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# **South Australian Fisheries Management Series**

## **Ecological Assessment of the South Australian Giant Crab (*Pseudocarcinus gigas*) Fishery**

### **Reassessment Report**

Prepared for the Department of Environment, Water, Heritage,  
and the Arts

For the purposes of Part 13 and 13(A) of the *Environment Protection and  
Biodiversity Conservation Act 1999*

December 2009

**Prepared by the Fisheries Division of Primary Industries and  
Resources South Australia**

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## 2. List of Attachments

- Log sheet for the Giant Crab Fishery
- Proposed by-catch identification sheet for the Giant Crab Fishery
- Fishery Assessment Report for PIRSA South Australian Giant Crab (*Pseudocarcinus gigas*) Fishery (2009)

## 3. Purpose

This report has been prepared by the Fisheries Division of the Department of Primary Industries and Resources, South Australia (PIRSA).

The purpose of this report is to provide a revised assessment of the management arrangements in place for the South Australian Giant Crab Fishery (SAGCF). This report updates information provided to DEWHA in 2007 for assessment against the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The report has been prepared in accordance with the *Guidelines for the Ecologically Sustainable Management of Fisheries*, 2<sup>nd</sup> Edition, and particularly addresses the level of change that has occurred in the fishery since the 2007 assessment.

## 4. Background

Since 1999, the export of Giant Crab has been controlled under the wildlife protection provisions of the Commonwealth EPBC Act 1999. Under Section 303FN (Approved Wildlife Trade Operation - WTO) Giant Crabs are declared as controlled specimens. The existing declaration allows for the product from the SAGCF to be exported until 14 March 2010.

Since assessment and subsequent updates there have been no changes to the management arrangements of the SAGCF that PIRSA feel will affect the criteria on which the EPBC Act 1999, WTO status is based.

The regulations that govern the management of the SAGCF are; *Fisheries Management Act (2007)* the *Fisheries Management (Miscellaneous) Regulations 2000*, and *(General) Regulations 2000*.

Giant Crabs are a long-lived and slow growing species that generally inhabit soft sedimentary environments and feed on sessile or slow moving benthic species. They are endemic to Australian waters and are distributed from southern Western Australia to central New South Wales inhabiting waters between 18 and 500 meters in depth, in temperatures between 10 and 18°C. The highest population densities occur at the shelf break in a depth of approximately 200 meters at the edge of the continental shelf.

The most recent stock assessment reports for the SAGCF have been completed for the 2007/08 fishing season. These reports are available from the PIRSA and SARDI websites, <http://www.pir.sa.gov.au> and <http://www.sardi.sa.gov.au>.

## 5. Level of Assessment

The SAGCF was assessed as an approved Wildlife Trade Operation in 2003. Since the last assessment there have not been significant changes in most areas of interest or particular issues as outlined in page 5 of the *Guidelines for the Ecologically Sustainable Management of Fisheries –second edition*.

**Table 1:** Level of assessment required by the SAGCF

Issue	Area of Interest	Yes	No
Fishery	Has there been any change to management arrangements, and/ or fishing practice?		<b>X</b>
External Influences	Has there been any change in the target stock status? i.e. Increase or decrease in number of overfished or uncertain stock, limit reference points or performance indicators have been triggered.		<b>X</b>
Interaction with protected species	Has there been any change in the nature, scale, intensity of impact, and/or management response?		<b>X</b>
Ecosystem impact	Has there been any change to an environmental issue/influence outside of the fishery management agencies control?		<b>X</b>
Target Stock Status	Has there been any change to management arrangements, and/ or fishing practice?		<b>X</b>

By-product/ by-catch status.	Has there been any change in the by-product and/or by-catch stock status? eg. Performance indicators triggered or risk assessment outcomes show risk levels have changed.		<b>X</b>
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Considering the above, the level of submission requirement for the SAGCF is standard.

However, it is important to note that all changes and progress concerning DEWHA's recommendations or conditions have been communicated through annual reports provided for all South Australian managed fisheries.

## 6. Fishery

The recreational take of Giant Crabs is negligible, due to the depth and proximity of the fishing grounds. The National Recreational and Indigenous Fishing Survey (Henry and Lyle 2003) did not report any catches for Giant Crabs. As such, recreational take of Giant Crabs is not regulated.

The costs for management, research, compliance, and any other costs associated with the management of commercial fisheries in South Australia are recovered from the licence holders through annual licence fees.

The SAGCF is a small sub-fishery of the Miscellaneous Fishery. The SAGCF is a single-species, single-method fishery.

The fishery has been divided into two zones; the Northern and Southern Zones. The Northern Zone includes a stretch of coastline in excess of 3,700 km, including all waters adjacent to South Australia west of the River Murray mouth to the Western Australian border, from the low water mark out to 200 nautical miles. The Southern Zone encompasses all of the remaining state. This geographic division recognises key differences in the physical and ecological character between the western and eastern borders of South Australia.

The fishery is comprised of two dedicated Miscellaneous Fishery licence holders, and some Rock Lobster licence holders who hold quota in the fishery; 5 in the Northern Zone, and 11 in the Southern Zone. Additionally, all Rock Lobster licence holders (both zones) who don't hold any Giant Crab quota are entitled to take 5 Giant Crabs as a by-product of their operations.

The commercial fishery operates between 1 October and 30 April in the Southern Zone and 1 November to 31 May in the Northern Zone. Targeting of Giant Crabs commenced in South Australian waters in 1992. Giant Crabs are sold mainly to South East Asian Markets: live, cooked, or pickled (Currie, 2009).

The Giant Crab resource is managed through a total allowable commercial catch (TACC) within which there is individual transferable quota units (ITQs)

to ensure the long term sustainability of the resource. The fishery operates under this output control based management system with the TACC set every year. The TACC for each zone is allocated between licence holders and quota holders, with a portion of the allocation set aside for the crabs taken as by-product by the rock lobster fishers who do not hold quota (5 per trip). Other management tools complement these arrangements.

The gear used in the fishery is mostly a steel-framed lobster pot fitted with moulded plastic necks and covered in 50x75mm plastic mesh. The pots are baited with Kangaroo meat, or a range of fish products, and are (usually) set overnight and hauled at first light next day. Undersized crabs (less than 150mm) are returned to the water, as are any berried females.

The following management arrangements apply to the management of the fishery:

**Table 2.** Summary of management measures for the commercial South Australian Giant Crab Fishery.

<b>Management Tool</b>	<b>Specifics</b>
Limited entry	<ul style="list-style-type: none"> <li>– Two dedicated non-transferable licences, with transferable quota units</li> <li>– All rock lobster licence holders may hold transferable Giant Crab quota</li> </ul>
By-product limits for rock lobster licence holders	<ul style="list-style-type: none"> <li>– All rock lobster licence holders without Giant Crab quota holdings may take up to 5 Giant Crabs per trip as a by-product</li> </ul>
TACC	<ul style="list-style-type: none"> <li>– The TACC for both zones has been maintained at Northern Zone (13.4 tonnes) and Southern Zone (8.7 tonnes)</li> </ul>
Seasonal closures	<ul style="list-style-type: none"> <li>– Southern Zone: 1 May to 30 September</li> <li>– Northern Zone: 1 June to 31 October</li> </ul>
Spatial closures	<ul style="list-style-type: none"> <li>– No take of dedicated Giant Crab fishing within a depth of 60 fathoms.</li> </ul>
Quota holding limits per licence	<ul style="list-style-type: none"> <li>– None</li> </ul>
Minimum legal length	<ul style="list-style-type: none"> <li>– 150mm for both females and males</li> <li>– No retention of berried females at any time</li> </ul>
Pot specifications	<ul style="list-style-type: none"> <li>– All Giant Crab pots must be either: (a) fitted with two rectangular escape gaps: (i) which are on opposite sides; and (ii) each of which is not less than 15 cm in length and 5.5 cm in depth; and (iii) the highest point of each is no more than 11 cm above the base; or (b) be covered with mesh of not less than 5 cm which is such that a cylindrical</li> </ul>

	rod 5 cm in diameter is able to be passed through it freely without distorting it
Maximum pot numbers	– 100 pots per licence
Vessel Monitoring System (VMS)	– Required
Catch and effort data	– Daily logbook submitted monthly
Catch Disposal Records (CDR)	– Daily CDR records, upon landing
Maximum vessel length	– 18m
Maximum engine capacity	– 1,200 break horsepower

## 7. External Influences

Changes in water temperature may affect Giant Crab distribution. Crabs inhabit temperatures between 11 to 17°C, and are well adapted for travel. It has been suggested that Giant Crabs occupy a thermal niche. As the niche boundaries move, the crabs move within the niche, shallower or deeper (Levings et al., 2001).

Giant Crabs inhabit mostly the region of seafloor where the flat continental shelf drops away rapidly to form the continental slope in about 150 to 400m depths. A recent project provided information to evaluate whether bottom trawling had an adverse impact on the habitats of Giant Crabs in the area where trawl and Giant Crab fisheries overlapped in Tasmania. The 'Bryozoan thicket' was one of the main habitats where Giant Crabs are fished. The study provided evidence to support that there is no evidence that degradation of Bryozoan habitat is directly detrimental to Giant Crab. However, it is believed that trawl discards on the seabed may provide an additional food source to Giant Crabs (Williams et al., 2009).

## 8. Interaction with Protected Species

The SAGCF has not reported any interactions with Threatened, Endangered or Protected Species.

All commercial fishers must report any wildlife interaction to PIRSA Fisheries and the DEWHA. Interactions include: collision or capture (hooked, netted or entangled), all interaction as well as those that relate to a species actually being landed onboard a vessel during a fishing operation are required to be reported. To assist fishers in this task, PIRSA and SARDI have produced a "Wildlife Interaction", identification and logbook, and provided it to all fishers.

A yearly report which includes major South Australian fisheries interactions with Threatened and Protected Species will be produced. The first report will be completed and available on the SARDI website within the next two months.

## 9. Ecosystem impact

The direct and indirect effects of Giant Crab fishing in SA are largely undetermined, however are deemed as minor. Potential impacts include direct disturbances to benthos, and the removal of non-target species (Currie & Ward, 2009).

There is no evidence to suggest that ghost fishing occurs as a result of lost commercial fishing gear. Bait in commercial crab pots to attract species is considered to last a maximum of 5 days. Therefore, should a pot be lost its potential to continue to attract species is limited and the entrance to the pot restricts species from becoming trapped.

## 10. Target Stock Status

SARDI Aquatic Sciences undertakes assessments of the SAGCF. The last assessment was published on April 2009 (attached).

The fishery is assessed against performance indicators (PIs), and through reference points (RPs), described in the Fishery Assessment Reports, available from SARDI's website.

Current performance indicators used to assess the performance of the fishery include:

Performance indicators	Measure
– Catch per unit effort	Nominal average catch rates as recorded in logbooks
– Total effort	Amount effort required to catch the TACC (as recorded in logbooks)
– Total catch relative to TACC	As an indicator of relative abundance. Recorded total catch by weight and numbers in logbooks
Secondary Performance indicators	Measure
– Sex ratio	As an indicator of reproductive capacity of the population, recorded in the logbooks.
– Relative abundance of mature females in the population	Indication of inter-annual changes in the spawning population.
– Pre-recruit Abundance Index	Provides a measure of inter-annual changes in recruitment. Recorded in the

	logbook.
– Mean crab weight	Nominal average mean weight recorded in logbooks

The reference points are measured against a range of performance indicators which compare the population to 1999/00; a period of stability for the fishery following the introduction of a quota system (Currie, 2009).

There are presently no sustainability concerns for the Giant Crab.

Total catch has remained relatively stable since the introduction of sectoral quotas in 2002/03, but in most recent seasons the TACC (22.1tonnes) has not been harvested. During the 2007/08 season 19.7 tonnes of Giant Crab were harvested from South Australia. Most of the catch (72%) was harvested by the two Miscellaneous Fishery licence holders. Rock lobster fishers with Giant Crab quota entitlements accounted for 18% of the total, while the remainder 10% was taken as by-product by commercial rock lobster fishermen.

Data to assess the fishery’s performance against six of the seven performance indicators in each zone was available. Five of the PIs were lower than the reference points namely; mean weight (NZ and SZ), catch rate (NZ), fishing effort (SZ), and total targeted catch (NZ).

It is suspected that the decrease in average weights for both zones is related to ‘grading’ by fishers, as smaller crabs are valued higher than larger crabs. Additionally, the reason for the TACC not being harvested fully is that Rock Lobster fishers who hold quota in the fishery are not targeting Giant Crabs.

PIRSA is currently revising the adequacy of the performance indicators, reference points and reference ranges for the fishery, and the report will be available in January 2010. It is understood that the assessments rely highly on the analysis of fishery dependent information. Further, data is limited to the miscellaneous (2) and rock lobster quota licence holder (1) that presently harvest 90% of the total catch.

## **11. By-product and by-catch stock status**

There is no provision under the Miscellaneous Fishery licence holder’s conditions to retain any other species as by-product.

No specific by-catch studies have been undertaken by the SAGCF, but studies have been undertaken by the South Australian Rock Lobster Fishery. This research suggests that the main by-catch species encountered are Octopus (*Octopus maorum*), Rock Lobster (*Jasus edwardsii*) and Pink Ling (*Genypterus blacodes*) (Book et al., 2004).

The fisheries log sheet is currently under revision to include by-catch species, and an identification guide (attached). The data collected will be integrated into the future decision making process.

## 12. Recommendations

PIRSA, in conjunction with the South Australian Giant Crab Industry has implemented the majority of the recommendations from the previous assessment and made substantial progress on others. The fishery is well-managed and has addressed issues as they have arisen. The 2007 recommendations have been addressed throughout the report, and are further addressed below.

***Recommendation 2:*** *Within 18 months, PIRSA to finalise and implement the SAGCF Management Plan which should include the commitments made by PIRSA in the SAGCF 2007 submission.*

PIRSA considers that the fisheries strategies currently in place for the management of the fishery are adequate for the size and level of complexity of the fishery. PIRSA is currently revising the adequacy of the performance indicators, reference points and reference ranges for the fishery in consultation with industry and SARDI Aquatic sciences. The stock assessment report with the revised PIs will be available in February 2010.

***Recommendation 3:*** *PIRSA to develop and implement measures to enhance the stock assessment and future management arrangements of the SAGCF including:*

- *Taking into account Giant Crab population dynamics;*  
The FRDC project 'Understanding shelf-break habitat for sustainable management of fisheries with spatial overlap' was published in June 2009. The project has provided valuable information in relation to the population dynamics of the Giant Crab. This information will be taken into account when developing the revised PIs.
- *Standardising fishing effort data:*  
Log sheets are provided to fishers to collect information. Information collected includes: Trip number, date, latitude and longitude (start and finish), depth, pot lifts, crab number, undersize crabs, spawning crabs, legal crabs (returned), species, and a by-catch area.
- *Accounting for removals of Giant Crab from other sectors and jurisdiction where appropriate:*  
By-product take has been factored into the stock assessment of the fishery and is included under the TACC. Recreational take for the fishery is negligible.

***Recommendation 4:*** PIRSA to collaborate, where appropriate, with other jurisdictions to actively pursue consistent and/or complementary research needs and management arrangements for the southern Australian Giant Crab stock.

The report 'Development of the Tools for long term management of the Giant Crab Resource: data collection methodology, stock assessment and harvest strategy evaluation' was published on November 2007. The report was coordinated by the Tasmanian Aquaculture and Fisheries Institute, and Victoria, and South Australia actively participated on the project.

The project objectives were to:

- develop a low cost, long term, Giant Crab resource assessment and data collection methodology;
- to quantify biases in the historical logbook data to increase its value for resource assessments;
- to obtain industry's understanding/observations of basic biological and market processes (eg moulting, egg-bearing, mating, migration, beach price influences) and how their fishing effort is adapted to this knowledge (eg targeting of size classes, seasonality of effort, etc.); and
- to develop the ability to investigate alternative harvest strategies (sustainability of different TACs; closed seasons etc).

This project resulted in the development of a stock assessment model for Giant Crab, incorporating catch and effort data such that estimates of fishing mortality are generated. Outputs from this project have improved data collection from the SAGCF.

***Recommendation 5:*** PIRSA Fisheries to develop cost-effective by-catch monitoring strategy for the fishery.

The log-sheets for the fishery are currently being revised to include additional by-catch specific information. An identification sheet is being rolled out for the fishery (attached).

### 13.1. Recommendations by DEWHA, Progress Summary.

**Table 3. GIANT CRAB - Recommendation Summary**

No	Recommendation	Progress	Target date
1*	PIRSA to inform DEWHA of any material change to the SAGCF management arrangements that could affect the criteria on which the Environment Protection and Biodiversity Conservation Act 1999 decisions are based, within three months of any change being made.		Ongoing
2	Within 18 months, PIRSA to finalise and implement the SAGCF Management Plan which should include the commitments made by PIRSA in the SAGCF 2007 submission.	Moderate	September 2008
3	PIRSA to develop and implement measures to enhance the stock assessment and future management arrangements of the SAGCF including: <ul style="list-style-type: none"> <li>• taking into account Giant Crab population dynamics;</li> <li>• standardising fishing effort data; and</li> <li>• accounting for removals of Giant Crab from other sectors and jurisdiction where appropriate.</li> </ul>	Complete	June 2007
4	PIRSA to collaborate, where appropriate, with other jurisdictions to actively pursue consistent and/or complementary research needs and management arrangements for the southern Australian Giant Crab stock.	Complete/ ongoing	June 2007
5	PIRSA to monitor the status of the target species in relation to performance indicators. Within 3 months of becoming aware of a performance indicator being triggered, PIRSA to develop a clear timetable for the implementation of appropriate management responses.	Moderate	June 2007
6	PIRSA to develop and implement a system for the monitoring and assessment of by-catch to ensure that changes in by-catch can be monitored and verified over time.	Significant	June 2007

### 13.2. Recommendations by DEWHA, South Australia's Strategies and Actions.

**Table 4. GIANT CRAB – Strategies and Actions**

No	Proposed Strategies	Actions	Target
2	<ul style="list-style-type: none"> <li>PIRSA has deemed a management plan for the fishery as unnecessary given the size, and take of the fishery.</li> </ul>	Continue preparation of Management Plan under the <i>Fisheries Management Act 2007</i>	September 2008
3	<ul style="list-style-type: none"> <li>PIRSA will continue to collaborate with other southern jurisdictions on management research and stock assessment to cost-effectively progress management, research and stock assessment improvements in the fishery.</li> </ul>	Prepare stock assessment report for the South Australian Fishery every year.	2008/09
4	<ul style="list-style-type: none"> <li>PIRSA Fisheries to review and refine as necessary the performance indicators and reference points used in the fishery</li> </ul>	Review all performance indicators and reference points in the fishery under during Management Plan development process	September 2008
5	<ul style="list-style-type: none"> <li>PIRSA Fisheries to develop cost-effective by-catch monitoring strategy for the fishery</li> </ul>	PIRSA is developing a cost-effective by-catch monitoring strategy for the fishery	2008

### 13. References:

- Currie, D.R., Ward, T.M. (2009). South Australian Giant Crab (*Pseudocarcinus gigas*) Fishery; Fishery Assessment Report for PIRSA. SARDI Aquatic Sciences Publication No. F2007/000698-2. SARDI Research Report Series No. 345.
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