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Policy for the Management of the Beach-cast Marine Algae Fishery

September 2023

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Government
of South Australia
Department of Primary
Industries and Regions

Policy for Management of the Beach-Cast Marine Algae Fishery

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All enquiries

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CONTENTS

1	Purpose and scope of this policy	4
2	Review	4
3	Description of the fishery	4
3.1	Seagrass and marine algae wrack	4
3.2	Biological information	5
3.3	History of the commercial fishery.....	6
3.4	Current commercial fishing arrangements	7
3.5	Recreational fishing.....	8
3.6	Aboriginal traditional fishing.....	8
4	Biology of key species.....	8
4.1	Seagrass.....	8
4.2	Marine algae	9
5	Ecosystem impacts	9
6	Threatened, Endangered and Protected Species (TEPS) impacts	10
6.1	Resident nesting Shorebirds	11
6.2	Migratory Shorebirds	11
7	Social and economic information.....	11
8	Ecologically sustainable development risk assessment.....	11
9	Goals and objectives	18
10	Current management arrangements.....	23
10.1	Area of harvest.....	23
10.2	Harvesting activities	24
10.3	Monitoring	24
10.4	Future management arrangements	25
11	Consultation	25
12	Compliance	26
13	Future strategies	26
14	References.....	26

1 Purpose and scope of this policy

This policy applies to the Beach-Cast Marine Algae Fishery (BCMAF) which is not formally identified under the *Fisheries Management Act 2007* (the Act). The BCMAF is primarily regulated under the following:

- *Fisheries Management Act 2007*
- *Fisheries Management (Miscellaneous Fishery) Regulations 2015*
- *Fisheries Management (Miscellaneous Developmental Fishery) Regulations 2013*.

The BCMAF applies to the commercial harvest of beach-cast seagrass and marine algae from South Australian beaches up to the spring high tide mark.

The purpose of this policy is to provide guidance as to how the Department of Primary Industries and Regions (PIRSA) will manage commercial fishing activities that include the harvest of beach-cast marine macroalgae and seagrass species through the collection of 'wrack' including a management framework to address key challenges of the fishery. For the purposes of this Management Policy, beach-cast seaweed (macroalgae) and seagrass accumulations are referred to as "**beach-cast wrack**".

The Act requires that fisheries are managed to protect, use and develop the aquatic resources of the state in a manner consistent with ecologically sustainable development (ESD). In particular, that aquatic habitats are protected and conserved and ecosystems and genetic diversity is maintained and enhanced. Consistent with this requirement, management of the BCMAF is considered as part of the broader ecosystem using an ecosystem-based fisheries management approach.

2 Review

This policy may be reviewed at any time to incorporate such measures into the management framework of the fishery required to address any significant issues that were not anticipated when this policy was developed.

This management policy has also been developed so that it can be integrated with any Aboriginal traditional fishing management plans that are made in the future that apply to the waters of this fishery.

3 Description of the fishery

3.1 Seagrass and marine algae wrack

Beach-cast wracks may consist of kelp or other detached marine algae, seagrasses, animal carcasses and other organic matter deposited from the sea onto a beach by waves or winds (Fairweather & Henry 2003; Duong 2008). Harvesting includes the removal, clearance, movement, relocation, or disturbance of any part of a beach-cast wrack. It is emphasised that this policy addresses beach-cast seagrass and marine algal material and does not refer to marine flora attached to a substrate or drifting in the water column.

Beach-cast accumulation (wracks) of decaying seagrass and marine algae are considered essential components of coastal ecosystems. They serve several important roles in the ecology of local coastal environments. Wracks contribute to the food web dynamics of beach and near-shore marine communities, including valuable fisheries, by supporting microbial processes and invertebrate fauna which are preyed upon by higher-level consumers and supplying nutrients that can be used by plant and animal communities (Kirkman & Kendrick 1997). Many bird species, some of high conservation status, also use these habitats. Beach-cast wracks also provide protection to coastal dunes and other important coastal environments (Ivey et al. 2013).

Interest in harvesting has resulted from a rising market demand for algal products both locally and internationally. An authority to collect any beach-cast wrack for commercial purposes is required under the Act. The commercial harvesting of beach-cast wracks from any beach of the state is under the care, control, and management of PIRSA on behalf of the community in accordance with the Act. The Act provides a broad statutory framework to ensure the ecologically sustainable management of South Australia's aquatic resources.

3.2 Biological information

Several studies, most notably in South Australia, Western Australia and South Africa, have highlighted the importance of beach-cast seagrass and marine algae accumulations as sources of detritus and of particulate and dissolved nutrients which can contribute to beach and inshore marine food webs (e.g. Griffiths & Stenton-Dozey 1981; Koop & Griffiths 1982; Lenanton et al. 1982; Robertson & Hansen 1982; Griffiths et al. 1983; Duong 2008). 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 Western Australia, 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, such as amphipods, isopods, coleoptera (beetles) and diptera (flies) rapidly colonises and consumes the decaying vegetation, breaking it down into detritus and particulate carbon (Griffiths & Stenton-Dozey 1981; Marsden 1991; Duong 2008). Griffiths et al. (1983) for example recorded 35 species (of which 22 were insects) amongst kelp wrack, which together accounted for more than 97% of the total intertidal faunal biomass. These organisms can reduce the biomass of dead marine algae 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; Duong 2008). The herbivorous detritivores are in turn preyed upon by beach-dwelling macrofauna such as beetles, birds and isopods (Duong 2008; Campbell 2018). 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. Duong (2008) found that algal wrack in South Australia, particularly brown algae including kelps, appeared to be a potential source of nutrition for beach and nearshore consumers such as amphipods and dipterans.

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, 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).

3.3 History of the commercial fishery

Beach-cast wrack harvesting has been a sporadic activity 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 & Kendrick 1997; 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. At that 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 where permits were issued under Section 48G of the *Fisheries Act 1982*. Subsequently, from 1996, the Director of Fisheries began issuing exemptions under section 59 of the *Fisheries Act 1982*, as an interim measure.

The permits and exemptions authorised a person to engage in the removal or disturbance of beach-cast wrack material. 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 amenities. Over the 1990s, a total of seven permits were issued under this management system, mainly to operators in the southeast of the State.

In late 1996, in response to the increased interest in wrack harvest from new and existing exemption holders, PIRSA 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 wrack 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 *Fishery (Scheme of Management - Miscellaneous Fishery) Regulations 2000*. As a result, the Ministerial exemption holders harvesting for commercial purposes were offered a Miscellaneous Fishery Licence in the fishery in 2003. This process resulted in the issue of three Miscellaneous Fishery Licences for beach-cast wrack harvesting, one of which lapsed in 2007.

A number of Ministerial exemptions have been previously issued for the collection of beach-cast wrack for amenity purposes whilst some Ministerial exemptions were granted for commercial use, mainly for feeding aquaculture abalone.

Since 2020, Exploratory Permits and Miscellaneous Research Permits have also allowed the commercial harvest of beach-cast wrack.

The fishing activity was approved for export by the Commonwealth Department of the Environment as a Wildlife Trade Operation under the *Environment Protection and Conservation Biodiversity Act 1999 (EPBC Act)* in September 2021 until September 2024 (*Assessment of the South Australian Beach-cast Marine Algae Managed Fishery*).

Approvals under the EPBC Act stipulate a number of conditions which prescribe requirements for the management of the fishery. These requirements also guide some management arrangements for authority holders through licence and permit conditions.

3.4 Current commercial fishing arrangements

Current authorities in the BCMAF permitting the harvest of beach-cast wrack are issued under the Act and include two licences in the Miscellaneous Fishery, three Exploratory Fishing Permits and one Miscellaneous Research Permit. Authorities in the fishery are non-transferable.

Miscellaneous licences are issued under the constituted Miscellaneous Fishery and legislated under the *Fisheries Management (Miscellaneous Fishery) Regulations 2015*. These licences have been in place for over 15 years.

An Exploratory Fishing Permit is a mechanism for gathering preliminary data to assist in determining whether the commercial harvesting of a particular aquatic resource in a particular manner is sustainable and desirable. Exploratory Fishing Permits are not transferable, so as to encourage exploratory fishing permit holders to actively explore the viability of the resource and avoid speculation in resource access.

Exploratory Fishing Permits are managed under the *Fisheries Management (Miscellaneous Developmental Fishery) Regulations 2013*. Exploratory permits may transition into developmental permits or be extended to enable further exploration of the viability of creating a commercial licence.

Miscellaneous research permits may be provided for a prescribed period of time to undertake research on specific aquatic species including the gathering of environmental, biological and economic data. Miscellaneous research permits are not designed to transition into fishery licences.

Existing activities to harvest beach-cast wrack for a commercial purpose are managed by imposing conditions on the licence or permit.

The BCMAF includes the harvest of beach-cast wrack from prescribed coastal areas adjacent to South Australian waters. Harvest is permitted on the shoreline between the high and low water mark.

3.5 Recreational fishing

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 is 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 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 impacts on the coastal ecosystem.

3.6 Aboriginal traditional fishing

None of the current licence or permit holders that are entitled to take beach-cast wrack are Aboriginal traditional fishers and there are no known documented historical accounts of Aboriginal traditional use of wrack. Any further information on Aboriginal traditional harvest of beach-cast wrack that becomes available in the future will be included in reviews of this Management Policy. 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 traditional fishers or communities may be considered in this process.

4 Biology of key species

4.1 Seagrass

In South Australia, seagrass meadows cover approximately 5000 km² 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. 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.

The main seagrass species occurring in South Australia are: *Posidonia angustifolia*, *P. australis*, *P. coriaceae*, *P. denhartogii*, *P. sinuosa*, *Amphibolis antarctica*, *A. griffithii*, *Heterozostera tasmanica*, *Halophila australis* and *Zostera muelleri* (Larkum & den Hartog 1989). *Z. muelleri* is primarily intertidal, while the other species are subtidal. In low-energy environments such as the two gulfs and Lacedpede 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 in *Posidonia* meadows, as thin, dispersed populations on mobile sediments or in stands of mixed species composition (Clarke & Kirkman 1989; Shepherd & Robertson 1989).

4.2 Marine algae

Marine algae 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 macro-algae are torn off or fragmented by wave action and later wash up on beaches. The supply of cast algae, like seagrass, is highly variable over short time and spatial scales, but is again most predominant in winter when very large accumulations may occur. Various seaweed species are found within algal beach wracks; their abundance varies depending on location and the source of the material (Duong 2008). 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*.

Cape Jaffa (in the southeast of South Australia) represents the westerly limit in the distribution of a number of key taxa including the large kelp (*Macrocystis pyrifera*) and the southern bull kelp (*D. potatorum*). Higher energy rocky intertidal and sublittoral fringes are typically dominated by bull kelp (*D. potatorum*) while subtidal reefs include numerous species of foliaceous red, brown and green macro-algae but tend to be visually dominated by species of the giant kelp (*M. pyrifera*), the kelp (*E. radiata*) as well as a large variety of other macro-algal species (Edyvane 1999a, b) including many species of *Cystophora* and *Sargassum* as well as the Seirococcacean species (*Phyllospora comosa*, *Seirococcus axilaris* and *Scytothalia dorycarpa*).

5 Ecosystem impacts

Beach-cast wrack constitutes a significant food resource consisting of fragments of marine algae, 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 may also have an effect on offshore secondary production although it is not clear to what extent this adds to the inputs from detrital material that is not cast ashore but rather decomposes within the marine environment.

Accumulated wrack can stabilize coastal ecosystems and may contribute to the fertility and stability of substrates behind the fore dunes. Management arrangements, which are

prescribed through licence or permit conditions reduce the amount of wrack that can be taken on any one occasion and in a specific area. Limitations on the number of harvest days also maintain areas of wrack on the beach, providing wrack for birds to nest and forage and for nutrient recycling and coastal stability.

There is a level of recreational access, including vehicular to the beaches in the BCMAF as well as walking access in most areas. These anthropogenic interactions would also have an effect on the general ecosystem.

Seagrass enhances the formation and stabilisation of coastal sand dunes and beaches with fibrous composition acting as a trap to bind drifting sands and reduce sand erosion in winter. Seagrasses are composed primarily of cellulose fibre with characteristics that inhibit breakdown while marine algae is subject to very rapid deterioration. Management arrangements in the BCMAF include a restriction on harvest near sand dunes and restriction of access to established tracks reducing vehicular and foot traffic to areas.

6 Threatened, Endangered and Protected Species (TEPS) impacts

Licence or permit holders are required to report interactions with TEPS in a wildlife interaction logbook and shorebird sighting form. The most likely interactions with TEPS are with bird species with particular importance placed on licence and permit conditions to minimise any adverse impacts.

Many shorebirds and seabirds are associated with wrack accumulations. These birds make use of the beach-cast wrack for a variety of purposes including nesting, shelter during strong winds or storms and camouflage while resting (Campbell & Anderson 2007). A large number of shorebirds also prey upon wrack-inhabiting organisms that constitute an important food resource. Shorebirds have been observed to frequent aged beach-cast wracks significantly more than fresh beach-cast wracks for both roosting and foraging (Davis & Keppel 2021).

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. Beach-cast wrack thus constitutes a valuable component of bird habitat (McCulloch 1996). It is recognised that beach-cast wracks have significant importance to a range of bird species, particularly resident nesting shorebirds and migratory shorebirds.

There are multiple facets to the potential impacts on shorebirds by operations in the BCMAF. These include impacts through direct interactions with the birds via human presence and harvesting activities, as well as indirect interactions through vehicle presence causing disturbance, including alarm flights. Shorebird type and presence would vary significantly by region. Management arrangements in the BCMAF include licence and permit holders being required to identify and report interactions with shorebirds, limiting harvest to fresh beach-cast wrack, limiting the amount that can be taken from an area and buffer zones for specific bird species.

6.1 Resident nesting Shorebirds

Resident nesting shorebirds rely on the beach-cast marine algae and seagrass wrack for shelter, habitat and microclimate (Davis & Keppel 2021) in addition to food sources. Resident nesting shorebirds spend the majority of their life in coastal areas, using the wrack structure for permanent habitat including breeding. Individuals pair up between August and March for the breeding period, then group together outside of this period, and tend to congregate in areas of beach wrack for food sources.

6.2 Migratory Shorebirds

Migratory shorebirds arrive from September onwards to their non-breeding grounds in South Australia. Beach-cast wracks are considered important for foraging and roosting for migratory shorebirds, as these contain essential food (amphipods and larvae) and provide camouflage and protection from inclement weather. The majority of migratory shorebirds leave in March/April (Department of the Environment 2015) with Sanderlings departing in the first 2 weeks of May. One exception is the Double Banded Plover which has a 'reverse migration' arriving in Australia in autumn/winter and present on beaches during this period. There are 37 migratory shorebirds classified under the EPBC Act.

7 Social and economic information

The harvest of beach-cast wrack has the potential to produce exportable, value-added primary products and therefore improve local regional economies. Some of these products may eventually replace existing imported goods. Marine algae are harvested for a variety of uses throughout Australia and overseas. Marine algae are processed immediately either via composting or by drying on outdoor racks and crushing. The use for algal derivatives includes food product for abalone aquaculture feed, production of alginate and agar, mineral supplements, cattle feed, garden fertilisers, soil conditioners, pesticides (Colombini & Chelazzi 2003) and boutique applications. Recent applications include the use of algae product in alcohol distilling and food additives.

The principal use for seagrass derivatives is for composted fertiliser and soil conditioners. There has been moderate demand for wrack material to supply the domestic market and harvesters have historically focussed on developing products for overseas export. Recent developments seek to grow domestic markets.

8 Ecologically sustainable development risk assessment

The ecological impacts associated with beach-cast wrack fishing activities were identified in consultation with key stakeholders and assessed through the process of conducting an ecologically sustainable development (ESD) risk assessment using the nationally recognised framework described by Fletcher et al. (2002).

Ecological, economic and social factors that affect the management of the activity were prioritised by stakeholders at a workshop on 30 March 2023 from Negligible to Severe risk.

The outcomes of the ESD risk assessment inform management arrangements for the fishery.

A summary of the ESD risk score outcomes is provided in Table 1 and the performance report for medium or higher risk components is provided in Table 2. Full details regarding risks identified for beach-cast seagrass and marine algae fishing activities are provided in the *Ecologically sustainable development (ESD) risk assessment of the Beach-cast Marine Algae Fishery Report* (PIRSA 2023).

Risks considered medium or higher were reviewed with respect to current management arrangements. Future management arrangements are outlined in section 10.4.

Table 1: Summary of ESD risk score outcomes

Component Tree	Severe	High	Medium	Low	Negligible
Retained Species					2
Non-retained species	1	1		2	4
General Ecosystem			2		8
General Community					2
Governance		1	4		
External Factors affecting Fishery Performance			1	2	5
Total	1	2	7	4	21

Table 2: Performance report for medium risks and above

Component	Risk/Issue	Description	Risk rating	Objective	Current Strategies	Performance Indicator	Indicator Robustness	External Drivers
Non Retained Species (7.2)	Direct interaction but no capture – TEPS – Resident Nesting Shorebirds	Risk of fishery impacts on TEPS species – Resident Nesting Shorebirds	Severe	To ensure harvesting impacts do not result in serious or irreversible harm to TEP species' populations.	<p>Protection of TEPS specifically resident nesting birds, birds with dependent young.</p> <p>Harvest prohibited within 100 m either side of an area where <i>Hooded Plovers</i> are nesting or caring for dependent young</p> <p>Harvest prohibited within 4 m of foredunes</p> <p>Restriction on harvest days during specified periods in specified areas</p> <p>No harvest adjacent to marine park zones</p> <p>Bird identification resources to be carried to correctly identify bird species</p> <p>Restricted to existing vehicle access tracks</p> <p>Reporting of TEPS interactions</p>	Number of interactions reported in wildlife interaction logbooks	High	Negative impacts of interactions between birds and other users of beaches in the harvest area including anthropogenic activities (vehicles, dogs and people on beaches), coastal development etc.

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	Direct interaction but no capture – TEPS – Migratory Shorebirds	Risk of fishery impacts on TEPS species – Migratory Shorebirds	High	To ensure harvesting impacts do not result in serious or irreversible harm to TEP species' populations.	Harvest prohibited within 4 m of foredunes Restriction on harvest days during specified periods in specified areas Bird identification resources to be carried to correctly identify bird species Reporting of TEPS interactions	Number of interactions reported in wildlife interaction logbooks	High	Negative impacts of interactions between birds and other users of beaches in the harvest area including anthropogenic activities (vehicles, dogs and people on beaches), coastal development etc.
General Environmental Impacts of the	Addition / movement of biological material	Trophic Level Including Birds and Nutrient Cycle	Medium	To ensure the effects of harvesting do not result in serious or irreversible harm to ecosystem structure and function.	Restriction of harvest days during specified periods and in specified areas Maximum harvest quantities in some areas Harvest not permitted adjacent to Marine Park zones in some areas Only fresh unattached Algae and Seagrass to be removed across the majority of the fishery	Wrack maintained at a sustainable level on the beach at all times.	Low	Negative impacts of other users of beaches in the harvest area including anthropogenic activities (vehicles, dogs and people on beaches), coastal development etc.

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Fishery (7.3)	Addition / movement of biological material	Erosion	Medium	To ensure the effects of harvesting do not result in serious or irreversible harm to ecosystem structure and function.	<p>Operations to minimise incidental take of material including return of sand to dune areas</p> <p>Restriction of harvest within 4 m of foredunes</p> <p>Maximum vehicle and trailer weights in specified areas</p> <p>Vehicle access restricted to existing tracks</p> <p>Only fresh unattached Algae and Seagrass to be removed across the majority of the fishery</p>	Wrack maintained at a sustainable level on the beach at all times. No notable changes to coastal structure.	Low	Negative impacts of other users of beaches in the harvest area including anthropogenic activities (vehicles, dogs and people on beaches), coastal development etc.
Governance (7.4)	PIRSA	Risk to the fishery through lack of sufficient resources to manage fishery efficiently and access security for the permit holder	High	PIRSA to apply management measures to ensure the sustainable harvest of Beach Cast and Marine Algae and that harvesting does not adversely impact the environment.	Proposed management arrangements are developed in consultation with participants and stakeholder. Management arrangements allow for efficient fishing operations within constraints of ecological sustainability.	<p>A primary contact person for permit holders is maintained. Regular contact between PIRSA and permit holders maintained.</p> <p>Fishing endorsements to access the resource is maintained if management arrangements allow for activity within the constraints of ecologically sustainability.</p>	High	

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	Other Government agencies	Risk to the fishery from other Government agencies	Medium	PIRSA to apply management measures to ensure the sustainable harvest of Beach Cast and Marine Algae and that harvesting does not adversely impact the environment.	Proposed management arrangements provided for public comment and communicated to other agencies.	Management arrangements for current or proposed activity is publicly available	Medium	Policies and procedures of other departments may conflict with the objectives of the fishery
	Industry	Risk of the Industry governance	Medium	PIRSA to apply management measures to ensure the sustainable harvest of Beach Cast and Marine Algae and that harvesting does not adversely impact the environment.	Proposed management arrangements are developed in consultation with industry. Code of practice to be developed by industry.	Management arrangements for any current or proposed activity is publicly available	Medium	
	Others (NGOs)	Risk to the fishery from governance arrangements of other organisations (NGOs)	Medium	PIRSA to apply management measures to ensure the sustainable harvest of Beach Cast and Marine Algae and that harvesting does	Proposed management arrangements provided for public comment. Stakeholders directly engaged regarding the ongoing management of the fishery	Management arrangements for any current or proposed activity is publicly available Level of engagement	Medium	Misunderstanding about the industry may result in loss of community confidence in the industry Note * consider

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				not adversely impact the environment.		and participation from NGOs		standard list of stakeholder groups to consult on any new applicants to the fishery
External factors affecting the performance of the fishery (7.6)	Dependent Communities-Community Stewards	Community Steward participation where appropriate	Medium	Community confidence in fisheries agencies to manage fisheries enabled	Proposed management arrangements provided for public comment and communicated to other agencies.	Management arrangements for the proposed activity is publicly available	Medium	Misunderstanding about the industry may result in loss of community confidence in the industry

9 Goals and objectives

This management policy sets out management goals and objectives for commercial harvest of beach-cast wrack that are complementary to the objects outlined in the *Fisheries Management Act 2007*.

The goals and objectives seek to ensure that there is an appropriate balance between the need for long term sustainability of the beach-cast wrack resource and minimising the impact on TEPS with both economic and social factors such as the optimum utilisation and equitable distribution of the resource between stakeholder groups and future generations.

The following broad goals are identified for the South Australian beach-cast seagrass and marine algae harvest fishery:

Goal 1 – Beach-cast seagrass and marine algae resources of South Australia are maintained at sustainable levels to ensure ecosystem impacts are minimised.

Goal 2 – The impact to threatened, endangered and protected species is minimised.

Goal 3 – Optimum utilisation and equitable distribution of the beach-cast seagrass and marine algae resource between stakeholders.

Goal 4 – Enable effective and participative management of the fishery.

Table 3: Goals and objectives for the BCMAF

Objective	Strategies	ESD risk addressed	Performance indicator	Description	Reference point
Goal 1: Seagrass and marine algae resource maintained at sustainable levels to ensure ecosystem impacts are minimised.					
1(a) Seagrass and marine algae resources of South Australia are maintained at sustainable levels.	1(a)(i) Restrictions on harvest area through exclusion zones 1(a)(ii) Restrictions on harvesting gear 1(a)(iii) Restrictions on number of licences/permits	Impacts on target species	Total area of harvest of wrack. Composition of wrack.	The total area of wrack harvested annually as a percentage of coastal extent of all licences/permits issued. Species of seagrass and macroalgae that are collected.	Total area of wrack harvest is not greater than 25% of coastal extent of all licences/permits issued. Composition of wrack harvested does not change significantly from previous year.
1(b) Information collected is sufficient to manage commercial harvest operations to sustainable levels.	1(b)(i) Fishery-dependent information collected through commercial harvest and effort logbooks and catch disposal records. 1(b)(ii) Regular contact between licence/permit holders and PIRSA.	Governance	Commercial harvest and effort.	Spatial and temporal catch and effort data provided by all commercial operators for each day fished in commercial logbooks and catch disposal records.	Total days of collecting harvest of wrack reported and monitored. Total amount (tonnes) of wrack reported and monitored

Objective	Strategies	ESD risk addressed	Performance indicator	Description	Reference point
Goal 2: The impact to threatened, endangered and protected species is minimised.					
2(a) The impacts to threatened, endangered and protected species	2(a)(i) Assessment undertaken of each new licence/permit application to identify TEPS species unique to the proposed areas (including individual ESD risk assessment).	Impacts on TEPS	Interaction rate for TEPS (number of interactions per day reported in wildlife interaction logbooks).	All licence/permit holders are required to report in wildlife interaction logbooks for any interactions with TEPS.	Interaction rates for TEPS from wildlife interaction logbooks monitored annually.

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Objective	Strategies	ESD risk addressed	Performance indicator	Description	Reference point
(TEPS) are identified and minimised.	<p>2(a)(ii) Licence/permit conditions are implemented to minimise impacts that harvesting may have on TEPS.</p> <p>2(a)(iii) Areas of significant importance to TEPS are identified with management measures in place to restrict harvest and access to these areas.</p> <p>2(a)(iv) Up to date information is maintained on TEPS, specifically shorebird species.</p>		No negative impacts on TEPS		Current information on shorebird species is maintained
2(b) Interactions with resident and migratory shorebirds are recorded and minimised.	<p>2(b)(i) Licence/permit holders are trained in the identification of shorebirds.</p> <p>2(b)(ii) Licence/permit conditions minimise potential negative impacts through restrictions on harvest days, areas and vehicle access.</p> <p>2(b)(iii) Licence / Permit holders have relevant resources to identify shorebird species.</p>	Impacts on shorebirds	Interaction rate for shorebirds (number of interactions per day reported in wildlife interaction logbooks).	<p>Shorebird identification information carried by each licence/permit holder.</p> <p>Shorebird interactions including alarm flights are recorded by licence/permit holders.</p>	<p>Records of training completed by licence/permit holders.</p> <p>Interaction rates of shorebird interactions monitored annually.</p>

Objective	Strategies	ESD risk addressed	Performance indicator	Description	Reference point
Goal 3: Optimum utilisation and equitable distribution of the beach-cast seagrass and marine algae resource between stakeholders.					
3(a) An economically efficient commercial activity without compromising sustainability objectives.	3(a)(i) Management arrangements allow commercial activities that consider sustainability objectives.	General community	Number of days of harvest conducted annually.	Management arrangements are fit for purpose to meet evolving sustainability concerns.	Some level of commercial effort harvesting beach-cast seagrass or marine algae is

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Objective	Strategies	ESD risk addressed	Performance indicator	Description	Reference point
					conducted each year. Number of active authorities in the fishery
3(b) Use of the resource is equitable between stakeholder groups, having regard to the range of social, cultural and wider community values attached to the fishery.	3(b)(ii) Review of allocations possible when changes in the industry are identified.	General community	Access to beach-cast wrack to extractive users is maintained.	Licence and permit conditions allow for continued access.	Access to beach-cast wrack to extractive users is maintained

Objective	Strategies	ESD risk addressed	Performance indicator	Description	Reference point
Goal 4: Enable effective and participative management of the fishery					
4(a) Management arrangements support cohesion and engagement between commercial operators and the wider community.	4(b)(i) Stakeholder input to the management of the commercial harvest of beach-cast wrack, through consultative processes including new applications. 4(b)(ii) Management arrangements are communicated to the wider community. 4(b)(iii) A stakeholder contact register is maintained by PIRSA.	Governance Governance – Others (NGOs). External factors affecting fishery – Access	Management information is available on PIRSA website A designated contact person is nominated on the PIRSA website Registration of stakeholders is maintained	Information related to management of the fishery is correct and relevant on the PIRSA website.	PIRSA website information is updated as required Level of stakeholder engagement and community involvement is maintained Up to date stakeholder register

Objective	Strategies	ESD risk addressed	Performance indicator	Description	Reference point
Goal 4: Enable effective and participative management of the fishery					
4(b) Maximise stewardship of the seagrass and marine algae resource.	4(b)(iv) Cost-effective compliance and monitoring program implemented to address identified risks. 4(b)(v) Management arrangements are communicated to the wider community.	Governance / Industry Governance – Others (NGOs)	Number of industry inspections Management information is available on PIRSA website	Number of inspections and outcomes related to the harvest of beach-cast wrack Number of interactions between fisheries officers and Beach-cast wrack fishers	Compliance with conditions is maintained Stakeholder engagement is maintained

10 Current management arrangements

The fundamental principle applied to cost recovery of management costs is that the main beneficiaries of the services (commercial licence and permit holders) are required to bear the cost of delivering the services required to manage their activities. In determining the level of costs recovered from industry, PIRSA is guided by relevant cost recovery policies and reviews.

In South Australian fisheries, most primary retained species are managed under a harvest strategy against biologically based reference levels, and the risk of all fishing on the broader stock(s) has typically already been determined as part of their stock assessments. Given the nature of the BCMAF, which has no defined stock assessment and the rate that beach-wrack is generated is difficult to determine, no harvest strategy is available to reference. Therefore, management arrangements in the fishery must consider the ecological impact of harvesting on species using beach-cast wrack for habitat and food.

Additionally, impact on the species themselves is limited as the material is already detached and provides no reproductive value.

Management arrangements are in place for the harvest of beach-cast wrack in South Australia through licence or permit conditions. Management arrangements vary according to the location and intention of harvest and include controls on the area and method of harvest.

10.1 Area of harvest

- Licence/permit holders have a set of defined areas from which they may harvest beach-cast wrack. Geo-referencing for each harvest area is published as part of the conditions on a licence/permit.
- The coastal extent of a licence/permit may contain areas designated as exclusion zones. Harvest of any seagrass and marine algae in an exclusion zone is prohibited. Absolute geo-referencing for each exclusion zone is published on the licence/permit.
- Areas for exclusion zones may include:
 - Areas that are otherwise inaccessible;
 - Protected areas under other legislation (e.g. National Parks) including areas adjacent to terrestrial conservation parks and reserves and marine parks zoned as a sanctuary zone or special use area;
 - Areas that, under advice from the Department for Environment and Water, are important Migratory Shorebird and Resident Nesting Shorebird habitats; and
 - Other areas as required to limit the total to 25% harvest of the total beach extent.
- Where sand dunes are present, limiting harvesting activity close to the fore dune.
- The harvest area(s) of the licence/permit must only be accessed via existing access routes.

- Vehicles may only transit through exclusion zones in order to transport material or equipment to and from areas where the take of beach cast material is permitted.

10.2 Harvesting activities

- A limit on the number of agents who can carry out the harvest activities on behalf of the licence/permit holder.
- Only fresh unattached algae and seagrass may be removed across the majority of the fishery.
- The licence/permit holder must carry bird identification resources such as the *Shorebird Identification Booklet Version 3* or other resources as identified by PIRSA to enable the correct identification of bird species.
- The permitted activity must not occur within 100 metres either side of areas where *Thinornis rubricollis* (Hooded Plovers) are currently nesting and/or caring for dependent young.
- Seasonal closure areas and/or closure periods may be identified within an area of harvest as required to allow for migratory and nesting/breeding birds to reduce impacts on shorebird activities.
- Operations must minimise incidental take of material including return of sand to dune areas.
- Maximum vehicle and trailer weights in specified areas.
- Heavy machinery prohibited for harvest and/or transport purposes in areas identified as important for migratory shorebirds during periods of the year in which the migratory species are present.

10.3 Monitoring

- Monthly reporting of harvest activities is required including species and harvest quantities.
- The licence/permit holder is required to complete records of any interactions with TEPS (listed under State and/or Commonwealth legislation), including shorebirds in the Wildlife Interaction Logbook. For the benefit of monitoring migratory bird activity this includes bird sightings and alarm flights as well as negative bird interactions.
- All licence/permit holders or registered agents must notify PIRSA at least 1 hour prior to undertaking the activity and advise:
 - The name of the person making the call;
 - The name of the nominated agent and permit number;
 - The mobile phone number of the permit holder or nominated agent;
 - The time and date the activity will commence and conclude;
 - The location/s of the activity; and
 - The species being collected.

- All licence/permit holders are required to submit a return recording the daily catch and harvest activities in respect of each calendar month within 15 days of the end of the month to which it relates. Information to be recorded includes:
 - The date of harvest;
 - The location of harvest including geo-reference points;
 - The estimated area of beach to which harvesting occurred;
 - The weight of species retained;
 - The method of harvest; and
 - The volume of the product sold and the form of that product.

10.4 Future management arrangements

In consideration of the risks identified as moderate and higher during the ESD risk assessment process, inclusions and amendments to current management arrangements are to be implemented for existing and future licences / permits. These include:

- Maintaining a register of stakeholders with relevant interest and knowledge in the area of the fishery and associated ecosystems.
- No fishing activity to occur within 400 metres either side of any nesting areas where *Thinornis rubricollis* (Hooded Plovers) are currently nesting and/or caring for dependent young.
- Vehicle access prohibited within 4 metres of the foredune for authorities using mechanical means to harvest wrack.
- Licence/permit holders to undertake a recognised Shorebird identification course.

It is anticipated that these arrangements will be implemented subsequent to the adoption of this policy.

11 Consultation

As part of the assessment of an application for a new licence/permit to join the BCMAF, or amendments to management arrangements, community consultation will be sought in the form of:

- PIRSA maintaining a register of stakeholders including participants of the ESD risk assessment workshop held 30 March 2023 and additional interested parties.
- A post on the PIRSA website describing the activity being considered inclusive of the draft licence/permit and ESD Risk Assessment, inviting written feedback.
- PIRSA directly contacting members on the register of stakeholders to inform of the community consultation period for proposed licences/permits and of any future changes to this policy.

12 Compliance

Compliance with the management arrangements relevant to BCMAF activities are undertaken by PIRSA Fisheries and Aquaculture Operations Branch. The compliance program has dual objectives:

- To maximise voluntary compliance with the fisheries rules including licence/permit conditions, regulations and any other enforceable instrument. Voluntary compliance will be encouraged through ensuring licence/permit holders are aware of and understand the rules that apply to their harvest activities, and the purpose of the rules.
- To create effective deterrence to breaches of fisheries rules through the presence of fisheries officers and compliance operations as well as through the detection and prosecution of illegal activity.

13 Future strategies

Future strategies to improve the management of the BCMAF include the following to utilise additional information and new technologies:

- Increased surveys and data relating to resident nesting and migratory shorebirds in areas subject to harvesting.
- Obtaining estimates of beach-cast wrack quantities and fluctuations in focus areas through the increased use of satellite imagery and artificial intelligence.
- Additional research on the commercial uses of beach-cast wrack to enable maximum use of the resource.

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