Management Plan for the South Australian Commercial Gulf St Vincent Prawn Fishery (2022)

1 July 2022

Government of South Australia

Department of Primary Industries and Regions

Management Plan for the South Australian Commercial Gulf St Vincent Prawn Fishery (2022).

Information current as of 3 June 2022

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The South Australian Fisheries Management Series Paper number 84: Management Plan for the South Australian Commercial Gulf St Vincent Prawn Fishery (2022)

ISBN 978-0-6482204-9-7

ISSN 1322-8072

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1. Fishery to which this plan applies

This plan applies to the Gulf St Vincent Prawn Fishery (GSVPF), which is formally constituted by the *Fisheries Management (Prawn Fisheries) Regulations 2017* (the regulations).

The regulations define the fishery as:

(a) the taking of prawns[1] in Gulf St Vincent; and

(b) the taking of aquatic resources specified in Schedule 1 Part 1 in Gulf St Vincent where the aquatic resources are taken at the same time in the same net incidentally to the taking of prawns.

The aquatic resources specified in Schedule 1 Part 1 of the regulations are:

- Balmain Bug[2] (*Ibacus* spp)
- Southern Calamari (*Sepioteuthis australis*)

The waters of the GSVPF are defined in the *Fisheries Management (Prawn Fisheries) Regulations 2017*.

2. Consistency with other management plans

This management plan has been developed so that is consistent with other fishery management plans. In particular, the provisions relating to the allocation of shared Southern Calamari resources between fishing sectors are consistent with other relevant plans and the allocation of this species listed in Schedule 1 of the *Fisheries Management (Prawn Fisheries) Regulations 2017* are consistent with the Management Plan for the South Australian Commercial Marine Scalefish Fishery (PIRSA 2013).

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

3. Term of the plan

This management plan applies from 1 July 2022 for a period of 10 years. Part 5 of the *Fisheries Management Act (2007)* prescribes the requirements for replacing or extending this management plan upon expiry.

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[1] Western King Prawn (*Melicertus latisulcatus*)

[2] Balmain Bug is referred to as Bug (*Ibacus* spp) in the *Fisheries Management (Prawn Fisheries) Regulations 2017*.

4. Description of the fishery

The GSVPF is primarily based on the capture of the Western King Prawn (*Melicertus latisulcatus*). In addition to prawns, commercial licence holders are permitted to retain and sell two species of by-product harvested incidentally during prawn trawling: Balmain Bug (*Ibacus* spp) and Southern Calamari (*Sepioteuthis australis*).

Three commercial prawn fisheries occur within South Australia – the Spencer Gulf Prawn Fishery (SGPF), the GSVPF and the West Coast Prawn Fishery (Figure 1). The SGPF is the largest prawn fishery in South Australia in both total catch and numbers of licences. The West Coast Prawn Fishery is the smallest of the three prawn fisheries with three licences. At the time this management plan was adopted, there were ten commercial fishery licences issued for the GSVPF. The location of the three Prawn Fisheries is described below in Figure 1.

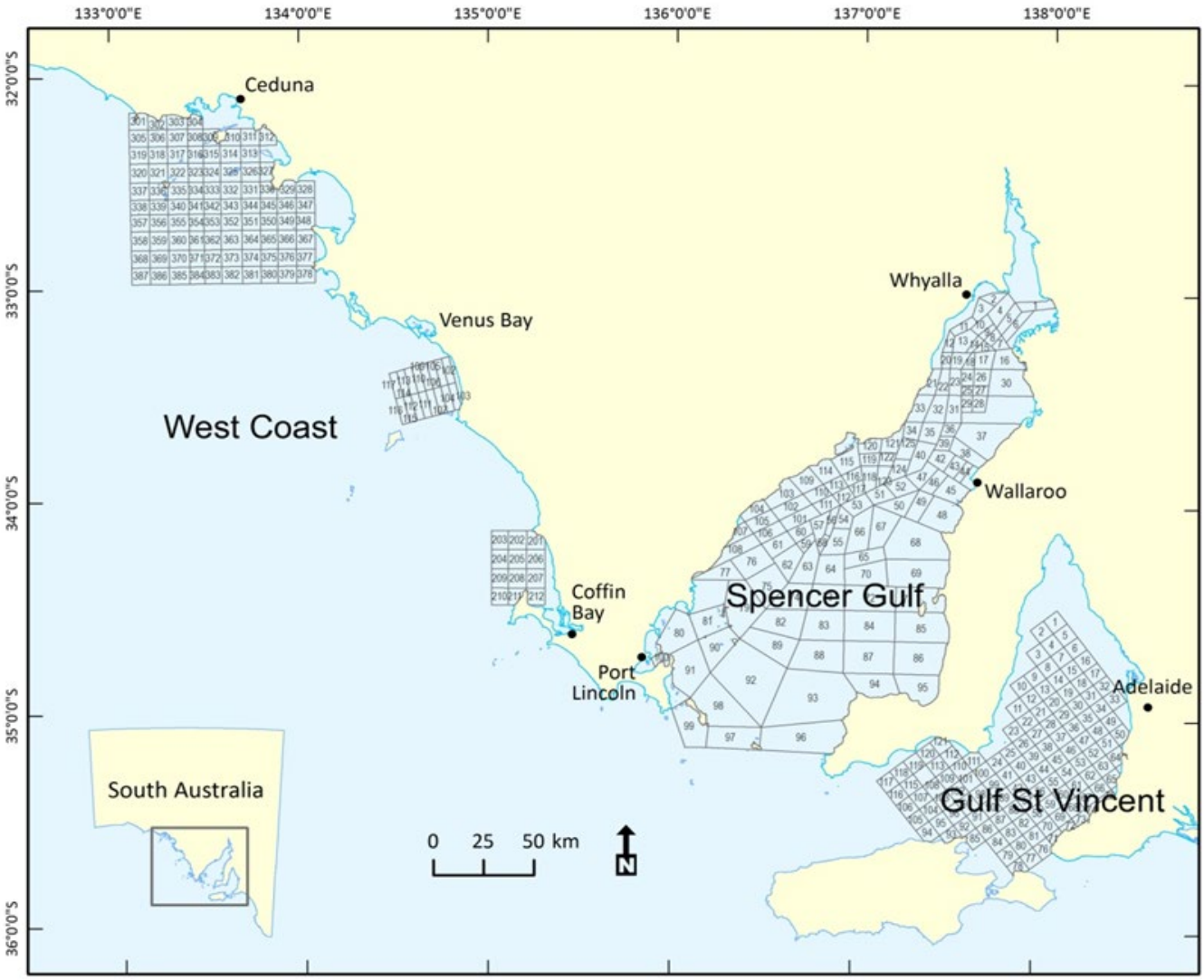


Figure 1: Locations of the three prawn fisheries in South Australia with fishing blocks illustrated

4.1. Commercial Fishery

The existence of Western King Prawns in South Australian waters had been known for many years, yet it was only in the late 1960's that the first commercial catches were made.

Commercial prawn fishing began in GSV in 1967. In 1968, the then Department of Fisheries closed all South Australian waters to trawling and offered permits for fishing in a number of different management zones in waters ≥10m in depth.

Since then, a series of management arrangements have been introduced to manage the take of Western King Prawns in GSV. These included the fishery being divided into geographical zones and licences issued to operate within specific zones. The GSVPF was established and included all waters between 136°30'E and 139°E, except inland waters and the waters of Spencer Gulf. Initially GSVPF licences were permitted to fish all waters of GSV and the Investigator Strait. Jurisdiction over Investigator Strait was transferred from the Commonwealth to the State in February 1983 and Investigator Strait was managed separately until 1986/87.

The fishery has been temporarily closed on several occasions through its history. In June 1991 the fishery was temporarily closed until February 1994 to enable stock recovery. The GSVPF was again closed in December 2012 at the request of all ten licence holders due to poor economic performance. The economic performance of the fishery had declined due to the declining catches, the high Australian dollar, decreasing prawn prices (largely due to the increasing imports of lower value farmed prawns from South-East Asia) and increasing costs of operation. The fishery reopened in November 2014.

Throughout the history of the GSVPF a number of reviews of management arrangements have been completed. A buy-back system resulting from the 1986 review resulted in the removal of two Investigator Strait entitlements and four GSVPF licences. In response to a review of the management arrangements in 2011, T-90 cod ends were introduced into the fishery in 2012 and spatial management arrangements for the fishery that opened and closed areas to fishing were removed.

Following closure of the fishery in 2012, the 2013 review conducted by Morgan and Cartwright (2013) recommended allocation of transferable fishing (access) nights. Morgan and Cartwright (2013) recommended that fishing access rights be allocated, and an individual transferable quota (ITQ) system of management be implemented via a two-stage approach. Stage 1 would use tradable effort units (fishing nights) and stage 2 would move the fishery to an ITQ system using catch quota units. Prior to the commencement of the 2014/15 fishing season a transferable effort unit entitlement (transferable nights) was issued to licence holders.

A management framework of tradeable nights was used to reopen the fishery in 2014 with each licence being issued individually transferable units and determination of a unit value providing effort entitlements for each of the ten licence holders in the fishery. An industry Code of Practice developed by the Saint Vincent Gulf Prawn Boat Owner's Association (SVGPBOA) provided guidance on fishing practices such as targeting of appropriate prawn sizes informed by grade size data provided by fishers. A voluntary trial of cameras

aboard vessels was undertaken in 2016 to assess their capacity to monitor prawn catches and bycatch for consideration for the fishery transitioning to an ITQ system. The outcomes of the trial suggested boats that use hopper systems with mechanical (Haldane) graders along with standardised carton packing and on-board freezing have promise as being suitable for the monitoring of discards and high grading. The case for electronic monitoring for boats with sorting tables and bagged cooked product stored in refrigerated sea water requires further investigation and evaluation as a tool in the GSVPF. The trial highlighted the need for careful consideration for the data issues surrounding the use of this technology along with the costs and benefits of a monitoring program for the fishery (Archipelago Asia Pacific, 2016).

Total catch in the fishery has varied annually ranging from a low total catch of 131 t to high total catch of around 600 t (Figure 2). At the time of developing this management plan, five vessels were operational in the GSVPF fishing the available nights over the ten licences remaining in the fishery at that time.

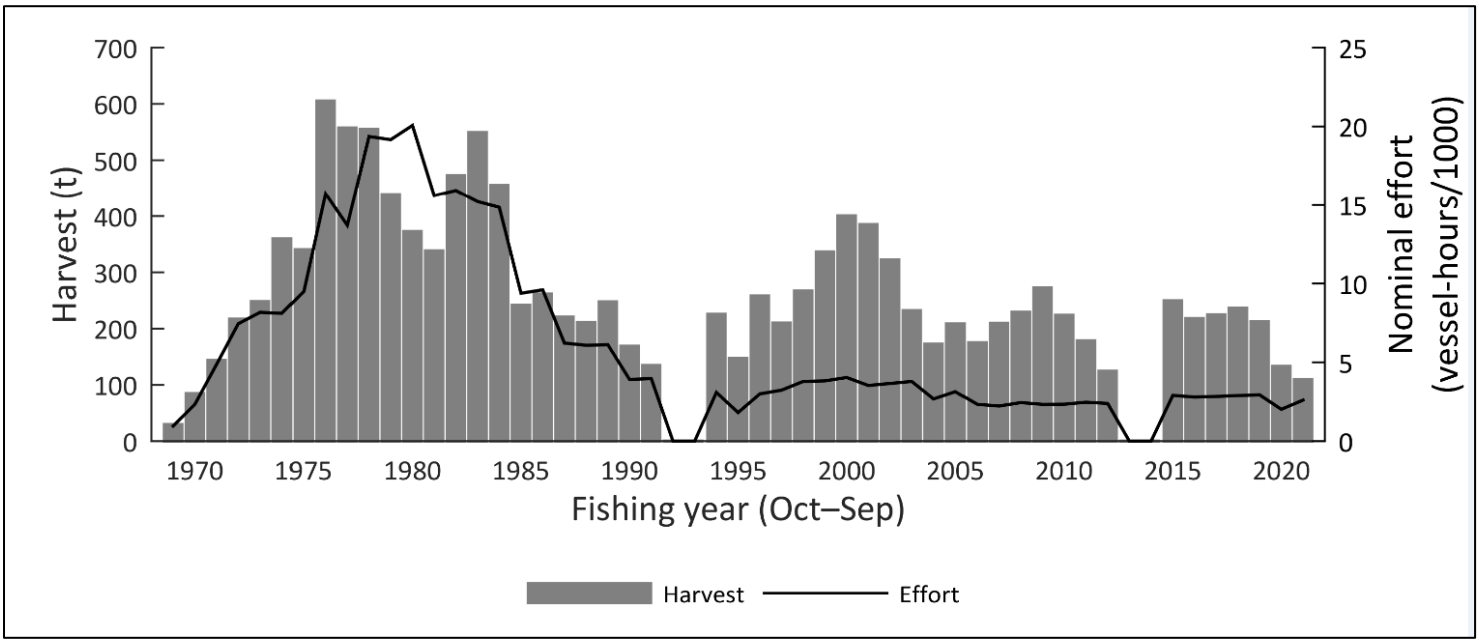


Figure 2: Catch and effort in the GSVPF (SARDI)

Due to disruption of the domestic market associated with the COVID-19 global pandemic in 2020 temporary management arrangements were introduced for the fishery. These arrangements included allowing for unfished fishing night entitlements on individual licences to be carried over from the 2019/20 fishing season to the following two fishing seasons. Fifty percent of the 2019/20 unfished fishing nights were carried over to the 2020/21 fishing season and these nights were available to relevant licence holders in addition to their allocated fishing nights in 2020/21.

In 2021, a bio-economic model developed in 2015 (Noell et al, 2015) for the GSVPF was revised with updated biological (including standardised catches) and economic data. The updated bio-economic model was used to inform development of the harvest strategy included in this management plan. An independent review of this harvest strategy was undertaken in 2021. The review provided advice with respect to the monitoring program; application and potential limitations of the bio-economic assessment model; limit and

target reference points (and associated risk levels). The review found the bio-economic model fit for purpose. This review also noted relatively low levels of effort and catch have maintained the fish stock at high relative biomass (fluctuating between 60% and over 100% of unfished levels) from the mid-1990s to 2020/21 (Smith, internal report to PIRSA).

At the time of developing this management plan, the Gulf St Vincent Prawn Fishery Management Advisory Committee recommended amendments to the period of the fishing season for the GSVPF described in the *Fisheries Management (Prawn Fisheries) Regulations 2017*. Specifically, the recommendation was to allow for commercial fishing in the fishery throughout the year, except for January and February. In the period of this management plan, these changes may be implemented through regulation amendment.

Table 1: A chronology of major management milestones in the commercial Gulf St Vincent Prawn Fishery of South Australian since 1967.

Year	Major management milestones
1967	Commercial prawn fishing commences in GSV
1968	All SA waters closed to trawling except for specific managed zones for which permits were offered and all waters less than ten metres are closed to trawling
1969	The *Preservation of Prawn Resources Regulations 1969* is introduced and vessels licensed to fish for prawns
1975	The fishery is split into two zones when five permits are issued to specifically fish in Investigator Strait
1982	Number of Investigator Strait zone fishers reduced to two
1982	Triple rig trawl nets introduced
1986	A review of management was completed by Prof Parzival Copes
1986	A licence rationalisation strategy was implemented as an outcome of the review
1987	The *Fisheries (Gulf St Vincent Prawn Fishery Rationalisation) Act 1987* is introduced
1987	The two Investigator Strait entitlements removed and four GSVPF licences removed over the following four years and the two zones are once again amalgamated
1990	Prof Parzival Copes was requested to complete his second review of the fishery
1990	Licences reduced to 10 in GSVPF
1991	Fishery closed in June
1991	A Select Committee of the House of Assembly of South Australia reviewed the fishery's management options
1994	The fishery re-opened in February
1995	A review of the fishery was conducted by Dr Gary Morgan
1998	First management plan for the fishery was introduced (MacDonald 1998)
2000	*Fisheries (General) Regulations 2000* enabled "large" vessels to enter the fleet
2007	The second management plan was implemented (Dixon and Sloan 2007)
2011	A review of the fishery was undertaken by Knuckey et al. (2011).
2012	The fishery was closed in November by unanimous agreement of industry. Introduction of T-90 mesh cod end
2013	Morgan & Cartwright completed a review of the fishery management framework
2014	Dichmont (2014) review of the stock assessment methods, processes and outputs. Fishery reopened to fishing in November 2014. Individual transferable units introduced. Revised framework for longer-term management of the Gulf St Vincent Prawn Fishery developed.

2018	Establishment of the Gulf St Vincent Prawn Fishery Management Advisory Committee
2020	50% of unfished nights allocated in the 2019/20 fishing season carried-over to 2020/21 as COVID-19 assistance measure.
2021	An independent review undertaken of the harvest strategy included in this management plan

4.2. Recreational Fishing

Recreational fishing contributes significantly to the well-being of many South Australians as well as State and regional economies through tourism, the purchase of fishing equipment, vessels, bait supplies and fuel. In recognition of the importance of recreational fishing to the community of South Australia, a management plan for recreational fishing was adopted in 2020 (PIRSA 2020).

The take of prawns in waters less than 10 metres of depth is prohibited for recreational fishers in South Australia. The most recent survey of recreational fishing in South Australia conducted in 2013/14 estimated the recreational take of prawns as nil (Giri and Hall 2015).

4.3. Aboriginal traditional fishing sector

Aboriginal People have fished the coastal waters of South Australia since long before European settlement (Cann et al. 1991). While there are no known documented historical accounts of Aboriginal traditional harvest of Western King Prawns this does not preclude the traditional use of this resource by Aboriginal Peoples in the past. The State Government, 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. Further information about Traditional Fishing activities and practices will be described in Aboriginal Traditional Fishing management plans that are made in the future that apply to the area of the GSVPF.

4.4. Ecosystem and habitat

The GSV is a large, relatively shallow embayment (generally <30m) with restricted water exchange with the open ocean due to Kangaroo Island, which also protects the gulf from high wave action. Due to its shallow nature and temperate location, water temperatures vary markedly throughout the year. A paucity of freshwater influx combined with high levels of evaporation during summer, leads to increased levels of salinity, particularly in the shallow northern reaches (Tanner 2003).

Dixon et al. (2006) presented analyses of habitat types associated with GSV coastal habitats from data presented in Bryars (2003). These analyses concentrated on the habitat types crucial to prawn recruitment, particularly tidal flats and mangrove habitats that are associated with tidal flats.

The GSV coastline was estimated as 551km in total length. Of this, 225km (41%) was tidal flat only and 79km (14%) was mangrove forest associated with tidal flat. Far Northern GSV (~31km of tidal flat only and 47km of mangrove forests (+ tidal flat)) and Port Adelaide (~41km of tidal flat only and 32km of mangrove forests (+ tidal flat) were the areas with the highest abundance of these habitat types (Figure 3).

Prawn productivity is impacted by the availability of suitable healthy habitat for adult and juvenile prawns. Maintaining adequate juvenile and adult habitat is important to the sustainability of the GSVPF.

4.5. Biology

4.5.1. Western King Prawns

Prawns are crustaceans with five pairs of swimming legs (pleopods) as well as five pairs of walking legs (pereiopods) with the front three having claws. They are nocturnal and burrow into the seabed during the day and emerge at night to feed.

Western King Prawns (*M. latisulcatus*) are a benthic species distributed broadly throughout GSV. with preference for sand and mud sediments, seagrass or vegetated habitats (Tanner & Deakin 2001). Adults tend to inhabit waters greater than 10m depth and are harvested in depths of up to 45m in the Investigator Straits.

Adult Western King Prawns aggregate, mature, mate and spawn in deep water between October and April, with the main spawning period between November and February. Females may spawn on multiple occasions during one season. During the peak spawning period, females tend to be more prevalent in the catch, due likely to increased feeding activity associated with ovary development. At other times the catch is generally male biased. Larger female prawns are proportionally more fecund than smaller prawns. Further, the proportion of female prawns with fertilised eggs increases with size. Therefore, the combination of the short spawning season, increased catchability of females, disproportionate fecundity levels and varying fertilisation success, means that the harvest of prawns, particularly larger size classes of females, during the peak spawning period has implications on recruitment to the fishery. However, it is recognised there is not a strong stock recruitment relationship (SRR) and environmental drivers are likely to have an impact on recruitment.

Post-larvae settle in inshore nursery areas when 2–3mm carapace length (CL) and can remain there for up to 10 months, depending on the time of settlement (Carrick 1996). The post-larvae produced from early spawning events settle in nursery areas during December or January where they grow rapidly and then emigrate to deeper water in May or June. Alternatively, post-larvae produced from spawning after January settle in nurseries from March and then grow slowly over the winter months in these nursery areas before recruiting to trawl grounds in February the following year (Carrick 2003). The effects of the two different recruitment patterns on adult growth and survival are unknown.

Growth of Western King Prawn in GSV is highly seasonal and increases with increasing temperature. The highest growth period is immediately after the spawning period is completed, as prawns reduce the energy spent on reproduction. Female prawns grow faster and attain a larger maximum size than males.

Whilst adult *M. latisulcatus* have an offshore life phase, the juvenile phase is spent in shallow near-shore environments generally associated with mangroves and/or tidal flats (Figure 3). Prawn larvae undergo metamorphosis through four main larval stages: nauplii, zoea, mysis and post-larvae. The length of the larval stage depends on water temperature, with faster development in warmer water (Hudinaga 1942).

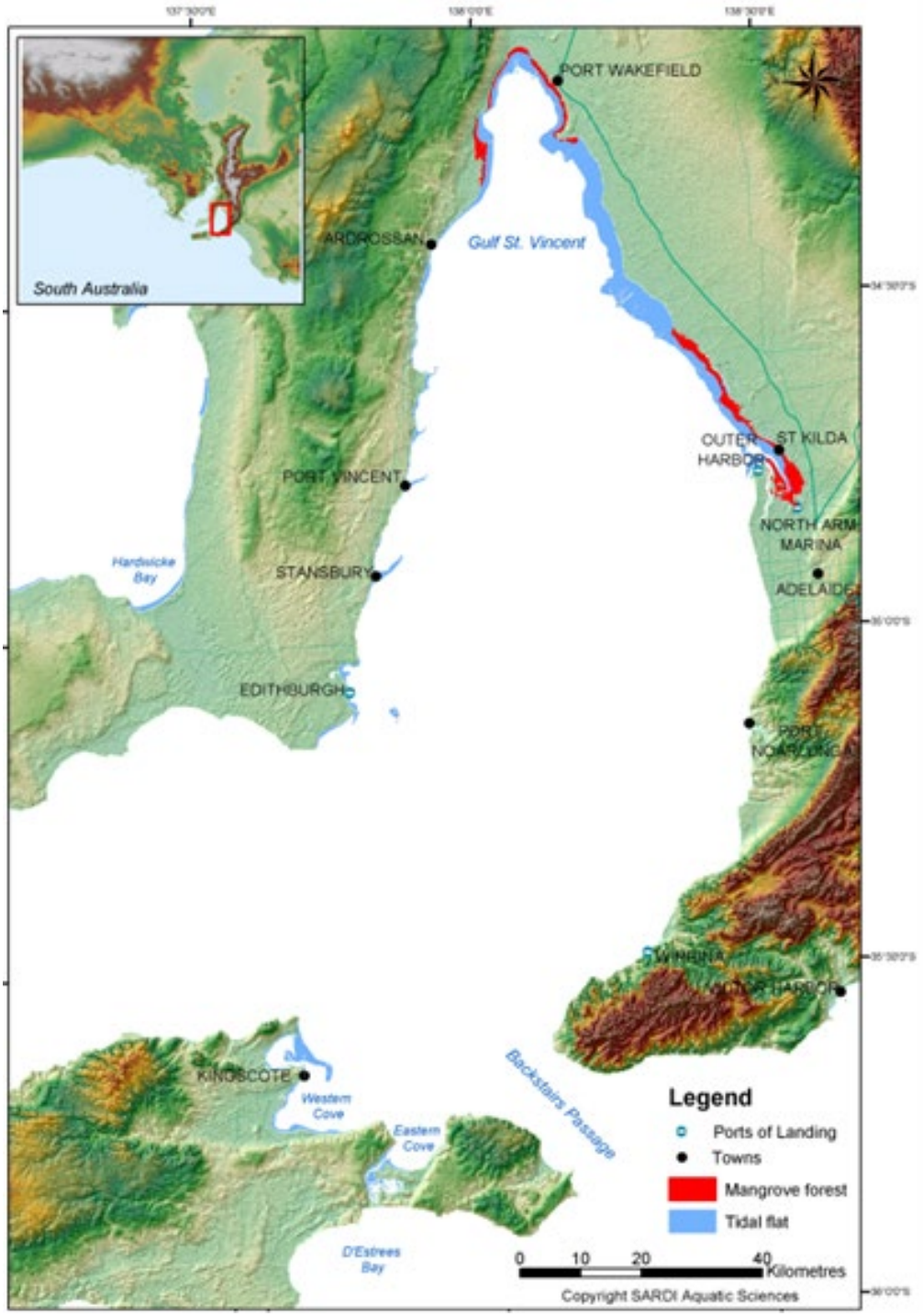


Figure 3: Location of mangroves and tidal flats in the area of the GSVPF

4.5.2. Southern Calamari

Southern Calamari (*Sepioteuthis australis*) is common throughout southern Australian coastal waters. It ranges from Dampier in Western Australia to Moreton Bay in Queensland, including Tasmania, and it also occurs in northern New Zealand waters. *S. australis* usually inhabits coastal waters and bays in depths of <70 m (Winstanley et al. 1983).

In GSV, Southern Calamari are spatially segregated into offshore and inshore spawning grounds (Steer et al. 2007), having a seasonal, systematic distribution that starts at Kangaroo Island in spring and ends up at Edithburgh during late winter, travelling anti-clockwise (Steer et al. 2006). These patterns were closely attributed to spawning behaviour and water clarity. Detailed studies on the general and reproductive biology of calamari in GSV are presented by Steer et al. (2006).

4.5.3. Balmain Bugs

Balmain Bugs (*Ibacus spp.*) are commonly referred to as a bug or slipper lobster. Of the seven species of bugs found in Australia, *I. peronii* was the predominant species of slipper lobster captured studies in the GSVPF (Dixon et al. 2006). *I. peronii* inhabits depths of 4–288m (Brown & Holthuis 1998) is long-lived, and exhibits low fecundity compared to other lobsters in the Scyllarid family (Stewart & Kennelly 1997, 2000). Whilst little is known of its biology in GSV, it exhibits limited movement patterns in NSW (Stewart & Kennelly 1998).

4.6. Stock Status and export approval

Stock status of the GSVPF management unit is assessed regularly and reported in annual stock status reports[3] published by SARDI. The most recent stock status report available at the time of developing this management plan assessed the stock in 2020/21 (McLeay and Hooper 2021) and classified the fishery as “sustainable”.

The Commonwealth Department of Agriculture, Water and the Environment requires that all commercial fisheries that export product be assessed for ecological sustainability under the *Environment Protection and Biodiversity Conservation Act 1999.* The GSVPF was re-assessed under this framework in 2015[4]. The fishery was assessed as being managed in an ecologically sustainable way and the fishery was granted export approval for a period of ten years to 2025. PIRSA will work with industry to continue export approval as required.

[3] Annual stock assessment reports for the Gulf St Vincent Prawn Fishery are available at http://www.pir.sa.gov.au/research/publications/research_reports

[4] The reassessment report for the Gulf St Vincent Prawn may be found at https://www.awe.gov.au/environment/marine/fisheries/sa

4.7. Stock assessment and research

4.7.1. Research services

PIRSA Fisheries and Aquaculture contracts research services for each fishery. SARDI Aquatic Sciences is currently the research provider for core research for the fishery.

The Commonwealth Fisheries Research and Development Corporation (FRDC) provides funding for specific research projects. In order to gain access to such funds, States currently contribute voluntarily 0.25% of the value of fisheries production (average over the preceding three years). South Australia's GSVPFs contribution for 2021/22 was around $8,968.00 which was collected from licence holders as part of their licence fee. Other sources of funding for research are also pursued if appropriate including the Australian Research Council, AusIndustry and Australian Department of Agriculture, Water and Environment.

4.7.2. Data collection

To achieve the research and monitoring needs for the fishery, a variety of data types are collected and analysed on an annual basis. These are:

Fishery-independent data

- Fishery independent surveys (FIS)
- Bycatch surveys
- Economic surveys

Fishery-dependent data

- Commercial catch and effort logbook data
- Wildlife interaction logbook data
- Catch disposal records (also called unload dockets)
- Pre-fishing surveys

4.7.2.1. Fishery-independent surveys (FIS)

Fishery-independent surveys have been conducted since 1984. From December 2004 a comprehensive survey program was conducted four times each fishing season (December, March, April and May) to assess the status of the Western King Prawn stock in Gulf St Vincent (Dixon et al. 2012). The number of surveys was reduced to two surveys annually (in April and May) in 2011/12 due to similarity of results among surveys and to reduce costs of management for the fishery. Following the fishery closure from 2012 to 2014, the number of surveys was further reduced to one survey in May each year (Beckmann et al. 2015) based on recommendations by Morgan and Cartwright (2013). In development of this management plan, a FIS survey in November and March each year in addition to the April/May FIS has been adopted. To ensure consistency with previous survey conditions the fishery is closed to fishing for up to three nights prior to commencement of fishery independent surveys and during surveys. In addition, the fishery may be closed for one night following completion of the survey to allow for those licence

holders that participate in the fishery independent surveys to offload survey personnel and prepare for fishing to recommence.

4.7.2.2. Bycatch surveys

Bycatch surveys are occasionally conducted to underpin a risk assessment of the GSVPF. The aims of the survey are to assess the potential vulnerability of bycatch species to the trawling activity of the fishery. Data are collected to understand species composition and spatial distribution of prawn trawl bycatch and by-product. Bycatch samples were collected in 2009/10 and processed in 2010/11. These samples have not been analysed further at the time of developing this management plan. Future bycatch research should consider the remaining analysis and reporting requirements to finalise a bycatch assessment.

4.7.2.3. Bio-economic modelling

A bio-economic model was developed for the GSVPF and SGPF (Australian Seafood CRC 2011/750) allowing for evaluation of management strategies with respect to optimising biological and economic performance (Noell et al. 2015). The bio-economic model was refined in 2021 (SARDI in prep) and used in the development of the harvest strategy included in this management plan. This bio-economic model may be re-run in assessing the performance of the harvest strategy.

4.7.2.4. Economic surveys

Economic surveys of the GSVPF are conducted regularly. Further information about the economic surveys of the GSVPF are available in Economic Indicator reports published regularly. These reports are available at https://www.bdo.com.au/en-au/econsearch/safisheriesreports.

4.7.3. Fishery-Dependent Data

4.7.3.1. Commercial catch and effort logbook data and catch disposal records

Licence holders are required to complete a daily logbook and catch disposal record (unload dockets) detailing their fishing activities and harvest. The data from these logbooks are entered into a database maintained by SARDI Aquatic Sciences and validated.

4.7.3.2. Wildlife interactions logbook

PIRSA Fisheries and Aquaculture implemented a data recording logbook in 2007 for wildlife interactions (including threatened, endangered and protected species – TEPS) for all South Australian commercial fisheries. A Wildlife Interactions Reporting Logbook was implemented as a method to ensure fishers consistently report interactions with TEPS and to fulfil requirements of the *Environmental Protection and Biodiversity Conservation Act 1999*. PIRSA Fisheries and Aquaculture currently contracts SARDI Aquatic Sciences to enter and archive the data from the Wildlife Interactions Reporting Logbooks and provide an annual summary report (see https://www.pir.sa.gov.au/fishing/commercial_fishing/fisheries#toc4).

4.7.4. Reporting

SARDI Aquatic Sciences have conducted stock assessment reports for the GSVPF since 1998. The stock assessment synthesises information available for the fishery, assesses the status of the resource, and evaluates the performance of the fishery with respect to performance indicators and reference points detailed within the harvest strategy in this management plan (section 9). The report also documents the available information on the biology and management of Western King Prawns. These reports are published on the SARDI website at https://www.pir.sa.gov.au/research/publications/research_reports.

4.8. Strategic research plan

In addition to the core scientific stock assessment 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 industry-led Gulf St Vincent Prawn Fishery Management Advisory Committee (GSVPFMAC). These future research projects could include:

- Monitor and analysis of byproduct, bycatch and TEPS
- Value adding (packaging/processing) and alternative products (e.g. live prawns)
- Recruitment Modelling
- Gear development/calibration
- Improvements to on-board processing and handling

These initiatives will be progressed through the support from the national strategic research and investment plan of the Australian Council of Prawn Fisheries, FRDC and other investment initiatives.

4.9. Economic characteristics

The Gulf St Vincent Prawn Fishery is an important and valuable commercial fishery in South Australia. In 2019/20, total output was $15m and total contribution to Gross State Production (GSP) was $8m.

Around 26 full time equivalent (fte) jobs are directly generated by this fishing industry in South Australia and downstream activities created employment of a further 74 fte jobs statewide.

Further information about the economic characteristics of the GSVPF are available in Economic Indicator reports published regularly. These reports are available at https://www.bdo.com.au/en-au/econsearch/safisheriesreports.

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 arrangements. 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.

In 2018 the SVGPBOA established, with support of the Department of Primary Industries and Regions (PIRSA), the GSVPFMAC and Research Subcommittee to provide a forum for the development of fishery management strategies and practices that support the sustainable management of the GSVPF.

The Saint Vincent Gulf Prawn Boat Owner's Association Inc is recognised as the representative industry body for the commercial GSVPF. PIRSA consults with this association to inform day to day management of the GSVPF.

6. Allocation

6.1. Current allocated shares of the resource

The *Fisheries Management Act 2007* (the Act) provides that a management plan must specify the share of the fishery to be allocated to each fishing sector under section (43(2)(h)). 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 be prepared (based on the most recent information available to the Minister) must be taken into account under section (43(3)).

The Minister formally requested preparation of the previous management plan on 17 June 2010 and therefore took into account the share of the GSVPF that the commercial fishing sector had access to on that date. Allocations for the recreational and Aboriginal traditional

fishing sectors must be determined at that time. The information used to allocate the shares are described in the 2017 management plan for the fishery (PIRSA 2017).

6.1.1. Recreational fishing sector

Recreational access to the take of Western King Prawns is primarily managed through the restriction on taking prawns from waters less than 10 metres in depth. The most recent survey of recreational fishing in South Australia conducted in 2013/14 estimated recreational take of Western King Prawns was nil (Giri and Hall 2015). This catch corresponded to 0% of the commercial catch in that year and was within allocations.

6.1.2. Aboriginal traditional fishing sector

Access to South Australia's fisheries resources by Aboriginal communities under the *Fisheries Management Act 2007* may 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. It is also possible that agreements may be made with Aboriginal communities in relation to traditional fishing arrangements before an ILUA is finalised. The agreements arising from these negotiation processes may inform the way that access to fisheries resources by Aboriginal communities is defined and implemented. Currently, 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.

There is little available information on the take of Western King Prawns by the Aboriginal traditional fishing sector. If a traditional fishing related agreement is negotiated within the timeframe of this management plan, at the appropriate review of this management plan, any difference between the nominal share put aside and the actual share agreed through the agreement can be calculated. Any difference would then be re-allocated to or from the recreational sector.

6.1.3. Commercial fishing sector

Prawns and bugs in GSV are allocated 100% to the commercial sector to reflect the existing share of the resource between fishing sectors at the time the Minister requested the 2017 plan to be prepared (Table 2). Shares of Southern Calamari have been allocated in the Marine Scalefish Fishery management plan (PIRSA 2013) at the state-wide level providing allocations for each of the sectors (Table 3).

Table 2: Shares of Gulf St Vincent Prawn Fishery resources allocated to each fishing sector.

Species	GSVPF	Other commercial	Recreational	Aboriginal traditional
Western King Prawns	100.0%	0.0%	0.0%	0.0%
Balmain Bugs	100.0%	0.0%	0.0%	0.0%

Table 3: Shares of Southern Calamari allocated to each fishing sector at the State-wide level. Marine Scalefish Fishery (MSF), Northern Zone Rock Lobster Fishery (NZRLF), Gulf St Vincent Prawn Fishery (GSVPF), Spencer Gulf Prawn Fishery (SGPF) and the West Coast Prawn Fishery (WCPF) (PIRSA 2013).

Species	Commercial		Recreational	Aboriginal traditional
Southern Calamari	MSF	56%	37.4	1%
	NZRLF	0.45%		
	GSVPF	0.45%		
	SGPF	4.6%		
	WCPF	0.1%		
Total	**61.6%**		**37.4%**	**1%**

6.2. Review of allocations

The *Fisheries Management Act 2007* requires that each management plan, in addition to allocating shares, also outlines the framework for adjusting shares in the future.

Allocations between sectors may be reviewed periodically in accordance with the criteria set out in the *Allocation Policy: Allocation of access to fisheries resources between fishing sectors* (the Allocation Policy). The following scenarios may be considered during a review of allocations

1. A review of the management plan, which will reassess the appropriateness of shares and may trigger an adjustment;

2. One or more sectors exceed their allocation of Western King Prawns, Balmain Bugs, or in accordance with the allocation triggers for Southern Calamari described in the management plan for the Marine Scalefish Fishery (PIRSA 2013); or

3. A major change in the management of a species and or a sector that results in a shift of allocations to a sector(s).

The declaration of a marine protected area that would result in a reallocation of shares may be given effect through the *Marine Parks Act 2007* and policies applying under that Act. That Act provides that compensation may be paid to licensed fishers affected by the closure of an area or restrictions of activities within a marine park.

6.2.1. Review process

An initial assessment of allocations may be conducted by PIRSA Fisheries and Aquaculture in consultation with relevant sectors of the fishery. Once the need for a review has been recognised an assessment committee will be established. The committee may be required to assess the need for a second-stage assessment based on consideration of the following questions:

- Has there been a shift in the access value of the fishery or is new information available that suggests a reallocation of shares would bring additional social and economic benefits to the State?

- If a trigger limit has been breached, can the breach be readily explained and justified?
- Is the potential change in shares significant and considered long term? A minor shift/anomaly may not require a full review.

A written report is to be prepared by the committee, with a recommendation to proceed to a full assessment or not. PIRSA Fisheries and Aquaculture will determine whether to move to a full assessment or may refer a recommendation to the Minister.

6.2.2. Full assessment

As with the initial assessment, a full assessment of allocation will be conducted by PIRSA Fisheries and Aquaculture in consultation with relevant stakeholders. An evaluation panel is to be established including independent experts as required.

The panel needs to evaluate how the value of one or more sectors is changing and the likely trends in the future. In the context of these changes, all options being considered should be evaluated against the option of maintaining the status quo and the potential flow-on effects with regard to:

- Contribution to Gross State Product;
- Contribution to employment;
- Access for consumers to fresh seafood;
- Maintenance, growth and wellbeing of regional communities;
- Health impacts;
- Sport and recreation opportunities;
- Consistency with tourism policies; and
- Other criteria relevant to the fishery.

6.2.3. Assessment outcomes

Following the full assessment, the review panel may recommend to the Minister one of two actions, either:

(a) manage each sector within the existing allocated shares; or

(b) proceed to adjust shares.

6.2.3.1. Managing within existing shares

If shares are to be maintained it may be necessary, depending on the circumstances, to alter the catch of one or more sectors to maintain the existing shares between all sectors. To determine the appropriate mechanism to re-establish initial allocations, the existing co-management arrangements will be used to develop a preferred option. Adjusting commercial shares within the GSVPF, if required, may be achieved through a variety of

controls consistent with current management arrangements such as; quota, seasonal and area closures.

6.2.3.2. Adjusting allocations of shares

Any future adjustment of shares will be consistent with the requirements of the *Fisheries Management Act 2007*. Adjustments may be from the commercial sector to the non-commercial sector, a voluntary scheme would seek to be pursued in the first instance. If a voluntary adjustment scheme is not able to be implemented in the fishery, a second voluntary option/step may be considered, including an incentive-based scheme for share adjustment.

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

- Purchase commercial access (i.e. quota units) to the resource on the open market;
- Create incentives for the commercial sector to trade access to the resource; and
- A process of compulsory acquisition may occur (through regulations) if necessary. Any compulsory acquisition of entitlements would include compensation to the commercial sector in accordance with the provisions of the Allocation Policy. Adjustments are to be finalised within two years.

6.3. Allocation triggers

6.3.1. Western King Prawns & Balmain Bugs

Where commercial sectors are allocated over 95% of the available resource, no triggers limits have been set as any shares greater than this amount are considered to be within normal fluctuation ranges.

6.3.2. Southern Calamari

The shares allocated to each sector in relation to Southern Calamari at the State-wide level and triggers for a review of the allocations reflect those set out in the Marine Scalefish Fishery management plan (PIRSA 2013).

Currently, catch estimates for Southern Calamari are available in annual reports for the Marine Scalefish Fishery available at SARDI Report at https://www.pir.sa.gov.au/research/publications/research_reports.

7. Ecosystem impacts

The *Fisheries Management Act 2007* requires the following ecological impacts to be identified in a management plan:

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

The ecological impacts associated with the GSVPF were considered through a review of a previous ecologically sustainable development (ESD) risk assessment conducted in 2016. This review (and the 2016 risk assessment) were guided by the *National ESD Reporting Framework for Australian Fisheries* of Fletcher et al. (2002).

The ecological factors relevant to the GSVPF were prioritised using risk ratings from negligible to high through the GSVPFMAC. A report describing the outcomes of the assessment is available in PIRSA (in prep). The performance report for risks ranked at a level of Moderate or Higher, including strategies to address those risks are provided in Appendix 1.

8. Goals and objectives

This management plan provides a set of management goals and objectives for the GSVPF that meet the objects prescribed in Section 7 of the *Fisheries Management Act 2007*. These goals and objectives take into account policy drivers, such as the principles of ecologically sustainable development, the precautionary principle and the guidelines for the ecologically sustainable management of fisheries set out in the *Environment Protection and Biodiversity Conservation Act 1999*.

Within the framework provided by ESD, the primary consideration for this plan is Section 7(1)(a) of the *Fisheries Management Act 2007* relating to the avoidance of over-exploitation. Economic and social objectives will be pursued to the extent possible, where stock sustainability objectives have been demonstrably achieved.

The key goals for the fishery are implemented through operational objectives and management strategies contained in this management plan. These key goals are:

- Maintain ecologically sustainable prawn biomass
- Enable optimum utilisation and equitable distribution
- Protect and conserve aquatic resources, habitats and ecosystems
- Enable cost effective and participative management of the fishery

Table 4: Management goals, objectives and strategies for management for the Gulf St Vincent Prawn Fishery. ESD risk is as described in the Ecologically Sustainable Development Risk Assessment of South Australia's Gulf St Vincent Prawn Fishery (PIRSA in prep)

Objective	Strategies	ESD Risk	Performance Indicator	Description	Reference Point
Goal 1: Maintain ecologically sustainable prawn biomass					
1a. Management arrangements are sufficient to maintain prawn stocks at sustainable levels based on performance indicators in the harvest strategy.	1ai. Control fishing with annual effort or catch restrictions 1aii. Appropriate regulations control gear used in the fishery, access to the fishery, and spatial and temporal restrictions 1aiii. Industry adopts a Code of Practice (rules for spatial management and target prawn sizes) 1aiv. Undertake stock status/assessments	Maintain Western King Prawn stocks at a sustainable level	Primary performance indicators set out in the Harvest Strategy including standardised commercial catch per unit of effort and standardised fishery independent survey (FIS) catch rate (March and April/May FIS) Industry's Code of Practice is provided to all skippers at the commencement of each fishing season Fishery assessment report is published	Performance indicators for stock are described in section 9.	Performance indicators are at or above the limit reference point levels described in the harvest strategy at section 9 in at least three years in the life of this management plan: Code of practice is reviewed annually by SVGPBOA A copy of the industry Code of Practice is on board every to registered vessel GSVPF Status/Assessment report is published annually
1b. Collect sufficient information to manage the fishery to sustainable levels.	1bi. Collect fishery dependent data through commercial logbooks and catch disposal records 1bii. Maintain fishery independent monitoring programs	Maintain Western King Prawn stocks at a sustainable level External factors impacting on the fishery	Submission of commercial logbooks and catch disposal records FIS are undertaken annually Consider factors influencing performance of the fishery (if required)	Spatial and temporal catch and effort data is collected in the GSVPF in SARDI commercial catch and effort logbooks and PIRSA Catch disposal (unload dockets) records External factors may include (but not limited to); -Biosecurity -Economic / Market -Biological -Ecological -Environmental	Daily logbook records are submitted for every night fished Catch disposal records submitted for every unload FIS are conducted as required Monitor external factors that could impact the Fishery

Objective	Strategies	ESD Risk	Performance Indicator	Description	Reference Point
Goal 2: Enable optimal utilisation and equitable distribution					
2a. Optimise economic performance within biologically sustainable levels	2ai. Economic performance is monitored 2aii. Management framework allows for economic optimisation 2aiii. Changes to management arrangements consider economic implications 2aiv. Undertake Pre-fishing surveys 2av. Bio-economic model rerun periodically 2avi. Support innovation and technology to improve catch handling and on-board processing or new or innovative product forms to improve financial performance of operators	External factors impacting on the fishery	Gross value of production (GVP) Boat Gross Margin Economic Rent Mean commercial prawn size Outputs from bio-economic model for GSVPF	Total catch valued at the landed beach price. Used to determine the whole fishery value A basic measure of profit. Return from a fishery after all costs have been met. Economic rent is maximized when economic efficiency is maximised Mean commercial prawn size from commercial size grade categories reported in catch disposal records Outputs from Bio-economic model developed by SARDI (SARDI in prep)	GVP reported and monitored Boat Gross Margin monitored when available Economic Rent monitored emerging trends in GOS are considered if available. Commercial prawns that are 16-20 grade or smaller make up less than 30% of the total harvest Monitor outcomes from bio-economic model when they are available
2b. Manage the shares allocated in this plan	2bi. Resource allocation between sectors provided in this management plan 2bii. Review of allocation provided in this management plan		Allocation reviewed when appropriate		Allocation reviewed when appropriate

Objective	Strategies	ESD Risk	Performance Indicator	Description	Reference Point
Goal 3: Protect and conserve aquatic resources, habitats and ecosystems					
3a. Fishery impacts on bycatch, byproduct, TEPS are within sustainable levels	3ai. Control fishing with annual effort or catch restrictions 3aii. Appropriate regulations control gear used in the fishery, access to the fishery, and spatial and temporal restrictions 3aiii. Promote environmentally friendly fishing practices 3aiv. Fishing interactions with TEPS recorded in Wildlife Interaction Logbooks 3av. Support further developments in gear technology to improve fishery selectivity and better handling to minimise fishery impacts on by-catch.	Maintaining the biomass of Balmain Bugs at a sustainable level Fishery impacts on the biomass of bycatch species is sustainable	Identify new technologies for reducing impacts on bycatch Monitor stock status of byproduct species where information is available Monitor stock status of bycatch species where information is available Use of approved bycatch reduction devices Number of TEPS interactions reports in Wildlife Interaction Logbooks	Technology that mitigates identified risks Maintain the use of T-90 cod end mesh, bycatch reduction grids and hoppers to sort the catch. The summary of TEPS interactions in GSVPF are regularly reported to the Department of Agriculture, Water and the Environment	Identify new technologies for reducing impacts on bycatch Regular reporting of TEPS interactions for the GSVPF
3b. Fishery impacts on benthic habitat and associated species communities are minimised	3bi. Control fishing with annual effort or catch restrictions 3bii. Closed areas maintained (i.e. waters <10m) 3biii. Promote environmentally friendly fishing practices 3biv. Industry Code of Practice *(*e.g. rules for spatial management) are implemented	Fishery impacts on the ecosystem	Fishing controls set prior to the start of the season Closed areas within the fishery area Use of approved bycatch reduction devices Industry's Code of Practice is provided to all skippers at the commencement of each fishing season	Fishing controls are set out in the Harvest Strategy Maintain the use of T-90 cod end mesh and bycatch reduction grids The Industry Code of Practice sets out arrangements that minimise the impacts of the fishery on the environment	Fishing controls set prior to the start of the season Closed areas maintained Approved bycatch reduction devices maintained A copy of the industry Code of Practice is onboard every registered vessel in the fishery

Objective	Strategies	ESD Risk	Performance Indicator	Description	Reference Point
Goal 4: Enable cost effective and participative management of the fishery					
4a. Industry participation in management	4ai. The GSVPFMAC is recognised as the advisory committee for the GSVPF 4aii. SVGPBOA holds regular meetings with industry 4aiii. PIRSA / SARDI engage with industry where appropriate		Membership of the GSVPFMAC Industry led GSVPFMAC operates within agreed terms of reference. PIRSA / SARDI attends industry meetings where appropriate PIRSA / SARDI engage with industry where appropriate	Membership of the GSVPFMAC includes a range of stakeholder interests. Maintenance of members on the GSVPFMAC to provide stakeholder group expertise will be monitored to measure performance of the MAC against the agreed terms of reference PIRSA/SARDI attend meetings and liaise with industry where appropriate including SVGPBOA meetings	Membership on the GSVPFMAC is maintained GSVPFMAC operates within agreed terms of reference GSVPFMAC monitors the performance of the management plan and provides advice management arrangements PIRSA/SARDI attend meetings and liaise with industry where appropriate including SVGPBOA meetings
4b. Support community stewardship of fisheries resources	4bi. Stakeholders have input to the management of the fishery 4bii. Communicate management arrangements to the wider community.		Membership for non-industry stakeholders on the industry led GSVPFMAC Management information is available on the PIRSA webpage	Maintenance of members on the GSVPFMAC to provide stakeholders with the appropriate expertise Information related to management of the fishery is correct and relevant on the PIRSA webpage	Membership for non-industry stakeholders on the industry led GSVPFMAC is maintained PIRSA website information is updated as required

Objective	Strategies	ESD Risk	Performance Indicator	Description	Reference Point
Goal 4: Enable cost effective and participative management of the fishery					
4c. Management costs of the fishery are funded by relevant stakeholders	4ci. Implement cost effective management, research, compliance and monitoring programs 4cii. Information on fisheries management cost recovery available in a timely and publicly accessible manner		A cost recovery process is in place for all relevant stakeholders Management information relating to cost recovery is available on PIRSA website PIRSA Annual cost recovery report produced	PIRSA Annual cost recovery process undertaken and report produced Information related to cost recovery of the fishery is correct and relevant on the PIRSA webpage	Annual cost recovery process undertaken and report produced Services are delivered within the agreed service level agreements under cost recovery PIRSA website information is updated as required

9. Harvest strategy

9.1. Background

The harvest strategy was developed with feedback from the GSVPFMAC. This committee included members from the SVGPBOA, PIRSA, SARDI and an independent scientist. The committee considered the outcomes of recent reviews relevant to the fishery including the most recent fishery status reports (McLeay and Hooper 2021), updated outputs from the bio-economic model developed for the fishery (Noell et al. 2015), reviews of the stock assessment (Dichmont 2014) and advice from the GSVPFMAC's Research Subcommittee.

An independent review of this harvest strategy was undertaken in 2021 by Prof. Tony Smith. The review provided advice with respect to the monitoring program; application and potential limitations of the bio-economic assessment model; limit and target reference points (and associated risk levels). This review found relatively low levels of effort and catch in the GSVPF from the mid-1990s to 2020/21 have maintained the prawn stock in GSV at high relative biomass fluctuating between 60% and over 100% of unfished levels, and above most conventional target levels of 50% unfished levels (Smith, internal report to PIRSA).

This review indicated a low risk to stock sustainability for a period of this harvest strategy with a target of 60% unfished biomass, noting this level is above the estimated Maximum Economic Yield (MEY) target of 54% and well above the estimated Maximum Sustainable Yield (MSY) target of 40% (SARDI in prep). The Limit Reference Point set at 40% of unfished levels used in this harvest strategy was considered to be relatively conservative, noting these findings were based on interpretations from the bio-economic model of which the results were new at the time of developing this harvest strategy and have not been peer reviewed.

Prof Smith proposed a longer-term strategy for managing the fishery should involve continued close monitoring using the commercial and fishery independent indicators and continued monitoring of size composition, more frequent updates to the bioeconomic model, and gradual changes to the harvest strategy.

Key improvements to the previous harvest strategy (PIRSA 2017) include:

- Improved standardisation of Fishery Independent Survey (FIS) and commercial catch rates using generalised linear models (GLMs)
- Increase in the number of Total Allowable Commercial Effort (TACE) "steps" in the decision rule table to guide setting of fishing nights for the fishery
- Revision of the FIS performance indicator to include two FIS (March and April/May).
- Pre-Christmas nights to be determined independent of pre-recruit index from the March FIS

The operational objective of this harvest strategy is to maintain stocks of Western King Prawns in the GSVPF above the limit reference points in at least three years in five years for the period of this management plan.

9.2. Performance indicators

9.2.1. Primary performance indicators

Primary performance indicators used in this harvest strategy include:

- Standardised annual commercial Catch Per Unit Effort (CPUE) (kg/vessel-night) for November to the following July of the most recently completed fishing season
- Standardised FIS CPUE (kg/trawl-shot), which is the average standardised CPUE from the most recent March and April/May FIS.

For application of the harvest strategy, performance indicators will be rounded to the nearest 0.1 kg/trawl-shot for standardised FIS CPUE and 1 kg/vessel-night for standardised annual commercial CPUE.

Standardised annual commercial CPUE is derived from catch and effort reports submitted to SARDI and PIRSA from the most recently completed fishing season noting catch and effort returns must be received by SARDI in sufficient time to allow for data entry and analysis prior to the performance indicator calculation.

The GLMs used to standardise the performance indicators account for effects of fishing year and month/survey, region, sea-surface temperature, vessel/licence, depth, mesh type (i.e. diamond mesh and T90), weighted by region and obtained separately via a generalised linear mixed model (GLMM)), and (for commercial catch rates) moon luminosity. Development of the GLMs followed documented approaches for the GSVPF and other fisheries (Venables and Dichmont 2004, Dichmont 2014, Noell et al. 2015).

9.2.2. Other performance indicator

Other data and performance measures may be used to assess the fishery but do not trigger explicit adjustments to fishing nights. Information includes:

- Recruitment data from FIS
- Prawn size information from FIS and commercial catch information
- Spatial information relating to FIS and commercial CPUE and prawn size
- FIS conducted in November
- Pre-fishing survey information where available

9.2.3. Industry input

Performance indicators occasionally require interpretation as a measure of fishery performance due to the influences of various external factors that may not necessarily be

related to stock abundance. Industry will be given an opportunity to provide factual and credible evidence to support the impacts of these external factors on performance indicators each year in the decision-making process.

In addition to the March and April/May FIS, a FIS will be conducted in November and one Fishery-dependent pre-fishing survey (PFS) may be undertaken by the industry when the fishery is not classified as depleted. A PFS will be for not more than ten vessel-nights. Fishing in a PFS will be restricted to FIS sites identified in Beckmann et al. (2015). No more than one shot may be undertaken at any one FIS site during a PFS. Survey data from a PFS will be distributed by the SVGPBOA to all licence holders and SARDI as soon as practicable after completion of the survey. The November FIS and PFS data may be used to assess the fishery but do not trigger explicit adjustments to fishing nights.

9.2.4. Reference points for performance indicators

Reference points in this harvest strategy were developed relative to unfished ('virgin') levels of biomass (B_0) calculated using a bioeconomic model (Noell et al. 2015). The reference points were converted to CPUE units based on the assumption that model estimates of CPUE at maximum sustainable yield ($CPUE_{MSY}$, i.e. 14.8 kg/trawl-shot for FIS and 492 kg/vessel-night for commercial fishing) infer a biomass (and LRP) of 0.4 B_0 (Table 5).

- Limit reference point (LRP)= $0.4B_0$
- Trigger reference point (TrRP)= $0.5B_0$
- Target reference point (TargRP) = $0.6B_0$

Table 5: Reference Points for performance indicators

Reference Point	Standardised Commercial CPUE	Standardised FIS CPUE
Limit (LRP)	492 kg/vessel-night	14.8 kg/trawl-shot
Trigger (TrRP)	615 kg/vessel-night	18.5 kg/trawl-shot
Target (TargRP)	738 kg/vessel-night	22.2 kg/trawl-shot

9.3. Monitoring

9.3.1. Fishery Independent Surveys (FIS)

Two FIS will be conducted each year in March and April/May. These surveys are conducted using industry vessels with independent observers. Each FIS is generally conducted over two nights, on the dark of the moon (new moon) in March and April/May within a timeframe of 2 days prior to/or 2 days after the new moon (weather permitting). The April/May FIS will be undertaken no later than the 7 May. If the timing of the FIS in May is after 7 May then the FIS may be undertaken on the dark of the moon in April. Each FIS will be conducted at 109 fixed locations throughout the gulf (described in McLeay and Hooper, 2021) unless extenuating circumstances prohibit surveying any locations. The survey involves 30-minute trawl shots using 51mm diamond-mesh net cod-ends.

9.3.2. Commercial Catch Rate (CPUE)

Standardised annual commercial CPUE is derived from catch and effort reports submitted to SARDI and PIRSA of the most recently completed fishing season noting catch and effort returns must be received by SARDI in sufficient time to allow for data entry and analysis prior to the performance indicator calculation.

9.4. Harvest Strategy decision rules

9.4.1. GSVPF TACE

This harvest strategy include includes two steps:

Step 1) setting a total number of nights (TACE) for the entire season; and

Step 2) setting a total number of fishing nights that may be fished in November and December (pre-Christmas period) to protect adult prawns during the peak spawning period.

Step 1: Set Annual TACE

The performance indicators relevant to total prawn abundance (being standardised annual commercial CPUE and standardised FIS CPUE) inform decision rules on the total number of fishing nights for the fishing season according to a harvest decision matrix framework described at Table 6.

Table 6: Harvest decision matrix to set annual commercial effort (nights) for a fishing season in the GSVPF. All amounts are in whole fishing nights

		Standardised FIS CPUE (kg/trawl-shot)							
		0	≥14.8 -	≥16.0 -	≥17.3 -	≥18.5 -	≥19.7 -	≥21.0 -	≥22.2
		<14.8	<16.0	<17.3	<18.5	<19.7	<21.0	<22.2	
Standardised Commercial CPUE (kg/vessel-night)	<492	0	90	110	130	150	170	190	200
	≥492 -<533	90	180	200	220	240	260	270	290
	≥533 -<574	110	200	220	240	260	280	300	310
	≥574 -<615	130	220	240	270	290	300	320	330
	≥615 -<656	150	240	260	290	300	320	340	350
	≥656 -<697	170	260	280	300	320	340	360	370
	≥697 - <738	190	270	300	320	340	360	370	390
	≥738 -	200	290	310	330	350	370	390	400

Step 2 – Set Pre-Christmas fishing TACE

Pre-Christmas fishing nights will be set at 20% of the total number of fishing nights for a fishing season provided through step 1 as a whole number of nights rounded[5] to the nearest multiple of ten.

9.4.2. Metarules

Metarule 1: If, three years from implementation of the harvest strategy using the decision matrix described in Table 6, the fishery has been equal to, or above the trigger reference points for standardised commercial catch rate (615 kg/vessel-night) and standardised FIS catch rate (18.5 kg/trawl-shot) in all years since implementation, the decision matrix at Table 7 may be used for the remainder of the term of the management plan.

Table 7: Harvest decision matrix used to set total annual commercial effort (nights) for a fishing season under metarule 1. All amounts are in whole fishing nights

		Standardised FIS CPUE (kg/trawl-shot)							
		0	≥14.8 -	≥16.0 -	≥17.3 -	≥18.5 -	≥19.7 -	≥21.0 -	≥22.2
		<14.8	<16.0	<17.3	<18.5	<19.7	<21.0	<22.2	
Standardised Commercial CPUE (kg/vessel-night)	<492	0	110	140	170	190	210	230	250
	≥492 -<533	110	220	250	280	300	320	340	360
	≥533 -<574	140	250	280	310	330	350	370	390
	≥574 -<615	170	280	310	330	360	380	400	420
	≥615 -<656	190	300	330	360	380	400	420	440
	≥656 -<697	210	320	350	380	400	420	440	460
	≥697 - <738	230	340	370	400	420	440	460	480
	≥738 -	250	360	390	420	440	460	480	500

9.4.3. Setting TACE without FIS data

If either the March or April/May FIS have not been completed or where FIS data available is from less than half of all survey locations the following guidelines will apply for setting fishing nights for the following fishing season:

- Where only one FIS is completed, the FIS CPUE performance indicator will be calculated based on the relationship between historical March and April/May FIS CPUE
- Where no FIS have been completed in a fishing season, it will be assumed the FIS outcomes would be at the same level as that of standardised commercial CPUE.

[5] Where 20% of total fishing season nights ends in numbers is less than 5 the number of pre-Christmas nights would be rounded down to the nearest multiple of 10; where the number ends in numbers 5 or greater, the number of pre-Christmas nights would be rounded up to the nearest multiple of 10.

- Pre-Christmas fishing TACE will be set at no higher than 10% of annual TACE rounded down to the nearest multiple of 10.

9.4.4. Reopening the fishery

The following decision rules will be considered in setting total allowable commercial effort (fishing nights) when reopening the fishery following a fishery closure in place for more than one year. Total fishing effort for a fishing season would be set according to Table 8.

Table 8: Decision rules for reopening the fishery

FIS CPUE	TACE
<14.8kg/trawl-shot	0 nights
≥14.8-<18.5 kg/trawl shot	180 nights
≥18.5 kg/trawl shot	300 nights

The TACE nights in Table 8 are derived from FIS CPUE level at either ≥14.8 kg/trawl shot or ≥18.5 kg/trawl shot respectively and corresponding levels of commercial CPUE as per Table 6.

If the fishery is reopened partway through a fishing season, the TACE set for the remainder of the fishing season will be pro-rata relative to the remaining period in that fishing season.

Total fishing effort for the pre-Christmas fishing period will be set at 10% of the total number of fishing nights for a whole fishing season as a whole number of nights rounded down to the nearest multiple of ten fishing nights.

9.5. TACE decision making process

The decision-making process for setting TACE will be undertaken each year prior to the start of the fishing season including consultation through the GSVPFMAC:

1. An advice note providing the primary performance indicators for the fishery for the current fishing season will be provided to the industry and members of the GSVPFMAC prior to a formal meeting of that group and presented by SARDI at that meeting. Where possible, this information will be provided to GSVPFMAC members one week prior to the meeting.
2. The GSVPFMAC will hold a formal meeting and recommend a TACE to PIRSA for the GSVPF guided by the harvest strategy decision rules following consideration of the following information:

    (a) The most up-to-date status for fishery and/or provisional standardised CPUE and FIS data.

    (b) Industry advice on external factors affecting the indicators.

    If the TACE recommended through the GSVPFMAC is not consistent with the decision rules in this harvest strategy or standardised commercial CPUE or FIS CPUE are below the trigger reference point, the GSVPFMAC will provide a document to PIRSA including all information considered in making the recommendation.

3. PIRSA will consider advice from the GSVPFMAC and the recommended TACE. If the TACE recommendation is consistent with the decision rules in this harvest strategy and CPUE is at or above the trigger reference point, a report may be provided to the Minister (or his/her delegate) regarding the TACE.
4. If the TACE recommendation is inconsistent with the decision rules in this harvest strategy, or standardised commercial CPUE or FIS are below the trigger reference point, PIRSA will provide a comprehensive report to the Minister or his/her delegate describing the recommendation of the GSVPFMAC, the information that has been considered in making recommendation and industry views.
5. A TACE recommendation will be provided to the Minister (or his/her delegate) prior to the commencement of the upcoming fishing season.
6. The Minister (or his/her delegate) will consider the TACE recommendation and make a decision on the TACE by way of setting a fishing night unit value and total number of fishing nights for each fishing period (pre-Christmas and for the total fishing season) as soon as practicable prior to the commencement of the new season.

All endeavors to provide a TACE decision as early as possible before the commencement of the fishing season will be undertaken, pending timely delivery of the requirements set out in this process.

9.6. Stock status classification

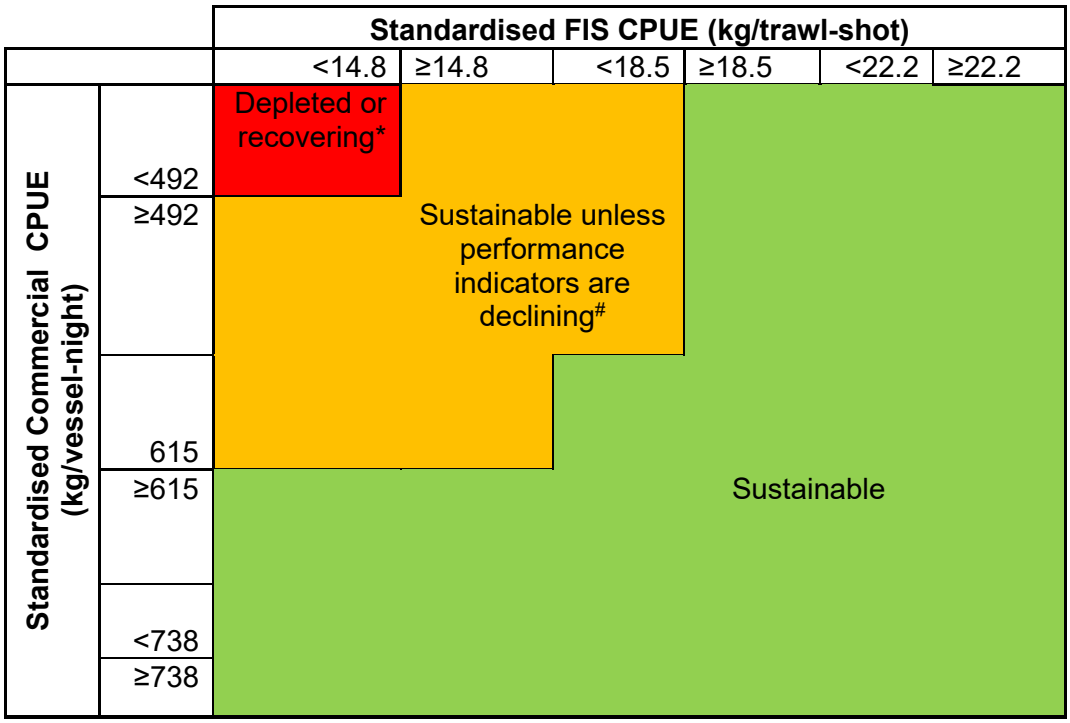
The stock status of the fishery is defined in this harvest strategy using terminology consistent with the national reporting framework for stock classification described in Piddocke et al. (2021) (www.fish.gov.au/). It is noted the review of this harvest strategy by Prof Tony Smith (Smith 2021) indicated the LRP (40% unfished levels) is set at a level estimated to be at MSY. LRP could be set at half that level, however a conservative level of 40% unfished levels has been adopted in this harvest strategy and used here to indicate a classification of depleted or recovering.

A decision matrix for guiding stock status is provided in Table 10 based on the identified reference points described in this harvest strategy and provided below.

Table 9: Reference Points for performance indicators

Reference Point	B_0	Standardised Commercial CPUE	Standardised FIS CPUE
Limit (LRP)	$0.4B_0$	492 kg/vessel-night	14.8 kg/trawl-shot
Trigger (TrRP)	$0.5B_0$	615 kg/vessel-night	18.5 kg/trawl-shot
Target (TargRP)	$0.6B_0$	738 kg/vessel-night	22.2 kg/trawl-shot

Table 10: Decision rules for classifying stock status for the GSVPF



*When primary performance indicators are below the LRP, stock status will be interpreted in consideration of the trajectory of the performance indicators (primary and other indicators if available) for the fishery. If a majority of the performance indicators are declining the fishery will be classified as depleted, or where a majority of performance indicators are increasing the fishery will be classified as recovering.

#When primary performance indicators are at or above the LRP and below the TrRP, stock status will be interpreted in consideration of the trajectory of the performance indicators (primary and other indicators if available) for the fishery. If a majority of the performance indicators are declining the fishery will be classified as depleting, or where a majority of performance indicators are stable or increasing the fishery will be classified as sustainable.

9.7. Transitioning to individual transferrable quota

As detailed in the revised management framework (PIRSA 2014) outlining the future management framework for the fishery, it is proposed the GSVPF may transition to an individual transferable quota (ITQ) management system with a total allowable commercial catch (TACC), if supported by the industry. In order to transition the fishery to a ITQ system certain requirements or pre-conditions would need to be met. These requirements include operational arrangements to ensure efficient and effective management of the system, as well as industry requirements to support the transition. These requirements may include:

- A catch disposal system requiring licence holders and processors to formally submit catch records when unloading and receiving prawns
- Defined landing points for vessel unloads

- A system for externally monitoring the position of each vessel
- Independent monitoring of fishing activities onboard all active vessels to mitigate quota evasion
- Majority agreement amongst licence holders that a ITQ system be implemented in the fishery
- Any arrangements implemented will provide for cost effective management.

If the fishery wishes to transition to an ITQ system the limits on commercial catch and pre-Christmas fishing catch will be informed from further testing and analysis by a reputable fisheries science provider.

9.8. Review of the harvest strategy

As this harvest strategy is included in a management plan developed pursuant to Part 5 of the *Fisheries Management Act 2007*, a review of this harvest strategy would be required if a review of this management plan is approved by the Minister for Primary Industries and Regional Development under section 49 of the Act. Section 12 of this management plan outlines the process for reviewing a management plan, including the harvest strategy.

The independent review of this harvest strategy undertaken in 2021 (Smith, 2021) recommended a review of the harvest strategy after 3 years of its implementation. If there is documented information that the performance of the harvest strategy has not met the objectives of this management plan described at Section 8 after 3 years of its implementation, a recommendation to review of the harvest strategy, including decision rules for setting pre-Christmas fishing nights will be considered by the GSVPMAC noting a review of the harvest strategy would require a request to the Minister for Primary Industries and Regional Development to undertake a review of the Management Plan.

10. Compliance and monitoring

PIRSA Fisheries and Aquaculture runs a compliance program that has dual objectives:

- To maximise voluntary compliance with fisheries rules[6]; 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

[6] Rules include regulations, licence conditions, closure notices or any other enforceable instrument under the *Fisheries Management Act 2007*.

presence of Fisheries Officers and awareness of compliance operations, as well as through detection and prosecution of illegal activity[7].

11. 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 aquatic resources of the State are to be managed in an efficient and cost-effective manner and targets set for the recovery of management costs.

The recovery of costs associated with the management of the commercial fisheries 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.

The fundamental principle applied to cost recovery of management costs is that the main beneficiaries of the services (in this case the commercial licence holders) are required to bear the cost of delivering the services required to manage their activities.

In determining the level of cost recovered from industry, PIRSA is guided by relevant cost recovery policies and reviews

12. Review of the plan

A review of this management plan may be conducted at any time under section 49(1) of the *Fisheries Management Act 2007*. A full review of this management plan will be conducted as soon as practicable after the fifth anniversary of its implementation under section 19(2) of the Act.

Section 49 of the *Fisheries Management Act 2007* outlines the process of reviewing a management plan. Amendments to this management plan may also be considered under section 46 of the Act where applicable. Section 46 of the Fisheries Management Act 2007 provides for amendments to the management plan to:

a) to correct an error; or

(b) to make a change of form (not involving a change of substance) in the plan; or

(c) if the Governor is satisfied that the amendment would not substantially alter the plan; or

[7] Prosecution may include the issuing of a formal caution or an expiation notice, in addition to prosecution through the courts.

(d) if the plan or the regulations provide that a change of a specified kind may be made by amendment under this section—to make a change of that kind.

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14. Appendix 1: ESD Risk Assessment Outcomes

Table 11: Performance report for Moderate and High risks identified in 2021 revised ESD Risk Assessment for the GSVPF (PIRSA in prep)

Component	Risk/Issue	Description	Risk/ Importance rating	Objective	Strategies
Retained species	Balmain Bug	The risk of maintaining the biomass at a sustainable level	Moderate	Maintain biomass at sustainable stock status	Monitor harvest of Balmain Bugs
Non-retained species	Blue Swimmer Crab	The risk of fishery impacting on the biomass of by-catch species	Moderate	Maintain appropriate levels of biomass of by-catch species to minimise any significant impact on their dynamics	Monitor stock status of Blue Swimmer Crabs in GSV in assessment reports from commercial Blue Swimmer Crab Fishery
Ecosystem effects	Ecosystem structure, community structure	The risk of fishery impacting on the ecosystem	Moderate	Fishery impacts on benthic habitat and associated species communities are minimised	Monitor trawl effort in the fishery
	Ecosystem structure, habitat disturbance		Moderate		
External Factors	Biological – Disease	The risk of external factors impacting on the performance of the fishery	Moderate		Maintain communications with Biosecurity SA
	Anthropogenic, water quality		Moderate		Communicate with EPA where required

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