

## **Competition to collaboration: Exploring co-management models for the Spencer Gulf Prawn Fishery**

This paper has been prepared to provide an overview of prawn fishing within the Spencer Gulf to the Steering Committee's of the FRDC funded project 'Competition to collaboration: exploring co-management models for the Spencer Gulf Prawn Fishery'.

The objectives of the project are to:

1. Develop effective working relationships between three key stakeholder groups regarding future management of the Spencer Gulf Prawn Fishery.
2. Identify, document and evaluate new fisheries management models for the Spencer Gulf Prawn Fishery.
3. Develop a preferred management model for the Spencer Gulf Prawn Fishery with discussions of the implications and potential risks of the model.

While the paper does not provide an exhaustive look at the Spencer Gulf Prawn Fishery or on the FRDC funded project; it should provide enough information for the Steering Committees to provide input into the data gathering process for investigating co-management opportunities within the Spencer Gulf Prawn Fishery. It should also be noted that this document is not referenced and is not for publication. Every effort has been made to provide an accurate description of the fishery, and readers are encouraged to read the original documents (links provided).

### **History**

Western King Prawns (*Melicertus latisulcatus*) were first trawled from the Spencer Gulf by the Fishery Investigations Ship *Endeavour* in 1909. The first commercial attempt at prawn trawling by a Danish seine boat was made in 1948, which was unsuccessful. The South Australian Department of Fisheries and Fauna Conservation carried out exploratory trawling using the *Weeruta* between 1957 and 1964, again with no commercial success. A number of Port Lincoln fishermen had limited success in 1961 on the Mameena.

The industry showed its true potential through the work of a Port Lincoln fisherman in 1967, who began extensive surveying of the Spencer Gulf in July 1967. After two and a half months of surveying the southern area during daylight and dark he finally caught the first commercial quantity of prawns in the Spencer Gulf: at the bend of the 'Gutter' in October 1967. Other fishermen joined the new fishery and it rapidly developed.

In March 1968, the Director of Fisheries (at the time) introduced restricted entry for the Spencer Gulf prawn fishery and 25 permits were granted. These early management measures were introduced to prevent over-exploitation of the resource and over-capitalisation within the fishery and to rationalise the development and quantify the extent of the resource. It was in 1968 that the Spencer Gulf and West Coast Prawn Fishermen's Association (the Association) formed and it was in these early days that the fishermen made 'gentlemen's agreements' to restrict fishing. The Spencer Gulf prawn fishery also documented catch and effort statistics from its inception in 1968 (fishermen's logbooks).

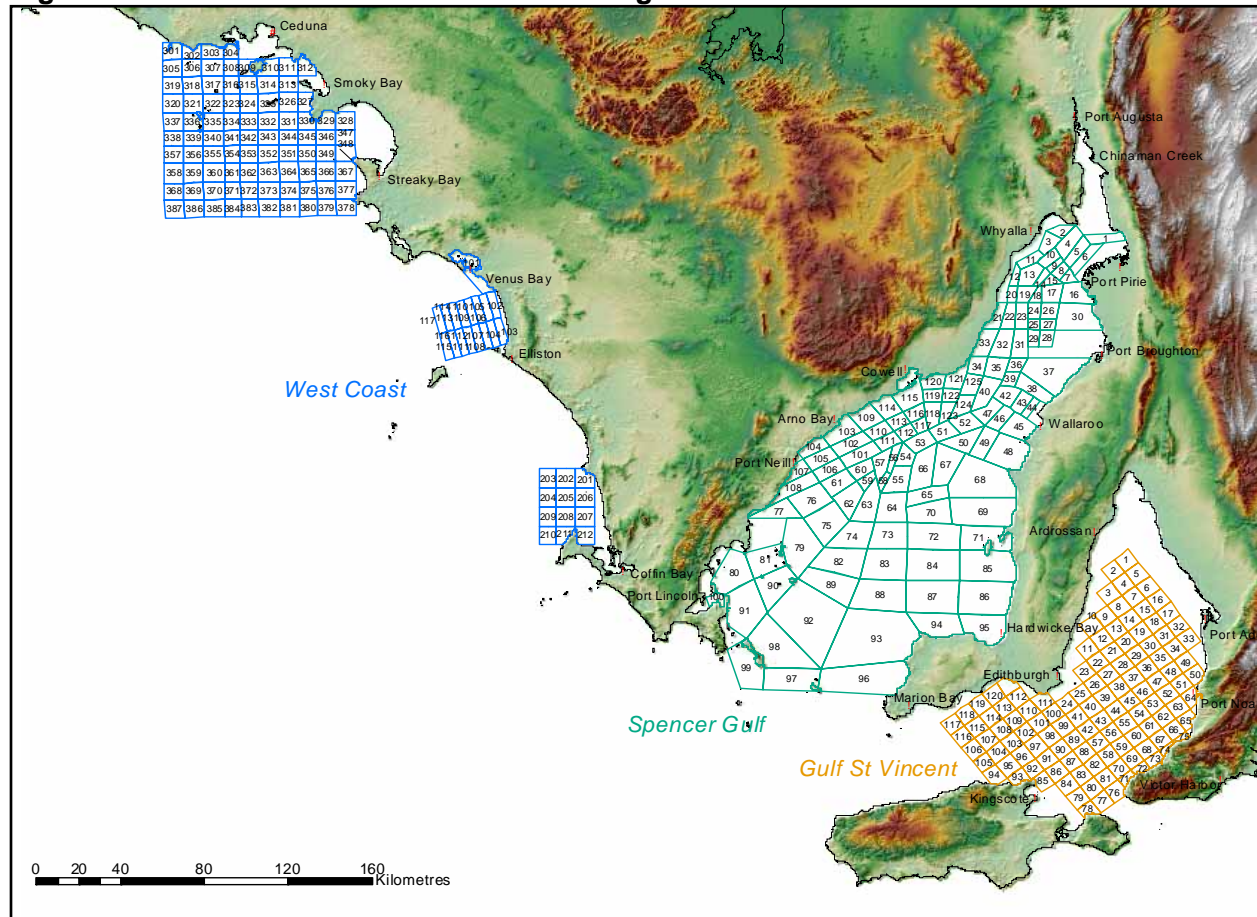
### **Spencer Gulf Prawn Fishery**

The Spencer Gulf Prawn Fishery is one of three prawn fisheries within South Australia: West Coast; Spencer Gulf; and Gulf St Vincent. There are currently 39 commercial prawn fishing licenses issued for the Spencer Gulf fishery. It is a single species commercial prawn fishery, capturing the Western King Prawn, *Melicertus latisulcatus*. However, in addition to prawns,

licence holders are permitted to retain and sell two by-product species incidental to fishing, slipper lobster (*Ibacus* spp) and southern calamari (*Sepioteuthis australis*).

The Spencer Gulf Prawn Fishery is permitted to fish in all Spencer Gulf waters greater than 10 metres in depth, north of the geodesic joining Cape Catastrophe (Latitude 34° 35.4'S, Longitude 136° 36.0'E) on Eyre Peninsula and Cape Spencer (Latitude 34° 9.6'S, Longitude 135° 31.2'E) on Yorke Peninsula, as shown in Figure 1.

**Figure 1: South Australia's Prawn Fishing Grounds**



Courtesy of: Fisheries Statistics Unit, SARDI AQUATIC SCIENCES

Commercial fishing is undertaken using the demersal otter trawl technique; consisting of towing a funnel shaped net leading into a bag (referred to as a cod-end), see Figures 2 and 3. A separate large meshed bag (referred to as a crab bag) is held within the cod end and retains blue crabs and megafauna (ie sharks and rays) while the prawns flow through to the cod end. The crab bag reduces crab mortality, damage to prawns and allows species (other than prawns) to be promptly returned to the sea. Otter boards (described as 'bison trawl boards' and 'bison boards' in Figures 2 and 3) are used to keep the trawl nets open horizontally during towing.

Figure 2: Trawl Net Configuration

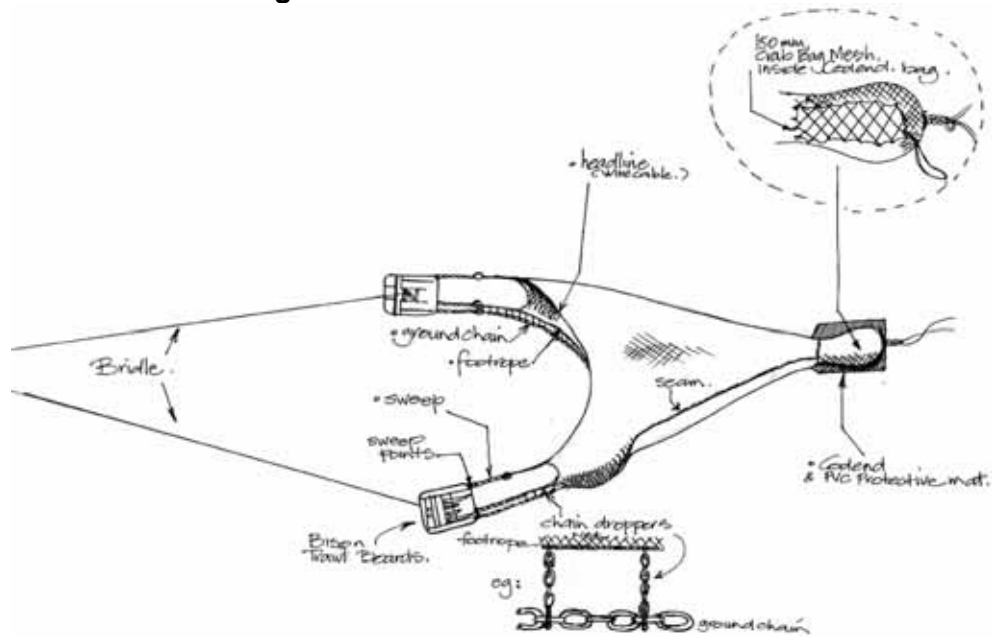
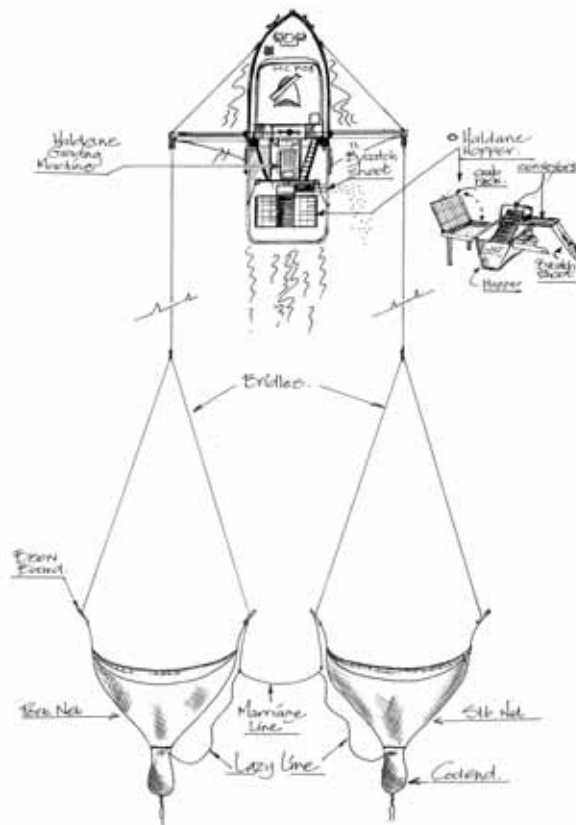


Figure 3: Double rig trawl gear



Trawling is undertaken during the night between sunset and sunrise, and generally between the last quarter of the moon, through the phase of the new moon to the first quarter. Western King Prawns are nocturnal and burrow into the seabed during the day and emerge at night to feed. The peak spawning period for Western King Prawns is between October and April, with one main spawning period between November and February.

The fishing season for the Spencer Gulf Prawn Fishery lasts from November through to and including June of the following year. The Fishery does not fish in January or February to ensure that spawning can occur with limited interference. However, fishing does still occur in November and December to meet Christmas demands for stock. These fishing periods are limited to minimise the impact on spawning and recruitment.

Trawl shots are of relatively short duration in comparison to other prawn fisheries and generally do not last over an hour. The short shot duration and the hopper–conveyer belt system return by-catch to the water quickly, greatly decreasing the risk of by-catch mortalities. The prawn catch is graded, cooked or dipped (into a preservative solution) if not cooked to suit market demand, packed and immediately snap frozen.

The Spencer Gulf Prawn Fishery is an important element of South Australia's commercial fishing industry. A total of 2024 tonnes of prawns were caught within the Spencer Gulf in 2006/07 to a value of \$39.4 million. In addition, the Spencer Gulf and West Coast Prawn Fishery was responsible for the creation of 217 full-time equivalent (fte) jobs in 2006/07 and a further 168 fte downstream jobs (processing, transport, retail etc). There were also an estimated 673 further jobs created through flow-on effects.

### **Research and Data**

Extensive research has been conducted on Western King Prawns within the Spencer Gulf since the late 1970's. From this, a sound understanding has been gained of their biological characteristics, spatial distribution of adults and juveniles and the processes associated with spawning and recruitment. The Spencer Gulf Prawn Fishery has used this information to its advantage and now only fishes approximately 55 nights per year, enjoying a unique and enviable fishing lifestyle.

The first prawn trawl surveys were conducted in 1981 and were carried out on several occasions throughout the year. The surveys were aimed at improving the understanding of prawn distribution and abundance in Spencer Gulf. The current management plan for the fishery 'Management Plan for the South Australian Spencer Gulf Prawn Fishery – September 2007' (the Management Plan) requires that three stock assessment surveys are conducted at 209 fixed shots throughout the Spencer Gulf each fishing season: in November, February and April. Data collected for each survey include; total catch weight; catch weight per commercial prawn grade; mean prawn size; sex-specific length frequency; and reproductive index (November and February only). This data is used to determine harvest strategies for each fishing period.

The primary objective of stock assessment surveys is to provide a regular snapshot of the relative biomass of prawns through the fishing season. The results of the survey are used explicitly to determine the harvest strategies for the following fishing periods. The conduct of regular stock assessment surveys provides confidence that gross over-fishing is unlikely to occur, as the harvest strategies are tailored to match the results observed in the surveys. For example, if survey results are low by historic standards, measures are in place in the Management Plan to

ensure that subsequent harvest strategies are conservative, with the explicit aim that the survey results will be back to normal levels on the next occasion.

In between stock assessment surveys the fishing fleet undertakes spot surveys. Data collected for each spot survey shot include: catch weight total; catch weight per commercial prawn grade; and mean prawn size. Spot surveys usually target areas with high catch rates (or known catches) to determine where smaller fish are located and the harvest strategy will avoid fishing in these areas. Spot survey data is then used in conjunction with the previous stock assessment data and historical data to develop a harvest strategy for the fishing period. Spot surveys, along with real-time management whilst at sea, enables the fishery to avoid the capture of small prawns as the adult distribution changes throughout the season. These Real-Time Management measures provide the certainty that gross over-fishing is unlikely to occur.

Since 1981 there have been a number of areas closed seasonally or during each fishing period. Some of these areas are significant to the fishery and have remained closed since 1981. Closures have been aimed at protecting newly recruited and juvenile prawns or ensuring maintenance of adequate levels of egg production. The closures have also been used to improve the size of prawns caught in order to optimise the value of the catch and to protect areas of juvenile finfish (ie whiting).

Information gathered through stock assessment surveys, spot surveys and commercial fishing logbooks are collated and analysed by SARDI. This information is presented to PIRSA and the Association in reports:

- Survey Report (three per year, one for each survey); presents the interim results from the fishery-independent survey and compares the results with previous data collected for the same fishing period
- Status Report (one per year); provides a brief on the previous fishing season soon after the season is finished
- Fishery Assessment Report (one per year); provides a detailed analysis of a fishing season, including all information gathered from surveys and commercial catch data and undergoes a rigorous review / verification process.

The Fishery assessment reports can be viewed on SARDI's website at:

[http://www.sardi.sa.gov.au/pages/fisheries/pub/prawns/prawn\\_pub.htm:sectID=268&tempID=1](http://www.sardi.sa.gov.au/pages/fisheries/pub/prawns/prawn_pub.htm:sectID=268&tempID=1)

In 1997 an extensive by-catch study was undertaken in the Spencer Gulf Prawn Fishery, based on information obtained over many years. Fishery independent surveys of by-catch then began (in 1997), although discontinued for a period and recommenced in 2000. In March 2002, a voluntary logbook entry was introduced to record by-catch information. SARDI prepared a consolidated report in 2005 on by-catch and by-product, entitled 'Monitoring and assessment of by-catch and by-product species of the Spencer Gulf Prawn Fishery'. This report is accessible through the SARDI link provided above. In 2006 the Spencer Gulf Prawn Fishery began funding a three-five year independent by-catch and by-product research project, resulting from recommendations of the Commonwealth Department of the Environment, Water, Heritage and the Arts (formerly Department of the Environment and Water Resources) in response to the EPBC Act.

### Ecological Impact

Prawn fishing is undertaken using the demersal otter trawl technique, as discussed under the 'Spencer Gulf Prawn Fishery' heading, and essentially drags chains attached to nets across the sea floor. This system of fishing collects most marine organisms from the seafloor and within the range of the net unless it is small enough to free itself through the net. It has been previously calculated that prawn fishing is generally conducted in only 15% of the total allowable fishing area. This is achieved through self-imposed closures, avoiding areas with perceived high biodiversity areas including rocky or reef systems (that tear nets) and only fishing in areas where catch is believed / known to be located.

As well as implementing permanent spatial closures, the fishery has reduced its ecological impact substantially; by reducing the effort of the fishery and constricting its spatial impact. The fishery has reduced its effort (trawl hours) by >60% since the peak effort observed in 1978/79, whilst maintaining the same catch. Currently almost 50% of the annual catch comes from one fishing region (Wallaroo). Furthermore, areas in the north of Spencer Gulf were shown to be higher in biodiversity, and effort in these regions has reduced substantially. Whereas previous catches in the north regularly exceeded 500 tonnes per year, catches ranged from 0-200 tonnes from this region between 2000/01 and 2005/06.

The catch is brought on board vessels and the contents of the cod ends are spilt into a hopper. The hopper is flooded with water to increase the survival of by-catch that is discarded. Retained catch is sorted from by-catch through a conveyor belt system. Discarded by-catch is returned directly to the water from the conveyer system. Trawl shots occur for around one hour, unlike other prawn trawling fisheries around the world that have much longer trawl times. This also increases the chance of by-catch survival.

By-catch survival is relatively well researched and reported, for instance see:

- Fishery Assessment Reports, SARDI (see details under 'Research and Data' for access)
- 'Monitoring and assessment of by-catch and by-product species of the Spencer Gulf Prawn Fishery', SARDI (see details under 'Research and Data' for access)
- 'Ecological Assessment of the South Australian Spencer Gulf Prawn Fishery, Gulf St Vincent Prawn Fishery and West Coast Prawn Fishery', PIRSA Fisheries. This is available from: <http://www.environment.gov.au/coasts/fisheries/sa/prawn-trawl/pubs/sa-prawn-trawl-submission.pdf>
- 'Assessment of the South Australian Spencer Gulf Prawn Fishery, Gulf St Vincent Prawn Fishery and West Coast Prawn Fishery' (in response to the PIRSA Fisheries report detailed above). This is available from: <http://www.environment.gov.au/coasts/fisheries/sa/prawn-trawl/pubs/sa-prawn-trawl-assessment.pdf>
- Svane, I., Roberts, S. & Saunders, T., 2007, *Fate and consumption of discarded by-catch in the Spencer Gulf prawn fishery, South Australia*, Fisheries Research 90 (2008), 158-169.

### Harvest Strategies

As briefly explained under 'Research and Data', stock assessment and spot surveys assist in development of harvest strategies. Harvest strategies provide details on where the Spencer Gulf Prawn Fishery fleet may fish or where fishing is prohibited, the target size of fish to be taken, and the amount of fish to be caught. The Management Committee, of the Association, develops harvest strategies in consultation with the State Government management bodies: Primary Industries and Resources of South Australia (PIRSA); and the South Australian Research and Development Institute (SARDI). The actual open and closed area Notices developed during any fishing period are gazetted in the South Australian Government Gazette (the Gazette) and approved / signed off by the Minister's delegate and then gazetted.

Harvest strategies can be amended during a fishing period at any given time, referred to as 'Real Time Management'. These amendments are generally associated with reductions in the harvest area, unless a spot survey specifically indicates that new areas can be sustainably opened for harvest. The 'Committee At Sea' (made up of nine skippers from the Spencer Gulf Prawn Fishery) use catch and effort information provided from all vessels to the Coordinator At Sea to determine open and closed areas and generally fine tune lines of closure. This is done to protect juvenile/small stock and/or by-catch (high rates of by-catch or species of significance). The harvest strategies must also reflect output control rules, as defined by the Management Plan: output control rules have been developed for development of harvest strategies prior to fishing as well as whilst at sea. Real Time Management has been an effective tool for the Spencer Gulf Prawn Fishery to manage the fishery in a sustainable way.

### **Fishery Management**

Commercial fishing within the Spencer Gulf is use of a public resource managed by the South Australian (SA) State Government. The SA State Government, in particular PIRSA, Fisheries division, have put into place a number of legislative controls to better manage Spencer Gulf fisheries resources and the environment from which they are taken. PIRSA Fisheries also recognise the increasing independence within the legislative framework that the Spencer Gulf prawn fishery is capable (and willing) to move.

Legislation directly related to the management of the Spencer Gulf Prawn Fishery includes the following:

- Fisheries Management Act 2007
- Fisheries Management (Prawn Fisheries) Regulations 2006
- Fisheries Management (General) Regulations 2007

The Management Plan pulls together the legislative controls and also incorporates other input and output controls to regulate the Spencer Gulf Prawn Fishery. This document provides a much more in-depth look at the fishery and how it is managed. Steering Committee members are encouraged to refer to the Management Plan to better understand the Spencer Gulf Prawn Fishery. The Management Plan can be found on the PIRSA Fisheries website:

[http://www.pir.sa.gov.au/\\_\\_data/assets/pdf\\_file/0003/57954/sg\\_prawn\\_management\\_plan\\_final\\_sept2007.pdf](http://www.pir.sa.gov.au/__data/assets/pdf_file/0003/57954/sg_prawn_management_plan_final_sept2007.pdf)

There are also a number of other legislative controls and priority plans that ensure activities undertaken, whether by the fishing industry or by people generally, are maintained within context of environmental sustainability. These legislative controls can also provide a basis for management of the fishing industry (ie reducing protected species loss, correct disposal of waste etc). An example of other legislation that the Spencer Gulf Prawn Fishery should consider in developing strategic plans, research and development plans or in priority setting:

- Environment Protection and Biodiversity Conservation Act 1999
- Environment Protection Act 1993
- Natural Resources Management Act 2004
- Marine Parks Act 2007
- South Australia's Strategic Plan 2007
- Aquaculture Act 2001

**Industry Drivers**

In 2002 the Association gained greater responsibility in the coordination of research surveys. Currently, the coordination of stock assessment surveys is jointly managed by industry and SARDI, and spot surveys are coordinated entirely by industry. It was also in 2002 that the Association developed a ten year plan, with a major goal to 'Manage the fishery ourselves with minimal involvement of the Government and have the finances to do this'. This change and the goals set for the Association resulted in cost savings, increased level of professionalism, forward thinking and planning, independence and the view that the Association could take a more autonomous role, with PIRSA Fisheries taking on more of an auditing role against fishery management plans. It is anticipated that the outcome of taking on more responsibility by the Association will provide the Association with: a return on investment through increased flexibility and management responsiveness, which will engender a more commercial focus for management whilst ensuring sustainability of the fishery.

The industry is now at a stage where research is needed to assess an alternative co-management model and what would be needed at an operational level to achieve it. The research component has to go hand in hand with requirements from State Government and the public to meet legislative controls, ensure sustainability, provide transparency of industry processes and provide a level of confidence to all stakeholders (of the public resource – Spencer Gulf). To meet these needs, the Association will be working with three Steering Committees formed from a: industry group (Spencer Gulf Prawn fishermen); State Government group (PIRSA Fisheries) and public group (Conservation Council of SA). These groups will provide input into the processes that are currently managed by the various bodies and develop a 'co-management model'. The co-management model will be assessed in parallel to a fishing season and identify areas which have not been addressed or explored in the project.