

**ECOLOGICALLY SUSTAINABLE DEVELOPMENT
(ESD) RISK ASSESSMENT OF THE
SOUTH AUSTRALIAN
COMMERCIAL ROCK LOBSTER FISHERY**

APRIL 2011



**Government
of South Australia**

Primary Industries
and Resources SA

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1. INTRODUCTION

Ecologically Sustainable Development (ESD) principles are the basis of fisheries and aquatic resource management in South Australia. Within the South Australian *Fisheries Management Act 2007*, ESD is described as “*the use, conservation, development and enhancement of the aquatic resources of the State in a way, and at a rate, that will enable people and communities to provide for their economic, social and physical well-being*”.

The Fisheries Division of Primary Industries and Resources South Australia (PIRSA) are responsible for fisheries management under the Act and must:

- sustain the potential of aquatic resources of the State to meet the reasonably foreseeable needs of future generations;
- safeguard the life-supporting capacity of the aquatic resources of the State; and
- avoid, remedy or mitigate adverse effects of activities on the aquatic resources of the State.

Similar ESD based management objectives are now widely accepted as the foundation of Australian State and Commonwealth fisheries and environmental management legislation, and ESD principles also underpin key international fisheries treaties and agreements. These include the United Nations Convention on the Law of the Sea (UNCLOS) and the Food and Agriculture Organisation (FAO) Code of Conduct for Responsible Fisheries.

ESD concepts also drive key fisheries aspects of the Australian Government’s overarching *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This legislation requires that all Commonwealth, State and Territory fisheries that export some or all of their catch are assessed against fisheries sustainability criteria before being licensed for export. This EPBC Act assessment process is focussed on the ecological impacts of fishing to ensure that management outcomes avoid overfishing and recover overfished stocks; maintain biodiversity; and minimize adverse impacts on ecosystem structure, function, and productivity.

Achieving strong ESD outcomes for commercial fisheries is a complex balancing act. It requires careful integration of immediate, medium, and long term resource use priorities with the full range of environmental, economic and social considerations facing business and communities. South Australia’s commercial and recreational fisheries are a significant part of the State’s identity, and are very important both economically and culturally. The commercial wild catch fishing sector has an annual production value of around \$220 million and it is estimated that a quarter of a million South Australians enjoy recreational fishing each year (Jones 2009). The viability of these important commercial and recreational activities relies on healthy and productive ecosystems, supported by an efficient regulatory and business framework.

1.1. Fishery Management Plans and ESD Reporting

The *Fisheries Management Act 2007* has been in place since 1 December 2007. Since then, the Fisheries Council of South Australia (Fisheries Council) has been established and is the peak advisory body to the Minister for Fisheries. The primary functions of the Fisheries Council are to prepare fisheries management plans under the *Fisheries Management Act 2007* and to advise the Minister for Fisheries on key aspects of fisheries and aquatic resource management.

To coincide with these changes, Fishery Management Committees (FMCs) were discontinued from 1 July 2007 and PIRSA Fisheries has signed communication protocols with the relevant representative industry association for each commercial fishery sector. For the South Australian Rock Lobster Fishery (RLF), the industry association is the South Australian Rock Lobster Advisory Council (SARLAC).

Management plans are a significant instrument, guiding decisions on annual catch or effort levels, the allocation of access rights, and establishing the tenure of valuable commercial licences. The Minister has directed the Fisheries Council to prepare a management plan for the RLF. PIRSA Fisheries and Aquaculture is leading the preparation of this draft plan on behalf of the Fisheries Council and in close collaboration with the industry association.

The *Fisheries Management Act 2007* also describes the nature and content of fishery management plans including mandatory requirements. Among other things, management plans must describe the biological, economic and social characteristics of a fishery.

Management plans must also include a risk assessment of the impacts or potential impacts of the fishery on relevant ecosystems. These risk assessments are then used to develop management strategies that will best pursue fishery-specific ESD objectives. The broad process is outlined in Figure 1 on the following page.

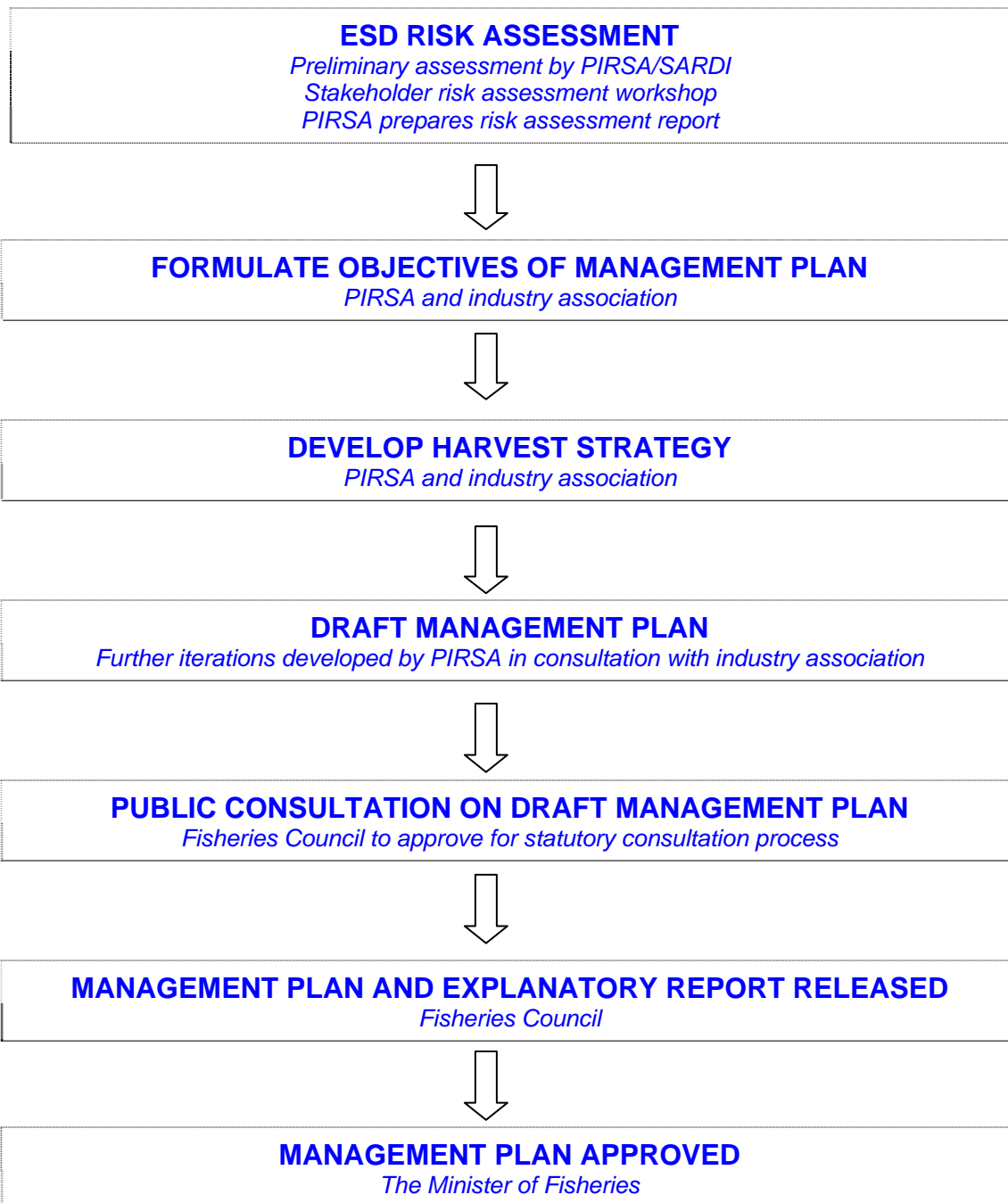


Figure 1 Process for preparing a Fishery Management Plan

The *Fisheries Management Act 2007* specifies that management plans may remain in force for up to 10 years from commencement. For developmental fisheries they may remain in force for up to 3 years. To ensure that management plans remain relevant, efficient, and focussed on the legislative and policy objectives of the day, the Fisheries Council must conduct a detailed review of the operation of a management plan soon after five years of commencement. This process will include a review of the ESD risk assessment.

1.2. The ESD Risk Assessment and Reporting Process

To efficiently meet its ESD accountabilities under both State and Commonwealth legislation, PIRSA Fisheries and Aquaculture has adopted the National ESD Reporting Framework for Fisheries¹. This approach, developed in Australia, has been extensively used to analyse and report on the ESD performance of commercial fisheries, and has the potential to drive substantial performance improvements. When applied appropriately, the national framework will:

- substantially improve knowledge about the environmental, economic, and social issues relevant to the ESD performance of a fishery;
- enable consistent and comprehensive analysis and reporting of the current and strategic operating environment for fisheries (this may also usefully inform industry strategic and business planning initiatives);
- engage industry, key fishery stakeholders, managers and scientists in a proven, transparent, and clearly defined collaborative process to understand and improve fisheries management performance; and
- improve the efficiency and quality of performance reporting against a range of public and private sector accountabilities (such as the EPBC Act Strategic Assessment process, or industry business planning initiatives).

On 30 March 2010, PIRSA Fisheries arranged an ESD risk assessment workshop with key stakeholders. Dr Rick Fletcher, an independent facilitator, ran the workshop process. This workshop built on earlier scoping work by the fishery manager, scientists, and industry to identify the majority of management issues facing the fishery and to start the process of developing detailed fishery-specific ESD component trees. The key steps undertaken at the broader stakeholder workshop that was held to inform the development of this full ESD report are outlined below:

1. The generic ESD component trees were modified through a process with stakeholders into a set of trees specific to the fishery. This process was used to identify all of the issues relevant to ESD performance of the fishery.
2. A risk assessment of the identified issues (or components) was completed based on the likelihood and consequence of events that may undermine or alternatively contribute to ESD objectives. This process involved managers, scientists, industry and key stakeholders.

¹ The National ESD Reporting Framework was initially developed under the Standing Committee for Fisheries and Aquaculture. The framework was then finalised under FRDC Project 2000/145. See Fletcher et al. (2002); or www.fisheries-esd.com for details.

3. Risks were then prioritised according to their severity. For higher level risks a detailed analysis of the issue, associated risks, and preferred risk management strategies was completed. For low risk issues, the reasons for assigning low risk and/or priority were recorded.
4. For higher level risks a full ESD performance report in the context of specific management objectives was prepared. This includes operational objectives, indicators, data required and performance measures.
5. A detailed fishery-specific background report was also prepared to guide the identification of issues, risks and management strategies. This report includes the history of the fishery and its management, the areas of operation and their biological and physical characteristics, target species and by-product and bycatch species, and other relevant information.

The full ESD reporting process outlined above provides a logical framework for managers and stakeholders to identify, prioritise, and efficiently manage risks to achieve agreed ESD objectives. Where there are substantial knowledge gaps, the process informs cost effective and efficient research strategies targeted to high risk areas.

2. BACKGROUND

2.1. Description of the Rock Lobster Fishery

2.1.1. Location of the Fishery

The South Australian Rock Lobster Fishery is primarily based on the capture of southern rock lobster, *Jasus edwardsii*. This species is found in the waters adjacent to South Australia in depths from 1 to 200 m. The South Australian rock lobster fishery is separated into two fishing zones (the Southern and Northern Zones).

The Southern Zone Rock Lobster Fishery (SZRLF) includes all South Australian waters between the mouth of the Murray River and the Victorian border and covers an area of 22,000 km² (Figure 2). It is divided into seven Marine Fishing Areas (MFAs), but the majority of fishing occurs in four MFAs (51, 55, 56 and 58). The Northern Zone Rock Lobster Fishery (NZRLF) includes all South Australian marine waters between the mouth of the Murray River and the Western Australian border and covers an area of 207,000 km² (Figure 2). It is comprised of 42 Marine Fishing Areas (MFAs), but most of the fishing is conducted in ten MFAs (7, 8, 15, 27, 28, 39, 40, 48, 49 and 50).

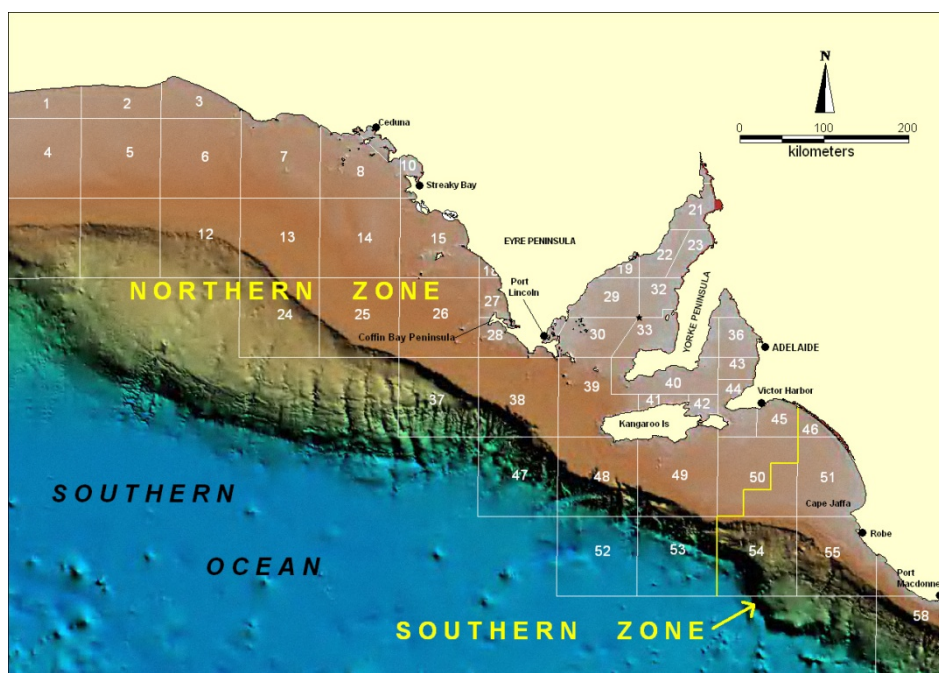


Figure 2 Marine Fishing Areas in the Northern and Southern Zones of the South Australian Rock Lobster Fishery

Rock Lobsters can be taken in all waters, except in aquatic reserves and the dedicated Rock Lobster sanctuaries. The locations and coordinates of the State's aquatic reserves and dedicated rock lobster sanctuaries are provided in the *Fisheries Management (Aquatic Reserves) Regulations 2008* and *Fisheries Management (General) Regulations 2007*, respectively or on the PIRSA Fisheries website.

2.1.2. Access to the Fishery

The commercial SZRLF is a limited entry fishery with a total of 181 licences. The majority of boats in this fishery fish from Port MacDonnell and Robe (Figure 2). The commercial NZRLF is a limited entry fishery with a total of 68 licences. The majority of the NZRLF fleet is based in Port Lincoln on the Eyre Peninsula (Figure 2). Recreational users also have access to the rock lobster resource, subject to complying to various management arrangements (see section 2.2.3)

2.1.3. Fishing Methods

Lobsters are caught using pots (Figure 3) that are set overnight and hauled at first light. Most pots are steel-framed and covered with wire mesh that incorporates a moulded plastic neck. All pots in the Southern Zone must not exceed 1.5 m in diameter or a height of 1.2 m and be covered by a minimum of 50 mm mesh. The pots in the NZRLF must be no more than 61 cm high, 1.22 m at its base and must also have two escape gaps (of not less than 5.7 cm high and 28 cm wide). A metal rod is often used in the pots of the NZRLF to prevent entry of Threatened Endangered and Protected Species (TEPS) to the pot. The catch is stored live in holding wells on boats before being transferred to live holding tanks at the numerous processing factories.



Figure 3 Commercial Pot used in the South Australian Rock Lobster Fishery

2.1.4. Retained Species

The South Australian Rock Lobster Fishery is primarily a single species, single method fishery, based on the capture of the southern rock lobster. Other species are permitted to be taken and sold as by-product and include the Maori octopus (*Octopus maorum*) and the giant crab (*Pseudocarcinus gigas*). Table 1 lists all species permitted to be taken under the *Fisheries Management (Rock Lobster Fisheries) Regulations 2006*, although three levels of access to these species apply for license holders, ranging from taking and using/selling only the three species listed above, to taking/using the three species listed above to sell and the other species listed in Table 1 as bait, through to taking/selling all species in Table 1.

Table 1 List of species that are permitted to be taken under the Fisheries Management (Rock Lobster Fishery) Regulations 2006.

Permitted Species	Common Name (Scientific Name)
Annelids	Beachworm (Class Polychaeta) Bloodworm (Class Polychaeta) Tubeworm (Class Polychaeta)
Crustaceans	Giant Crab (<i>Pseudocarcinus gigas</i>) Velvet Crab (<i>Nectocarcinus tuberculatus</i>)
Molluscs	Southern Calamary (<i>Sepioteuthis australis</i>) Cockle (<i>Anadara</i> & <i>Katelsysia</i> spp.) Cuttlefish (<i>Sepia</i> spp.) Mussel (<i>Mytilus</i> spp.) Octopus (<i>Octopus</i> spp.) Oyster (Family Ostreidae) Scallop (Family Pectinidae) Gould's Squid (<i>Notodarus gouldii</i>)
Scalefish	Australian Anchovy (<i>Engraulis australis</i>) Barracouta (<i>Thyrsites atun</i>) Black Bream (<i>Acanthopagrus butcheri</i>) Cod (marine species) (Family Moridae) Dory (Family Zeidae) Flathead (Family Platycephalidae) Flounder (Family Bothidae or Pleuronectidae) Southern Garfish (<i>Hyporhamphus melanochir</i>) Bluespotted Goatfish (<i>Upeneichthys vlamingii</i>) Australian Herring (<i>Arripis georgianus</i>) Leatherjacket (Family Monacanthidae) Pink Ling (<i>Genypterus blacodes</i>) Blue Mackerel (<i>Scomber australasicus</i>) Common Jack Mackerel (<i>Trachurus declivis</i>) Morwong (Family Cheilodactylidae) Mullet of all species (Family Mugilidae) Mulloway (<i>Argyrosomus hololepidotus</i>) Redfish (<i>Centroberyx affinis</i>) Bight Redfish (<i>Centroberyx gerrardi</i>) West Australian Salmon (<i>Arripis truttaceus</i>) Australian Sardine (<i>Sardinops sagax</i>) Snapper (<i>Pagrus auratus</i>) Snook (<i>Sphyraena novaehollandiae</i>) Southern Sole (<i>Aseraggodes haackeanus</i>) Sea Sweep (<i>Scorpius aequipinnis</i>) Swallowtail (<i>Centroberyx lineatus</i>) Blue-eye Trevalla (<i>Hyperoglyphe antarctica</i>) Trevally (Family Carangidae) Whiting (Family Sillaginidae) Bluethroat Wrasse (<i>Notolabrus tetricus</i>)
Sharks	Rays of all species (Class Elasmobranchii) Shark of all species (Class Elasmobranchii) other than White Shark (<i>Carcharodon carcharias</i>) Skate of all species (Class Elasmobranchii)

2.1.5. Non-Retained Species

Interaction and capture of other species in the SZRLF are monitored in the Fishery-Independent Monitoring Surveys (FIMS) and in log book returns annually. Bycatch of non-retained species is generally low but is dominated by relatively few species including blue-throat wrasse (*Notolabrus tetricus*) and leatherjacket species (*Meuschenia hippocrepis* and *Meuschenia australis*) (Brock et al. 2007). Interactions with Australia Sea Lions, including mitigating the risks of entrapment has recently been researched, reinforcing the effectiveness of metal rods in preventing sea lions entering pots (Goldsworthy et al. 2010).

2.1.6. Bait Usage

As discussed in Section 2.1.4 the many rock lobster fishers are permitted to retain a number of species for bait use only pursuant to their own fishing licences. Bait may be taken using various scale fishing gear types, a bait net, or retained as incidental bycatch in lobster pots. Species permitted to be taken as bait by those with licenses to do so are provided in Table 1.

2.2. Management Arrangements and Objectives

2.2.1. Management History of the Fishery

The southern rock lobster has been fished in South Australian waters since the 1890s but the commercial fishery did not develop until the late 1940s and early 1950s when overseas markets for frozen tails were first established. Since then there has been a gradual change to live export. Currently, over 90% of the commercial catch is exported live to overseas markets.

A winter closure was introduced in 1966 to protect spawning females and to help conserve egg-production. In 1967 changes were introduced for the rock lobster fishery including a limit on pot and boat numbers.

In 1968, the fishery was separated into two management zones (known as the Southern Zone and Northern Zone), in recognition of the significant differences in geological and ecological characteristics between the eastern and western regions of the South Australian coast. At the same time, limited entry provisions were introduced, which included individual pot allocations for each licence. A series of management arrangements have been introduced over the past five decades to control catch and effort levels in the fishery (see Table 2 for SZRLF and Table 3 for NZRLF). Some of these arrangements are discussed below.

In 1992, a review undertaken by PIRSA suggested that the continued high catch levels achieved through the early 1990s were unsustainable in the long term. This review recommended that effort levels should be reduced in both the Southern and Northern Zone. Following this review, government managers advocated strongly for a quota system in both zones as the most effective approach to ensure long term sustainability and profitability. As a result of this review process, a quota system was introduced in the Southern Zone in 1993.

The first management plans for the fishery were developed in 1997 and provided a series of performance indicators and a reference range to guide future management decision-making (Zacharin 1997a,b). The management plans established criteria to maintain the performance of the fishery within the historical range recorded between the 1992 and 1996 seasons. The management plans formalised a goal to maintain an annual exploitation rate of between 40% and 42% for the SZRLF and 26% and 30% for the NZRLF.

A comprehensive review of the existing management system in the NZRLF was undertaken during 2002 and led to the introduction of a quota management system in 2003. New management plans for both fisheries were published in 2007 (Sloan and Crosthwaite 2007a,b).

Table 2 Major management milestones for the South Australian Southern Zone Rock Lobster Fishery. TACC = total allowable commercial catch

Date	Management milestone
1958	Closed season for females from 1 June-31 October and for males from 1 to 31 October
1967	Pot and boat limit introduced, no new boats to operate in the then "South-Eastern Zone"
1968	Limited entry declared, compulsory commercial catch log
1978	June, July, October closed
1980	Winter closure declared. Season from 1 October to 30 April.
1984	15% pot reduction
1987	Buyback of 40 licences (2455 pots)
1993	April closed; TACC implemented for 1993/94 season at 1720 t
1997	Management Plan for the fishery published (Zacharin 1997a)
2001	TACC increased by 50 t to 1770 t
2003	TACC increased by 130 t to 1900 t; May opened on trial basis
2005	May trial completed. Decision to open May permanently
2007	New Management Plan for the fishery published (Sloan and Crosthwaite 2007a)
2008	TACC reduced from 1900 t to 1770 t.
2009	TACC reduced from 1770 t to 1400 t.

Table 3 Major management milestones for the South Australian Northern Zone Rock Lobster Fishery. TACC = total allowable commercial catch, LML = legal minimum length, CL = carapace length, VMS = vessel monitoring system.

Date	Management milestone
1968	Limited entry declared
1985	10% pot reduction; max number of pots 65
1992	10% pot reduction; max number of pots 60
1993	1 week closure during season
1994	LML increased from 98.5 to 102 mm CL; further "1 week" closure
1995	Further "1 week" closure added
1997	Flexible closures introduced. Management Plan for the fishery published (Zacharin 1997b)
1999	Extra 3 days of fixed closure added Ballot to determine if size should increase to 105 mm CL– affirmed for 2000 season
2000	LML increased from 102 to 105 mm CL
2001	7% effort reduction
2002	8% effort reduction
2003	TACC implemented for the 2003/04 season at 625 t; VMS introduced.
2004	TACC reduced to 520 t; vessel length and power restrictions removed.
2007	New Management Plan for the fishery published (Sloan and Crosthwaite 2007b)
2008	TACC reduced from 520 t to 470 t.
2009	TACC reduced from 470 t to 310 t.

2.2.2. Legislation

The *Fisheries Management Act 2007* provides the broad statutory framework to provide for the conservation and management of South Australia's aquatic resources. In the administration of the Act, the Minister for Fisheries must pursue the following objectives, outlined in Section 7 of the Act:

- (1) An object of this Act is to protect, manage, use and develop the aquatic resources of the State in a manner that is consistent with ecologically sustainable development and, to that end, the following principles apply:
 - (a) proper conservation and management measures are to be implemented to protect the aquatic resources of the State from over-exploitation and ensure that those resources are not endangered;
 - (b) access to the aquatic resources of the State is to be allocated between users of the resources in a manner that achieves optimum utilisation and equitable distribution of those resources to the benefit of the community;

- (c) aquatic habitats are to be protected and conserved, and aquatic ecosystems and genetic diversity are to be maintained and enhanced;
 - (d) recreational fishing and commercial fishing activities are to be fostered for the benefit of the whole community;
 - (e) the participation of users of the aquatic resources of the State, and of the community more generally, in the management of fisheries is to be encouraged.
- (2) The principle set out in subsection(1)(a) has priority over the other principles.
- (3) A further object of this Act is that the aquatic resources of the State are to be managed in an efficient and cost effective manner and targets set for the recovery of management costs.
- (4) The Minister, the Director, the Council, the ERD Court and other persons or bodies involved in the administration of this Act, and any other person or body required to consider the operation or application of this Act (whether acting under this Act or another Act), must—
- (a) act consistently with, and seek to further the objects of, this Act; and
 - (b) insofar as this Act applies to the Adelaide Dolphin Sanctuary, seek to further the objects and objectives of the *Adelaide Dolphin Sanctuary Act 2005*; and
 - (c) insofar as this Act applies to the River Murray, seek to further the objects of the *River Murray Act 2003* and the *Objectives for a Healthy River Murray* under that Act; and
 - (d) insofar as this Act applies to areas within a marine park, seek to further the objects of the *Marine Parks Act 2007*.
- (5) For the purposes of subsection (1), *ecologically sustainable development* comprises the use, conservation, development and enhancement of the aquatic resources of the State in a way, and at a rate, that will enable people and communities to provide for their economic, social and physical well-being while—
- (a) sustaining the potential of aquatic resources of the State to meet the reasonably foreseeable needs of future generations; and
 - (b) safeguarding the life-supporting capacity of the aquatic resources of the State; and
 - (c) avoiding, remedying or mitigating adverse effects of activities on the aquatic resources of the State,
- (taking into account the principle that if there are threats of serious or irreversible damage to the aquatic resources of the State, lack of full scientific certainty should not be used as a reason for postponing measures to prevent such damage).

The regulations that govern management of the South Australia Rock Lobster Fishery are contained within the *Fisheries Management (Rock Lobster Fisheries) Regulations 2006*, *Fisheries Management (Marine Scalefish Fisheries) Regulations 2006* and the *Fisheries Management (General) Regulations 2007*.

2.2.3. Current Management Arrangements

The previous management plans for the NZRLF and SZRLF were developed in accordance with the *Fisheries Management Act 1982*. Both plans contained a series of performance indicators and a reference range to guide future management decision-making. For the 2007 plans, the fisheries were assessed against the principles of ESD. In 2011 and 2012 new management plans will be developed under the *Fisheries Management Act 2007* through a consultative process, including a period of public consultation. This will provide the opportunity for interested and affected parties to contribute to future management of the rock lobster resource.

The new management plans will operate for a five-year period and will be used to guide decision-making in relation to management and research for the NZRLF and SZRLF. Regular stock assessment reports will provide the basis for assessment of fishery performance in various areas of the two management zones and address the key performance indicators and reference points outlined in the plans. The present ESD risk assessment report is the first step in developing the new management plan.

Commercial Fishery

A summary of the current management arrangements in the two zones is shown in Table 4. Along with limited entry, the main tool used to manage the rock lobster resource is a quota management system. This system requires a total allowable commercial catch (TACC) limit to be set every year in each management zone for the target species (see Table 4 for current TACCs). The catch each licence holder can take is directly related to the number of quota units endorsed on their licence. These are issued annually as separate entitlements, after the TACC has been set, and are fully transferable within zones. In the SZRLF, the minimum number of pots that may be registered on a licence is 40 pots, while for the NZRLF it is 20 pots. The maximum number of pots that may be registered on an individual licence is 100 pots for both zones. A minimum holding of 320 quota units applies to all licences in the NZRLF. 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. Temporary transfers are also permitted.

A full description of how the quota allocation is calculated each year and subsequently allocated among licences can be found in the 2007 Management Plans (Sloan and Crosthwaite 2007a,b).

Size limits have been applied to rock lobster 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. Rock lobster are also totally protected in the dedicated rock lobster sanctuaries

across the State (Cape Jaffa, Margaret Brock Reef, Rivoli Bay and Gleesons Landing) as well as in all aquatic reserves. Escape gaps are compulsory in the NZRLF, but optional in the SZRLF.

Table 4 Summary of current management measures for the Northern and Southern Zones of the commercial South Australian Rock Lobster Fishery

Management Tool	Northern Zone	Southern Zone
Limited Entry	68 licences	181 licences
TACC	310 tonnes	1400 tonnes
Total pot numbers	3950	11923
Closed season	1 June to 31 October	1 June to 30 September
Minimum size limit (carapace length)	105 mm	98.5 mm
Maximum quota unit holding	Unlimited	Limited by pot holding (100 pots)
Maximum no. of pots/licence	100 pots	100 pots
Minimum no. of pots/licence	20 pots	40 pots
Spawning females	No Retention	No Retention
Maximum vessel length	None	None
Maximum vessel power	None	None
Closed areas	Gleesons Landing Aquatic Reserve	Aquatic Reserves: Margaret Brock Reef, Cape Jaffa, and Rivoli Bay
Catch and effort data	Daily logbook, submitted monthly	Daily logbook, submitted monthly
Catch and disposal records	Daily records submitted on landing	Daily records submitted on landing (Electronic scales)
Landing locations	Anywhere in the zone	7 designated landing points
Landing times	Any time during the season	Core hours only
Prior landing reports to PIRSA	1 hour before landing or 1 hour before unloading into corf	1 hour before landing, permitted outside core hours
Escape gaps	Compulsory, 2 gaps per pot: 57 mm high x 280 mm wide; 180° apart no obstructions	Optional. Minimum 50 mm mesh covering pot, or 2 gaps per pot; 55 mm high x 150 mm wide
Vessel Monitoring System (VMS)	Yes	No
Sealed bins	All bins must be sealed with a lid and an approved tag prior to lobster being unloaded from the vessel. Tags are sequentially numbered	No

Recreational Fishery

The recreational sector is managed through a combination of input and output controls, aimed at ensuring the total catch is maintained within sustainable limits and to ensure that recreational access to the fishery is equitably distributed between recreational participants. Similar to the commercial sector, these controls include limitations on the type and amount of fishing gear that may be used, spatial and temporal closures, a legal size limit (which is consistent with the commercial sector), and bag and boat limits.

2.2.4. Traditional Involvement in the Fishery

Many Aboriginal communities have a long history of fishing in what are now known as South Australian waters. Each community's fishing activities and cultural practices are distinct. Information about these activities and practices will be described in each Aboriginal Traditional Fishing Management Plan. These plans are currently being developed through the South Australian Government process of negotiating Indigenous Land Use Agreements (ILUAs) with the native title claimants, and will be available as the plans are finalised. This process will help in quantifying the level of Aboriginal fishing across all fisheries in South Australia.

2.2.5 Catch and Effort Reporting

The Aquatic Sciences division of the South Australian Research and Development Institute (SARDI Aquatic Sciences) is contracted by PIRSA Fisheries to administer a daily logbook program and collate catch and effort information. Licence holders complete a compulsory daily logbook which is submitted monthly and entered into the South Australian Rock Lobster (SARL) database. Details currently recorded in the daily logbook include:

- the MFA within which the fishing took place
- depth in which the pots were set
- number of pots set
- weight of retained legal-sized lobsters - reported at the end of each trip or as a daily estimated weight
- landed number of legal-sized lobsters
- number of undersized lobsters caught
- number of dead lobsters caught
- number of spawning lobsters caught
- weight of octopus caught
- number of octopus caught
- number of giant crab pots
- depth of giant crab pots
- landed weight of giant crabs
- landed number of giant crabs
- marine scalefish retained

Validation of catch and effort logbook data in the Rock Lobster Fisheries can be achieved by comparing them with the catch and disposal records (CDRs) used in the quota management system. Processor records are not used for

validation as lobsters may be transported to processors outside of the zone in which the lobsters were landed.

PIRSA Fisheries and Aquaculture has also implemented a generic data recording logbook for wildlife interactions (including TEPS) in 2007 for all South Australian commercial fisheries. The TEPS logbook was implemented to ensure consistent reporting practices for interactions with TEPS and to fulfil the requirements under the *Environment Protection and Biodiversity Conservation Act 1999*, as well as addressing the recommendations made by the Australian Government's Department of the Environment, Water, Heritage and the Arts (DEWHA) for South Australian commercial fisheries export approval. SARDI Aquatic Sciences is currently collecting and archiving the data from the TEPS logbooks and an annual report will be prepared to summarize them.

2.3. Biology of Species

2.3.1. Biology of Target Species

The southern rock lobster is 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, passing through a brief (10-14 days) nauplius phase, then into a planktonic leaf-like phyllosoma phase, 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, 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. 1999) 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.

2.3.2. Current Biological Status

There is strong evidence to suggest that the resource on which the SZRLF is based has declined in recent seasons (Linnane et al. 2010a). While catches have remained relatively stable from 2002 to 2007 (and have declined from 2007 to 2009), there has been a marked trend in increasing effort (Figure 4). Consequently, there has been a general decrease in catch per unit effort (CPUE) from 2002 onwards (Figure 5), which includes decreasing trends in zonal and regional catch rates.

Further evidence that the status of the SZRLF has declined comes from pre-recruit indices (PRI), which have decreased in recent years in both fishery dependent and independent surveys (Figure 6), and have been confirmed by independent model outputs (Linnane et al. 2010a). However, there was a marked increase in the 2009 catch sampling PRI (Figure 6) which is a result of strong settlement in 2005 and 2006.

One factor that may have influenced the recent low levels of recruitment in the SZRLF is an extreme upwelling event (2°C lower than usual) in 2007/08, which has occurred again in 2009/10 (Linnane et al. 2010a).

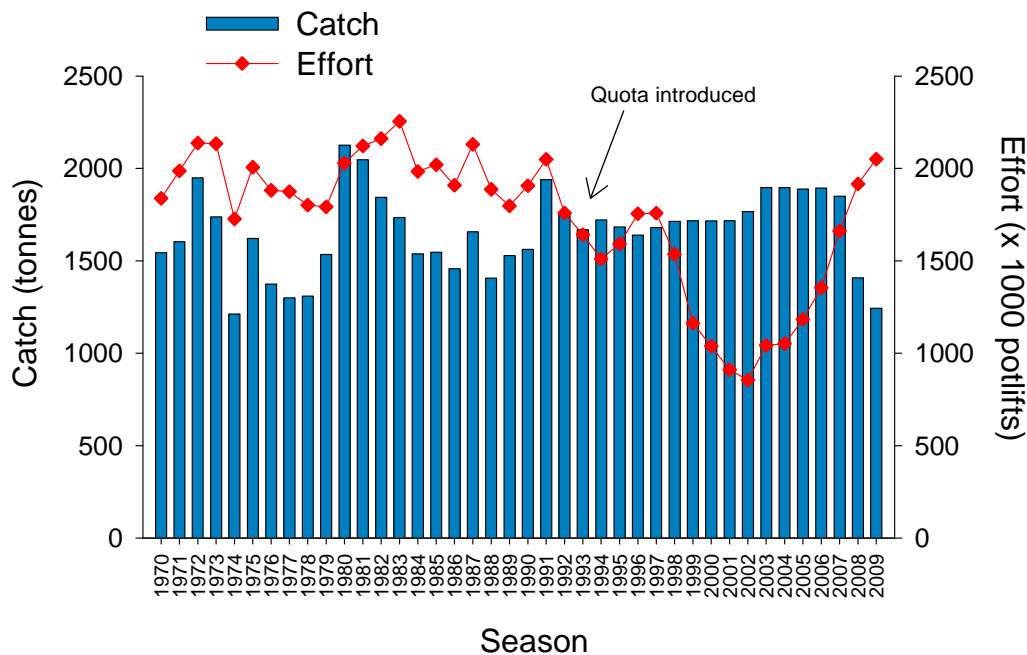


Figure 4 Inter-annual trends in catch and effort in the South Australian Southern Zone Rock Lobster Fishery from 1970 to 2009 (Quota = 1,400 tonnes during the 2009 season) (Figure taken from Linnane et al. 2010a)

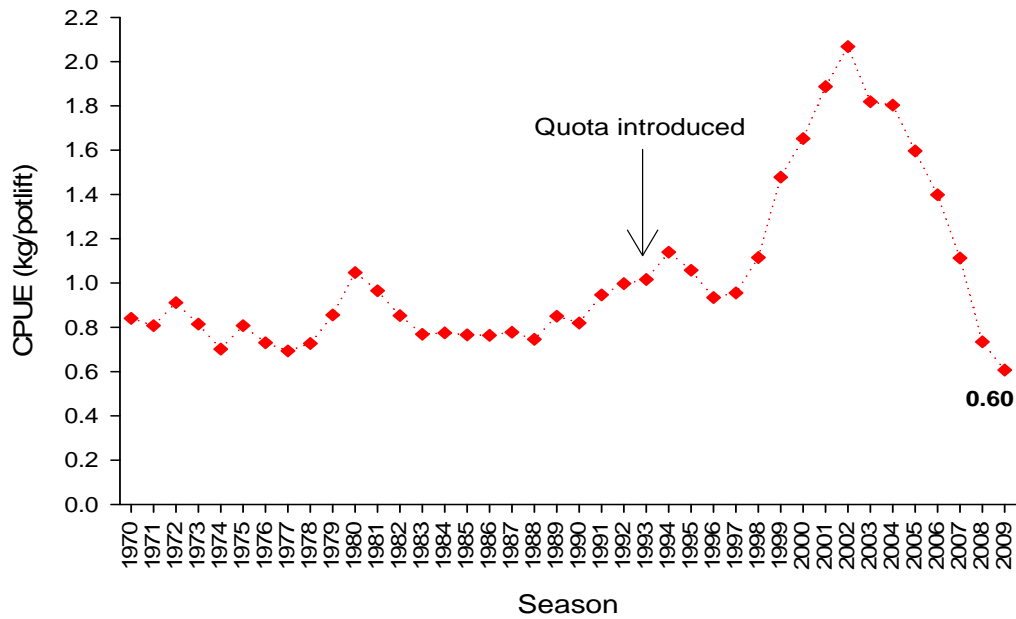


Figure 5 Inter-annual trends in catch-per-unit-effort (CPUE) in the South Australian Southern Zone Rock Lobster Fishery between 1970 and 2009 inclusive (Figure taken from Linnane et al. 2010a)

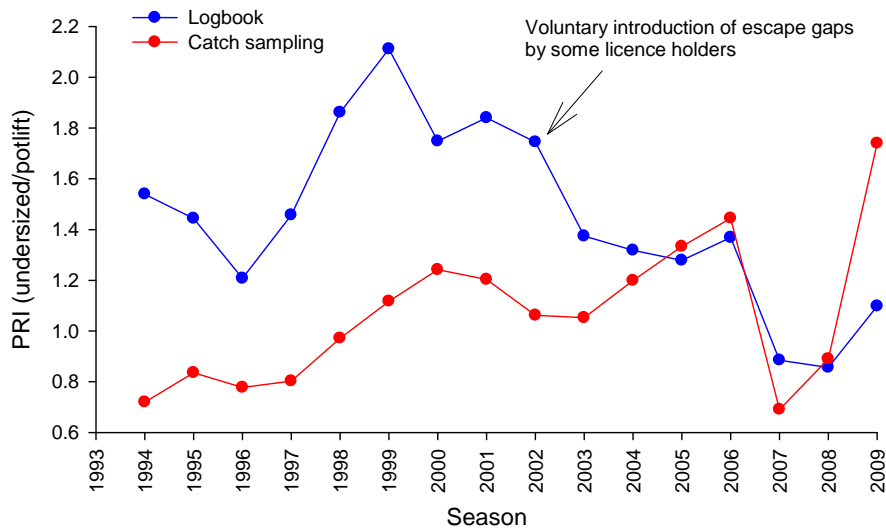


Figure 6 Inter-annual trends in pre-recruit index in the Southern Zone Rock Lobster Fishery from 1994 to 2009 as calculated from both logbook and voluntary catch sampling data (Nov-Mar inclusive) (Figure taken from Linnane et al. 2010a).

There is strong evidence to suggest that the resource on which the NZRLF is based is currently overfished (Linnane et al. 2010b). Following the introduction of quota in 2003 (and despite the TACC being incrementally reduced from 625 tonnes in 2003 to 470 tonnes by 2008), the TACC was not reached for six successive years (Figure 7).

In 2009, the TACC was set at 310 tonnes and for the first time was fully taken (Linnane et al. 2010b). While catch has been decreasing in recent years, effort has not decreased at the same rate over this period (Figure 7); and this is reflected in a generally declining trend of CPUE (Figure 8).

Nonetheless, there are some signs of improvement in 2009/10 (including an increase in PRI, Figure 9), indicating that the fishery has entered a rebuilding phase (Linnane et al. 2010b) (see later for further discussion).

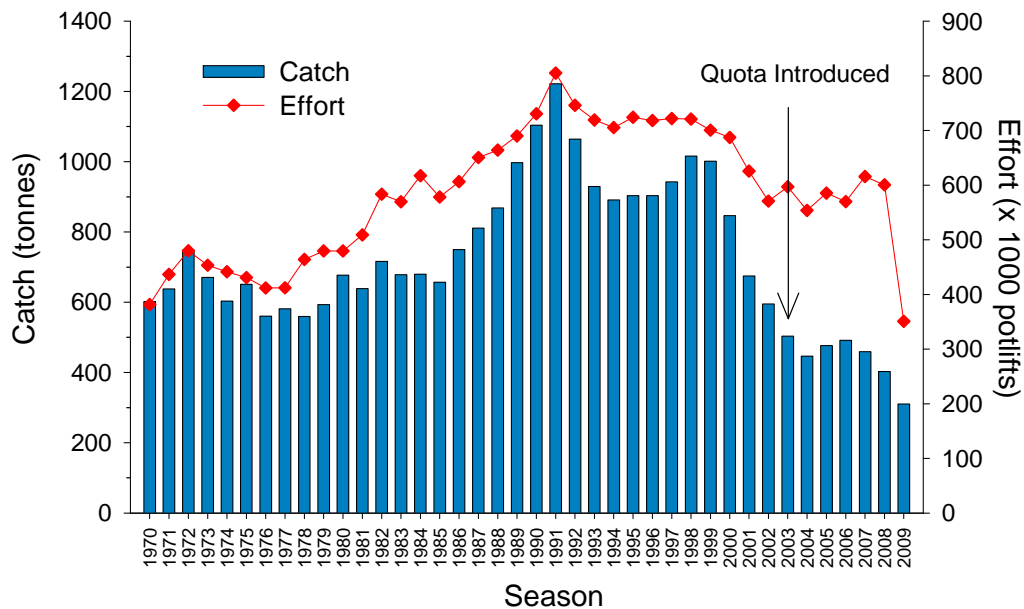


Figure 7 Inter-annual trends in catch and effort in the South Australian Northern Zone Rock Lobster Fishery from 1970 to 2009. (Quota = 310 tonnes during the 2009 season) (Figure taken from Linnane et al. 2010b)

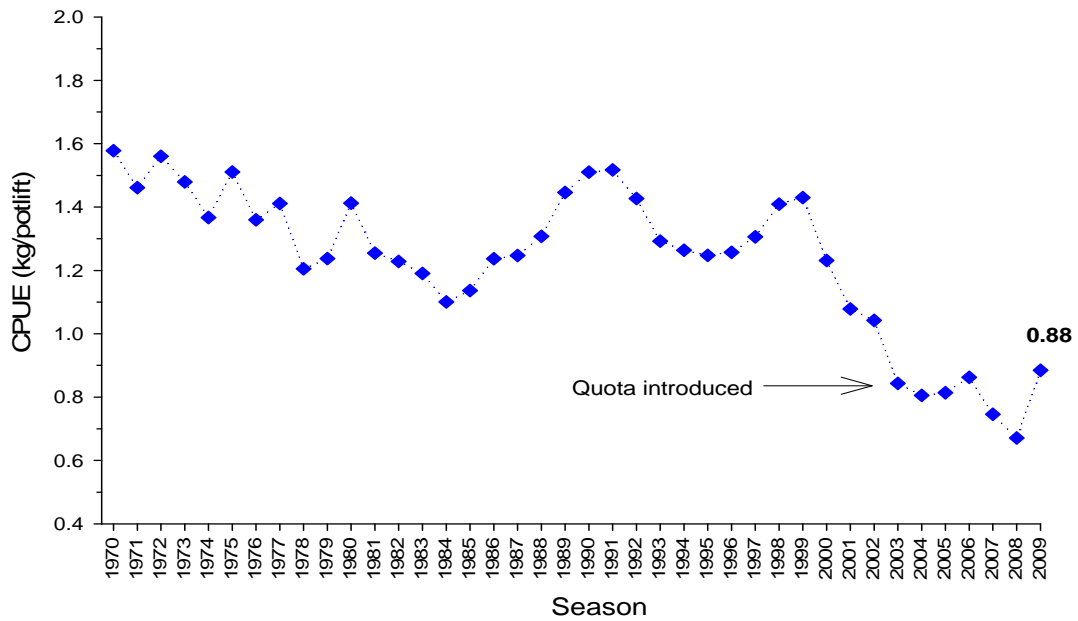


Figure 8 Inter-annual trends in CPUE in the South Australian Northern Zone Rock Lobster Fishery from 1970 to 2009 (Figure taken from Linnane et al. 2010b)

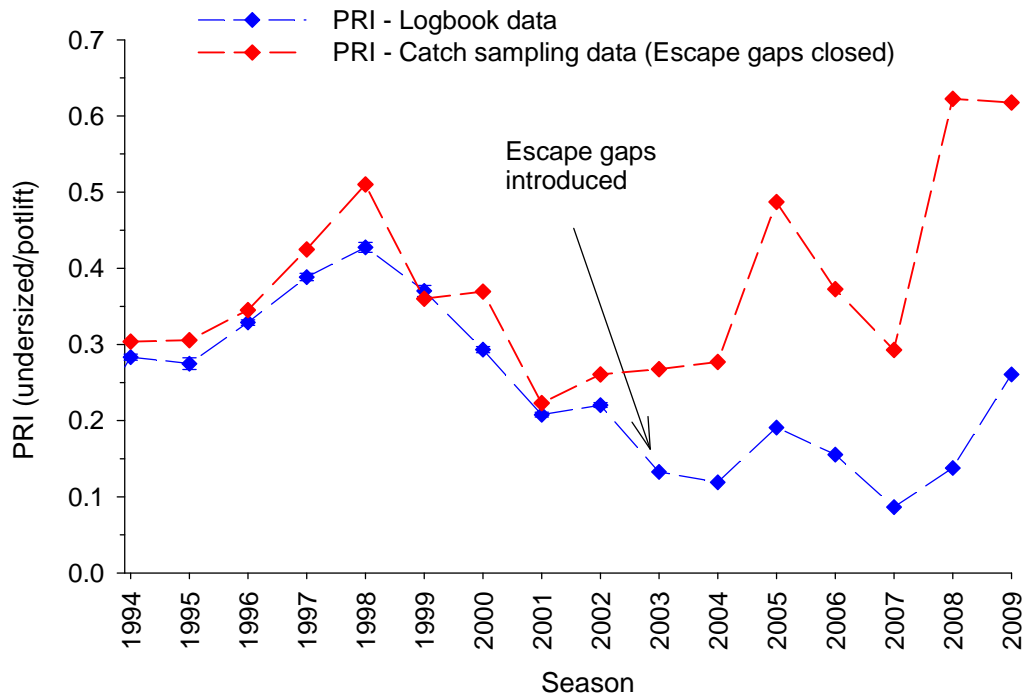


Figure 9 Inter-annual trends in pre-recruit index (PRI) in the Northern Zone Rock Lobster Fishery from 1994 to 2009 based on logbook and voluntary catch sampling data (Figure taken from Linnane et al. 2010b)

2.4. Major Environments

2.4.1. Physical Environment

Southern Zone

The sea floor in the Southern Zone consists mainly of reefs made of bryozoan or aeolianite limestone. The limestone matrix has eroded to form ledges, crevices, undercuts and holes which provide ideal habitat for lobsters. These reefs are almost continuous, being separated only by small stretches of sand substrate (Lewis 1981). The salinity and temperature of the surface water over the continental shelf in the Southern Zone cycles seasonally, with minimum salinity and maximum temperature (35.2 ppt, 18°C) during summer and maximum salinity and minimum temperature (35.6 ppt, 14°C) during winter (Lewis 1981).

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

Northern Zone

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.

During winter, water over the continental shelf is vertically homogeneous, well mixed and characterised by low nutrient levels (NO₃ <0.25 µg/l), high salinities (> 36 ppt), and medium temperatures of ~17°C. In summer the mean 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 (Middleton and Platov 2003). The water layer above the thermocline is characterised by medium salinity (35.6 ppt), low nutrient levels (NO₃ <0.1 µg/l), and high temperatures (18 to 19°C). Water below the thermocline has lower salinity (< 35.5 ppt), higher nutrient levels (NO₃ >0.2 µg/l), and lower temperatures (~14°C).

Environmental Issues

The overall environmental impacts associated with rock lobster fishing are considered to be low. The South Australian RLF was reassessed by the Australian Government Department of Environment and Heritage in 2008 against the 'Guidelines for ecological sustainable management of fisheries', which are set out in the Australian Government *Environment Protection and Biodiversity Conservation Act 1999*.

2.4.2. Socio-Economic Environment

The fisheries have a significant impact on regional South Australia. They operate out of a large number of ports along the coastline. The 249 vessels usually have a crew of 2 to 3 (a skipper and one or two deckhands) and thus there are between 500 and 750 people directly employed by the fishery (see Econsearch 2009a,b). In addition there are many people employed by the lobster processing sector and associated support and service industries.

The total catch of rock lobster in the southern zone has tended to be steady over the past 20 years, although there has been a slight decrease in TACC and actual catch in the last two years. The total catch in the northern zone has decreased over the last 20 years, with continued reductions in TACC since the quota system was introduced in 2003. The increase in the live trade of lobsters overseas has a significant impact on the profitability of the fishery.

The rate of price increase for rock lobster has been well above CPI for the past 20 years apart from a period of price fall in 2001 to 2004.

2.5. Research Strategy

2.5.1. Recent / Current Research

SARDI Aquatic Sciences undertakes regular stock assessments on rock lobster across both Zones. These assessments provide an evaluation against the established key performance indicators and reference points outlined in the management plans and identify regions exhibiting undesirable levels of fishing pressure.

Commercial catch and effort data are used to provide the spatial and temporal analyses of catch, effort, and CPUE. SARDI Aquatic Sciences also undertakes a fishery-independent monitoring program in the SZRLF each year to estimate abundance and population size structure.

Given the observed regional trends in fishery performance there is a strong need for assessment at a finer spatial scale. Current research is aiming to investigate the implementation of user-friendly onboard technology that provides real time spatial information on fishing effort. This objective is currently being addressed through an FRDC funded project titled "*Standardizing data collection across the southern rock lobster fisheries of South Australia, Victoria and Tasmania*" (Project No. 2008/003).

2.5.2. Proposed Future Research

Given the inherent problems associated with fishery-dependent data, a fishery independent monitoring survey of the NZRLF would greatly improve future assessments of the resource.

Further research into the oceanographic and environmental influences that underpin both settlement and catch rate within the resource is also required. Specifically, research into the environmental effects on the relationship between puerulus settlement, pre-recruit indices and legal sized catch rate should be prioritised. This will be addressed through an FRDC research proposal titled: *“Sustainability of rock lobster resource in south-eastern Australia in a changing environment: implications for assessment and management”*

3. METHODOLOGY

The current series of PIRSA's ESD performance reports have been prepared to ensure that South Australian fisheries management is both effective and efficient in the context of achieving ESD outcomes. In addition to meeting the statutory requirements of the *Fisheries Management Act 2007*, and national environmental legislation, this approach will also provide the fishing industry, key stakeholders, and the broader community with an ongoing opportunity to contribute to, and influence, fisheries management outcomes.

The reports will also provide the basis for the development of statutory management plans required under the *Fisheries Management Act 2007*. On behalf of the Fisheries Council, PIRSA Fisheries and Aquaculture has used the comprehensive issue identification and subsequent risk assessment and priority setting process to collaboratively develop more effective management arrangements under the new Act. Where necessary this may include development of fishery-specific harvest strategies, and related research and monitoring programs for each of the fisheries assessed.

The issue identification, risk assessment, and reporting process described in detail below, as well as the final report format, is closely based on the National ESD Framework *How To Guide* (see www.fisheries-esd.com), as well as the Department of Fisheries Western Australia ESD performance reports pioneered by Dr Rick Fletcher and other WA Fisheries staff.

3.1. Scope

The present ESD report describes “the contribution of the South Australian commercial RLF to ESD” in the context of South Australian Fisheries legislation and policy. The report is based on preliminary scoping and issue identification work by PIRSA Fisheries and Aquaculture staff in conjunction with RLF industry representatives. This initial scoping was then refined and validated through a broader stakeholder workshop on 30 March 2010. The scope of the assessment was contained to issues relevant to the commercial RLF (pot sector). Marine Scale fishing by RLF licence holders will be assessed as part of the Marine Scalefish Fishery ESD assessment. The recreational catch of rock lobster will be assessed separately through an ESD assessment of South Australian recreational fishing.

The assessment process examined an extensive range of issues, risks and opportunities identified by stakeholders during various rock lobster workshops. The identification of issues was informed by the generic ESD component tree approach with each fishery component tree refined specifically for this fishery. Each major component tree reflects the primary components of ESD, and the ESD report assesses the performance of the fishery for each of the relevant ecological, economic, social and governance issues facing the management zones of the fishery (Table 5 below). The process also identifies where additional (or reduced) management or research attention is needed, and identifies strategies and performance criteria to achieve management objectives to the required standard.

Table 5 Primary Ecologically Sustainable Development (ESD) Components

Retained Species	<i>Ecological Wellbeing</i>
Non-Retained Species	
General Ecosystem	
Community Wellbeing	<i>Human Wellbeing</i>
Aboriginal Community	
Governance	<i>Ability to Achieve</i>
External Factors Affecting	
Fishery Performance	

3.2. Overview

The steps followed to complete this RLF report are detailed below:

1. A set of “Generic ESD Component Trees” were modified through a process with stakeholders into a set of trees specific to the fishery. This process identified the issues relevant to ESD performance of the fishery under the categories described in Table 5 above. Where necessary, the NZRLF and SZRLF were assessed separately.
2. A risk assessment of the identified issues (or components) was completed based on the *likelihood* and *consequence* of identified events that may undermine or alternatively contribute to ESD objectives. This process involved managers, scientists, industry and key stakeholders.
3. Risks were then prioritised according to their severity. For higher level risks - where an increase in management or research attention was considered necessary - a detailed analysis of the issue, associated risks, and preferred risk management strategies was completed. For low risk issues, the reasons for assigning low risk and/or priority were recorded.
4. For higher level risks a full ESD performance report was prepared (Section 4 of this report). This was completed in the context of specific management objectives and includes operational objectives, indicators and performance measures.
5. A background report providing context and necessary supporting information about the fishery was also prepared to guide the identification of issues, risks and management strategies. This report includes the history of the fishery and its management, the areas of operation and their biological and physical characteristics, target species and by-product and bycatch species, and other relevant information.

The process is illustrated in Figure 10.

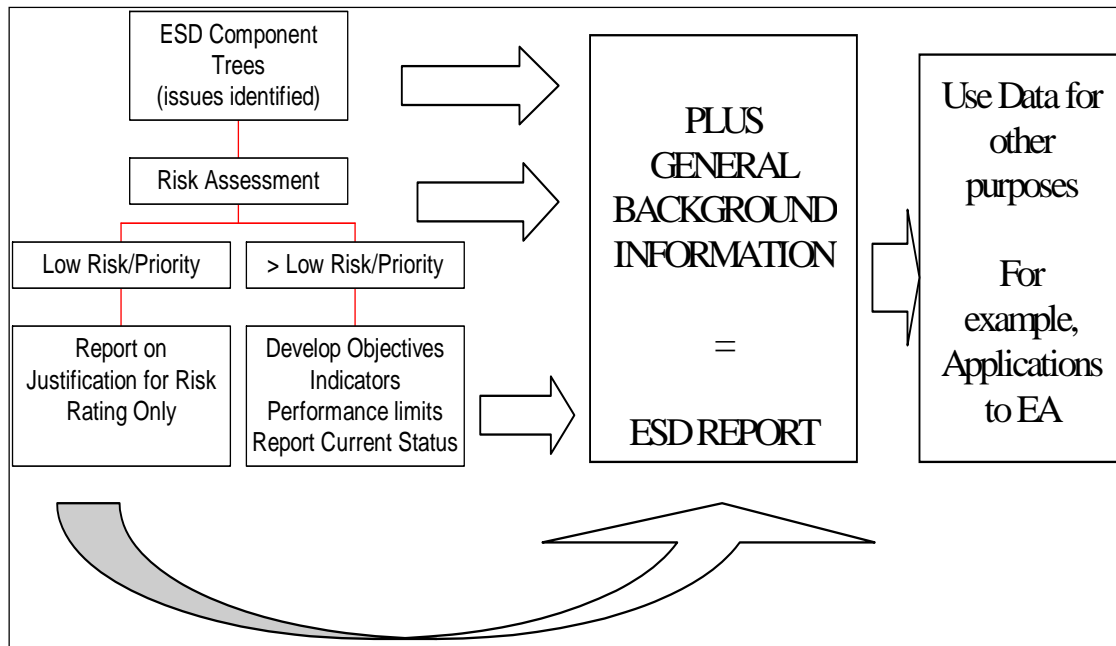


Figure 10 Summary of the ESD reporting framework processes
(Source: ESD Reporting *How To Guide*; Fletcher et al. 2002).

3.3. Issue Identification (component trees)

The RLF ESD reporting component trees are a refined version of the generic trees suggested in the National ESD Reporting Framework. The generic trees and the issues that they encompass were the result of extensive consideration and refinement during the initial development of the National Fisheries ESD approach. The trees were designed to be very comprehensive to ensure that all of the conceivable issues facing a fishery would be considered during the workshop process. The fishery-specific component trees developed after expert and stakeholder consideration provide a more realistic and practical illustration of the issues facing a particular fishery.

The generic component trees have been used as the starting point to ensure thorough, consistent, and rigorous identification and evaluation of ESD issues across all of the South Australian Fisheries being assessed. When developing each of the major fishery-specific component trees, each primary component is broken down into more specific sub-components for which operational objectives can then be developed.

For example, the component tree identifying *General ecosystem effects of the fishery* that was refined during the stakeholder workshop for the South Australian RLF is reproduced in Figure 11.

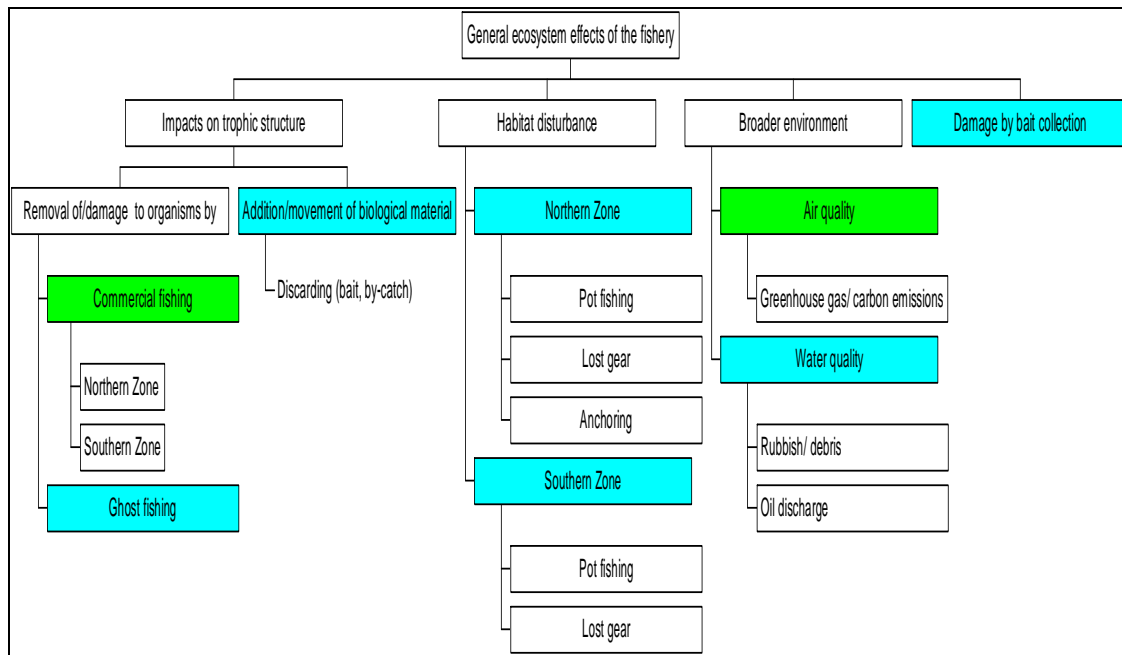


Figure 11 South Australian Rock Lobster Fishery Component Tree Structure for the General Ecosystem Effects of the Fishery

3.4. Risk Assessment and Prioritisation of Issues

Once the fishery-specific component trees were developed and reviewed by stakeholders, the focus moved to the assessment and prioritisation of risks and opportunities facing the fishery. These have been considered in the context of the specific management objectives for each fishery being assessed. The higher level management objectives and desired ESD outcomes are those described in the *Fisheries Management Act 2007*. Risks and opportunities are also evaluated against more detailed fishery-specific objectives - such as those articulated in the management plans.

The risk assessment of issues identified for the South Australian Rock Lobster Fishery has been done on the basis of existing management which is currently managing risks to the fishery. Hence the risk assessment conducted during stakeholder workshops considered the residual risk after the existing risk treatments were taken into account. For example, PIRSA Fisheries and Aquaculture’s current compliance program for the two zones of the RLF is itself based on a separate compliance risk assessment process. This process identifies compliance risks in the context of the fishery’s management objectives, and then develops and applies strategies to mitigate those risks. The ESD assessment and reporting process works across the full suite of fishery ESD objectives in a similar way.

Risk assessment applied under the national ESD framework has been designed to be consistent with the Australian and New Zealand Standard AS/NZS 4360:1999 for Risk Management. Subject matter experts and key fishery stakeholders consider the range of potential consequences of an issue, activity, or event (identified during the component tree development process) and how likely those consequences are to occur.

The estimated consequence of an event is multiplied by the likelihood of that event occurring to produce an estimated level of risk.

What is Risk Analysis?

“Risk analysis involves consideration of the sources of risk, their consequences and the likelihood that those consequences may occur.”

Australian and New Zealand Standard (AS/NZS) 4360 – 1999

(NB. AS/NZS 4360-1999 has since been superseded by AS/NZS 4360:2004, which was then superseded by AS/NZS ISO 31000:2009)

ESD workshop participants worked methodically through each component tree from the top down and conducted a qualitative risk assessment of each issue. In some cases an estimate of the consequence level for each issue was made and scored from 0–5, with 0 being negligible and 5 being catastrophic/irreversible (see Appendix 1 for details of the risk consequence tables). The consequence estimate was based upon the combined judgement of workshop participants who had considerable expertise in the issues being assessed.

The level of consequence was estimated at the appropriate scale and context for the issue in question. For the target species (Rock Lobster) the consequence assessment was based at the population not the individual level. Killing one lobster is catastrophic for the individual but not for the population. Similarly, when assessing possible ecosystem impacts this was done at the level of the whole ecosystem or at least in terms of the entire extent of the habitat, not at the level of an individual patch or individuals of non-target species².

The likelihood of that consequence occurring was assigned to one of six levels from remote (1) to likely (6). This was based on a judgement about the probability of the events - or chain of events - occurring that could result in a particular adverse consequence. This judgement about conditional probability was again based on the collective experience and knowledge of workshop participants. See Appendix 1 for details of the likelihood table.

From the consequence and likelihood scores, the overall risk value (Risk = Consequence x Likelihood), was calculated. On the basis of this risk value each issue was assigned a Risk Ranking within one of five categories (see Table 6). In many cases this risk value was assigned using the collective knowledge and experience of the workshop participants without using consequence and likelihood scores.

² These descriptions, and detailed guidance about developing consequence and likelihood scores for fishery issues are provided in the ESD How To Guide at www.fisheries-esd.com.

Table 6 Risk ranking definitions

RISK	Likely Management Response	Reporting
Negligible	Nil	Short Justification Only
Low	None Specific	Full Justification needed
Moderate	Specific Management Needed	Full Performance Report
High	Possible increases to management activities needed	Full Performance Report
Extreme	Likely additional management activities needed	Full Performance Report

Where a more detailed and/or quantitative risk assessment and management process was in place for the fishery - such as a robust quantitative stock assessment for a target species - the resultant risk score could be expected to be moderate to low. The risk score in this example reflects the fact that the risk is being managed effectively through existing arrangements. All issues identified in the Governance component tree (Section 4.6) were given a minimum rating of moderate, as a breakdown or change in any of the organisations and processes related to the management of the fishery could have (at a minimum) a moderate consequence, regardless of the likelihood.

The national ESD reporting framework suggests that only those issues scored at moderate, high and extreme risk, which require additional management attention, need to have full ESD performance reports completed. This is the approach that has been used in PIRSA ESD reports. The rationale for scoring other issues as low or negligible risk has also been documented and form part of these reports. This encourages transparency and should help stakeholders to understand the basis for risk scores and the justification for no further management, or for additional management action if necessary. The process is summarised earlier in this section (Figure 10).

3.5. Performance Reports for Higher Risk Issues

As noted above, a comprehensive ESD performance report has only been prepared for higher risk/priority issues that require additional management attention (Section 4 of this RLF report). The content of these reports is based on the standard subject headings recommended in the ESD Framework's *How To Guide*.

The full performance report for the RLF was developed by PIRSA Fisheries and Aquaculture, informed by the initial consultation with industry, and then broader stakeholders at PIRSA Fisheries and Aquaculture's ESD workshop on 30 March 2010. A preliminary draft ESD report was sent to industry members and other stakeholders for review.

3.6. Overview Table

The following table provides a summary of the material presented in the performance reports (see Section 4).

Table 7 Overview of the ESD Risk Assessment for the South Australian Rock Lobster Fishery

NZ = Northern Zone; SZ = Southern Zone; N = Negligible; L = Low; M = Moderate; H = High; N/A = Not applicable; * = Review under new Management Plan, scheduled for 2011; ** = Review at next major ESD assessment, scheduled in 5 years. Coloured cells reflect final risk ratings from the ESD risk assessment workshop (see Section 4).

Issue	Risk / Priority	Objective Developed	Indicator Measured	Performance Measure	Current Performance	Robustness	Actions
Retained Species							
Southern rock lobster – NZ	M	Yes	No	No	N/A	N/A	*
Southern rock lobster – SZ	M	Yes	No	No	N/A	N/A	*
Octopus species – NZ	N	Yes	No	No	N/A	N/A	**
Octopus species – SZ	L	Yes	No	No	N/A	N/A	**
Other by-product species	N	Yes	No	No	N/A	N/A	**
Bait	N	Yes	No	No	N/A	N/A	**
Non-Retained Species							
Capture – TEPS – SZ	N	Yes	Yes	Yes	Acceptable	Medium	**
Capture – TEPS – NZ – Australian sea lion	M	Yes	Yes	Yes	Acceptable	Medium	**
Capture – TEPS – NZ – Western blue groper	N	Yes	Yes	Yes	Acceptable	Medium	**
Capture – Other species	N	No	No	No	N/A	N/A	**
Non-Capture – TEPS	N	Yes	Yes	Yes	Acceptable	Medium	**
General Ecosystem Impacts of Fishing							
Commercial fishing	L	Yes	No	No	N/A	N/A	**
Ghost fishing	N	Yes	No	No	N/A	N/A	**
Addition/movement of biological material	N	Yes	No	No	N/A	N/A	**
Habitat disturbance	N	Yes	No	No	N/A	N/A	**
Air quality	L	Yes	No	No	N/A	N/A	**
Water quality	N	Yes	No	No	N/A	N/A	**
Bait collection	N	Yes	No	No	N/A	N/A	**

Issue	Risk / Priority	Objective Developed	Indicator Measured	Performance Measure	Current Performance	Robustness	Actions
Community							
Profit – NZ	H	Yes	Yes	No	N/A	N/A	**
Profit – SZ	M	Yes	Yes	No	N/A	N/A	**
Employment – NZ	H	Yes	Yes	No	N/A	N/A	**
Employment – SZ	M	Yes	Yes	No	N/A	N/A	**
OHS&W – NZ	M	Yes	Yes	Yes	Acceptable	Medium	**
OHS&W – SZ	M	Yes	Yes	Yes	Acceptable	Medium	**
Relationship with community – NZ	N	Yes	Yes	Yes	Acceptable	Low	**
Relationship with community – SZ	N	Yes	Yes	Yes	Acceptable	Low	**
Asset value – NZ	H	Yes	Yes	No	N/A	N/A	**
Asset value – SZ	H	Yes	Yes	No	N/A	N/A	**
Lifestyle – NZ	L	No	No	No	N/A	N/A	**
Lifestyle – SZ	L	No	No	No	N/A	N/A	**
Economic value – NZ	M	Yes	No	No	N/A	N/A	**
Economic value – SZ	M	Yes	No	No	N/A	N/A	**
Social capital – NZ	M	Yes	No	No	N/A	N/A	**
Social capital – SZ	M	Yes	No	No	N/A	N/A	**
Infrastructure – NZ	M	Yes	No	No	N/A	N/A	**
Infrastructure – SZ	M	Yes	No	No	N/A	N/A	**
Attitude of recreational fishers – NZ	N	Yes	No	No	N/A	N/A	**
Attitude of recreational fishers – SZ	M	Yes	No	No	N/A	N/A	**
Non-dependent communities	N	No	No	No	N/A	N/A	**
Aboriginal community							
*To be completed							
Governance							
Management plan	H	Yes	No	No	N/A	N/A	**
Allocation	M	Yes	No	No	N/A	N/A	**
Consultation	M	Yes	No	No	N/A	N/A	**
Management effectiveness	H	Yes	Yes	No	N/A	N/A	**
Resources	H	Yes	Yes	No	N/A	N/A	**
Strategic policy	H	Yes	Yes	No	N/A	N/A	**
Research / Information	H	Yes	No	No	N/A	N/A	**

Issue	Risk / Priority	Objective Developed	Indicator Measured	Performance Measure	Current Performance	Robustness	Actions
Compliance	M	Yes	Yes	No	N/A	N/A	**
Legal framework	M	Yes	No	No	N/A	N/A	**
Consultation	M	Yes	No	No	N/A	N/A	**
Reporting	M	Yes	No	No	N/A	N/A	**
Other agencies	H	Yes	No	No	N/A	N/A	**
Codes of conduct	M	Yes	No	No	N/A	N/A	**
Communication / Participation	M	Yes	No	No	N/A	N/A	**
Industry association	M	Yes	No	No	N/A	N/A	**
Access security	M	Yes	No	No	N/A	N/A	**
Compensation	E	Yes	No	No	N/A	N/A	**
Principles	H	Yes	No	No	N/A	N/A	**
Others (NGOs etc.)	H	Yes	No	No	N/A	N/A	**
External factors affecting performance of the fishery							
Oceanographic	M	Yes	No	No	N/A	N/A	**
Climate change	H	Yes	No	No	N/A	N/A	**
Temperature	M	Yes	No	No	N/A	N/A	**
Weather	M	Yes	No	No	N/A	N/A	**
Upwellings	E	Yes	No	No	N/A	N/A	**
Diseases	L	Yes	No	No	N/A	N/A	**
Water quality	N	Yes	No	No	N/A	N/A	**
Mining / exploration activities	M	Yes	No	No	N/A	N/A	**
Illegal marine dumping	N	Yes	No	No	N/A	N/A	**
Coastal development	N	Yes	No	No	N/A	N/A	**
Dredging	N	Yes	No	No	N/A	N/A	**
Commercial shipping	N	Yes	No	No	N/A	N/A	**
Exotic species	L	Yes	No	No	N/A	N/A	**
Gear interference	L	Yes	No	No	N/A	N/A	**
Economic	M	Yes	No	No	N/A	N/A	**
Marine parks	E	Yes	No	No	N/A	N/A	**
Shipping	N	Yes	No	No	N/A	N/A	**

4. PERFORMANCE REPORTS

Red, pink and yellow boxes indicate that the issue was considered of high enough risk/priority at the 30 March 2010 workshop to warrant having a full report on performance. Green and blue boxes indicate that the issue was rated as a low risk or negligible risk, respectively and no specific management is required – only justification is presented.

4.1. Retained Species

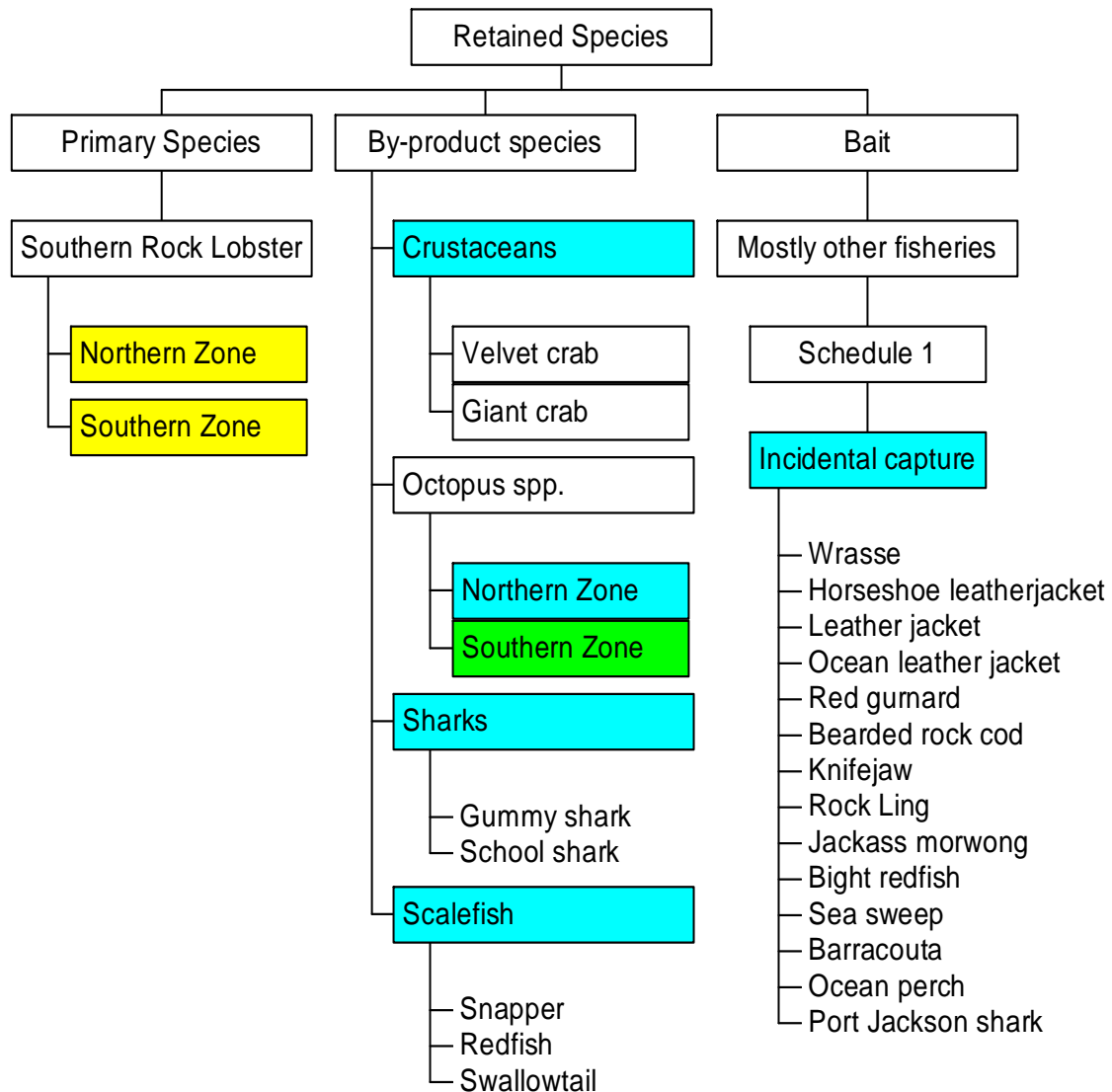


Figure 12 Component Tree for the retained species in the South Australian Rock Lobster Fishery

4.1.1. Primary Species

The southern rock lobster is a highly fecund species found throughout southern Australian and New Zealand. A TACC is the primary tool used in the fishery to control the harvest of southern rock lobster in both the Northern and Southern Zones. There are also restrictions to limit the number of licences and amount of gear that may be used.

A conservative minimum legal size limit, the protection of berried females, and a seasonal closure further protect the breeding population. Several small area closures also exist where the commercial take of rock lobster is prohibited.

Southern Rock Lobster – Northern Zone

Objective

- Ensure the rock lobster resource in the NZRLF is harvested within ecologically sustainable limits.

Meeting this objective should ensure sufficient spawning stock to continue recruitment at levels that will replenish what is taken by fishing, predation and other environmental factors by maintaining the spawning stock of rock lobster at or above a level that minimizes the risk of recruitment over-fishing.

ERA Risk Rating: Impact of the NZRLF on the rock lobster resource (MODERATE)

Previous stock assessments (e.g. Linnane et al. 2009b) indicate that the NZ stock has been over-fished. It was apparent that the quota needed to be reduced to constrain catch and allow biomass to start recovering. Issues of concern included:

- Quota was consistently not being reached.
- CPUE was declining.
- Biomass was declining.
- Numbers of pre-recruits were consistently low.

Management measures have now been implemented to reduce catch and allow the stock to begin recovery. The most recent stock status report by Linnane et al. (2010b) indicates some positive signs for the NZRLF, including:

- The TACC for the 2009 season (which was reduced from 470 tonnes in 2008 to 310 tonnes in 2009) was reached for the first time since quota was introduced in 2003.
- CPUE increased by 31% in the 2009 season from the previous season (Figure 8).
- PRI in 2008 and 2009 are two of the highest on record (Figure 9).

Nonetheless, it is apparent that catches in the NZRLF are strongly influenced by variable settlement and recruitment, and that the positive signs from the 2009 season largely reflect good settlement in 2005 and 2006. Consequently, Linnane et al. (2010b) recommend that conservative TACCs are maintained to ensure that peaks in recruitment entering the fishable biomass in 2009 and 2010 are protected over the following period of predicted low recruitment in 2011 and 2012.

In summary, the stock in the NZRLF is currently considered to be overfished but has entered a rebuilding phase. The NZRLF is clearly operating under an adaptive management framework that is striving to protect and rebuild the stock. Therefore the impact on the population was ranked as moderate. The operation of the fishery since the quota management system was introduced in 2003 is believed to be sustainable, and it was considered that the existing **moderate (C2)** consequence on the stock would be **likely (L6)** to continue. This resulted in an overall risk rating of **MODERATE (12)**.

Indicators and Performance measures

To be determined in new management plan

Southern Rock Lobster – Southern Zone

Objective

- Ensure the rock lobster resource in the SZRLF is harvested within ecologically sustainable limits.

Meeting this objective should ensure sufficient spawning stock to continue recruitment at levels that will replenish what is taken by fishing, predation and other environmental factors by maintaining the spawning stock of rock lobster at or above a level that minimizes the risk of recruitment over-fishing.

ERA Risk Rating: Impact of the SZRLF on the rock lobster resource (MODERATE)

Previous stock assessments (e.g. Linnane et al. 2009a) have indicated that the SZ stock is fully-fished. However, the most recent stock status report by Linnane et al. (2010a) for the 2009/10 season has highlighted some issues of concern, including:

- Quota has not been reached for the past three seasons;
- CPUE has declined for seven consecutive seasons (Figure 5);
- CPUE in 2009 is the lowest on record since 1970; and
- Biomass is predicted to have declined from a peak in 2002 to its lowest recorded level in 2009.

A positive note for the SZRLF is that PRI has increased in the past two seasons (Figure 6), suggesting that a pulse of recruitment will enter the fishery in 2010 (Linnane et al. 2010a). Nonetheless, there are clear signs that

the resource on which the SZRLF is based has declined, and that the pulse of recruits in 2010 require protection with a precautionary TACC (Linnane et al. 2010a).

Despite current concerns, the stock in the SZRLF is considered to be fully fished and operating in a sustainable way. The SZRLF is clearly operating under an adaptive management framework that is striving to protect and rebuild the stock. Therefore the impact on the population was ranked as moderate. The operation of the fishery since the quota management system was introduced in 1996 is considered to have been sustainable. It was considered **likely (L6)** that this existing **moderate (C2)** consequence would continue to occur. This resulted in an overall risk rating of **MODERATE (12)**.

Indicators and Performance measures

To be determined in new management plan

4.1.2. By-product Species

Octopus species – Northern Zone

Objective

- Ensure the octopus resource in the NZRLF is harvested within ecologically sustainable limits.

ERA Risk Rating: Impact on breeding populations of octopus (NEGLIGIBLE)

The main species of octopus taken as by-product in the NZRLF is the Maori octopus (*Octopus maorum*, Brock and Ward 2004). The abundance of octopus in the NZRLF is lower than that in the SZRLF. Current catch rates of octopus (including Maori octopus) are relatively low in both the NZRLF and SZRLF (Linnane et al. 2009a,b) and there is no indication that the catch rates of octopus have declined or that this level of by-catch is unsustainable (Brock and Ward 2004).

Consequently, current fishing activities were considered to be having only a **negligible (C0)** impact on the populations of octopus species in the NZRLF and it was **likely (L6)** that this would continue to occur. The resultant risk rating was therefore **NEGLIGIBLE (0)**. This rating may need to be revisited if new markets are developed or catch rates of octopus increase in the future.

Octopus species –Southern Zone

Objective

- Ensure the octopus resource in the SZRLF is harvested within ecologically sustainable limits

ERA Risk Rating: Impact on breeding populations of octopus (LOW)

The main species of octopus taken as by-product in the SZRLF is the Maori octopus (*Octopus maorum*, Brock and Ward 2004). Although the abundance of octopus in the SZRLF is higher than that in the NZRLF, the current catch rates of octopus (including Maori octopus) are still relatively low in the SZRLF (Figure 13) (Linnane et al. 2009a,b) and there is no indication that the catch rates of octopus have declined or that this level of by-catch is unsustainable (Brock and Ward 2004).

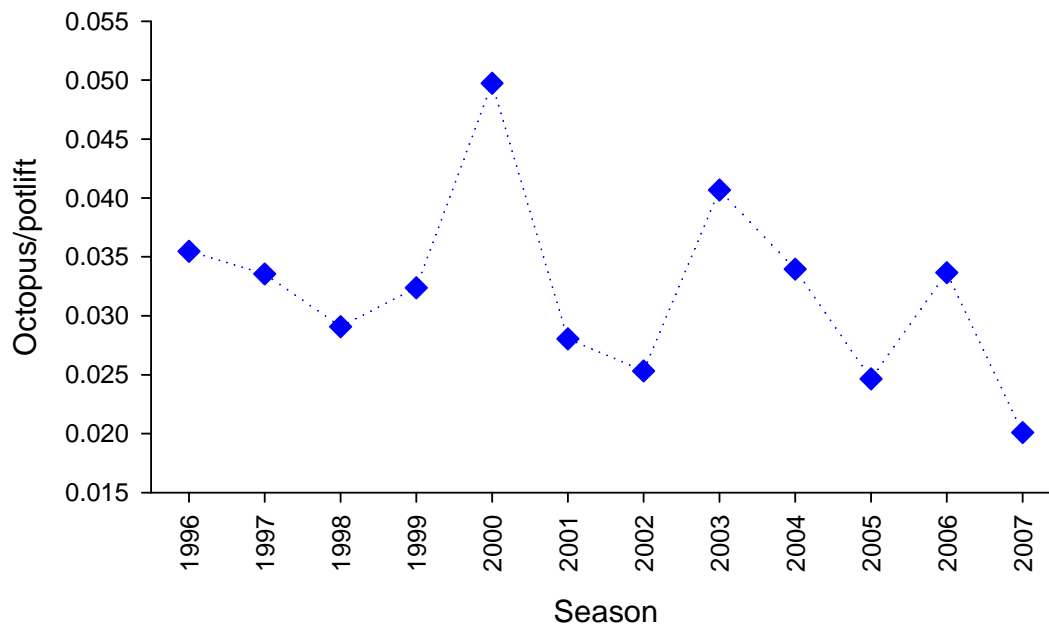


Figure 13 Inter-annual trends in catch rates of octopus in the SZRLF from 1996 to 2007 (Figure taken from Linnane et al. 2009a)

Current fishing activities were therefore considered to be having only a **minor (C1)** impact on the populations of octopus species in the SZRLF and it was **likely (L6)** that this would continue to occur. The resultant risk rating was therefore **LOW (6)**. This rating may need to be revisited if new markets are developed or catch rates of octopus increase in the future.

Other by-product species – Velvet and Giant Crabs, Sharks, and Scalefish

Objective

- Ensure that other by-product species are harvested within ecologically sustainable limits.

ERA Risk Rating: Impact on breeding populations of other by-product species (NEGLIGIBLE)

The level of take by the RLF of velvet and giant crabs, sharks, and marine scalefish is very low compared to the overall biomass and take by other fisheries (e.g. Marine Scalefish, Brock et al. 2007). Consequently, current fishing activities were considered to be having a **negligible (C0)** impact and it was **likely (L6)** that this would continue to occur. The risk rating was therefore **NEGLIGIBLE (0)**.

4.1.3. Bait

Bait

Objective

- Ensure that bait species are harvested within ecologically sustainable limits.

ERA Risk Rating: Impact on breeding populations of bait species (NEGLIGIBLE)

Industry advised that the take of personal bait by licence holders is very rare because it is quicker and easier to buy bait. Industry also advised that few fish taken in pots are used as bait and most are released alive. Bait used in the fishery is generally sourced from the South Australian Marine Scalefish Fishery. It was noted that if industry practice changed, the species most likely to be targeted would be West Australian salmon. Therefore, it was considered **likely (L6)** that the RLF is having a **negligible (C0)** impact on the populations of these species. This resulted in a risk rating of **NEGLIGIBLE (0)**.

4.2. Non-Retained Species

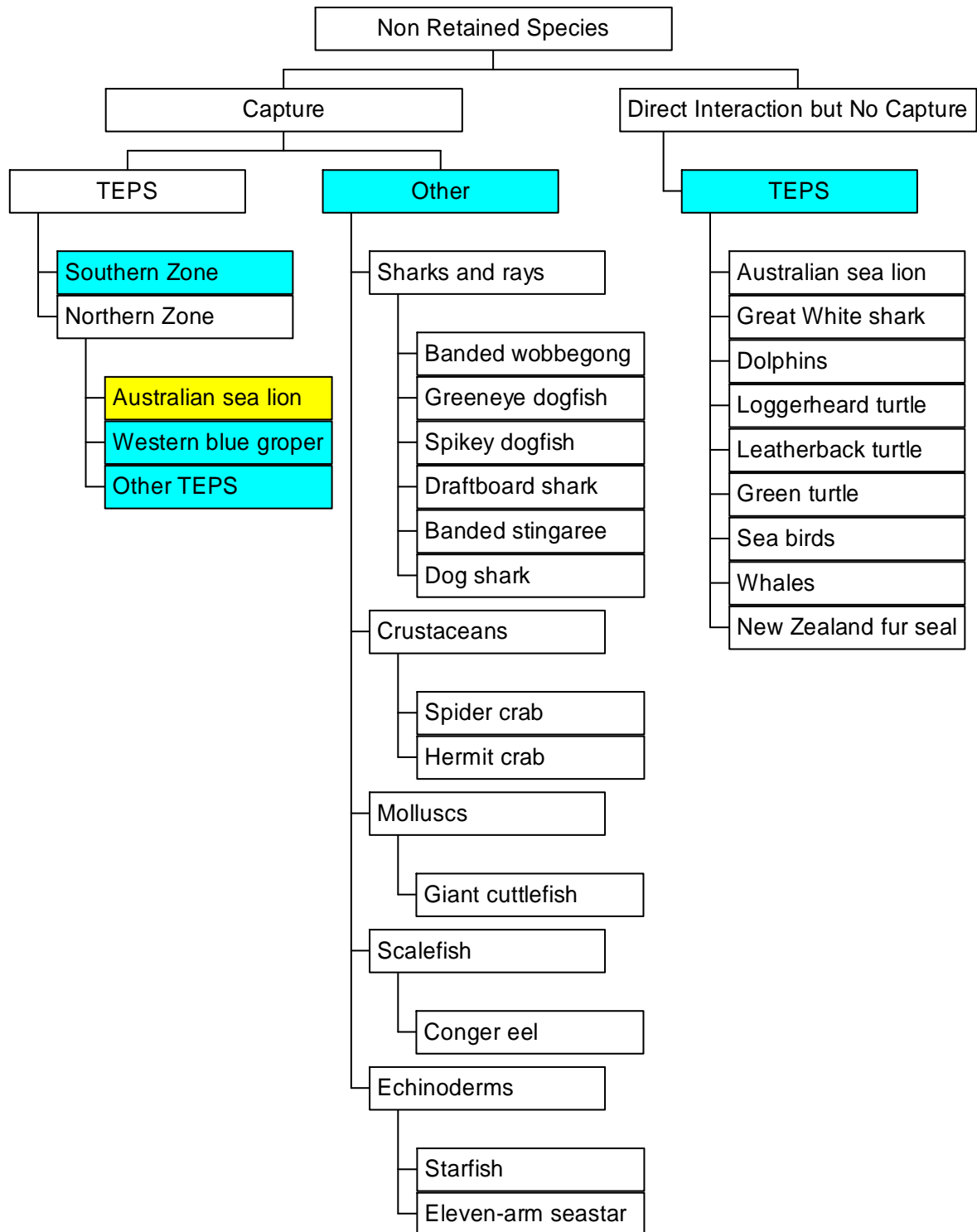


Figure 14 Component Tree for Non-Retained Species in the South Australian Rock Lobster Fishery

4.2.1. Captured by Gear

Threatened, Endangered and Protected Species (TEPS)-Southern Zone

Objective

- Minimise fishery interactions with threatened, endangered, and protected species in the SZRLF.

There are a number of species listed as threatened, endangered and protected under State and/or Australian Government legislation. These species are not permitted to be taken and must be released immediately if an interaction occurs. All licences holders in South Australian commercial fisheries are required to record all interactions with threatened, endangered and protected species (TEPS) using a 'wildlife interaction' logbook, which are then provided to SARDI Aquatic Sciences.

ERA Risk Rating: Impact on breeding populations of TEPS by the SZRLF (NEGLIGIBLE)

A number of TEPS occur in the Southern Zone, including seals, sharks, whales, and leafy sea dragons. According to the logbook returns submitted during 2007/08 by the SZRLF their only TEPS interaction was with one turtle. The fishing method and the low numbers of TEPS in the area means that there will **occasionally (L5)** be a **negligible (C0)** impact on TEPS populations by the SZRLF. Thus the risk rating is **NEGLIGIBLE (0)**.

Threatened, Endangered and Protected Species (TEPS)-Northern Zone

Objective

- Minimise fishery interactions with threatened, endangered, and protected species in the NZRLF.

A number of TEPS occur in the Northern Zone, including seals, Australian sea lions (ASL), whales, sharks, blue groper, and leafy sea dragons. According to the logbook returns submitted during 2007/08 by the NZRLF their only TEPS interaction was with a single dolphin and a flock of petrels. Other interactions (but not capture) of dolphins and whales have been reported for the fishery, including the one for the 2007/08 reporting period.

ERA Risk Rating: Impact on breeding populations of TEPS by the NZRLF: Australian sea lion (MODERATE), western blue groper (NEGLIGIBLE), other TEPS (NEGLIGIBLE)

The fishery has the potential to have interactions with seal and ASL juveniles and pups. Devices (metal rods) for protecting bait and excluding pinnipeds from pots are used extensively in some areas of the fishery. The effectiveness of these devices has recently been quantified through a research project showing potential for bait protection and prevention of pups from becoming trapped in the pots (Goldsworthy et al. 2010). Many subpopulations of ASL in

the area of the NZRLF are in decline, and the loss of one pup from the areas could have implications on their localised survival. After some discussion, the risk on these subpopulations was considered moderate. However the mitigation methods (metal rods) already employed brings the likelihood of an entrapment down to almost zero. Thus the consequence was considered to be **severe (C3)** but **unlikely (L3)** to occur, with a final risk rating of **MODERATE (9)**.

The potential impact on blue groper (which are fully protected in parts of the Northern Zone) was assessed separately. However, a bycatch study by Brock et al. (2007) indicated that very few blue groper are captured in pots in the NZRLF. Thus it was considered that the impact on blue groper populations was **negligible (C0)** and that this will **occasionally (L5)** occur into the future. The risk rating was therefore **NEGLIGIBLE (0)**.

Due to the very low level of interactions it was considered that the impact on other TEPS (apart from blue groper and ASL) was **negligible (C0)** and that this will **occasionally (L5)** occur into the future. The risk rating was therefore **NEGLIGIBLE (0)**.

Indicator

- Level and nature of interactions on TEPS reporting log sheets.

Performance measure

- Zero or minimal mortalities of TEPS.

Other Species – Sharks and Rays, Crustaceans, Giant Cuttlefish, Conger Eel, and Echinoderms

ERA Risk Rating: Impact on breeding populations of other species (NEGLIGIBLE)

Several other species are captured in pots but not retained for sale and/or used as bait by the industry. A comprehensive bycatch study was conducted from 2002 to 2004 which looked at the numbers of other species captured in pots (Brock et al. 2007). In comparison with other fisheries, bycatch numbers were very low, especially in relation to species that are not retained by the fishers. However, the bycatch was dominated by just a few species and the potential exists to impact on them – especially if other fisheries are capturing them also. Another factor that should be considered when looking at these low numbers is that there is a paucity of information about the population structure of many by-catch species in the fishery regions. Some species like the giant cuttlefish (*Sepia apama*) and the conger eel (*Conger verreauxi*) may need further consideration if new information becomes available. Nonetheless, despite the current lack of information, it was felt that the consequence was **negligible (C0)** and that this was **likely (L6)** to continue. The risk rating was therefore **NEGLIGIBLE (0)**.

4.2.2. Direct Interaction but No Capture

Threatened, Endangered and Protected Species (TEPS)

Objective

- Avoid fishery interactions with threatened, endangered and protected species.

ERA Risk Rating: Impact on breeding populations of TEPS (NEGLIGIBLE)

The potential exists for a number of TEPS to interact with rock lobster pot float lines on rare occasions. These species include whales, dolphins, sharks, and seals. The degree to which fishers may encounter each of these species varies temporally and spatially, although this has not been formally quantified.

In the NZRLF interaction occasionally occurs with ASL which involves the removal of bait and/or catch from the pots. The fishery usually implements metal rods to limit the loss of baits in areas with ASL, and also tend to avoid these areas when the frequency of this interaction is highest.

As discussed earlier, there is little or no information about interactions with TEPS in the logbook returns submitted during 2007/08 by either fishery. Despite the current lack of information, it was felt that the consequence of interactions with TEPS was **negligible (C0)** and that this was **likely (L6)** to continue. The risk rating was therefore **NEGLIGIBLE (0)**.

Indicator

- Level of interactions on TEPS reporting log sheets.

Performance measure

- The level of capture of these TEPS remains at zero.

4.3. General Ecosystem Effects of the Fishery

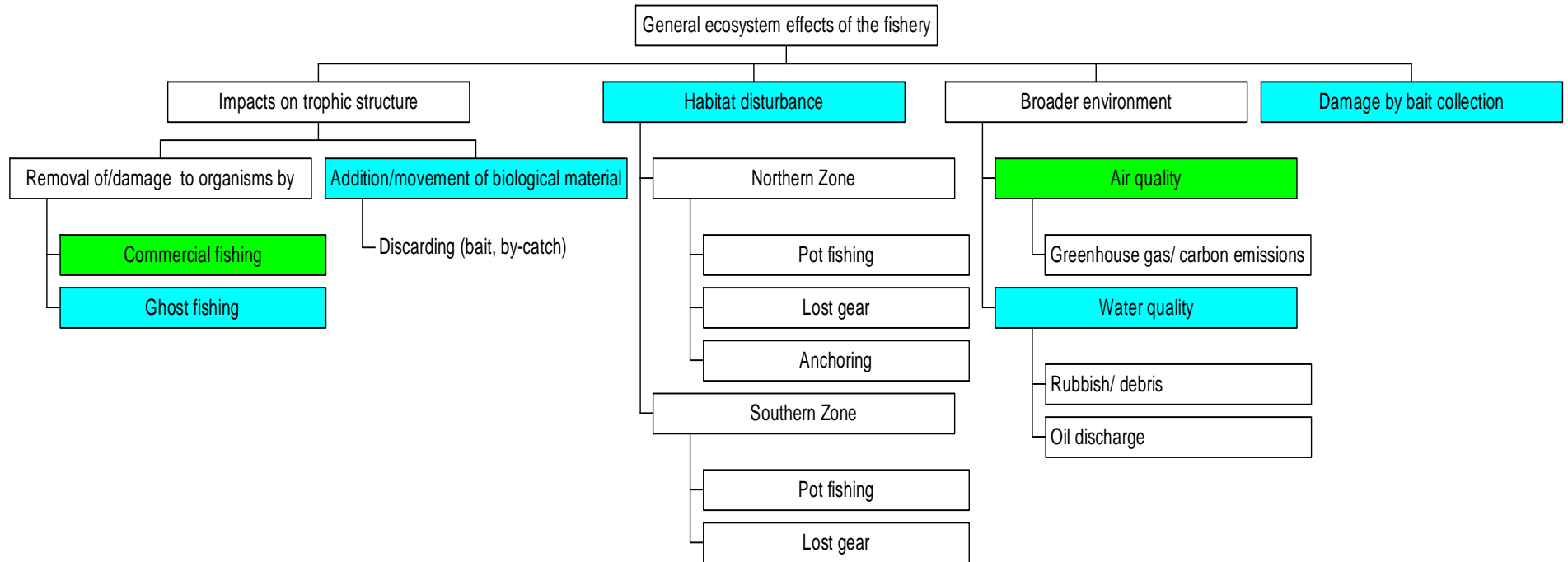


Figure 15 Component Tree for General Ecosystem effects of the South Australian Rock Lobster Fishery

4.3.1. Impacts on Trophic Structure

Broad objective

- Minimise fishery impacts on the trophic structure of the ecosystem.

Removal of / damage to organisms by commercial rock lobster fishing

Over-harvesting of a target species has the potential to cause changes in the trophic structure of an ecosystem. For example, in Tasmania it appears that in some areas the resilience of the ecosystem to changes by urchins (i.e. macroalgae to barrens) has been lowered due to the removal of larger lobsters through fishing.

ERA Risk Rating: Fishery effects on trophic structure by removal of/damage to organisms by commercial rock lobster fishing (LOW)

Due to the significant variation in abundance caused by environmental factors, it was considered that current commercial harvesting activities are **likely (L6)** having a **minor (C1)** impact on food chains or ecological communities. This resulted in an overall risk rating of **LOW (6)**. It was noted, however, that the management plan may need to include provisions to respond to environmental influences. In addition, it was also noted that future monitoring in no-take sanctuary zones of the new marine parks system may enable a better understanding of the ecosystem effects of rock lobster fishing.

Removal of / damage to organisms by ghost fishing

The impacts of the continued fishing of lost gear or 'ghost fishing' may be significant in some fisheries and is often difficult to quantify.

ERA Risk Rating: Fishery effects on trophic structure by ghost fishing (NEGLIGIBLE)

There was a consensus that the impact of lost fishing gear has very little effect on the trophic structure of the regions. The ability of the bait in commercial lobster pots to attract species is considered to last a maximum of a few days. Therefore, should a pot be lost its potential to continue to attract species is limited and the entrance to the pot restricts species from becoming trapped. The workshop also noted industry advice that there is minimal catch with unbaited pots.

Lost gear in the fishery was considered **likely (L6)** to have a **negligible (C0)** impact on the ecosystem. This resulted in a risk rating of **NEGLIGIBLE (0)**.

Addition / movement of biological material

ERA Risk Rating: Fishery effects on trophic structure by the addition/movement of biological material (NEGLIGIBLE)

Discarding of small amounts of bait and bycatch does occur in the RLF. However, the amount discarded was considered **likely (L6)** to be having a **negligible (C0)** impact on the trophic structure of the ecosystem. Thus the risk rating was **NEGLIGIBLE (0)**.

4.3.2. Habitat Disturbance

Habitat Disturbance by pot fishing, lost gear, and anchoring

Objective

- To minimise the effect of the industry on habitat disturbance through gear usage/ loss and anchoring while fishing.

ERA Risk Rating: Fishery effects by habitat disturbance (NEGLIGIBLE)

Operators in the RLF generally set pots adjacent to reefs and structures where rock lobsters are found. Industry advised that pots are very rarely set near seagrass patches or seagrass areas. It was noted that some licence holders set pots over a large area and pull the gear once per day. Physical interactions do occur when rock lobster pots are placed on the substrate. However, as these fishing devices are passive by nature, the interactions are not considered to be significant. The result of a pot landing on benthic organisms attached to the substrate is that it is unlikely to dislodge them. Even so, the areas where the pots are set are usually subject to heavy ocean swell and have a suite of benthic flora and fauna that is well adapted to surviving turbulent conditions. There have been no published studies in South Australia on damage to the benthic environment caused by pot fishing activities. Results from a Western Australian study showed that pots lift directly up rather than drag when pulled, causing very little damage to the benthos. The loss of gear (pots) and its possible effect on benthic habitats was not considered to be an issue at all.

Only boats in the NZRLF anchor. Industry advised that anchors are set to minimise damage by setting in the sand and avoiding seagrass areas. The impact on the habitat of the setting of gear and anchoring was considered **likely (L6)** to be having a **negligible (C0)** impact on the ecosystem. This results in a risk rating of **NEGLIGIBLE (0)**.

4.3.3. Broader Environment

Air Quality - Greenhouse gas / carbon emissions

Objective

- Minimise the impact of the fishery on the broader environment by reducing carbon emissions.

ERA Risk Rating: Fishery effects on the broader environment through air quality (LOW)

In the NZRLF, trips tend to vary between overnight trips and trips for up to a week. In the SZRLF most licence holders undertake fishing activities on a daily basis, with the average trip ranging from 35 to 60 nm per day.

The industry recognises that it will need to be able to demonstrate its impact on the environment in the future as industries everywhere become more accountable for their energy use. For these reasons it was identified as an important issue to address. Nonetheless, the level of emissions relative to other pollution sources (e.g. land-based industry) is small, and it was considered **likely (L6)** that the lobster fishery was having a **minor (C1)** effect on the air quality of the broader environment. Thus the risk rating was **LOW (6)**.

Water Quality

Objective

- Minimise the impact of the fishery on the broader environment by effectively managing rubbish/debris and oil discharge.

ERA Risk Rating: Fishery effects on the broader environment through water quality (NEGLIGIBLE)

The impacts of harvesting rock lobster on water quality are considered to be negligible due to the industry code of practice *Clean and Green*. This code looks to minimise the environmental effects of discharge and rubbish at sea and is actively audited by the fishery. Notwithstanding this there are stringent regulations applied by the Department of Transport and Infrastructure (DTEI) on the management of oil at sea. The *Pollution of Waters by Oil and Noxious Substances Act 1987* relates to the protection of the sea and certain waters from pollution by oil and other noxious substances. It also provides for penalties of up to \$200,000 for individuals and \$1,000,000 for corporations for contravention of the Act. Operators in the fishery store all rubbish on board the vessels for disposal on return to port. The fishery does not generate a significant amount of plastic waste in its fishing activities. It was considered **likely (L6)** that the rock lobster fishery is having a **negligible (C0)** effect on the water quality of the broader environment. This results in a risk rating of **NEGLIGIBLE (0)**.

Removal of / damage to organisms by bait collection

Objective

- Minimise fishery impacts on the ecosystem through collection of bait.

In some fisheries there may be trophic impacts caused by the removal of high volumes of certain species. Research on trophic structure related to South Australian fisheries is not readily available.

ERA Risk Rating: Fishery effects through bait collection (NEGLIGIBLE)

Given industry advice that there is no bait collection taking place, it was considered that the impact on the ecosystem was **likely (L6)** to be **negligible (C0)**. Thus the risk rating was **NEGLIGIBLE (0)**.

4.4. Community

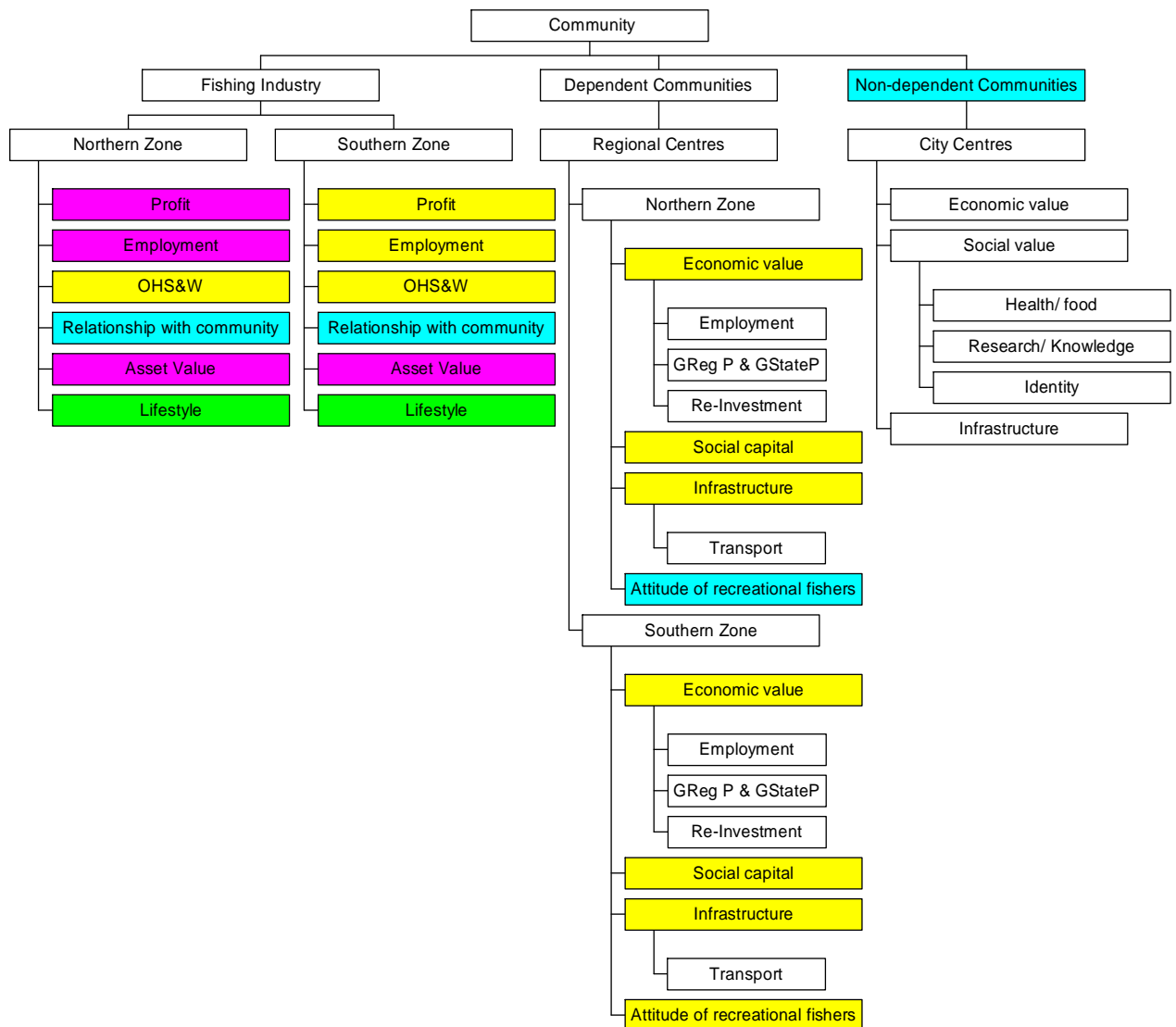


Figure 16 Component tree for the contribution of the South Australian Rock Lobster Fishery to Community/Regional Socio-Economic Wellbeing.

The components in this section were not assessed 'quantitatively' for risks using likelihood and consequence values. Rather, issues (or components) were assigned a risk rating by industry based upon their feel for how important the issue was. Thus, consequence and likelihood values do not appear in Section 4.4.1 below.

4.4.1. Fishing Industry

Broad objective

- Maintain a flow of benefit from the fishery to the regional fishing industry and broader community, in both dependant regional centres and cities.

Profit – Northern Zone

Profit is of primary importance to licence holders and is one of the key factors affecting the economic viability of the fishery.

Objective

- Maintain a level of profitability that allows the NZRLF to be economically sustainable.

ERA Risk Rating: The importance of profit to the NZRLF (HIGH)

According to EconSearch (2009a), gross operating surplus (GOS) was calculated by excluding imputed wages for operator and family members as a cost item. The average GOS of all boats in the NZRLF in 2007/08 was estimated to be approximately \$12,400, a significant reduction compared to the previous year. Boat cash income is measured as gross operating surplus with imputed wages (unpaid labour) included as cash costs. The estimated average boat cash income for the NZRLF in 2007/08 was approximately -\$17,400 per boat. Cash operating surplus and boat business profit give an indication of the capacity of the operator to remain in the fishery in the short to medium term. In 2007/08, the average boat business profit was almost -\$63,800. Profit at full equity is a measure of the profitability of an individual licence holder, assuming that licence holder has full equity in the operation. It is a useful absolute measure of the economic performance of fishing firms. Profit at full equity for the NZRLF was -\$7,600 in 2007/08, slightly less than the previous year (EconSearch 2009a).

The lack of profitability of the NZRLF was identified as a **HIGH** risk issue by the fishers, with the industry concerned about more conservative TACCs and fluctuating prices and the impact they will have on profit.

Profit – Southern Zone

Profit is of primary importance to licence holders and is one of the key factors affecting the economic viability of the fishery.

Objective

- Maintain a level of profitability that allows the SZRLF to be economically sustainable.

ERA Risk Rating: The importance of profit to the SZRLF (MODERATE)

In 2007/08 the average GOS of all boats in the SZRLF was estimated to be approximately \$160,000, while average boat cash income was \$190,000, average boat business profit was \$147,000 per boat and individual profit at full equity was almost \$180,000 (EconSearch 2009b). The lack of profitability of the SZRLF was identified as a **MODERATE** risk issue by the fishers, with the industry concerned about a lowering of TACCs and the impact they will have on profit.

Indicators

- Gross operating surplus
- Boat cash income
- Profit at full equity

Performance measure

To be determined

Employment – Northern Zone

The provision of employment to those people directly involved in the NZRLF is considered to be very important by the fishing industry.

Objective

- Continuation of the NZRLF to be an important and viable employer within the fishing industry and broader community.

ERA Risk Rating: The importance of employment to the NZRLF fishing industry (HIGH)

In 2007/08, the NZRLF was responsible for the direct employment of around 155 fte (or full-time equivalent) and a further 34 jobs on downstream activities (EconSearch 2009a). Subsequent lowering of the TACC has meant it is more difficult to keep this level of employment, and the industry ranked the risk to employment as **HIGH**. The industry are concerned about more conservative TACCs and the impact they will have on the current number of fte and the ability to attract new employees to the industry. They are also concerned with the qualifications required by deckhands and how that will impact on the number of individuals who are suitable qualified to work overnight in the NZRLF (see OHS&W section).

Employment – Southern Zone

The provision of employment to those people directly involved in the SZRLF is considered to be very important by the fishing industry.

Objective

- Continuation of the SZRLF to be an important and viable employer within the fishing industry and broader community.

ERA Risk Rating: The importance of employment to the SZRLF fishing industry (MODERATE)

In 2007/08, the SZRLF was responsible for the direct employment of around 414 fte and a further 130 jobs on downstream activities (EconSearch 2009b). Subsequent lowering of the TACC has meant it is more difficult to keep this level of employment, and the industry ranked the risk to employment as **MODERATE**. The industry are concerned about continued lowering of the TACC and the impact this will have on employment in the industry

Indicator

- Level of full-time equivalent employment provided by the fishery

Performance measure

To be determined

Occupational Health, Safety and Welfare (OHS&W)-Northern Zone

The safety of licence holders and crew during fishing activities is paramount for those involved in the NZRLF.

Objective

- Maintain a high standard of OHS&W practices that ensures optimum working conditions

ERA Risk Rating: The importance of good OHS&W practices for the NZRLF and the impact of changes to legislation (MODERATE)

There are significant OHS&W standards and requirements for training, activities and record keeping for commercial fisheries that are enforced by DTEI. The fishers are concerned about changes that are occurring through the transfer of legislative power to the Australian Maritime Safety Authority (AMSA) of minimum training, qualification and industry standard requirements of fisheries in general. This has resulted in a risk rating of **MODERATE**, but evolving circumstances may mean the rating could become high or extreme. One of the changes could involve the minimum qualifications that deckhands require (Marine Engineer if fishing overnight on a two handed boat) which may limit the number of deckhands suitable to employ. There is considerable uncertainty, especially in the NZRLF (where overnight trips are more common) to the impact these changes may have.

Occupational Health, Safety and Welfare (OHS&W)-Southern Zone

The safety of licence holders and crew during fishing activities is paramount for those involved in the SZRLF.

Objective

- Maintain a high standard of OHS&W practices that ensures optimum working conditions

ERA Risk Rating: The importance of good OHS&W practices for the SZRLF and the impact of changes to legislation (MODERATE)

There are significant OHS&W standards and requirements for training, activities and record keeping for commercial fisheries that are enforced by DTEI. The fishers are concerned about changes that are occurring through the transfer of legislative power to the Australian Maritime Safety Authority of minimum training, qualification and industry standard requirements of fisheries in general. This has resulted in a risk rating of **MODERATE**, but evolving circumstances may mean the rating could be higher. One of the changes could involve the minimum qualifications that deckhands require, which may limit the number of deckhands suitable to employ.

Indicator

- Number of reportable incidents/near misses

Performance measure

- No incidents/near misses

Relationships with community-Northern Zone

Objective

- Build and maintain positive relationships with the broader community in the NZRLF

ERA Risk Rating: The importance of positive relationships with the community to NZRLF (NEGLIGIBLE)

Building and maintaining positive relationships with the broader community were identified as being important for the NZRLF. The fishing community is actively managing their activities to pursue this goal (e.g. by recommending all provisions (e.g. fuel and ice are bought in the local community where fishing occurs). The NZRLF considers its relationship with the community to be strong, so the risks to the fishery were considered to be **NEGLIGIBLE**.

Indicator

- Level of acceptance of management and fishing arrangements within the community

Performance measure

- General acceptance of the fishery and management arrangements within the community

Relationships with community-Southern Zone

Objective

- Build and maintain positive relationships with the broader community in the SZRLF

ERA Risk Rating: The importance of positive relationships with the community to SZRLF (NEGLIGIBLE)

Building and maintaining positive relationships with the broader community were identified as being important for the SZRLF. The fishing community is actively managing their activities to pursue this goal (e.g. by recommending all provision, such as fuel, food and ice are bought in the local community where fishing occurs). The SZRLF considers its relationship with the community to be strong, so the risks to the fishery were considered to be **NEGLIGIBLE**.

Indicator

- Level of acceptance of management and fishing arrangements within the community

Performance measure

- General acceptance of the fishery and management arrangements within the community

Asset value-Northern Zone

Objective

- Maintain a level of value to the assets of the NZRLF

ERA Risk Rating: The importance of asset value to the NZRLF fishing industry (HIGH)

NZRLF licences and quota entitlements are fully transferable. The importance of maintaining the value of assets was rated highly by the industry. Assets may include fishery licences, quota entitlements, vessels, businesses, gear, etc.

The value of licenses represents a significant proportion of the capital used by each license holder in the fishery. In 2007/08 the reported license value for the NZRLF was \$1.3 million per boat (EconSearch 2009a,b). The fishers from this zone were concerned that diminishing profit and potential changes to TACC could have a significant effect on the asset value of their licenses, resulting in a **HIGH** risk rating.

Asset value-Southern Zone

Objective

- Maintain a level of value to the assets of the SZRLF

ERA Risk Rating: The importance of asset value to the SZRLF fishing industry (HIGH)

SZRLF licences and quota entitlements are fully transferable. The importance of maintaining the value of assets was rated highly by the industry. Assets may include fishery licences, quota entitlements, vessels, businesses, gear, etc.

The value of licenses represents a significant proportion of the capital used by each license holder in the fishery. In 2007/08 the reported license value for the SZRLF was \$3.3 million per boat (EconSearch 2009a,b). The fishers from this zone were concerned that diminishing profit and potential changes to TACC could have a significant effect on the asset value of their licenses, resulting in a **HIGH** risk rating.

Indicator

- Investment in fishing gear and licence
- Licence value
- Value of quota units

Performance measure

To be determined

Lifestyle

ERA Risk Rating: The importance of lifestyle to the Rock Lobster fishing industry (LOW)

In general, the RLF has been a very profitable fishery with a high value product. Operators did not consider themselves lifestyle fishers, with many licenses changing from owner operator to business owned. The impact on 'lifestyle' as a result of changes in the fishery was considered to be **LOW** risk by the industry.

4.4.2. Dependent Communities – Regional Centres

Economic value-Northern Zone

Objective

- Maintain a flow of benefit from the NZRLF to the broader community.

ERA Risk Rating: Impact of the NZRLF on the economic value of the community (MODERATE)

The industry was concerned that some of the employment and re-investment in the local communities could be lost if the fishery continued to have a reduction in TACC. According to EconSearch (2009a), apart from the 733 fte directly employed by the fisheries, a further 630 people were employed State-wide (342 employed regionally). The State-wide jobs are concentrated in trade manufacturing and business services sectors. It must be noted that the removal of the fishery would have a much larger impact in much smaller communities like Point Souttar. In 2007/08 the NZRLF fishing industry-related contribution to Gross State Product (GSP) was 22.6 million (\$13.5 million in the Eyre region). As roughly 75% of the GSP of the fisheries is kept in the regions, the fishing industry was concerned that the money coming back into the local communities may be affected by a downturn in the fisheries in the next 5 years. Therefore the impact of a downturn in the NZRLF on the economic value of the community was considered to be a **MODERATE** risk.

Economic value-Southern Zone

Objective

- Maintain a flow of benefit from the SZRLF to the broader community.

ERA Risk Rating: Impact of the SZRLF on the economic value of the community (MODERATE)

The industry was concerned that some of the employment and re-investment in the local communities could be lost if the fishery continued to have a reduction in TACC. According to EconSearch (2009b), apart from the 733 fte directly employed by the fisheries, a further 630 people were employed State-wide (342 employed regionally). The State-wide jobs are concentrated in trade manufacturing and the business services sectors. It must be noted that the removal of the rock lobster fishery would have a much larger impact in much smaller communities like Point Souttar and Southend. In 2007/08 the SZRLF fishing industry-related contribution to Gross State Product (GSP) was \$107.4 million (\$79.4 million in the south east). As roughly 75% of the GSP of the fisheries is kept in the regions, the fishing industry was concerned that the money coming back into the local communities may be affected by a downturn in the fisheries in the next 5 years. Therefore the impact of a downturn in the SZRLF on the economic value of the community was considered to be a **MODERATE** risk.

Social capital-Northern Zone

ERA Risk Rating: Impact of the NZRLF on the social capital of the regional centres (MODERATE)

The components of social value that were considered for the risk assessment were: health / food; identity; and social capital.

The main regional areas associated with the NZRLF are Port Lincoln, Yorke Peninsula and Kangaroo Island. Since nearly all of the rock lobster caught by this fishery is exported to China, and other parts of Asia, there is minimal product sold and consumed in the regional area where the fishery operates. For this reason, there is little food or health benefit from the fishery in these regional areas.

However, many of the regional communities still derive an 'identity' from the operation of this fishery and there are significant social capital benefits. Therefore a downturn in the fishery was considered to be a **MODERATE** risk to the social capital of these areas, particularly in the smaller regional communities like Point Souttar.

Social capital-Southern Zone

ERA Risk Rating: Impact of the SZRLF on the social capital of the regional centres (MODERATE)

The components of social value that were considered for the risk assessment were: health / food; identity; and social capital.

Almost all the major coastal towns in the southeast are with the SZRLF (including Mt Gambier). Since the vast majority of the rock lobster caught by this fishery is exported to China, and other parts of Asia, there is minimal product sold and consumed in the regional area where the fishery operates. For this reason, there is little food or health benefit from the fishery in these regional centres.

However, many of the regional communities still derive an 'identity' from the operation of this fishery and there are significant social capital benefits. Therefore a downturn in the fishery was considered to be a **MODERATE** risk to the social capital of these areas, particularly in the south east and smaller regional communities like Southend and Beachport.

Infrastructure-Northern Zone

ERA Risk Rating: Impact of the NZRLF on community infrastructure (MODERATE)

The NZRLF operates using infrastructure such as wharves and boat ramps, and the workshop participants considered the industry to have significantly contributed to the investment in new infrastructure in regional areas. Specific examples of infrastructure being developed for/by the NZRLF include processing factories, boat harbours and regional roads. If this fishery ceased to exist, these processing factories would most likely close, disadvantaging a host of other commercial fisheries such as the MSF, which are currently using them. In larger regional communities, the contribution by the NZRLF to new infrastructure is significant compared to that of the recreational and smaller commercial fisheries sectors. Consequently, the impact of the rock lobster fishery on community infrastructure was given a **MODERATE** risk rating.

Infrastructure-Southern Zone

ERA Risk Rating: Impact of the SZRLF on community infrastructure (MODERATE)

The SZRLF operates using infrastructure such as wharves and boat ramps, and the workshop participants considered the industry to have significantly contributed to the investment in new infrastructure in regional areas. Specific examples of infrastructure being developed for/by the SZRLF include processing factories, boat harbours and regional roads. If this fishery ceased to exist, these processing factories would most likely close, disadvantaging a host of other commercial fisheries such as the MSF, which are currently using them. In larger regional communities, the contribution by the SZRLF to new infrastructure is significant compared to that of the recreational and smaller commercial fisheries sectors. Consequently, the impact of the rock lobster fishery on community infrastructure was given a **MODERATE** risk rating.

Attitude of Recreational Fishers – Northern Zone

ERA Risk Rating: Impact of the NZRLF on the attitude of recreational fishers (NEGLIGIBLE)

The workshop participants believed there was little or no negative interaction between the commercial and recreational fishers in the NZRLF. Thus the risk rating was **NEGLIGIBLE**.

Attitude of Recreational Fishers – Southern Zone

ERA Risk Rating: Impact of the SZRLF on the attitude of recreational fishers (MODERATE)

There was discussion during the workshop about the fact that the commercial fishers are coming closer to shore in the SZRLF in recent years. One of the consequences of this perceived change in fishing behaviour is that recreational fishers are starting to pull commercial pots and there is a rising level of negativity between the sectors. The industry believes the negative interaction is isolated to one or two individuals. The risk rating for this component was set at **MODERATE**, with the expectation that this rating may come down if the individuals involved can be consulted.

Indicators and Performance measures

To be determined

4.4.3. Non-Dependent Communities – City Centres

The South Australian RLF is a niche fishery with few operators and a high value product. Other than those directly and indirectly employed by the fishery, the main impacts of an interruption to the flow of benefits from the fishery to the community would be export related (primarily a lack of availability of product to Asia).

Economic value, Social value, and Infrastructure

ERA Risk Rating: Impact of the RLF on the economic, social values and Infrastructure of the broader South Australian community (NEGLIGIBLE)

In the absence of the fishery, there would be indirect impacts to the community through product unavailability and job losses in the retail, processing and transport industries. Product unavailability would have some impact on the community's ability to buy rock lobster in Sydney, Melbourne and Adelaide given that the fishery is a supplier to these markets. Research supported by the commercial RLF makes a significant contribution to the knowledge and understanding of the rock lobster resource in South Australia.

In the context of South Australia's total Gross State Product of \$70.9 billion in 2007/08 (ABS, 2009), the loss of the economic, social and infrastructure value of the RLF was considered to be **NEGLIGIBLE** to the broader South Australian community.

4.5. Aboriginal Community

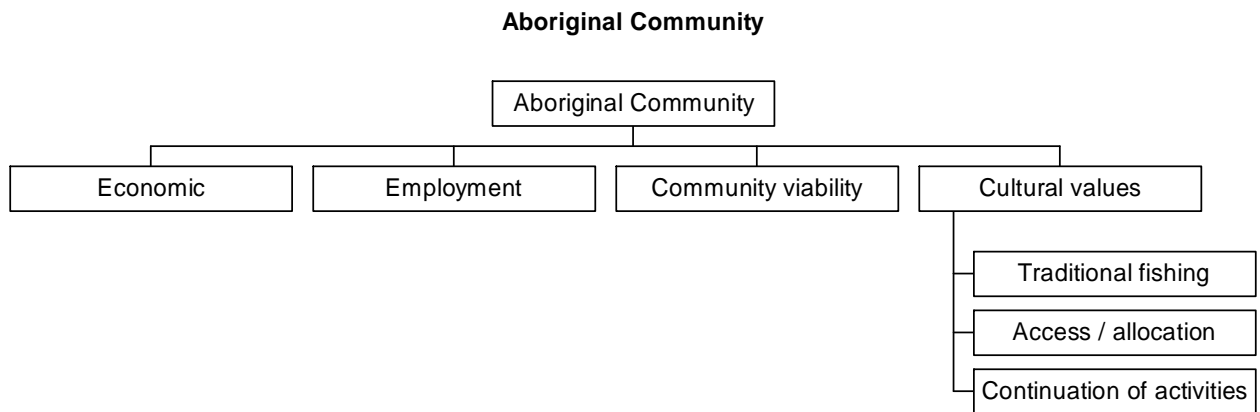


Figure 17 Component tree for the Indigenous community of the South Australian Rock Lobster Fishery

4.6. Governance

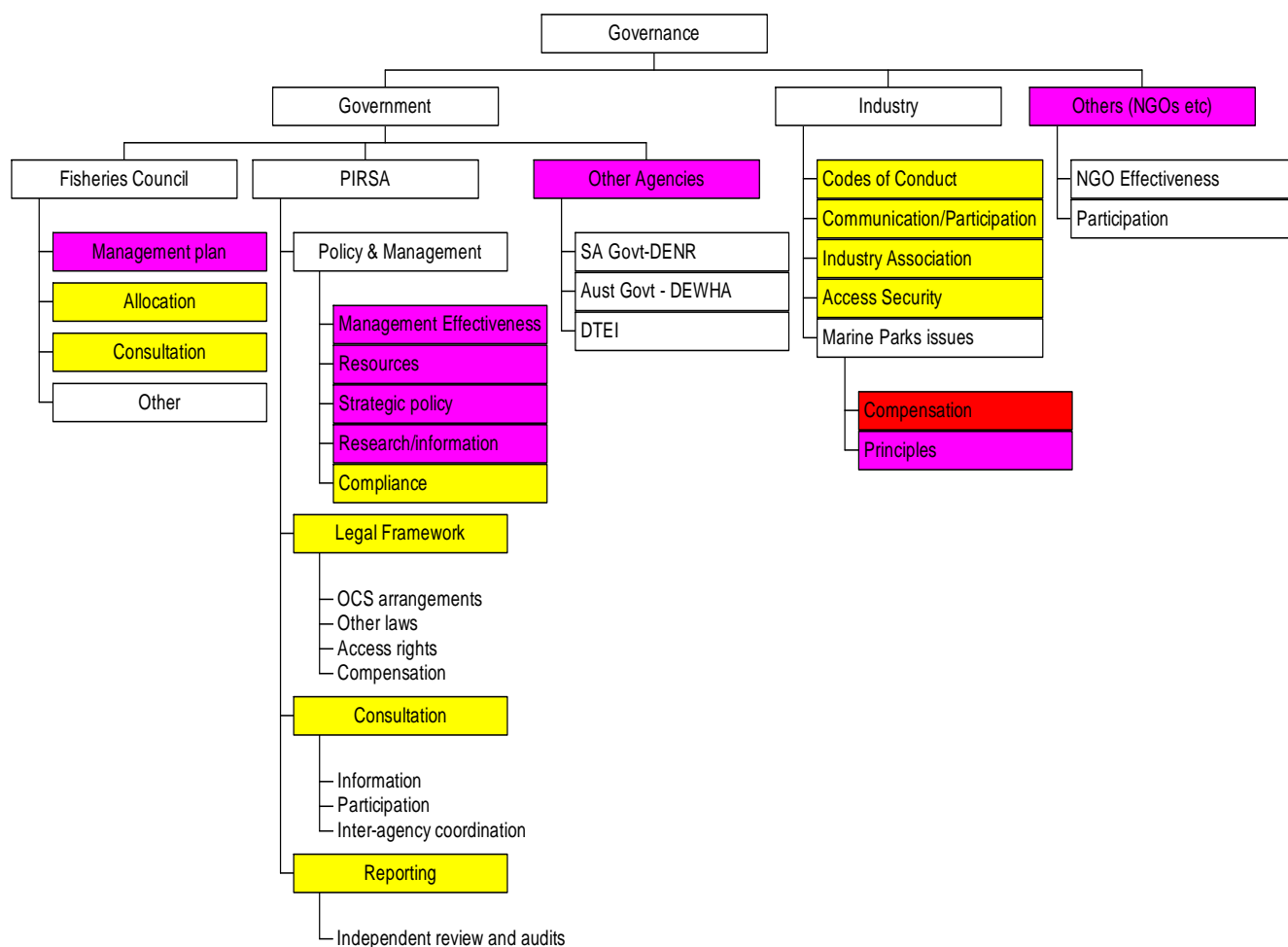


Figure 18 Component Tree for the Governance of the South Australian Rock Lobster Fishery

This section was not assessed for risks as per most of the other sections in this report. Issues identified by stakeholders during the workshop for either further action or as current issues are reported on below. The facilitator identified that each component of the tree should be at least moderate risk, to highlight the importance of effective governance on the success of a fishery. The high proportion of issues assessed as a “high” or “extreme” risks indicate a lack of trust with governance for this fishery.

4.6.1. Government

Fisheries Council

Under the new *Fisheries Management Act 2007*, the Fisheries Council have a significant involvement throughout the process of developing new management plans, which include allocation for all sectors and a public consultation period.

Broad objective

- Manage the impact of the Fisheries Council on the Rock Lobster Fishery

Fisheries Council – Management Plan

ERA Risk Rating – The importance of the delivery of effective management plans for the NZRLF and SZRLF (HIGH)

The management plans that are currently being developed under the *Fisheries Management Act 2007* are a key requirement for the NZRLF and SZRLF as they not only provide a framework for the sustainable management of the resource but they also give certainty to the industry in detailing how future management decisions will be made. Many of the higher risk components identified in this report should be mitigated by revised biological reference points and other new initiatives contained within these management plans. All participants at the workshop agreed that the preparation of the new management plans that will occur after the risk assessment process are vital to the effective management of the NZRLF and SZRLF, therefore the risk rating was listed as **HIGH**.

Fisheries Council – Allocation/Consultation

ERA Risk Rating – The importance of balanced allocation and effective consultation through the Fisheries Council to the rock lobster fishery (MODERATE)

Access to the rock lobster resource is explicitly allocated between users in a manner that aims to achieve optimal utilisation and equitable distribution of the resource to the benefit of the community. The *Fisheries Management Act 2007* requires that fishery management plans explicitly allocate resource shares to the commercial, recreational and Aboriginal traditional sectors of the fishery.

There were concerns raised by the commercial sector about the incidence of interference with commercial gear and the high level of non-compliance with fishing rules and regulations for rock lobster in the recreational sector of the fishery. The industry was also concerned that the results of the recreational fishing survey are not representative of the true catch of recreational fishers,

with the proportion of the resource used by this sector much higher than reported in the survey.

The role of the Fisheries Council and its effectiveness in comparison to the previous model of FMCs was discussed in both industry and stakeholder workshops. The industry believed they had an effective FMC prior to the changes in 2007 and were unsure of the benefits that they gained in the change of management structure.

Indicators and Performance measures

To be determined

PIRSA – Policy and Management

Objective

- Manage the rock lobster resource in an efficient and cost-effective manner, in line with the Government's cost-recovery policy

Policy and Management – Management Effectiveness, Resources, and Strategic Policy

ERA Risk Rating: Importance of PIRSA management, resources and policy to the rock lobster fishery (HIGH)

The workshop considered that it was important for management to be proactive to address problems before they arise and to be adaptive to allow for industry flexibility. The management plans that are currently being developed under the *Fisheries Management Act 2007* are a key requirement for the NZRLF and SZRLF as they not only provide a framework for the sustainable management of the resource but they also gives certainty to the industry in detailing how future management decisions will be made. The effectiveness of PIRSA and the industry in developing these management plans and effectively implementing the recommendations, performance measures and responses was considered to be **HIGH** risk by the workshop participants.

The effectiveness of management is largely dependent on the amount of resources available for policy, research and compliance. In 2008/09, the annual policy and research budget for the NZRLF and SZRLF was approximately \$1.1 million and \$2.5 million, respectively.

Indicator

- Delivery of fishery management plan

Performance measure

To be determined

Policy and Management – Research / Information

Objective

- Ensure sufficient biological, environmental, economic and social information is collected to inform management decisions.

ERA Risk Rating: Importance of PIRSA research & information to the rock lobster fishery (HIGH)

Annual stock assessment reports for both the NZRLF and SZRLF are regularly produced by SARDI Aquatic Sciences for the Minister for Fisheries. These reports provide vital information for fisheries managers and are considered during the TACC setting process each year. It is important for stakeholders to be able to access and understand key information about these fisheries. The industry has some concern with the effectiveness of the research and related information that underpins the current management plan and which will inform the new management plan. Many of these issues will be addressed during the process of developing the new management plans, including the collection of information to underpin the revised biological performance indicators and scope to identify the future research needs of the fisheries. The importance of research and information to the RLF was accordingly rated as **HIGH**.

Indicators and Performance measures

To be determined

Policy and Management – Compliance

Objective

- Ensure there is sufficient compliance to inform and mitigate any risks associated with the effective management of the fishery.

ERA Risk Rating: Importance of PIRSA compliance to the rock lobster fishery (MODERATE)

Effective compliance is vital to the sustainability of rock lobster stocks and continued profitability of the commercial fishery. PIRSA Compliance spends around \$1.5 million on enforcement and compliance monitoring in the South Australian RLF, consisting of a mix of sea patrols, covert surveillance, and education. Despite this, some illegal rock lobster fishing is undoubtedly still occurring. As in most fisheries, it is difficult to quantify the illegal catch in any one year. Annual compliance risk assessments consider illegal fishing activities in the fishery and guide compliance activities and management decision-making. The implementation of systems for monitoring the TACC combined with the prior reporting system has reduced opportunities for the disposal of illegal catches. Regardless, methods to quantify illegal catch

levels, and the biological and economic impact of illegal fishing, have been identified as a strategy in the management plan and strategic research plan.

PIRSA Compliance will continue to provide effective compliance service within resourcing constraints. The recent completion of a compliance risk assessment will better direct resources and increase the effectiveness of compliance activities. The importance of compliance to the rock lobster fishery was accordingly rated as **MODERATE**.

Indicators

- Degree of understanding of rules and regulations by licensees and the broader fishing community.
- The levels of compliance with these rules and regulations, including the estimated level of illegal activity.

Performance measures

To be determined

Legal Framework / Consultation / Reporting

Objective

- Manage the rock lobster resource in an efficient and cost-effective manner, which includes access (or compensation), effective consultation and independent reviews and audits of the process.

ERA Risk Rating: Importance of PIRSA Fisheries and Aquaculture's legal framework, consultation, and reporting to the each of the NZRLF and SZRLF MODERATE)

The legal framework under which the fishery in the two zones operates has become more complex with the legislation for marine parks and the access right and compensation issues that this provides. Much of this will be covered in the sections on marine park issues under industry (Section 4.6.2) and impacts of other issues on the fishery (Section 4.7.4).

There is a perception in the rock lobster industry that communication between different government agencies may be occasionally stifled and this may be impacting on the efficient management of this resource. PIRSA Fisheries and Aquaculture considers that mechanisms for inter-agency communication and input to the management of the rock lobster resource are well established and functioning effectively. This is illustrated in part by the current ERA process, where a broad range of fishery stakeholders have been actively engaged.

The management of the NZRLF and SZRLF is based around a robust consultation and communication process. The new *Fisheries Management Act 2007* contains certain requirements with regard to consultation that must be undertaken in the course of managing each fishery. To ensure these requirements are being met, a communication protocol has been written for

both the NZRLF and SZRLF to improve the flow of management information to stakeholders.

PIRSA will continue to work with other agencies and industry members to raise awareness about management issues relevant to each fishery. This will help ensure that the community understands and supports the management approaches adopted. This information will be widely distributed via the PIRSA Fisheries and Aquaculture website (www.pir.sa.gov.au).

Periodically there are independent reviews of the research and management of the NZRLF and SZRLF. These reviews are usually instigated by industry and are used to provide rigorous feedback and independent advice on many issues that are important to the industry including setting of TACC and other future research and management issues.

The collective importance of PIRSA's legal framework, consultation, and reporting to the both NZRLF and SZRLF was considered to be of **MODERATE** risk.

Indicators and Performance measures

To be determined

Other Agencies

Objective

- Manage the rock lobster resource in an efficient and cost-effective manner, specifically related to interaction with the other government agencies and their role in the governance of the NZRLF and SZRLF.

ERA Risk Rating: Importance of other government agencies to NZRLF and SZRLF (HIGH)

The industry members of the workshop participants thought there was a HIGH risk rating to the governance of both the NZRLF and SZRLF in relation to government agencies other than PIRSA. Many of the issues with other agencies relate to other component trees contained in the present report, so the key issues of each agency in the tree are summarised below.

Uncertainty exists within the industry with regard to SA DENR's rollout of Marine Parks throughout the State. This uncertainty is covered in section 4.6.7.

The management arrangements for the RLF are assessed against the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) every 5 years by DEWHA. If the rock lobster fishery is considered to be managed in an ecologically sustainable way and its operation is consistent with the objects of Part 13A of the EPBC Act, then this fishery is provided with a five-year exemption from the export controls of the EPBC Act. If not, DEWHA has the authority to revoke this exemption. Any cancellation of this

exemption would devastate the profitability of the rock lobster fishery because almost the entire product is exported to Asia.

Transport rules and regulations are administered by DTEI. As discussed in section 4.4.1 there are some proposed changes to the administration of these regulations including minimum qualifications that the crew on a vessel are required to have which, if enforced, may have a profound effect on the rock lobster fishery.

The importance of government agencies other than PIRSA was accordingly rated as a **HIGH** risk to the rock lobster fishery.

Indicators and Performance measures

To be determined

4.6.2. Industry

Codes of Conduct, Communication / Participation, Industry Association, and Access Security

Objective

- Ensure active participation and adherence to industry initiatives that are designed to optimize performance of the NZRLF and SZRLF.

ERA Risk Rating: Importance of industry codes of conduct, communication/participation, industry association, and access security to each of the NZRLF and SZRLF MODERATE)

Adherence to industry codes of practice by fishers demonstrates good industry practice. The NZRLF and SZRLF have a 'clean green' program which relates to activities such as waste disposal. The fishery management plans for the NZRLF and SZRLF will provide greater certainty of access to the commercial industry through extended tenure of licences, a clear decision-making framework for TACC setting, and explicit allocation between the various sectors of the NZRLF and SZRLF. Industry participation in developing robust management plans is very important.

The South Australian Rock Lobster Advisory Council (SARLAC) is the peak representative body for both the NZRLF and SZRLF. The council has an elected president and employs an executive officer. The majority of licence holders are members of the association.

The collective importance of industry codes of conduct, communication/participation, industry association, and access security were rated as a **MODERATE** risk to each of the NZRLF and SZRLF

Indicators and Performance measures

To be determined

Marine Parks issues

The South Australian Government proclaimed 19 new marine parks in 2010, under the South Australian Representative System of Marine Protected Areas (SARSMPA).

Other Australian States, as well as the Australian Government, are also developing systems of marine protected areas that are representative of marine life in other parts of Australia. Collectively, this Australia-wide effort will contribute to the National Representative System of Marine Protected Areas.

All 19 marine parks are located within the State's waters, generally within 3 nautical miles from the coast and including the gulfs and offshore islands. The South Australian marine parks will be zoned for multiple-uses. They will be sectioned into four zones, with varying levels of use and conservation. Most activities, such as recreational and commercial fishing, will still be allowed within a marine park. There will, however, be particular zones or periods of time, where some activities will not be permitted.

Following the introduction of the *Marine Parks Act 2007*, the outer boundaries of the marine parks have been proclaimed but the zones have not yet been determined. Management plans with zoning for each marine park will be developed in consultation with the community and industry during 2011. Potential impacts of the marine parks on access to State waters by the NZRLF and SZRLF were unknown at the time of the ESD risk assessment workshop.

Broad objective

- Actively engage in the marine parks process and manage the impact of marine parks on the performance of the NZRLF and SZRLF

Marine Parks issues – Compensation

ERA Risk Rating: Importance of marine parks compensation to the NZRLF and SZRLF (EXTREME)

The Rock Lobster Industry as a whole felt that there had been poor consultation from government in terms of compensation for areas lost to fishing (i.e. no take sanctuary zones) within marine parks. Due to the uncertainty surrounding compensation for displaced effort and/or reduced quota, industry from both management zones rated the risk as **EXTREME**. However, given that government has committed to capping the economic impact on commercial fishers at 5%, this risk rating appears too high. Nonetheless, the extreme risk rating does highlight the concerns of industry with the marine parks process and a lack of trust with governance.

Marine Parks issues – Principles

ERA Risk Rating: Importance of marine parks principles to the NZRLF and SZRLF (HIGH)

The Rock Lobster Industry as a whole felt that in general there had been poor consultation from government with the marine parks process. Due to the degree of dissatisfaction with government, the issue of marine parks principles was rated as **HIGH**.

Indicators and Performance measures

To be determined

4.6.3. Others (NGOs etc.)

Others (NGOs etc.)

Objective

- Manage the impact of NGOs on the performance of the **NZRLF and SZRLF**

ERA Risk Rating: Importance of other agencies to the rock lobster fishery (HIGH)

Due to issues with marine parks, industry felt that other agencies (such as the Conservation Council of SA) represent a **HIGH** risk to each of the NZRLF and SZRLF

Indicators and performance measures

To be determined

4.7. External Factors Affecting Performance of the Fishery

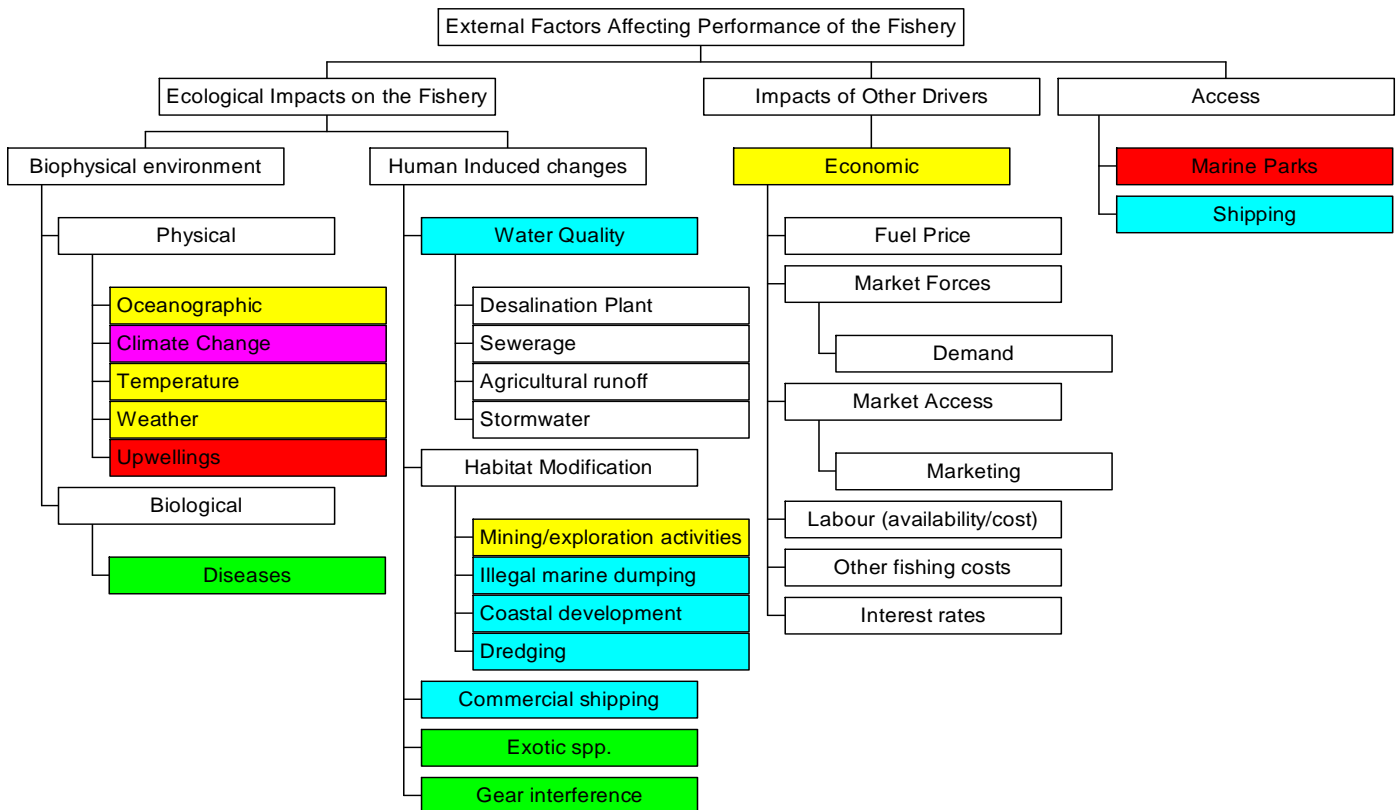


Figure 19 Component Tree for External Factors Affecting Performance of the South Australian Rock Lobster Fishery

4.7.1. Ecological Impacts on the Fishery – Biophysical Environment

Broad objective

- Understand and manage negative impacts on the NZRLF and SZRLF from external physical and biological influences

Physical Environment – climate change and upwellings

ERA Risk Rating: Impacts of climate change (HIGH) and upwellings (EXTREME) on the NZRLF and SZRLF

Ambient environmental factors can influence commercial fishery catches. In rock lobster this effect may occur by reducing catch rates of fish through lower water temperatures reducing feeding activity, or potentially causing mortality by reaching threshold temperature levels for survival. A series of severe upwelling events in the SZRLF have infrequently occurred over the last 10 years, with sea temperature dropping to 3 degrees below the usual

temperatures in seasonal upwellings. One of the factors that may potentially influence this is persistent offshore south east winds that are lasting for longer periods. As well as temperature, rock lobsters are also potentially affected by dissolved oxygen, bottom currents, and turbidity. In addition, the survival of larvae (and thus recruitment to the fishery) is likely to be influenced by these factors.

It was considered **likely (L6)** that upwellings would continue to have a **major (C4)** impact on the RLF, and the risk rating was therefore **EXTREME (24)**. While the potential impact of climate change on upwellings (and other components of the biophysical environment) is unknown, it was considered **possible (L4)** that it may have a **major (C4)** impact on the RLF, and was therefore rated as a **HIGH (16)** risk.

Physical Environment – Oceanographic, Temperature, and Weather

ERA Risk Rating: Impacts of oceanography, temperature, and weather on the the NZRLF and SZRLF MODERATE)

Oceanographic, temperature, and weather factors are all known to play a significant role in the catch rates and productivity of rock lobster. Consequently, it was considered **likely (L6)** that they would continue to have a **moderate (C2)** impact. Thus the risk ratings for the factors of oceanographic, temperature, and weather were all **MODERATE (12)**.

Biological Environment – Diseases

ERA Risk Rating: Impacts of diseases on the rock lobster fishery (LOW)

Unlike other fisheries (e.g. abalone), disease has not been an issue for southern rock lobster. Nonetheless, it was acknowledged that disease can have a major impact on a fishery. Consequently, it was considered a **remote (L1)** possibility that disease could have a **major (C4)** impact on either the NZRLF or SZRLF with a final risk rating of **LOW (4)**.

Indicators and Performance measures

To be determined

4.7.2. Ecological Impacts on the Fishery – Human Induced Changes

Broad objective

- Minimise negative impacts on the NZRLF and SZRLF from external factors and/or drivers.

Water quality

ERA Risk Rating: Impact of water quality on the NZRLF and SZRLF (NEGLIGIBLE)

The regions where southern rock lobsters occur are generally remote from major human settlements where poor water quality is most likely to result from land-based run-off and effluent discharges (e.g. adjacent to Adelaide). It was therefore considered **likely (L6)** that water quality will continue to have a **negligible (C0)** impact on the NZRLF or SZRLF. Thus the risk rating was **NEGLIGIBLE (0)**.

Habitat modification – Mining / exploration activities

ERA Risk Rating: Impact of mining/exploration activities on the rock lobster fishery (MODERATE)

As mining/exploration activities generally occur offshore, the potential exists for mining/exploration activities to have an impact on the RLF through damage to lobster habitat. Thus it was considered **possible (L4)** that mining/exploration activities could have a **moderate (C2)** impact on the RLF, with a final risk rating of **MODERATE (8)**.

Habitat modification – illegal marine dumping, coastal development, and dredging

ERA Risk Rating: Impact of illegal marine dumping, coastal development, and dredging on the rock lobster fishery (NEGLIGIBLE)

The potential exists for illegal marine dumping, coastal development, and dredging to have an impact on the RLF through damage to lobster habitat. However, it was considered **likely (L6)** that the current **negligible (C0)** level of impact would continue to occur, and the final risk rating for each issue was **NEGLIGIBLE (0)**.

Commercial shipping

ERA Risk Rating: Impact of commercial shipping on the rock lobster fishery (NEGLIGIBLE)

The potential exists for commercial shipping to have an impact on the RLF through potential oil spills. However, it was considered **likely (L6)** that the current **negligible (C0)** level of impact would continue to occur, and the final risk rating for each issue was **NEGLIGIBLE (0)**.

Exotic species

ERA Risk Rating: Impact of exotic species on the rock lobster fishery (LOW)

Exotic species can have an impact on commercial fishery species. At present there are no known exotic species that present a major threat to the southern rock lobster or its habitat. Thus, while it was acknowledged that disease can have a major impact on a fishery, it was considered a **remote (L1)** possibility that disease could have a **major (C4)** impact on either the NZRLF or SZRLF with a final risk rating of **LOW (4)**.

Gear interference

ERA Risk Rating: Impact of gear interference on the rock lobster fishery (LOW)

Gear interference does occur in the RLF whereby pots are lifted and the catch is taken. As this activity does affect the performance of the fishery, it was considered **likely (L6)** to have a **minor (C1)** impact, with a risk rating of **LOW (6)**.

Indicators and Performance measures

To be determined

4.7.3. Impacts of Other Drivers

Economic

Objective

- Minimise negative impacts on the NZRLF and SZRLF from external economic drivers.

ERA Risk Rating: Impact of economic drivers on the rock lobster fishery (MODERATE)

Economic drivers such as increasing fuel price, the availability and cost of labour, and interest rates, have recently been unpredictable and are likely to have an impact on the long term profitability of both the NZRLF and SZRLF. The boom in the mining sector has had a major impact on the availability of labour for a number of commercial fisheries, particularly those in the west. To a lesser extent, market forces and other costs of fishing (such as licence fees, maintenance and equipment costs) also impact on the NZRLF and SZRLF. Given that these costs are likely to rise in the future, it was considered that economic drivers are **likely (L6)** to have a **moderate (C2)** impact on both the NZRLF and SZRLF, resulting in a risk rating of **MODERATE (12)**.

Indicators and Performance measures

To be determined

4.7.4. Access

Broad objective

- Minimise negative influences on the NZRLF and SZRLF due to reduced access to the resource

Marine parks

ERA Risk Rating: Impacts of marine parks on the NZRLF and SZRLF (EXTREME)

As discussed in Section 4.6.2, a series of no-take zones will be sited within SA's new system of 19 marine parks. As many of these marine parks overlap with lobster fishing grounds, there is potential for loss of fishing access or reduction in quota. At present, the potential impacts of the marine parks on access to State waters by the NZRLF and SZRLF are unknown.

Because of this uncertainty the industry considers the issue of reduced access to marine parks to **occasionally (L5)** have a **severe (C4)** impact on both the NZRLF and SZRLF with a final risk rating of **EXTREME (20)**. However, it should be noted that several factors have been announced by the State government that will mitigate the risk to industry, including a maximum of 5% economic impact, a fair and reasonable compensation, and an end result of leaving some stock in the water. Thus the risk rating of extreme would be lowered if these mitigation measures are implemented.

Shipping

ERA Risk Rating: Impacts of shipping on the rock lobster fishery (NEGLIGIBLE)

The potential exists for shipping activities to reduce access by the RLF to some fishing grounds. However, it was considered **likely (L6)** that the current **negligible (C0)** level of impact from shipping on the RLF would continue, and therefore the risk rating was **NEGLIGIBLE (0)**.

Indicators and Performance measures

To be determined

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6. APPENDICES

6.1. Appendix 1: Likelihood, Consequence and Risk Matrix Tables

Table 8 Likelihood Definitions

Level	Descriptor
Likely (6)	It is expected to occur
Occasional (5)	May occur
Possible (4)	Some evidence to suggest this is possible here
Unlikely (3)	Uncommon, but has been known to occur elsewhere
Rare (2)	May occur in exceptional circumstances
Remote (1)	Never heard of, but not impossible

(Source: Fletcher et al. 2002)

Table 9 Consequence categories for the Major Retained/Non-Retained Species

Level	Ecological (Retained: target/Non-retained: major)
Negligible (0)	Insignificant impacts to populations. Unlikely to be measurable against background variability for this population.
Minor (1)	Possibly detectable, but minimal impact on population size and none on dynamics.
Moderate (2)	Full exploitation rate, but long-term recruitment/dynamics not adversely impacted.
Severe (3)	Affecting recruitment levels of stocks/or their capacity to increase.
Major (4)	Likely to cause local extinctions, if continued in longer term (i.e. probably requiring listing of species in an appropriate category of the endangered species list (e.g. IUCN category).
Catastrophic (5)	Local extinctions are imminent/immediate

(Source: Fletcher et al. 2002)

Table 10 Consequence categories for the By-Product Species/Minor Non-retained species

Level	Ecological (RETAINED: By-product/Non-retained: other)
Negligible (0)	The area where fishing occurs is negligible compared to where the relevant stock of the species resides (< 1%).
Minor (1)	Take in this fishery is small (< 10%), compared to total take by all fisheries and these species are covered explicitly elsewhere. Take and area of capture by this fishery is small, compared to known area of distribution (< 20%).
Moderate (2)	Relative area of, or susceptibility to capture is suspected to be less than 50% and species do not have vulnerable life history traits.
Severe (3)	No information is available on the relative area or susceptibility to capture or on the vulnerability of life history traits of this type of species. Relative levels of capture/susceptibility suspected/known to be greater than 50% and species should be examined explicitly.
Major (4)	N/A Once a consequence reaches this point it should be examined using Table 9.
Catastrophic (5)	N/A (See Table 9).

(Source: Fletcher et al. 2002)

Table 11 Consequence levels for the impact of a fishery on Protected species

Level	Ecological
Negligible (0)	Almost none are impacted
Minor (1)	Some are impacted but there is no impact on stock
Moderate (2)	Levels of impact are at the maximum acceptable level
Severe (3)	Same as target species
Major (4)	Same as target species
Catastrophic (5)	Same as target species

(Source: Fletcher et al. 2002)

Table 12 Consequence levels for the impacts of a fishery on habitats

Level	Ecological (HABITAT)
Negligible (0)	<p>Insignificant impacts to habitat or populations of species making up the habitat – probably not measurable levels of impact. Activity only occurs in very small areas of the habitat, or if larger area is used, the impact on the habitats from the activity is unlikely to be measurable against background variability. <i>(Suggestion- these could be activities that affect < 1% of original area of habitat or if operating on a larger area, have virtually no direct impact)</i></p>
Minor (1)	<p>Measurable impacts on habitat(s) but these are very localised compared to total habitat area. <i>(Suggestion – these impacts could be < 5% of the original area of habitat)</i></p>
Moderate (2)	<p>There are likely to be more widespread impacts on the habitat but the levels are still considerable acceptable given the % of area affected, the types of impact occurring and the recovery capacity of the habitat. <i>(Suggestion – for impact on non-fragile habitats this may be up to 50% [similar to population dynamics theory] - but for more fragile habitats, to stay in this category the percentage area affected may need to be smaller, e.g. 20%)</i></p>
Severe (3)	<p>The level of impact on habitats may be larger than is sensible to ensure that the habitat will not be able to recover adequately, or it will cause strong downstream effects from loss of function. <i>(Suggestion - Where the activity makes a significant impact in the area affected and the area > 25 - 50% [based on recovery rates] of habitat is being removed)</i></p>
Major (4)	<p>Substantially too much of the habitat is being affected, which may endanger its long-term survival and result in severe changes to ecosystem function. <i>(Suggestion this may equate to 70 - 90% of the habitat being affected or removed by the activity)</i></p>
Catastrophic (5)	<p>Effectively the entire habitat is in danger of being affected in a major way/removed. <i>(Suggestion: this is likely to be in range of > 90% of the original habitat area being affected).</i></p>

(Source: Fletcher et al. 2002)

Table 13 Consequence levels for the impact of a fishery on the general ecosystem/trophic levels

Level	Ecological (ECOSYSTEM)
Negligible (0)	General - Insignificant impacts to habitat or populations, Unlikely to be measurable against background variability. Ecosystem: Interactions may be occurring but it is unlikely that there would be any change outside of natural variation.
Minor (1)	Ecosystem: Captured species do not play a keystone role – only minor changes in relative abundance of other constituents.
Moderate (2)	Ecosystem: measurable changes to the ecosystem components without there being a major change in function. (no loss of components).
Severe (3)	Ecosystem: Ecosystem function altered measurably and some function or components are locally missing/declining/increasing outside of historical range &/or allowed/facilitated new species to appear. Recovery measured in years.
Major (4)	Ecosystem: A major change to ecosystem structure and function (different dynamics now occur with different species/groups now the major targets of capture). Recovery period measured in years to decades.
Catastrophic (5)	Ecosystem: Total collapse of ecosystem processes. Long-term recovery period may be greater than decades.

(Source: Fletcher et al. 2002)

Table 14 Consequence levels for impacts of management of a fishery at a political level

Level	SOCIAL - POLITICAL
Negligible (0)	No impact - would not have any flow-on impacts to the local community. No fisheries department staff would need to make a statement.
Minor (1)	May have minor negative impact on the community (for example, small number of job losses) but these impacts would be easily absorbed.
Moderate (2)	Some increase in unemployment and decrease in overall income to which the community will adjust over time. Some community concern, which may translate to some political action or other forms of protest.
Severe (4)	Significant reductions in employment and income associated with the fishery. Significant employment and income flow-on effects to other community businesses, as reduced income and increased unemployment in fishing works its way through the local economy. Significant levels of community concern over the future of the community, which may translate to political action or other forms of protest.
Major (6)	High level of community impacts which the community could not successfully adapt to without external assistance. Significant level of protest and political lobbying likely. Large-scale employment and income losses in the fishing sector of the local economy. Significant flow-on effects in terms of increasing unemployment and income reductions as a consequence of changes to the fishery. Decline in population and expenditure-based services (e.g. schools, supermarkets, bank). Population declines as families leave the region looking for work.
Catastrophic (8)	Large-scale impacts well beyond the capacity of the community to absorb and adjust to. Likely to lead to large-scale rapid decline in community income and increase in unemployment in areas directly and indirectly related to fishing. May lead to large-scale and rapid reduction in population as families leave the region. Likely to lead to high levels of political action, protest and conflict. Significant reduction in access to private and public sector services, as businesses become unviable and target populations needed to attract government and commercial services decline below threshold levels.

(Source: Fletcher et al. 2002)

Table 15 The General Consequence Table for use in ecological risk assessments related to fishing

Level	General
Negligible (0)	Very insignificant impacts. Unlikely to be even measurable at the scale of the stock/ecosystem/community against natural background variability.
Minor (1)	Possibly detectable but minimal impact on structure/function or dynamics.
Moderate (2)	Maximum appropriate/acceptable level of impact (e.g. full exploitation rate for a target species).
Severe (3)	This level will result in wider and longer term impacts now occurring (e.g. recruitment overfishing).
Major (4)	Very serious impacts now occurring with relatively long time frame likely to be needed to restore to an acceptable level.
Catastrophic (5)	Widespread and permanent/irreversible damage or loss will occur – unlikely to ever be fixed (e.g. extinctions)

(Source: Fletcher et al. 2002)

Table 6 Risk Matrix-colour indicates risk ratings

Likelihood	Consequence					
	Negligible (0)	Minor (1)	Moderate (2)	Severe (3)	Major (4)	Catastrophic (5)
Remote (1)	NEGLIGIBLE	LOW	LOW	LOW	LOW	LOW
Rare (2)	NEGLIGIBLE	LOW	LOW	LOW	LOW	LOW
Unlikely (3)	NEGLIGIBLE	LOW	LOW	LOW	MODERATE	MODERATE
Possible (4)	NEGLIGIBLE	LOW	MODERATE	MODERATE	HIGH	HIGH
Occasional (5)	NEGLIGIBLE	LOW	MODERATE	HIGH	HIGH	EXTREME
Likely (6)	NEGLIGIBLE	LOW	MODERATE	HIGH	EXTREME	EXTREME