Management Plan for the South Australian Southern Zone Rock Lobster Fishery

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This document also contains information in relation to the *Fisheries Act 1982*, *Fisheries Management Act 2007* and associated regulations. This information has been prepared as a summary of the fisheries management arrangements that are in place at the time of publication, and does not replace the legislation. Legislation may change from time to time. It is the responsibility of each individual to ensure that they are aware of the law that applies and to comply with it.

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FOREWORD

Management of the South Australian Southern Zone Rock Lobster Fishery

The rock lobster resources of the South Australian Southern Zone Rock Lobster Fishery are community owned resources. The role of the Government, as custodian of these resources on behalf of the broader community and future generations, is to ensure that they are used in an ecologically sustainable and economically efficient manner, while at the same time promoting optimum utilisation and maximising returns to regional and wider South Australian communities.

The South Australian Southern Zone Rock Lobster Fishery is a large scale fishery that operates across an extensive coastline from the River Murray mouth to the Victorian border. There is an abundance of suitable habitat for rock lobster in these waters. The fishery contributes to the socio-economic well being of regional coastal communities throughout the State, through commercial and recreational activity.

Experience world-wide has demonstrated that where unrestricted access to fisheries resources is allowed, the incentive for individuals to conserve fish stocks is diminished. The resulting competition among and between user groups often leads to increased fishing effort and excess fleet capacity, which in time reduces biological, ecological and economic productivity.

In managing fisheries resources, the South Australian Government has the primary responsibility of balancing optimum utilisation with the need to ensure long term resource sustainability. The Government must also ensure that the basis for sharing fisheries resources among all user groups is clearly understood and accepted as equitable, and that the allocation of fisheries resources and their level of utilisation is consistent with the needs of present and future generations.

Where there are considered to be threats of serious or irreversible damage to fisheries resources, or the environment upon which they depend, a lack of full scientific certainty or insufficient information will not prevent the Government from making decisions. Where resource management decisions must be made in an environment of uncertainty, the Government, in partnership with the fishery's stakeholders, will take a precautionary approach to the management of South Australia's fisheries resources.

This Management Plan provides a framework to address key challenges facing the future management of the Southern Zone Rock Lobster Fishery over the next three years.

Hon. Paul Holloway MLC
Acting Minister for Agriculture, Food and Fisheries

ACKNOWLEDGEMENTS

The Southern Zone Rock Lobster Fishery Management Committee (FMC) coordinated a process to finalise this management plan. All members of the FMC are acknowledged for their contributions. The following organisations are acknowledged: South Australian Research and Development Institute (SARDI) Aquatic Sciences; the South East Professional Fishermen's Association; the Seafood Council of South Australia Inc.; the South Australian Fishing Industry Council; and the South Australian Recreational Fishing Advisory Council. Dr Adrian Linnane provided scientific advice throughout the development process. Ms Annette Doonan prepared the maps presented in the document.

As of March 2007 FMCs were discontinued in South Australia in preparation for the introduction of the *Fisheries Management Act 2007* which establishes a Fisheries Council to advise the Minister. In the absence of FMCs and in preparation for operations under the new Act, PIRSA Fisheries has consulted directly with the South Australian Rock Lobster Advisory Council (SARLAC) who have positioned themselves as the peak industry association for providing fisheries management advice. SARLAC coordinates advice at the zone level from the South East Professional Fishermen's Association and the Northern Zone Rock Lobster Fishermen's Association. These bodies have provided response in relation to the draft rock lobster management plans that were released for public comment.

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1 PURPOSE

The purpose of this management plan is to maintain the rock lobster stock that supports the Southern Zone Rock Lobster Fishery at or above current levels. In a more general sense, this management plan aims to provide for the ecologically sustainable management of the South Australian Southern Zone Rock Lobster Fishery.

This plan sets out a formal harvest strategy for the fishery that includes a set of decision rules for Total Allowable Commercial Catch (TACC) setting. The plan provides direction for the formulation of regulations under the *Fisheries Act 1982*. This plan is intended to provide greater certainty in day-to-day and longer-term management decision-making for all stakeholder groups.

Access to fisheries resources, managed by the South Australian Government on behalf of the broader community and future generations, comes with certain obligations for commercial licence holders, recreational participants and traditional fishers regarding the proper management and care of fisheries resources. These obligations are set out in the management plan. Information in this document provides a reference for the broader community in relation to the management measures that have been introduced to ensure the long-term sustainability of the fisheries resources utilised in the Southern Zone Rock Lobster Fishery.

In accordance with the objectives of the *Fisheries Act 1982*, a key goal of this management plan is to ensure that an appropriate balance exists between the need to ensure long term sustainability of the fisheries resources of the Southern Zone Rock Lobster Fishery and the optimum utilisation and equitable distribution of these resources, for all stakeholder groups and future generations. This requires the management plan to strike the right balance between minimising the risk to sustainability objectives and minimising the risk of lost opportunities.

This management plan sets out key performance measures to allow for assessment of the degree to which stated management objectives are being achieved.

2 FISHERY OVERVIEW

2.1 Description of the fishery

The South Australian Rock Lobster Fishery is separated into two fishing zones (the Southern and Northern Zones). This management plan applies to the Southern Zone. The waters to which this management plan applies include a stretch of coastline of about 425km, from the low water mark to the edge of the Australian Fishing Zone (AFZ), from the River Murray mouth to the Victorian border (Fig. 1). The Northern Zone encompasses all remaining State waters to the west of the Murray mouth along a more extensive, yet less productive, stretch of coastline of about 3,700km.

The South Australian rock lobster fishery is primarily a single species, single method fishery, based on the capture of southern rock lobster, *Jasus edwardsii*. The South Australian fishery is one of several State managed fisheries for the species, which supports important commercial and recreational fisheries in South Australia, Tasmania, Victoria, Western Australia and New Zealand. The most productive fishing grounds exist in waters adjacent to South Australia, which have historically supported the largest fishery for the species. The total commercial catch of *J. edwardsii* from South Australian waters has historically averaged between 2,000 and 2,500 tonnes per year, which represents about 30% of the total annual commercial catch for the species. The total South Australian recreational catch is estimated to be between 95 and 118 tonnes (Henry and Lyle 2003; Boxall *et al* 2003; Curie *et al* 2006).

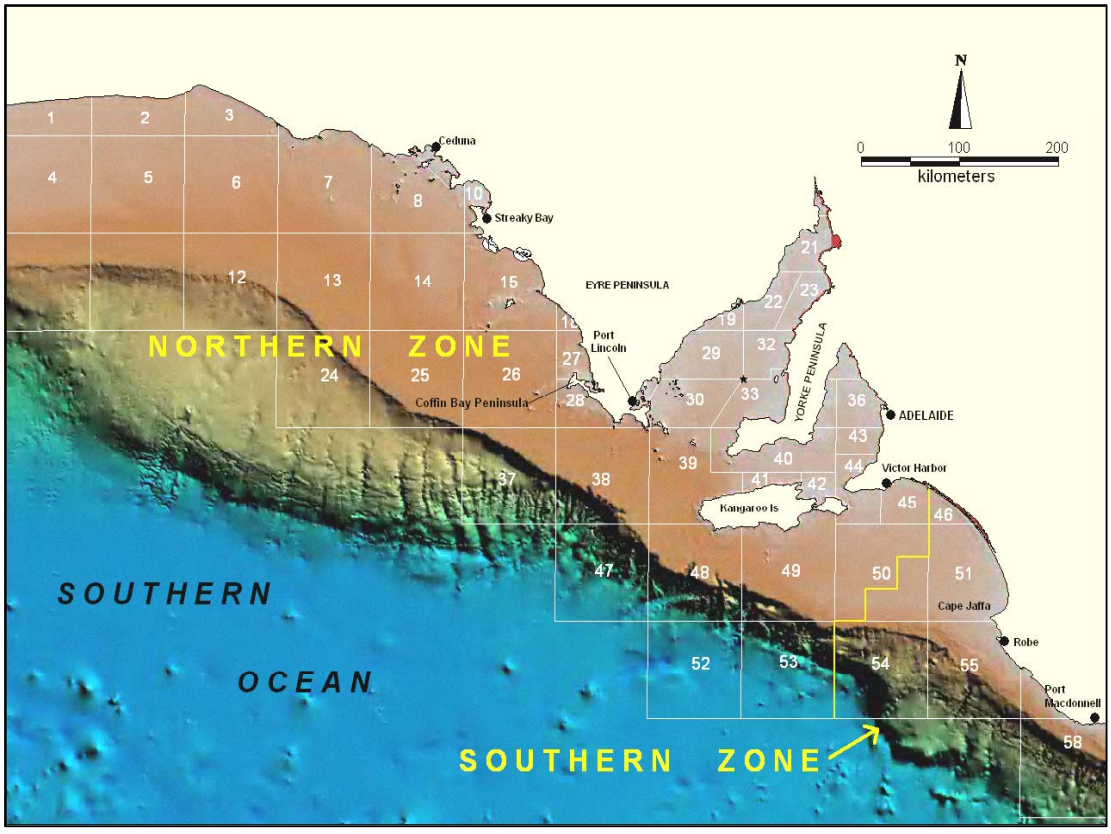

Figure 1. The Southern and Northern zones of the South Australian Rock Lobster Fishery (the numbered boxes are marine fishing areas (MFAs), used as data collection blocks).

Lobsters may be landed at seven controlled landing points in the Southern Zone. Southern Zone fishers generally undertake day trips and fish close to their home port, while Northern Zone vessels fish for between one to ten days per trip, generally fishing for longer periods on the more remote west coast. The costs of fishing are generally lower in the Southern Zone than they are in Northern Zone waters due to the shorter distances travelled each day to complete a fishing trip.

The Southern rock lobster fishery is South Australia's most valuable commercial fishery. In 2005/06, the gross landed value of production across both fishing zones was $81 million AUD (Anon. 2007). In 2005/06, catches were 476t and 1,889t in the Northern and Southern zones, respectively (Linnane *et al* 2006a; Linnane *et al* 2006b). More than 95% of the annual catch is exported to a number of destinations, the most significant of which is currently Hong Kong. The total annual export revenue generated by both fisheries is in the order of $110 million AUD per year, while the annual output from both fisheries (direct and flow-on) is currently estimated to be $200 million AUD (Anon. 2006a and 2006b).

2.2 Biological Characteristics of Key Species

The following descriptions provide brief background information on the biological characteristics, commercial production statistics and recreational catch and effort levels for southern rock lobster and key non-target species in the Southern Zone Rock Lobster Fishery. More detailed information on stock status is provided in stock assessment reports prepared by the South Australian Research and Development Institute (SARDI), Aquatic Sciences. All completed stock assessment reports are available on both the Primary Industries and Resources South Australia (PIRSA) Fisheries website at www.pir.sa.gov.au/fisheries. or the SARDI Aquatic Sciences website at www.sardi.sa.gov.au.

2.2.1 Southern rock lobster

Southern rock lobster, *Jasus edwardsii* (Hutton 1875) are distributed around southern mainland Australia, Tasmania and New Zealand (Booth et al. 1990). In Australia, the northerly limits of distribution are Geraldton in Western Australia and Coffs harbour in northern New South Wales, however the bulk of the population can be found in South Australia, Victoria, and Tasmania where they occur in depths from 1 to 200 m (Brown and Phillips 1994). Mating occurs from April to July and eggs are brooded over the winter for about 3-4 months. The larvae hatch in early spring, pass through a brief (10-14 days) nauplius phase into a planktonic, leaf-like phase called phyllosoma before being transported offshore. They develop through a series of 11 stages over 12-23 months before metamorphosing into the puerulus (settlement) stage near the continental shelf break. (Booth et al. 1991). The puerulus actively swims inshore to settle onto reef habitat in depths from 50 m to the intertidal zone.

Lobsters grow through a cycle of moulting and thus increase their size incrementally (Musgrove 2000). Male and female moult cycles are out of phase by 6 months, with males undergoing moulting between October and November, and females during April to June. A tagging study undertaken across South Australia between 1993 and 1996 (Linnane *et al.* 2005), in which over 61,000 lobsters were tagged and 16,000 recaptured, demonstrated that there was substantial variation in growth rates among locations (McGarvey *et al.* 1999a) with a general trend of higher growth rates in the Northern Zone compared to the Southern Zone. This corresponded to lower lobster density and higher water temperatures in northern regions. Growth rates also varied throughout the life of individuals and the mean annual growth for lobsters at 100 mm carapace length (CL) ranged from 7-20 and 5-15 mm per year for males and females respectively.

2.2.2 Octopus

The Maori Octopus (*Octopus maorum*) is distributed across New Zealand and southern Australian waters. It is the largest of the southern octopuses and reaches weights of up to 9 kg (Edger, 1997). The species lives on rocky reefs and seagrass or seaweed beds to depths of over 100 metres. It forms lairs in crevices or burrows, recognised by the scatter of shells and crab parts around the entrance. It feeds on a wide range of prey including crabs, abalone, crayfish, mussels, fish and other cephalopods (Norman, 2000).

Octopus are also a major predator of rock lobsters and are incidentally caught in lobster pots in the commercial fishery. Field studies have shown that over 98% of within-trap lobster mortality in the fishery is attributable to the maori octopus. Over the period 1998-2003, approximately 240,000 lobsters per annum were killed in traps in South Australia, representing ~4% of the total commercial catch (Brock and Ward 2004).

2.2.3 Giant crab

Giant crabs are long-lived, slow growing species that generally inhabit soft sedimentary environments and feed on sessile or slow-moving benthic species including gastropods, asteroids and other decapods. The sexes are separate, with males growing to more than twice the size of females and reaching at least 13 kg (Currie *et al* 2006). Approximately half of all females reach sexual maturity at 125mm carapace length (Levings *et al.*, 1996), and proceed to mate during the months of June and July. Females only bear eggs in non-moulting years, and the clutch sizes can range from approximately 0.5 to 2.0 million eggs. The eggs are carried by the female for up to 4 months, and as hatching approaches (October to November) females are thought to migrate to the continental shelf break (Kailola *et al*., 1993).

The genetic structure of the population is poorly understood, but studies using allozyme and DNA techniques have indicated a genetically homogeneous stock (Levings *et al*., 2001). Factors including a 3 – 4 month planktonic larval phase and adult movements of up to 400 km are thought to contribute to dispersion and mixing within the stock (Currie *et al* 2006).

2.3 Environmental Characteristics

The sea floor in the Southern Zone consists mainly of reefs made of bryzoan or aeolianite limestone. The limestone matrix has eroded to form ledges, crevices, undercuts and holes which provide ideal habitat for lobsters. These reefs are almost continuously separated by small stretches of sand substrate (Lewis 1981).

The salinity and temperature of the surface water over the continental shelf in the Southern Zone cycles seasonally, with minimum salinity and maximum temperature (35.2 ppt, 18^{o}C) during summer and maximum salinity and minimum temperature (35.6 ppt, 14^{o}C) during winter (Lewis 1981).

The water over the continental shelf is vertically well mixed during winter. However, during summer the south-easterly winds predominate which creates an upwelling of nutrient-rich cold water (11-12^{0}C) which intrudes onto the continental shelf (Schahinger 1987). This results in an increase in productivity which contributes to the high densities of southern rock lobster.

3 SCOPE OF THE MANAGEMENT PLAN

3.1 General

The South Australian Government has management jurisdiction for southern rock lobster from the low water mark out to three nautical miles in all waters adjacent to South Australia. South Australia also has jurisdiction from three nautical miles out to the edge of the Australian Fishing Zone (200 nautical miles) under an Offshore Constitutional Settlement (OCS) agreement between the South Australian and Commonwealth Governments.

The *Fisheries Act 1982* provides a broad statutory framework to ensure the ecologically sustainable management of South Australia's fisheries resources. In the administration of the *Fisheries Act 1982*, the Minister for Agriculture, Food and Fisheries, the Director of Fisheries and the Fisheries Management Committees must operate in accordance with the following objectives:

(a) ensuring, through proper conservation, preservation and fisheries management measures, that the living resources of the waters to which this Act applies are not endangered or overexploited; and

(b) achieving the optimum utilisation and equitable distribution of those resources.

(c) insofar as this Act applies to the River Murray, seeking to further the objects of the River Murray Act 2003 and the Objectives for a Healthy River Murray under that Act.

(d) insofar as this Act applies to the Adelaide Dolphin Sanctuary, seeking to further the objects and objectives of the Adelaide Dolphin Sanctuary Act 2005.

The regulations that govern the management of the Southern Zone Rock Lobster Fishery are the *Fisheries (Scheme of Management – Rock Lobster Fisheries) Regulations 2006*, the *Fisheries (General) Regulations 2000* and the *Fisheries (Fish Processor) Regulations 2006*. This management plan should be read in conjunction with these regulations. It is the primary policy document that applies in relation to the Southern Zone Rock Lobster Fishery and should be used to guide decision-making under the Act and regulations.

This management plan updates the first management plan developed for the fishery (Zacharin, 1997). It covers all fishing activity undertaken within the Southern Zone of the South Australian Rock Lobster Fishery, including commercial, recreational, traditional and any illegal fishing.

Management of the South Australian Southern Zone Rock Lobster Fishery is subject to a number of international legal instruments including the United Nations Convention on the Law of the Sea. The existing management regime complies with these international conventions.

3.2 Operation and review of the management plan

This management plan will operate for a three-year period from 2007/08 to 2009/2010 inclusive. It will be used to guide decision-making in relation to management and research for the fishery. An annual stock assessment report will provide the basis for this assessment of fishery performance. Stock assessment reports will address the key performance indicators and reference points outlined in this management plan.

In the life of this management plan a comprehensive review will be undertaken to determine the appropriateness of both the key performance indicators and the additional performance measures set out in the harvest strategy, how they are measured and how they are used in fishery assessments.

New legislation to replace the *Fisheries Act 1982* has been passed by parliament and will be implemented in 2007. This legislation contains extensive provisions about management plans. This plan will be reviewed and developed as a plan under the *Fisheries Management Act 2007*. At that time, the new plan will replace this plan.

3.3 Policy Context

This management plan aims to achieve outcomes that are consistent with broader Government objectives for the management of the marine environment. Other important policy drivers that have been taken into account in the development of this management plan are:

- The National Strategy for Ecologically Sustainable Development;
- The Precautionary Principle, as set out in the Intergovernmental Agreement on the Environment;
- The Australian Government 'Guidelines for the Ecologically Sustainable Management of Fisheries', which relate to the requirements of the *Environment Protection and Biodiversity Conservation Act 1999*; and
- The National Policy on Fisheries By-catch.

3.3.1 National Strategy for Ecologically Sustainable Development

The principles of Ecologically Sustainable Development (ESD) have been incorporated into fisheries legislation and management frameworks throughout Australia. The Australian Government defined the concept of ESD in the National Strategy for ESD as 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased' (the National Strategy for Ecologically Sustainable Development, 1992, p.6).

The overriding goal of the National Strategy for ESD is 'development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends'. The following core objectives were developed as part of the National Strategy for ESD (the National Strategy for Ecologically Sustainable Development, 1992, p.8):

- To enhance individual and community wellbeing and welfare by following a path of economic development that safeguards the welfare of future generations;
- To provide for equity within and between generations; and
- To protect biological diversity and maintain essential ecological processes and life-support systems.

The following guiding principles are outlined in the National Strategy for ESD (the National Strategy for Ecologically Sustainable Development, 1992, p.8):

- Decision making processes should effectively integrate both long and short term economic, environmental, social and equity considerations;

- Where there are threats of serious irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- The global dimension of environmental impacts of actions and policies should be recognised and considered;
- The need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised;
- The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised;
- Cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms; and
- Decisions and actions should provide for broad community involvement on issues which affect them.

The broad national objectives and guiding principles outlined in the National Strategy for ESD have shaped the way in which natural resources are currently being managed throughout Australia. In 2000, the Australian Standing Committee on Fisheries and Aquaculture initiated a process to develop a national ESD reporting framework for all Australian fisheries (Fletcher *et al.,* 2002). The national ESD reporting framework provides for a consistent national approach to reporting on fishery performance against all elements of ESD.

The National ESD reporting framework highlights that implementing ESD in the day-to-day management of fisheries requires consideration of not only the impacts of fishing on target species, but also the impacts of fishing on non-target species and the wider ecosystem. Linked to this is a recognition that the economic health of a fishery also relies on maintaining essential ecological processes. In addition, governments and key stakeholder groups must be able to satisfy the wider community that the management systems in place are adequate and that fisheries are providing sufficient socio-economic benefits to justify any negative impacts they may have (Fletcher *et al.,* 2002).

This management plan takes into account the approach suggested in the National ESD Reporting Framework and aims to provide for regular assessment of fishery performance against all aspects of ESD.

3.3.2 The Precautionary Approach

The ‘precautionary approach’ is widely accepted as an integral tool in managing naturally renewable resources. Applying the precautionary approach to fisheries management means recognising that changes in fisheries systems are only slowly reversible, difficult to control, not well understood and subject to changing environmental and human values (FAO 1996, p.6).

The Food and Agriculture Organisation (FAO) of the United Nations (UN) International Code of Conduct for Responsible Fisheries prescribes a precautionary approach to the management of all fisheries, in all aquatic ecosystems, and regardless of their jurisdictional nature, recognises that most problems affecting the management of fisheries results from a lack of precaution in management regimes when faced with high levels of uncertainty (FAO 1996, p.3).

Principle 15 of the Rio Declaration of the UN Conference on Environment and Development states that *"In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation"* (FAO 1996, p.3).

The implications of adopting a precautionary approach to fisheries management are summarised as follows (FAO 1996, p.6):

"*The precautionary approach involves the application of prudent foresight. Taking account of the uncertainties in fisheries systems and the need to take action with incomplete knowledge, it requires inter-alia:*

- *Consideration of the needs of future generations and avoidance of changes that are not potentially reversible;*
- *Prior identification of undesirable outcomes and of measures that will avoid them or correct them promptly;*
- *That any necessary corrective measures are initiated without delay, and that they should achieve their purpose promptly, on a time scale not exceeding two or three decades;*
- *That where the likely impact of resource use is uncertain, priority should be given to conserving the productive capacity of the resource;*
- *That harvesting and processing capacity should be commensurate with estimated sustainable levels of resource, and that increases in capacity should be further contained when resource productivity is highly uncertain;*
- *All fishing activities must have prior management authorisation and be subject to periodic review;*
- *An established legal and institutional framework for fishery management within which* management plans *implement the above points are instituted for each fishery; and*
- *Appropriate placement of the burden of proof by adhering to the requirements above*."

The Australian Commonwealth and State governments formed an agreement in 1994 to implement a precautionary approach to all facets of policy development and decision-making concerning the environment. This agreement is embodied in section 6 of the *National Environment Protection Council Act 1994* (the NEPC Act), which sets out the Intergovernmental Agreement on the Environment. Clause 3.5.1 of the Australian Intergovernmental Agreement on the Environment defines the precautionary principle as:

"Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decision-making should be guided by:

- *careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and*
- *an assessment of the risk-weighted consequences of various options.*

This management plan seeks to promote a precautionary approach to the management of the Southern Zone Rock Lobster Fishery, as stated in the harvest strategy (section 5.2). For the purposes of this management plan, the precautionary principle has the same meaning as in clause 3.5.1 of the Australian Intergovernmental Agreement on the Environment.

3.3.4 Australian Government Environment Legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) establishes reporting requirements against the 'guidelines for the sustainable management of fisheries'. All State and Commonwealth fisheries must undergo a comprehensive independent ecological assessment process, which is subject to public consultation, prior to fishery products being considered for export approval under Parts 13 and 13A of the EPBC Act.

The two key principles of the EPBC Act 'guidelines for the ecologically sustainable management of fisheries' are as follows:

- A fishery must be conducted in a manner that does not lead to overfishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover; and
- Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem.

The Australian Government Department of Environment and Heritage (DEH) undertook an ecological assessment of the South Australian Rock Lobster Fishery during 2003, using the 'guidelines for the ecologically sustainable management of fisheries' outlined in the EPBC Act. As part of this assessment process, the DEH provided the following recommendations to PIRSA Fisheries. These recommendations and PIRSA's progress towards addressing them are set out in Appendix 8.2. The recommendations have been integrated into this management plan and in particular have been used to guide the formulation of objectives and strategies for management of the fishery. Appendix 10.2 includes information about how each recommendation is reflected in the management plan.

3.3.5 National Policy on Fisheries By-catch

The Ministerial Council on Forestry, Fisheries and Aquaculture endorsed the National Policy on Fisheries By-catch in April 1999 to ensure a unified national response to the problem of by-catch across all Australian fisheries. The overall goal of the policy is to ensure that the direct and indirect fishery impacts on ecosystems are taken into account in the development and implementation of fisheries management regimes. An overarching objective of the policy is to ensure that by-catch species and populations are maintained at sustainable levels. Supporting this are the following sub-objectives (National Policy on Fisheries By-catch 1999):

- To reduce by-catch;
- To improve protection for vulnerable/threatened species; and
- To minimise adverse impacts of fishing on the aquatic environment.

The National Policy on Fisheries By-catch defines fisheries by-catch at its broadest level, to include all material, living and non-living, other than targeted species which is caught while fishing. However, for practical purposes, the National Policy defines by-catch to include discards (that part of the catch returned to the water) and also that part of the catch that is not landed but is killed as a result of interactions with fishing gear. By-product is defined as non-targeted catch that is commercially valuable and therefore retained by fishers. For the purposes of this management plan, by-catch and by-product have the same meaning as the definitions set out in the National Policy on Fisheries By-catch.

4 MANAGEMENT OF THE FISHERY

4.1 History

4.1.1 Commercial Fishing

Commercial fishing has occurred for southern rock lobster in South Australian waters since early European settlement. In August 1967, following a 12 month investigation by a Government Select Committee into the operation of the commercial fishing industry in South Australia, two changes were introduced for the Rock Lobster Fishery:

(i) A limit on pot and boat numbers in each of the three zones in the fishery, and
(ii) A restriction on any new boats operating in the south-eastern zone without the approval of the Minister (Anon. 1967).

Following these early changes, a series of management arrangements have been introduced over the past five decades to control catch and effort levels in the fishery. A winter closure was introduced in 1966 to protect spawning females and to help conserve egg-production. In 1968, the fishery was separated into two management zones, in recognition of the significant differences in geological and ecological character between the eastern and western borders of the South Australian coast. At the same time, limited entry provisions were introduced, which included individual pots allocations for each licence.

In 1978, a government review of the Rock Lobster Fishery suggested that effective effort levels had increased significantly due to the adoption of new technologies (Copes, 1978). In 1984, total pot numbers were reduced by 15% to reduce effort levels and the upper and lower pot limits (per vessel) were set at 80 pots and 40 pots, respectively. In 1987, a buy-back scheme was introduced to further reduce effort levels in the fishery, which resulted in 45 licences (2,455 pots) being removed from the fishery.

In 1992, a review undertaken by PIRSA suggested that the continued high catch levels achieved through the early 1990s were unsustainable in the long term (Prescott and Lewis, 1992). This review recommended that effort levels should be reduced in the Southern Zone. Following this review, government managers advocated strongly for a quota system in the Southern and Northern zones, as the most effective approach to ensure long term sustainability and profitability. As a result of this review process, a quota system was introduced in the Southern Zone in 1992.

The first management plan for the fishery was developed in 1997, which provided a series of performance indicators and reference points to guide future management decision-making (Zacharin 1997). The management plan established criteria to maintain the performance of the fishery within the historical range recorded between the 1992 and 1996 seasons. This management plan formalised an implicit goal to maintain annual exploitation rates between 40% and 42%.

Table 1. A chronology of management changes in the Southern Zone Rock Lobster Fishery.

Date	Management change
1917	Minimum size limit of 8 inches (about 20cm total length)
1917	Prohibition on removal of eggs from female lobster
1966	Winter closure introduced (June, July and October)
1968	Limited entry introduced; separation of fishery into northern and Southern zones; mandatory commercial logbook
1972	Recreational bag and boat limits introduced (initially a limit of 5 per day by diving)
1980	Winter closure varied (May and August closed, October opened)
1984	15% pot reduction; 80 pot maximum; 40 pot minimum
1987	Buy back of 41 licences (2,455 pots removed)
1992	April closed, competitive TACC of 1,650 tonnes implemented
1993	ITQs implemented. TACC 1720 tonnes
2000	Dockside Monitoring Program implemented
2001	TACC increased to 1,770 tonnes
2003	TACC increased to 1,900 tonnes; Trial commercial fishing undertaken in May (no extra quota allocated)
2004	Trial commercial and recreational fishing undertaken in May (no extra quota allocated)
2005	Dockside monitoring programme ceased; video monitoring trial of catch weighing process undertaken at Robe; Fishery-independent monitoring programme trial commenced
2006	Electronic scales and video monitoring phased in at all ports

Quota management system

The quota management system was introduced with the express purpose of promoting stock recovery by ensuring catches would not exceed a pre-determined sustainable level. A number of management options were considered prior to a competitive TACC of 1,650 being introduced in 1992 (Zacharin, 1997).

Following one season under a competitive TACC, a system based on Individually Transferable Quota (ITQ) units was developed. Developing an equitable method for allocating ITQs between licence holders in the fishery was a very complex and controversial issue.

Three alternative allocation methods were initially considered based on a:

- fisher's share of the total number of pots in the fishery (standard pot allocation);
- fisher's share of the total historical catch from the fishery; or
- combination of the above.

For the first year under ITQ management, shares were allocated according to the "Adjusted Preferred" method or the "Presser Model". This method selected each fisher's greatest relative share of either pots or catch history. Determining a fisher's share by the

total number of pots in the fishery was straightforward. However, determining a fisher's share of the catch history was more complex.

In June 1991, the commercial fishers were advised that if the allocation method included consideration of historic catches, catch history up to (and including) the 1990/91 season would be used as the basis for allocation. This was to avoid licence holders falsifying catch and effort returns in an attempt to establish an inflated catch history.

The method for determining shares of catch history in the fishery for the purposes of the "Adjusted Preferred" method was to average the catch per pot for the best two years of the 1988/89, 1989/90 and 1990/91 seasons, and then multiply this by the number of pots endorsed on the licence holder's fishing licence at the end of the 1990/91 fishing season.

After adding the highest percentage shares of all fishers (eg shares in either pots or catch history) the total percentage figure was about 110%. To ensure that the Total Allowable Catch (TAC) was not exceeded, all individual allocations were reduced by 10%. This meant that all licence holders received an allocation that was about 10% less than that achieved with their most preferred allocation system, regardless of whether this used catch history or pots.

The Minister for Primary Industries at the time gave an undertaking that management of the fishery (including the allocation method) would be reviewed at the end of the 1993/94 season. The review was conducted from May 1994 until August 1994, with most effort focusing on a review of the quota allocation method.

An exhaustive process of management committee meetings, port meetings and consultations with individual licence holders resulted in the management committee recommending that the current quota allocation method be adapted so that quota would be allocated on the basis of an equal share of the quota per pot at the end of a three year period - the "APACHE" (Adjusted Preferred Allocation Catch History Equation) Model.

The Minister for Primary Industries instructed the management committee to consider further the impact of this recommendation on licence holders with a history of high catches. The management committee laboured over the issue and while still supporting the "APACHE" model agreed that the system should be implemented over a four year period to allow high catch history licence holders an extra season to adapt to the changes.

Whilst the recommendation to implement the APACHE four year method of quota allocation was supported by the management committee and accepted by the Director of Fisheries and the Minister for Primary Industries, around 25 percent of licence holders did not support the method. This generally equates to the number of licence holders who would benefit under an allocation system based on catch history.

A high catch history licence holder successfully challenged the regulations which implemented the APACHE model in the Supreme Court of South Australia in March 1995 (BR Lawrie v Minister for Primary Industries, J Jefferson and TJ Moran). As a result, the fishery reverted to a competitive quota managed fishery for the remainder of the 1994/95 season. Fishers voted to continue to support the allocation model and continued fishing on this basis. The Minister successfully appealed this decision in the Full Supreme Court of South Australia in July 1995 (Minister for Primary Industries & ORS v Lawrie). All three judges agreed that the appeal should be allowed and the recommendations of the management committee and the "APACHE" model remain in force.

During the four years of the APACHE allocation method, pots transferred were allocated the average weight of the pot quota across the fishery. The 1997/98 season saw the end of the APACHE model with all pots being allocated a standard per pot allocation of the TACC.

4.1.2 Recreational Fishing

Fishing has provided an important recreational and sporting activity throughout South Australia since European settlement. Many early accounts of fishing in South Australia refer to fish being taken as part of recreational pursuits, to supplement food supplies and to trade for other goods and services. Recreational fishing for rock lobster has traditionally been undertaken using pots, drop nets, bait sticks and by diving. Areas in the south east of South Australia have been the most popular recreational fishing location over time.

Initially controls such as size limits and measures aimed at controlling total harvesting capacity (eg. gear restrictions and seasonal closures) were generally introduced to be consistent with those in place for commercial fishers and were not specifically targeted at the recreational sector. However, over time the need for specific management arrangements for recreational activity developed due to increases in the popularity of fishing, improvements in recreational opportunities and the growing number of people living or holidaying on or near the coast.

The first comprehensive survey of recreational catch and effort levels in the South Australian Rock Lobster Fishery was undertaken in the 1998/99 fishing season (McGlennon, 1999). This survey focused on the catch taken by the recreational pot sector and estimated that the total statewide recreational catch of rock lobster was less than 67 tonnes in the 1998/99 fishing season (about 2.6% of the total State catch of the species). It was estimated that about 60% of the catch (in weight) was taken in the Southern Zone.

This survey was repeated in the 2001/02 fishing season with a wider focus including an estimation of the pot, dive and drop net sector catches (Boxall, *et al.*, 2003). This survey estimated that the total statewide recreational catch by all methods was 118 tonnes in the 2001/02 fishing season (about 4.7% of the total State catch of the species). It was estimated that over 70% of the catch (in weight) was taken in the Southern Zone. This survey is repeated every three years and has been undertaken during the 2004/05 season (Currie *et al* 2006). Based on data from registered pot fishers only, the estimated State recreational catch in the 2004/05 season was 83.17 tonnes of which 74.62 tonnes came from the SZRLF and 8.56 tonnes came from the NZRLF. The total number of persons with recreational pot registrations for 2004/05 was 5,656. The number of individual pots in use was 9,827.

Today, recreational fishing opportunities provided by both zones of the South Australian Rock Lobster Fishery contributes to the overall well being of many South Australians. As well, the recreational community contributes significantly to state and regional economies through tourism, the purchase of fishing equipment, vessels, bait supplies and fuel. In recognition of the importance of recreational fishing to the community of South Australia, a strategic plan for recreational fishing was developed in 2001 to set a number of future directions for management and development of recreational fishing throughout the state.

4.1.3 Aboriginal fishing

Many Aboriginal communities have a long history of fishing in what are now known as South Australian waters. Each community's fishing activities and cultural practices are distinct. Further information about these activities and practices will be described in each Aboriginal Traditional Fishing management plan that is developed. These plans are currently being developed through the process of negotiating Indigenous Land Use Agreements with native title claimants and will be available as those agreements are concluded.

4.1.4 Fish Processing and Markets

Since 1998 over 80% of annual South Australian rock lobster has been exported with the majority of product going into Hong Kong, China and Taiwan markets (Anon 2006a). In 2003, the outbreak of the SARS virus in Asia, high fuel prices and the strong performance of the Australian dollar against Asian currencies led to a severe price drop for rock lobster. This exposed the industry's vulnerability to having a single export market.

In response to these issues, the Australian Southern rock lobster industry (comprising industry associations from South Australia, Victoria and Tasmania) is undertaking a market development project. The project focuses on the development of supply chain, distribution and communication tools to facilitate penetration of other markets, particularly premium fine dining markets. Initially, it is intended that the project will provide an avenue into the USA's Super-Premium-Fine-Dining sector.

A key component of the project is to establish traceability systems and a quality assurance program to ensure delivery of a quality branded product. The industry "Clean Green" program has therefore been implemented to provide the framework for supply and to promote the sustainable image of the fishery.

4.2 Consultation and co-management

The *Fisheries (Management Committees) Regulations 1995* outline a set of co-management principles and establish a number of Fisheries Management Committees (FMCs) for key fisheries or groups of fisheries, including the Southern Zone Rock Lobster Fisheries Management Committee (SZRLFMC). Under these regulations, the SZRLFMC developed this management plan.

New co-management arrangements will be established under the *Fisheries Management Act 2007*, with a greater emphasis of industry self-governance.

4.3 Current Management Arrangements

4.3.1 Commercial Fishing

The current management arrangements for the Southern Zone Rock Lobster Fishery reflect arrangements that have evolved since the 1960s, as well as some major changes that were introduced in 1992 following a management review.

The commercial fishery is managed using a complex mix of input and output controls aimed at matching harvesting capacity with resource availability. Table 2 outlines existing management controls in the fishery.

Table 2. Management controls in the commercial sector.

Management tool	**Current restriction**
Limited entry	181 licences
Total Allowable Commercial Catch	1,900 tonnes
Closed season	1 June to 30 September
Total number of pots	11,923
Minimum size limit	98.5 mm carapace length
Maximum number of pots/licence	100 pots
Minimum number of pots/licence	40 pots
Maximum quota unit holding	Limited by pot holding (100 pots)
Minimum quota unit holding	Limited by minimum pot holding (40 pots)
Spawning females	No retention
Maximum vessel length	None
Maximum vessel power	None
Closed areas	Aquatic Reserves: Margaret Brock Reef, Cape Jaffa and Rivoli Bay
Escape gaps	Optional, not mandatory at present
Monitoring tool	**Requirement**
Catch and effort data	Daily logbook submitted monthly
Catch and Disposal Records	Daily records submitted upon landing (electronic scales currently being implemented to automate this process)
Landing locations	7 designated landing sites
Landing times	Landings permitted during core hours
Prior landing reports to PIRSA	Outside core hours, 1 hour before landing

4.3.1.1 Access to the Rock Lobster Fishery

Commercial access to the Southern Zone Rock Lobster Fishery is limited to 181 commercial licences. In order to hold pots and quota entitlements in the commercial fishery, a person must be the holder of a current commercial licence. In addition to the licence buy-back in 1987, there has been a gradual reduction in licences over time due to licences being 'split up' where all the pots on a licence are sold separately to other licence holders and the licence is surrendered.

4.3.1.2 Access to the Marine Scalefish Fishery

Rock lobster licence holders have varied levels of access to the South Australian Marine Scalefish Fishery. There are three levels, described as Option A, B and C.

Option A allows the take of rock lobster, octopus and giant crabs for the purposes of trade or business. All other species listed on Schedule 1 of the *Fisheries (Scheme of Management – Rock Lobster Fisheries) Regulations 1991* may not be taken.

Option B allows the take of rock lobster, octopus and giant crabs for the purposes of trade or business and the take of other species listed on Appendix 10.1 for the purposes of bait

use only. "Bait use" means for use as bait in a licence holder's own fishing operations and does not involve selling or transferring those fish.

Option C allows the take of all species on Schedule 1 for the purposes of trade or business. All species may be taken and sold.

Options are implemented by licence condition and each option attracts a different licence fee. Options were taken up voluntarily, with the majority of licence holders taking up Option C. Licence holders may 'downgrade' their marine scalefish access (for example, by shifting from Option C to Option B) but cannot upgrade (ie. once Option A has been chosen cannot later choose to upgrade to Option B or C).

4.3.1.3 'Take home' lobster mortalities

Rock lobster fishing results in some pot-induced lobster mortality that is accounted for in TACC setting. In order to minimise waste, all licence holders are permitted to retain up to 2 dead lobster per trip that were dead upon pot retrieval. Each licence holder is permitted to land up to a total of up to 30 lobster mortalities per year. These fish will not be subtracted from quota holdings. These lobster mortalities (or 'take home' lobster) must be recorded on the Catch and Disposal Record (CDR) form.

4.3.1.4 Area of the Fishery

The area of water encompassed by the Southern Zone Rock Lobster Fishery includes waters extending from a stepped line near the Murray River Mouth to the Victorian border. The fishery boundaries as described in the *Fisheries (Scheme of Management – Rock Lobster Fisheries) Regulations 2006* are as follows:

> *"easterly of a line commencing at the point where the meridian of longitude 139°E intersects the shore of South Australia, then due south to position latitude 36°20.0'S and longitude 139°E, then due west to position latitude 36°20.0'S and longitude 138°40.0'E, then due south to position latitude 36°40.0'S and longitude 138°40.0'E, then due west to position latitude 36°40.0'S and longitude 138°20.0'E, then due south to position latitude 37°S and longitude 138°20.0'E, then due west to position latitude 37°S and longitude 138°E, then continuing due south along the meridian of longitude 138°E."*

Rock lobster is also totally protected in the dedicated rock lobster sanctuaries across the State (Cape Jaffa, Margaret Brock Reef, Rivoli Bay and Gleesons Landing) as well as in all aquatic reserves.

4.3.1.5 Quota Restrictions

A quota system is in place, which restricts the annual commercial catch a to a pre-defined limit each year. This arrangement requires a TACC to be set each year. The Director of Fisheries sets the TACC each year in accordance with the scheme of management regulations. A minimum quota unit holding of 40 quota units (40 pots) applies to all licences. The maximum quota unit holding is 100 quota units (100 pots).

4.3.1.6 Gear Restrictions

A number of gear restrictions are in place to limit the amount of effort expended in the fishery and limit any incidental impacts on non-target species populations. The only method permitted for targeting southern rock lobster is a rock lobster pot. All pots must have the following design specifications:

Pot design feature	Dimensions
Maximum diameter	1m
Maximum height	1m
Maximum weight	40kg
Entrance	One entrance at the top
Minimum mesh covering the pot	50mm; or 2 escape gaps of 55mm high x 150mm wide - the highest point of each gap must be no more than 110mm from the base of the pot

A maximum of 11,923 pots are registered in the fishery. The maximum number of pots that may be registered on an individual licence is 100 pots. The minimum number of pots that may be registered on a licence is 40 pots.

4.3.1.7 Size Limit

Size limits have been applied to southern rock lobster since at least the introduction of the *Fisheries Act 1917* (Trigg, 1940) to maximise the opportunity for individual lobster to reproduce at least once before capture. This measure is primarily intended to protect fish stocks from recruitment overfishing. Size limits are used to maximise the biological or economic yield per-recruit and to protect fish populations from growth overfishing. The minimum legal size limit in the Southern Zone is 98.5 mm carapace length (CL)

4.3.1.8 Quota unit and pot transfers

Quota units are fully transferable between licence holders in the fishery, within the upper (100 units) and lower (40 units) limits. Each year the Director of Fisheries determines the value of a quota unit (TACC divided by the number of quota units in the fishery). Quota units and pot entitlements are permanently and temporarily transferable. Quota and pots are linked - for every quota unit that is transferred, a pot must also be transferred at the same time to the same licence.

4.3.2 Fish processing

Rock lobster licence holders are required to dispose of all rock lobster to a registered fish processor. Under the *Fisheries (Fish Processor) Regulations 2006* there are two types of registrations – full registration and restricted registration. Registrations are granted to applicants on an annual basis. A full registration attracts a base fee plus a fee for authorisation to process specified species, including rock lobster. A restricted registration attracts a lesser annual fee.

A full registration allows the holder to process, store or deal with fish for the purposes of trade or business subject to the requirements set out in the regulation, which include quota monitoring, reporting and labelling requirements.

A restricted registration allows a licence holder to only process fish taken pursuant to their own licence for the purpose of one of the following:

- for sale to an unregistered fish processor;
- for sale directly to the public (eg. beach selling);
- for sale to a person who is supplying the fish to the public as part of a meal (eg. to a pub or restaurant).

4.3.3 Recreational Fishing

The recreational sector is managed through a combination of input and output controls, aimed at ensuring the total catch is maintained within sustainable limits and to ensure that recreational access to the fishery is equitably distributed between recreational participants. Similar to the commercial sector, these controls include limitations on the type and amount of fishing gear that may be used, spatial and temporal closures, a legal size limit (which is consistent with the commercial sector) and bag and boat limits. The majority of management controls currently used to manage the recreational sector have been in place for many years. Please refer to the existing set of regulations for specific recreational management controls.

4.3.3.1 Access to the Fishery

Entry to the South Australian Recreational Rock Lobster Fishery is currently unlimited (anyone can take rock lobster). However, individual recreational fishers are subject to various management controls outlined in this section. The allocated recreational catch is capped at 4.5% of the State-wide rock lobster catch. The total catch in the recreational sector is estimated using recreational surveys every three years. In the years when a catch and effort survey is not undertaken, the number of pots registered in the recreational sector is used as a proxy to estimate the total catch taken by the recreational sector. Under these arrangements, if more than 4.5% is taken by the recreational sector, PIRSA can use various management measures to ensure that long term recreational catch levels remain within the established 4.5% cap.

4.3.3.2 Recreational Fishing Methods

Recreational fishers are permitted to take rock lobster using pots, drop nets, hoop nets and by diving, during the existing seven month season. A maximum of two pots per person may be registered with PIRSA Fisheries each year. Anyone over the age of 15 years may register rock lobster pots. Recreational pot registrations are non-transferable. Gear specifications are set out in the *Fisheries (General) Regulations 2000*.

4.3.3.3 Catch Limits

Bag and boat limits are output controls used to cap the total catch in the recreational sector to ensure catch levels remain within sustainable limits. Bag limits and boat limits help to ensure that recreational fishers catch only what they require for their immediate needs and also assist with ensuring the catch is equitably shared between recreational participants in the fishery. Under the *Fisheries Act 1982* a maximum daily bag limit of 4 lobster and a daily boat limit of 8 lobster applies to the recreational sector.

4.3.3.4 Other Controls

All lobster taken by recreational fishers must have the tail fan clipped to enable fisheries compliance officers to identify between the commercial and recreational sector catches. The landing of egg bearing females is prohibited in both the commercial and recreational sectors and a minimum size limit of 98.5mm CL is applied consistently across the Southern Zone.

4.3.4 Aboriginal Fishing

All of the management measures in place for the recreational sector currently apply to Aboriginal communities when undertaking traditional fishing practices. This is because the *Fisheries Act 1982* does not currently recognise traditional fishing as a separate type of fishing.

Access to South Australia's fisheries resources by Aboriginal communities under the *Fisheries Management Act 2007* will be provided through Aboriginal traditional fishing management plans. These plans may be made where an Indigenous Land Use Agreement (ILUA) is in place in relation to a native title claim area. The State is currently engaged in ILUA negotiations with native title claimants and the commercial fishing industry. The agreement negotiation process will inform the way that access to fisheries resources by Aboriginal communities is defined and implemented.

4.3.5 Stock Enhancement and Translocation

4.3.5.1 Regulations

There has been no stock enhancement program in the South Australian Rock Lobster Fishery. The South Australian *Fisheries Act 1982* currently prohibits the release of any exotic fish, farmed fish or any fish that have been kept apart from their natural habitat into any "waters". The Act defines "waters" to mean any sea or inland waters including any body of water or watercourse of any kind occurring naturally or artificially created. It is therefore an offence to release any cultured fish (restocking) or translocate fish from their natural habitat unless the Director of Fisheries has issued a permit in accordance with section 50 of the *Fisheries Act 1982* for this activity to occur.

4.3.5.2 Policy

A stock enhancement and translocation policy is currently being developed by PIRSA Fisheries.

4.3.5.3 Broodstock Collection

A policy is currently being prepared by PIRSA to guide decision-making on the collection of broodstock for aquaculture purposes across all of South Australia's fisheries. Associated with this are a set of strict guidelines and protocols developed for the aquaculture industry that prohibit the re-release and translocation of broodstock, the prevention of escapements of cultured animals, and the management of disease and parasites.

5 FRAMEWORK FOR DECISION-MAKING

The framework for decision-making for the Southern Zone Rock Lobster Fishery is set out in this section. There are three parts to the framework. Firstly, the goals, objectives and strategies provide overarching principles for management of the fishery. The second sub-section describes the harvest strategy, which is the operational aspect of the plan that defines the decision rules for setting the TACC. The third subsection describes additional factors that will be taken into account in assessing the performance of the fishery. Measurable performance indicators are identified for the fishery and reference points outline how those measures should be interpreted. Each performance indicator is linked specifically to the goals, objectives and strategies that they measure.

5.1 Goals, Objectives and Strategies

The *Fisheries Act 1982* provides an overarching framework to ensure long-term sustainability of South Australia's fisheries resources. This management plan provides a set of management goals and objectives for the Southern Zone Rock Lobster Fishery that are complementary to the objectives outlined in the Act. These goals and objectives also take into account policy drivers set out in section 3.3 such as the principles of ecologically sustainable development, the precautionary principle, the guidelines for the ecologically sustainable management of fisheries set out in the EPBC Act 1999 and the National Policy on Fisheries By-catch.

This management plan seeks to ensure that an appropriate balance exists between the need to ensure long term sustainability of southern rock lobster stocks in the Southern Zone and the optimum utilisation and equitable distribution of Southern Zone rock lobster stocks between all stakeholder groups and future generations. For this reason, the stock sustainability and environmental management objectives set out in this management plan provide the baseline against which all other objectives will be pursued. Economic and social objectives will be pursued to the extent possible, where stock sustainability objectives have been demonstrably achieved.

There are four key management goals for the fishery:

1. Maintain ecologically sustainable stock levels
2. Ensure optimum utilisation and equitable distribution of rock lobster stocks
3. Minimise impacts on the ecosystem
4. Cost effective and participative management

A series of objectives has been established to ensure that management goals are operationalised. Linked to these objectives is a series of management strategies designed to ensure that objectives are effectively pursued over the next five years. The objectives and strategies that relate to each management goal are presented in table 3. The following paragraphs describe some of the key objectives and strategies for each goal.

Goal 1: Maintain ecologically sustainable stock levels

The primary objective for Goal 1 is to ensure that rock lobster stocks in the Southern Zone are harvested sustainably and that adequate data exists to determine this. The main management strategies for ensuring sustainability of the fishery are the major output controls - restrictions on the total commercial catch each year through the quota system, bag and boat limits for recreational fishers, size limits and restrictions on taking berried females. The closed season to protect spawning stock is also an important measure.

As the commercial sector accesses 95.5% of the fishery each year, the decision rules and reference points for determining the annual TACC in the harvest strategy are the focus in terms of ensuring ecologically sustainable stock levels.

Goal 2: Optimum utilisation and equitable distribution of rock lobster stocks

Goal 2 aims to optimise the use of the fishery in an equitable way, within the sustainability constraints of the fishery. Optimising the use of the fishery is addressed in the objectives and strategies in terms of maximising stable economic returns from the commercial fishery and maintaining equitable access to the resource for the non-commercial sectors.

The TACC decision rules and reference points in the harvest strategy aim to establish catch limits that maximise catch and economic returns from the fishery.

Goal 3: Minimise impacts on the ecosystem

Commonwealth guidelines for the ecological sustainability of Australian fisheries acknowledge the need to minimise the impacts of fishing on the ecosystem. Three key objectives were identified to achieve this goal: ensure sustainability of by-catch and by-product species; minimise interactions with threatened, endangered and protected species (TEPS); and minimise impacts on benthic habitats and associated communities.

A strategy that is common to each of these objectives is the maintenance of effort restrictions through licence limitation, gear restrictions and the seasonal and spatial closures that exist in the fishery. Also, the development and implementation of environmentally friendly fishing gear and fishing practices will be encouraged to minimise impacts on the ecosystem.

Research is currently being undertaken to investigate ways of minimising impacts on TEPS, particularly seals.

Another strategy to be employed during the life of this plan is to facilitate collection of improved information on interactions with threatened, endangered and protected species. The first phase of this strategy has begun with the development of a draft commercial logbook designed specifically by PIRSA Fisheries to be used across all of South Australia's commercial fisheries.

Goal 4: Cost effective and participative management of the fishery

The key objectives of this goal are to ensure that each sector of the fishery has involvement in the decision-making processes for developing and implementing management arrangements and to ensure that management arrangements are complied with. The cost effectiveness of management arrangements also needs to be taken into account in the development process as the costs of management are recovered from fishers in accordance with the Government's cost recovery policy.

Table 3. Management goals, objectives and strategies for the management of the Southern Zone Rock Lobster Fishery**.**

Goal	Objectives	Strategies
1. Maintain ecologically sustainable stock levels	*1a. Maintain the stock at or above a level that will support the commercial catch rates achieved in the reference year of 2000.*	▪ Set the TACC annually. ▪ Review the TACC every two years, in accordance with TACC decision rules in the harvest strategy. ▪ Maintain all other existing input and output controls.
	1b. Fishing is conducted at a level that provides protection from recruitment overfishing.	▪ Monitor the number of pre-recruits in the fishery through the voluntary catch sampling program, as an index of future recruitment strength. ▪ Review the TACC every two years, in accordance with TACC decision rules in the harvest strategy ▪ Monitor larval settlement in the fishery, as an index of future recruitment strength. ▪ Use escape gaps to minimise pot-induced juvenile mortality rates.
	1c. Sufficient biological and environmental information exists to inform management decisions.	▪ Collect fishery-dependent information through commercial logbooks. ▪ Maintain a voluntary catch sampling program to collect additional biological information. ▪ Develop and implement a fishery-independent data collection program. ▪ Undertake recreational survey to estimate catch and effort every three years. ▪ Assess the status of the stock through quantitative stock assessment. ▪ Review and update the strategic research and monitoring plan bi-annually.
2. Optimum utilisation and equitable distribution of rock lobster stocks	*2a. Maintain the stock so as to support the commercial catch rates achieved in the reference year of 2000.*	▪ Set the TACC annually. ▪ Review the TACC every two years, in accordance with TACC decision rules in the harvest strategy.
	2b. Maintain a flow of economic benefit from the fishery to the broader community	▪ Review the TACC every two years, in accordance with TACC decision rules in the harvest strategy. ▪ Develop and implement management arrangements that allow commercial operators to maximise operational flexibility, economic efficiency and returns. ▪ Maintain and refine mechanisms to allow for autonomous fleet adjustment.

Goal	Objectives	Strategies
	2c. Equitable public access and recreational fishing opportunities	▪ Maintain appropriate recreational catch limits. ▪ Monitor recreational catch and effort levels across the State every three years. ▪ Allow recreational fishers to register up to 2 recreational rock lobster pots. ▪ Allow recreational fishers to dive and use drop nets to harvest rock lobster. ▪ Improve recreational fishing opportunities by rebuilding the stock to target levels.
	2d. Recognise Aboriginal fishing access.	▪ Integrate any traditional fishing access prescribed in Aboriginal traditional fishing management plans with the management of the commercial, charter and recreational sectors.
	2e. Sufficient economic information to ensure management decisions are properly informed	▪ Undertake annual economic surveys of the commercial fishery to assess economic performance against a set of economic indicators.
	2d. Shares of access to rock lobster explicitly allocation between Aboriginal, commercial, charter and recreational sectors.	▪ Control the State-wide recreational and charter share of rock lobster resource to 4.5% of the total State-wide catch. ▪ Control the State-wide commercial catch of rock lobster to 95.5%. ▪ Integrate any traditional fishing access prescribed in Aboriginal traditional fishing management plans with the management of the commercial, charter and recreational sectors. ▪ Develop mechanisms for adjusting shares in the future that utilise market tools.

Goal	Objectives	Strategies
3. Minimise impacts on ecosystem	*3a. Minimise fishery impacts on by-catch species and the ecosystem*	▪ Maintain a cap on the total number of pots used in the commercial fishery. ▪ Use appropriately sized escape gaps to minimise by-catch of undersized lobster and other non-target species. ▪ Manage the take of key by-product species to ensure that catches remain at very precautionary levels in the absence of direct management controls based on full stock assessments. ▪ Undertake a risk assessment to determine the vulnerability of non-target species to fishing operations. ▪ Develop and implement a by-catch action plan for the fishery. ▪ Maintain a program to monitor a set of by-catch indicator species. ▪ Promote uptake of the industry 'clean green' code of practice. ▪ Promote the development of environmentally friendly fishing practices, including strategies to avoid lengthy pot soak times that result in high incidental mortality rates.
	3b. Avoid the incidental mortality of endangered, threatened and protected species	▪ Quantify the impact of fishing operations on endangered, threatened and protected species. ▪ Improve data recording systems to capture fishing interactions with endangered, threatened and protected species. ▪ Undertake a risk assessment to determine the vulnerability of endangered, threatened and protected species to fishing operations. ▪ Using the risk assessment as a guide, develop management measures to avoid interactions with endangered, threatened and protected species.
4. Cost effective and participative management of the fishery.	*4a. Cost-effective and efficient management of the fishery, in line with government's cost recovery policy.*	▪ Quantify the impact of fishing operations on endangered, threatened and protected species. ▪ Improve data recording systems to capture fishing interactions with endangered, threatened and protected species. ▪ Undertake a risk assessment to determine the vulnerability of endangered, threatened and protected species to fishing operations. ▪ Using the risk assessment as a guide, develop management measures to mitigate interactions with endangered, threatened and protected species.

Goal	Objectives	Strategies
	4b. Management arrangements reflect concerns and interests of the wider community.	▪ Develop and implement management arrangements that are effective at achieving management objectives and optimising costs. ▪ Determine the annual real costs of management, research and compliance for the fishery. ▪ Recover licence fees from commercial licence holders, sufficient to cover the attributed costs of fisheries management, research and compliance of the commercial fishery in accordance with the Government's cost recovery policy. ▪ Recover a pot fee for all recreational pot registrations to cover the attributed costs of fisheries management, research and compliance of the recreational fishery. ▪ Develop options for greater self-governance by the commercial sector.
	4c. Management arrangements complied with.	▪ Promote stakeholder input to the management of the fishery, through co-management processes and communication strategies. ▪ Ensure that social and cultural issues are given appropriate consideration when new management strategies are being developed. ▪ Communicate management arrangements to the wider community.

5.2 Harvest strategy

This harvest strategy is designed to implement a precautionary approach to managing the fishery and to set the TACC at levels that promote stock sustainability.

The TACC decision rules pursue objectives 1a, 1b, 2a and 2b by establishing decision rules and reference points to ensure that the TACC:

- is set at a precautionary level that allows for adequate recruitment and surplus production to be accumulated to allow for stability in catches during periods of low recruitment; and
- is set at a level that rebuilds stock to a level that provides a buffer against large variations in catch rates between and within years and therefore provides greater business certainty; and
- explicitly takes into account pre-recruit index (PRI) measured through the voluntary catch sampling program and catch rate measured through commercial logbooks.

The TACC decision rules trigger a specific response in terms of TACC increases or reductions.

The management plan also sets additional performance indicators to supplement the key performance measures used in the decision rules (see section 5.3). These performance measures provide supplementary information for fishery assessment. They will also provide information for periodic review to ensure that the performance indicators are adequate indicators for fishery assessment. These additional performance measures do not trigger a specific response. They only require that a management issue be considered, without dictating what the response should be.

Section 5.3 also sets out additional performance indicators that measure performance against other objectives by initiating a response process if they are triggered.

5.2.1 Management Regions

This harvest strategy establishes biological performance indicators that are to be assessed at both the whole-of-fishery level and at the regional level. The relevant regions are the three primary marine fishing areas (MFAs) identified below.

Breaking the assessment down into individual regions in this way will refine management of the fishery to a finer spatial scale and ensure that greater precaution is factored into management arrangements. Improved spatial management will ensure that one region of the fishery is not propping up another region, particularly during periods of low recruitment. Similarly, if the overall fishery is performing strongly, a downturn in one area may not necessarily lead to a TACC reduction for the whole fishery.

The three primary MFAs are 55, 56, and 58. MFA 51 has been excluded from the TACC decision-making process because it does not contribute significantly to the overall performance of the fishery. It is considered more precautionary to use the three main MFAs to guide the TACC setting process. If effort shifts within the fishery, the harvest strategy may need to be reviewed to incorporate different MFAs

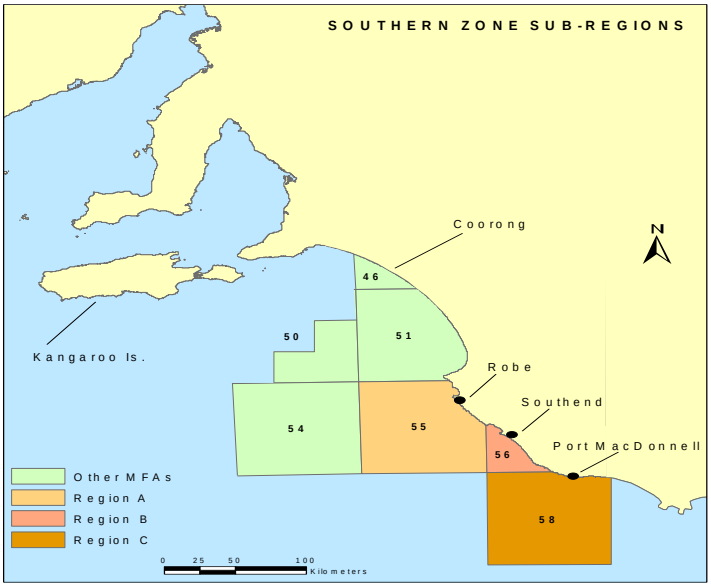

Figure 2: Data assessment and management regions in the Sothern Zone Rock Lobster Fishery**.**

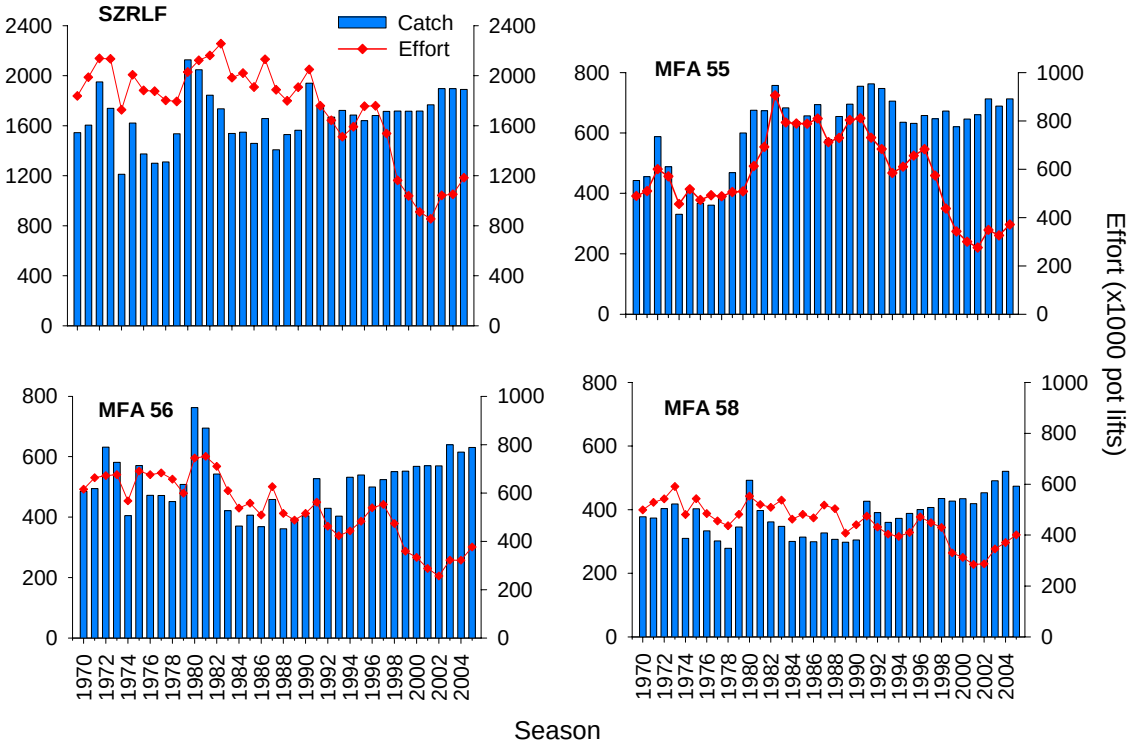

Figure 3. Catch and effort in the Sothern Zone Rock Lobster Fishery and each of the three primary MFAs from 1970-2005 (note alternate seasonal tick on x axis).

5.2.2 Reference points

A goal of this management plan is to maintain the stock at or near historically high levels. This goal will be achieved by ensuring that fishery performance is maintained within the reference points that have been developed for key performance indicators. Although this plan sets out a range of biological performance indicators, reference points have only been developed for two of these (standardised catch rate and PRI). Performance of the fishery against these two reference points will guide TACC setting in the fishery. This approach aims to achieve the following outcomes:

- Stock sustainability
- Simple and robust assessment of fishery performance against management goals;
- More responsive management to changes in biological productivity;
- Improved structure in the annual TACC setting process;
- Stronger stakeholder ownership over the annual TACC setting process; and
- Greater certainty in the annual TACC setting process for all stakeholders.

The biological reference points set out in this management plan have been designed to provide clear guidance to the TACC setting process by defining how key performance indicator estimates should be interpreted and by explicitly linking them to a set of decision rules for TACC setting. The limit reference points represent unacceptable fishery performance that the fishery aims to avoid. Target reference points represent desirable fishery performance that the fishery aims to achieve. Therefore, overall fishery performance will be measured by evaluating annual estimates of key performance indicators, relative to established limit and target biological reference points.

The key biological performance indicators used in this harvest strategy are standardised catch rate (catch per unit effort – CPUE) and PRI. The target and limit reference points for the fishery as a whole are set out below in table 4.

Table 4. Target and limit reference points for catch rate and PRI for the whole fishery and for each primary MFA in the fishery.

Region	Catch rate (kg/potlift)	Catch rate (kg/potlift)	Pre-recruit index (Pot sampling data)
	Limit	Target	Limit
Southern Zone	1.47	2.07	1.03
MFA 55	1.60	2.38	0.46
MFA 56	1.54	2.25	1.77
MFA 58	1.23	1.58	2.31

5.2.2.1 Catch rate

Limit reference points for catch rate have been defined taking into account:

- Historical commercial catch and effort data;
- Nationally and internationally accepted safe limits for spawning biomass and egg production levels;
- Stakeholder expectations of biological and economic performance; and
- A long term goal to maintain a biomass that will support and sustain a TACC of 1,900 tonnes.

The average of the 10 year period 1995 to 2004 has been chosen as the limit reference point, as this represents a period when the fishery is considered to have been performing within a desirable range, both biologically and economically. Using this limit reference value will lead to precautionary decision making for TACC setting.

The year 2002 has been chosen as the target reference year for catch rate, as this represents the fishing season when the fishery reached a peak position that exceeded stakeholder expectations of fishery performance. Using this target reference value will provide stability of catches and catch rates, and will ensure that a precautionary approach is taken to increasing the TACC.

5.2.2.2 Pre-recruit index

Only a limit reference point is set for PRI. Therefore, at any time, PRI is either above or below the reference point. Reference points are set for the fishery as a whole and for each of the three primary MFAs.

For the purposes of setting limit reference points for PRI, a reference period between 1995 and 2004 has been chosen, as this represents a period when the fishery has been operating within a desirable performance range, with respect to meeting stated biological and economic objectives. In order to set reference points for pre-recruit abundance, the average over this ten year reference period has been taken for the whole fishery and for each primary MFA.

As set out in the decision rules (section 5.2.3) the relevant measure for any particular year is the average of the most recent three years. For example, for calculating the PRI for 2007/08, the average of 2005/06, 2006/07 and 2007/08 will be used to determine whether PRI is considered to be above or below the reference points.

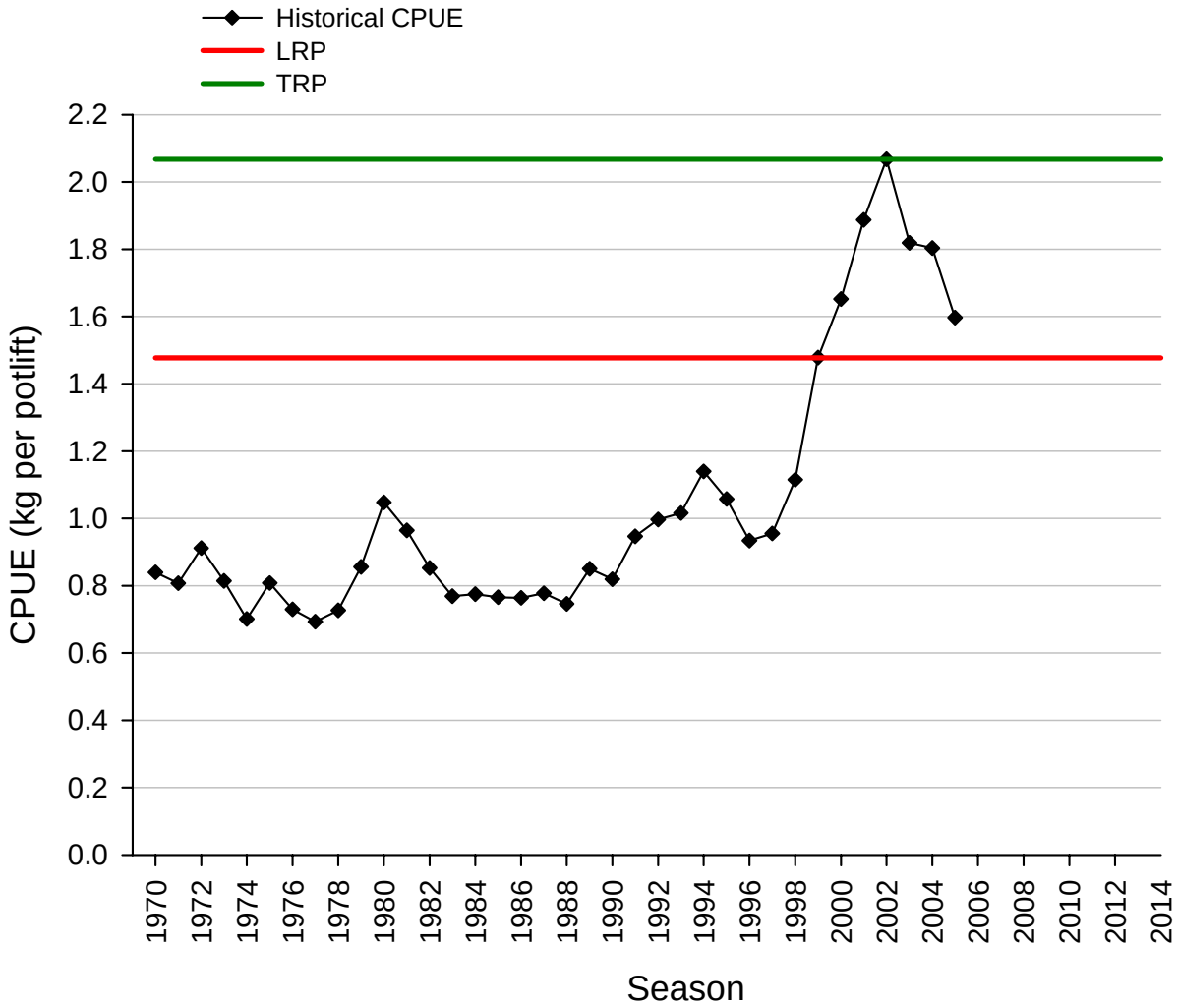

Figure 4: Zonal catch rate (CPUE) with Limit and Target Reference Point (LRP and TRP).

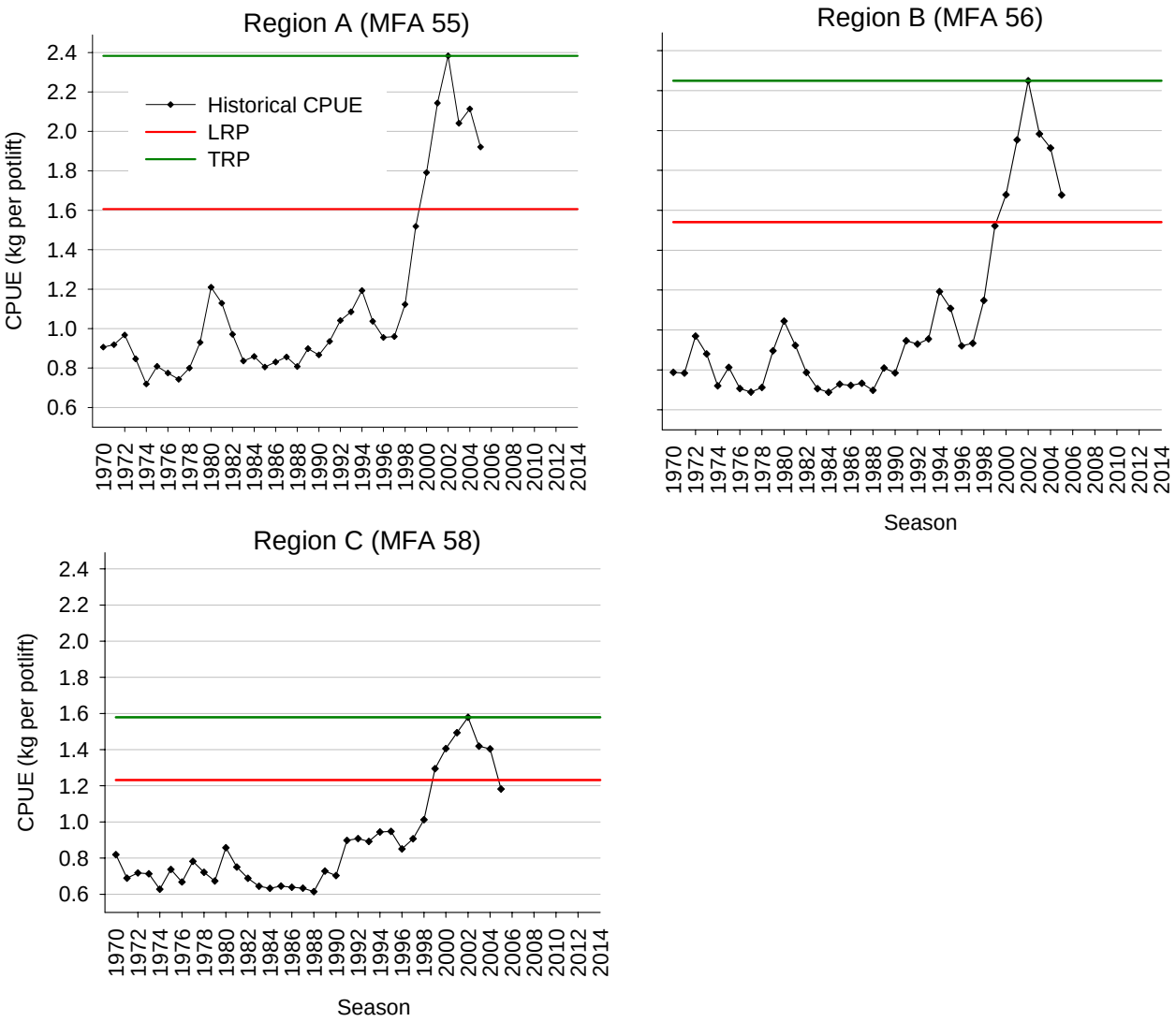

Figure 5. Regional catch rate (CPUE) with Limit and Target Reference Point (LRP and TRP).

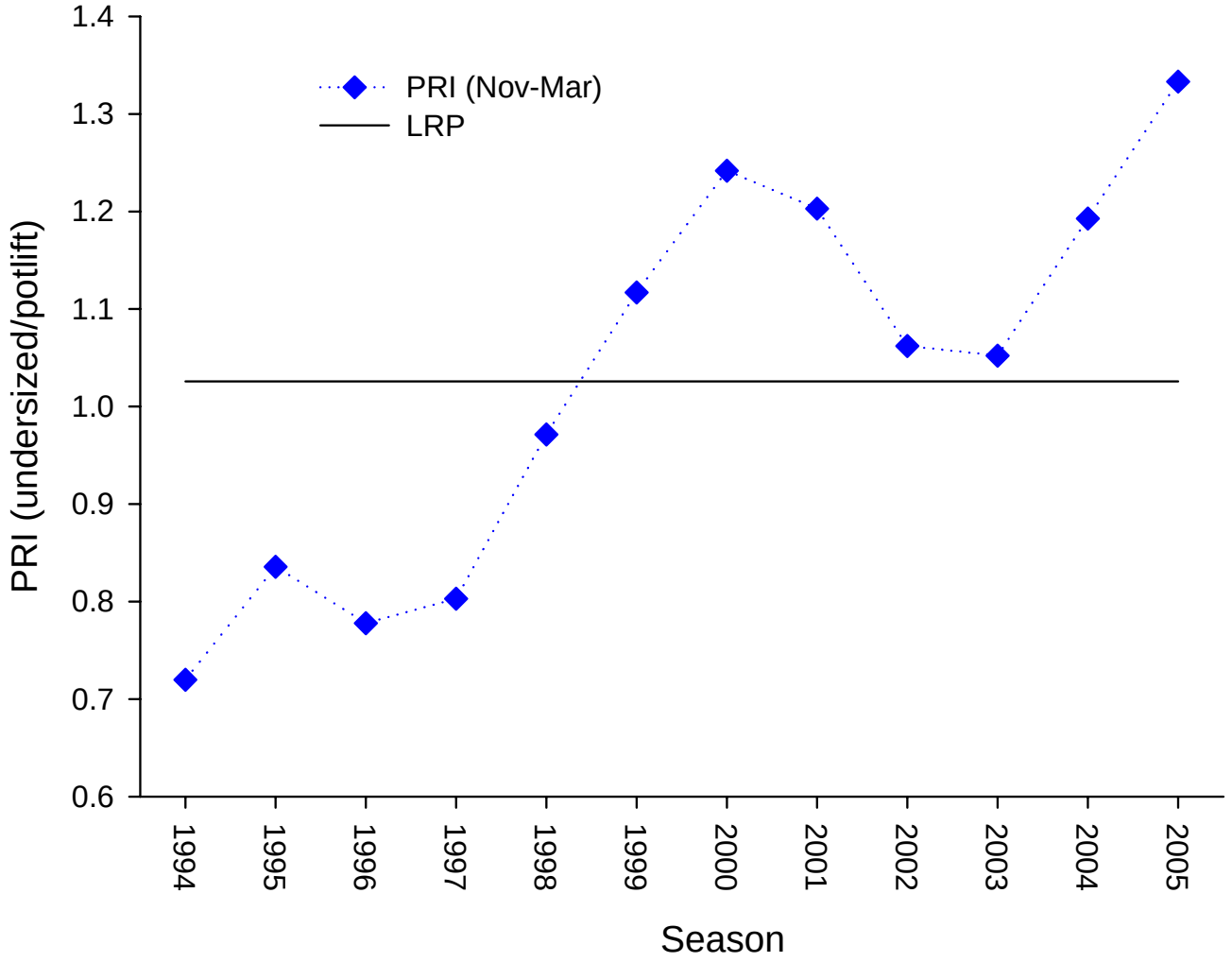

Figure 5: Zonal pre-recruit index (PRI) and Limit Reference Point (LRP)**.**

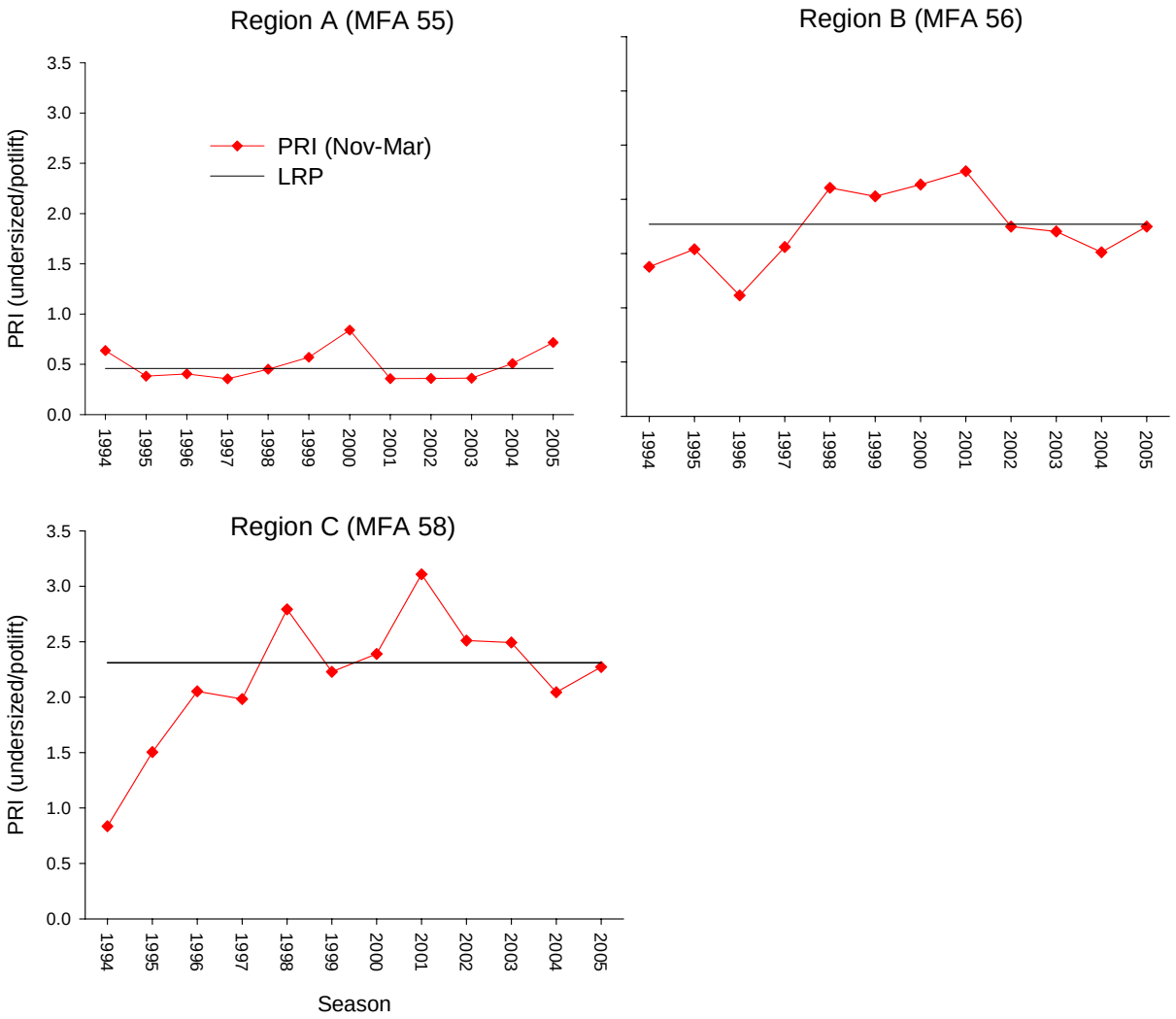

Figure 6. Regional pre-recruit index (PRI) with Limit Reference Point (LRP).

5.2.3 Decision Rules for TACC Setting

The following decision rules apply to annual TACC setting, to ensure greater certainty and security for all stakeholders in the decision-making process.

Decision Rules

Take remedial action when all of the following conditions are met in any given year:

1. Standardised catch rate drops below the limit reference point in 2 primary MFAs; and
2. Standardised catch rate drops below the limit reference point for the whole fishery; and
3. Pre-recruit index (rolling average over the most recent three year period) drops below the limit reference point in 2 primary MFAs; and
4. Pre-recruit index (rolling average over the most recent three year period) drops below the limit reference point for the whole fishery.

One of the following remedial actions must be taken in relation to the upcoming season if all of the above conditions are met:

1. Reduce the TACC to 1720 tonnes (which is a TACC that has previously allowed for rebuilding).
2. Introduce spatial management arrangements that are based on reliable scientific information and that will have the effect of relieving pressure on the stock.
3. A combination of TACC reduction and spatial management arrangements, as above.

Increase the TACC by between 5 to 10% when all of the following conditions are met in any given year:

1. Standardised catch rate for the whole Southern Zone is above the target reference point for three consecutive years; and
2. Standardised catch rate is above the target reference point in 2 primary MFAs for three consecutive years, providing the other MFA is not below limit reference point in those three years; and
3. Pre-recruit index (rolling average over the most recent three year period) is above the limit reference point for the whole Southern Zone; and
4. Pre-recruit index (rolling average over the most recent three year period) is above the limit reference point in 2 primary MFAs, providing the other MFA is not below limit reference point.

These rules will be applied in making a recommendation to the Minister and the Director of Fisheries in relation to the TACC. The Director of Fisheries has responsibility for determining the value of a quota unit on an annual basis (and therefore setting the TACC) under the regulations.

Industry feedback was received during the public comment period that these rules are too onerous. Further consideration of these issues will be undertaken during the life of this plan, during which time it is not expected that the status of the fishery will warrant consideration of a TACC increase. The outcomes of this review will be taken into account in the development of the new plan under the *Fisheries Management Act 2007*.

5.2.4 Guidelines for Applying the TACC Decision Rules

The following guidelines apply to the treatment of data used to estimate performance indicators and reference points when applying the TACC decision rules:

- Annual estimates of CPUE (for the Southern Zone and for each region) may be standardised to account for any future changes in fishing behaviour that significantly influence the annual catch rates estimates. In particular, changes that may lead to a significant over-estimate of annual catch rate should be identified. Fishery-independent data should be used in any standardisation. The process must also involve consultation with licence holders from across the fishery, including one representative from each port.
- Annual estimates of CPUE (for the Southern Zone and for each primary MFA) will be estimated for the period 1 October to 31 May of each fishing season.
- The annual estimate of PRI will be calculated using standardised pot sampling data.
- The annual estimate of PRI will be calculated using the average of the PRI over the three most recent seasons.
- Each commercial fisher participating in the voluntary catch sampling program must undergo a simple training process with SARDI Aquatic Sciences in relation to data collection and reporting.

5.2.5 Spatial management

The assessment of data at the regional level and the establishment of decision rules that take into account regional differences in the fishery are the first steps in managing the fishery at a finer spatial scale. This is particularly important in the Southern Zone because stock assessments in recent years have indicated that the majority of catch is being taken from the shallow in-shore grounds of the fishery and that large parts of the fishery are virtually unfished. This is being driven primarily by economic factors, as the market prefers the smaller red lobsters that are generally taken in shallow waters to the larger white or speckled lobsters that are generally taken in deeper waters. The high price of fuel is also a contributing factor.

The decision rules in the harvest strategy have been formulated to account for these trends as much as possible by ensuring that if two MFAs are performing poorly as well as whole fishery, then a TACC reduction should be implemented. Similarly, if only one MFA is performing badly, the TACC should not necessarily be reduced when the overall biomass is considered healthy and capable of sustaining the TACC.

Nevertheless, it is possible that as data continues to be analysed at a finer spatial scale, more refined management measures may be appropriate to address specific spatial issues. Such management measures would be designed to find a balance between the objectives of sustainability and optimum utilisation. For example, it is possible that large tracts of the fishery may remain unfished and fisheries-independent monitoring will indicate that those parts of the fishery contribute to a biomass that can support a specified TACC. At the same time, in-shore area may be spatially depleted to an extent that requires a management response.

Therefore, it is proposed that a strategy be developed in the first two years of this management plan to further refine spatial management within the fishery, and to propose management measures that may be used to complement the TACC decision rules. Research into the spatial dynamics of recruitment in the fishery may form a part of this strategy.

5.3 Additional performance indicators

Assessment against the table of performance measures (Table 5) will provide additional information to supplement assessment of the performance of the fishery. These measures are not required for TACC setting however, if limit reference points are not achieved, this may assist in developing other management arrangements other than TACC adjustments.

In the life of this management plan a comprehensive review will be undertaken to determine the appropriateness of both the key performance indicators and the additional performance indicators set out in the harvest strategy, how they are measured and how they are used in the fishery assessments.

The performance indicators that relate to each goal are set out below in a separate table associated with each set of objectives and strategies.

When a limit reference point for the additional performance indicators is triggered, PIRSA Fisheries and the relevant co-management body will take the following actions:

1. Notify the Minister and Director of Fisheries.

2. Undertake a detailed review including an examination of the causes and implications.

3. Where appropriate, consult with key stakeholder groups regarding the need for alternative management strategies to improve the performance of the fishery.

4. Provide a report to the Minister and the Director of Fisheries within three months of the initial notification on the effects of either not meeting or exceeding one or more limit reference points, including any recommendations on alternative management strategies.

5. The Minister or the Director of Fisheries will consider recommendations, endorse supported strategies and implement them as appropriate.

Table 5. Table of additional performance indicators for each management objective

Goal	Objective	Performance Indicator	Description	Limit reference point
1. Maintain ecologically sustainable stock levels	*1a. Maintain the stock at or above a level that will support the commercial catch rates achieved in the reference year of 2000.*	Biomass	Reflects the sum total weight of the breeding population and is used to determine the reproductive capacity of the population.	Monitored annually and reported in stock assessment
		Egg production	Reflects the reproductive capacity of the fishery by providing an estimation of the number of eggs produced by all mature females in the population, as a percentage of the virgin egg production.	Monitored annually and reported in stock assessment
		Catch vs TACC	Provides an indicator of the relative abundance of lobster in the fishery.	Drops below 95%
		Mean weight	May reflect changes in the stock structure or changes in fishing practices. Higher mean weight values usually reflect a lack of newly recruited lobster in the population. Lower mean weight usually reflects a greater frequency of smaller lobster in the population due to increased recruitment.	Monitored annually and reported in stock assessment
		Puerulus settlement index	Reflects larval (puerulus) settlement abundance and provides an index of future recruitment strength. Provides an indication of future catch in 4 - 5 years time.	Monitored annually and reported in stock assessment

Goal	Objective	Performance Indicator	Description	Limit reference point
2. Optimum utilisation and equitable distribution of rock lobster stocks	*2b. Maintain a flow of economic benefit from the fishery to the broader community*	Gross Value of Production (GVP)	The total catch valued at the landed beach price - Used to determine overall industry value.	Monitored annually and reported in stock assessment
		Economic Impact (measured by contribution to Gross State Product (GSP)).	The total flow on effects associated with the fishery, including business turnover, employment, household income and value adding). Used to determine the total impact on the economy.	Contribution to GSP drops below $75million.
		Economic Rent	The difference between the market price of rock lobster and the unit costs of producing the landed product. Used to determine the value of the natural resource itself.	Economic rent decreases for two consecutive years.
3. Minimise impacts on ecosystem	*3a. Minimise fishery impacts on by-catch species and the ecosystem*	Trend in the quantity of key by-catch indicator species	Reflects the overall impact of rock lobster fishing operations on indicator by-catch species.	Monitored and reported in annual stock assessment.
		By-catch risk assessment and by-catch action plan	Sets out strategies for identifying impacts, rating those risks and implementing strategies for minimising the highest risks.	Risk assessment undertaken and plan approved by Minister during 2008.
	3b. Avoid the incidental mortality of endangered, threatened and protected species	Number of interactions with endangered, threatened and protected species	Reflects the level of fishery impact on endangered, threatened and protected species. Measured through reporting in TEPS logbook reporting, to be introduced across all fisheries 2007.	TEPS interactions and significant increases addressed.

Goal	Objective	Performance Indicator	Description	Limit reference point
4. Cost effective and participative management of the fishery.	*4a. Cost-effective and efficient management of the fishery, in line with government's cost recovery policy.*	Management costs	Total annual costs associated with management of the fishery.	Management costs as % of GVP increase for two consecutive years. Total management costs increase by 10% or more in one year. Total management costs increase by 15% or more in any two consecutive years.
	4b. Management arrangements reflect concerns and interests of the wider community.	Stakeholder involvement in decision-making	Affected sectors consulted in the decision-making process	A fishing sector not consulted in the development of key management arrangements that affect that sector.
		Information available to public	Information about management arrangements that apply freely available.	Information freely available to public.
	4c. Management arrangements complied with.			

6 ECOSYSTEM IMPACTS

One of three core objectives of the National Strategy for ESD is to 'protect biological diversity and maintain essential ecological processes and life support systems'. The National Strategy for ESD was a key policy driver in the development of the Australian Government 'guidelines for the ecologically sustainable management of fisheries' set out in the *Environment Protection and Biodiversity Conservation Act 1999*. These guidelines mandate the need to ensure that fisheries management frameworks minimise the impacts of fishing on the structure, productivity, function and biological diversity of ecosystems.

Goal 3 of this management plan sets out objectives and strategies for addressing broad ecosystem impacts related to fishing operations. Broader ecosystem impacts have only recently been taken into account in fisheries management systems and stock assessment (Fletcher, *et al.*, 2000). As a result, there is generally a higher level of uncertainty associated with the potential consequences of these impacts.

The national ESD reporting framework (Fletcher, *et al.*, 2000) outlines a process to identify fishery-related ecosystem impacts and evaluate the level of risk associated with fishing activities. An outline of fishery related impacts on the ecosystem and external (non-fishery related) impacts on the ecosystem are presented in Appendix 10.3 as a series of component trees. These component trees will be used to undertake a qualitative assessment of the risks to individual species and the wider ecosystem posed by fishing activities and the risks to the fishery from external factors.

In order to address the issue of by-catch within the fishery, a study was undertaken by SARDI Aquatic Sciences during the 2001/02 to 2003/04 commercial seasons (Brock *et al.*, 2004). The aims were to identify the species composition of by-catch, estimate bycatch catch rates and assess various sampling options for future monitoring. The outcomes from this study have been incorporated into a tri-State By-catch Risk Assessment Strategy in collaboration with Victorian and Tasmanian rock lobster fisheries. This strategy is due for release in 2007. Ongoing monitoring of by-catch within the fishery is undertaken as part of the annual independent observer and Fishery Independent Monitoring Surveys within the fishery.

7 STOCK ASSESSMENT AND RESEARCH

7.1 Data collection

The primary source of data used to underpin all stock assessment work is fishery-dependent. The collection of fishery-dependent data is facilitated by a commercial logbook program, which requires all commercial fishers to compulsorily record daily information on catch and effort levels and other details on daily fishing operations. This information is entered into a database, which is managed by SARDI Aquatic Sciences. Information collected through the logbook program is periodically reviewed to ensure data collection meets management and research needs. The common unit of effort currently used to measure CPUE in the fishery is a pot lift.

SARDI Aquatic Sciences is contracted by the Director of Fisheries to: (i) administer a daily logbook program, (ii) collate catch and effort information, (iii) conduct pot-sampling, bycatch, puerulus and fishery independent monitoring programs and (iv) produce annual stock assessment and status reports that assesses the status of the Sothern Zone Rock Lobster Fishery against the performance indicators defined in the management plan.

Licence holders complete a compulsory daily logbook that has been amended to accommodate changes in the fishery. During 1998, the logbook was modified to include specific details about giant crab fishing. In 2000/01, the logbook was amended so that the recording of numbers of undersize, spawning and dead lobsters, along with numbers of octopus became voluntary. Logbook returns are submitted monthly and are entered into the South Australian Rock Lobster (SARL) database.

Since 1991, commercial fishers and researchers have collaborated in an at-sea voluntary pot-sampling program with the main aim of providing temporal and spatial data on pre-recruit indices, length frequencies, reproductive status, sex ratios and estimates of lobster mortality. Fishers are encouraged to record the above data from 3 pots (in which the escape gaps are closed) per day. This sampling strategy has been identified as being the most optimal as it can provide quantifiable and minimum variances in mean lengths and catch rates from a high percentage of vessels across a wide spatial scale (McGarvey *et al.* 1999b).

Rates of puerulus and post-puerulus settlement have been monitored in the Sothern Zone Rock Lobster Fishery since 1991. The puerulus collector sites in the Sothern Zone Rock Lobster Fishery are located at Blackfellows Caves, Livingstons, Beachport, Cape Jaffa and Kingston. Data are utilised to calculate a puerulus settlement index (PRI) in order to estimate future biomass in the fishery using a 4-5 year time span between settlement and recruitment.

Due to the inherent problems associated with the use of fishery-dependent data for estimating lobster abundance, a Fishery Independent Monitoring Survey (FIMS) was trialled in the Sothern Zone Rock Lobster Fishery during the 2005/06 season. Sampling is currently being undertaken along a number of predetermined transects that cover a range of depth profiles. Data will be used as input for fishery independent models with outputs used in the determination of a fishery independent estimate of lobster abundance. Sampling protocol and data analyses procedures developed in this survey will be applied to the Sothern Zone Rock Lobster Fishery in the coming seasons. Both current and future research needs in the Sothern Zone Rock Lobster Fishery have recently been refocused by the PIRSA rock lobster research sub-committee to ensure the recommendations outlined in the assessment of the fishery by the DEH are addressed appropriately (see *Ecosystem*

Impacts section). The DEH report outlines 13 recommendations to the fishery relating to both management arrangements and ecologically sustainable fishing practices. These recommendations are currently being addressed through either ongoing research or through proposed research projects.

All data available on non-commercial catch and effort levels will be taken into account when assessing the performance of the fishery through stock assessment. The data provided by the periodic surveys undertaken by PIRSA to estimate recreational rock lobster catch and effort levels (Venema *et al*., 2003; Currie *et al*., 2006) and the National Recreational and Indigenous Fishing Survey (Henry and Lyle, 2003) will be used as the main source of information on catch and effort levels in the recreational sector. Refinement of cost-effective methods to continue the collection of accurate recreational catch and effort data is identified as a priority in the strategic research plan.

Where there is another fishery that has an impact on the Southern Zone rock lobster stock, those impacts will be taken into account when estimating fishery performance. Additional indicators of fishery performance may be developed over time as advances in knowledge are made and as stock assessment methods are refined.

7.2 Strategic Research and Monitoring Plan

The strategic research and monitoring plan describes the research and monitoring requirements for the Southern Zone Rock Lobster Fishery to achieve the goals and objectives of this management plan. It is not intended to be a definitive list of all research needs for the fishery over the life of the plan. Future research needs are to be defined by the goals for which they are required.

As set out in Table 6 of this plan, the Strategic Research and Monitoring Plan is to be reviewed every two years. This review should assess research needs, priority and timing. SARDI is the current research provider for the Southern Zone Rock Lobster Fishery. Future projects may be funded and conducted through alternative research providers.

Research and monitoring projects in the plan are assigned priority. 'Core' research and monitoring is the highest priority and forms part of ongoing work programs. 'Important' research and monitoring is essential to support good decision-making in the fishery but is a once-off or periodic project that has not been commenced or is in progress. 'Desirable' research and monitoring is work that would be useful for improved decision-making in the fishery but is dependant on funding.

Table 6. Strategic Research and Monitoring Plan

Goal	Description	Priority	Status	Responsibility	Timing
1	Commercial fishery monitoring including detailed analysis of catch and effort	Core	Ongoing	SARDI	Annual
	Commercial sector voluntary catch sampling to collect biological information and monitor pre-recruit abundance	Core	Ongoing	Industry/SARDI	Annual
	Estimation of non-commercial catch and effort levels	Core	Ongoing	SARDI	Every three years

Goal	Description	Priority	Status	Responsibility	Timing
	Continued refinement of quantitative stock assessment models - with an emphasis on risk assessment and catch forecasting	Core	Ongoing	SARDI	Annual
	Puerulus settlement monitoring program	Core	Ongoing	SARDI	Annual
	Incorporate fishery-independent monitoring survey (FIMS) to estimate of rock lobster abundance across the NZ and SZ	Core	Ongoing	SARDI	Annual
	Quantification of discarded and damaged rock lobsters	Core	Ongoing	SARDI	Annual
	Female fecundity estimation	Core	Complete – paper pending		Paper due 2007
	Relationship between rock lobster recruitment characteristics and oceanographic conditions	Important	In progress	CSIRO	Report due 2007
	Relationship between localised depletions and fishery recruitment	Important		Research provider	Initial workshop 2007
	Effects on egg condition and viability caused by catching and handling processes during the spawning season.	Important		SARDI	Will become necessary if changes to season considered
	Density dependent population growth effects resulting from high discard rates of large lobster.	Desirable	Ongoing (data being collected through FIMS)	SARDI	
2	Analysis of economic indicators for fishery	Core	Ongoing	PIRSA (services contracted)	Annual
	Develop a process for reviewing the appropriateness of allocations between sectors periodically (eg. 5yrs) and mechanisms for shifting shares between sectors in an equitable way.	Core	Subject to new fisheries legislation	PIRSA	Subject to new fisheries legislation
	Market and product development	Important	Ongoing	Industry	

Goal	Description	Priority	Status	Responsibility	Timing
	Monitor and assess changes in industry structure, ie. trends in ownership of licences.	Important	As required for management decisions	PIRSA	As required for management decisions
	Develop industry representation and leadership capacity for all sectors	Desirable		Industry	
	Refinement of socio-economic performance indicators, including indicators of importance of fishery to regional areas	Desirable		PIRSA	
3	Data collection for all by-product, by-catch, threatened, endangered and protected species, to inform risk assessment processes.	Core	Ongoing	SARDI	
	Undertake an assessment of risks to by-product, by-catch, threatened, endangered and protected species from rock lobster fishing.	Core	Risk assessment commenced with Tas and Vic 2006	PIRSA	2007
	Assessing ecological interactions between rock lobsters and other key species in reef communities such as abalone and urchins, including predator/prey relationships, diet etc.	Important	In progress (data being collected through FRDC translocation project)	SARDI	
	Quantify and assess the level of interaction between rock lobster fishing and seal populations.	Important	Scoping study completed	SARDI	Full seal/sea lion project application pending approval
	Definition and mapping of critical rock lobster habitats.	Desirable		SARDI	To inform introduction of Marine Protected Areas
4	Refine methods to estimate illegal harvest	Important	Ongoing	PIRSA	Annual
	Develop model for quantifying optimum monitoring levels to ensure maximum compliance within budget constraints.	Important		PIRSA	2007/08

8 COMPLIANCE AND MONITORING

PIRSA Fisheries uses a risk management approach to the development of compliance strategies across all fisheries in South Australia. This approach is designed to improve the cost-effectiveness of compliance and monitoring activity in all sectors by prioritising key activities, based on a formal semi-quantitative assessment of the risks in all fisheries.

Risk levels are rated using semi-quantitative estimations of:

- The *likelihood* of identified risks occurring; and
- The *consequences* if the identified risks occur; and
- The degree to which existing management *controls* and *compliance programs* limit the likelihood of risks occurring.

The risk profile prepared for the Southern Zone Rock Lobster Fishery for the 2007/08 fishing season is provided in Appendix 10.4. The risk priorities contained in this profile will be the focus of compliance activity in the Southern Zone Rock Lobster Fishery during 2007/08. Other risks will be addressed outside the planned programme, as circumstances require.

The focus of compliance activity may change during the course of a year on the basis of information received. Activity and outcome information is collected in relation to compliance activities to address priority risks. The risk profile for the fishery is audited and updated each year to take account of any changes to arrangements or emerging issues. The commercial industry has input to the annual review of the risk assessment.

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10 APPENDICES

10.1 Permitted Species

The Southern Zone Rock Lobster Fishery is defined in the *Fisheries (Scheme of Management – Rock Lobster Fisheries) Regulations 1991*. It includes fishing for the fish specified in Schedule 1 of those regulations:

Scalefish

- Anchovy (*Engraulis australis*)
- Barracouta (*Thyrsites atun*)
- Bluethroated wrasse (*Notolabrus tetricus*)
- Bream (*Nematalosa erebi*)
- Black bream (*Acanthopagrus butcheri*)
- Cod (marine species) (Family Moridae)
- Dory (Family Zeidae)
- Flathead (Family Platycephalidae)
- Flounder (Family Pleuronectidae and Bothidae)
- Garfish (*Hyporhamphus melanochir*)
- Horse mackerel (*Trachurus declivis*)
- Leather jacket (Family Aluteridae*)*
- Ling (*Genypterus blacodes*)
- Mackerel (*Scomber australasicus*)
- Morwong (Family Cheilodactylidae)
- Mullet (Family Mugilidae)
- Mulloway (*Argyrosomus japonicus*)
- Nannygai, Red snapper, Swallowtail (Family Berycidae)
- Pilchard (*Sardinops neopilchardus*)
- Red Mullet (*Upeneichthys porosus*)
- Salmon (*Arripis truttacea*)
- Snapper (*Chrysophrys auratus*)
- Snook (*Sphyraena novaehollandiae*)
- Sole (*Aserragodes haackeanus*)
- Sweep (*Scorpis aequipinnis*)
- Tommy ruff (*Arripis georgiana*)
- Trevalla (*Hyperoglyphe antarctica*)
- Trevally (*Usacaranx georgianus*)
- Whiting (Family Sillaginidae)

Crustaceans

- Crab, giant (*Pseudocarcinus gigas*)
- Crab, velvet (*Nectocarcinus tuberculosus*)

Molluscs

- Cockle (Suborder Teledonta)
- Cuttlefish (*Sepia* spp.)
- Mussels (*Mytilus* spp.)
- Octopus (*Octopus* spp.)
- Oyster (Family Ostridae)
- Scallop (Family Pectinidae)
- Squid (calamary, *Sepioteuthis australis* and arrow, *Nototodorus gouldi*)

Annelids (Class Polychaeta)

- Beachworm
- Bloodworm
- Tubeworm

Shark, Skate and Rays (Class Elasmobranchii)

- All species other than white pointer shark (*Carcharodon carcharias)*
- Skates and rays

10.2 Commonwealth DEH recommendations

No	Recommendation	Progress	Target
1*	PIRSA to inform the DEH of any significant changes to the management regime of the SA Rock Lobster Fishery.		Ongoing
2	The current review of South Australia's *Fisheries Act 1982* should provide for the inclusion of general community members on the two fisheries management committees. Greater efforts should also be made to increase conservation and general community involvement in stock assessments and research priority setting processes.	Substantial	June 2010
3	PIRSA to pursue complementary management arrangements with other Aust. jurisdictions responsible for managing southern rock lobster fisheries to ensure that all removals and other relevant impacts on the stock are properly accounted for in stock assessments.		Ongoing
4*	PIRSA to continue to improve assessment of all components of non-commercial catch in the fishery to be factored into the annual stock assessment process and management of the fishery. This will include further periodic surveys or other data collection and analysis measures to enhance the assessments of recreational and indigenous catch in the fishery. .	Complete	June 2010
5	PIRSA, within 18 months, to review the monitoring requirements for both zones, including options for independent monitoring appropriate to the scale of fishing and status of stocks in the main fishing areas, to identify monitoring measures necessary to confirm the status of stocks and support stock recovery strategies. PIRSA to progressively implement priority actions identified in the review.	Complete	June 2006
6	PIRSA and the SA industry to work with their Victorian counterparts to investigate and adopt appropriate measures to address quota avoidance, misreporting of catches and other illegal activities in waters near the SA-Victoria border. These measures should be built into SA's compliance strategies.		Ongoing
7	Performance measures and targets for the main by-product species to be included in the revised management plans for both zones, and the catches of the main by-product species should be reviewed as part of the annual stock assessment process.	Substantial	Dec 2006
8	PIRSA to develop within 18 months a conservative harvest strategy for the Northern Zone fishery, including a TAC to commence on 1 November 2003, that includes recovery targets and reference points, and monitoring arrangements, representative of the scale of fishing in the Zone, and stock recovery timeframes.	Complete	June 2006
9	Priority should be given to early implementation of escape gaps in the Northern Zone, and should be mandatory in both zones by October 2004. Decisions on the dimensions of escape gaps in both zones to be based on the requirement to minimise impacts on all bycatch species.	Substantial	June 2006
10	PIRSA within 18 months to introduce mandatory structured reporting of all interactions between the Rock Lobster Fishery and TEPS.	Substantial	June 2006
11	PIRSA & industry to continue to monitor the extent of interactions between Rock Lobster Fishery and fur seals/sea lions, and develop appropriate mitigation measures, including establishment within 2 yrs of preliminary trigger &reference points, to minimise interactions.	RA Complete	June 2006
12	PIRSA within 12 months to conduct a qualitative risk assessment of the interactions between the Rock Lobster Fishery and protected species off SA and use the outcomes of this assessment to implement further protected species mitigation measures as required.	Complete	June 2006
13	PIRSA to develop measures to assess ecosystem impacts of the fishery. Consideration should be given to the appropriateness of reference areas that would allow comparison between fished and unfished areas.	Complete	June 2010

*Recommendation addressed in All of Fisheries, section 4.1

10.3 Ecosystem impact component trees

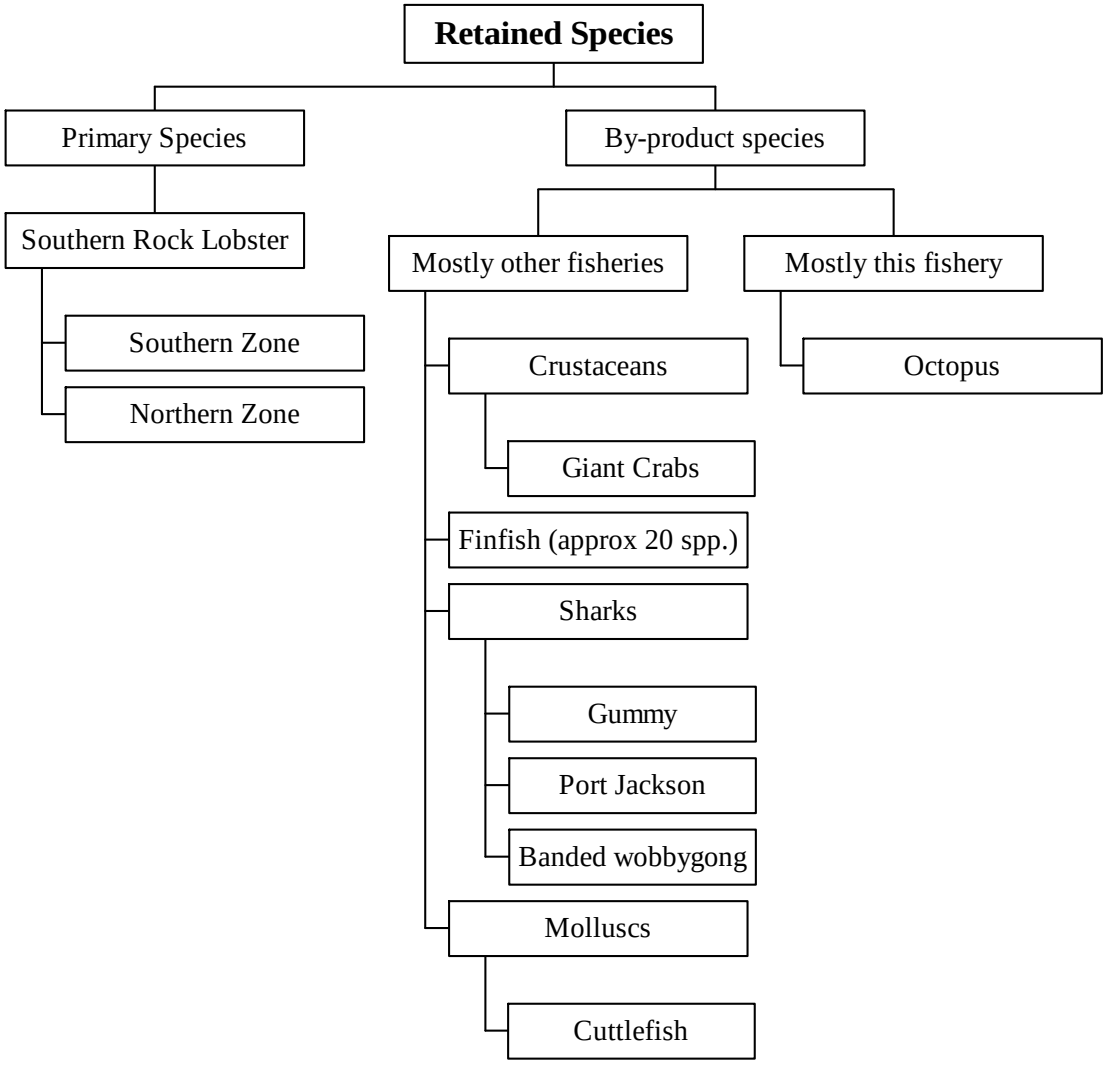

Figure 6. Retained species in the Southern Zone Rock Lobster Fishery**.**

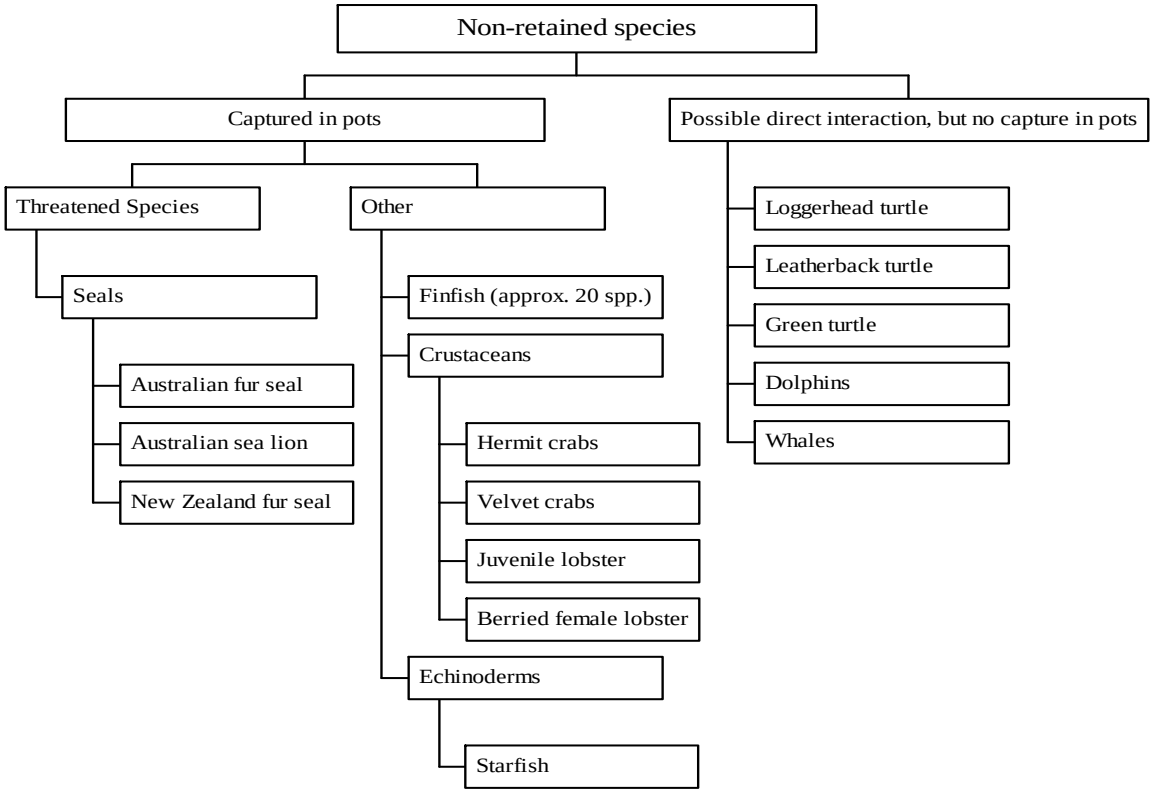

Figure 7. Non-retained species in the Southern Zone Rock Lobster Fishery**.**

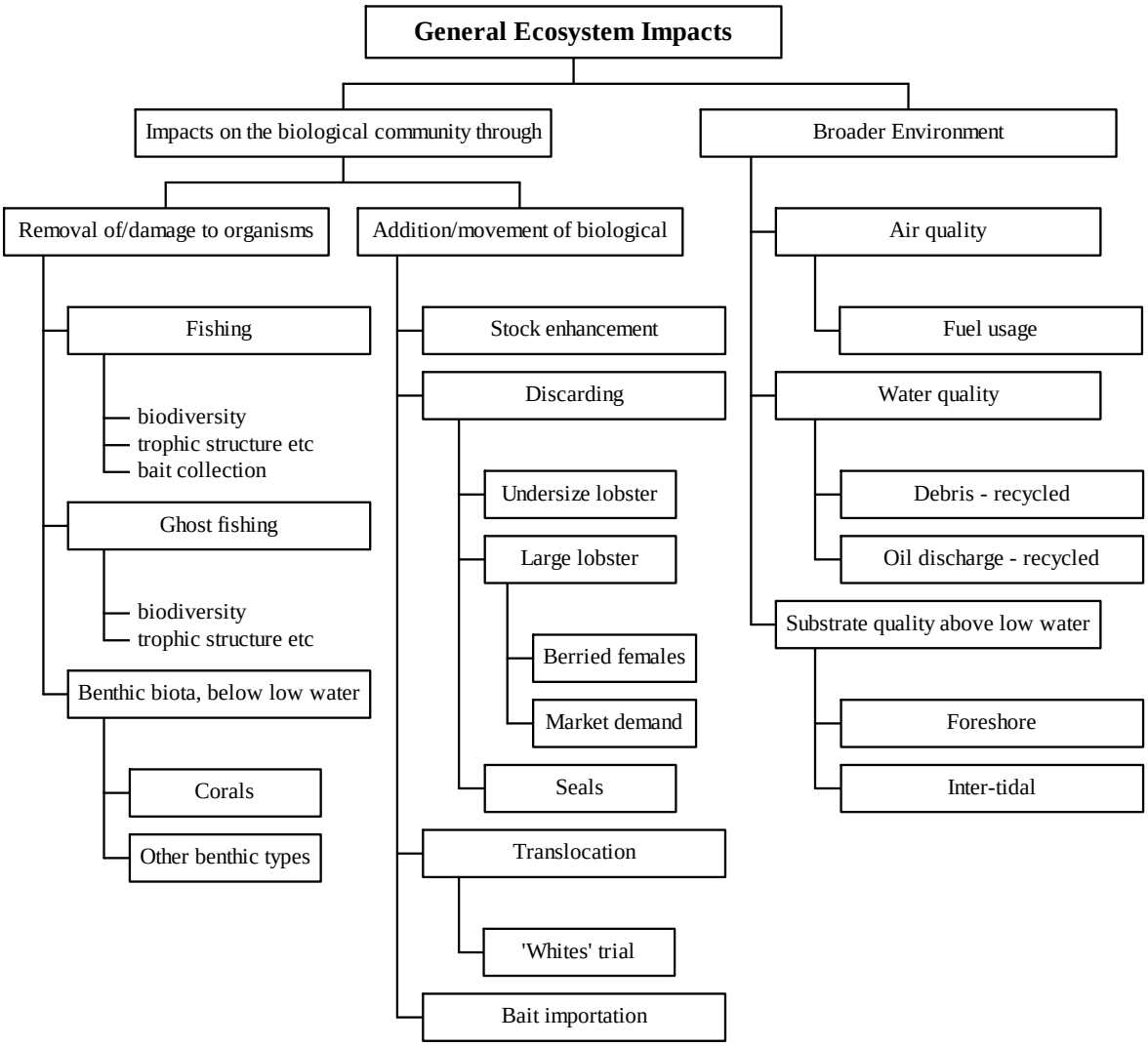

Figure 8. General ecosystem impacts in the Southern Zone Rock Lobster Fishery

10.4 Compliance Risk Assessment

The risk priorities contained within the table below will be the focus of compliance activity for the Southern Zone Rock Lobster Fishery during 2007-2008. Other risks will be addressed outside of the planned program, as circumstances require. Focus risks may change during the course of the year on the basis of information received by PIRSA Fisheries.

During 2007/08 PIRSA Fisheries will be coordinating a process for developing measurable benchmarks for appropriate levels of compliance monitoring.

Fishery sector	What can happen (risks)	Priority	Possible actions (mitigating strategies)	Notes on changes from 2006/07
Commercial	Quota evasion: Illegal at sea transfers Misreporting on CDR Collusion with processor Fail to prior report Fail to complete CDR Exceed take home allowance Seeding recreational pots Unreported unloadings)	High	Conduct random boat checks Conduct random checks at scales Use prior report data to target checks at scales outside of core hours Conduct intel driven operations Conduct random & targeted processor checks Conduct transit checks between scales and processor Monitor unloadings using video surveillance Conduct covert operations / investigations Conduct overt operations / investigations Conduct processor audits Follow-up and investigate possible illegal activity Comparison of data: -electronic scale data with paper CDR data -prior report and CDR information	Mitigating strategies to utilise video surveillance and electronic scales
	Illegal fishing by interstate fishers Not having operational VMS unit on boat throughout season	High	Use VMS and prior reporting to monitor single jurisdiction arrangements Liaise with interstate authorities Conduct targeted at sea patrols utilising VMS Conduct landing checks Conduct aerial surveillance	New arrangements to be reviewed for effectiveness

Fishery sector	What can happen (risks)	Priority	Possible actions (mitigating strategies)	Notes on changes from 2006/07
			Liaise with fishers to increase access to information Conduct intel driven operations Conduct joint operations with Vic. Fisheries Conduct processor checks Follow-up and investigate possible illegal activity Improved prior reporting Catch storage restrictions	
	Lack of understanding of legislation	Moderate	Review and simplification of licence conditions Conduct education campaign actively talking to fishers about requirements Attendance at port meetings	
	Errors on CDRs/errors in electronic scale usage	Low	Conduct awareness and education program Follow-up errors with licence holders for correction	Previous awareness work has been effective
	Non-compliance with wildlife interaction reporting requirements	Low	Intel gathering in relation to this risk	In final stages of implementation, compulsory as of 1 April 2007 Will need to be monitored closely once implemented
Non-commercial	Organised illegal activity	High	Conduct covert operations / investigations Conduct intel driven operations Conduct inspections of unregistered processor premises Plan and deliver joint operations with intra and interstate enforcement agencies Follow-up and investigate possible illegal activity/sales	Current prosecution involving illegal sales to hotels
	Use of unregistered /illegal gear	High	Liaise with interstate authorities Conduct at sea patrols Conduct random beach checks Liaise with fishers to increase access to information Conduct intel driven operations Follow-up and investigate possible illegal activity	

Fishery sector	What can happen (risks)	Priority	Possible actions (mitigating strategies)	Notes on changes from 2006/07
	Take over bag	High	Conduct at sea patrols Conduct random beach checks Conduct covert operations / investigations Fisheries Officers to educate fishers re size, bag and boat limits Maintain multi-lingual signage	
	Take undersized	Moderate	Conduct at sea patrols Conduct random beach checks Conduct awareness program at caravan and camping grounds Follow-up and investigate possible illegal activity Fisheries Officers to educate fishers re size, bag and boat limits Maintain multi-lingual signage	
	Lack of understanding of legislation	Low	Conduct education campaign actively talking to fishers about requirements Participate in school education program Maintain multi-lingual signage	
Processor	Quota evasion (collusion)	High	Review fish processor regulations under new legislation Conduct random processor checks Conduct processor audits Conduct checks at scales Follow-up and investigate possible illegal activity	
	Errors on CDRs	Moderate	Follow-up errors with processors for correction Identification of repeat offenders for issuing of expiation notices	Previous awareness work has been effective
	Non-commercial purchase / sales	High	Conduct random processor checks Conduct processor audits Conduct intel driven operations Follow-up and investigate possible illegal activity	

10.5 Links to Other Policy, Legislation and Codes of Practice

- The management plan for the South Australian Marine Scalefish Fishery
- The Commonwealth Southern and Eastern Scalefish and Shark Fishery management plan
- The National Strategy for Ecologically Sustainable Development
- The Australian Intergovernmental Agreement on the Environment
- The National Policy on Fisheries By-catch
- The Australian Government *Environment Protection and Biodiversity Conservation Act 1999*
- *Native Title Act 1993* (Australian Government)
- *Native Title (South Australia)(Act) 1994*
- Code of Conduct for Recreational Anglers in SA
- The National ESD Reporting Framework (Fletcher, *et al.*, 2002)
- The Industry 'Clean Green' Program

10.6 Glossary

These terms are intended to be used for the purposes of this management plan only and are not intended to be inconsistent with fisheries legislation.

Adaptive management Management involving active responses to new information or the deliberate manipulation of fishing intensity or other aspects in order to learn something of their effects. Within a stock, several sub-stocks can be regarded as experimental units in which alternative strategies are applied.

Age structure A breakdown of the different age groups within an individual population, or population sample.

Allocation Distribution of the opportunity to access fisheries resources, within and between stakeholder groups.

Aquatic reserve An area of water, or land and water, established as an aquatic reserve by proclamation under the *Fisheries Act 1982*.

Artisinal fishery A small-scale, low-cost and labour intensive fishery in which the catch is consumed locally.

Bag limit The maximum number of a species that can be legally taken by a person per day or per fishing trip, as specified.

Benthic Describes animals that live on, in or near the substrate.

Biodiversity The variability among living organisms from all sources (including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part) and includes: (a) diversity within species and between species; and (b) diversity of ecosystems.

Biomass The total weight or volume of individuals in a fish stock.

Boat limit The maximum number of a species that can be legally taken by persons on a boat per day or per fishing trip, as specified.

By-catch At a broad level, fisheries by-catch includes all material, living and non-living, other than targeted species which is caught while fishing. It includes discards (that part of the catch returned to the water) and also that part of the catch that is not landed but is killed as a result of interaction with fishing gear.

By-product Non-targeted catch that is commercially valuable and retained by fishers.

Catch The total amount (weight or number) of a species captured from within a specified area over a given period of time. The catch includes any animals that are released or returned to the water.

Catch per unit effort (CPUE) The weight or number of a species caught by a specified amount of effort. Typically, effort units are defined using a combination of the following factors: gear type; gear size; the amount of gear; the amount of time the gear is used ; and the number of people operating the gear. CPUE is often used as an index of relative abundance in fisheries stock assessment. In modern assessments, CPUE is standardised

to account for the diverse range of factors that can affect CPUE.

Closures Prohibition of fishing during particular times or seasons (temporal closures) or in particular areas (spatial closures), or a combination of both.

Cohort A group of fish spawned during a specified period, usually within a year. A cohort is also referred to as an age class.

Co-management Arrangements between governments and stakeholder groups to allow joint responsibility for managing fisheries resources on a cooperative basis. Co-management arrangements can range from a consultative model, where stakeholders have an advisory role to government, to an informative model where co-managers have decision-making powers.

Commercial fishing Fishing undertaken for the purposes of trade or business.

Common property resource A resource that is determined to be owned by the community, or by the State on behalf of the community, and to which no individuals or user groups have exclusive access rights.

Critical habitats Habitats that are crucial in at least part of the life cycle of a species, which typically includes nurseries such as estuaries, mangroves, seagrass beds, reefs and defined spawning areas.

Data poor fishery A fishery where limited data are available to inform management. For example, fisheries for species where baseline biological data such as size at maturity, fishing mortality and growth rates are unknown.

Ecologically sustainable development Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.

Economic efficiency The maximisation of the value of the net benefits derived from fishery resources.

Ecosystem A dynamic complex of plant, animal, fungal, and micro-organism communities and the associated non-living environment interacting as an ecological unit.

Effort Amount of fishing taking place, usually described in terms of gear type and frequency or period during which the gear is in use; for example, 'hook-sets', 'trawl-hours', 'searching hours'.

Fecundity Number of eggs an animal produces each reproductive cycle; the potential reproductive capacity of an organism or population.

Fishery A term used to describe the collective enterprise of taking fish. A fishery is usually defined by a combination of the species caught (one or several), the gear and/or fishing methods used, and the area of operation.

Fishery dependent data Information collected about a fishery or fish stock by the participants of a fishery, eg. catch and effort information from fishery log sheets.

Fishery independent data Information collected about a fishery or fish stock by researchers, independent of the fishery, eg. scientific surveys, observer reports.

***Fisheries Management Committee** (FMC)* A statutory advisory body established by the Minister to provide a forum for consideration of management issues relevant to a specific fishery, by stakeholders in that fishery. FMCs are designed to allow for stakeholder input to fisheries management.

Fishing capacity The amount of fishing effort that a fishing boat, or a fleet of fishing boats, could exert if utilised to its/their full potential.

Fishing mortality The rate of deaths of fish due to fishing.

Fully exploited This describes a fish stock for which current catches and fishing pressure are close to optimum (the definition of which may vary between fisheries; for example, catches are close to maximum sustainable yield). Categorising a species as 'fully fished' suggests that increasing fishing pressure or catches above optimum (allowing for annual variability) may lead to overfishing.

Gear restriction A type of input control used as a management tool to restrict the amount and/or type of fishing gear that can be used by fishers in a particular fishery.

Growth overfishing A level of fishing pressure beyond that required to maximise the yield (or value) per recruit; a level of fishing where young recruits entering the fishery are caught before they reach an optimum marketable size.
Habitat The place or type of site in which an organism naturally occurs.

Harvest The total number or weight of fish caught and kept from an area over a period of time.

Indicator species A species whose presence or absence is indicative of a particular habitat, community or set of environmental conditions.

Individually transferable quota A management tool by which portions of the total allowable catch are allocated among licence holders (individual fishers or companies) as units of quota. Quota entitlements can be made to be temporarily or permanently transferable between these licence holders.

Input controls Limitations on the amount of fishing effort; restrictions on the number, type, and size of fishing vessels or fishing gear, or on the fishing areas or fishing times in a fishery.

Latent effort The potential for effective effort within a fishery to increase over time (i.e. inactive fishing licences that may be used in the future).

Length Frequency An arrangement of recorded lengths of a species of fish, which indicates the number of times each length or length interval occurs in a population or sample.

Limited entry Fishing effort is controlled by restricting the number of operators. It usually requires controlling the number of licences in a fishery. It can also include restrictions on the number and size of vessels, the transfer of fishing rights, and the replacement of vessels

Logbook An official record of catch and effort data made by fishers.

Marine protected area An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources, and managed through legal or other effective means.

Marine park An area of water, or land and water, considered to be of national significance because of the aquatic flora or fauna of those waters or the aquatic habitat, and established as a marine park by proclamation under the *Fisheries Act 1982* and/or the *National Parks and Wildlife Act 1972*.

Minimum mesh size The smallest size of mesh permitted in nets and traps; imposed on the basis that smaller individuals will escape unharmed.

Mortality Rate of deaths (usually in terms of proportion of the stock dying annually) from various causes. Comprises (i) Natural Mortality - deaths in a fish stock caused by predation, pollution, senility, etc., but not fishing and (ii) Fishing Mortality - deaths in a fish stock caused by fishing.

Nominal fishing effort 'Nominal' means quantities as they are reported, before any analyses or transformations. Nominal effort refers to measures of fishing effort or vessel carrying capacity that have not been standardised.

Non-target species Any part of the catch, except the target species, and including by-catch and by-product.

Non-retained species Species that are taken as part of the catch but are subsequently discarded, usually because they have low market value or because regulations preclude them being retained.

Offshore Constitutional Settlement (OCS) An agreement between the State(s) and the Commonwealth whereby the State or the Commonwealth (or in some cases a Joint Authority) is given jurisdiction for a particular fishery occurring in both coastal waters and the Australian Fishing Zone. When no OCS agreement has been reached, the fishery remains under the jurisdiction of the State out to 3 nm, and the Commonwealth from 3 to 200 nm.

Output controls Limitations on the weight of the catch (quota), or the allowable size, sex or reproductive condition of individuals in the catch.

Over-exploited or overfished A fish stock in which the amount of fishing is excessive or for which the catch depletes the biomass too much; or a stock that still reflects the effects of previous excessive fishing.

Parameter A 'constant' or numerical description of some property of a population.

Parental stock The weight of the adult population of a species.

Population A group of individuals of the same species, forming a breeding unit and sharing a habitat.

Possession limit A possession limit under the *Fisheries Act 1982* is a prescribed number of fish for a species that represents what is considered a commercial quantity of that species. If a person has the prescribed amount of fish in their possession, then the onus of proof is reversed in any prosecution relating to taking those fish illegally.

Precautionary principle This concept asserts that where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decision-making should be guided by: (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and (ii) an assessment of the risk-weighted consequences of various options.

Quota A limit on the weight or number of fish that may be caught of a particular stock or from specified waters.

Quota entitlement The proportion of a quota that is allocated to a particular licence, which limits the total amount of a species that is permitted to be taken pursuant to that licence.

Recreational fishing Fishing for a purpose other than trade or business, where the catch is released or used for personal consumption or taken for sport.

Recruitment The addition of new individuals to a stock.

Recruitment overfishing Occurs when excessive fishing effort or catch reduces recruitment to the extent that the stock biomass falls below the pre-defined limit reference point.

Relative abundance An index of fish population abundance used to compare fish populations from year to year. This does not measure the actual numbers of fish, but shows changes in the population over time.

Retained species The species within the catch that are not discarded.

Sample A proportion or a segment of a fish stock which is removed for study, and is assumed to be representative of the whole. The greater the effort, in terms of both numbers and magnitude of the samples, the greater the confidence that the information obtained is a true reflection of the status of a stock (level of abundance in terms of numbers or weight, age composition, etc.).

Seasonal closure The closure of a fishing ground for a defined period of time, usually used to protect a stock during a spawning season.

Selectivity The ability of a type of gear to target and catch a certain size or species of fish.

Socio-economic Relating to both social and economic considerations.

Spatial Of or relating to space.

Species A group of organisms capable of interbreeding freely with each other but not with members of other species.

Size limits A minimum or maximum size limit determines the legal size at which a given species can be retained.

Size of maturity Length or weight of the fish when it attains reproductive maturity.

Slot size limit Refers to a situation where both a minimum and maximum size limit has been determined for a given species.

Stakeholder An individual or a group with an interest in the conservation, management and use of a resource.

Stock A group of individuals of a species occupying a well defined spatial range independent of other groups of the same species, which can be regarded as an entity for management or assessment purposes.

Stock assessment A detailed analysis of stock status (abundance, distribution, age structure, etc.) to support the management of the species/fishery.

Target species The most highly sought component of the catch taken by fishers.

Target effort Effort that is directed at a particular species.

Traditional fishing Fishing for the purposes of satisfying personal, domestic or non-commercial communal needs, including ceremonial, spiritual and educational needs and utilising fish and other natural marine and freshwater products according to relevant indigenous custom.

Temporal Of or relating to time.

Threatened A species or community that is vulnerable, endangered or presumed extinct.

Total allowable catch (TAC) For a fishery, a catch limit set as an output control on fishing. The total amount of a species that may be taken during a specified time period.

Total allowable commercial catch (TACC) For a fishery, a catch limit set as an output control specifically on commercial fishing. The total amount of species that may be taken by commercial fishing during a specified time period.

Trigger points Events or measures that, if they occur or if they reach specified levels, are used to determine when a response should be made. Not usually used as a criterion for overfishing, but to indicate the need for review of management.

Uncertain A fish stock that may be underfished, fully fished or overfished, but for which there is inadequate or inappropriate information to make a reliable assessment of its status.

Under-exploited *or underfished* A fish stock that has potential to sustain catches higher than those currently taken.

Vulnerable species Under endangered species protection legislation, a species that within 25 years will become endangered unless mitigating action is taken.

Yield Total weight of fish harvested from a fishery

10.7 List of Acronyms

AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
CDR	Catch and Disposal Record
CPUE	Catch Per Unit Effort
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific Industry Research Organisation
DEH	Department of Environment and Heritage
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EEZ	Exclusive Economic Zone
ESD	Ecologically Sustainable Development
FAO	Food and Agriculture Organisation of the United Nations
FMC	Fisheries Management Committee
FRDC	Fisheries Research and Development Corporation
ITQ	Individually Transferable Quota
MFA	Marine Fishing Area
MPA	Marine Protected Area
MSC	Marine Stewardship Council
MEY	Maximum Economic Yield
MSY	Maximum Sustainable Yield
NEPC Act	*National Environment Protection Council Act 1994* (Cth)
NRIFS	National Recreational and Indigenous Fishing Survey
OCS	Offshore Constitutional Settlement
PIRSA	Department of Primary Industries and Resources, South Australia
PRI	Pre-Recruit Index
SANZRLFA	South Australian Southern Zone Rock Lobster Fishermen's Association
SAFIC	South Australian Fishing Industry Council
SARDI	South Australian Research and Development Institute
SARFAC	South Australian Recreational Fishing Advisory Council
TAC	Total Allowable Catch
TACC	Total Allowable Commercial Catch
TEPS	Threatened, Endangered and Protected Species

10.8 Contacts

Primary Industries and Resources South Australia, Fisheries
GPO Box 1625
ADELAIDE SA 5000
Tel: (08) 8226 0219
Fax: (08) 8226 0434
FISHWATCH: 1800 065 522
www.pir.sa.gov.au/fisheries

South Australian Research and Development Institute, Aquatic Sciences
Po Box 120
HENLEY BEACH SA 5022
Tel: (08) 8200 2400
Fax: (08) 8200 2481
www.sardi.sa.gov.au

South East Professional Fisherman's Association
Level 1, 16 Unley Road
UNLEY SA 5061
Tel: (08) 8272 7766
Fax: (08) 8272 7767

South Australian Fishing Industry Council
60 London Road
MILE END SOUTH SA 5031
Tel: (08) 8234 8622
Fax: (08) 8234 8633
www.safic.com.au

South Australian Rock Lobster Advisory Council (SARLAC)
Level 1, 16 Unley Road
UNLEY SA 5061
Tel: (08) 8272 7766
Fax: (08) 8272 7767

South Australian Recreational Fishing Advisory Council Inc.
1 Boskenna Avenue
NORWOOD SA 5067
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