in each zone and input controls, facilitate consultation process, encourage stakeholder participation, prepare draft quota orders and quota notices	Annual	FV & peak bodies	Included above
	Enhance commercial fishing access	Improve provisions for fishery access licences Withdraw 50 pot limit in the Apollo Bay Paddock	Annual Complete 2007/08	FV & RLFAL holders	Within program budget
Obtain export accreditation	Meet Commonwealth guidelines for ecologically sustainable fishing	Hold briefing meetings and prepare submission to Environment Australia	Complete 2003/04	FV	25
Maintain seafood supplies	Promote the rock lobster industry, ensure food health standards and improve utilisation and marketing of by-product species	Develop and implement the Victorian seafood strategy. Implement extension, education and publicity strategy	Commence 2003/04	FCC, SIV, FV	Within program budget
Encourage competition and market forces within the ESD context by implementing the Victorian Government's response to NCP	Maintain licensing and arrangements that allow access licences, pot entitlements and quota within each zone to be independently tradeable Minimise restrictions on pot entitlements	Management of licensing arrangements, development of arrangements for temporary transfer of pots Alter the regulations associated with minimum and maximum pot numbers and remove the regulations relating to the Apollo Bay Paddock 50 pot zone by November 2007	Complete 2003/04 Commence 2003/04 Complete 2006/07	FV	5

Table 9. (continued)

Goals & Objectives	Strategy	Required Management Action	Schedule	Responsibility	Estimated Cost x \$,000
Goal 2. Resource Access and Utilisation					
2a) Promote commercial use for economic prosperity					
Identify aquaculture opportunities	Monitor and review national and international research findings	Prepare a literature review, liaise with RLEAS and implement publicity and education strategy. Encourage the fishing and aquaculture industry to participate in research and development	Every three years from 2002/03	FV, FRDC, RLEAS, VAC	Within program budget
2b) Provide recreational opportunities					
Maintain resource access for divers and non-divers	Improve recreational access by re-building the stocks Continue to allow active recreational fishing methods Encourage non-consumptive use through access for divers to no-take areas	Hold TAC Forum, facilitate consultation process, and encourage stakeholder participation Develop and implement a code of practice that is consistent with ESD Liaise with Parks Victoria and implement publicity and education strategy	Annual On-going On-going	VRFish, SDFV, FV FV, VRFish, SDFV, FCC DSE, Parks Victoria, VRFish, SDFV	Included above No cost Within program budget
Manage the recreational catch within the TAC	Quantify the recreational catch Review the daily bag limit and adjust the legal minimum length, bag limits, closed seasons and areas, and fishing methods as required	Develop licensing arrangements and a database that will enable cost effective surveys and catch estimation Undertake annual surveys to estimate the recreational catch Facilitate consultation process, prepare RIS, change regulations as required, implement publicity and education strategy, implement compliance strategy	Commence 2003/04 Complete 2004/05 Commence 2005/06 Commence 2007/08	FV, VRfish, SDFV MAFRI FV, VRfish, SDFV	100 500 As above

Table 9. (continued)

Goals & Objectives	Strategy	Required Management Action	Schedule	Responsibility	Estimated Cost x \$,000
Goal 2. Resource Access and Utilisation					
2c) Provide opportunities for indigenous communities to access the resource for traditional purposes					
	Provide equitable representation in co-management	Facilitate consultation process	Annual	FV, FCC	Within program budget
	Opportunities for resource access for traditional purposes	Issue General Fisheries Permits for cultural and ceremonial purposes	Annual	FV	Within program budget
		Provide fisheries management advice on mediation of native title claims	As required	FV, FCC	
d) Ensure equity for future generations					
Re-build the stocks to 40% of the 1951 biomass	Manage the commercial and recreational fisheries within TAC and minimise illegal catches to prevent overfishing	Hold TAC Forum, facilitate consultation process, encourage stakeholder participation Monitoring of rock lobster stocks in MPAs to assess their contribution in re-building the resource	Annual Annual	FV & peak bodies MAFRI, DSE, Parks Victoria	Included above 360
Conserve marine ecosystems	Use environmentally benign fishing methods and maintain effective working relationships with other Government agencies	Establish effective compliance strategies to prevent fishing in MPAs Identify responsibility and process for engaging other Government agencies in the development and implementation of new strategies and policies for the marine environment	Annual Annual	DSE, Parks Victoria FV, DSE, Parks Victoria, EA	Within program budget

Table 9. (continued)

Goals & Objectives	Strategy	Required Management Action	Schedule	Responsibility	Estimated Cost x \$,000
Goal 3. Effective Fishery Management					
3a) Monitor fisheries performance and implement of management arrangements					
Continue high quality monitoring, research and assessment	Review priorities and provide research funding	Consult with the FCC sub-committee, participate in VRFRAC meetings, liaise with FRDC and prepare research strategies and funding proposals	Annual	MAFRI, FCC, FRDC	Within program budget
	Improve data collection methods for by-catch and by-product	Ensure that accurate records are provided by the industry with independent observations for validation	Commence 2003/04	FV, MAFRI, RLFAL holders	Within program budget or included above
	Monitoring of interactions with marine wildlife	Encourage industry to participate in wildlife research programs	On-going	MAFRI, SIV, FCC, RLFAL holders	
	Estimate the illegal catch	Conduct research, analyse information collected by fisheries officers, prepare reports on law enforcement activities and levels of compliance	Commence 2003/04 Complete 2005/06	FV, MAFRI	20
	Research collaboration with other agencies	Provision of scientific and policy advice on by-catch species, exotic species, endangered species and marine wildlife interactions	Commence 2003/04 Complete 2006/07	MAFRI, FV, EA, interstate fisheries agencies, CSIRO, Arthur Rylah Institute, Phillip Island Nature Park & Universities	50
Develop timely and cost effective management arrangements	Review management based on the stock assessment, TAC Forum and management actions	Amend legislation according to the RLFMP and prepare RIS Establish arrangements for inter state landings and associated methods for compliance Prepare quota orders; renew licences with quota notices Continue to improve methods of reporting to the QMS	Commence 2003/04 Commence 2003/04 Annual	FV FV FV	100

Table 9. (continued)

Goals & Objectives	Strategy	Required Management Action	Schedule	Responsibility	Estimated Cost x \$,000
Goal 3. Effective Fishery Management					
3a) Monitor fisheries performance and implement of management arrangements					
Develop timely and cost effective management arrangements	Review management based on the stock assessment, TAC Forum and management actions	Report annually on implementation progress FV & FCC Complete the consultation and planning review process during the last year of the RLFMP	Commence 2003/04 Complete 2007/08	FV, FCC, SIV, VRFish FV, FCC, peak bodies	
3b) Promote stakeholder participation in decision making					
Provide opportunities for stakeholder participation	An effective and transparent co-management process	Prepare an annual progress report on the implementation of the RLFMP, research and monitoring, and compliance and education strategies Involve stakeholders in stock assessment workshops and research Establish the TAC Forum with equitable representation of stakeholders Establish an annual management workshop for industry, managers and fisheries officers Encourage the fishing industry and the recreational sector to develop and comply with codes of practice that complements fishery and wildlife management	Annual Annual Annual Annual Commence 2003/04	FV, FCC & peak bodies MAFRI & peak bodies FV & peak bodies FV, SIV Peak bodies, FCC, FV, DSE	Within program budget Within program budget
Raise community support for compliance with the law and research	Encourage the community to report offences Encourage participation in research, stock assessment meetings, TAC Forum and management workshops	Seek permission to publish lists of pot entitlements and quota holdings Provide information on research progress, stock assessment and effectively disseminate research results	Commence 2003/04 Annual	FV, RLFAL holders MAFRI	5 Within program budget

Table 9. (continued)

Goals & Objectives	Strategy	Required Management Action	Schedule	Responsibility	Estimated Cost x \$,000
Goal 3. Effective Fishery Management					
3c) Ensure compliance with legislation					
Raise public awareness of fisheries regulations and penalties	Develop and implement an effective compliance strategy	Frequent inspections of catches, records, coffs and landings	Annual	FV	60
		Develop and implement strategies to optimise compliance with commercial and recreational fishing regulations	Commence 2003/04	FV, FCC & peak bodies	
		Quantify and categorise the illegal catch	Commence 2003/04 Complete 2005/06	FV, MAFRI	
		Gather intelligence and undertake investigations	Annual	FV	
		Apprehend and prosecute offenders	Annual	FV	
		Prepare annual reports on compliance levels and law enforcement activities	Annual	FV	
		Review funding priorities for community education and compliance	Annual	FV	
		Publish information from court cases involving fisheries offences, convictions and fines	Annual	FV	
3d) Provide a public information service					
Raise public awareness of fisheries issues	Develop a communication strategy	Produce high quality information and disseminate using the DPI website and a variety of other media	Annual	FV	25
		Integrate information into teaching programs at the Marine Discovery Centre as appropriate	Commence 2003/04	MAFRI	20
Total	Additional costs for implementation over 5 years				2,000

Appendix 1: Ministerial Guidelines

MINISTERIAL GUIDELINES PURSUANT TO SECTION 28(2) OF THE FISHERIES ACT 1995

I, Candy Broad, Minister for Energy and Resources, issue the following guidelines with respect to the preparation of a management plan for the Victorian rock lobster fishery.

Fisheries Victoria will be responsible for the preparation of the Management Plan. The Fisheries Co-Management Council will oversee the process of preparing the Management Plan, in consultation with the relevant Fishery Committees.

The Management Plan will be prepared in consultation with all major stakeholder groups, including commercial, recreational, traditional, conservation and aquaculture interests.

1. The Plan will define the process for reviewing management arrangements for the fishery including the total allowable catch (TAC), size limits and closed seasons.
2. The Plan will take account of Environment Australia's guidelines for assessing the ecologically sustainable management of fisheries.
3. The Plan will be consistent with the Victorian Government Response to the National Competition Policy (NCP) Review of the *Fisheries Act 1995*, released in December 2001.
 - (a) The Plan will address the need to define a threshold limit for the total allowable catch (TAC) in each zone above which mechanisms such as auctions, tender, or ballot should be considered for the allocation of increases in the TAC.
 - (b) The Plan will address issues relating to pot limits in the rock lobster fishery under an ITQ system and the relationship between the pot entitlement on a RLFAL and the number of ITQ units held on that licence.
4. The Plan will review the management zones within the fishery including:
 - (a) The 50 pot zone within the Western Zone known as the Apollo Bay 'Paddock'
 - (b) The area in the Eastern Zone known as the 'Eastern Corridor'
 - (c) The possible creation of a separate 'Far Eastern Zone'
5. The Plan will review arrangements, including compliance, relating to rock lobsters taken from Victorian waters being landed at ports in another State.
6. The Plan will review the management arrangements for the recreational rock lobster fishery, including the use of hookah equipment for recreational purposes.
7. The Plan will review interstate and overseas policies in examining the potential opportunities for aquaculture of rock lobsters.

Appendix 2: Fishery Strengths, Weakness, Opportunities and Threats

Strengths

- Good research-based knowledge of the rock lobster resource and fishery
- Long term stability of the resource
- Resilience of the fishery with strong capabilities of recovery
- Rock lobster stocks are responsive to fishery management measures
- Single species, well targeted fishery with minimal by-catch issues
- Harvesting techniques have negligible environment threat
- High market demand – highly sought after species
- Harvesting occurs in an uncontaminated and 'disease free' environment
- High value 'profitable' commodity
- Strong community connections
- Increased yield in the Western and Eastern Zone from stock rebuilding
- Increased catch rates in both zones and long term sustainability of the industry
- Opportunities to increase production through resource enhancement
- Development of new technologies may increase lobster production from aquaculture in the future
- Re-building of stakeholder confidence to improve co-management relationships
- Secure fishing property rights that encourage industry to participate in stock re-building
- ESD accreditation and increased export revenues from Asia, USA and Europe
- Local economy from rural employment, coastal infrastructure, and seafood consumption

Weakness

- Limited knowledge of the recreational catch
- Lack of knowledge about the illegal catch
- Fishing capacity is excessive
- Strategy for improving compliance with the law is lacking
- Complicated life cycle impedes progress in aquaculture development
- Industry cohesion is lacking and zone / port associations are ineffective
- Ineffective consultation with fishers and a perception that co-management is failing
- A lack of a strategic plan and insufficient resources
- Domestic and overseas buyers control the international market
- A lack of socio-economic research for management information

Opportunities

- Science and research will increase knowledge of the resource and marine environment
- With monitoring, MPAs could provide stock assessment opportunities

Perceived threats

- Fishing effort displaced by MPAs may retard the stock re-building
- Unforeseen consequence of quotas – eg sex ratio, fishery structure, socio-economic factors
- Environmental threats from degraded water quality and reef habitat and ecosystem threats from the introduction or translocation of exotic pest species (flora and fauna)
- A lack of industry support and incentive to comply with management measures
- Unknown and increasing impacts of illegal fishing from a lack of compliance activities
- Rising costs (labour, harbour, fuel, boats), access to bait supplies, loss of fishing skills
- NCP implementation (eg cost recovery)
- Lack of rural investment in ports, infrastructure and aquaculture development
- Effects of volatile exchange rates, export conditions on the international market demand

Appendix 3: Acronyms

BAP	By-catch Action Plan
CL	Carapace Length
CRLGCFC	Commercial Rock Lobster and Giant Crab Fishery Committee (FCC)
DPI	Department of Primary Industries
DSE	Department of Sustainability and Environment
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
IVR	Interactive Voice Response System for catch reporting
MAFRI	Marine and Freshwater Resources Institute
mm	Millimeters
MPA	Marine Protected Area (Marine National Parks and Sanctuaries)
NCP	National Competition Policy Review of the <i>Fisheries Act 1995</i>
QMS	Quota Management System
RFL	Recreational Fishing Licence
RLEAS	Rock Lobster Enhancement and Aquaculture Sub-Program of FRDC
RLFAG	Rock Lobster Fishery Assessment Group
RLFAL	Rock Lobster Fishery Access Licence
RLFMP	Rock Lobster Fishery Management Plan
RMC	Recreational Marine Committee (FCC)
RIS	Regulatory Impact Statement
SCUBA	Self Contained Underwater Breathing Apparatus
SIV	Seafood Industries Victoria
SOM	Size of Maturity
SWOT	Analysis of Strengths, Weaknesses, Opportunities and Threats
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
VRFRAC	Victorian Recreational Fisheries Revenue Allocation Committee
WZ	Western Zone

Appendix 4: Definition of Terms

Aquaculture

Farming of aquatic plants or animals.

Available biomass

The proportion of the rock lobster stock above the legal size.

Biological diversity/biodiversity

The variability among living organisms in marine and other aquatic ecosystems and the ecological complexes including diversity within species and between species, and diversity of ecosystems.

By-catch

Non target species that are discarded from the catch or retained for scientific purposes, and that part of the "catch" that is not landed but is killed as a result of interaction with fishing gear. This includes discards of commercial species.

By-product

Species that are used or landed, but are not the prime target species of the fishing operation.

Carapace

A hard bony or chitinous outer covering, such as the fused dorsal plates of a turtle or the portion of the exoskeleton covering the head and thorax of a crustacean.

Coff

A sea cage used to store rock lobsters alive.

Community

Associations of plants and animals that inhabit a particular habitat and are ecologically dependent on each other.

Consult

To seek information or advice.

Continental shelf

The seabed from the shore to the edge of the continental slope.

Continental slope

The outer edge of the continental shelf from the 200m depth contour to the ocean floor.

Crayfish

Alternative common name for rock lobster.

Crustacean

Animals belonging to the class Crustacea. These animals live in water, and have a hard exoskeleton and jointed limbs.

Ecologically Sustainable Development

The use of natural resources within their capacity to sustain natural processes while maintaining the life-support systems of nature and ensuring that the benefit of the use to the present generation does not diminish the potential to meet the needs and aspirations of future generations.

Ecologically viable stock

The maintenance of the exploited population at high levels of abundance designed to maintain productivity, provide margins of safety for error and uncertainty and maintain yields over the long term in a way that conserves the ecological role and function of the stock in the ecosystem.

Ecosystem

The physical, chemical and biological environment of a community and the ecological interactions between organisms and the environment.

Endemic

Any species that is of natural origin to a location.

Exotic Species

Any species that is not of natural origin to a location.

Fecund/Fecundity

The number of eggs carried on setae under the tail of females in berry.

Fishery

The taking of fish described by reference to location, the species taken, the gear used and/or the purpose of the fishery.

Fishery Resources

The stock or stocks that support the fishery.

Fishing effort

The time spent fishing with a type or unit of fishing gear.

Function

Relationships between components of the ecosystem, without which individuals could not survive and/or reproduce eg protection for juveniles provided by marine plants; trophic relationships.

Habitat

The area where an organism lives including the components of the ecosystem that supports each life stages.

Input Controls

Indirect restraints on the catch including regulation of the amount or type of fishing gear (eg. numbers of pots) and fishing period (eg. closed seasons).

Invertebrate

Animal lacking a backbone or spinal column.

Larvae

- 1) The newly hatched, earliest life stage of animals that undergo metamorphosis, differing markedly in form and appearance from the adult.
- 2) Early life stages of rock lobsters are also known as phyllosomes and puerulus.

Limited Entry Fishery

A fishery where the number of operators or vessels is restricted to control the amount of fishing.

Output Controls

A direct limit on the catch by the fishery (eg. a total allowable catch) or by an access licence holder (eg. ITQs).

Overfishing

- 1) *Recruitment overfishing* - where or when fishing activities cause a reduction in recruitment in succeeding years and cause the mortality of too many fish in total, too many pre-productive fish, or too many fish that have only spawned a few times. The end result is that the stock can no longer replenish itself adequately.
- 2) *Growth overfishing* - where or when fishing activities lead to a reduction in the size of the individuals of a species, as a consequence of which few grow to the size required for the optimum yield to be obtained.

Phyllosome/Phyllosoma

Initial stages of larval development of the rock lobster.

Precautionary Approach

Used to implement the precautionary principle; An assessment of the risk-weighted consequences of the various options.

Precautionary Principle

The lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage.

Puerulus

Final stage in the larval development of the rock lobster.

Reference Point

An indicator level of fishing (or stock size) to be used as a benchmark for assessment or decision making.

Sexual Maturity

The size of onset of sexual maturity is equivalent to the size at which 50% are mature.

Spawning Biomass

The proportion of the stock above the size at onset of sexual maturity.

Stakeholder

An individual or organisation with a vested interest or an historical association with the rock lobster resources in Victoria; The peak bodies recognised in the *Fisheries Act 1995* represent the majority of stakeholders.

Stock

A reproductively isolated population or a group of individuals in a defined spatial range with a low rate of exchange with others of the species.

Sustainability

A characteristic of a process or a state that can be maintained indefinitely.

TAC Forum

Annual open meeting after the stock assessment to provide recommendations for the total allowable catch; Participants will include an independent chairman, members of the commercial rock lobster and giant crab fishery committee, representatives of peak bodies, observers and the DPI staff (policy, compliance, and research).

Total Allowable Catch (TAC)

The total allowable catch of rock lobsters from all sectors.

Total Allowable Commercial Catch (TACC)

The total weight of rock lobsters that may be landed within a quota period by the commercial fishery according to the final quota order.

Total Allowable Recreational Catch (TARC)

The total weight of rock lobsters taken by the recreational fishery.

Appendix 5: Review of Interstate and International Aquaculture Policies

Introduction

There is considerable interest worldwide in rock lobster aquaculture due to the high demand and value of all species. Most Australian rock lobster fisheries are fully exploited and the capacity to increase production from capture fisheries is limited. However, there is potential to increase rock lobster production and value using aquaculture. In a few countries, such as Vietnam, there is already considerable production and marketing of tropical lobsters that are on-grown from puerulus and juveniles taken from the sea. A review of the extensive aquaculture research on the southern rock lobster and other species that has been conducted in Australia and New Zealand is outlined below.

New Zealand

Rock lobster aquaculture in New Zealand is based on the collection of puerulus from the sea. The rationale behind this technique is the high mortality (75-97%) during settlement in the wild, whereas mortality in tanks can be lower than 5% with good husbandry. In order to maintain biological neutrality with the wild fishery, three companies have participated in a quota buy-out scheme in return for puerulus collection licences. This entitled the companies to collect 40,000 puerulus for each tonne of quota with a limit of 60,000 puerulus for 1.5 tonnes of quota per licence. Commercial success has been limited by difficulties with puerulus collection and the cost of labour.

Queensland

Tropical rock lobsters (*Panulirus ornatus*) have a shorter larval period (4-10 months) and higher growth rates. Research partnerships between the State and the fishing industry have begun to investigate the propagation and on-growing of tropical lobsters by closing the life cycle.

Tasmania

Rock lobster aquaculture in Tasmania is also based on the collection of puerulus. The development of conditions associated with the permits was in full consultation with the rock lobster fishing industry. A condition of the permit stipulates that 25% of puerulus collected are reseeded into the wild fishery as 1 year old juveniles. Seven permits were issued in 2001 to collect up to 50,000 puerulus at a cost of \$5000 per licence. These are issued on an annual basis and are subject to review. The intention is to develop on-growing systems for rock lobster in anticipation of advances in hatchery technology that may enable eggs to be hatched and on-grown. Most of the puerulus collected so far have been used in on-growing and reseeded research rather than commercial production.

South Australia

Sea cages and land-based rock lobster aquaculture activities in South Australia have been used for on-growing and value adding to adult wild-caught lobsters by weight gain and colour enhancement. There is potential to achieve weight gains of around 20% by growing the animals through the annual moult, representing a 60% return on investment. However, there were problems with mortality and tail fan necrosis. There were also difficulties associated with lease renewals for cage culture at sea so the trials have moved to onshore facilities.

Western Australia and Northern Territory

There is also considerable interest in on-growing of tropical lobster puerulus captured in association with pearl oyster culture and some interest in on-growing puerulus of Western rock lobsters (*Panulirus cygnus*).

Appendix 6: Research Priorities for the Victorian Rock Lobster Resource

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

Future Research & Monitoring Needs		Priority
Sub-program: Fisheries Assessment and Biology		
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>
Sub-program: Habitat and Ecology		
13	Development of robust environmental sustainability indicators	<i>High</i>
14	Definition and mapping of rock lobster habitats	<i>Medium</i>
15	The interaction between 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>

Future Research & Monitoring Needs		Priority
Sub-program: Socio-economics and Management		
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 Fisheries Victoria's 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>

Appendix 7: References

Hobday, D.K. and Smith, D.C. (2003). Rock Lobster – 2001. Compiled by the Rock Lobster Stock Assessment Group. Fisheries Victoria Assessment Report No. 44 (Fisheries Victoria: East Melbourne).

Hobday, D.K. and Punt, A.E. (2001). Length-structured population modelling and risk assessment of the Victorian southern rock lobster, *Jasus edwardsii*, fishery. *Marine and Freshwater Research* **52**, 1495-1507.

Appendix 8: Submissions received during the period of public consultation

No.	Name	Title & Affiliation
1.	John Sherwood	Chair, Fisheries Co-Management Council
2.	Tia Navaneri	Chair, Commercial Rock Lobster and Giant Crab Fishery Committee, Fisheries Co-Management Council
3.	John Hawkins	Recreational Marine Committee
4.	Steve Dunn	Director, NSW Fisheries
5.	Victoria Wilkinson	Acting Assistant Director, Sustainable Fisheries Section, Environment Australia
6.	Ross McGowan	Executive Director, Seafood Industry Victoria
7.	Pat Washington OAM	Chairman VRFish
8.	Daniel Grimm	Vice President – Communications, Scuba Divers Federation of Victoria
9.	Chris Smyth	Marine Campaign Officer, Victorian National Parks Association
10.	Lee Everett	Rock Lobster Fishery Access Licence Holder, Eastern Zone
11.	Russell Barwick	Rock Lobster Fishery Access Licence Holder, Eastern Zone
12.	John Barrett	Rock Lobster Fishery Access Licence Holder, Eastern Zone
13.	John Black	Rock Lobster Fishery Access Licence Holder, Eastern Zone
14.	Matt Edmunds	Australian Marine Ecology, Consultant
15.	Ian Voight	Regional Manager SW Region, Department of Primary Industries
16.	Margie Morrice & Peter Gill	Whale Ecology Group, School of Ecology and Environment, Deakin University

Appendix 9: Steering Committee Members and Affiliations

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