



Australian Government

Department of the Environment and Heritage

Assessment of the
**South Australian Beach-cast Seagrass and Marine Algae
Fishery**

August 2004

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This document is an assessment carried out by the Department of the Environment and Heritage of a commercial fishery against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. It forms part of the advice provided to the Minister for the Environment and Heritage on the fishery in relation to decisions under Part 13A of the Environment Protection and Biodiversity Conservation Act 1999. The views expressed do not necessarily reflect those of the Minister for the Environment and Heritage or the Australian Government.

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Assessment of the ecological sustainability of management arrangements for the South Australian Beach Cast Seagrass and Marine Algae Fishery

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EXECUTIVE SUMMARY

Background

Primary Industries and Resources South Australia (PIRSA) has submitted a document for assessment under Part 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The draft document *Ecological Assessment of the South Australian Beach-cast Seagrass and Marine Algae Fishery* (the submission) was received by the Department of the Environment and Heritage (DEH) in November 2003. The submission was released for a thirty-day public comment period that expired on 20 February 2004. Five public comments were received. PIRSA provided a response to the issues raised and amended the submission where necessary.

The submission reports on the South Australian Beach-cast Seagrass and Marine Algae Fishery against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. The DEH assessment considers the submission, associated documents, public comments and PIRSA's response to the comments.

Table 1: Summary of the South Australian Beach-cast Seagrass and Marine Algae Fishery

Area	Shorelines in southeast of South Australia, including Lacedpede and Rivoli Bays along Kingston and Beachport foreshores. PIRSA advises that the total shoreline accessed by licensees is less than 10% in Lacedpede Bay, where the majority of harvesting occurs.
Fishery status	The target species is considered to be underfished.
Target Species	Beach-cast seagrass (primarily <i>Posidonia spp</i>), Brown algae (primarily <i>Durvillaea potatorum</i> , <i>Ecklonia radiate</i>) and Red algae (including <i>Gracilaria spp</i>).
By-product Species	No byproduct species permitted.
Gear	<ul style="list-style-type: none"> ▪ Seagrass is collected with a range of machinery including bulldozers, front-end loaders and excavators. ▪ Marine algae collection is species specific and by hand collection only.
Season	Sporadic, carried out opportunistically whenever significant quantities of wrack are deposited on the foreshore. Peak collections are in Winter and Spring.
Commercial harvest 2001-02	20 500 kg combined seagrass and macroalgae.
Value of commercial harvest	The commercial value of the fishery is unknown but is considered small in relation to other State fisheries.
Recreational harvest	No significant recreational take.
Commercial licences issued	3 licences have been issued, one for macroalgae and two for seagrass. Licences are issued for either seagrass or macroalgae but not both on the same licence.
Management arrangements	Input controlled through: <ul style="list-style-type: none"> • Limited entry (3 licences) • Area restrictions, including exclusion zones where no harvest is to take place • Species specific macroalgae harvest • Harvest limited to 75% of the available wrack • Seagrass harvesters are required to leave 10 cm of seagrass coverage.

Export	No current export, one licensee previously held an exceptional circumstance permit, which expired in June 2004.
Bycatch	Limited to a small amount of commensal organisms living within the Seagrass and algae harvested.
Interaction with Threatened Species	Uncertain, thought to be minimal.

The area of the fishery includes beaches around the shoreline of Lacedpede and Rivoli Bays, mainly along the Kingston and Beachport foreshores. Under the *Beach Cast Seagrass and Marine Algae Management Plan, 2000* (the management plan), harvesting is currently permitted in the southeast of South Australia (SA), (easterly of the meridian of longitude 139°E) but prohibited from the shorelines of Gulf St Vincent, Spencer Gulf, West Coast and Kangaroo Island for a period not less than 5 years. PIRSA advises that the total shoreline accessed by licensees is less than 10% in Lacedpede Bay, where the majority of harvesting occurs. The entire fishery is managed by PIRSA.

The fishery targets seagrass, primarily *Posidonia* spp, two species of brown macroalgae, *Durvillaea potatorum* and *Ecklonia radiata* and some red macroalgae including *Gracilaria*. *Posidonia* spp contributes over 95% of the beach-cast seagrass harvested in SA (PIRSA, 2001). No other species are taken as byproduct.

The main seagrass species occurring in SA are: *Posidonia angustifolia*, *Posidonia australis*, *Posidonia coriacea*, *Posidonia sinuosa*, *Amphibolis antarctica*, *Amphibolis griffithii*, *Heterozostera tasmanica*, *Halophila australis* and *Zostera muelleri* (Larkum & den Hartog 1989).

Seagrass plants generally shed their leaves annually in autumn. During periods of strong wind and wave action, particularly in winter months, surge and swell mobilise the detached leaves, which wash into surf zones and subsequently wash onto the beach in clumps. The amount, location and timing of wrack deposits depend on a number of factors including the density and extent of seagrass meadows, local tidal activity and current, wind and storm activity (PIRSA, 2001). Wrack remains on the beach for variable amounts of time, with some washing back into the ocean, resulting in longshore depositions of wrack, while others deposit above the high tide mark, accumulating to form large semi-permanent deposits. There are subsequently large variations in wrack accumulations from site to site, with occasional persistent accumulations around man-made structures such as groynes, jetties and breakwaters (PIRSA, 2001).

Seagrass wracks can form accumulations of several metres, providing protection from strong wave action to the coastal foreshore. Seagrass wracks also enhance the formation and stabilisation of coastal sand dunes and beaches and may contribute to the fertility and stability of substrates behind the foredunes.

Marine macroalgae grow on shallow rocky substrate, commonly found in inshore limestone reefs along the SA coastline. During storms and periods of high wind and wave activity, large portions of the macroalgae are broken off and deposited on nearby beaches. Due to the variation in this activity, the amount of algae deposited on coasts is highly variable over time. Various species are found amongst the algal beach wracks (PIRSA, 2001).

Both seagrass and marine macroalgae are widely recognised as important components of beach and shore ecosystems, acting as sources of detritus, particulate and dissolved nutrients, which form the basis of beach and marine food chains (eg Koop & Griffiths 1982, Robertson & Hansen 1982).

Many shorebirds and seabirds are associated with seagrass and algal wracks. In SA, a total of 40 species have been recorded utilising beach wrack in some way, including feeding, nesting, shelter during strong winds or storms and camouflage while resting (McCulloch, 1996).

The Nationally Endangered Orange-bellied Parrot migrates from breeding locations in Tasmania to coastal areas in southeast SA to feed in winter periods. The species can be found inhabiting foredunes and strand areas near wrack deposition sites (Bezuijen & Lane, 1997).

Approximately 20 500 kg of combined seagrass and marine algae were harvested in the Seagrass and Marine Algae Fishery in 2001-02. The commercial value for the fishery is unknown because of its relatively small size and harvest.

The fishery began in 1990, with two permits being issued for commercial take in southeast SA. Since 1993, a total of seven permits have been issued to operations in the southeast, and a small number in Port Adelaide and Port Parham. The fishery has now been limited to a total of three active licences. There has recently been an increase in requests for permits for new harvest areas, as well as requests from current harvesters wishing to increase harvesting areas and effort. The current management plan does not allow for further licences to be issued.

The fishery is relatively small, with two permits being issued for the harvest of seagrass, and one for the harvest of marine macroalgae. Further exemptions have also been issued to councils wishing to improve beach access and amenity.

The collection methods and associated restrictions for the fishery differ slightly between the harvesting of seagrass and marine macroalgae.

Seagrass

Beach-cast seagrass wracks are harvested with a range of machinery including bulldozers, front-end loaders and excavators. While local councils are able to place restrictions on hours of operation, access points and vehicular access to certain areas, there are currently no limits on the type of machinery used. However, difficulties in accessing harvest sites and restrictions on the take of sand from the harvest area has made the use of large machinery inefficient.

Seagrass harvesters are permitted to collect 75% of the allocated species in the area, with the proviso that a 10 cm covering of seagrass is left on the sand. PIRSA has advised that the 10 cm covering has been conservatively set, based on suggestions that the bottom 10 cm or 25% of seagrass and marine macroalgae wracks is most productive and important to the ecosystem.

Marine Macroalgae

Marine macroalgae is collected by hand following storm and wind activity, prior to the algae degrading or becoming buried in sand. Harvesting is species-specific for commercial purposes as well as to preserve other species of macroalgae to support meio- and macro-fauna. As it is currently unclear as to whether any particular species plays a more important ecological role in the ecosystem, harvesters are permitted to harvest only 75% of the allocated species in the harvest area.

Direct information on bycatch in the fishery is limited, but is likely to include a small number of commensal organisms living within the wrack. This take is likely to be insignificant given gear and effort limitations imposed on harvesters, including the prohibition on the removal of sand with harvested wrack.

Some migratory bird species that may be affected by this fishery are currently listed as vulnerable or nationally endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Possible effects include loss of nesting locations, habitat and feeding sites. While evidence on possible impacts to date is limited, the fishery is unlikely to interact with any protected species on a large scale, given the limited size and harvest locations of the fishery. These interactions are assessed under Principle Two of this report.

PIRSA advises that take of beach-cast seagrass and marine algae by the indigenous and recreational sectors is not significant. Decisions relating to small scale recreational harvests of beach-cast wrack are the responsibility of the relevant Local Government Authority, where enabled through regulation. Recreational requests are usually granted, on the proviso that harvests are by hand only and limited to small quantities. Coastal Councils seeking to authorise recreational collection must provide PIRSA with a policy on recreational collection for approval.

The fishery is broadly managed under the *Fisheries Act 1982*. Regulations governing the management of the Beach-cast Seagrass and Marine Algae are established in the *Scheme of Management (Miscellaneous Fisheries) Regulations 1991*. The *Beach-Cast Seagrass and Marine Algae Management Plan (2000)* (the management plan), covers commercial, recreational, traditional and illegal fishing activities for beach-cast seagrass and marine algae within South Australian waters and provides a framework and harvest strategy to ensure the ecologically sustainable development of the fishery. The management plan does not form part of the *Scheme of Management (Miscellaneous Fisheries) Regulations 1991*, and does not have any statutory basis. It operates over a five-year period and will be reviewed in January 2005 to reflect recent changes and developments in the fishery. There is currently no timeframe for the implementation of the revised management plan.

A comprehensive review of the *Fisheries Act 1982* is also being undertaken and is likely to result in changes to the broad sustainability framework for the management of SA fisheries.

Overall assessment

The material submitted by PIRSA indicates that the South Australian Beach-cast Seagrass and Marine Algae fishery operates in accordance with the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. DEH considers that the South Australian Beach-cast Seagrass and Marine Algae fishery is a well-managed fishery that is unlikely to have an unacceptable or unsustainable impact on the environment in the short to mid term.

Recommendations have been developed to ensure that the risk of impact is minimised in the longer term. Overall, the management regime of capped licences, harvest limitations, spatial closures and data collection systems, suggests that the fishery is being managed in an ecologically sustainable way.

In making its assessment, DEH considers that the information collection system, management arrangements and objectives are sufficient to ensure the fishery is conducted in a manner that does not lead to over-fishing and that stocks are not currently overfished. Considering the management arrangements in place and the selectivity and benign characteristic of the fishery operations, DEH considers that fishing operations are managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem.

The assessment finds that the fishery is managed in an ecologically sustainable way and its operation is consistent with the objects of Part 13A of the EPBC Act. DEH recommends that the export of species taken in the fishery should be exempt from the export requirements of Part 13A of the EPBC Act, with that exemption to be reviewed in 5 years. DEH considers that the fishery, as

managed in accordance with the management regime is not likely to cause serious or irreversible ecological damage over this period.

To further strengthen the effectiveness of the management arrangements for the South Australian Beach cast Seagrass and Marine Algae fishery, and to contain the environmental risks in the medium to long term, DEH has developed a series of recommendations. The implementation of these and other commitments made by PIRSA in the submission will be monitored and reviewed as part of the next DEH review of the fishery in 5 years time.

Recommendations

1. The Department of Primary Industries and Resources, South Australia to 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.
2. PIRSA to formally implement performance indicators and trigger points for objective one of the ecological fishery dimension: “Disturbance by commercial operators to sand dunes, coastal vegetation, fauna and beach surfaces is minimised”. The performance indicators and trigger points will be implemented by July 2005.
3. PIRSA to formally amend its management response to include a timeframe for reporting a trigger breach to the Director of Fisheries, and for the report to include a timeframe for implementing the appropriate management response. This amendment will be implemented by July 2005.
4. PIRSA to document the research program, including a timetable for implementation, and make the program outline publicly available by July 2005.

PART I - MANAGEMENT ARRANGEMENTS

The day to day management of the South Australian Beach-cast Seagrass and Marine Algae fishery is undertaken by PIRSA. DEH considers that the management regime is adequately documented, publicly available and transparent. The management regime is described in the following documents, all of which are, or will be publicly available:

- *Scheme of Management (Miscellaneous Fisheries) Regulations 1991;*
- *The Beach-cast Seagrass and Marine Algae Management Plan (2000)* (the management plan);
- *The Fisheries Act 1982;*
- Relevant Gazetted notices and licence conditions.

A number of other documents covering environmental and ecological issues, including scientific literature and discussion papers are integral to the management of the fishery.

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Due to the importance of the documents discussed above to DEH's assessment of the fishery, an amendment could change the outcomes of our assessment. DEH therefore requests that PIRSA advise DEH of any material change to the management regime that could affect the criteria on which EPBC decision are based, within 3 months of that change being made.

Recommendation 1: *The Department of Primary Industries and Resources, South Australia to 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.*

The management plan for the fishery was developed through a consultative process involving adequate stakeholder representation. It is reviewed every five years, and is currently being reviewed in light of increasing interest to harvest in the fishery. The review has involved consultation with stakeholders, including licence holders, fish processors, recreational and commercial representative bodies, local councils, communities, conservation groups, Indigenous representatives and government agencies.

The broad Management Objectives of the management plan are:

- To achieve ecologically sustainable development of the industry, such that there are no adverse effects either on other state fishery resources or on coastal ecosystems generally;
- To achieve long-term economic stability of the industry, and;
- To maintain social and economic justice.

The management plan for the fishery is strategic, outlining Objectives, Strategies, Performance Indicators, Trigger Points and Management Strategies for the biological, ecological, and social dimensions of the fishery (see Table Three). A full assessment of the effectiveness of these measures is included in Part Two of this report.

Harvest levels in the fishery are controlled primarily through input controls, including limited entry, harvest restrictions, area restrictions, gear restrictions and monthly reporting requirements (see Table Two).

Table Two – Input controls

Control	Description
Limited entry	A limit of three licences is currently imposed
Harvest restrictions	Harvesters of seagrass and macroalgae shall not harvest more than 75% of the total wrack. Seagrass licence holders are required to leave a 10 cm covering of seagrass at the harvest site.
Area restrictions	Harvesting is limited to the locations outlined in Part I, and must only occur between the low water mark and 4 metres from the foredunes. Harvesting is prohibited from critical bird habitats or where species of high conservation status are nesting. Exclusions zones are also implemented.
Gear restrictions	Hand collection of macroalgae only.
Reporting requirements	Harvesters must submit monthly reports detailing a range of information.

Compliance with the management arrangements is monitored by PIRSA Fishwatch and enforced by SA Fisheries Officers. Intelligence on harvesting activity is gathered from field officers and reports from the public, as reported through the Fishwatch hotline. There have been no compliance issues to date. DEH considers that these compliance measures contain the means of enforcing critical aspects of the management arrangements for the fishery.

Fishery-dependent data relating to the target species is collected on a regular basis in the fishery. Some fishery independent data is also collected. Discussion of the information collection system can be found in Part Two of this report.

An analysis of the fishery's capacity for assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which the target species live and the fishery operates is contained under Principle Two of this report.

DEH considers that the current management arrangements comply with all relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy. As the bycatch level of the fishery is low, there is currently no need for a bycatch action strategy to be developed.

No regional or international management regimes, to which Australia is a party, are of direct relevance to the fishery. DEH considers it is incumbent on all authorities to develop a thorough understanding of the framework of national, regional and international agreements and their applicability to export-based fisheries for which they are responsible.

Conclusion

DEH considers that the South Australian Beach-cast and Marine Algae fishery management plan is documented, publicly available and transparent, and is developed through a consultative process. The management arrangements are adaptable and underpinned by appropriate objectives and performance criteria by which the effectiveness of the management arrangements can be measured, enforced and reviewed.

The management arrangements are capable of controlling the harvest through a range of input controls, appropriate to the size of the fishery. Periodic review of the fishery is provided for, as are the means of enforcing critical aspects of the management arrangements.

The management regime adheres to arrangements established under Australian laws and international agreements.

PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES

Stock Status and Recovery

Principle 1: *‘A fishery must be conducted in a manner that does not lead to over-fishing, 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’*

Maintain ecologically viable stocks

Objective 1: *‘The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability’*

Information requirements

Fishery Dependent

Fishery dependent data is collected via monthly reports that the licence holders in the fishery are required to submit. The monthly report outlines the species harvested and associated weight, exact location of the harvesting site, methods used to collect and process the resource, the volume and use of product sold and photo points to monitor the adjacent coastline, including dune, beach and vegetation profiles.

In addition, licence holders must provide PIRSA Fisheries with a yearly assessment of the harvest area, which summarises the findings of monthly reports. If the seagrass wrack harvester fails to submit information, the Director of Fisheries may recommend the imposition of a substantial fine or term of imprisonment under Section 46 of the *Fisheries Act 1982*.

Fishery Independent

Fishery independent data is collected through Environmental Impact Assessments (EIA), which are required prior to the approval of harvest sites. The EIA must be carried out by a consultant approved by PIRSA and undertaken according to a prescribed methodology, which takes into account the nature, amount, function and turnover rate of the available wrack and identification of bird nesting or critical habitat at the site. The EIAs for the three current licences were carried out up to ten years ago when the licences were initially approved. There have been no further licences approved since this time and PIRSA advises that there are therefore no EIAs available for assessment. DEH suggests that if new licences are approved, the EIAs conducted should be made publicly available.

There is currently no ongoing fishery-independent monitoring. The management plan includes a research program, to be partially funded through licence fees. This program, discussed in more detail under Principle 2, may provide information about the ecologically sustainable harvest of target stocks.

Overall, given the range of fishery dependent data gathered by PIRSA and the mechanisms for regularly reviewing the performance of wrack harvesters, DEH considers that there is a reliable information collection system in place appropriate to the scale of the fishery.

Assessment

PIRSA advises that there is currently limited research on which to determine ecologically sustainable beach-cast harvest levels. In recognition of this, and the potentially harmful effects of wrack harvesting on beach and near-shore environments, PIRSA intends to continue its precautionary and structured approach to harvest processes.

As the productivity of the stock is highly variable and difficult to assess, PIRSA has contained harvest levels by controlling the number of licences in the fishery and by setting levels of harvest at conservative levels (outlined in Part I). PIRSA advises that these levels were determined on the basis of scientific evidence, suggesting that the bottom 10 cm covering of seagrass is the most productive and that 25% of the remaining wrack is sufficient to support the beach ecosystem.

Further information on stock levels is being gathered through the monthly and yearly reports provided by harvesters, which may be used to provide stock productivity estimates in the future. Information gathered through the EIA process (as detailed above) provided information on the sustainability of each site based on the best available evidence.

The distribution and spatial structure of stocks is highly variable and dependent upon environmental factors including wave action, storm and tidal activity. Generally, the wrack is unevenly deposited along the foreshore and the time the wrack remains on the shore is highly variable. Transport back to the subtidal zones by wave action and longshore drift results in changes in wrack biomass at time scales of days and weeks.

Potential removals of seagrass and marine algae include direct harvest by this fishery, local Council removal for amenity purposes and limited recreational take. Concern was raised during the public comment period in relation to the lack of reporting requirements for local Councils. At present, one Council has been granted a commercial licence to clear wrack, while two have been granted exemptions to clear wrack for amenity purposes in the last twelve months. PIRSA advises that Councils granted a commercial licence must comply with all licence requirements while Councils granted exemptions are generally required to relocate wrack deposits, rather than dispose or on-sell. PIRSA has advised that Councils granted an exemption are required to report the volume of wrack relocated under any exemption.

DEH notes the lack of information on the potential productivity, spatial distribution and stock densities for the fishery, however, given the small scale of the fishery and precautionary measures taken (as outlined in Part I, Table 1), DEH considers that the probability of unsustainable depletion of sea-grass and marine algae wracks is low.

Management response

The current management plan for the Beach-cast Seagrass and Marine Algae fishery aims to maintain ecologically viable stock levels through a range of input controls as outlined in Table 1 and Part I of this report. While there has been interest in the further development of the fishery by both current and new harvesters, the management arrangements prevent increases in effort until further research on wracks has been carried out.

The *Management Plan for Harvesting Beach-cast Seagrass and Marine Algae (2000)* contains a series of performance indicators and trigger points relating to the harvest of seagrass and marine algae. They include triggers relating to the control, measure and regulation of take, disturbance to ecological surroundings and allowing for reasonable access to wrack resources for all users, as outlined in Table Three.

Table Three: South Australian Beach-cast Seagrass and Marine Algae Fishery Management Objectives

Fishery Dimension	Objectives	Strategies	Performance Indicator	Trigger Point	Management Response
Biological	Control, measure and regulate all catches/extractions from the resource	Number of licences capped at existing levels	Number of licences issued annually	> three licences issued	Apply appropriate regulations Report to Director of Fisheries
		Component of licence fees directed towards research program determining relative importance of wrack to coastal trophodynamics and coastal processes	Research program conducted	No research conducted	
		Licence holders to provide a yearly assessment	Annual assessment of harvest area	No annual assessment received	
Ecological	Disturbance by commercial operators to sand dunes, coastal vegetation, fauna and beach surfaces is minimised.	Limiting the use of heavy machinery and mechanical harvesters			
		Restricting vehicular access to beach except via established tracks and boat ramps			
		Direct removal of sand prohibited			
		Harvesters of seagrass wrack to leave a 10cm covering of seagrass	Seagrass cover remaining on beaches in harvest areas	No seagrass cover remaining on beaches in harvest area	
		Harvesting limited to beyond 4 metres from the toe of the fore-dune	Harvest area within an approved site	Harvesting has taken place <4 metres from the toe of the foredune	
		Harvesting limited to beach-cast wrack deposits and must not be harvested from below the water mark	Harvest area within an approved site	Harvesting has taken place below the water mark	
		Harvesting will not be permitted in critical bird habitats or when species of high conservation status are nesting			
		Processing of wrack to be carried out off-site			
Social	To provide for reasonable access to wrack resources for all users	Permission may be granted to coastal Councils for the removal of accumulations to improve local beaches and for public amenity purposes	Number of coastal councils with exemptions		
		Access to the resource to be maintained in accordance with the management plan			

(sourced from *Ecological Assessment of the South Australian Beach-cast Seagrass and Marine Algae Fishery* PIRSA submission)

At the time of assessment, a number of the strategies outlined in Table 3 did not have performance indicators and trigger points formally incorporated. While PIRSA has advised DEH that performance indicators and trigger points have been informally developed, DEH recommends that they be formally implemented in the fishery by July 2005.

Recommendation 2: *PIRSA to formally implement performance indicators and trigger points for objective one of the ecological fishery dimension: "Disturbance by commercial operators to sand dunes, coastal vegetation, fauna and beach surfaces is minimised". The performance indicators and trigger points to be implemented by July 2005.*

DEH considers that the input controls should ensure adequate protection of the target stocks, but notes that further management controls are required for monitoring migratory bird species (discussed in detail under Principle 2).

The Report contains some triggers for management action should performance measures not be met. DEH notes that timeframes for the implementation of these actions were not developed at the time of assessment. While PIRSA has advised that timeframes for the implementation of management actions have been informally developed, DEH recommends that they be formally implemented into the management plan by July 2005. Further details of management responses should also be provided, particularly where there are significant threats of ecological impacts such as those to nesting bird species.

Recommendation 3: *PIRSA to formally amend its management response to include a timeframe for reporting a trigger breach to the Director of Fisheries, and for the report to include a timeframe for implementing the appropriate management response. This amendment to be implemented by July 2005.*

Conclusion

DEH considers that the management plan in the South Australian Beach-cast Seagrass and Marine Algae fishery is appropriately precautionary and provides for the fishery to be conducted in a manner that does not lead to over-fishing. DEH considers that the information collection system, conservative harvest levels and precautionary management arrangements generally are sufficient to ensure that the fishery is conducted at catch levels that maintain ecologically viable stock levels with acceptable levels of probability.

DEH considers that there is scope to further refine some of the existing information collection, assessment and management responses and has provided a number of recommendations for improvements in the longer term.

Promote recovery to ecologically viable stock levels

Objective 2: *'Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes'*

Stock availability and reference points are difficult to determine due to the high variability of harvest wracks. In response to the high level of uncertainty in the fishery, PIRSA has placed conservative limits on the percentage of seagrass and marine algae harvested and are committed to developing the fishery through a precautionary approach.

Conclusion

DEH considers that the seagrass and marine algae stocks are not currently below a defined reference point. While DEH is concerned at the lack of data available on stock availability, PIRSA has committed to improving the information available through further research and DEH has made a recommendation to further strengthen this commitment (see Recommendation 4).

Ecosystem impacts

Principle 2: *'Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem'*

Bycatch protection

Objective 1: *'The fishery is conducted in a manner that does not threaten bycatch species'*

Information requirements

Bycatch in this fishery is likely to be insignificant, due to the species specificity of harvest and the nature of collection. Any bycatch is limited to a small number of commensal organisms living within the wrack. Harvesters are not required to report on the take of bycatch species.

Assessment

PIRSA acknowledges the need for further research to determine the potential effects of harvesting on commensal organisms living within seagrass and marine algae wracks and has committed to a research program to address these, and other, issues. The research program is further discussed under Objective 3.

Management response

While the likely take of commensal organisms is low, a number of steps have been taken to ensure that large disturbance to the beach ecosystem is avoided.

Measures include exclusion zones between harvest sites, machinery limitations, access limitations and the prohibition of sand being taken with machine or hand harvested wrack. These measures should ensure that bycatch is limited to a small number of commensal organisms living within the wrack.

Conclusion

DEH considers that there is a high likelihood the fishery is conducted in a manner that does not threaten bycatch species. Should this situation change, or a risk assessment process indicate otherwise, DEH expects that PIRSA would undertake appropriate actions to ensure that bycatch species are not threatened by this fishery.

Protected species and threatened ecological community protection

Objective 2: *'The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities'*

Information requirements

PIRSA recognises the potential threats of the fishery to a number of migratory bird species, including the Threatened Hooded Plover and the Nationally Endangered Orange-bellied Parrot. To date, limited information has been collected on specific threats of the fishery to these species. The potential threat of the fishery to migratory bird species, particularly the Orange-bellied parrot and the Hooded Plover was raised as an issue of concern during the public comment period.

Harvesters are not required to report interactions with bird species in monthly or annual reports, and no data has been collected on potential impacts to the species.

Assessment

PIRSA advises that harvesters are currently not required to report protected species interactions because such interactions are unlikely, given the small size and minimal effort of the fishery. Additionally, the highly mobile nature of the harvested wrack is likely to prevent colonisation by protected species, particularly migratory birds, in the region.

PIRSA recognises the concerns raised in public comment regarding the impact of harvesting on sea and shorebirds and has outlined a number of management responses to interactions, including closure of nesting sites and exclusion zones. PIRSA has agreed that the Environmental Impact Assessments carried out at new harvest sites will include an assessment of the impact of harvesting activities on nesting, feeding and roosting of birds of conservation significance.

The submission states that no interactions with protected species have been reported in the fishery to date. No threatened ecological communities have been identified in the fishery.

Management response

Although there are currently no reporting obligations in relation to protected species, PIRSA has implemented a number of licence requirements to minimise the effects of the fishery on protected species and the beach ecosystem more generally. These requirements include harvesters being restricted to 75% of the wrack stock at a harvest site and a minimum 10 cm remaining coverage of seagrass to provide habitat for any dependent species.

The submission states that the measures taken in the fishery have considered the objectives and needs of the Orange-bellied Parrot Recovery Plan: Management Phase 1998-2002.

PIRSA advises that a component of the research program discussed under Objective 3 will be directed towards ascertaining the level of any interaction between harvesting and birds of conservation significance. The research program will engage and liaise with operators, therefore gathering any information or evidence of potential interactions with birds of conservation significance. PIRSA has committed to developing and implementing management actions if interactions are detected through the research program, annual reports or the 5-year fishery review.

Conclusion

DEH notes that interactions with protected species in this fishery are likely to be minimal and is satisfied that the fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities. Should this situation change, or a risk assessment process indicate otherwise, PIRSA has the capacity within its management plan to take, and DEH expects it would take appropriate actions to ensure that the fishery avoids mortality or injury to these species and avoid or minimise impacts on threatened ecological communities.

Minimising ecological impacts of fishing operations

Objective 3: *'The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally'*

Information requirements

Little information is currently available on the ecological impacts on the wider ecosystem of harvesting beach-cast seagrass and marine algae. To improve understanding of wrack biology and ecology, PIRSA proposes to utilise funds taken from licence fees to establish a research program looking at the relative importance of wrack to coastal trophodynamics and coastal processes. The overall objective of the research program will be to control the ecological impacts of the beach-cast seagrass and marine algae fishery and provide a research basis for the management of the fishery. The submission does not provide a timeframe for this research program.

***Recommendation 4:** PIRSA to document the research program, including a timetable for implementation. PIRSA to make the document publicly available by July 2005.*

DEH notes the lack of information collection and research covering the fishery's impact on the ecosystem and environment generally. However, DEH understands that this lack of information is the case across a range of Australian and International fisheries and until appropriate research techniques and programs are developed and implemented this will continue to be the case. DEH encourages PIRSA to support research in this area.

Assessment

Although the effect of seagrass and marine algae harvesting on the ecosystem has yet to be fully investigated, PIRSA recognises the important ecological functions each of these stocks plays in oceanic and shore ecosystems.

Potential impacts include disruption of onshore and offshore nutrient cycles and impacts to features of harvest sites. As the fishery is relatively small, due to the limited harvest areas in the fishery and exclusion zones implemented both on and between harvest sites, the impact on ecological communities is likely to be minimal.

Limited research has been carried out on the effects of removing wracks from terrestrial and marine food webs. PIRSA recognises the potential effects of removing food species from many different levels of the food chain and has implemented dispersion zones between harvest sites to allow for the maintenance of habitat and links in terrestrial and marine food webs.

Potential impacts to the physical environment of a wrack harvest site include pollution and emission impacts from the combustion and noise from machinery, disturbance of fauna, removal of natural ecological components of the ecosystem, loss of dune vegetation and seed reserves and displacement of nesting or feeding birds due to noise and habitat disturbance. Given the limited harvest of wracks in the fishery and the range of restrictions placed on harvesters, the impacts on the general ecosystem are likely to be minimal.

The harvest of beach-cast wrack is a terrestrial activity and is therefore unlikely to have a substantial impact on water quality. The only potential water quality impact is from the machinery, however, PIRSA advises that harvesters are not permitted below the low watermark and therefore have no reason to enter the water.

Management response

PIRSA has implemented a range of management measures that minimise the risk of significant impact of harvesting on ecosystems and their components. As discussed in Principle 1 of the report, strict regulation on effort, gear and sites have been implemented to protect the broader environment of harvest sites.

Additionally, a research program has been included in the management plan to provide information on the ecological impacts of beach cast seagrass and algae harvesting. As detailed in Objective 2,

the program will include a research component to determine impacts of harvesting on migratory bird species.

DEH considers that the precautionary approach in limiting licences, harvest areas and other input controls should provide sufficient ability to detect any impacts and take appropriate management action.

Conclusion

DEH considers that the fishery is conducted in a sufficiently precautionary manner to minimise the impact of fishing operations on the ecosystem generally. A recommendation has been developed to ensure that the risk of significant impact by the fishery on the marine environment generally is minimised in the longer term.

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LIST OF ACRONYMS

PIRSA	Primary Industries and Resources South Australia
DEH	Department of the Environment and Heritage
EIA	Environmental Impact Assessment
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
SA	South Australia
FMC	Fisheries Management Committee