

**The South Australian Fisheries Management Series  
Paper No. 50**

**Management Plan for the Beach-Cast Seagrass and  
Marine Algae Fishery**

**Draft for Public Consultation**

**Fisheries Division  
Primary Industries and Resources South Australia**

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

### **The South Australian Fisheries Management Series**

#### **Paper number 50: Management Plan for the Beach-Cast Seagrass and Marine Algae Fishery**

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# 1 FOREWORD

## Management Plan for the Beach-Cast Seagrass and Marine Algae Fishery

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The marine resources of South Australia are community owned resources. The role of the Government, as custodian of these resources on behalf of the broader community and future generations, is to ensure that they are used in an ecologically sustainable and economically efficient manner, while at the same time promoting optimum utilisation and maximising returns to the South Australian community.

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

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

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

I am pleased to support this revised Management Plan for the Beach-Cast Seagrass and Marine Algae Fishery in South Australia, that has been prepared by PIRSA Fisheries, in accordance with Section 20 of the *Fisheries Act 1982*. In the case of beach-cast seagrass and marine algae wrack, the dangers of over-exploitation apply not so much to the wrack itself as to the organisms and communities dependent upon it as a source of nutrients, food, shelter and refuge.

This Management Plan provides a framework to address key challenges facing the future management of the Beach-Cast Seagrass and Marine Algae Fishery over the next five years.

**Hon Rory McEwen MP**  
Minister for Agriculture, Food and Fisheries  
Minister for Forests

/ /2007

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### 3 PURPOSE

The purpose of this Management Plan is to provide a detailed outline of the strategic policy framework to provide for the ecologically sustainable management of beach-cast seagrass and marine algae harvesting in South Australia. The beach-cast seagrass and marine algae fishery is classed as a Miscellaneous Fishery. This Management Plan sets out a formal harvest strategy to achieve its objectives and provides direction for the formulation of regulations contained within the *Fisheries (Scheme of Management – Miscellaneous Fishery) Regulations 2000* and the *Fisheries (General) Regulations 2000*. This Management Plan is intended to provide greater certainty in day-to-day and medium term management decision-making, for all stakeholders.

This Management Plan is set in place to ensure that beach-cast marine plant (wrack) resources in South Australia are exploited within biologically acceptable levels.

Access to marine resources, managed by the Government on behalf of the broader community and future generations, comes with certain obligations for commercial licence holders, recreational participants and indigenous harvesters regarding the proper management and care of marine resources. These obligations are set out in this Management Plan. Information in this plan provides a reference for the broader community in relation to the management measures that have been introduced to ensure the long-term sustainability of beach-cast seagrass and marine algae wrack resources in South Australia.

The *Fisheries Act 1982* provides a broad statutory framework to ensure the ecologically sustainable management of South Australia's marine, estuarine and freshwater resources. In the administration of the *Fisheries Act 1982*, the Minister for Agriculture, Food and Fisheries and the Director of Fisheries must operate in accordance with the following objectives (*Fisheries Act 1982*, Section 20):

- a. *ensuring, through proper conservation, preservation and fisheries management measures, that the living resources of the waters to which this Act applies are not endangered or overexploited;*
- b. *achieving the optimum utilisation and equitable distribution of those resource;*
- c. *insofar as this Act applies to the River Murray, seeking to further the objects of the River Murray Act 2003 and the Objectives for a Healthy River Murray under that Act; and*
- d. *insofar as this Act applies to the Adelaide Dolphin Sanctuary, seeking to further the objects and objectives of the Adelaide Dolphin Sanctuary Act 2005.*

This Management Plan sets out management strategies and key performance measures to allow for assessment of the degree to which these objectives are being achieved. A key goal of this Management Plan is to ensure that an appropriate balance exists between the need to maintain ecosystem structure and processes, and the role that beach-cast seagrass and algae plays in that structure, to allow the sustainable exploitation of wrack resources over the long term, and the optimum utilisation and equitable distribution of these resources.

This Management Plan aims to continue moving towards a more integrated management framework for the beach-cast seagrass and marine algae fishery by incorporating environmental management principles with standard fisheries management. It also aims to provide for ongoing adaptive management of the fishery as new scientific knowledge becomes available, and encourages research on this issue.

## 4 SCOPE OF THE MANAGEMENT PLAN

### 4.1 General

This Management Plan covers all commercial, recreational and traditional harvesting activities undertaken in relation to the beach-cast seagrass and marine algae resources in South Australia. The regulations that govern the management of the South Australian Beach-Cast Seagrass and Marine Algae Fishery are established in the *Fisheries (Scheme of Management – Miscellaneous Fishery) Regulations 2000* and the *Fisheries (General) Regulations 2000*. This Management Plan describes management and research arrangements that will ensure the long-term protection and sustainability of the resource, in accordance with Section 20 of the *Fisheries Act 1982*. It does not form part of the *Fisheries (Scheme of Management – Miscellaneous Fishery) Regulations 2000* and does not have any statutory basis. This Management Plan is an expression of the policy that applies in relation to the harvest of beach-cast seagrass and marine algae wrack in the Miscellaneous Fishery that will inform the exercise of any discretionary decision-making powers in the legislation, as they apply to the fishery.

The exploitation of a natural marine resource for commercial use is regarded as a commercial activity under the terms of the *Fisheries Act 1982*. In addition, a ‘fish’ is defined in Section 5 of the *Fisheries Act 1982* (the Act), as: “***an aquatic organism of any species and includes the eggs, spat or spawn, or the body or part of the body (including the shell) of such an organism***”. Seagrass and marine algae products, whether drift-cast, beach-cast or attached, are a natural marine resource and/or ‘fish’ for the purposes of the *Fisheries Act 1982*. Accordingly, the harvesting of beach-cast seagrass or marine algae accumulations from any beach of the State is under the care, control and management of the Fisheries Division of Primary Industries and Resources South Australia (PIRSA). Beach-cast wrack harvesting is restricted to between the mean high water mark and the mean low water mark of the approved harvesting site at spring tides. The new *Fisheries Management Act 2007* will replace the *Fisheries Act 1982* on 1 September 2007.

**For the purposes of this Management Plan, beach-cast seagrass and seaweed accumulations are referred to as “beach-cast wrack”.** Wrack is drifting plant matter deposited onto beaches. Technically wrack may consist of kelp or other detached macroalgae, seagrasses, animal carcasses and other organic matter deposited from the sea onto a beach by waves or wind (Fairweather and Henry 2003). Harvesting includes the removal, clearance, movement, re-location or disturbance of any part of a wrack. It is also emphasised that this Management Plan covers only beach-cast wrack and does not refer to flora attached to a substrate or drifting in the water column. Removal of attached or floating marine plants is prohibited.

In South Australia, the harvesting of beach-cast wrack is a relatively small industry. Interest in harvesting has resulted from a market demand for seagrass and algal products. In addition beach-cast wrack may be harvested in some cases for amenity purposes. Beach-cast wracks serve several important roles in the ecology of local coastal environments. Beach-cast wrack contributes to the food web dynamics of beach and near-shore marine communities, including valuable fisheries, by supporting microbial and invertebrate fauna that are preyed on by higher-level consumers and they supply nutrients that can be utilised by plant and animal communities. Beach-cast wrack also offer habitat to many bird species, some of high conservation, status and provide protection to coastal dunes and other important coastal environments.

## 4.2 Operation of the Management Plan

This Management Plan will operate from 2007 to 2010 inclusive, subject to annual review and amendments that are considered necessary by the Director of Fisheries or the Minister for Agriculture, Food and Fisheries. The Director of Fisheries will use this Management Plan to guide annual processes for providing advice to the Minister on management and research on an as required basis due to the miscellaneous nature of the fishery. Decision-making processes in this Management Plan have been designed to deliver improved public accountability on the management of the fishery.

## 4.3 Review of the Management Plan

This Management Plan is a working document that reflects the current understanding of the beach-cast seagrass and marine algae fishery, and as such is expected to change over time. This Management Plan will be periodically reviewed and improved as advancements in knowledge and management are made. However, no major departure from the stated management arrangements will occur unless the Director of Fisheries is otherwise directed by the Minister for Agriculture, Food and Fisheries during the life of this Management Plan. In 2010, PIRSA Fisheries will undertake a major review of the fishery, and this Management Plan, including the strategic research and monitoring plan (see section 8).

A wide variety of community and conservation groups have a stake in the preservation of coastal and near shore marine environments. Much of South Australia's coastline is relatively pristine and provides highly valued recreational and tourism opportunities to the South Australian community as well as to overseas visitors. The general public, as well as all interested organisations, will be offered the opportunity to provide comment on this Management Plan when it is under review in 2010.

The *Fisheries Management Act 2007* will be gazetted on 1 September 2007. The review of this management plan in 2010 will be undertaken under the new Fisheries Management Act.

## 4.4 Key Policy Drivers

This Management Plan aims to achieve outcomes that are consistent with broader Government objectives. Other important policy drivers that have been taken into account in the development of this Management Plan are detailed below:

- National Strategy for Ecologically Sustainable Development;
- The Precautionary Principle, as set out in the Intergovernmental Agreement on the Environment;
- International Conventions and Agreements;
- *Environment Protection and Biodiversity Conservation Act 1999*;
- National Policy on Fisheries Bycatch;
- State Inter-Governmental Management Arrangements; and
- The South Australian Living Coast Strategy.

#### 4.4.1 National Strategy for Ecologically Sustainable Development

The principles of Ecologically Sustainable Development (ESD) have been incorporated into fisheries legislation and management frameworks throughout Australia. The Australian Government defined the concept of ESD in the National Strategy for ESD as:

*‘Using, conserving and enhancing the community’s resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased’* (Australian Government, 1992).

The goal of the National Strategy for ESD is:

*‘Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends’* (Australian Government, 1992).

To achieve this goal, the following core objectives were developed (Australian Government, 1992):

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

In addition to the core objectives, the following guiding principles need to be considered for a balanced approach in pursuing the goal of ESD (Australian Government, 1992):

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

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

The National ESD Reporting Framework highlights that implementing ESD in the day-to-day management of fisheries requires consideration of not only the impacts of fishing on target

species, but also the impacts of fishing on non-target species and the wider ecosystem. Linked to this is a recognition that the economic health of a fishery also relies on maintaining essential ecological processes. In addition, governments and key stakeholder groups must be able to satisfy the wider community that the management systems in place are adequate and that fisheries are providing sufficient socio-economic benefits to justify any negative impacts they may have.

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

#### **4.4.2 The Precautionary Principle (Intergovernmental Agreement on the Environment)**

There is no consensus on the definition of a precautionary approach, but it is generally understood that it is applied as a risk management tool. A well-known approach to precaution is Principle 15 of the Rio Declaration of the United Nations Conference on Environment and Development:

*'In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation'* (FAO, 1996).

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

The precautionary approach to fisheries management recognises that changes in fisheries systems are only slowly reversible, difficult to control, not well understood and subject to changing environmental and human values (FAO, 1996). The implications of adopting a precautionary approach to fisheries management are summarised as follows (FAO, 1996):

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

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

The Australian and State Governments formed an agreement in 1992 to implement a precautionary approach to all facets of policy development and decision-making concerning the environment. This agreement known as the Intergovernmental Agreement on the Environment, is embodied in the resultant *National Environment Protection Council Act 1994*. Section 3.5.1 (precautionary principle) of the Australian Intergovernmental Agreement on the Environment states that:

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

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

This Management Plan seeks to promote a precautionary approach to the management of the beach-cast seagrass and marine algae wracks through its harvest strategy. For the purposes of this Management Plan, the precautionary principle has the same meaning as in Section 3.5.1 of the Australian Intergovernmental Agreement on the Environment.

#### **4.4.3 International Conventions and Agreements**

The international conventions “The Convention on Migratory Species” and the “Convention on Biological Diversity” place obligations on Australia that may have implications for this Management Plan.

Australia is a signatory to two bilateral agreements on migratory shore birds, one with Japan, the other with China. The Japan Australia Migratory Bird Agreement (JAMBA) and the China Australia Migratory Bird Agreement (CAMBA) detail a list of endangered migratory shore birds which both countries agree to prohibit the taking of and to protect key habitats for their survival. Beach-cast wrack has been identified to provide the basis of some of the listed birds’ food chain.

In order to address the issue of migratory birds and to protect nesting or aggregation sites, a number of measures are being implemented.. The highly mobile nature of much of the harvested wrack may already prevent colonisation of migratory birds and other species.

The proclamation of the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) in July 2000 provides statutory cover for these international obligations where actions impact on matters of national environmental significance. As beach-cast wrack supports migratory shorebird food chains as well as providing habitat to endangered species of wildlife such as the hooded plover and the orange-bellied parrot, the actions of harvesting the wrack will require monitoring to ensure that a significant impact does not occur.

#### **4.4.4 Environment Protection and Biodiversity Conservation Act 1999**

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

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

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

PIRSA Fisheries prepared a submission during 2003, to allow for the Australian Government Department for the Environment and Heritage to undertake an assessment of the management framework in place for beach-cast wrack, against the EPBC Act 'guidelines for the ecologically sustainable management of fisheries'. The fishery was considered as exempt from the export regulations of the EPBC Act on the 9 August 2004 and will be included on the exempt list until 1 August 2009.

PIRSA Fisheries will advise DEH of any material change to the management regime that could affect the criteria on which an EPBC decision is based, within 3 months of that change being made.

#### **4.4.5 State Inter-Governmental Management Arrangements**

##### **4.4.5.1 Department of Transport, Energy and Infrastructure (DTEI)**

The Minister for Transport is the custodian of the seabed of the State under the *Harbors and Navigation Act 1993*. Part 3 of the *Harbors and Navigation Act 1993* defines 'adjacent' and 'subjacent' land as:

- Adjacent land – extends from the low water mark on the shore to the nearest road or section boundary, or to a distance of 50 metres from the high water mark (whichever is the lesser distance) but not land vested in fee simple in any person or otherwise removed from the Minister. This is often referred to as the foreshore.
- Subjacent land – is that underlying the navigable waters of the State (commonly referred to as the seabed).

If the land is not a reserve under the *National Parks and Wildlife Act 1972*, or an Aquatic Reserve under the *Fisheries Act 1982*, then the Governor may, by proclamation, place any adjacent or subjacent land belonging to the Minister for Transport under the care, control and management of any Minister or Authority but if within a local government boundary the Council must be given the prior opportunity to make representation on any proposal.

The foreshore, which for the vast majority of our coastline is within the boundaries of a Council, is under the care, control and management of the Council (if not within a Council the Minister for Transport has care, control and management). Council controls commercial activity by Council by-law (which requires the approval of the Minister for Transport or if within a port, the port operator under provisions of the *Harbors and Navigation Act 1993*).

However, the removal of wrack for commercial purposes requires an authority under the *Fisheries Act 1982*.

##### **4.4.5.2 Local Government**

Beach-cast wrack harvesting is regarded as a commercial activity and local government may need to determine (i) if harvesting beach-cast wracks constitutes development for the purposes of the *Development Act 1993* and (ii) whether the land that the harvesting activity takes place on is regulated for a specific purpose under a Council's Development Plan.

In addition, Councils may control vehicular access to the beach and/or enforce by-laws regarding the nature and manner of any activities conducted on the foreshore, such as restricting the timing of harvesting to avoid or minimise conflicts with other beach users.

Subject to consultation with PIRSA, DEH and DTEI, a permit may be granted to coastal Councils for the removal of permanent accumulations of beach-cast wrack at locations where Councils can provide appropriate justification (public swimming beaches, boat ramps, recreation areas) for the removal of persistent wrack deposits to improve public amenity values whilst maintaining stability of the beach and dune system. However, if the Council is proposing to **remove and on-sell beach-cast wrack** they are required to hold a Miscellaneous Fishery Licence under the terms and conditions of this Management Plan.

#### **4.4.5.3 Department of Environment and Heritage (DEH)**

The DEH is responsible for environment policy, biodiversity conservation, heritage conservation, environmental sustainability and animal welfare, and is a custodian of information and knowledge about the State's environment. The Department also manages the State's public land - land held in the conservation reserve system and as Crown lands (DEH website, 2006).

DEH also has a key advocacy and engagement role across Government and with business and communities throughout South Australia. It makes an important contribution to the economic and environmental health of the State by:

- Driving strategies for sustainability across government;
- Creating the basis for nature-based tourism industry;
- Providing essential environment and land information; and
- Generating employment opportunities in regional areas.

DEH was consulted during the development of this Management Plan and for the issuing of additional Miscellaneous Fishery Licences through the use of the Inter-Departmental Assessment Protocol (Appendix 11.2).

##### **4.4.5.3.1 Coast Protection Board**

The Coast Protection Board, which is administered by the Coastal Protection Branch of DEH, is responsible for the management of coast protection issues and the provision of direction and advice on coastal development. CPB has expressed concern at the removal of beach-cast wrack from South Australian beaches due to their role in the formation and stabilisation of sand dunes, prevention of soil erosion and general protection of the foreshore as well as their importance to the littoral and coastal food web and in providing habitat to many bird species.

## 5 MANAGEMENT OF THE FISHERY

### 5.1 Historical overview

#### 5.1.1. Commercial Harvesting

Beach-cast wrack harvesting has been a sporadic activity for many decades in South Australia, being carried out opportunistically whenever significant quantities of wrack are deposited on the foreshore. Internationally, Australia and South Africa collect the most amount of beach-cast wrack for commercial purposes (McClary et al. 2005). Beach-cast wrack is harvested for a variety of uses throughout Australia and overseas, by both commercial operators and the recreational sector. Seagrass wrack is commonly stored in paddocks and allowed to decompose for several years before it is suitable for use as a soil improver or as garden mulch (Morand *et al.* 1990). Marine algae is processed immediately either via composting or by drying on outdoor racks and crushing. Algal derivatives are used in the production of alginate and agar, mineral supplements, cattle feed, garden fertilisers, aquaculture feed and pesticides (Kirkman and Kendrick, 1997 and McClary et al. 2005).

The current fishery began formally developing early in 1990 as it was considered that beach-cast wrack harvesting had the potential to produce exportable, value-added primary products and thus improve local regional economies. Up to this time, there were no formal management arrangements or licensing regulations in place for the harvesting of beach-cast wrack. Initially a permit system was used authorising a person to engage in the removal or disturbance of beach-cast wrack material, which were issued under Section 48G of the *Fisheries Act 1982*. These permits were issued:

- (i) For the purposes of market research and development, to identify potential markets for seagrass and algal products and determine if the industry could be viable; and
- (ii) To allow certain seaside Councils to improve local beach access and amenity. Over the 1990's, a total of seven permits were issued under this management system, mainly to operators in the southeast of the State.

It was later determined however, that issuing these permits under Section 48G of the *Fisheries Act 1982*, did not adequately apply to the harvesting of beach-cast wrack for commercial purposes (authorisation for the clearance of beach-cast wrack for amenity purposes still currently uses this permit system). In light of this, from 1996 the Director of Fisheries began issuing exemptions under section 59 of the *Fisheries Act 1982*, as an interim measure. In late 1996, in response to the increased interest in wrack harvest from new and existing exemption holders, PIRSA Fisheries declared a moratorium on the issue of any new exemptions in the fishery, pending the development of a management plan.

The development of a management plan for harvesting beach-cast seagrass and marine algae in 2000 led to a review of the management initiatives used and identified that the most appropriate management arrangement for granting access to beach-cast wrack as a commercial operation was by the means of a Miscellaneous Fishery Licence under the newly released *Fishery (Scheme of Management - Miscellaneous Fishery) Regulations 2000*. As a result all existing permit holders, harvesting for commercial purposes, were offered a Miscellaneous Fishery Licence in the fishery. If a current permit holder did not wish to make an application for a Miscellaneous Fishery Licence, then a licence could be issued through a prescribed tender process. This process resulted in the issue of 3 Miscellaneous Fishery Licences for beach-cast wrack harvesting. Miscellaneous Fishery Licences are not transferable.

There is currently no research basis upon which to determine ecologically sustainable beach-cast wrack harvest levels. PIRSA Fisheries is currently supporting research on beach-cast

wrack by Flinders University. In the case of beach-cast wrack, the dangers of over-exploitation apply not so much to the wrack itself but to the organisms and communities dependent upon it as a source of nutrients, food, shelter and refuge. There are also no historical records of wrack biomass, composition or turnover rates for any beach in the State. Moreover, any assessment of wrack abundance is problematic because of the highly patchy and mobile nature of the resource (McClary et al. 2005). Thus, averaged amounts of beach wrack calculated for a length of coastline are probably over-estimates as wrack is patchily distributed across sites and between seasons (Kendrick *et al.* 1995). In the absence of this scientific data and because of concerns regarding the possible impact on coastal fisheries from the removal of wrack accumulations, PIRSA Fisheries has adopted a 'precautionary approach' to the harvesting of beach-cast wrack. Harvest levels have fluctuated over the life of the fishery with variation in wrack availability dependent on storms and market requirements.

The management history of the Beach-Cast Seagrass and Marine Algae Fishery is summarised in Table 1.

**Table 1: Management milestones for South Australian beach-cast seagrass and marine algae fisheries.**

Date	Milestone
1990	Fishery started – 2 permits issued
1996	Moratorium of the issue of any new permits
2000	Management Plan completed
	WTO Issued
2003	3 Miscellaneous Fishery Licences issued to existing permit holders
2004	Considered as exempt from the export regulations of the EPBC Act on the 9 August 2004
2006	Management Plan reviewed
2007	One Miscellaneous Fishery Licence expired

### 5.1.2. Amenity Clearance Permit

Authority to clear beach-cast wrack accumulations may be considered for local government in some instances for amenity purposes. This is generally in areas where beach-cast wrack accumulations may adversely affect the recreational use and enjoyment of beaches and coastal public venues.

The decomposition process of beach-cast wrack often produces hydrogen sulphide gas, which has a highly unpleasant odour, and attracts plagues of beach flies (Kirkman & Kendrick 1997). Metropolitan and District Councils are therefore interested in removing beach-cast wrack from beaches which are recognised as important local tourism assets, as well as at specific sites (such as boat ramps and marinas) where wracks are regarded as a problem. This has the potential of cleaning up and beautifying popular tourist beaches and thereby benefiting both local residents and visitors.

### 5.1.3. Recreational Harvesting

Members of the public often seek to obtain small amounts of beach-cast wrack in particular, for use as 'mulch' or fertiliser on domestic gardens. Decisions relating to recreational (non commercial) harvests of beach-cast wrack are the responsibility of the relevant local government, where enabled through regulation. In some cases, local by-laws exist which prohibit this without Council permission. These requests have generally been granted, provided the material is harvested by hand, only small quantities are collected and it's a strictly non-commercial activity. In a few cases, where a Council believes it is detrimental to the shoreline, this activity is either discouraged or actively prohibited. The recreational

harvest of beach-cast wrack from within commercial harvest areas is allowed, but must be approved by the local Council due to beach access restrictions. Coastal Councils seeking to authorise recreational collection will be required to provide PIRSA Fisheries with a policy on recreational collection for approval.

There is currently no data collected on the recreational take of beach-cast wrack, as it is considered to be a small amount and have negligible risk on the coastal ecosystem.

#### **5.1.4 Aboriginal Harvesting**

Currently none of the Miscellaneous Fishery Licence holders that are entitled to take beach-cast wrack are Aboriginal. There are also no known documented historical accounts of Aboriginal use of beach-cast wrack.

The State, Native Title parties and the commercial fishing industry are currently involved in negotiations of Indigenous Land Use Agreements (ILUAs) with a view to resolving native title claims. The future involvement in existing commercial fisheries by Aboriginal persons or communities may be considered in this process.

#### **5.1.5 Illegal Harvesting**

The illegal harvest of beach-cast wrack is not considered to be a significant risk. South Australia has regional fisheries compliance resources to address any illegal activities. To date there have been no prosecutions for offences in this fishery.

### **5.2 Consultation and Co-management**

No formal requirements currently exist in the *Fisheries Act 1982* to consult with the broader community concerning fisheries management decision-making. However, as a matter of policy, PIRSA Fisheries consults with key stakeholder groups and the broader community through public comment processes when significant management changes or developments are being considered. For example, all PIRSA Fisheries management plans and policies undergo a public consultation process.

Before PIRSA Fisheries grants access to the resource, it will first give due consideration to the possible impact of the activity on the coastal environment. As numerous agencies are involved in this issue through their statutory obligations, it is necessary to implement a standard consultation arrangement that provides a clear process by which wrack harvest applications will be routinely assessed (including both amenity clearance permits and Miscellaneous Fishery Licence applications). An inter-departmental assessment protocol (Appendix 11.2) will be used to facilitate assessment by PIRSA, DEH and DTEI to determine the suitability and conditions of each harvest application.

The review of the *Fisheries Act 1982* may result in changes to the model for consultation and co-management of marine resources in South Australia.

### **5.3 Current Management Arrangements**

This Management Plan aims to provide a foundation for the fishery to continue to move towards a more integrated, ecosystem-based approach to management. This Management Plan provides a more streamlined approach to resolve previous issues encountered during the development of this fishery which often involved negotiation with several government agencies with overlapping or conflicting jurisdictions.

Management approaches will continue to evolve as knowledge of the interaction between environmental variables and harvesting operations is better understood.

### 5.3.1. Commercial Harvesting – Applications and Conditions

The commercial fishery is managed using a number of input management controls, such as exclusion zones and specific methods of harvesting. Access to the fishery is limited to holders of a current Miscellaneous Fishery Licence (pertaining to the harvesting of beach-cast wrack), renewed annually by the Director of Fisheries under section 34 of the *Fisheries Act 1982*, subject to certain requirements.

The coastline and climatic and topographical conditions experienced in the southeast of the State has lead to this being a significant accumulation of beach-cast wrack. Interest has also been expressed in collecting key target algae species on the West Coast.

Therefore, the harvesting area of Miscellaneous Fishery Licence holders is restricted to:

- the southeast of South Australia, east of the meridian of longitude 139°E,
- and the West Coast of South Australia, west of 135° 37.5'E (Cape Carnot)

Research on the environmental impact of opening new areas to harvest is required before any new applications for a beach-cast wrack Miscellaneous Fishery Licence will be considered. Consequently, any applicant for a new area will need to commission an environmental assessment of that area by a suitably qualified consultant (at the applicants expense). This assessment will be used to assess the licence application, but will not guarantee a licence will be issued.

However, small extensions to existing harvest areas will be considered by the Director of Fisheries, taking into account the determinable impact of the existing operation.

Each Miscellaneous Fishery Licence may contain specific conditions relating to the area to be harvested, methods of harvesting allowed and closed seasons. The methods of harvesting will be set as part of the initial assessment process, during consultation with PIRSA, DEH, DTEI and local government (refer to Appendix 11.2). These regulations are subject to change at the discretion of the Director of Fisheries, in consultation with the harvester and other relevant authorities.

A limit of one Miscellaneous Fishery Licence shall be issued for any specific area in which the Director of Fisheries considers a sufficient volume of the resource exists to support a sustainable harvest. Each Miscellaneous Fishery Licence holder is therefore afforded sole access to a nominated section or sections of shoreline and a particular species allocation. There should be no spatial overlap in the areas of operation among licences. Miscellaneous Fishery Licences are not transferable.

All Councils proposing to remove and **on-sell** beach-cast wrack are required to hold a Miscellaneous Fishery Licence under the terms and conditions of this Management Plan. Councils may sub-contract a licensed harvester to collect beach-cast wrack from a licensed area, under the terms and conditions of this Management Plan where those areas are under the care, control and management of the Council.

Harvesting is not permitted in Spencer Gulf or Gulf St Vincent.

A summary on the management arrangements for the commercial fishery is presented in Table 2.

**Table 2: Overview of current management arrangements for the South Australian beach-cast seagrass and marine algae fishery.**

Management Strategy	
Licensing year	1 July to 30 June
Limited entry (no. of licence holders)*	One licence per area
Main species	Macro-algae Seagrass
Recreational licence	Not required**
Corporate ownership of licence	√
Max. no of masters permitted	2
Licence transferability	No

\* Research on the environmental impact of increasing the number of entitlements is required before any new applications for a beach-cast wrack Miscellaneous Fishery Licence will be considered.

\*\*Must gain permission through the respective local Council.

### 5.3.1.1 Resource Allocation

In light of the difficulties in quantifying the amount of wrack available to harvest, the most appropriate approach is to apply the precautionary principle and ensure the level of harvest is **contained by limiting the numbers of entitlements, until robust scientific evidence, such as an appropriate environmental impact assessment ensures the resource can be harvested sustainably from a new proposed site.** The assessment should take into consideration the nature, amount, function and turnover rate of the wrack available at the site. Regard must be given to whether the wrack is persistent or highly mobile and the likelihood and rate of replenishment. This information will be used to determine whether the wrack accumulation may be harvested sustainably from an area according to best available evidence. The assessments may be undertaken by an approved person engaged by the Miscellaneous Fishery Licence applicant, but must be done according to a described methodology, so reports can be assessed by PIRSA, DEH and DTEI. The methodology must stipulate the parameters to be measured including area covered, time period, methods of estimating amount of wrack, species composition of wrack, likely impact on beach ecology, identification of bird nesting or critical habitat. Issues to be considered in this assessment are listed in appendix 11.3. **Costs resulting from the assessment process will be incurred by the Miscellaneous Fishery Licence applicant and does not guarantee that the applicant will be granted a licence to harvest the wrack.**

The applicant funding the assessment process will be entitled to first right of access to the resource on a particular section, or sections, of the foreshore. This may or may not be the entire length of beach proposed in the original Miscellaneous Fishery Licence application. The harvest area will be determined during the licence assessment process.

Selective harvesting whereby 75% of available wrack is taken, thus leaving 'chunks' (25%) untouched in extended harvesting areas, further ensures pristine habitat remains for critical bird habitat, prevention of erosion, production of copepods and other organisms and assurance of the continuation of important ecological processes. Except in specific cases where it is required for public amenity purposes, complete removal of all beach-cast wrack material from a large section of foreshore will not be permitted. Where the proposed area of operations extends for a long and continuous section of beach, 'exclusion zones' must be interspersed within harvest sites to the effect that no more than 75% of the estimated biomass of beach-cast wrack be removed from a licensed area. Exclusion zones are to run from the low water mark<sup>1</sup> to the high water mark<sup>1</sup> (or to within four metres of the fore dune, where sand dunes

<sup>1</sup> Mean low water mark and the mean high water mark of the approved harvesting site at spring tides

are present), within each designated harvest area. Sections where harvesting is permitted will be located in close proximity to access routes, thus mitigating the need for heavy machinery traversing large sections of beach. It is recognised that, until scientific information is available, the distribution of harvest and exclusion zones will be decided on a largely subjective basis, achieving a balance between community, conservation and commercial values.

It is an objective through proposed research programs that a scientific basis upon which to determine future ecologically sustainable beach-cast wrack harvest levels will be determined.

### 5.3.1.2 Data Collection and Analysis

Section 46 of the *Fisheries Act 1982* requires all beach-cast wrack harvesters operating under a Miscellaneous Fishery Licence to submit catch and effort return information to the Chief Executive of SARDI. In addition to this, they are also required to submit an annual assessment of the harvest area. This information will be available to the Chief Executives of DTEI and DEH at their respective requests. This information will be treated confidentially. The return shall be in a form approved by the Minister for Agriculture, Food and Fisheries. The following information will be requested from each wrack harvester:

- A list of the species harvested;
- The weight of each species harvested;
- The exact location of the harvesting activity;
- The method used to collect the resource;
- The method used to process the resource;
- The use made of the resource;
- The volume of product sold each month; and
- Photo points to monitor the adjacent coastline including dune and beach profiles and vegetation line.

The above information must be submitted every month for the period of the licence. Failure to submit catch and effort information may result in a prosecution or a fine under the *Fisheries (Scheme of Management – Miscellaneous Fishery) Regulations 2000*. This information will be entered into a database, which is managed by SARDI Aquatic Sciences and used to monitor the fishery.

Given the potential impacts of wrack harvesting on beach and near-shore environments and the lack of quantitative scientific data from which to establish a sustainable harvest level, there are good commercial and conservation motives for adopting a precautionary and structured approach to harvesting beach-cast wrack and avoiding development of the fishery before the wider and more long-term impacts of this activity on dependent coastal ecosystem processes have received some scientific attention.

### 5.3.2. Public Amenity Harvesting

One of the benefits from harvesting wrack is an increase in the amenity values of coastal beaches for recreation and tourism. A permit to remove aquatic or benthic flora or fauna can be issued under the authority of the Director of Fisheries, subject to consultation with PIRSA, DEH and DTEI. **The permit holder however, cannot engage in an operation considered to be commercial in nature including the on-selling of removed product.** Wracks that are removed for public amenity purposes are small amounts and are only harvested periodically.

Appropriate harvesting techniques, location and disposal of removed product for amenity purposes will need to be approved by PIRSA Fisheries, prior to harvesting. In the case of public amenity harvest, all wrack accumulation may be removed. The permit holder may only remove unattached or beach-cast wrack from a designated area, and must not involve the taking of sand and if in the presence of sand dunes, only take place within four metres of the fore-dune. An application form can be obtained by contacting the PIRSA Fisheries. Information required as a part of this application includes:

- Harvesting Location;
- Description of wrack including species composition, area and volume;
- Proposed harvesting technique and contracted harvester;
- Use/disposal of removed material;
- Timeframe for removal; and
- Description of why the permit is required.

A report on the area of beach cleared (square metres), volume of wrack cleared (cubic metres) and the method and location of disposal must be supplied to the Director of Fisheries, no later than 15 working days after the expiration of the permit. These permits will generally be issued for a short time with operations occurring within an approved area.

### **5.3.3. Harvesting/Removal Methods**

Harvesting of beach-cast wrack is normally undertaken using machinery such as bulldozers, front-end loaders and excavators which load the material onto trucks for removal. In the commercial fishery, fresh specimens of macroalgae are collected immediately after storms or periods of strong wind, prior to the onset of any degradation or burial by wind-blown sand, from beaches adjacent to offshore limestone reefs. Seaweed harvesting is species-specific; that is, the target species is selected specifically for its unique chemical properties. Individual plants are collected by hand, sometimes from amongst wracks of mixed algal composition, and loaded into vehicles for removal. Macroalgae may also be collected as a by-product of seagrass harvesting.

The harvesting method for both licence holders and permit holders will be subject to consultation with PIRSA and DEH and may be outlined in the conditions stipulated on the respective licence or permit.

### **5.3.4. Areas Prohibited from Harvest**

The harvesting, removal or disturbance of beach-cast wrack by Miscellaneous Fishery Licence holders and amenity clearance permit holders is prohibited from:

- All Aquatic Reserves proclaimed under the *Fisheries Act 1982*;
- Foreshore adjacent to land under the care, control and management of the Minister of Environment and Heritage and gazetted as a reserve under the *National Parks and Wildlife Act 1972*, *Wilderness Act 1992*, *Crown Lands Act 1929* or the *Coast Protection Act 1972*;
- Spencer Gulf and Gulf St Vincent;
- Areas adjacent to lands under the management of the Department of Defence; and
- Foreshore restricted by Local and/or District Councils for the purpose of non-development, recreation or conservation reserves.

In addition, the harvesting of wrack may be subject to specific restrictions relevant to specific locations. Such restrictions will be developed in consultation between PIRSA, DEH and Local

Governments and may include provisions for the preservation of rare or endangered terrestrial flora and fauna or the prevention of degradation of foreshores, dunes and coastal vegetation communities. In addition, the local district or metropolitan Council can impose restrictions on the timing of harvesting to avoid or minimise conflicts with other beach users.

## **5.4 Harvest Strategy**

The following section outlines the linkages between management objectives, strategies, performance indicators, reference points, management triggers and agreed management actions to be introduced, upon reaching reference points or triggers.

### **5.4.1. Management Goals and Objectives**

The *Fisheries Act 1982* provides an overarching framework to ensure long-term sustainability of South Australia's marine, estuarine and freshwater marine resources. Consistent with the objectives of the *Fisheries Act 1982*, a key goal of this Management Plan is to ensure that an appropriate balance exists between the need to explore the beach-cast wrack resource and take a precautionary approach to the exploitation of beach-cast wrack. For this reason, the stock sustainability and environmental management objectives set out in this Management Plan provide the baseline against which all other objectives will be pursued. Economic and social objectives will be pursued to the extent possible, where stock sustainability imperatives have been demonstrably achieved.

The following management goals aim to address key challenges facing the fishery and take into account key policy drivers set out in Section 4.4 (a series of objectives have been established (Table 3) to ensure the management goals are actively pursued):

Goal 1. Sustainable harvesting of marine resources.

- a. Harvesting is conducted at ecologically sustainable level;*
- b. Sufficient biological and environmental information is collected and analysed to make informed management decisions; and*

Goal 2. Minimise impacts on the structure, productivity, function and biological diversity of the ecosystem.

- a. Minimise harvesting impacts on the ecosystem;*
- b. Avoid the incidental mortality of endangered, threatened and protected species.*

Goal 3. Cost-effective and participative governance of the fishery.

- a. Promote cost-effective and efficient management of the fishery;*
- b. Have regard to the range of social, cultural and wider community values attached to the fishery; and*
- c. Promote compliance with management controls.*

### **5.4.2. Management Strategies, Performance Indicators and Performance Measures**

The current management objectives aim to establish a suitable regulatory regime and to ensure the orderly development of the fishery. This means that the key drivers for the fishery are the collection of information and taking a precautionary approach. Furthermore, the ecosystem impacts of harvesting beach-cast wrack in commercial quantities and the effects of ecosystem changes on the surrounding environment need to be considered.

The extent to which this Management Plan is achieving the range of established management objectives and strategies will be assessed using a combination of performance indicators. These indicators are designed to measure the performance of the fishery, the status of beach-cast wrack and the overall condition of the environment.

Ideally, performance indicator values will be estimated using conventional stock assessment methods, models and more empirically based practical methods. Because of the nature of the beach-cast wrack fishery and limited information regarding the impacts of removal on the surrounding environment, these methods will be further developed and refined during the life of this Management Plan as advances in knowledge are made.

Overall fishery performance will be measured by evaluating:

- Longer term trends, as determined by the rate of change in annual performance indicator estimates over a three to four year period, relative to the established reference rates of change.

### **5.4.3. Management Responses**

When annual estimates of one or more performance indicators (refer to Table 3) suggests that the fishery is performing outside of the reference range established in this Management Plan (i.e. if a reference point is reached), PIRSA Fisheries will take the following actions:

1. Notify the Minister for Agriculture, Food and Fisheries and participants in the fishery as appropriate;
2. Establish a working group to undertake a detailed review including an examination of the causes and implications for all key species of reaching one or more reference values. The working group should involve licence holders, a Fisheries Manager and a SARDI scientist.
3. Consider the need for alternative management strategies for each sector, which may include changes or improvements to:
  - Limitations on total effort levels;
  - The type and amount of harvesting gear that may be used;
  - Temporal and spatial closures;
  - Moratoria on the take of individual species;
  - Limits on the total harvest of an individual species (output controls);
  - Limitations on the number of participants; and
  - Processes that influence environmental performance.
4. Provide a report to the Minister, within three months of the initial notification, on the effects of reaching one or more limit reference values, including any recommendations on alternative management strategies.

Given that the commercial harvest of beach-cast wrack is a relatively limited activity and the relative lack of information about the fishery, this non-prescriptive approach to management review and response is considered appropriate. A more structured approach to decision-making may be considered in the future if management tools become available that provide a capacity to evaluate the level of biological risk and uncertainty associated with alternative management strategies.

When a management review is undertaken it does not mean that management arrangements will automatically be altered. If a review reveals that unsatisfactory performance can be

explained by factors other than those directly related to resource sustainability (eg. market forces), then it may be recommended that no management action be taken or that further monitoring be undertaken. In extreme circumstances, the Minister may use the powers in section 43 of the *Fisheries Act 1982* to protect a fishery or an individual species by removing access to a species or limiting fishing activities in a fishery for a specified period while a long-term management response is being formulated.

**Table 3. Harvest Strategy for the beach-cast seagrass and marine algae fishery.**

Management Objectives	Management Strategies	Performance Indicators	Responsibility / Schedule	Reference Points/Triggers
<i>Goal 1. Sustainable harvesting of marine resources</i>				
a. Harvesting is conducted at an ecologically sustainable level.	<ol style="list-style-type: none"> <li>Commercial harvesting is restricted to the southeast and west coast of South Australia.</li> <li>Number of licences capped at existing levels, unless robust ecological scientific evidence demonstrates a proposed harvest area will be sustainable.</li> <li>A limit of one licence is issued for each approved harvesting area.</li> </ol>	<ol style="list-style-type: none"> <li>Number of licences issued annually.</li> <li>Total harvest from an approved harvesting area.</li> </ol>	PIRSA Fisheries / Annual	<ol style="list-style-type: none"> <li>Commercial harvesting outside of approved areas.</li> <li>The provision of robust scientific evidence demonstrating the proposed operation is ecologically sustainable</li> </ol>
b. Sufficient biological and environmental information is collected and analysed to make informed management decisions.	<ol style="list-style-type: none"> <li>Component of licence fees directed towards research / monitoring program determining relative importance of wrack to coastal trophodynamics and coastal processes<sup>2</sup></li> <li>Licence holders: to provide yearly assessment of harvest area</li> <li>Amenity Permit holders: to provide an end of harvest assessment no later than 15 days after the expiration of the permit</li> </ol>	<ol style="list-style-type: none"> <li>Research / monitoring program conducted</li> <li>Licence Holders: Annual assessment of harvest area</li> <li>Amenity Permit Holders: End of harvest assessment of harvest area</li> </ol>	PIRSA Fisheries / Annual	<ol style="list-style-type: none"> <li>No research / monitoring conducted</li> <li>Licence Holders: No annual assessment of harvest area received by the end of the licencing year</li> <li>Amenity Permit Holders: No end of harvest assessment received within 15 days of the expiration of the permit</li> </ol>

<sup>2</sup> This research has not been conducted in the past, as there were no licence fees collected for exemptions. It is intended that such research will be investigated under the new licence regime. Currently, research being conducted has been funded separately, by the Coast Protection Board, PIRSA Fisheries Division and the DEH.

<b>Management Objectives</b>	<b>Management Strategies</b>	<b>Performance Indicators</b>	<b>Responsibility / Schedule</b>	<b>Reference Points/Triggers</b>
<i>Goal 2. Impacts on the structure, productivity, function and biological diversity of the ecosystem are minimised.</i>				
a. Minimise harvesting impacts on the ecosystem.	<ol style="list-style-type: none"> <li>1. Limiting the use of heavy machinery and mechanical harvesters.</li> <li>2. Limiting access to beach by established access points only.</li> <li>3. Direct removal of sand prohibited.</li> <li>4. Harvesters of beach-cast wrack to leave a 10cm covering of wrack and some areas may be excluded from harvest.</li> <li>5. Processing of wrack to be carried out off-site.</li> <li>6. Harvesting area restricted to between the mean low water mark and the mean high water mark of the approved harvesting site at spring tides.</li> <li>7. Where sand dunes are present, no harvesting is to take place within 4 metres of the fore dune.</li> </ol>	<ol style="list-style-type: none"> <li>1. Limited use of heavy machinery and mechanical harvesters in designated harvesting areas.</li> <li>2. Vehicular access to the beach is restricted to established access points.</li> <li>3. Sand remains on beaches during harvest operations.</li> <li>4. Wrack cover remaining on beaches in harvest areas.</li> <li>5. Processing of wrack material occurs in an approved area off the harvesting site.</li> <li>6. Harvest area within an approved site.</li> </ol>	PIRSA Fisheries and Local Government / Annual	<ol style="list-style-type: none"> <li>1. Increasing trend in the use of heavy machinery and mechanical harvesters in designated harvesting areas.</li> <li>2. Use of un-established tracks in order to access harvesting sites.</li> <li>3. Sand is removed from designated harvesting areas.</li> <li>4. No beach-cast wrack cover remaining on beaches in approved harvesting areas.</li> <li>5. Processing of wrack has taken place at a harvesting area.</li> <li>6. Harvesting has taken place outside of an approved harvesting area.</li> <li>7. Where sand dunes are present, harvesting has taken within 4 metres of the fore dune.</li> </ol>

<p>b. Avoid the incidental mortality of endangered, threatened and protected species.</p>	<ol style="list-style-type: none"> <li>1. Harvesting will not be permitted in critical bird habitats or when species of high conservation status are nesting.</li> <li>2. Harvesters of beach-cast wrack to harvest a maximum of 75% of available wrack from the approved harvesting site.</li> </ol>	<ol style="list-style-type: none"> <li>1. Harvest area within an approved site.</li> <li>2. 25% of beach-cast wrack cover remaining in harvest areas.</li> </ol>	<p>PIRSA Fisheries / Annual</p>	<ol style="list-style-type: none"> <li>1. Harvesting at an unapproved site.</li> <li>2. No beach-cast wrack cover remaining on beaches in an approved harvest area.</li> </ol>
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<b>Management Objectives</b>	<b>Management Strategies</b>	<b>Performance Indicators</b>	<b>Responsibility / Schedule</b>	<b>Reference Points/Triggers</b>
<i>Goal 3. Cost-effective and participative governance of the fishery.</i>				
a. Promote cost-effective and efficient management of the fishery.	<ol style="list-style-type: none"> <li>1. Develop and implement arrangements that are effective in achieving management objectives, while minimising costs.</li> <li>2. Determine the annual total real costs of management, research and compliance for the fishery.</li> <li>3. Recover an economic return from commercial licence holders, sufficient to cover the attributed costs of fisheries management, research and compliance, in line with established recovery principles.</li> </ol>	<ol style="list-style-type: none"> <li>1. Trend in the annual total real costs of management, research and compliance for the fishery.</li> <li>2. Trend in the total costs of management, research and compliance in the fishery attributed to the commercial industry, relative to GVP.</li> </ol>	PIRSA Fisheries / Annual	
b. Have regard to the range of social, cultural and wider community values attached to the fishery.	<ol style="list-style-type: none"> <li>1. Permission may be granted to coastal Councils for the removal of accumulations to improve local beaches and for public amenity purposes (management strategies 1., 2., 3., 6. and 7. apply as outlined in Goal 2).</li> <li>2. Ensure that social and cultural issues are given appropriate consideration when developing new management strategies.</li> <li>3. Provide an information service to the public and communicate management to the wider community.</li> </ol>	<ol style="list-style-type: none"> <li>1. Number of coastal Councils with exemptions.</li> <li>2. Scope of stakeholder involvement and community consultation in the development of new management strategies.</li> <li>3. Scope of information available to the public on the management of the fishery.</li> </ol>	PIRSA Fisheries / Annual	<ol style="list-style-type: none"> <li>1. Decreasing trend in the level of stakeholder and community involvement in the development of management strategies</li> </ol>

<b>Management Objectives</b>	<b>Management Strategies</b>	<b>Performance Indicators</b>	<b>Responsibility / Schedule</b>	<b>Reference Points/Triggers</b>
<i>Goal 3. Cost-effective and participative governance of the fishery.</i>				
c. Promote compliance with management controls.	<ol style="list-style-type: none"> <li>1. Undertake annual compliance risk assessment.</li> <li>2. Promote high levels of stakeholder stewardship through established management processes and Fishwatch activities.</li> <li>3. Increase public awareness on the management of the fishery.</li> <li>4. Encourage the community to report fisheries offences to Fishwatch.</li> </ol>	<ol style="list-style-type: none"> <li>1. Risk assessment is updated annually to take into account of changes in the risk profile for the fishery.</li> <li>2. Trend in the number of compliance checks undertaken by Fishwatch each year.</li> <li>3. Trend in the number of reports of illegal activity, relative to the number of compliance actions each year (eg. expiations, formal briefs, cautions).</li> <li>4. Trend in the number of Fishwatch reports each year.</li> </ol>	PIRSA Fisheries / Annual	<ol style="list-style-type: none"> <li>1. Increasing trend in the level of illegal activity.</li> </ol>

## 6 ECOLOGICAL CHARACTERISTICS OF THE FISHERY

### 6.1 Biological Characteristics of Beach-Cast Seagrass and Marine Algae

#### 6.1.1. Seagrass

Seagrasses are underwater flowering plants that evolved from land plants around 100 million years ago. There are about 30 different seagrass species from 12 genera in Australia. Seagrasses grow on sandy to muddy substrates, from the intertidal zone to a depth of approximately 40 metres. They are anchored to the substrate by a network of fibrous underground stems or rhizomes. Their distribution is dependent upon temperature and exposure to wave action but, most importantly, upon light. The depth distribution of seagrasses is therefore influenced by water clarity, as this controls light penetration.

In South Australia, seagrass meadows cover approximately 5000 km<sup>2</sup> of sea floor (Shepherd & Robertson 1989). Combined with meadows in Western Australia and Bass Strait, this constitutes one of the largest temperate seagrass ecosystems in the world (Shepherd & Robertson 1989). Most of these meadows are comprised of *Posidonia* spp. occupying the clear, sheltered waters of Spencer Gulf and Gulf St Vincent (Figure 2). Other major areas of seagrass distribution include the shallow embayments on the western coast of Eyre Peninsula (e.g. Streaky Bay), Lacepede Bay in the southeast of the State and areas of Backstairs Passage, wherever suitable substrate occurs (Figure 2).

The main seagrass species occurring in South Australia are: *Posidonia angustifolia*, *Posidonia australis*, *Posidonia coriaceae*, *Posidonia denhartogii*, *Posidonia sinuosa*, *Amphibolis antarctica*, *Amphibolis griffithii*, *Heterozostera tasmanica*, *Halophila australis* and *Zostera muelleri* (Larkum & den Hartog 1989). In low-energy environments such as the two gulfs and Lacepede Bay, the meadow-forming species *P. angustifolia*, *P. sinuosa*, and *P. australis* are most abundant. *Posidonia* generally requires stable, non-mobile sediments on which to grow and establish dense meadows. *P. coriaceae* and *P. denhartogii* generally only occur as small stands or as fringe communities. The four other species, (*A. antarctica*, *A. griffithii*, *H. tasmanica* and *H. australis*) occur either as fringe communities on the edges of blowouts<sup>3</sup> in *Posidonia* meadows, as thin, dispersed populations on mobile sediments or in stands of mixed species composition (Shepherd & Robertson 1989).

Seagrass plants generally shed their leaves annually in early autumn; the blades are initially buoyant, then sink and accumulate in drifts on the seabed (Shepherd pers. comm.). During periods of strong wind and wave activity, particularly in the winter months, surge and swell resuspends and mobilises the detached leaf blades. Persistent onshore winds blow this beach-cast material into the surf zone and at high tide it is washed onto the beach in clumps. Greater than 95% of the beach-cast seagrass in South Australia consists of the blades of *Posidonia* spp. (Shepherd pers. comm.).

The amount, location and timing of wrack deposition depend on the density and areal extent of offshore seagrass meadows as well as on local tidal, current, wind and storm activity. Wrack remains on the shore for variable lengths of time - in some cases only one tidal cycle - or may become stranded above the high water mark and accumulate over weeks or months forming large semi-permanent deposits. Often, beach-cast material is washed back into the surf zone and re-deposited several times resulting in significant longshore movement of wrack. Consequently, large variations in wrack deposits occur from one location to another and on a monthly, weekly or daily basis. Persistent accumulations are often associated with man-made structures such as groynes, breakwaters and jetties. At Kingston for example,

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<sup>3</sup> Saucer- or trough-shaped depressions of bare, unvegetated sand in the midst of seagrass meadows (Clarke & Kirkman 1989).

there is a large, permanent accumulation of seagrass wrack approximately 2 metres deep covering the beach between the southern groyne of the Maria Creek outlet and the town jetty.

### 6.1.2. Macroalgae

The marine macroalgal diversity of temperate Australia is one of the richest in the world, with approximately 123 species of Chlorophyta (green algae), 203 species of Phaeophyta (brown algae) and about 800 species of Rhodophyta (red algae) recorded within southern Australian waters (Womersley 1984). Many of these macroalgal species are endemic to the region. Robe (in the southeast of SA) is regarded as the westerly limit of a number of key taxa including the large kelp (*Macrocystis angustifolia*) and the bull kelp (*Durvillaea potatorum*). South Australia's macroalgal flora is also characterised by a small number of subtropical species, which generally occur in sheltered waters and inlets where temperatures are high enough for the species to survive.

Macroalgae grow on shallow rocky substrates and are common on the numerous inshore limestone reefs that dot the coastline of South Australia. Some species, particularly the kelps, grow to very large size and form dense subtidal beds. During storms and periods of strong winds, large numbers of these macroalgae are uprooted or fragmented by wave action and swell and later washed up on nearby beaches. The supply of beach-cast algae, like seagrass, is highly variable over short time and space scales, but is again most predominant in winter when very large accumulations may occur. Various seaweed species are found within algal beach wrack; their abundance varies depending on location and the source of the material. The species that are targeted by the fishery are primarily several large brown algae (e.g. *Durvillaea potatorum* and *Ecklonia radiata*) and some of the red algae such as *Gracilaria*.

## 6.2 Nutrient Cycling and Food Webs

Several studies, most notably in Western Australia (WA), New Zealand and South Africa, have highlighted the importance of beach-cast seagrass and macroalgal accumulations as sources of detritus and of particulate and dissolved nutrients which form the basis of beach and inshore marine foodwebs (e.g. Griffiths & Stenton-Dozey 1981; Koop & Griffiths 1982; Lenanton *et al.* 1982; McClary *et al.* 2005; Robertson & Hansen 1982; Griffiths *et al.* 1983). Wracks of dead seagrass and algal material are physically broken down by wave and sand abrasion and are biologically decomposed by the action of bacteria and small invertebrates. Decomposition by bacteria releases nitrogen and phosphorous - nutrients necessary for the growth of offshore seagrass meadows (Bell 1983). In WA, substantially higher concentrations of dissolved nutrients were measured in waters adjacent to beaches covered in decaying wrack material compared with wrack-free beaches, where waters were relatively nutrient-deficient (Bell 1983).

A rich community of detritivores<sup>4</sup>, such as amphipods, isopods (sandflies), coleoptera (beetles) and diptera (flies) rapidly colonises and consumes the decaying vegetation, breaking it down into detritus and particulate carbon (e.g. Griffiths & Stenton-Dozey 1981; Marsden 1991). These organisms must rely on these organic inputs, due to the lack of primary production occurring on beach environments (McClary *et al.* 2005). Griffiths, Stenton-Dozey & Koop (1983) for example recorded 35 species (of which 22 were insects) amongst kelp wrack, which together amounted to more than 97% of the total intertidal faunal biomass. These organisms can reduce the biomass of dead macroalgae to 50% of its initial weight after 2 days and 20% after 14 days, mainly due to consumption by amphipods and dipteran (kelp fly) larvae (Griffiths & Stenton-Dozey 1981; Rieper-Kirchner 1990). Several species of beach flies complete their life cycles within seagrass/algal wrack (Blanche 1992 in Kendrick *et al.* 1995). The herbivorous detritivores are in turn preyed upon by beach-dwelling

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<sup>4</sup> Animals that feed on dead organic matter

macrofauna such as beetles, birds and isopods. Griffiths *et al.* (1983) suggest that at some sites on the southwest coast of South Africa, approximately 95% of the food supply of beach macrofauna comes from the regular, enormous influxes of kelp.

Particulate and dissolved carbon and other organic matter released from wracks by bacteria may either remain in situ and enter the sand column as a source of nutrients to interstitial fauna, or be leached back into the sea at high tide to support detrital-based benthic communities. Very high concentrations of dissolved organic matter (DOM) have been recorded in sand below beach-cast kelp and this in turn supports a high biomass of interstitial meiofauna (Koop & Griffiths 1982; Rieper-Kirchner 1990). Peak numbers of nematodes and oligochaetes for example often occur beneath rotting seaweed (Koop & Griffiths 1982).

Moreover, nutrients, detritus, particulate carbon, bacteria and prey organisms in wracks are often transported by wave action into the surf zone where they serve as an important food source for particulate suspension (filter) feeders, crustaceans, molluscs and fish (Kirkman & Kendrick 1997). For example, work by Lenanton *et al.* (1982) demonstrated that the main prey item of the juveniles of many important commercial fish species such as school whiting (*Sillago bassensis*), yellow-eyed mullet (*Aldrichetta forsteri*) and tommy ruff (*Arripis georgianus*) is the amphipod *Allorchestes compressa* which lives exclusively on detached macrophytes on the beach and in the surf zone.

Detritus from wracks can also be exported offshore to supply food to demersal and abyssal fauna (Suchanek *et al.* 1985 in Thresher *et al.* 1992; Joselyn *et al.* 1983 in Kendrick *et al.* 1995). In addition, recent work in Tasmania (Thresher *et al.* 1992) strongly suggests that "it might also constitute a widespread and potentially important source of productivity for planktonic ecosystems as well". These authors found evidence that the food chain supporting first-feeding larvae of Tasmanian blue grenadier (*Macruronus novaezelandiae*) - the dominant nektonic (midwater) predator of the region - is based on microbial decomposition of seagrass detritus. First feeding is often maintained to be a critical period for fish larval survival. Moreover, higher rates of larval growth were associated with periods of frequent winter storms, when offshore transport of seagrass detritus from coastal wrack accumulations is at a maximum (Thresher *et al.* 1992). Thus, the export of detrital material from wracks may significantly affect the reproductive success of one of temperate Australia's dominant fish predators (Thresher *et al.* 1992).

The wrack community therefore constitutes a significant food resource consisting of fragments of seaweed and seagrasses, bacteria, meiofauna and beach macrofauna. It may remain in situ, providing food for terrestrial detritivores and consumers (including insects and birds) or it may be washed back into the sea during storm or high tide events, where it provides food for benthic coastal communities and important feeding sites for shallow water fish species. Particulate matter from the breakdown of wracks also appears to have a direct effect on offshore secondary production.

### **6.3 Birds**

Many shorebirds and seabirds are associated with wrack accumulations. These birds make use of the beach-cast vegetation for a variety of purposes including feeding, nesting, shelter during strong winds or storms and camouflage while resting. Wrack-inhabiting organisms are preyed upon by a large number of shorebirds and constitute an important food resource for species such as the vulnerable Hooded Plover, which feeds on crustaceans, insects and polychaetes (Kendrick *et al.* 1995). In WA, decomposing wrack provides an important winter food source for Silver Gulls, which feed on kelp fly larvae and amphipods and may time their breeding cycle to coincide with the local availability of wrack (Kendrick *et al.* 1995). On King Island, Ruddy Turnstones and Double-banded Plovers are amongst the birds that forage

in the bull kelp for small invertebrates. These species have all been recorded feeding in beach-cast vegetation in SA as well.

Wrack accumulations also provide habitat and nursery areas for many birds species. They provide protection and camouflage for nest-sites, eggs, chicks and adults alike (McCulloch 1996).

In South Australia, a total of 40 species of birds have been recorded utilising beach-cast wrack in some way (McCulloch 1996). This includes long-distance migratory birds, waiting out the tide or bad weather in the lee of wrack accumulations, as well as many resident species. Wrack thus constitutes a valuable component of bird habitat (McCulloch 1996).

The orange-bellied parrot migrates from breeding grounds in Tasmania to coastal areas in Victoria and south east South Australia for each summer period. It usually frequents the dune and beach system feeding on the vegetation along the coast. This bird is classified as Nationally Endangered under the EPBC Act, Threatened under the Victorian *Flora and Fauna Guarantee Act* 1988; Endangered in Schedule 1 of the *Threatened Species Protection Act* 1995 in Tasmania; Endangered in Schedule 7 of the *National Parks and Wildlife Act* 1972 in South Australia; and Endangered in Schedule 1 of the *Threatened Species Conservation Act* 1995 in NSW and is subject to a Recovery Plan jointly managed by the Australian Government, Victoria, South Australia and Tasmania (Holdsworth and Starks, 2004).

#### **6.4 Coastal Geomorphology**

In contrast to macroalgae, which are subject to very rapid deterioration, seagrasses are composed primarily of cellulose fibre with characteristics that inhibit breakdown of the vegetative matter. Beach-cast seagrass accumulations are therefore typically long-lived, taking as many as 3 - 5 years to fully decompose into detrital matter. As a result, seagrass wrack may accumulate to a height of several metres and serve as a physical barrier between the sea and the dune system, reducing wave energy and providing a degree of protection to the foreshore.

Seagrass wracks also enhance the formation and stabilisation of coastal sand dunes and beaches, their fibrous composition acting as a trap to bind drifting sands and reduce sand erosion in winter. They may also contribute to the fertility and stability of substrates behind the fore-dunes.

## 7 ECOSYSTEM IMPACTS

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

This Management Plan aims to address broad ecosystem impacts at two levels: impacts related to harvesting operations (eg. trophic impacts related to the harvesting of wrack); and external impacts on the environment (eg. productivity of near shore marine communities) broader ecosystem impacts have only recently been taken into account in fisheries management systems and stock assessment. As a result, there is generally a higher level of uncertainty associated with the potential consequences of these impacts.

The national ESD reporting framework outlines a process to identify fishery-related ecosystem impacts and evaluate the level of risk associated with fishing activities. An outline of fishery related impacts on the ecosystem and external (non-fishery related) impacts on the ecosystem are presented in Appendix 11.4 as a component tree. This component tree will be used to undertake a qualitative assessment of the risks to individual species and the wider ecosystem posed by fishing activities and the risks to the fishery from external factors.

It is clear from Section 5 that beach-cast seagrass and algal wracks serve several important ecological functions in environments extending from the supralittoral<sup>5</sup> to the abyssal<sup>6</sup> and encompassing both benthic<sup>7</sup> and pelagic<sup>8</sup> systems. Sandy beaches are characterised by an absence of attached macrophytes and hence an almost complete lack of in situ primary production (Griffiths *et al.* 1983). The import of detached macrophytes from offshore beds provides organic material that delivers nutrients to the interstitial food chain as well as acting as the primary food source for intertidal fauna (Marsden 1991). The macrofauna in particular relies entirely on material imported from the sea to meet its nutritional requirements. Wrack therefore provides a rich food supply that is not only persistent, but also concentrated high up on the beach.

The contribution of decomposing seagrass and seaweed to productivity in marine ecosystems has also been shown to be both measurable and significant. Both in the surf zone and on the beach, wracks are important sites for the nutrient recycling which sustains nearshore primary and secondary production in coastal waters. South Australia's waters are generally nutrient-poor and the decomposition of beach-cast wrack may supply a vital source of particulate and dissolved organic matter to the State's coastal ecosystems. Moreover, the large supply of detritus and prey organisms released during wrack breakdown supports marine food webs, including some that lead to commercially important fish species. This suggests that the removal of wrack material from beaches may have implications for other fisheries that are dependent upon nearshore productivity (Kendrick *et al.* 1995). This has particular significance for seagrass wrack harvesting in the two gulfs in South Australia where there are few, if any, other nutrient inputs to the system and productivity is low (Smith & Veeh 1989). It may however be of less importance in more nutrient-rich coastal marine environments (Kendrick *et al.* 1995) such as the southeast of SA, and perhaps also off the west coast of Eyre

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<sup>5</sup> above the high water mark

<sup>6</sup> pertaining to the ocean depths

<sup>7</sup> of or on the sea bed

<sup>8</sup> of or in the water column

Peninsula, where seasonal upwelling events return nutrient-rich bottom waters to the surface layers. In the southeast there is also an additional input of nutrients to the inshore zone via a series of agricultural drains.

Removal of beach-cast material may disrupt terrestrial and marine food webs, interfere with nutrient recycling to the nearshore zone and deprive subsurface beach organisms of dissolved organic materials (Anderson et al. 1989). This net loss of organic matter from the shoreline will impact upon sandy beach ecosystems in a way that cannot as yet be predicted and must be determined through future research and monitoring.

Beach-cast wrack also clearly constitutes a valuable component of bird habitat for many species of sea and shore birds, including some that are listed as threatened or vulnerable. Harvesting of wrack may adversely affect bird species that are dependent upon undisturbed seagrass wracks for feeding, resting, nesting and raising chicks<sup>9</sup>. It also has the potential to incur damage to the foreshore, interfere with beach stability and contribute to coastal erosion.

Therefore, there are a number of potential environmental impacts associated with beach wrack removal that include: direct impacts to the beach and nearshore environments; disruption of the natural cycle of beach nourishment from nearshore sand dynamics; and impacts to significant sites and features. Off-beach environmental impacts relate mainly to the disposal of beach litter such as plastics, glass and fishing wastes, as well as wrack, at municipal landfills or other locations (Fairweather and Henry 2003). In the absence of this scientific data and because of concerns regarding the possible impact on coastal fisheries from the regular or over-harvesting of beach-cast wrack, PIRSA Fisheries has always adopted a 'precautionary approach' to the harvesting of beach-cast wracks.

## **7.1 Impacts on Bycatch Species**

The South Australian beach-cast seagrass and marine algae fishery is target specific and has no bycatch in terms of what is traditionally considered as bycatch in marine based fisheries. There is however, the unavoidable removal of commensal organisms during harvest. However, the low harvest rates and exclusion zones ensure that these species are not threatened. These species are also not dependent on beach-cast wrack for survival, the use of this is more of an opportunistic measure.

## **7.2 Impacts on Physical Habitat**

Fairweather and Henry (2003) highlight a number of potential impacts from removing wrack which include: pollution and emission impacts from the combustion and noise from machinery; disturbance of fauna from the presence of human workers; removal of natural ecological components including wrack itself (i.e. as a form of organic matter, nutrient source, habitat and refuge) or sediments (also highlighted as a key impact of harvesting in Eyras et al. 2003 and McClary 2005); and the loss of dune vegetation and seed reserves, if cleaning extends up into fore-dunes. Sound emissions may scare off nesting or feeding birds and hydrocarbon based pollution such as exhaust fumes and oil leaks may also occur.

The harvest conditions imposed on beach-cast wrack harvesters ensure that there is minimal impact on the physical habitat. Harvesters must take away no sand from their harvest areas, use exclusion zones where wrack is to be maintained for ecological reasons and are only able to access the beach from existing ramps or access tracks. Local Councils will restrict hours of

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<sup>9</sup> For instance, DEH has identified Cape Jaffa and the area of Kingston Beach north of the Blackford Drain and adjacent to an Urban Coastal Zone Reserve as important habitat for Orange-bellied Parrots. Also the extensive tidal flats associated in Gulf St Vincent and Spencer Gulf provide valuable habitat for shorebirds and waterbirds, some of which are species of national and international importance.

access and administer any seasonal access restrictions as necessary to prevent problems through sound emissions and to ensure that all vehicles and machinery are registered and in good condition to ensure minimal damage to the beach ecosystem. In addition, if sand dunes are present, licence holders are restricted to only removing wrack that is farther than four metres of the fore-dune.

### **7.3 Impacts on Water Quality**

The harvest of beach-cast wrack is a land-based activity and thus has little or no impact upon water quality. The only potential for water quality impact is through the use of machinery in the harvest areas. It is believed that there will be minimal impact from the use of this machinery as it is for only short time periods and the harvesters are not to harvest from below the mean low water mark<sup>10</sup>, thus giving them no reason to enter the water.

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<sup>10</sup> Mean low water mark of the approved harvesting site at spring tides

## **8 STOCK ASSESSMENT AND RESEARCH**

It is intended that enough harvesting information will be collected to make a preliminary assessment of the status of the fishery, and to establish some baseline data with which to assess the future of the fishery. Therefore, the need for the collection and analysis of scientific information must be taken into account in the cost recovery process. Licence fees will reflect the outcome of the decisions made in this process in relation to the appropriate amount of money that is required to manage the fishery.

Further to this, the issue of confidentiality of data collected will need to be addressed, as numbers of fishers in each zone will be less than five persons.

A full research plan for the fishery will be finalised once the full extent of involvement by current licence holders and exemption holders is apparent.

## 9 COMPLIANCE AND MONITORING

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

The main priority risks to sustainable management of the fishery are broken down into three main categories each year: commercial risks, non-commercial risks and fish processor risks. Risk levels are rated using semi-quantitative estimations of:

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

The risk profile prepared for the Miscellaneous Fishery for the 2006/07 licensing year is provided below. The risk priorities contained will be the focus of compliance activity for that period. Other risks will also be addressed as circumstances require. The focus of compliance activity may change during the course of the year on the basis of information received. The risk profile for the fishery is audited and updated each year to take account of any changes to arrangements or emerging issues.

**PIRSA Fisheries Compliance Risk Assessment.**

**Risk mitigation tool-kit: Miscellaneous Fishery 2006-2007**

The risk priorities contained within the table below will be the focus of compliance activity for the Miscellaneous Fishery during 2006-2007. Other risks will be addressed outside of the planned program as circumstances require. Focus risks may change during the course of the year on the basis of information received by the Fisheries Group. Activity and outcome information will be collected in relation to the risks and activities outlined below. The risk profile will be reviewed and updated on an annual basis.

**Table 4: Compliance Risk Assessment for the Miscellaneous Fishery 2006-2007**

<b>Fishery sector</b>	<b>What can happen (risks)</b>	<b>Priority</b>	<b>Possible actions (mitigating strategies)</b>
<b>Commercial</b>	Fishing in closed areas / periods	High	<ul style="list-style-type: none"> <li>• Conduct awareness program - talking to fishers about closures</li> <li>• Conduct random overt patrols</li> <li>• Conduct intel driven investigations / operations</li> <li>• Follow-up and investigate possible illegal activity</li> </ul>
	Take non-permitted species	Moderate	<ul style="list-style-type: none"> <li>• Conduct targeted inspections</li> <li>• Conduct intel driven investigations / operations</li> <li>• Conduct random processor checks</li> <li>• Follow-up and investigate possible illegal activity</li> </ul>
	Contravene exemption conditions	low	<ul style="list-style-type: none"> <li>• Conduct awareness program - talking to fishers about permit conditions</li> <li>• Conduct random inspections to determine compliance with exemption conditions</li> <li>• Follow-up and investigate possible illegal activity</li> </ul>
<b>Non-Commercial</b>	Illegal sales	Low	<ul style="list-style-type: none"> <li>• Conduct intel driven investigations</li> <li>• Conduct intel driven operations</li> <li>• Follow-up and investigate possible illegal activity</li> </ul>
<b>Processor</b>	Purchase rec fish	Moderate	<ul style="list-style-type: none"> <li>• Liaison and networking with processor sector (eg bait suppliers)</li> <li>• Conduct random processor checks.</li> <li>• Conduct targeted investigations</li> <li>• Follow-up and investigate possible illegal activity</li> </ul>

	Take over bag and boat limit	Moderate	<ul style="list-style-type: none"> <li>• Conduct awareness campaign on size and bag limits</li> <li>• Liaise with Fishcare volunteers</li> <li>• Provide awareness talks to schools and groups</li> <li>• Conduct covert and overt operations / investigations</li> <li>• Use Fishwatch to target priorities</li> <li>• Follow-up and investigate possible illegal activity</li> </ul>
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## 11 APPENDIX

### 11.1 Licensing System as per current Management Plan

The most appropriate arrangements for granting access to beach-cast wrack are by means of a fishery licence under the *Fisheries (Scheme of Management – Miscellaneous Fishery) Regulations 2000*. The following conditions are to apply with regard to licensing regulations governing terms and conditions of access and operation in the fishery:

1. A new licence application will only be considered by PIRSA Fisheries, if robust scientific evidence demonstrates a new proposed harvesting area will be ecologically sustainable. This should be in the form of an Environmental Impact Assessment (EIA) as described in appendix 11.3. Please note that this will not however ensure that the licence application will be approved.
2. A licence can only be granted to a body corporate or a natural person;
3. The Director of Fisheries shall only issue a licence once licence fees (or the first installment thereof) have been paid. The cost of a licence is determined by the Minister and will be based on the costs of administering and managing the fishery. Licence fees are charged on a yearly basis;
4. Each licensee will be permitted to nominate a total of two 'Masters' who may harvest the resource on their behalf within their approved designated harvesting area;
5. A limit of one licence shall be issued for each designated harvest area in which the Director of Fisheries considers a sufficient volume of the resource exists to support a sustainable harvest. Each licensee is therefore afforded sole access to a nominated section or sections of shoreline and a particular species allocation (*see* Section 6.3.2 and Section 6.3.3). There should be no spatial overlap in the areas of operation among licences;
6. Each licence may contain specific conditions relating to the area to be harvested, methods of harvesting allowed and closed seasons. The methods of harvesting will be set as part of the initial assessment process, during consultation with PIRSA, DEH, DTEI and Local Government (refer to Appendix 11.2);
7. The holder of a licence must provide PIRSA Fisheries with catch and effort results for each calendar month in which the licence is current (*see* Section 6.3.4), in a form approved by the Minister for Agriculture, Food and Fisheries. The licence holder must also supply photo point monitoring of beach and dune profile and vegetation line;
8. All Councils proposing to remove and on-sell beach-cast wrack are required to hold a licence under the terms and conditions of this Management Plan.
9. Beach-cast wrack licences will be transferable but access rights to a particular section of beach may not be traded as this is not the jurisdiction of PIRSA Fisheries (Ecological Assessment of South Australian Beach-Cast Seagrass and Marine Algae Fisheries Page 37).

## 11.2 Inter-Departmental Assessment Protocol

1. Licence application is received by PIRSA Fisheries with specific details of the operation documented on the appropriate application form. All applications to harvest beach-cast wrack will first be screened by PIRSA Fisheries, who will assess the overall merits of the application and ensure that it complies with the objectives of the Management Plan for the fishery. Please note that new licence applications will only be accepted if robust scientific evidence demonstrates a new proposed licence will be ecologically sustainable.
2. PIRSA Fisheries will also assess the relative abundance of wrack at the location and may seek scientific advice and information from a research agency in regards to the sustainability of the proposed operation. PIRSA Fisheries will also consult with relevant Local Government about the suitability of proposed operations before the application proceeds further.
3. If there are no objections to the harvest operation on the basis of resource sustainability and beach ecology, the application will proceed to the next stage of the licence assessment process. PIRSA Fisheries will consult with PIRSA Aquaculture and DEH (Coast Protection Board) about the suitability of the proposed operation with regard to coastal land use and local planning and development issues and obtain advice and recommendations relating to any terms and conditions that should be imposed on the harvest operation. DTEI will be informed of the application and asked to identify if there are any other existing or intended DTEI lease commitments to the said area of land.
4. PIRSA Fisheries will note and review comments and suggestions received from all other stakeholders, the application will be forwarded to the Director of Fisheries with recommendations regarding suggested allocation and harvest conditions to be incorporated onto the licence.
5. A final assessment will be made by the Director of Fisheries, who will review the information and advice obtained during the inter-departmental review process and either approve or reject the licence application, or advise that it should be modified. **Approval must be granted by all relevant agencies in order for an application to be approved.** If approved, the Director of Fisheries will issue a Miscellaneous Fishery Licence pursuant to the *Fisheries Act 1982*.
6. PIRSA Fisheries will advise DTEI on foreshore access licence requirements.

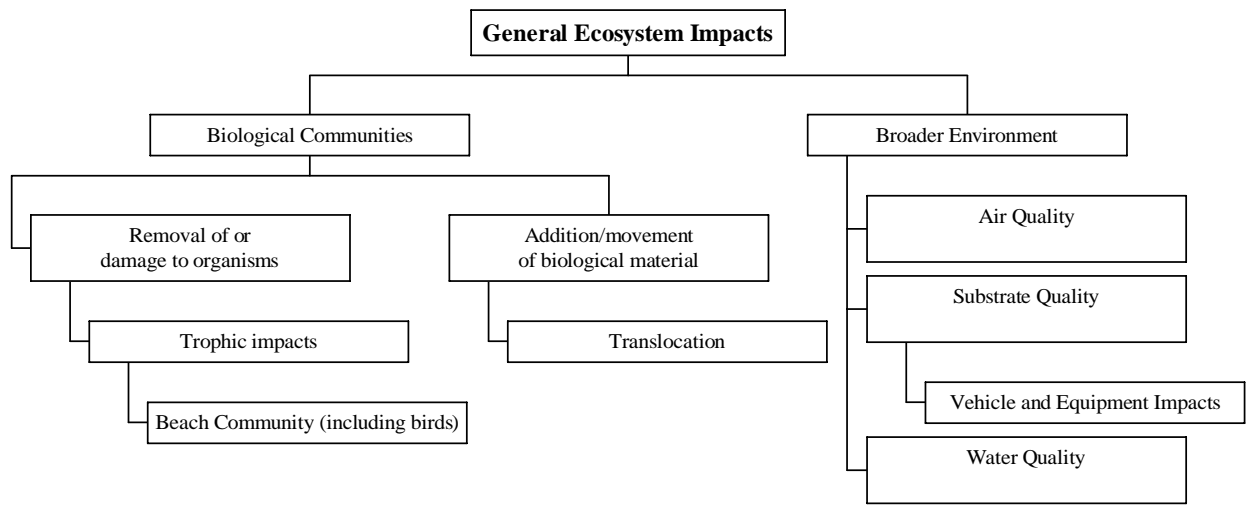
The above protocol will ensure that PIRSA Fisheries retains overall control of all proposed harvesting operations. The application may at any stage be rejected or returned to the applicant for modification or amendment if the application compromises management objectives for the fishery or current development arrangements for the region.

### **11.3 Issues to be Considered in Environmental Impact Assessment for Proposed Harvest Areas**

The Environment Impact Assessment should include:

- Proposed target species
- Species composition of wrack, including abundance of target species
- Volume and turn over of wrack in harvest area and surrounding areas
- Whether the wrack is persistent or mobile
- Important bird species in the harvest area
- Critical habitats
- Proposed harvest and processing strategies
- Vehicle and equipment use
- Access points
- Beach and dune stability
- Issues associated with processing
- Disposal of unwanted material
- Any other issue at the discretion of the Director of Fisheries

## 11.4 ESD Component Tree of Ecosystem Effects



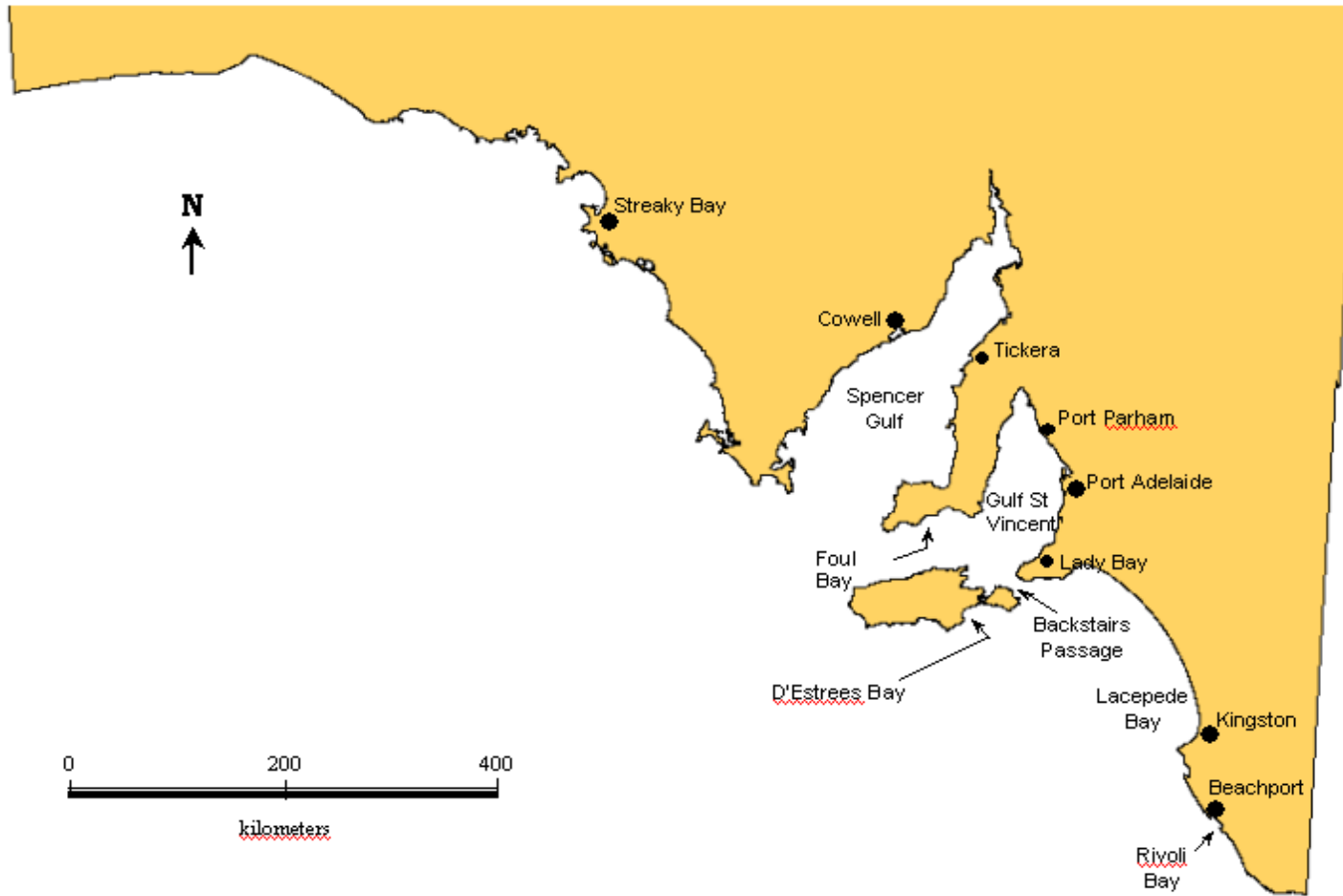
**Figure 1: Component tree describing the general ecosystem effects of beach-cast seagrass and marine algae harvesting in South Australia**

## 11.5 Orange Bellied Parrot Recovery Plan

**Table 5: Outline of the relevant sections of the National Recovery Plan for the Orange-bellied Parrot (*Neophema chrysogaster*)2006-2010**

Action	Description	Tasks and Performance Criteria
<i>Specific Objective 3 - To increase the carrying capacity of habitat through active management of sites throughout the species' range</i>		
<b>3.1</b>	<p>Review implementation and effectiveness of management plans to protect OBP resources throughout the breeding and non-breeding range. Agencies responsible for developing and implementing these plans will be informed of the locations of known and potential OBP habitats through the site register (Action 2.1) and informed of review outcomes.</p> <p><b>Responsibilities</b> Implementation: WSPO and State agencies Evaluation: OBPRT NRM Regions: All</p>	<p>3.2.1 Employ a project officer to review and report on the effectiveness of conservation measures in all existing management plans throughout the range by 2006.</p> <p>3.2.2 Ensure that OBP requirements are integrated into all new management plans throughout the range.</p> <p>3.2.3 Monitor management plan development and make submissions as required.</p>
<b>4.6</b>	<p>Control the spread of introduced invasive plants at key OBP sites. This includes:</p> <ul style="list-style-type: none"> <li>▪ Rice Grass <i>Spartina anglica</i> (Anderson's Inlet (Vic), Barwon River estuary (Vic) and</li> <li>▪ Robbins Passage (Tas).</li> <li>▪ Boxthorn <i>Lycium ferocissimum</i> (The Spit NCR (Vic))</li> <li>▪ Marram Grass <i>Ammophila arenaria</i> (Tasmanian Wilderness World Heritage Area)</li> <li>▪ Sea Spurge <i>Euphorbia paralias</i> (west coast and Bass Strait islands (Tasmania))</li> </ul> <p>Prescriptions for the control of other species (e.g. Coast Barb-grass <i>Parapholis incurva</i>, Sea Barley-grass <i>Critesion marinum</i>) and at other sites will be developed. This will include the management of cattle grazing, fire and human activities that exacerbate the spread of invasive weeds.</p> <p><b>Responsibilities</b> Implementation: State agencies Evaluation: State agencies NRM Region: All</p>	<p>4.6.1 Use the site register database to identify priority weed infestations.</p> <p>4.6.2 Develop site based control programs and engage land managers and volunteer groups in control programs.</p> <p>4.6.3 Monitor the effectiveness</p>
<b>9.3</b>	<p>Review State and Australian Government listings of the species to reflect current knowledge and listing criterion. Similarly, all State and Australian Government authorities should identify and make management provisions for critical habitats under their respective jurisdictions.</p> <p><b>Responsibilities</b> Implementation: Recovery Team and AGDEH (9.3.1), all State agencies (9.3.2–9.3.4) Evaluation: OBPRT and RPC NRM Regions: All</p>	<p>9.3.1 Review the listing under EPBC in the first year of the Plan.</p> <p>9.3.2 Ensure that listing is consistent across the range by year two of the Plan.</p> <p>9.3.3 All listings are reviewed in year five of the Plan.</p> <p>9.3.4 All habitat critical to the species is identified and, provided with appropriate protection under relevant jurisdictions.</p>

## 11.6 Beach-Cast Wrack Harvesting Location



**Figure 2: Map of South Australia showing locations mentioned in text.**

## **11.7 List of Acronyms**

<b><i>DEH</i></b>	Department of Environment and Heritage
<b><i>DTEI</i></b>	Department of Transport, Energy and Infrastructure
<b><i>EPBC Act</i></b>	Environment Protection and Biodiversity Conservation Act
<b><i>ESD</i></b>	Ecologically Sustainable Development
<b><i>FMC</i></b>	Fisheries Management Committee
<b><i>FRDC</i></b>	Fisheries Research and Development Corporation
<b><i>MPA</i></b>	Marine Protected Area
<b><i>PIRSA</i></b>	Primary Industries and Resources, South Australia
<b><i>SARDI</i></b>	South Australian Research and Development Institute

## **11.8 Contacts**

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