

Management plan for the South Australian Northern 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 Northern Zone Rock Lobster Fishery

The rock lobster resources of the South Australian Northern 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 Northern Zone Rock Lobster Fishery is a large scale fishery that operates across an extensive coastline from the River Murray mouth to the Western Australian border in the Great Australian Bight, including the waters around Kangaroo Island. The benthic ecosystem that supports the fishery is characterised by patchy and discrete reef formations that are separated by large expanses of sandy bottom. These characteristics, coupled with environmental changes results in variable recruitment to the fishery that is difficult to predict. 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 Northern Zone Rock Lobster Fishery over the next three years and initiates a ten year rebuilding strategy.

Hon. Paul Holloway MLC

Acting Minister for Agriculture, Food and Fisheries

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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 promote sustained stock recovery in the Northern Zone Rock Lobster Fishery to a level defined by the targets set out in the harvest strategy. In more general terms, this management plan aims to provide for the ecologically sustainable management of the South Australian Northern Zone Rock Lobster Fishery.

This Plan sets out a formal harvest strategy for the fishery that includes a set of decision rules for setting the annual Total Allowable Commercial Catch (TACC). It also provides direction for the formulation of regulations. 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 Aboriginal 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 Northern 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 Northern Zone Rock Lobster Fishery and the optimum utilisation and equitable distribution of these resources, for all stakeholder groups and future generations. This requires that the management plan 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 fishery

The South Australian rock lobster fishery is separated into two fishing zones (the Northern and Southern Zones). This management plan applies to the Northern Zone. The waters to which this management plan applies include a stretch of coastline in excess of 3,700km, from the low water mark to the edge of the Australian Fishing Zone (AFZ), from the River Murray mouth to the Western Australian border in the Great Australian Bight (Fig. 1). The Southern Zone encompasses all remaining State waters along a much smaller, yet more productive, stretch of coastline of about 425km.

Lobsters are commonly landed at more than 40 locations in the Northern Zone, compared to seven controlled landing points in the Southern Zone. Northern Zone vessels fish for between one to ten days per trip, generally fishing for longer periods on the more remote west coast. Southern Zone fishers generally undertake day trips and fish close to their home port. The costs of fishing in the Northern Zone are generally higher than those of Southern Zone fishers due to the larger distances travelled.

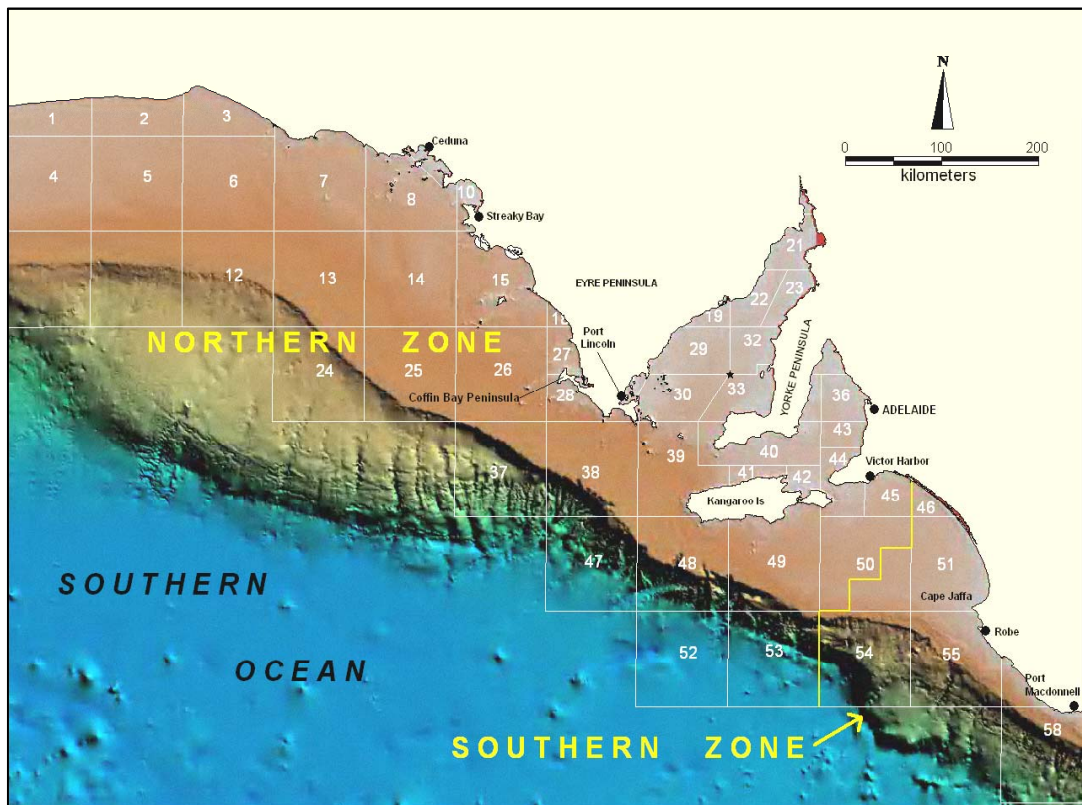


Figure 1. The Northern and Southern Zones of the South Australian rock lobster fishery (the numbered boxes are data collection map codes)

The South Australian rock lobster fishery is a primarily 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 about 2,500 tonnes per year, which represents about 30% of the total annual commercial catch for the species. The total South Australian recreational catch was estimated to be approximately 83 tonnes for 2004/05 (Currie *et al* 2006). Estimates for previous years have been between 95 and 118 tonnes (Henry and Lyle 2003; Boxall *et al* 2003, Currie *et al* 2006.).

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 2004, catches were 446t and 1,900t 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 Northern 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 the Primary Industries and Resources South Australia (PIRSA) Fisheries website at www.pir.sa.gov.au/fisheries as well as the SARDI Aquatic Sciences website at www.sardi.sa.gov.au. Additional scientific publications and reports in relation to the fishery are also posted regularly on the SARDI website.

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

2.3.1 General

Geologically, the Northern Zone can be divided into two subregions. From Gulf St Vincent to the South Australia/Western Australia border, the marine substrate is comprised mainly of a vast basement of granitic rocks (Lewis 1981). Reef communities and habitats for lobsters are confined to relatively small patches where this basement of granite projects through the overlying sands. Some additional small areas of limestone reef occur off Elliston. The remainder of the Northern Zone (i.e. from Gulf St Vincent to the Murray mouth) is comprised of a metamorphosed basement with intrusions of igneous rocks, particularly granites. These intrusive granites produce peaked reefs that provide discrete localised habitats for lobsters that are interspersed by large expanses of

sand. Granite does not erode as easily as the limestone reefs in the Southern Zone of the fishery and granite reefs thus lack the numerous ledges, crevices and undercuts that provide ideal habitats for lobsters. Densities of lobsters on the granitic reefs of the Northern Zone are generally lower than those on the limestone reefs of the Southern Zone.

2.3.2 The Great Australian Bight

A detailed description of the main ecosystems that support the Northern Zone fishery and the fundamental environmental influences is provided in McClatchie *et al* (in press). Broadly, the southern Australian continental shelf is storm-dominated with high (>2.5 m) modal deep-water wave heights. Winds are predominately south-easterly during summer and north-westerly during winter. During summer, currents flow westward along the coast of the eastern Great Australian Bight and eastward over the shelf break (Herzfield and Tomczak 1997; Evans and Middleton 1998; Herzfield and Tomczak 1999). The Flinders Current (Bye 1972) flows from east to west along the continental slope, and is the source of cold, nutrient rich water that upwells onto the continental shelf from depths of around 600m. The mean summer wind direction over the shelf from Robe to the head of the Great Australian Bight is favourable for upwelling. South-easterly winds transport warm surface water offshore and cold, nutrient rich water is upwelled from below (Cirano and Middleton 2004). The water layer above the thermocline is characterised by medium salinity (35.6 parts per thousand, i.e. ppt), low nutrient levels (NO₃ <0.1 mg/l) and high temperatures (18 to 19°C). Water below the thermocline has lower salinity (< 35.5 ppt), higher nutrient levels (NO₃ >0.2 mg/l) and lower temperatures (~14°C). Sea surface temperatures during summer are lower near the coast (e.g. 14-15°C), especially along the western Eyre Peninsula and off the western tip of Kangaroo Island, and higher offshore (18-20°C).

During winter, water over the continental shelf is vertically homogeneous, well mixed and characterised by low nutrient levels (NO₃ <0.25 mg/l), high salinities (> 36 ppt) and medium temperatures of ~17°C. Westerly, downwelling-favourable winds lead to the formation of an eastward coastal current along the shelf break from Cape Leeuwin to the east coast of Tasmania (Cirano and Middleton 2004). The presence of this coastal current suppresses the upwelling of water from the Flinders Current, which flows underneath the coastal current at a depth of around 600m, onto the shelf. Sea surface temperatures are lower inshore than offshore at this time.

The lower densities of lobster associated with Northern Zone reef structures, environmental characteristics and other factors such as its close proximity to the western extension of the geographic distribution of *J. edwardsii*, generally results in higher inter-annual recruitment variation than many other fisheries for *J. edwardsii*. Growth rates and size at sexual maturity for *J. edwardsii* are highly variable throughout the waters of South Australia, with growth rates generally faster in the Northern Zone (Prescott *et al* 1997; Mc Garvey *et al.* 1999a).

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. 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, 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 Northern 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 Northern 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 Northern Zone Rock Lobster Fishery, including commercial, recreational, Aboriginal and any illegal fishing.

Management of the South Australian Northern 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. In addition, part of the fishery operates within the boundaries of the Great Australian Bight Marine Park, an area recognised primarily for its importance for whales and seals.

3.2 Operation and review of the management plan

This management plan will operate for a three-year period from 2007/08 to 2009/10 inclusive.

This management plan 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 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 indicators set out in the harvest strategy, how they are measured and how they are used in the 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*;
- The National Policy on Fisheries By-catch;
- The Great Australian Bight Marine Park management plan.

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 of the United Nations (FAO) 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 United Nations 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 NECP 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 Northern Zone Rock Lobster Fishery, as stated in the harvest strategy (section 3.4). 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.

3.3.3 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.

In April 2003, PIRSA Fisheries provided a submission to the Australian Government Department for the Environment and Heritage (the DEH) to allow for an assessment of the management framework in place for the Northern Zone Rock Lobster Fishery, against the EPBC Act ‘guidelines for the ecologically sustainable management of fisheries’. Following this assessment, the Federal Minister for Environment and Heritage provided the South Australian Government with a five year exemption to the export controls of the EPBC Act, subject to a number of recommendations for improved management of rock lobster stocks over this period. These recommendations and PIRSA’s progress towards addressing them are set out in Appendix 10.2. 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.

3.3.4 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.

3.3.5 The Great Australian Bight Marine Park management plan

The Great Australian Bight Marine Park (GABMP) was established to protect the biological diversity of the Bight while providing for ecologically sustainable use of the park's natural resources. The park is divided into zones, which allows the management of specific threatening processes and provides the ability to implement different levels of protection for the park's assets. This consequently results in some activities being controlled, while others are prohibited.

The GABMP has been established in both Commonwealth and State waters as two adjoining marine parks, established by the South Australian and Commonwealth Governments. State waters extend from the coast to three nautical miles offshore. The State waters of the park comprise a Sanctuary Zone and a Conservation Zone. The Sanctuary Zone is in two portions, the Whale Sanctuary at the Head of Bight extends to the limit of State waters, and the western portion extends from the base of the Bunda Cliffs to one nautical mile offshore. Relevant South Australian legislation is the *Fisheries Act 1982* and the *National Parks and Wildlife Act 1972*.

The Commonwealth waters of the Marine Park are managed under the *Environment Protection and Biodiversity Conservation Act 1999* and include the Marine Mammal Protection Zone and the Benthic Protection Zone which extends south to the limit of the Australian Exclusive Economic Zone, approximately 200 nautical miles offshore.

The relevant Acts contain penalties for offences such as entering prohibited areas or conducting prohibited activities within the park. Recreational fishing can take place in the park. Boating activity must conform to the zoning conditions, and line fishing can take place from the shore at any time. State regulations apply in relation to legal lengths, catch limits, permitted gear, and any other conditions.

Boundary and zoning information is provided on the park map linked to this page, the table on the map outlines activities permitted and prohibited within the zones. If you visit the park you should be aware of the boundaries, including the zones, and of prohibited activities and seasonal closures. State and Commonwealth legislation protects mammals, birds, and reptiles within and outside the park.

4 MANAGEMENT OF THE FISHERY

4.1 History

4.1.1 Commercial Fishing

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).

A series of management arrangements have been introduced over the past five decades to control catch and effort levels in the fishery. Throughout history, a significant challenge for management of the Northern Zone has been quantifying and controlling effective effort levels. 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 pot allocations for each licence.

In 1978, a government review of the Rock Lobster Fishery suggested that effective effort levels had increased significantly in the Northern Zone due to the adoption of new technologies (Copes, 1978). In 1985, total pot numbers were reduced by 10% to reduce effort levels and the upper pot limit (per vessel) was increased from 60 to 65 pots to provide some scope for fleet restructuring.

In 1992, a review undertaken by government scientists and managers suggested that the 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 Northern Zone to accommodate a catch in the order of 850 tonnes. Following this review, government managers advocated strongly for a quota system in the Northern and Southern Zones, as the most effective approach to ensure long term sustainability and profitability.

A quota system was introduced in the Southern Zone in 1993. However, the South Australian Northern Zone Rock Lobster Fishermen's Association (the SANZRLFA) opposed the suggested change from effort controls to a quota system. The SANZRLFA undertook its own comprehensive review of the existing management arrangements (Edwards and Presser, 1993). During the review process, total pot numbers in the Northern Zone were reduced by 10% and the upper pot limit was decreased from 65 to 60 pots per licence.

The SANZRLFA management review recommended that an effort control system be maintained, with modifications to allow for annual effort adjustments through constraining total fishing time (Edwards and Presser, 1993). An Individually Transferable Quota (ITQ) system was evaluated for the Northern Zone and rejected by the SANZRLFA principally because of concerns over:

- (i) the high variation in recruitment levels recorded in the fishery and the associated difficulties with accurately setting annual catch limits;
- (ii) compliance and monitoring cost-effectiveness;
- (iii) equity in the allocation method; and
- (iv) stakeholder support for, and ownership of, the existing effort control system.

The industry recommendation to maintain a modified effort control system was adopted by the Government, although it was not the Government's preferred approach to management of the Northern Zone. From this point forward, the Government and industry worked in partnership to manage the fishery under a refined effort control system.

As part of a package of changes to the effort control system resulting from the government and industry reviews undertaken in 1992 and 1993, further effort reductions were introduced over three consecutive seasons. These consisted of one-week time closures in the 1993, 1994 and 1995 fishing seasons (three additional weeks in total). These reductions were introduced to offset the progressive increases in catching efficiency identified by Prescott and Lewis (1992). In addition, the legal minimum length for lobsters was increased from 98.5mm to 102mm in the 1994 fishing season to help conserve egg production.

In 1997, a biomass-based simulation model was developed to facilitate further refinement to the time management system and allow fishers to choose between a series of fixed and flexible time closure options of varying time periods, both at the beginning of the season and during the season (McGarvey and Prescott, 1998). These time closure options were designed to have a similar impact on total effort and catch, regardless of when they were taken. In a biological sense, these flexible time closure options were aimed at removing sufficient effort during periods of high catchability to protect against overfishing. In an economic sense, these time closure options were designed to allow for fishing during periods of known market demand and price increases such as the Chinese New Year. The Northern Zone Rock Lobster Fisheries Management Committee developed and refined the time closure options on an annual basis.

The first management plan for the fishery was developed in 1997, which provided a series of performance indicators and a reference range 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; a period that produced some of the highest catches recorded in the history of the fishery. The management plan formalised an implicit goal to maintain an annual exploitation rate of between 26% and 30%. In theory, this approach capped future effort expansions and stabilised the fraction of the biomass being harvested. However, this approach assumed a stable relationship existed between annual exploitation rates and fishing effort. In reality, this relationship was not stable, as increases in the effectiveness of effort acted to confound the relationship and complicate stock assessment work. Increasing effective effort levels resulted in a greater proportion of each newly recruited year class of lobsters being harvested.

In 1999, an additional 3 day time closure was introduced to offset effective effort increases brought about by an increase in the use of closure periods to deal with vessel breakdowns and general maintenance that would have traditionally been lost days during the season. The minimum size limit was increased again in 2000 from 102mm to 105mm to provide further protection for egg production. In 2001, an additional 14

day fleet-wide fixed closure was introduced in response to concerns over declining catches. These concerns continued during the 2001 season, leading to a further 16 day time closure in the 2002 season.

These effort reductions started to provide a significant constraint on the capacity for fishers to fish when market conditions were optimal. As a result, further modifications were made to the time management system in 2002 to promote commercial flexibility. These modifications involved establishing three fishing blocks for the 2002 season, during which each individual fisher was required to take off 20 fishing days, a total of 60 fishing days per fisher. The upper pot limit was also increased from 60 pots to 70 pots in 2002 to assist structural adjustment and improve economic performance of the fleet.

Under this modified system individual fishers could make rapid decisions about when to fish, in response to market fluctuations, weather conditions, catch rates and lifestyle. However, the same issues of declining catches, low economic returns, limited commercial flexibility and the need for further effort reductions created industry momentum for a review of the management system.

Table 2 sets out a chronology of management changes initiated to counter the ongoing concerns over issues associated with expanding effective effort levels, reductions in stock size and to conserve egg production in the fishery.

Table 1. A chronology of management changes in the Northern 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
1968	Limited entry introduced; separation of fishery into Northern and Southern Zones
1974	Recreational bag and boat limits introduced
1985	10% pot reduction introduced; maximum pot limit of 65
1992	10% pot reduction; maximum pot limit of 60 pots
1993	One week time closure added
1994	Further one week time closure added; size limit increased from 98.5mm to 102mm
1995	Further one week time closure added
1997	Flexible time closure system introduced under new management plan
1999	Further 3 days of time closure added
2000	Size limit increased from 102mm to 105mm
2001	7% effort reduction introduced (about 14 days of further time closures)
2002	8% effort reduction introduced (about 16 days of further time closures); Management review process undertaken; Upper pot limit increased from 60 to 70 pots
2003	Quota system introduced (TACC of 625 tonnes); VMS, sealed bins and prior reporting introduced; escape gaps introduced
2004	TACC reduced from 625 tonnes to 520 tonnes
2005	Upper pot limit increased from 70 pots to 100 pots; Lower pot limit decreased from 25 pots to 20 pots

Introduction of a quota management system

A comprehensive review of the existing management system was undertaken during 2002, including an independent review of the scientific information underpinning management of the fishery (PIRSA, 2002a; 2002b). This review process led to the introduction of a quota management system in 2003. The quota system was introduced with the support of a majority of commercial licence holders. The TACC limit was set at 625 tonnes for the first year, to ensure the catch remained at the level intended to be brought about by the two consecutive effort reductions, implemented in the lead up to the introduction of the quota system. Other important features of the quota system included the use of a Vessel Monitoring System (VMS), a prior reporting system and a requirement for all storage/transport bins to be sealed prior to unloading. A requirement to use escape gaps in all commercial pots was introduced in 2002, as an independent measure to improve sustainable operations in the fishery.

Following the decision to introduce a quota system, an independent allocation advisory panel (IAAP) was appointed by the Government to provide advice on the fairest and most equitable method of allocating quota shares between licence holders in the fishery. The IAAP consisted of a retired Chief Justice of the South Australian District Court, an independent fisheries economist and an independent commercial fisher.

The IAAP recommended that in the longer term, the close and direct relationship between catch (quota allocations) and the number of pots held on a licence should be maintained and consolidated. However, they also recommended that a time period should be provided to allow for business adjustment to the new management system. The IAAP recommended that quota shares in the fishery should be allocated between licence holders as a function of both pot holdings (50%) and prior catch history (50%) for a three year adjustment period.

Following the three year adjustment period, the IAAP recommended that pot holdings should be used as the sole basis for allocating quota shares between licence holders. In recommending this method, the IAAP recognised the importance of protecting licence value in the longer term and providing some limited capacity for fishers to adjust to lower income under the new management system (IAAP 2003).

Following further industry consultation in relation to the IAAP's recommendations, the following allocation formula was adopted for a three year adjustment period:

$$Q_t^f = Q_t^T \times ((0.5 \times P_t^f / P_t^T) + (0.5 \times (C^f / C_t^T \times P_t^f / P_t^T)))$$

Where:

Q_t^f	the quota allocation of fisher f in year t
Q_t^T	the total number of quota units in the fishery in year t
P_t^f	the number of pots held by fisher f in year t
P_t^T	the total number of pots in the fishery in year t
C^f	the average catch per pot over fisher f's best three years out of the four assessment years
C_t^T	the average catch per pot for the whole fishery over the assessment period (ie. the total average of each fishers C^f)

Catch history was treated as being personal to an individual fisher, rather than being attached to a licence and was therefore not treated as a tradeable commodity. All pot and licence transfers transacted after the catch history assessment period (1997/98 –

2000/01) were allocated an industry average for each pot held, which was determined to be 16 quota units per pot (160 kilograms per pot under the TACC of 625 tonnes). There were no legal proceedings initiated over the final allocation method.

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 etc.) 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 catch of the species). It was estimated that 39.8% of the catch (in weight) was taken in the Northern 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; Venema *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 catch of the species). It was estimated that 26% of the catch (in weight) was taken in the Northern Zone.

The most recent survey of recreational fishers was 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 tonnes of which 74 tonnes came from the Southern Zone and 9 tonnes from the Northern Zone. The number of recreational pot registrations in the South Australian rock lobster fishery 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 etc. 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 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 from 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 currently 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 Northern Zone Rock Lobster Fishery Management Committee (NZRLFMC). Under these regulations, the NZRLFMC developed this management plan. New co-management arrangements will be established under the *Fisheries Management Act 2007*, with a greater emphasis on industry self-governance.

4.3 Current Management Arrangements

4.3.1 Commercial Fishing

The current management arrangements in place for the Northern Zone Rock Lobster Fishery reflect historical arrangements that have evolved over many years since the 1960s, as well as some major changes that were introduced in 2003 following a major management review.

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

Table 2. Management controls in the commercial sector.

Management tool	Current restriction
Total Allowable Commercial Catch	520 tonnes
Closed season	1 June to 31 October
Total number of pots	3,950
Minimum size limit	105mm
Maximum number of pots/licence	100 pots
Minimum number of pots/licence	20 pots
Maximum quota unit holding	Unlimited
Minimum quota unit holding	320 quota units
Spawning females	No retention
Maximum vessel length	None
Maximum vessel power	None
Closed areas	Gleeson Landing Reserve
Catch and effort data	Daily logbook submitted monthly
Catch and Disposal Records	Daily records submitted upon landing
Landing times	Landings permitted at any time during the season
Prior landing reports to PIRSA	1 hour before removing lobster from boat
Escape gaps	2 gaps per pot
Vessel Monitoring System (VMS)	Operational VMS units required on all vessels during the season
Bin tags	All bins must be sealed with a lid and an approved tag prior to lobster being unloaded from the vessel. Tags are sequentially numbered.

4.3.1.1 Access to the Fishery

Commercial access to the Northern Zone Rock Lobster Fishery is limited to 68 commercial licences. In order to hold pots or quota units in the commercial fishery, a person must be the holder of a current commercial licence. There has been a gradual reduction in licences over time (an average of 1.3 per year over the last decade) 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. Pot reductions have assisted this gradual structural adjustment.

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 2006* 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 Schedule 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 Area of the Fishery

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

“westerly 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°20.0S and longitude 139°E, then due west to position latitude 36°20.0S and longitude 138°40.0E, then due south to position latitude 36°40.0S and longitude 138°40.0E, then due west to position latitude 36°40.0S and longitude 138°20.0E, then due south to position latitude 37°S and longitude 138°20.0E, 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 rock lobster sanctuaries across the State (Cape Jaffa, Margaret Brock Reef, Rivoli Bay and Gleeson Landing) and in all aquatic reserves.

4.3.1.4 Quota Restrictions

A quota system is in place, which restricts the annual commercial catch to a pre-defined limit each year. This arrangement requires a TACC limit to be set each year. A minimum quota unit holding of 320 quota units applies to all licences. This restriction applies in conjunction with the minimum pot limit and is in place to ensure that active licences remain the fundamental management unit in the fishery. This encourages owners of licences to participate in the fishery rather than facilitating speculative financial investment. This is desirable because active participants in a fishery have a greater sense of stewardship over the resource. The maximum number of quota units that may be held on an individual licence is unlimited.

4.3.1.5 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 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.

4.3.1.6 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
Escape gaps	2 gaps Must be 180° apart and free of any obstruction 57mm high x 280mm wide The highest point of each gap must be no more than 110mm from the base of the pot

Note that each commercial licence holder is permitted to use three ‘control’ pots without escape gaps fitted, for the purposes of monitoring pre-recruit abundance in the fishery through the on-board voluntary catch sampling program.

A maximum of 3,950 pots may be 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 20 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. Quota units are issued annually to all licences in the fishery after the TACC has been set. Quota units and pots are issued to licences as separate entitlements and may be traded separately. Temporary pot or quota unit transfers are permitted.

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 access to the fishery and fishing opportunities are equitably distributed between recreational participants. The majority of management controls currently used to manage the recreational sector have been in place for many years. Refer to the Recreational Fishing Guide and existing set of regulations for specific recreational management controls.

4.3.3.1 Access to the Fishery

Access to the South Australian recreational fishery is not limited (ie. anyone can take rock lobster), subject to various management controls imposed by regulation, which are outlined in this section. However, for the purposes of allocating access between sectors, the total recreational catch is capped at 4.5% of the total Statewide 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, the Minister and the Director will use various management measures to ensure that long term catch levels remain within the established benchmark. Furthermore, one of the research priorities under this management plan is the development of mechanisms for adjusting shares between sectors. These mechanisms may also be implemented if the Statewide recreational catch exceeds 4.5%.

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 up to two recreational rock lobster pots each season. Recreational pot registrations are non-transferable. Details related to the gear specifications are set out in the *Fisheries (General) Regulations 2000*.

4.3.3.3 Catch limits

Bag and boat limits are an output control used to cap the total catch in the recreational sector to within sustainable limits. A maximum daily bag limit of 4 lobster and a daily boat limit of 8 lobster applies to the recreational sector. The *Fisheries Management Act 2007* provides for the imposition of possession limits by regulation. These regulations will be developed following a comprehensive public consultation process.

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 105mm is applied consistently across the Northern 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* 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 specifically permitted by the Director of Fisheries.

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 directive applies to guide decision-making on the collection of broodstock for aquaculture purposes across all of South Australia's fisheries (Policy Directive No.4 of 2005). 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 Northern 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 Northern 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 3.4 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 Northern Zone and the optimum utilisation and equitable distribution of Northern 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 are the priority objectives. 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. Rebuild the stock to ecologically sustainable 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.

5.1.1 Goal 1: Rebuild the stock to ecologically sustainable levels

The primary objectives for Goal 1 are to ensure that rock lobster stocks in the Northern Zone are rebuilt and that adequate data exists to inform this process. 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 a pre-determined share of 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 rebuilding ecologically sustainable stock levels.

5.1.2 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 levels in the harvest strategy aim to establish catch limits that maximise catch and economic returns from the fishery during the stock rebuilding process.

5.1.3 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.

5.1.4 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 Northern Zone Rock Lobster Fishery.

Goal	Objectives	Strategies
<i>1. Maintain ecologically sustainable stock levels</i>	<i>1a. Return the stock to a level that will support sustained catch rates within target and limit reference levels between now and 2016.</i>	<ul style="list-style-type: none"> ▪ Set the TACC annually, in accordance with TACC decision rules in the harvest strategy. ▪ Maintain all other existing input and output controls.
	<i>1b. Fishing is conducted at a level that provides protection from overfishing during extended periods of low recruitment.</i>	<ul style="list-style-type: none"> ▪ Monitor the number of pre-recruits in the fishery through the voluntary catch sampling program, as an index of future recruitment strength. ▪ Set the TACC annually, 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.
	<i>1c. Ensure sufficient biological and environmental information exists to inform management decisions.</i>	<ul style="list-style-type: none"> ▪ 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. ▪ Monitor recreational catch and effort levels across the State every three years
<i>2. Optimum utilisation and equitable distribution of rock lobster stocks</i>	<i>2a. Rebuild the stock to a level sufficient to provide for greater stability in catches between and within fishing seasons</i>	<ul style="list-style-type: none"> ▪ Set the TACC annually, in accordance with TACC decision rules in the harvest strategy.
	<i>2b. Maintain a flow of economic benefit from the fishery to the broader community</i>	<ul style="list-style-type: none"> ▪ Set the TACC annually, 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
	<i>2c. Maintain equitable public access and recreational fishing opportunities</i>	<ul style="list-style-type: none"> ▪ 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.
	<i>2d. Recognise Aboriginal fishing access.</i>	<ul style="list-style-type: none"> ▪ Integrate any traditional fishing access prescribed in Aboriginal traditional fishing management plans with the management of the commercial, charter and recreational sectors.
	<i>2e. Sufficient economic information to ensure management decisions are properly informed</i>	<ul style="list-style-type: none"> ▪ Undertake economic surveys of the commercial fishery to assess economic performance against a set of economic indicators.
	<i>2f. Shares of access to rock lobster explicitly allocation between Aboriginal, commercial, charter and recreational sectors.</i>	<ul style="list-style-type: none"> ▪ Control the State-wide non-commercial 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
<p><i>3. Minimise impacts on ecosystem</i></p>	<p><i>3a. Minimise fishery impacts on by-catch species and the ecosystem</i></p>	<ul style="list-style-type: none"> ▪ 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.
	<p><i>3b. Minimise the incidental mortality of endangered, threatened and protected species</i></p>	<ul style="list-style-type: none"> ▪ 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
<p>4. Cost effective and participative management of the fishery.</p>	<p>4a. Cost-effective and efficient management of the fishery, in line with government's cost recovery policy.</p>	<ul style="list-style-type: none"> ▪ 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.
	<p>4b. Management arrangements reflect concerns and interests of the wider community.</p>	<ul style="list-style-type: none"> ▪ 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.
	<p>4c. Management arrangements complied with.</p>	<ul style="list-style-type: none"> ▪ Undertake annual compliance risk assessment. ▪ Develop a model for determining a quantifiable level of monitoring in the fishery to achieve optimum compliance in a cost-effective way. For example, determine a percentage of landings that should be monitored per year. ▪ Investigate options for adopting technology for compliance and monitoring purposes to improve effectiveness and efficiencies. ▪ Investigate methods to quantify illegal catch. ▪ Develop and implement management arrangements that are clear and uncomplicated so as to promote voluntary compliance and assist with successful enforcement. ▪ Where possible, develop and implement licensing, compliance and monitoring arrangements that are consistent with other fisheries to reduce administrative costs. ▪ Encourage the community to report fisheries offences to the Fishwatch number.

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 rebuilding.

The TACC decision rules pursue objectives 1a, 1b, 2a and 2b by establishing decision rules and reference levels 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 measured through the voluntary catch sampling program and catch rate measured through commercial logbooks, as the two key indicators of fishery performance.

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

The management plan also sets additional performance measures to supplement the key performance indicators used in the decision rules (see 5.3). These performance measures provide supplementary information for fishery assessment. They will also provide information for periodic review to ensure that the key 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.

During the life of the plan a comprehensive review will be conducted to test the appropriateness and reliability of the key performance indicators and reference levels to ensure that they provide a sound basis for setting the TACC. The outcomes of this review will be incorporated into the development of a new plan to replace this plan under the *Fisheries Management Act 2007*.

5.2.1 Management Regions

This harvest strategy establishes key biological performance indicators that are to be assessed at both a whole-of-fishery level and at a regional level.

Breaking the assessment down into individual regions 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 map in Figure 2 indicates the four key regions that will be used to assess the performance of the fishery. Figure 3 below sets out historical catch and effort information for each of the four regions. These graphs demonstrate the variations that can occur across the fishery.

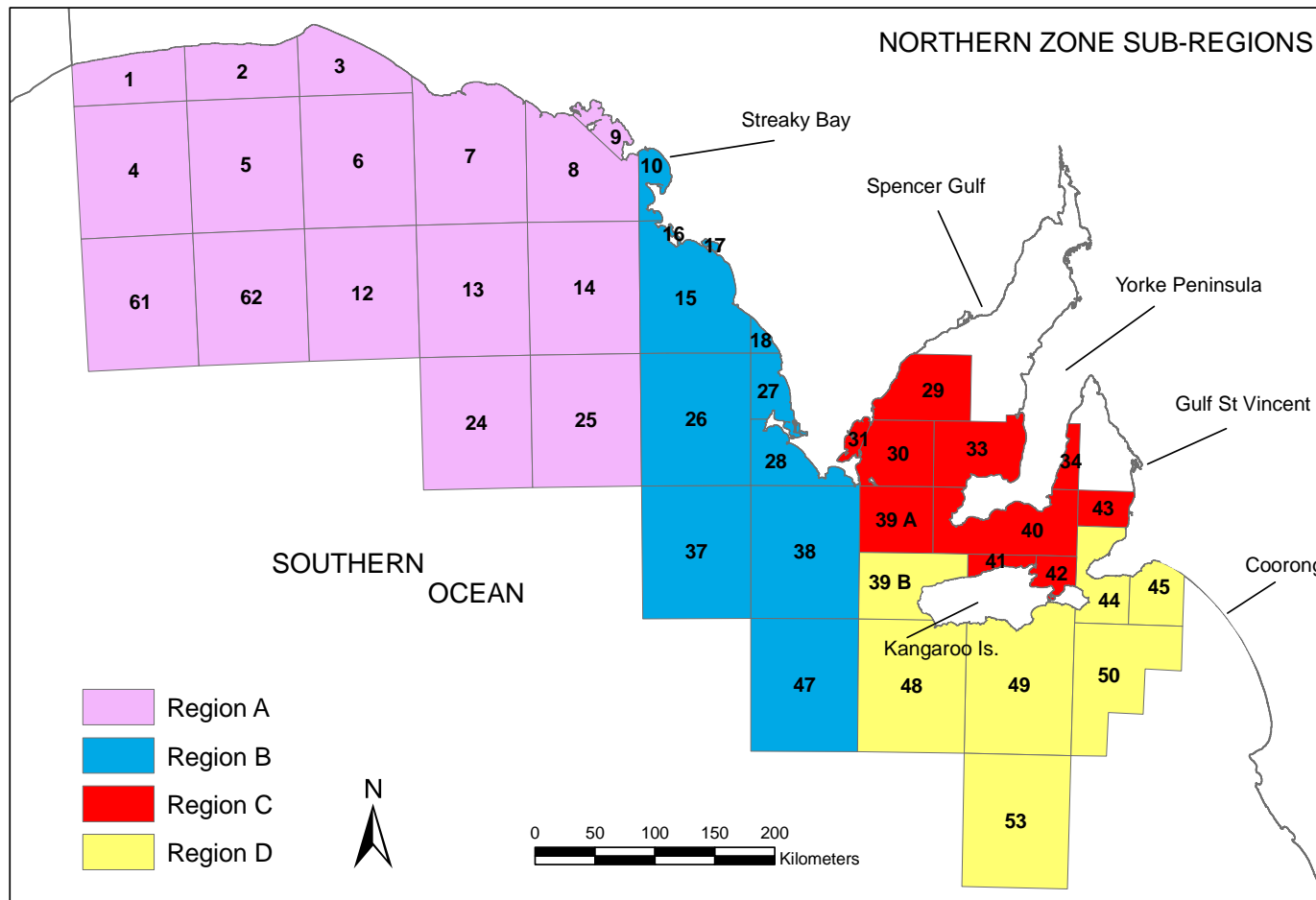


Figure 2. Data assessment and management regions in the NZRLF.

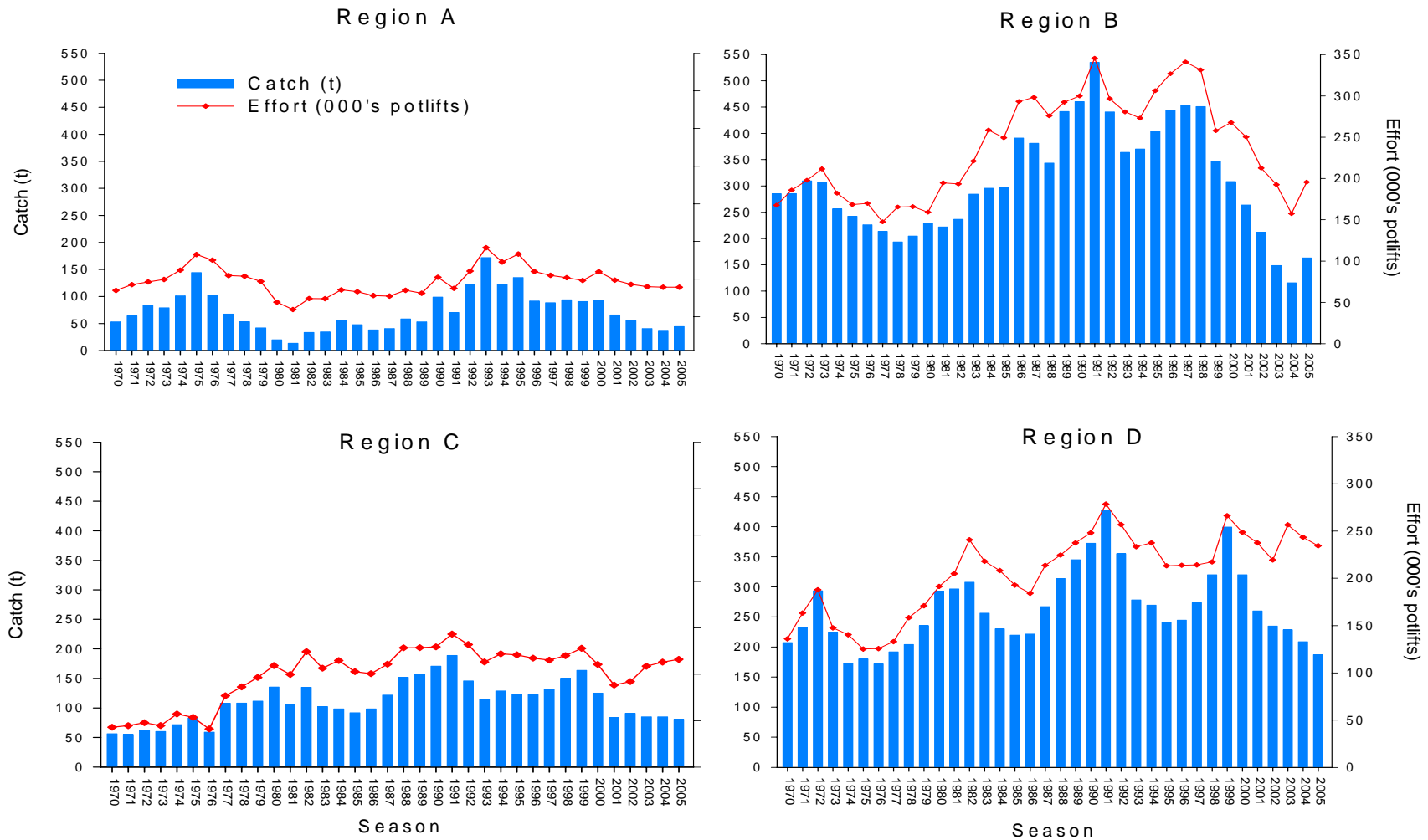


Figure 3. Total catch and effort levels for each region in the Northern Zone rock lobster fishery.

(Note that catch and effort from MFA 39 (see Figure 1) has been apportioned 30:70 between Regions C and D.)

5.2.2 Key performance indicators and reference points

A goal of this management plan is to promote stock recovery within an agreed timeframe. This goal will be achieved by ensuring that fishery performance is maintained within the reference levels 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 pre-recruit index). Performance of the fishery against these two reference points will guide TACC setting in the fishery. This approach aims to achieve the following outcomes:

- Incremental progress towards stock recovery;
- 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 levels 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 levels represent unacceptable fishery performance that the fishery aims to avoid. Target reference levels 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 levels.

The key biological performance indicators used in this harvest strategy are standardised catch rate and pre-recruit index. The guidelines for standardising catch rate are set out in section 5.2.4.

5.2.2.1 Catch rate

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

- Historical commercial catch and effort data;
- Stakeholder expectations of biological and economic performance; and
- A long term goal to achieve stock recovery.

For the purposes of setting limit reference points for catch rate, the year 2004 has been chosen as a starting point, as this represents a point when the fishery is considered to have been at its lowest point in both a biological and an economic sense. A LRP recovery trajectory has been developed for the whole fishery and for each region to allow for gradual increase in the LRP over the recovery period (see Table 4).

Target reference points (TRP) have been defined taking into account:

- Historical commercial catch and effort data;
- Stakeholder expectations of biological and economic performance;
- A long term goal to maintain and improve stability in future catches; and
- A long term goal to achieve a stock that will sustain a TACC of 600-700 tonnes.

Limit and target reference points have been established for both the fishery as a whole and each of the four regions, for the purposes of the TACC decision rules. Whilst this management plan applies for a period of three years, the recovery trajectories relate to a ten year period.

Table 4 and figures 4 and 5 below set out these reference points for catch rate.

5.2.2.2 Pre-recruit index (PRI)

Only a limit reference point (LRP) is set for pre-recruit index (PRI). Therefore PRI at any time is either above or below the reference point.

For the purposes of setting LRPs for PRI, a reference period between 1995 and 2004 (inclusive) has been chosen. This ten year period is representative of recent fishery performance. In order to set reference points for pre-recruit abundance, the average over this period has been taken.

When calculating the average, the highest and lowest years have been removed as part of a data smoothening process. This was suggested by industry because the high pre-recruit index in 1998 was seen as an unusual event, with the index far exceeding any other year before or since in Region D. As a result, the 1998 data was deemed to overflate the averages, therefore making the reference levels disproportionate to the long term performance of the fishery, particularly for Region D. To address this concern, the highest and lower data point for each region and for the whole zone have been disregarded for the purposes of calculating the limit reference levels.

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 levels.

Table 4. Limit reference points for pre-recruit index for each region of the fishery and the whole fishery.

Region	Pre-recruit index (Pot sampling data)
Northern Zone	0.33
A	0.03
B	0.19
C	0.42
D	0.61

Table 5. Yearly CPUE target and limit reference points for the four Regions of the Northern Zone based on a 12-year recovery time period. 2004 values correspond to data (italics), and 12-year target and limit objectives are shown in bold.

Rock Lobster Season	Year number	Whole Zone		Region A		Region B		Region C		Region D	
		Target	Limit	Target	Limit	Target	Limit	Target	Limit	Target	Limit
2004 (<i>data</i>)	0	0.82	0.82	0.94	0.94	0.75	0.75	0.78	0.78	0.87	0.87
2005	1	0.86	0.84	0.98	0.95	0.79	0.76	0.81	0.79	0.90	0.88
2006	2	0.89	0.85	1.02	0.97	0.83	0.78	0.83	0.79	0.93	0.89
2007	3	0.93	0.87	1.06	0.98	0.86	0.79	0.86	0.80	0.97	0.90
2008	4	0.96	0.88	1.09	0.99	0.90	0.80	0.89	0.80	1.00	0.91
2009	5	1.00	0.90	1.13	1.01	0.94	0.81	0.91	0.81	1.03	0.92
2010	6	1.04	0.91	1.17	1.02	0.98	0.83	0.94	0.82	1.06	0.94
2011	7	1.07	0.93	1.21	1.03	1.01	0.84	0.97	0.82	1.09	0.95
2012	8	1.11	0.94	1.25	1.05	1.05	0.85	0.99	0.83	1.12	0.96
2013	9	1.14	0.96	1.29	1.06	1.09	0.86	1.02	0.83	1.16	0.97
2014	10	1.18	0.97	1.32	1.07	1.13	0.88	1.05	0.84	1.19	0.98
2015	11	1.21	0.99	1.36	1.09	1.16	0.89	1.07	0.84	1.22	0.99
2016	12	1.25	1.00	1.40	1.10	1.20	0.90	1.10	0.85	1.25	1.00

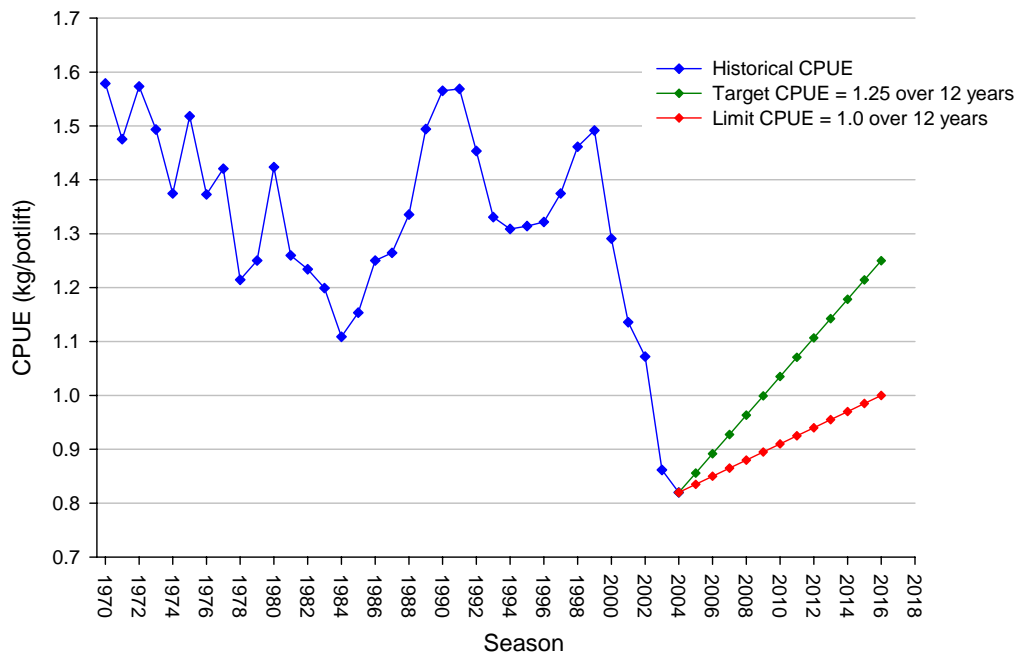


Figure 4. Target and limit reference points for standardised CPUE in the Northern Zone.

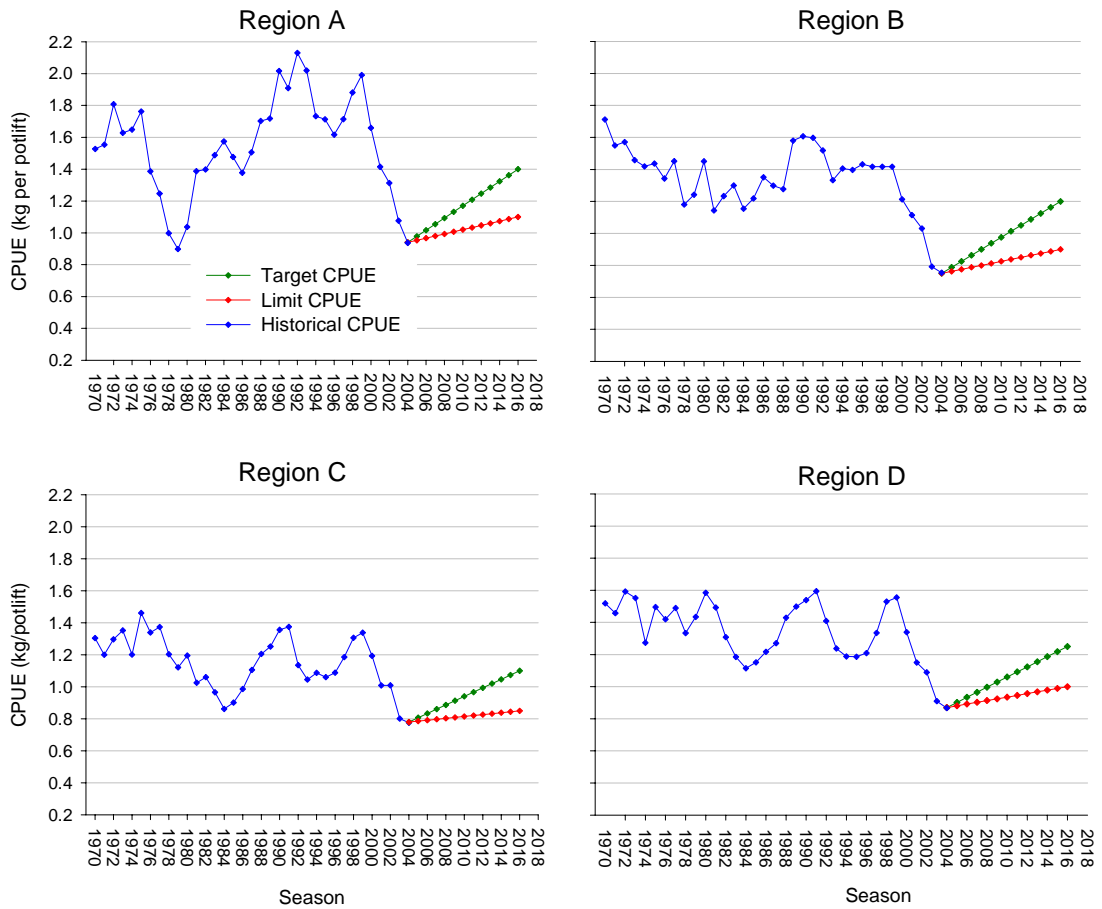


Figure 5. Target and limit reference points for standardised CPUE for each region.

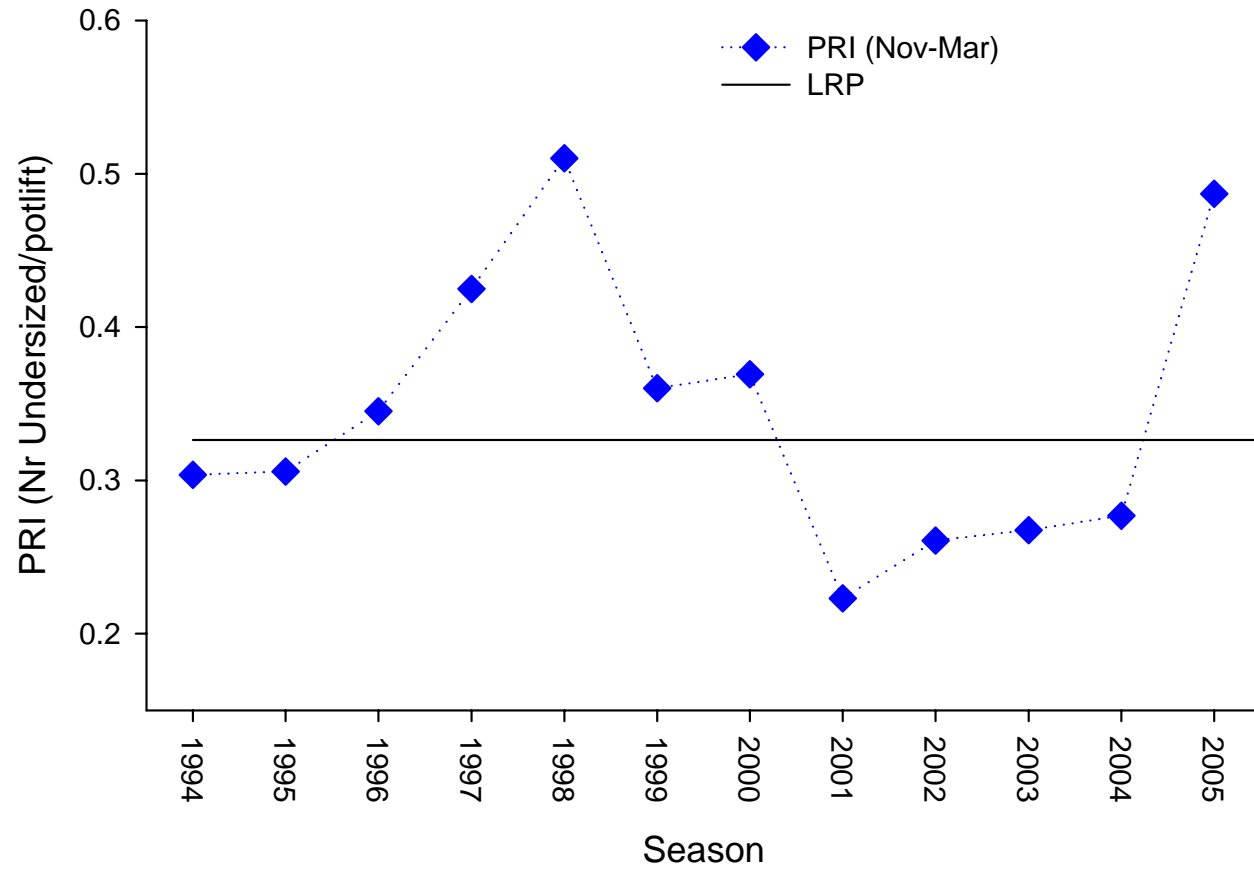


Figure 6. Limit reference point for standardised Pre-recruit index for the Northern Zone (whole zone).

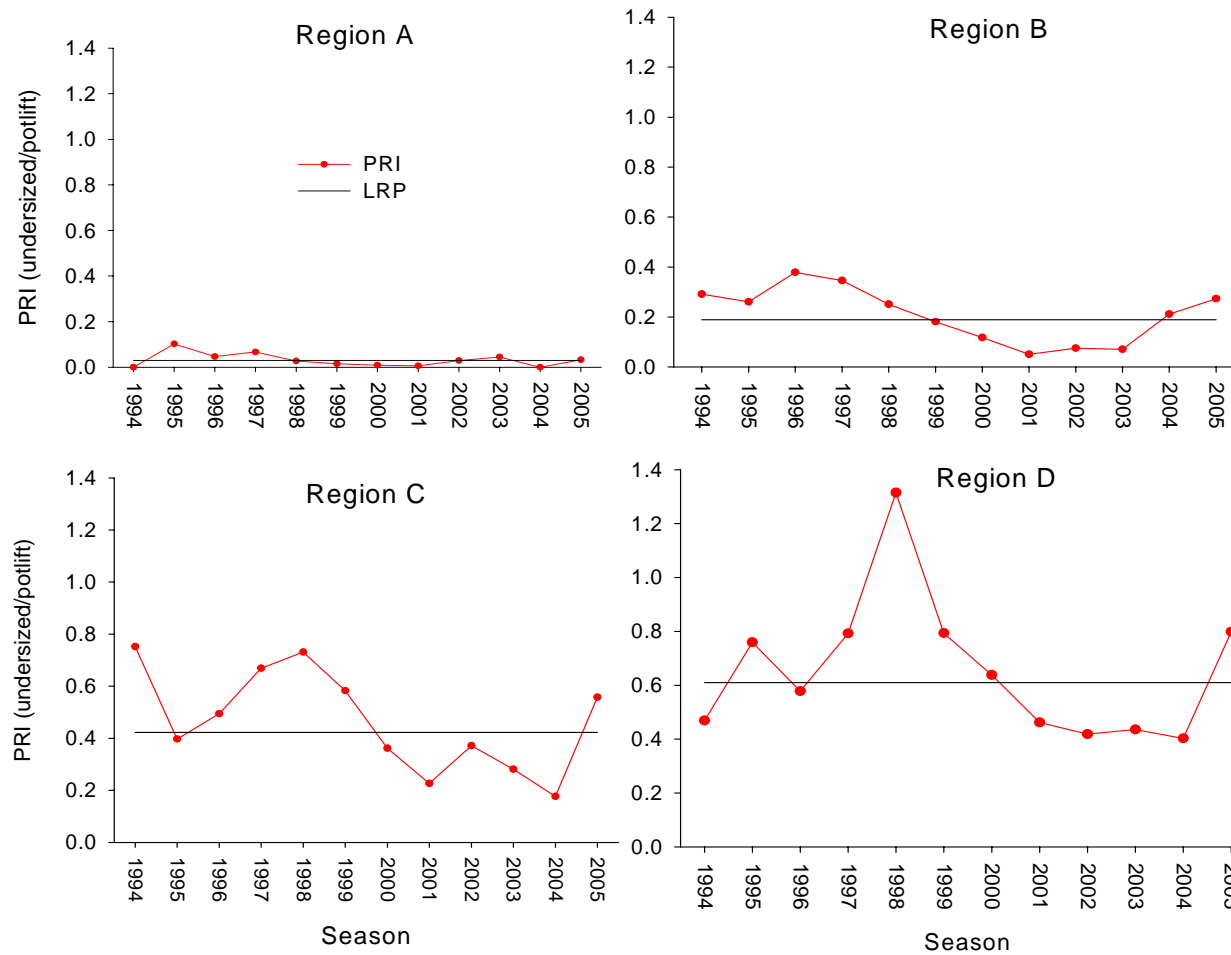


Figure 7. Limit reference point for standardised Pre-recruit index for each region of the Northern Zone.

5.2.3 Decision Rules for TACC Setting

The following decision rules apply to annual TACC setting, ensuring 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 for the whole Northern Zone drops below the limit reference point; and
2. Standardised catch rate drops below the limit reference points in two regions of the fishery; and
3. Pre-recruit index (rolling average over the most recent three year period) drops below the limit reference point for the whole Northern Zone; and
4. Pre-recruit index (rolling average over the most recent three year period) drops below the limit reference points in two regions.

One of the following remedial actions must be taken in relation to the upcoming season:

1. Reduce the TACC by at least 10%.
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 up to 10% when all of the following conditions are met in any given year:

1. Standardised catch rate for the whole Northern Zone is above the target reference point for three consecutive years; and
 2. Standardised catch rate is above the target reference points in all regions for three consecutive years; and
 3. Pre-recruit index (rolling average over the most recent three year period) is above the limit reference point for the whole Northern Zone; and
 4. Pre-recruit index (rolling average over the most recent three year period) is above the limit reference points in all regions; and
 5. At least 90% of the TACC was taken in the previous three years consecutively.
-

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 Northern 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 two representatives from each port.
- Annual estimates of standardised CPUE (for the Northern Zone and for each region) will be estimated for the period 1 November to 30 April of each fishing season.
- Logbook data and pot sampling data collected prior to MFA 39 being split into two will be allocated 30:70 (39a:39b) when representing data for regions B and C.
- The annual estimate of PRI will be calculated using standardised voluntary pot sampling data.
- The annual estimate of PRI will be calculated using the average of the PRI over the three most recent seasons.
- Annual estimates of standardised PRI (for the Northern Zone and for each region) will be estimated for the period 1 November to 31 March of each fishing season.
- If the catch in a region is 10% or more of the TACC in any season, then that region will be used in the TACC setting process.
- If the catch in a region is below 10% of the TACC in any season, then that region will not be used in the TACC setting process.
- There must be logbook data available from at least 5 licences for a region to be used in the TACC setting process.
- 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 important in the Northern Zone because the proportion of the fishery that has actually been fished in recent years has contracted, particularly since the introduction of quota. As licence holders have a specified quota entitlement rather than a specified number of fishing days, the trend has been to fish in a reduced area using the least fuel and time possible. In addition, 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. As a result, the western and deeper southern parts of the fishery have only been subjected to minimal fishing pressure in recent seasons and Regions B and C have been more heavily fished.

The decision rules in the harvest strategy have been formulated to account for these trends as much as possible by ensuring that if two regions are performing poorly and the fishery as a whole is below limit reference levels, then the TACC should be reduced. Given that the fishery is in a rebuilding phase, the decision rules for increasing the TACC are more onerous to ensure that the whole fishery can be assessed with certainty to be performing well before a TACC increase is contemplated.

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 Regions A and B may remain largely unfished and fisheries-independent monitoring may indicate that those parts of the fishery contribute to a biomass that can support an increase in the TACC. However, an increase may only be appropriate if the extra fish are actually taken from the western part of the fishery. An increase in the TACC without other management measures (such as separate quota zones) would not be appropriate in these circumstances.

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 TACC decision rules. Research into the spatial dynamics of recruitment in the fishery may form a part of this strategy.

5.3 Additional performance measures

Assessment against the table of additional performance measures (Table 6) will provide 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 levels, 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 6. Table of additional performance indicators for each management objective.

Goal	Objective	Performance Indicator	Description	Limit reference point
<i>1. Maintain ecologically sustainable stock levels</i>	<i>1a. Maintain the stock at or above a level that will support the commercial catch rates achieved in the reference year of 2000.</i>	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 90%
		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.
<i>2. Optimum utilisation & equitable distribution of stocks</i>	<i>2b. Maintain a flow of economic benefit from the fishery to the broader community</i>	Gross Value of Production (GVP)	The total catch valued at the landed beach price - Used to determine overall industry value.	GVP decreases by 20% or more in one year. GVP decreases by 10% or more each year for two consecutive years.

Goal	Objective	Performance Indicator	Description	Limit reference point
		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 \$15million.
		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.
	<i>2d. Shares of access to rock lobster explicitly allocated.</i>	Estimation of recreational catch.	Measures whether recreational sector fishing within allocated share.	Recreational catch exceeds 4.5% at Statewide level.
<i>3. Minimise impacts on ecosystem</i>	<i>3a. Minimise fishery impacts on by-catch species and the ecosystem</i>	Trend in the quantity of key by-catch and by-product indicator species	Reflects the overall impact of rock lobster fishing operations on indicator by-product and by-catch species.	Monitored and reported in annual stock assessment. Rock lobster fishery catches of giant crab assessed through Giant Crab Fishery assessment. Trial conducted of new trigger octopus pot 2008.
		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.
	<i>3b. Avoid the incidental mortality of endangered, threatened and protected species</i>	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 monitored and significant increases addressed.

Goal	Objective	Performance Indicator	Description	Limit reference point
<i>4. Cost effective and participative management of the fishery.</i>	<i>4a. Cost-effective and efficient management of the fishery, in line with government's cost recovery policy.</i>	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.
	<i>4b. Management arrangements reflect concerns and interests of the wider community.</i>	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.
	<i>4c. Management arrangements complied with.</i>	Detection rates	Number of prosecutions initiated, expiation notices issue or cautions given.	Increase by 10% or more in one year.

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 by-catch 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 coverage.

7 STOCK ASSESSMENT AND RESEARCH

7.1 Data collection and monitoring

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 PIRSA Fisheries Policy 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 stock assessment and status reports that assesses the status of the NZRLF 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 NZRLF since 1996. The four puerulus collector sites in the NZRLF are located at McLaren Point and Taylor Island in Port Lincoln and Marion Bay and Stenhouse Bay on the Yorke Peninsula. 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 SZRLF during the 2005/06 season. Sampling is currently being undertaken along five 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 NZRLF in the coming seasons. Both current and future research needs in the NZRLF have recently been refocused by the PIRSA rock lobster research sub-committee to ensure the recommendations outlined in the assessment of the fishery by 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 Northern 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 Northern 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 7 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 NZRLF. 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 7. 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	
	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

Goal	Description	Priority	Status	Responsibility	Timing
	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 Northern Zone Rock Lobster Fishery for the 2007/08 fishing season is provided in Appendix 10.4. The risk priorities contained will be the focus of compliance activity in the Northern 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 the 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 Northern Zone Rock Lobster Fishery is defined in the *Fisheries (Scheme of Management – Rock Lobster Fisheries) Regulations 2006*. It includes fishing for the fish specified in Schedule 1 of those regulations, copied below.

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 (*Scorpius aequipinnis*)
- Tommy ruff (*Arripis georgiana*)
- Trevalla (*Hyperoglyphe antarctica*)
- Trevally (*Usacaranx georgianus*)
- Whiting (Family Sillaginidae)

Crustaceans

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

Molluscs

- Cockle (Suborder Teledonta)
- Cuttlefish (*Sepia* spp.)
- Mussels (*Mytilus* spp.)
- Octopus (*Octopus* spp.)
- Oyster (Family Ostidae)
- 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 SA'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	September 2007
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 NZ, 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 endangered, threatened or protected species.	Complete	June 2006
11	PIRSA & industry to continue to monitor extent of interactions between rock lobster fishery & fur seals/sea lions, and develop appropriate mitigation measures, including establish within 2 yrs preliminary trigger & reference points, to minimise these interactions.	Commenced	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.	RA 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.	Substantial	June 2010

*Recommendation addressed in All of Fisheries, section 4.1.

10.3 Ecosystem component trees

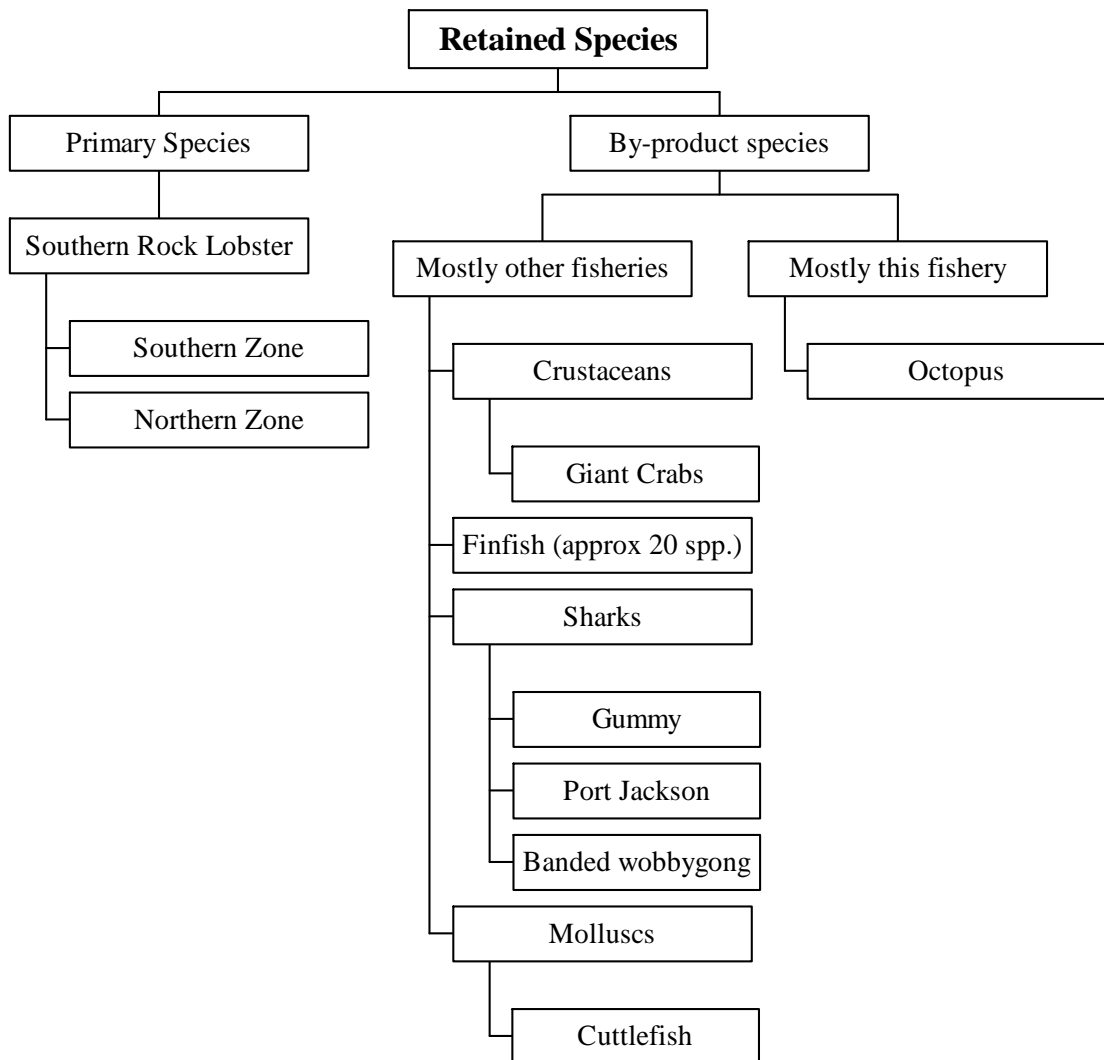


Figure 8. Retained species in the Northern Zone rock lobster fishery.

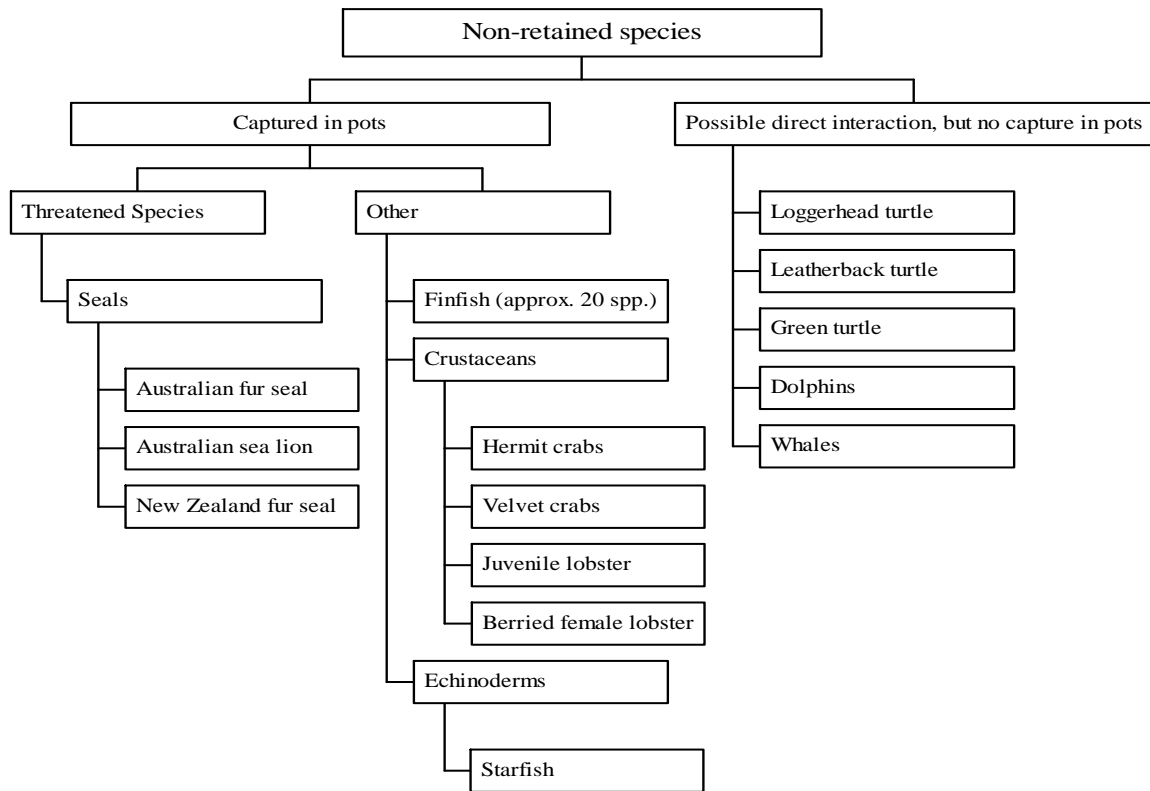


Figure 9. Non-retained species in the Northern Zone rock lobster fishery.

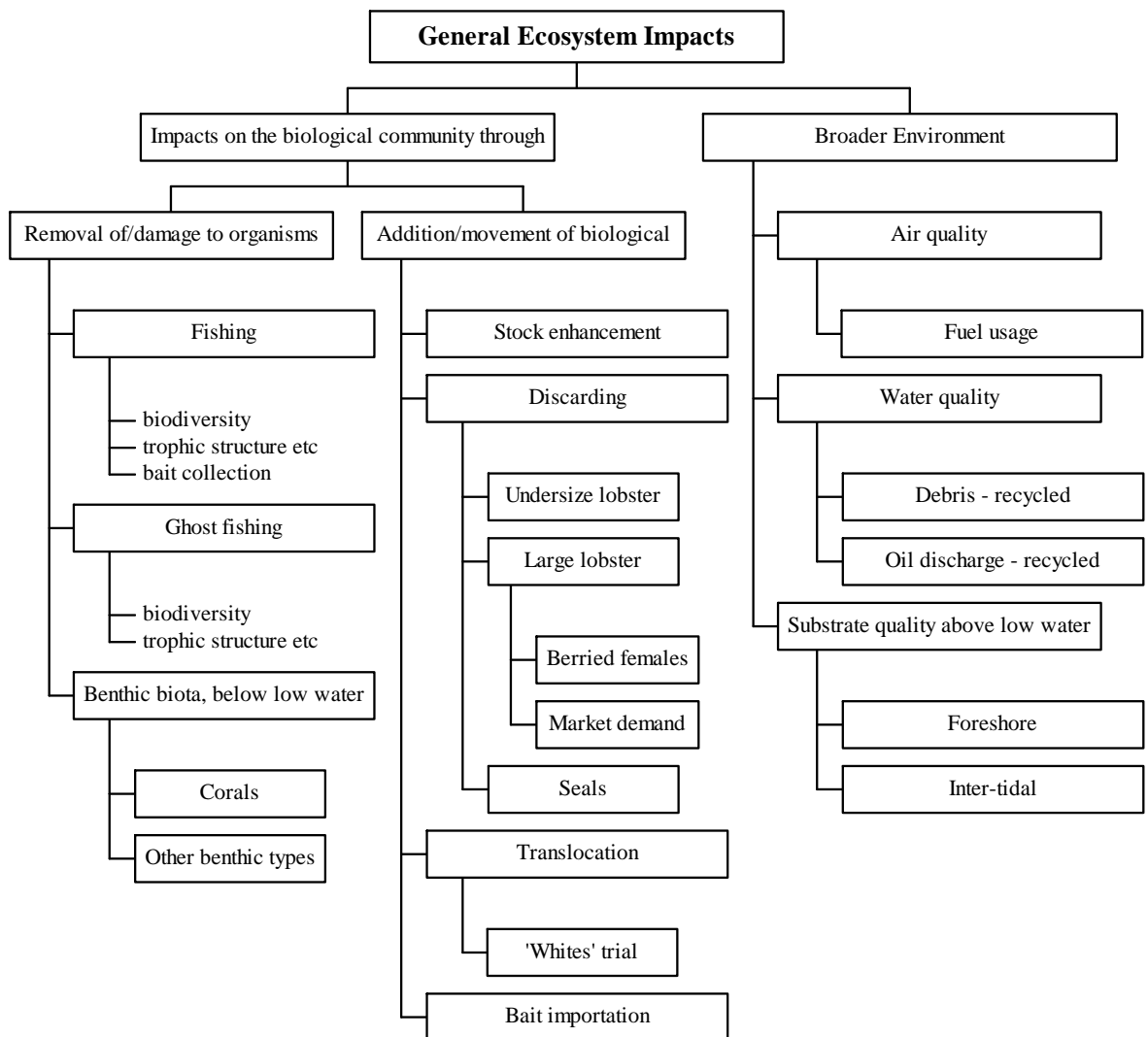


Figure 10. General ecosystem impacts in the Northern Zone Rock Lobster Fishery

10.4 Compliance Risk Assessment

The risk priorities contained within the table below will be the focus of compliance activity for the Northern 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 profile
Commercial	Quota evasion: <ul style="list-style-type: none"> • Illegal at sea transfers • Fail to complete daily catch record on CDR • Misreporting on CDR • Collusion with processor • Fail to prior report • Fail to seal bins • Fail to complete CDR • Fail to send CDR with fish • Exceed take home allowance • Seeding recreational pots • Unreported unloadings 	High	<ul style="list-style-type: none"> • Investigate strategies for phasing out unsuitable bin lids, including the possibility of standardisation of bins. • Conduct education program on requirements • Conduct random & targeted processor checks • Monitor vessel positions (VMS) and expected landing times • Use VMS to identify possible illegal unloading and transshipment • Conduct random and targeted on land inspections • Conduct random and targeted at sea inspections • Conduct covert operations / investigations • Conduct overt operations/ investigations • Conduct intel driven operations • Liaise with fishers to encourage offence reporting • Conduct analysis on prior reporting and CDRs received • Follow-up and investigate possible illegal activity 	<ul style="list-style-type: none"> • Work with the FMC for strategies for replacing bin lids.
	Take berried females	Moderate	<ul style="list-style-type: none"> • Conduct random and targeted on land inspections • Conduct random and targeted at sea inspections • Conduct random & targeted processor checks 	

Fishery sector	What can happen (risks)	Priority *	Possible actions (mitigating strategies)	Notes on changes from 2006/07 profile
	Take undersize	Moderate	<ul style="list-style-type: none"> • Conduct random and targeted on land inspections • Conduct random and targeted at sea inspections • Conduct random & targeted processor checks 	<ul style="list-style-type: none"> •
	Not having operational VMS unit on boat throughout season	Moderate	<ul style="list-style-type: none"> • Conduct education program – information sheet on VMS operating requirements to be distributed to licence holders and masters • VMS Duty Officer in place to respond to system alarms/alerts • Annual review of existing protocols relating to VMS unit failure • Investigate breaches 	<ul style="list-style-type: none"> • Duty officer follow up on overdue units and power outages addresses risk and compliance inspections, therefore, not necessary.
	Use of corfs	Moderate	<ul style="list-style-type: none"> • Monitor unloadings from corfs 	
	Fish in closed season/area	Low	<ul style="list-style-type: none"> • At-sea compliance • Aerial surveillance • Act on intelligence received resulting in targeted operations 	<ul style="list-style-type: none"> • Fundamental fisheries management arrangement in the fishery and offence detected in 05/06 season.
	Collusion with other fishers	Low	<ul style="list-style-type: none"> • Conduct random and targeted at sea inspections • Aerial surveillance • Act on intelligence received resulting in targeted operations 	
	Non-compliance with wildlife interaction reporting requirements	Low	<ul style="list-style-type: none"> • Intel gathering in relation to this risk 	<ul style="list-style-type: none"> • In final stages of implementation, compulsory as of 1 April 2007 • Will need to be monitored closely once implemented
	Lack of understanding of legislation	Low	<ul style="list-style-type: none"> • Review and simplification of licence conditions • Maintain a Fisheries Compliance liaison officer for NZRL fishery • Conduct education program on requirements (quota, VMS, 	

Fishery sector	What can happen (risks)	Priority *	Possible actions (mitigating strategies)	Notes on changes from 2006/07 profile
			<ul style="list-style-type: none"> prior reporting etc) • Include registered masters in any education / awareness campaign 	
Processor	Quota evasion (collusion): <ul style="list-style-type: none"> • Fail to retain copies of records on premises • Fail to return CDR or S&T forms to PIRSA • Fail to weigh on receipt • Fail to weigh accurately (includes failure to weigh in sealed bins) • Take possession of unsealed containers • Interference with sealed bin 	High	<ul style="list-style-type: none"> • Conduct random and targeted transporter and processor checks • Conduct targeted processor audits • Conduct covert surveillance on processor premises • Conduct intel driven operations • Follow-up and investigate possible illegal activity 	<ul style="list-style-type: none"> • Risks viewed as components of quota evasion as opposed to individual risks
	Fail to complete CDR or Sales and Transfer documentation	Moderate	<ul style="list-style-type: none"> • Conduct random and targeted processor checks 	<ul style="list-style-type: none"> •
	Rec fish stored on premises	Moderate	<ul style="list-style-type: none"> • Prohibit storage of recreational fish (recommended for inclusion in Fisheries Management Bill) 	<ul style="list-style-type: none"> •
	Lack of understanding of legislation	Low	<ul style="list-style-type: none"> • Maintain a Fisheries Compliance liaison officer for NZRL fishery • Education campaign for fish processors 	<ul style="list-style-type: none"> •
Non-commercial	Organised illegal activity	High	<ul style="list-style-type: none"> • Conduct covert operations / investigations • Conduct intel driven operations • Conduct inspections of unregistered processor premises • Liaise with interstate enforcement agencies • Follow-up and investigate possible illegal activity 	<ul style="list-style-type: none"> •

Fishery sector	What can happen (risks)	Priority *	Possible actions (mitigating strategies)	Notes on changes from 2006/07 profile
	Fish in closed season/area	Moderate	<ul style="list-style-type: none"> • At-sea compliance • Aerial surveillance • Act on intelligence received resulting in targeted operations 	<ul style="list-style-type: none"> • Fundamental fisheries management arrangement in the fishery and intelligence received relative to this risk.
	Use of illegal gear	Moderate	<ul style="list-style-type: none"> • Liaise with interstate authorities • Conduct at sea patrols • Conduct random beach checks • Liaise with fishers to increase access to information • Conduct intel driven operations • Fisheries Compliance Officers regional focus • Follow-up and investigate possible illegal activity 	
	Take over bag	Moderate	<ul style="list-style-type: none"> • Conduct at sea patrols • Conduct random beach checks • Liaise with FishCare volunteer patrols to educate fishers re size and bag limits • Conduct covert operations / investigations 	
	Take undersized	Moderate	<ul style="list-style-type: none"> • Conduct at sea patrols • Conduct random beach checks • Liaise with FishCare volunteer patrols to educate fishers re size and bag limits • Conduct awareness program at caravan and camping grounds • Follow-up and investigate possible illegal activity 	
	Lack of understanding of legislation	Low	<ul style="list-style-type: none"> • Conduct education campaign - talking to fishers about requirements • Participate in school education program 	

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 from 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
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	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
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
NRIFS	National Recreational and Indigenous Fishing Survey
SANZRLFA	South Australian Northern Zone Rock Lobster Fishermen's Association
PIRSA	Department of Primary Industries and Resources, South Australia
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

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FISHWATCH: 1800 065 522
www.pir.sa.gov.au/fisheries

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