

Draft Management Plan for the South Australian Commercial Blue Crab Fishery

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All Enquiries

Department of Primary Industries and Regions
2 Hamra Ave
WEST BEACH SA 5024
T 08 8207 5400
www.pir.sa.gov.au/fisheries

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1 Fishery to which this plan applies

This draft plan applies to the commercial Blue Crab Fishery, which is formally constituted by the *Fisheries Management (Blue Crab Fishery) Regulations 2013*.

The regulations define the fishery as:

The taking, in the waters of the blue crab fishing zones—

- a) of aquatic resources specified in Schedule 1 Part 1; and*
- b) of aquatic resources specified in Schedule 1 Part 2 for the purpose of bait.*

Schedule 1 of the regulations is also included in this management plan at Appendix 1.

Blue crab fishing zone means—

- a) the Gulf St Vincent Blue Crab Fishing Zone; or*
- b) the Spencer Gulf Blue Crab Fishing Zone.*

2 Consistency with other management plans

This draft management plan has 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 management plan.

3 Term of plan

This draft plan applies from 1 July 2024 for a period of ten years.

Section 49 of the *Fisheries Management Act 2007* prescribes the requirements for reviewing this management plan.

4 Description of the fishery

The commercial Blue Crab Fishery is based on the capture of a single species Blue Swimmer Crab, *Portunus armatus*, although other crustacean species are permitted to be landed and sold as by-product. A number of other species are permitted to be taken for use as personal bait.

Access to the fishery is provided through a licence for the Blue Crab Fishery or the Marine Scalefish Fishery. Licences are endorsed with quota units for either the Gulf St Vincent zone or Spencer Gulf zone. Blue Crab Fishery licence holders use crab pots to trap their catch and bait nets are permitted to be used. Marine Scalefish Fishery licence holders are restricted to using crab nets (i.e. hoop nets or drop nets). The areas of waters in which holders of licences for the Blue Crab Fishery may take Blue Swimmer Crabs are provided in Figure 1 and described as follows (GDA94):

Gulf St Vincent - In the waters of Gulf St Vincent north of the geodesic from the location on Mean High Water Springs closest to 35°10'04.74" South, 137°40'38.64" East to the location on Mean High Water Springs closest to 35°36'48.51" South, 138°05'44.01" East,

with the exception of the following areas from 1 December to Easter Monday (inclusive);

All waters landward of a line commencing at the seaward end of the southern Outer Harbor breakwater closest to latitude 34°47'18.96"S, longitude 138°28'00.12"E, then westerly along the geodesic to latitude 34°47'12.12"S, longitude 138°24'54.00"E, then south-southeasterly along the geodesic to latitude 35°02'30.84"S, longitude 138°29'16.44"E, then east along the parallel of latitude 35°02'30.84"S to the point on mean high water springs closest to latitude 35°02'30.84"S, longitude 138°30'37.44"E.

All waters landward of a line commencing at the seaward end of the northern Outer Harbor breakwater closest to latitude 34°47'02.52"S, longitude 138°28'12.12"E, then northwesterly along the geodesic to latitude 34°44'51.06"S, longitude 138°26'40.80"E (spoil ground navigation mark), then northeasterly along the geodesic to the point on mean high water springs closest to latitude 34°41'36.84"S, longitude 138°28'24.36"E.

All waters in the area contained within 2 nautical miles (NM) from the boat ramps at the following locations:

Ardrossan (latitude 34°26'05.52"S, longitude 137°55'02.70"E);

Black Point (latitude 34°36'22.74"S, longitude 137°52'55.38"E);

Port Vincent (latitude 34°46'39.96"S, longitude 137°51'46.44"E);

Stansbury (latitude 34°54'13.62"S, longitude 137°47'51.66"E).

Spencer Gulf - In the waters of Spencer Gulf north of the geodesic from the location on Mean High Water Springs closest to 34°26'45.00" South, 136°06'57.58" East to the location on Mean High Water Springs closest to 34°26'45.00" South, 137°24'59.26" East,

with the exception of the following areas (all year);

Upper Spencer Gulf – in the waters of Spencer Gulf north of the geodesic from the location on Mean High Water Springs closest to 32°43'45.67" South, 137°47'41.28" East to the location on Mean High Water Springs closest to 32°43'45.67" South, 137°54'11.78" East.

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Whyalla – in the waters of or near False Bay contained within and bounded by a line commencing at Mean High Water Springs closest to 33°04'26.61" South, 137°32'58.50" East, then beginning north-easterly following the line of Mean High Water Springs to the location closest to 32°59'41.12" South, 137°45'31.96" East (Stony Point), then south-westerly to 33°05'12.75" South, 137°34'10.86" East, then north-westerly to the point of commencement.

Port Broughton and Fishermen's Bay - in the waters of or near Fisherman Bay contained within and bounded by a line commencing at Mean High Water Springs closest to 33°32'57.56" South, 137°56'27.59" East, then beginning south-easterly following the line of Mean High Water Springs to the location closest to 33°35'40.46" South, 137°55'20.82" East, then northerly to the location on Mean High Water Springs closest to 33°33'27.77" South, 137°55'24.65" East (Shag Island), then north-easterly to the point of commencement.

with the exception of the following areas from 1 December to Easter Monday (inclusive);

Wallaroo - the State waters of or near Wallaroo contained within and bounded by a line at a radius of 2NM from an approximate point location of 33° 55' 34.415" South, 137° 37' 26.060" East, but excluding any land or waters so encompassed that lie landward of the line of Mean High Water Springs.

Moonta - the State waters of or near Moonta contained within and bounded by a line at a radius of 2NM from an approximate point location of 34° 04' 28.397" South, 137° 32' 48.225" East, but excluding any land or waters so encompassed that lie landward of the line of Mean High Water Springs.

Franklin Harbor – in the State waters of or near Franklin Harbor contained within and bounded by a line commencing at mean high water springs closest to 33° 43' 34.047" South, 136° 59' 25.230" East, then south-westerly to the location on mean high water springs closest to 33° 44' 25.604" South, 136° 58' 11.766" East, then beginning northerly following the line of mean high water springs to the point of commencement, but excluding any land or waters so encompassed that lie landward of the line of Mean High Water Springs.

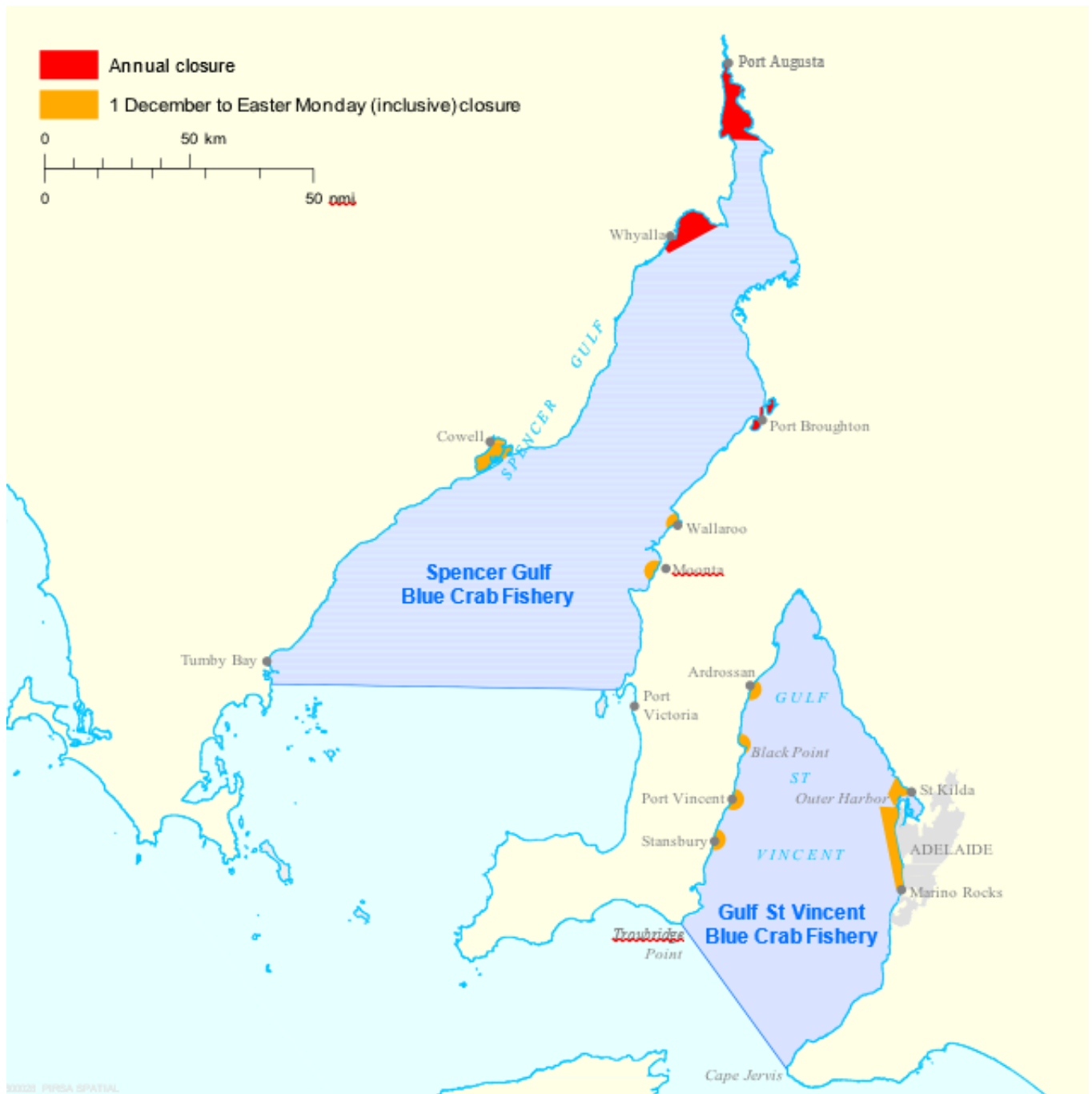


Figure 1. Area of the Blue Crab Fishery

4.1. Historic overview

Blue Swimmer Crabs were initially taken commercially as incidental catch in the marine scalefish and prawn fisheries. In the late 1970s, the South Australian Department of Fisheries began to investigate the potential for the development of a commercial Blue Swimmer Crab fishery.

This investigation led to the establishment of an experimental Blue Swimmer Crab pot fishery in 1983 through a call for expressions of interest from Marine Scalefish Fishery licence holders who had been impacted by net closures in upper Spencer Gulf.

In 1996, the South Australian Government established a commercial Blue Swimmer Crab pot fishery, implementing management and research strategies to maintain a sustainable and financially viable fishery. Access arrangements to the fishery were determined using historical catches. A number of Marine Scalefish Fishery licence holders who had historically targeted Blue Swimmer Crabs in waters adjacent to the Yorke Peninsula using hoop and drop nets were provided access. The fishery was divided into two zones (Spencer Gulf and Gulf St Vincent).

Since the establishment of the fishery, an Individual Transferable Quota (ITQ) management system has been in place. At the commencement of the fishery in 1996, total allowable commercial catches (TACCs) were set and divided equally amongst licence holders in each of the zones.

The combined TACC was initially set at 520 tonnes (t) for the 1996/97 fishing season. Over the next four seasons, the combined TACC gradually increased until it reached 626.82 t in 2000/01, with 381.7 t for the Spencer Gulf Zone and 245.1 in the Gulf St Vincent Zone becoming the baseline catch levels for the Blue Crab Fishery operations in each zone.

In the Spencer Gulf Zone, the TACC was maintained at 381.7 t from 1998/99 to 2019/20, before increasing to 419.8 t in 2020/21 and 2021/22, and then to 458 t in 2023/24, consistent with the harvest strategy in the management plan. In the Gulf St Vincent Zone, the TACC was set at 245.1 t from 2015/16 to 2019/20. In 2020/21 the TACC was increased to 269.7 t, and then to 294.2 t in 2021/22, before returning to 245.1 t in 2023/24, consistent with the harvest strategy.

Since 1997/98, the total number of licences with blue crab quota has decreased from 40 to 10. In 2023 there were nine Blue Crab Fishery licences and one Marine Scalefish Fishery licence with blue crab quota entitlements.

The first Management Plan for the South Australian Commercial Blue Crab Fishery under the *Fisheries Management Act 2007* came into operation on 1 January 2012 (PIRSA 2012). A second management plan for the Blue Crab Fishery in South Australia was adopted in 2018 following a review (PIRSA 2018). The 2018 management plan identified a planned review of the harvest strategy included in the plan within two years after the commencement. Consistent with the outcomes of this planned review, an amended version of the 2018 management plan was adopted and implemented from 1 July 2020.

Following an extension to the expiry of the 2018 management plan, a review was undertaken in 2023, recommending the plan be replaced, noting updates were needed for several sections of the plan. This replacement management plan incorporates these updates.

4.2. Ecosystem and habitat

4.2.1. Spencer Gulf

Spencer Gulf is a unique marine environment in South Australia. It contains the most extensive seagrass meadows in South Australia. The mangrove *Avicennia marina* forms large stands around the coast. Both of these habitats provide vital nursery areas for a large number of fish and crustacean species in the gulf. Black Point, near Whyalla, provides an important breeding ground for the Australian Giant Cuttlefish, *Sepia apama*.

The Spencer Gulf is considered vulnerable to environmental impacts because its water exchange with the ocean is constrained and the waters are naturally very low in nutrients by world standards. The existing marine communities have evolved to these unique circumstances, and are therefore particularly susceptible to changes in their environment (DEH 2006).

4.2.2. Gulf St Vincent

Gulf St Vincent lies within the Gulf St Vincent Bioregion. Habitats typical of this region include:

- Saltmarshes, mangroves and tidal flats
- Dense seagrass meadows and sandy seafloor
- Sand and shell grit beaches, tidal creeks and river deltas.

The habitats in the upper Gulf St Vincent area provide critical baselines to measure changes to the State's marine ecosystems that may arise over time from, for example, pollution or climate change.

The coastal wetlands of Gulf St Vincent provide nursery habitats for King George Whiting, Southern Garfish, Mullet, Western King Prawn and Blue Swimmer Crab. Exposed tidal flats provide important food and resting places for thousands of migratory shorebirds during summer. Species within the region are influenced by the distinctive clockwise circulation of currents within Gulf St Vincent (DEH 2009).

The overall environmental impacts associated with Blue Swimmer Crab fishing are considered to be low. Management of the Blue Crab Fishery as part of the broader ecosystem is a goal of this plan. Ecosystem impacts are considered in more detail in section 7.

4.3. Biology of key species

The following description provides brief background information on the biological characteristics, commercial production statistics and recreational catch and effort levels for Blue Swimmer Crabs. More detailed information on stock status is provided in stock assessment and stock status reports prepared by the South Australian Research and Development Institute (SARDI), Aquatic Sciences. All completed reports are available on the PIRSA and SARDI Aquatic Sciences websites at www.pir.sa.gov.au/fisheries or www.sardi.sa.gov.au.

Blue Swimmer Crabs (*Portunus armatus*) are distributed throughout the coastal waters of the tropical regions of the western Indian Ocean and the Eastern Pacific (Kailola et al.1993); they are adapted to a life in warmer waters. In the relatively colder, temperate parts of Australia, the life cycle has evolved to increase growth and reproduction during the warmer part of the year when water temperatures are elevated to those similar to the tropical regions. Activity reduces during the colder winter months. Blue Swimmer Crabs are found throughout South Australian waters but the majority of the stock inhabits the warmer shallow waters of Gulf St Vincent and Spencer Gulf.

Blue Swimmer Crabs are generally distinguished by the fact that their last pair of legs is modified as swimming paddles. They are active swimmers but when inactive, they bury themselves in the sediment leaving only their eyes, antennae and gill chamber opening exposed. Males are blue and have larger claws than females, which are green-brown in colour (Dixon and Hooper 2009).

The species occurs in a wide range of algal and seagrass habitats and on both sandy and muddy substrata, from the intertidal zone to at least fifty metres of depth (Williams 1982; Edgar 1990, in Dixon and Hooper 2009). In coastal waters, smaller crabs are found in shallow waters, while adults are found in comparatively deeper waters. Juvenile crabs occur in mangrove creeks and mud flats for eight to twelve months by which time they attain a size of 80 to 100 mm carapace width. Within South Australia, there is a distinct seasonal pattern of adult crab movements into shallow inshore waters during the warmer months of September to April and to deeper offshore waters during the colder months of May to August (Smith 1982 in Dixon and Hooper 2009).

The Blue Swimmer Crab populations within Spencer Gulf, Gulf St Vincent and the West Coast regions of South Australia are believed to represent separate sub-populations with a limited gene flow. Inter-regional larval dispersal has also been found to be restricted and each sub-population must be dependent on its own larval supply (Bryars and Adams 1999). Chaplin et al. (2001) has also found that the assemblages of *P. armatus* in different embayments in South Australia often constitute genetically different meta-populations. The level of migration between these populations is probably limited and likely to be determined by local factors (Dixon and Hooper 2009).

Male and female *P. armatus* generally reach sexual maturity at a size of 70 to 90 mm in carapace width, when they are approximately one-year-old. The spawning season lasts for 3 to 4 months over the summer/autumn period. The duration of the growing season varies among individuals because those settling in early summer have a longer growing season than those settling in mid-to-late summer. In South Australian waters, crabs close to the minimum legal-size (110 mm) are approximately 14 to 18 months old, are sexually mature with females having produced at least two batches of eggs within one season (Kumar et al. 2000 & 2003 in Dixon and Hooper 2009).

4.4. Economic characteristics

4.4.1. Catch and gross value of production

The total landed catch of Blue Crabs in the Blue Crab Fishery increased from 515 tonnes in 2002/03 to 521 tonnes in 2021/22. The total catch in 2021/22 (521 t) was 1 per cent above that in 2002/03. While the nominal value of the catch was almost three times that in 2002/03, increasing from \$3.2 million to \$8.7 million in 2021/22. In real terms, the Gross Value of Production (GVP) in 2021/22 was 74 per cent higher than that in 2002/03, a result of the increase in catch (1 per cent), and a significant rise in the real price (72 per cent). (Figure 2).

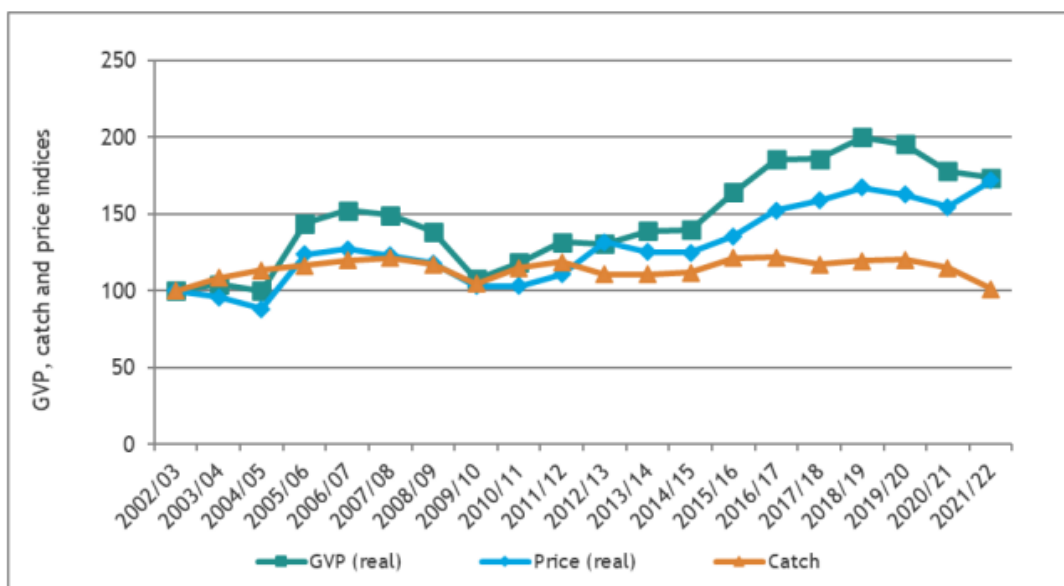


Figure 2: Economic indicators for Blue Crab Fishery (EconSearch 2023)

4.4.2. Contribution to South Australian economy

In the South Australian Blue Crab Fishery output, household income and contribution to Gross State Product (GSP) all followed an increasing trend between 2002/03 and 2021/22.

In 2021/22, total Blue Crab fishing industry related contribution to GSP in South Australia was \$26.9 million; \$6.7 million generated by fishing directly, \$6.3 million generated by downstream activities and \$13.9 million generated in other sectors of the state economy. In 2021/22 there were an estimated 225 full time equivalent jobs generated, directly and indirectly (Econsearch 2023).

5 Co-management arrangements

Co-management is an arrangement whereby responsibilities and obligations for sustainable fisheries management are negotiated, shared and delegated at appropriate levels between government, the commercial fishing industry, recreational fishers, Aboriginal traditional fishers and other key stakeholders such as conservation groups (Neville 2008). Co-management is recognised as a spectrum of positions – starting from centralised government regulation with no industry input at one end to more autonomous management by industry groups and key stakeholders at the other, where government plays more of an audit role. Co-management is designed to achieve efficient regulatory practice (among many other things) and is by no means a way of industry or other key stakeholders avoiding regulatory scrutiny and influence.

PIRSA has adopted a Policy for the Co-Management of Fisheries in South Australia to inform discussion with the wider commercial fishing industry and other stakeholder groups as to how best to promote and implement co-management. The policy proposes that implementation of a preferred co-management model should be through a phased approach whereby industry and key stakeholders build their capacity over time and which allows for a government audit process to measure performance and success.

Section 20 of the *Fisheries Management Act 2007* provides that the Minister, or delegate of the Minister, may establish committees to provide advice to the Minister on any matter related to the administration of the Fisheries Management Act 2007.

The South Australian Blue Crab Pot Fishers Association Inc. (SABCPFA) is recognised as the representative industry body of the Blue Crab Fishery. PIRSA consults with this association to inform day to day management of the Blue Crab Fishery. RecFish SA is recognised as the peak representative advisory body for recreational fishing in South Australia.

6 Allocation of access between sectors

6.1. Allocated shares of the resource

The *Fisheries Management Act 2007* provides that a management plan must specify the share of the fishery to be allocated to each fishing sector.

The Act also provides that, in determining the share of aquatic resources to be allocated to a particular fishing sector under the first management plan for an existing fishery, the share of aquatic resources to which that fishing sector had access at the time the Minister requested the plan to be prepared (based on the most recent information available to the Minister) must be taken into account.

The Minister formally requested preparation of the first management plan for the Blue Crab Fishery on 3 July 2008. Therefore, the 2012 Management Plan had to take into account the share of the Blue Swimmer Crab resource that the commercial fishing sector had access to at that time. Allocations for the recreational and Aboriginal traditional fishing sectors were also determined (Table 1). The

proportions provided in Table 1 reflect the estimated state-wide catch of Blue Crab taken by each sector in 2007/08.

Table 1: State-wide shares allocated to each sector in relation to the Blue Crab Fishery (BCF)

Species	Commercial		Recreational	Aboriginal traditional
Blue Swimmer Crab	BCF	65.5%	29%	1%
	MSF	4.5%*		

The BCF allocation set out in Table 1 is inclusive of the allocation provided to MSF licence holders endorsed with Blue Crab quota entitlements. Conversely, the MSF allocation applies to MSF licence holders that are not endorsed with Blue Crab quota entitlements, and who are not permitted to take Blue Crab in waters east of 135 degrees East.

The Blue Crab Fishery also has access to other crustacean species, which are permitted to be landed and sold as by-product, and a number of other species that are permitted to be taken for use as personal bait (Appendix 1). There have been no or negligible reported catches of these species by the fishery.

6.1.1. Marine Scalefish Fishery

Licence holders in the Marine Scalefish Fishery (without Blue Crab quota entitlements) with the appropriate gear endorsements are permitted to take Blue Swimmer Crabs on the west coast of South Australia, west of longitude 135 degrees East. These fishing activities are not part of the constituted Blue Crab Fishery and are not managed under this management plan, but as part of the Marine Scalefish Fishery. The allocation of 4.5% in table 1 to the Marine Scalefish Fishery reflects these arrangements.

6.1.2. Recreational sector

The 2021/22 South Australian Recreational Fishing Survey estimated a recreational harvest of 921,000 crabs retained or 251 tonnes, and 1 million released. The retained catch was 29% of the total harvest weight from all sectors across the state (Beckmann et al 2023). This recreational harvest was equal to the allocated recreational share of 29% specified in the Management Plan for the South Australian Commercial Blue Crab Fishery.

As part of a 2016 review of recreational fishing, the bag and boat limits for recreational fishers were reduced from 40 crabs per person per day to 20 crabs per person per day to support maintaining the allocation of shares of the Blue Swimmer Crab resource and, moreover, to support a 'fair days fishing' by all recreational fishers. Feedback through the recreational fishing review supported the reduction, however recreational fishers expressed the need for any reduction to be done while maintaining the allocation of the resource, consistent with the allocated shares.

6.1.3. Aboriginal traditional sector

Access to South Australia's fisheries resources by Aboriginal communities under the *Fisheries Management Act 2007* will be provided through Aboriginal traditional fishing management plans. These plans may be developed when an Indigenous Land Use Agreement (ILUA), agreed to resolve a native title claim, is in place in relation to a native title claim area. The State is currently engaged in ILUA negotiations with native title claimants and other stakeholder groups, including the fishing industry. The agreements arising from these negotiation processes will inform the way that access to

fisheries resources by Aboriginal communities is defined and implemented. Aboriginal traditional fishing under the Act only relates to fishing agreed through the ILUA process. Aboriginal people are also recreational fishers outside of these arrangements.

In this management plan, a share of access has been allocated and set aside for the purpose of resolving these native title claims. There is little available information on the take of Blue Swimmer Crabs by the Aboriginal traditional fishing sector; however, the small number of claims with fishery-related interests and negotiations to date has informed the share that has been put aside for this purpose. A nominal share of 1% has been made to the Aboriginal traditional sector in this management plan, which has been deducted from the total recreational share. This is because Aboriginal traditional fishing is non-commercial fishing.

Fishery-related ILUAs will be negotiated over coming years. Therefore, at the appropriate review of this management plan, any difference between the nominal share put aside and the actual share agreed through the ILUA can be calculated. Any difference would then be reallocated to or from the recreational sector.

6.2. Review of allocations

Allocations between sectors are to be reviewed periodically in accordance with the criteria set out in the Allocation Policy (PIRSA 2023). For the Blue Crab Fishery, the first review of shares was conducted following the finalisation of the 2013/14 recreational fishing survey. A subsequent evaluation was undertaken following the completion of the 2021/22 recreational fishing survey and in preparation of this management plan. Method for adjusting allocations of access in future

If any future adjustment of shares is to be from the commercial sector to the non-commercial sector, a voluntary scheme would always be pursued in the first instance. The Blue Crab Fishery has a small number of licences and few participants and this may mean that it is difficult to assess the value of quota units and fishery licences and/or that a voluntary adjustment scheme may not be able to be implemented in the fishery. Therefore, a second voluntary option/step is required, which would investigate an incentive-based scheme for share adjustment. Compulsory acquisition of commercial access to the fishery would be explored as a last resort.

The adjustment of shares from the commercial sector to a non-commercial sector can be summarised by the following options:

- 1 Purchase commercial access (i.e. quota units) to the resource on the open market
- 2 Create incentives for the commercial sector to trade access to the resource
- 3 Compulsory acquisition of commercial access to the fishery would be explored as a last resort. Any compulsory acquisition would include compensation to the commercial sector.

7 Ecosystem Impacts

The *Fisheries Management Act 2007* requires that ecological impacts be identified and assessed as the first step in developing a management plan. A goal of this plan is the management of the Blue Swimmer Crab resource as a part of the broader ecosystem, using an ecosystem-based fisheries management (EBFM) approach. The Act specifically requires that the following impacts are identified:

- Current known impacts of the fishery on the ecosystem

- Potential impacts of the fishery on the ecosystem
- Ecological factors that could have an impact on the performance of the fishery.

These impacts must be assessed to determine the most serious risks and strategies for addressing those risks must be developed.

The ecological impacts associated with the fishery have been identified and assessed through the process of conducting an ecologically sustainable development (ESD) risk assessment for the fishery. The National ESD Reporting Framework for Australian Fisheries (Fletcher et al. 2002) was used to conduct the risk assessment.

In accordance with the ESD objective in the Act, this approach is aimed at assisting PIRSA with identifying and prioritising all of the important ecological, social and economic factors effecting the management of the fishery. Full details about the risks identified and their relevant priorities are provided in the report from the Ecologically Sustainable Development (ESD) Risk Assessment for the Commercial Blue Crab Fishery (PIRSA 2009). These risk ratings were reviewed and updated in September and November 2023 and any additional risks and emerging important issues in the fishery were identified in consultation with stakeholders and incorporated in the Revised ESD Risk Assessment for the South Australian Commercial Blue Crab Fishery (PIRSA 2023) .

Specific management strategies to minimise these risks and associated performance indicators have been developed and are provided in Table 2.

8 Goals and Objectives

Section 7 of the *Fisheries Management Act 2007* sets out the objects of the Act. Ecologically sustainable development is established as the overall object of the Act. A number of biological, social and economic factors are identified that must be balanced in pursuing ecologically sustainable development. Object 7(a), relating to the avoidance of over-exploitation, is specified as the primary consideration.

Objectives for the Blue Crab Fishery are set out below. They are organised under four broad goals. These goals and objectives capture all of factors identified in the Act that must be balanced to pursue ecologically sustainable development.

Goal 1 – Ensure the Blue Swimmer Crab resource is harvested within ecologically sustainable limits

This goal relates to the environmental sustainability of the target stock.

The primary objective for Goal 1 is to ensure that Blue Swimmer Crab stocks are harvested sustainably and that adequate data exists to determine this. The main management strategies for ensuring sustainability of the fishery are the major output controls - restrictions on the total commercial catch each year through the quota system, bag and boat limits for recreational fishers, a minimum legal-size limit and restrictions on taking berried females.

As the commercial sector accesses approximately 70% of the fishery each year, the decision rules and reference points for determining the annual TACC in the harvest strategy are an important focus in terms of ensuring ecologically sustainable stock levels.

The objectives of this management plan in relation to environmental sustainability are to:

- Maintain the stock within sustainable limits in accordance with performance indicators

- Collect biological and environmental information to inform management decisions based on the performance indicators specified in this management plan.

Goal 2 – Allocate access to Blue Swimmer Crab resources to achieve optimum utilisation and equitable distribution to the benefit of the community

This goal relates to the economic and social sustainability benefits derived from the fishery. The objectives of this management plan in relation to these benefits are to:

- Maintain the stock at or above a level that will support commercial catch rates within the historical range
- Maintain a flow of economic benefit from the fishery to the broader community
- Provide equitable public access and recreational fishing opportunities consistent with the allocated catch shares
- Recognise Aboriginal traditional fishing access

Goal 2 aims to optimise the use of the fishery in an equitable way, within the sustainability constraints of the fishery. Optimising the use of the fishery is addressed in the objectives and strategies in terms of maximising stable economic returns from the commercial fishery and maintaining equitable access to the resource for the non-commercial sectors.

Goal 3 – Minimise impacts on the ecosystem

This goal relates to the management of the fishery using an EBFM approach. The objectives of this management plan in relation to EBFM are to:

- Minimise fishery impacts on non-target retained and discarded species and the ecosystem
- Minimise the interaction with threatened, endangered and protected species.

Australian Government guidelines for the ecological sustainability of Australian fisheries acknowledge the need to minimise the impacts of fishing on the ecosystem. Three key objectives were identified to achieve this goal: ensure sustainability of by-catch and by-product species and minimise interactions with threatened, endangered and protected species (TEPS).

Goal 4 – Cost effective and participative management of the fishery

This goal relates to co-management of the fishery, planning of management activities and the recovery of the costs of management of the fishery.

The objectives of this management plan in relation to co-management, planning and cost recovery are to:

- Provide cost effective and efficient management of the fishery, in line with Government's cost recovery policy
- Ensure management arrangements reflect concerns and interests of the wider community
- Maximise compliance with management arrangements
- Ensure management is responsive to changes in environmental conditions

The key objectives of this goal are to ensure that the fishery has involvement in the decision making processes for developing and implementing management arrangements, and to ensure that management arrangements are responsive to changes in environmental conditions and are complied with. The cost effectiveness of management arrangements also needs to be taken into account in the development process as the costs of management are recovered from fishers in accordance with the Government's cost recovery policy.

Table 2: Summary of management goals, objectives, strategies, performance indicators and reference points for the Blue Crab Fishery

Goal	Objective	Strategies	Addressing Issue or Risk ¹	Performance Indicator	Description	Limit Reference Point
Goal 1 Ensure the Blue Swimmer Crab resource is harvested within ecologically sustainable limits	1a Maintain the stock within sustainable limits in accordance with performance indicators.	1a(i) Set the TACC annually, in accordance with the harvest strategy. 1a(ii) Ensure other input and output controls support sustainable use of the resource.	Blue Swimmer Crab – Spencer Gulf population Blue Swimmer Crab – Gulf St Vincent population Management effectiveness	Catch rate of legal-size crabs from Fishery Independent Surveys (FIS) (kg/potlift) Relative biomass of pre-recruit crabs from FIS (kg/potlift) Commercial catch rate (CPUE kg/day) of legal-sized crabs using fishery dependent commercial logbook data.	Fishery independent estimate of biomass for crabs across the area of the fishery during the year it was measured. Fishery independent estimate of biomass for pre-recruit (undersize) crabs provides an indicator of biomass for future seasons, across the area of the fishery. Trends in fishery dependent data recorded throughout the fishing season may provide indicator of abundance from year to year	Gulf St Vincent: 0.8 kg/potlift Spencer Gulf: 1.0 kg/potlift Monitored annually and reported in stock assessment Monitored annually and reported in stock assessment
	1b Collect biological information and consider environmental information to inform management decisions based on the performance indicators specified in this management plan.	1b(i) Collect fishery dependent information through commercial logbooks and voluntary pot sampling program. 1b(ii) Conduct regular fishery independent surveys to collect data on the spatial abundance and sizes of Blue Swimmer Crabs in Spencer Gulf and Gulf St Vincent. 1b(iii) Assess the status of the stock through stock assessment. 1b(iv) Review and update the strategic research and monitoring plan. 1b(v) Communicate research and information on the commercial fishery to the broader community. 1b(vi) Consider environmental information for stock assessment (e.g. temperature, salinity, acidification where available)	Research/information Blue Swimmer Crab – Spencer Gulf population Blue Swimmer Crab – Gulf St Vincent population Climate change Water quality	Licence holder participation in voluntary daily pot sampling program FIS undertaken for each quota zone Annual fishery stock assessment reports published	Good quality temporal data on the abundance of pre-recruit crabs (as an indicator of recruitment biomass) is vital to building a robust suite of fishery data.	Licence holder participation in voluntary daily pot sampling program
Goal 2 Allocate access to Blue Swimmer Crab resources to achieve optimum utilisation and equitable distribution to the benefit of the community	2a Maintain the stock at or above a level that will support commercial catch rates within the historical range.	2a(i) Set the TACC annually, in accordance with the harvest strategy.	Management effectiveness Profit	Standardised CPUE of legal-sized crabs using fishery dependent commercial logbook data.	Commercial fishers need to maintain catch rates in order to maximise economic efficiency.	Monitored annually and reported in stock assessments
	2b Maintain a flow of economic benefit from the fishery to the broader community.	2b(i) Economic indicators are monitored and reported annually.	Profit Employment Economic drivers	Gross Value of Production (GVP) Total economic impact	GVP is the total catch valued at the landed beach price. Used to determine whole fishery value.	Economic indicators are monitored annually

¹ See PIRSA (2023) *Revised Ecologically Sustainable Development (ESD) Risk Assessment of the South Australian Commercial Blue Crab Fishery*.

Goal	Objective	Strategies	Addressing Issue / Risk ¹	Performance Indicator	Description	Limit Reference Point
		<p>2b(ii) Develop and maintain positive relationships with the regional communities in the area of the fishery.</p> <p>2b(iii) Communicate positive sustainability and economic outcomes of the fishery to the broader community.</p>	<p>Relationships with community</p> <p>Communication with community</p>	<p>Total Gross State Product</p> <p>Level of full-time equivalent employment provided by the fishery</p>	<p>Price and cost indices indicators are derived from the nominal average price and average cost per kilogram of catch.</p> <p>Total economic impact refers to the direct fishing industry impacts (fishing, processing, etc.) and the indirect impacts on other sectors of the economy.</p>	
	2c Equitable public access and recreational fishing opportunities within allocated shares.	<p>2c(i) Maintain commercial catch limits within the allocation framework consistent with the PIRSA Allocation Policy.</p> <p>2c(ii) Undertake recreational survey to estimate catch and effort every five years.</p>	<p>Allocation</p> <p>Recreational Fishing</p>	<p>Allocation maintained</p> <p>Recreational fishing survey undertaken</p>		
	2d Recognise Aboriginal traditional fishing access.	2d(i) Integrate any traditional fishing access prescribed in Aboriginal traditional fishing management plans with the management of the commercial, charter and recreational sectors.	<p>Allocation</p> <p>Aboriginal traditional fishing</p>	Allocation maintained		
Goal 3 Minimise impacts on the ecosystem	3a Minimise fishery impacts on non-target retained and discarded species and the ecosystem.	<p>3a(i) SABCPFA to develop biofouling management plan to reduce the risk of translocation of exotic aquatic plants and animals.</p> <p>3a(ii) Maintain minimum mesh size for pots to minimise bycatch of undersized crabs and other non-target species.</p> <p>3a(iii) Use commercial catch and effort returns to collect information on retained byproduct species .</p> <p>3a(iv) Manage and monitor the take of key byproduct species to ensure that catches remain at very precautionary levels.</p>	<p>Translocation</p> <p>Impact on populations of retained non-target species</p> <p>Impact on populations of discarded non-target species</p>	<p>Biofouling management plan developed to address risks posed by potential translocation of biological material and disease</p> <p>Monitor biosecurity risks/outbreaks appropriately</p> <p>Landings of retained non-target species recorded in catch and effort logs</p> <p>Bycatch in FIS are recorded</p>	<p>Translocation of biological material and disease can have negative environmental and economic effects.</p> <p>Catches of non-target species are annually reviewed to identify any significant changes</p> <p>Catches of non-target species are annually reviewed to identify any significant changes</p>	
	3b Minimise the interaction with endangered, threatened and protected species.	<p>3b(i) Continue and improve commercial data recording systems to capture fishing interactions with endangered, threatened and protected species.</p> <p>3b(ii) Develop management measures to minimise interactions with threatened, endangered and protected species should any new issues arise in the fishery.</p>	<p>Non-Retained Species – Capture, Direct interaction but no capture of TEPS</p>	<p>Wildlife interaction reports completed and submitted</p>	<p>All commercial fishery licence holders are required to complete and submit wildlife interaction reports to report any interactions with threatened, endangered or protected species</p>	

Goal	Objective	Strategies	Addressing Issue / Risk ¹	Performance Indicator	Description	Limit Reference Point
Goal 4 Cost effective and participative management of the fishery	4a Provide cost effective and efficient management of the fishery, in line with government's cost recovery policy.	4a(i) Develop and implement management arrangements that are cost effective at achieving management objectives and optimising costs. 4a(ii) Determine the annual real costs of management, research and required costs of compliance for the fishery. 4a(iii) Recover licence fees from commercial licence holders, sufficient to cover the attributed costs of fisheries management, research and compliance of the commercial fishery in accordance with the Government's cost recovery policy.	Management effectiveness Economic drivers	Fee per licence holder Licence fees as a proportion of GVP Licence fees as a proportion of total cash costs	Licence fees include the costs of management, compliance and research. A breakdown of major cost items as a proportion of total cash costs. Progression along the co-management continuum	
	4b Ensure management arrangements reflect concerns and interests of the wider community.	4b(i) Promote stakeholder input to the management of the fishery, through co-management processes and communication strategies. 4b(ii) Ensure that social and cultural issues are given appropriate consideration when new management strategies are being developed. 4b(iii) Communicate management arrangements to the wider community.	Management effectiveness Communication with community			
	4c Maximise compliance with management arrangements.	4c(i) Undertake annual compliance risk assessment as part of the master operational planning process. 4c(ii) Develop a model for determining a quantifiable level of monitoring in the fishery to achieve optimum compliance in a cost effective way. For example, determine a percentage of landings that should be monitored per year. 4c(iii) Review existing quota monitoring arrangements. 4c(iv) Develop and implement management arrangements that are clear and uncomplicated so as to promote voluntary compliance and assist with successful enforcement.	Blue Swimmer Crab – Spencer Gulf population Blue Swimmer Crab – Gulf St Vincent population Management effectiveness	Compliance risk assessment undertaken annually	Undertake annual compliance risk assessment as part of the master operational planning process	Compliance risk assessment not undertaken annually

Goal	Objective	Strategies	Addressing Issue / Risk ¹	Performance Indicator	Description	Limit Reference Point
		<p>4c(v) Where possible, develop and implement licensing, compliance and monitoring arrangements that are consistent with other fisheries to reduce administrative costs.</p> <p>4c(vi) Investigate methods to quantify illegal, unreported and unregulated catch.</p> <p>4c(vii) Encourage the community to report fisheries offences to FISHWATCH.</p>				
	<p>4d Ensure management is responsive to changes in environmental conditions.</p>	<p>4d(i) Promote stakeholder input to the management of the fishery, through co-management processes and communication strategies.</p> <p>4d(ii) Ensure that environmental factors (e.g. water quality and climate change) are given appropriate consideration when new management strategies are being developed.</p>	<p>Water quality</p> <p>Climate Change</p>	<p>Apparent changes in climate or water quality within the fishing grounds.</p>	<p>Mitigation measures considered where performance of the fishery is considered to have been impacted by water quality / climatic changes.</p>	

9 Harvest Strategy

This harvest strategy is designed to be consistent with the 2014 *National Guidelines to Develop Fishery Harvest Strategies* (Sloan et al 2014), and the *South Australian Fisheries Harvest Strategy Policy* (PIRSA 2015) developed by PIRSA Fisheries and Aquaculture.

This harvest strategy was developed by a Blue Crab Fishery Harvest Strategy Review Committee established under section 20 of the *Fisheries Management Act 2007*.

The harvest strategy aims to:

- Define operational objectives
- Define biological performance indicators that align to national status classifications
- Provide explicit decision rules that link available biomass to exploitation

In addition to the operational objectives listed below, this harvest strategy aims to meet goals that relate to broader fisheries management policies for South Australian managed fisheries including:

- Minimising ecosystem impacts
- Maintaining the commercial catch within its allocated catch share
- Ensuring cost effective and participative management of the fishery.

The harvest strategy defines separate operational objectives, performance indicators and reference points based on FIS undertaken by SARDI Aquatic Sciences in March/April for the Gulf St Vincent and Spencer Gulf components of the commercial Blue Crab Fishery.

9.1. Operational Objectives

Gulf St Vincent

Maintain the legal-size Blue Swimmer Crab biomass in Gulf St Vincent at or above the trigger reference point of 1.7 kg/potlift and not less than the limit reference point of 0.8 kg/potlift

Spencer Gulf

Maintain the legal-size Blue Swimmer Crab biomass in Spencer Gulf at or above the trigger reference point of 2.4 kg/potlift and not less than the limit reference point of 1.0 kg/potlift

These values have been chosen as they represent a conservative level of relative biomass that would allow sustainable harvest. The lower values represent a historically low level of biomass that may result in a risk of recruitment overfishing.

The harvest strategy aims to achieve these objectives by maintaining the stock at sustainable levels by setting an appropriate annual TACC to achieve:

- Sustainability of the Blue Crab Fishery
 - Providing management decisions responsive to changes in relative abundance of Blue Swimmer Crab (fishery independent catch rates).

- Improved business certainty and viability
 - Defining decision rules to provide greater certainty to the annual TACC decision making process for all stakeholders
 - TACC is altered when fishery conditions have significantly changed such as a rise or fall in relative biomass has occurred (from Fishery Independent Surveys (FIS))
 - Facilitate structured industry input into the decision making process.

9.2. Biological performance indicators

9.2.1. Legal-size Blue Swimmer Crab biomass

Legal-size catch rate expressed as catch per unit of effort (CPUE) from FIS is the primary biological performance indicator as an index of relative biomass of legal-size Blue Swimmer Crabs retained during March/April FIS and is defined as:

- Legal-size FIS CPUE (kg/potlift)

Relative biomass of legal-size crabs collected through the annual FIS for each gulf is measured using catch and effort data. SARDI Aquatic Sciences produces a report with the results of the FIS within a month of its completion.

9.2.2. Other performance indicators

Additional biological performance indicators will be used, if available, to inform the assessment of the stock status classification of the fishery:

- Pre-recruit portion of the Blue Swimmer Crab relative biomass from the March FIS
- Commercial CPUE (kg/potlift) of legal-sized crabs

9.2.3. Economic performance indicators

Economic performance indicators have not been developed for this harvest strategy. Future consideration of economic performance indicators may include cost of management services (licence fees) as a percentage of GVP, and rate of return to capital. Such indicators may be investigated for inclusion in future reviews of this harvest strategy.

9.3. Reference points

Reference points have been developed based on analysis of catch rate data from March/April FIS compared to historical catch rate data from June/July FIS across 60 sites in each Gulf. A comparison of the current and former reference points is available in Appendix 2.

Consistent with the South Australian fisheries harvest strategy policy developed by PIRSA, limit, target and trigger reference points have been developed to guide decision making process, and guide determination of stock status consistent with the guidelines and the national reporting framework for stock status classification system described in Stewardson et al. 2018.

The stock status classification system framework is:

- Sustainable – Stock for which biomass (or biomass proxy) is at a level sufficient to ensure that, on average, future levels of recruitment are adequate (i.e. not recruitment overfished) and for which fishing pressure is adequately controlled to avoid the stock becoming recruitment overfished
- Recovering – Recovering stock—biomass is recruitment overfished, but management measures are in place to promote stock recovery, and recovery is occurring
- Depleting – Deteriorating stock—biomass is not yet recruitment overfished, but fishing pressure is too high and moving the stock in the direction of becoming recruitment overfished
- Depleted - Spawning stock biomass has been reduced through catch, so that average recruitment levels are significantly reduced (i.e. recruitment overfished). Current management is not adequate to recover the stock, or adequate management measures have been put in place but have not yet resulted in measurable improvements

A modified traffic light method will be used to inform the current status of the fishery relative to target, trigger and limit reference levels for Legal-size FIS CPUE as described in Figure 3 and Figure 4

9.3.1. Gulf St Vincent

The target reference point will be reached if the Legal-size FIS CPUE is greater than or equal to 2.5 kg/potlift.

The trigger reference point will be reached if the Legal-size FIS CPUE is less than 1.7 kg/potlift.

The limit reference point will be breached if the Legal-size FIS CPUE is less than 0.8 kg/potlift. At this level there is a risk of spawning stock being insufficient to ensure sustainable levels of recruitment (i.e. recruitment overfishing). Should relative biomass fall below this level, the fishery will be closed.

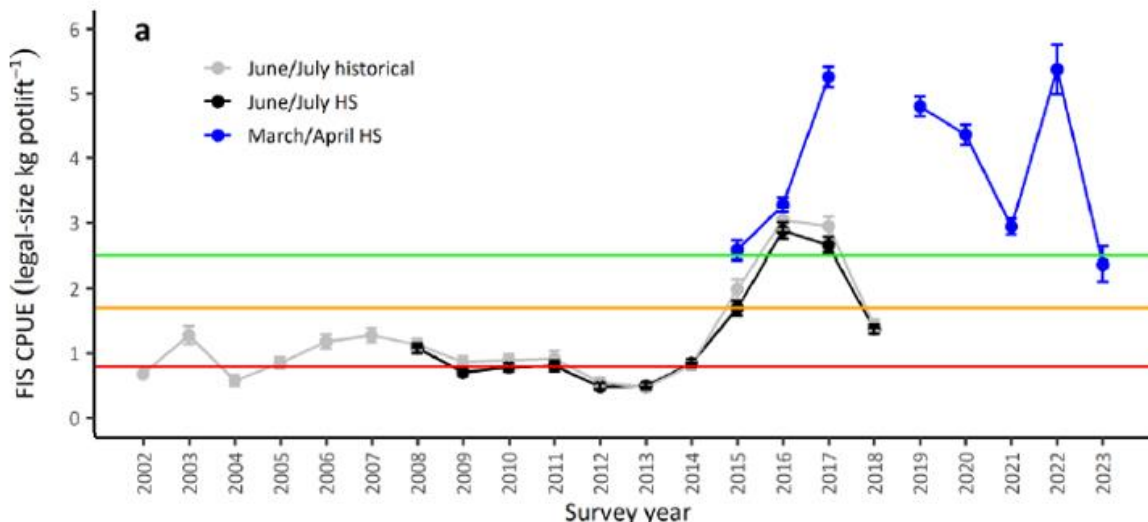


Figure 3: Annual FIS CPUE from research pots in GSV by weight of (a) legal-size crabs (kg.potlift⁻¹). Historical sites refer to 37 sites which have not changed since 2003 (excludes new sites) and HS sites refer to the subset of 60 sites sampled since 2008 (includes new sites). Green, yellow, and red lines represent the target, trigger and limit RPs for March/April identified in the HS. Error bars, standard error. Note: no FIS was conducted in March/April 2018 or from June/July 2019

9.3.2. Spencer Gulf

The target reference point will be reached if the Legal-size FIS CPUE is greater than or equal to 3.7 kg/potlift.

The trigger reference point will be reached if the Legal-size FIS CPUE is less than to 2.4 kg/potlift.

The limit reference point will be breached if the Legal-size FIS CPUE is less than 1.0 kg/potlift. At this level there is a risk of spawning stock being insufficient to ensure sustainable levels of recruitment (i.e. recruitment overfishing). Should relative biomass fall below this level, the fishery will be closed.

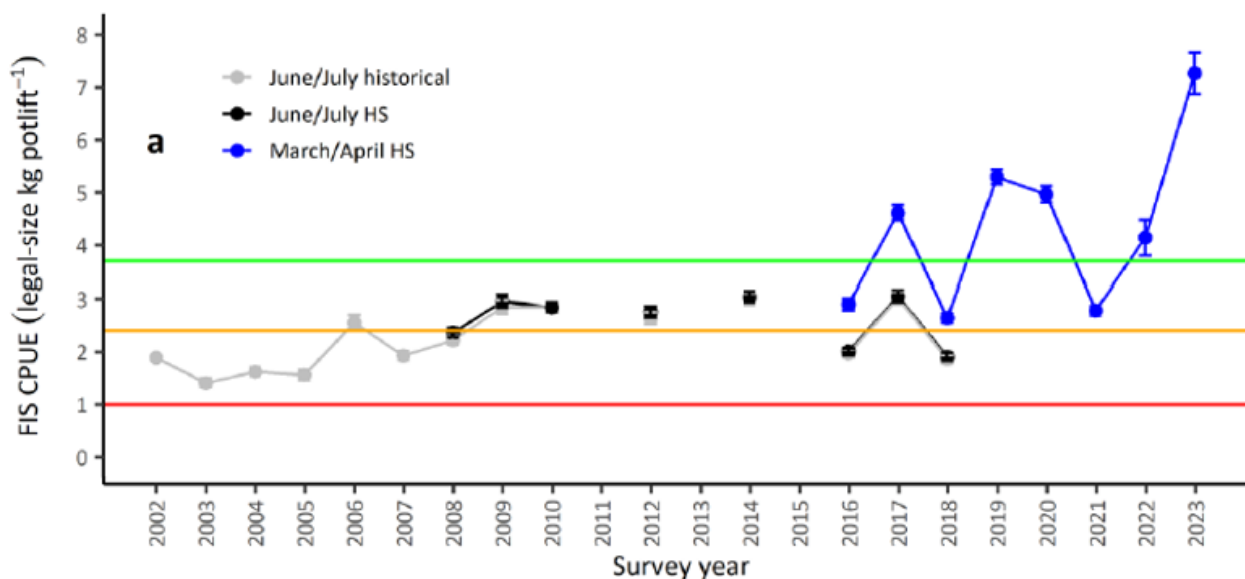


Figure 4: Annual FIS CPUE from research pots in SG by weight of (a) legal-size crabs (kg.potlift⁻¹). Historical sites refer to the 52 sites which have not changed since 2003 (excludes new sites) and HS sites refer to the subset of 60 sites sampled since 2008 (includes new sites). Green, yellow, and red lines represent the target, trigger and limit RPs for March/April identified in the HS. Error bars, standard error. Note. June/July FIS were not conducted in 2011, 2013, 2015, or from 2019.

9.4. Decision rules for TACC setting

The decision rules used in this harvest strategy have been designed to provide guidance to the TACC setting process by defining how estimates of fishery independent Legal-size FIS CPUE should be interpreted when adjusting the TACC such that TACC is reduced when biomass declines, and TACC increases in each zone can be considered when biomass increases. This approach adds a precautionary measure into the TACC setting process to take into account experiences in this and other fisheries when environmental factors cause a decline in recruitment.

Table 3. Gulf St Vincent harvest strategy decision rules.

Legal-size FIS CPUE (kg/potlift)	Maximum biological sustainable catch (Tonnes)
3.3 or above	294.18
2.5 to 3.29	269.66
1.7 to 2.49	245.15
1.2 to 1.69	196.12
0.8 to 1.19	147.09
Below 0.8	0

DECISION RULES GULF ST VINCENT

Dependent on the Legal-size FIS CPUE (kg/potlift) in the decision rule table above the following rules apply:

- TACC set for each fishing zone will not be higher than that described in the decision rule table (Table 3) relevant to the Legal-size FIS CPUE.
- When Legal-size CPUE is above 1.7kg/potlift, TACC can increase by only one level per year.
- The maximum biologically acceptable TACC or any lower value can be taken.

Table 4. Spencer Gulf harvest strategy decision rules

Legal-size FIS CPUE (kg/potlift)	Maximum biological sustainable catch (Tonnes)
5.0 or above	458
3.7 to 4.99	419.84
2.4 to 3.69	381.67
1.7 to 2.39	305.34
1.0 – 1.69	229.00
Below 1.0	0

DECISION RULES SPENCER GULF

Dependent on the Legal-size FIS CPUE (kg/potlift) in the decision rule table above the following rules apply:

- TACC set for each fishing zone will not be higher than that described in the decision rule table (Table 4) relevant to the Legal-size FIS CPUE.
 - When Legal-size CPUE is above 2.4 kg/potlift, TACC can increase by only one level per year.
 - The maximum biologically acceptable TACC or any lower value can be taken.
-

9.5. TACC decision making process

This harvest strategy provides a structured framework for decision making that pursues the ecologically sustainable development objectives of the *Fisheries Management Act 2007*. This decision making framework involves three main steps that will be undertaken each year prior to the start of the new fishing season. The primary aim of this harvest strategy is to ensure that the Blue Swimmer Crab resource is harvested within ecologically sustainable limits, in accordance with the objectives set out in the strategy.

Step 1 - Use biological performance indicators to assess the current status of the Blue Crab Fishery, including a maximum TACC.

Step 2 - Provide industry the opportunity to receive a verbal presentation of the stock status report with the fishery independent Legal-size FIS CPUE from SARDI by 15 May each year. PIRSA will then convene an annual meeting to consider the information and discuss decisions and any feedback from industry.

Step 3 - Use reference points and decision rules to guide the TACC setting process to ensure the Blue Crab Fishery resource is harvested within ecologically sustainable limits.

The decision rules used in this framework are based on results from FIS; they state that a specific response will be triggered in terms of TACC adjustment based on fishery performance.

The resulting TACC that meets the decision rules will then be recommended to the Minister or their delegate for the upcoming season by PIRSA. The Minister or their delegate has responsibility for determining the value of a quota unit on an annual basis and setting the TACC under the *Fisheries Management (Blue Crab Fishery) Regulations 2013*.

9.6. Exceptional circumstances

The development of this harvest strategy requires that considerations are made for exceptional circumstances. These circumstances may include stressors on the stock which result in poor FIS results that are deemed outside the impacts considered as a part of the harvest strategy at the time of development and may include mass mortality events, disease out-breaks, natural or human-induced disasters.

9.7. Review of the harvest strategy

This management plan, including this harvest strategy, may be reviewed by the Minister at any time, and a review must be undertaken as soon as practicable after the fifth anniversary of the commencement of the plan, pursuant to section 49 of the *Fisheries Management Act 2007*.

The current harvest strategy relies on data from Fishery Independent Surveys (FIS), which comprises “research pots” and commercial pots, although until recently catch-per-unit-effort (CPUE) using only research pots was used as a performance indicator (PI) to inform the assessment of stock status and total allowable commercial catch (TACC) setting. There is potential to move towards using the catch rate data from commercial pots used in the FIS. This would require an update to the CPUE reference points to reflect transition from research to commercial pots. Initial analysis undertaken as part of the 2023 review of the management plan has identified that an estimated further three years of data would be required to establish the relationship between commercial pots and research pots. This relationship will be monitored annually as part of the FIS reports provided to PIRSA. Should this information support a review of the harvest strategy, a review of this management plan may be considered.

10 Stock Assessment and research

10.1. Research services

PIRSA contracts research services for each fishery. SARDI Aquatic Sciences is the primary research provider for core research for the Blue Crab Fishery.

10.2. Data collection and analysis

SARDI completed the first stock assessment report for the fishery in 1998, and has since provided annual reports. Information on data collected is summarised below. Full details on the status of the stocks can be found in the latest report (Beckmann and Hooper 2023).

10.2.1. Fishery dependent data

Commercial logbooks

Catch and effort information forms the basis for decision making in relation to the biology of the fishery. Daily catch and effort returns are completed and submitted by registered masters in accordance with the regulations. In 2023/24, the Blue Crab Fishery transitioned from paper logbooks to electronic reporting.

SARDI Aquatic Sciences maintains a comprehensive catch and effort database for the fishery using data collected from the compulsory fishing logbook system. To simplify reporting, each gulf is divided into a series of administrative fishery blocks. Data provided include: fishing block, depth, effort, catch weight and catch abundance. The logbook system is also used to collect biological data, including the number of undersized crabs, berried females and the sex-ratio of the catch.

All licences holders in South Australian commercial fisheries are required to record all interactions with threatened, endangered and protected species (TEPS) using a ‘wildlife interaction’ logbook. In 2023/24, the Blue Crab Fishery transitioned to electronic TEPS interactions reporting.

10.2.2. Fishery Independent Survey data

Fishery independent surveys for the Blue Crab Fishery have been conducted on an annual basis during June/July from 2002. The primary aim of the survey was to collect data on the spatial abundance and size composition of Blue Swimmer Crabs in Spencer Gulf and Gulf St Vincent during winter, when juvenile crabs generally recruit to the fishery. To inform a review of the harvest strategy in 2018/19 these surveys have been carried out in March/April since 2015 (in Gulf St Vincent) or 2016 (Spencer Gulf) to reduce the time-lag between FIS (that provide information for annual quota setting) and the beginning of the quota year (1 July). FIS are now conducted in March/April as described in Beckmann and Hooper 2023.

During the FIS, both commercial crab pots and small mesh pots are set and hauled on a daily basis. Small mesh pots, designed specifically for surveys, have a diameter of 1.4 m, a height of 50 cm, and a smaller mesh covering of 55 mm.

A global positioning system (GPS) was used to locate the gear, and depth was recorded for each site. Blue Swimmer Crabs were measured using Vernier calipers (carapace width, mm), and details of sex (male or female) and condition (dead, soft, berried) were recorded.

10.2.3. Recreational fishing surveys

Recreational fishers collectively harvest significant proportions of the total catch for Blue Swimmer Crabs in South Australia. The need for statistically robust estimates of their catches is crucial in managing allocated shares of the resource between sectors, as well as managing the State's aquatic resources under the Fisheries Management Act 2007. Regular estimates of the recreational take are required and, therefore, there is a need to develop cost effective methods to collect such information in a timely manner.

The methods developed for surveying recreational fishers differ significantly from those used for commercial fishers. The primary source of data used for managing recreational fishing is the state-wide recreational fishing surveys, currently undertaken approximately every five years.

10.3. Reporting

Two types of publications are prepared and delivered periodically for the Blue Crab Fishery:

- 1 Fishery independent survey Advice Note. This is a report that summarises survey results for each gulf published in May each year. It includes early indications of fishery independent measures of legal-size, pre-recruit biomass and total crab biomass, which are required to make decisions in accordance with the harvest strategy in this management plan.
- 2 Stock assessment report. This is a major report that is published annually and documents, analyses and interprets the available data and assesses the South Australian Blue Crab Fishery against the performance indicators identified in this management plan. This report is delivered to an industry forum each year.

10.4. Strategic research plan

In addition to the core research for making decisions under the harvest strategy, additional research projects can also be undertaken to meet longer-term fishery objectives or to underpin the development of strategies under this plan. Future research projects to meet longer-term objectives will be considered in consultation with the SABCPFA and other relevant stakeholders.

11 Compliance and monitoring

PIRSA runs a compliance program that has dual objectives:

- To maximise voluntary compliance with fisheries rules; and
- To create effective deterrence to breaching fisheries rules.

These objectives are consistent with the National Fisheries Compliance Policy.

Voluntary compliance is maximised through ensuring that fishers are aware of the rules that apply to their fishing activities, understand the rules and the purpose of those rules and operate in a culture of compliance.

Effective deterrence is created through the presence of Fisheries Officers and awareness of compliance operations, as well as through detection and prosecution of illegal activity.

12 Review of plan

A review of this management plan may be conducted at any time by the Minister. A review of this management plan will be conducted as soon as practicable after the fifth anniversary of its commencement as set out in Section 49 of the Act. Section 49 of the Act prescribes the process of reviewing a management plan. Amendments to this management plan may also be considered under section 46 of the Act.

PIRSA will undertake to assess proposals to review the boundaries of the Blue Crab Fishery as a strategic priority within three years of the commencement of this Plan. Depending on the outcome of this assessment, the Minister may choose to approve a review of this management plan.

13 Resources required to implement the plan

South Australia's fisheries resources are managed in accordance with the *Fisheries Management Act 2007* established to protect, manage and develop the aquatic resources of the State in a manner that is consistent with ecologically sustainable development to the benefit of the community, and management should occur in an efficient and cost effective manner with targets set for the recovery of management costs.

The recovery of costs associated with the management of the commercial fisheries as required by the *Fisheries Management Act 2007* has been intended to ensure specific industry sectors fund the government products and services required as a direct result of their commercial activities derived from access to the State's community-owned aquatic resources. The cost for the provision of these services is recovered by PIRSA Fisheries and Aquaculture through the administration of annual fees applied to regulated licences, or fee for service work applied on a per-transaction basis if required.

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15 Acronyms

CPUE	Catch per unit effort
DEH	Former Department of Environment and Heritage (South Australia)
ESD	Ecologically sustainable development
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
FIS	Fishery independent survey
FRDC	Fisheries Research and Development Corporation
ILUA	Indigenous Land Use Agreement
PIRSA	Department of Primary Industries and Regions
SABCPFA	South Australian Blue Crab Pot Fishers Association Inc.
SARDI	South Australian Research and Development Institute
TEPS	Threatened, endangered and protected species

Appendix 1 - Aquatic resources prescribed for the Blue Crab Fishery

The following species are prescribed to be taken in the Blue Crab Fishery as provided for in Schedule 1 of the *Fisheries Management (Blue Crab Fishery) Regulations 2013*

Part 1—Aquatic resources prescribed for purposes of regulation 4(2)(a)

Crustaceans

- Blue Swimmer Crab (*Portunus armatus*)
- Rock Crab (*Nectocarcinus integrifons*)
- Spider Crab (Family Majidae)
- Velvet Crab (*Nectocarcinus tuberculatus*)

Part 2— Aquatic resources prescribed under regulation 4(2)(b) – for the purpose of bait

Molluscs

- Octopus (*Octopus* spp)
- Gould's Squid (*Nototodarus gouldi*)

Scalefish

- Australian Anchovy (*Engraulis australis*)
- Barracouta (*Thyrsites atun*)
- Black Bream (*Acanthopagrus butcheri*)
- Cod (marine species) (Family Moridae)
- Flathead (Family Platycephalidae)
- Flounder (Family Bothidae or Pleuronectidae)
- Bluespotted Goatfish (*Upeneichthys vlamingii*)
- Eastern Striped Grunter (*Pelates sexlineatus*)
- Australian Herring (*Arripis georgianus*)
- Yellowtail Kingfish (*Seriola lalandi*)
- Leatherjacket (Family Monacanthidae)
- Blue Mackerel (*Scomber australasicus*)
- Common Jack Mackerel (*Trachurus declivis*)
- Morwong (Family Cheilodactylidae)
- Mullet of all species (Family Mugilidae)
- Mulloway (*Argyrosomus japonicus*)
- West Australian Salmon (*Arripis truttaceus*)
- Australian Sardine (*Sardinops sagax*)
- Snook (*Sphyraena novaehollandiae*)
- Southern Sole (*Aseraggodes haackeanus*)
- Sea Sweep (*Scorpius aequipinnis*)
- Trevally (*Carangidae* spp)
- Wrasse (Labridae) (other than Western Blue Groper (*Achoerodus gouldii*))

Sharks

- Rays of all species (Class Elasmobranchii)
- Shark of all species (Class Elasmobranchii) other than White Shark (*Carcharodon carcharias*)
- Skate of all species (Class Elasmobranchii)