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MANAGEMENT POLICY FOR COMMERCIAL FISHING OF GIANT CRABS IN SOUTH AUSTRALIA

20 JULY 2018

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MANAGEMENT POLICY FOR COMMERCIAL FISHING OF GIANT CRABS IN SOUTH AUSTRALIA

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All enquiries

Primary Industries and Regions SA (PIRSA)

Level 14, 25 Grenfell Street

GPO Box 1625, Adelaide SA 5001

T 08 82260900

Document Control

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Table of Contents

1	Purpose and scope of the policy	4
1.1	Commercial fishing	4
1.2	Recreational fishing	7
1.3	Traditional fishing	7
1.4	Biology	7
1.5	By-catch	8
1.6	Current status of Giant Crab resource	8
2	Ecosystem impacts	8
3	Goals and objectives	9
4	Research and monitoring	14
4.1	Data collection and analysis	14
4.2	Fishery-dependent monitoring	14
4.3	Reporting	14
5	Harvest Strategy	15
5.1	Background	15
5.2	Defined operational objectives	15
5.3	Performance indicators	15
5.4	Reference points	15
5.5	Monitoring strategy	16
5.6	Assessment of fishing performance	16
5.7	Decision rules	16
5.8	Review process	17
5.9	Review of the harvest strategy	17
6	Other commercial fishing	17
7	Compliance and monitoring	18
	Objectives	18
	Planning	18
8	Review of the policy	19
9	Appendices	19
9.1	Summary of ESD Reporting	19
10	References	22

1 Purpose and scope of the policy

The purpose of this document is to provide administrative guidance as to how Primary Industries and Regions South Australia (PIRSA) will manage commercial harvest of Giant Crab (*Pseudocarcinus gigas*) in South Australia.

Commercial fishing for Giant Crabs is not formally identified as a discrete fishery under the *Fisheries Management Act 2007* and is, therefore, referred to as a fishing activity through this document. The activity is formally regulated by the *Fisheries Management (Miscellaneous Fishery) Regulations 2015* and the *Fisheries Management (Rock Lobster Fishery) Regulations 2017*.

This policy applies to the commercial harvest of Giant Crabs only. The area of the activity covered under the policy includes marine waters of South Australia except within Aquatic Reserves, Marine Park sanctuary zones, restricted access zones (unless otherwise authorised under the *Marine Parks Act 2007*) and waters landward of the line of Mean High Water Springs to a depth of 2 metres.

The policy does not apply to broodstock and seedstock collection or stock enhancement activities.

1.1 Commercial fishing

1.1.1 History

Targeted commercial fishing for Giant Crab was initiated in Tasmanian waters in 1990/91. Commercial fishing for Giant Crabs began in South Australian waters in 1992 as a by-product of rock lobster fishing operations. Initially the activity in South Australia was jointly managed by Commonwealth and South Australia. In 1992 two dedicated Giant Crab fishers began fishing under Commonwealth licences in South Australian waters, Rock Lobster Fishery (RLF) licence holders were permitted to take Giant Crab in Commonwealth waters. In 1997 management related to fishing for Giant Crab was separated into two zones, the Southern Zone and Northern Zone, consistent with zones designated for the RLF (see PIRSA 2013 and PIRSA 2014 for description of these zones).

In 1997 an Offshore Constitutional Settlement (OCS) arrangement was made between the South Australian and Commonwealth governments that transferred management responsibility for Giant Crab to the South Australian Government. The two Commonwealth Giant Crab licences holders were issued with South Australian Miscellaneous Fishery licences with access to Giant Crabs. Initially their access was limited to the waters of the Southern Zone but was subsequently extended to include the Northern Zone. Rock Lobster fishers who had previously held a Commonwealth permit with Giant Crab access were provided with unrestricted access to Giant Crab under their South Australian licence. Licence holders without any access to Giant Crab under a Commonwealth permit were permitted a by-catch limit of five Giant Crabs per trip under their South Australian RLF licence.

An annual Total Allowable Commercial Catch (TACC) of 26 tonnes was introduced for commercial harvest of Giant Crab in 1999 as a competitive TACC. In 2000 the TACC was reduced to 22.1 t. The TACC has remained at this level since that time. In 2002 quota became individually transferable with 1000 quota units in each zone allocated to licence holders with 60.6% of the quota provided to the Northern Zone and the remainder provided to the Southern Zone. These initial allocations between zones was based on historical average annual catches in each zone between 1997/98 and 1999/2000 (Sloan 2002).

Management arrangements for the commercial fishing activity was described in a report prepared by PIRSA for the (then) Commonwealth Environment Australia on the management of the South Australian Giant Crab (*Pseudocarcinus gigas*) Fishery for the purposes of section 303FN (Approved Wildlife Trade Operation) of the *Environment Protection and Biodiversity Conservation Act 1999* (Sloan 2002).

A review of the performance indicators described in the EPBC report (Sloan 2002) was conducted in 2017 (SARDI internal document). The review recommended new performance indicators for measuring the performance of the fishing activity. The recommendations of this review were taken into account in developing the harvest strategy included in this policy and will allow for greater certainty in determining stock status for the resource in the future.

1.1.2 Management arrangements

Regulatory arrangements for the commercial fishing activity are contained in the *Fisheries Management (Miscellaneous Fishery) Regulations 2015*, the *Fisheries Management (Rock Lobster Fisheries) Regulations 2017* and the *Fisheries Management (General) Regulations 2017*. Any amendments to these regulations could change the regulatory arrangements described in this section. Appropriate consultation will be undertaken should any changes to regulation be required. Management arrangements may also be implemented through licence conditions. The Minister reserves the right to amend licence conditions for commercial fishing of Giant Crabs if required to meet sustainability objectives of the *Fisheries Management Act 2007*.

Commercial fishing for Giant Crab in South Australia is managed through a mix of input and output controls summarized in Table 1. These controls are aimed at matching harvesting capacity with resource availability.

Commercial access to the Giant Crab resource in South Australia is limited to 245 licence holders in the RLF and the Miscellaneous Fishery. Two licence holders¹ in the Miscellaneous Fishery with access to both zones and all licence holders in the RLF can access Giant Crab for commercial purposes through Giant Crab quota entitlements, or for non-quota holders in the RLF through an allowance of up to five individual Giant Crabs per fishing trip as by-product. There are 15 licence holders who hold Giant Crab quota units: one in the South Australian Miscellaneous Fishery and 14 in the RLF. A total of 229 RLF licence holders can retain Giant Crab as by-product.

The TACC is allocated among licence holders who hold Giant Crab quota units with 5% of quota in each fishing zone held aside to account for Giant Crab taken as by-product by RLF licence holders that do not hold Giant Crab quota units. The TACC is set by a determination of a value in kilograms for each giant crab unit in each fishing zone. Quota units may be transferred between Rock Lobster and Miscellaneous Fishery licences with access to harvest Giant Crab in the fishing zone to which the quota unit relates. All harvest of Giant Crab must be consigned to a registered fish processor to support the quota monitoring system and reported to PIRSA and the research provider, the South Australian Research and Development Institute (SARDI) Aquatic Sciences.

Fishing in each zone is subject to a seasonal closure. The fishing season in the Southern Zone is between 1 October and 30 April, while in the Northern Zone the fishing season runs between 1 November and 31 May.

¹ One licence holder in the Miscellaneous Fishery has a licence that allows for commercial access to Giant Crab has zero Giant Crab quota entitlements at the time of writing this policy.

Vessels and masters must be registered on a fishery licence when commercially accessing Giant Crab in South Australia. Vessels operating with a Northern Zone RLF licence or under a Miscellaneous Fishery licence are required to operate vessel monitoring systems.

Fishers use steel-framed pots similar to (or the same as) rock lobster pots, fitted with a molded plastic neck and covered in mesh. All pots must comply with regulations specifying maximum dimensions, weight, escape gaps etc. The number of pots that each licence may use to commercially harvest Giant Crab is regulated to limit effort expended in the fishing activity and limit incidental impacts on non-target species.

A minimum legal size limit of 150 mm carapace length is in place for both commercial and recreational fishers to maximize the opportunity for individual Giant Crab to reproduce at least once before being available to fishing. Females with external eggs are also protected and must be returned to the water as soon as possible.

Table 1: Management arrangements for commercial fishing of Giant Crab in 2017

Management Arrangements	Northern Zone	Southern Zone
Limited entry (number of licences with access to the commercial fishing activity)	Miscellaneous (with access to Giant Crab) - 2 Rock Lobster (with quota) - 5 Rock Lobster (by-catch) - 58	Miscellaneous (with access to Giant Crab) - 2 Rock Lobster (with quota) - 9 Rock Lobster (by-catch) - 171
Minimum legal size limit	150 mm carapace length	
Commercial gear	Pots Limit on number of pots Escape gaps Sea lion exclusion devices in waters <100 m	Pots Limit on number of pots Escape gaps (optional)
Protected species	No retention of females with external eggs	No retention of females with external eggs
TACC (2017/18)	13.4 t	8.7 t
Spatial Closures	Yes	Yes
Fishing season	1200 hrs 1 November to 1800 hrs 31 May of the following year	0600 hrs 1 October to 1800 hrs 30 April of the following year
Vessel Monitoring System	Yes	Yes for Miscellaneous Licence holders only
Catch and effort reporting	Yes	Yes
Catch disposal reporting	Yes	Yes

1.1.3 Economic Characteristics

Due to the small size of the activity, socio-economic information for commercial fishing for Giant Crab is not formally reported. In 2015/16 Giant Crab was estimated to have a gross value of production of around \$1.4 million (SARDI unpublished).

1.1.4 Co-management

There was no organization formally representing licence holders with access to the Giant Crab resource at the time this policy was developed. Consultation on issues related to the activity are conducted directly with the relevant Miscellaneous and RLF licence holders with Giant Crab quota units endorsed on their licences. Consultation with Rock Lobster fishers is also referred to associations for the RLF being the South Eastern Professional Rock Lobster Fishermen's Association and the South Australian Northern Zone Rock Lobster Fishermen's Association.

If a formal organization representing licence holders with access to the Giant Crab resource is formed in the future, PIRSA may consult with this body on fisheries management issues if appropriate.

1.1.5 Cost-recovery

South Australian commercial fisheries operate in accordance with the Government's cost recovery policy which provides that costs attributed to the management of a commercial fishing activity are recovered from industry. The costs of policy development, research and compliance programs are fully cost recovered through legislated licence fees. An annual plan for service delivery for commercial fishing for Giant Crabs and the costs associated with delivery of these services is developed each year considering the long term objectives for the activity and the work programs required to meet these objectives. Licence fees are collected through a base licence fee and an additional fee per unit of quota endorsed on individual licences.

1.1.6 Export Approval

Commercial fishing for Giant Crab in South Australia was assessed under Part 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* in 2015 and is currently approved as a wildlife trade operation until 2025 (see <http://www.environment.gov.au/marine/fisheries/sa/giant-crab>).

1.2 Recreational fishing

Recreational fishers are permitted to take Giant Crabs in South Australian waters; however, due to the depth in which this species is found, recreational take of Giant Crabs is minor (Giri and Hall 2015). Management arrangements for recreational fishers include minimum size limits, closed seasons and gear restrictions. There are no recreational bag or boat limits.

1.3 Traditional fishing

While it is known Aboriginal People have fished the coastal waters of South Australia since long before European settlement (Cann et al. 1991) there are no documented records of harvest of Giant Crab by traditional fishers. Any further information on Aboriginal traditional harvest of Giant Crabs that becomes available in the future will be included in reviews of this policy.

1.4 Biology

Giant Crab are large crabs reaching at least 13 kg. They have a heavy exoskeleton with large crushing claws. Giant Crabs are long-lived and slow growing (up to 15 years between moults) and, therefore, may be susceptible to fishing pressure. Giant Crabs are endemic to southern Australia at depths from 20 m to 600 m (Kailola et al. 1993). The highest population densities are found at depths of approximately 100-200 m, noting this is based on catch and effort records from commercial fishing (Levings et al. 2001). The structure of the population is not well defined. It is believed that there is a homogenous genetic population throughout southern Australia (Levings et al. 2001).

In Tasmania, research indicates that undersized Giant Crab occupied the same depth range as legal sized crabs; however, a concentration of undersized crabs in one area was identified possibly due to a larval "sink" (Williams et al. 2009). Migration patterns for Giant Crabs is not clear in South Australia. It is believed Giant Crab movement may be driven by water temperatures, with crabs moving to deep water in summer to escape higher surface temperatures (S. Clark pers comm.).

Mating occurs in June-July with females only bearing eggs in non-moult years. Giant crab can have long periods between moults with females moulting ever 5-15 years. Females carry eggs for approximately four months with hatching occurring in October to November. Larval settlement patterns are poorly understood. (Kailola et al. 1993). Males grow to at least twice the size of females.

1.5 By-catch

Research on by-catch in the Tasmanian Giant Crab Fishery identified the main by-catch species in this fishery as antlered crab, hermit crab and draftboard shark with these species considered to have a high chance of post-release survival (Hobday et al. 2008). Observers in the Victorian Giant Crab Fishery reported that in that fishery 95% of by-catch was hermit crabs with a high probability of survival on release (Fisheries Victoria 2009). Information related to by-catch in South Australia is less certain with no formal monitoring of by-catch for Giant Crab fishing; however, based on by-catch in the Rock Lobster Fishery it is likely that by-catch could include hermit crabs, other crabs, leather jackets, bearded rock cod and octopus.

1.6 Current status of Giant Crab resource

Giant Crab is considered to be a single biological stock from Western Australia to Tasmania because the species occurs in a continuous distribution across this range. The most recent classification of the status of the South Australian Giant Crab resource, based on a weight of evidence approach, classified the stock as “undefined”. This classification took into account the contrasting inferences of stock status between the previous performance indicators for the commercial fishing activity described in Sloan (2002) resulting in high levels of uncertainty in the assessment (McLeay 2016).

In 2016 the Western Australia Giant Crab Fishery was classified as “sustainable”, while in Victoria the resource was classified as “undefined” and “overfished” in Tasmania. Given the significant difference in the relative performance of the fisheries in the various jurisdictions, a single stock status for the southern Australian Giant Crab biological stock in 2016 was not possible (Hartmann et al. 2016).

2 Ecosystem impacts

The *Fisheries Management Act 2007* requires that fishing activities are managed to protect, use and develop the aquatic resources of the state in a manner consistent with ecologically sustainable development (ESD). In particular, that aquatic habitats are protected and conserved and ecosystems and genetic diversity is maintained and enhanced. Consistent with this requirement, management of commercial fishing for Giant Crab in South Australia is considered as part of the broader ecosystem using an ecosystem-based fisheries management approach.

The ecological impacts associated with the fishing activity considered in development of this policy have been identified and assessed through the process of conducting an ESD risk assessment for the activity, using the National Ecologically Sustainable Development Reporting Framework for Australian Fisheries (Fletcher et al. 2002) to guide the assessment. In accordance with the ESD object in the Act, this approach was used to identify and prioritise important ecological, social and economic factors that affect the management of the activity. Full details about the risks identified and their relevant priority are provided in the report entitled *Ecologically Sustainable Development Risk Assessment of Commercial Fishing for Giant Crabs in South Australia* (PIRSA, 2018). A summary of this report is described in section 9.

A ‘High’ risk rating was identified for climate change impacting on the performance of the activity. Risk ratings of ‘Moderate’ were identified for the Giant Crab resource, as well as external factors effecting the performance of the activity including oceanographic influences, economic, mining and other activities and other commercial fisheries. Specific management objectives and strategies listed in Table 2 have been developed to address risks identified as ‘Moderate’ from the ESD risk assessment. Development of objectives and management

strategies that directly mitigate the effects of climate change is limited and, therefore, this risk is not referred to in objectives and strategies.

3 Goals and objectives

Section 7 of the *Fisheries Management Act 2007* sets out objects for the Act including principles to protect, manage, use and develop the aquatic resources in a manner that is consistent with ESD. Management of South Australia's fisheries and fishing activities must be consistent with these objects. A number of biological, social and economic factors are identified in the objects of the Act that must be balanced in pursuing ESD. The principle of avoiding over-exploitation of resources and ensuring that those resources are not endangered is specified as the primary consideration.

Four key goals have been identified for commercial fishing for Giant Crab linked to operational objectives for the activity. Performance indicators and reference points for each objective are provided to allow future assessment of this policy in meeting the identified goals as described in Table 2.

Goal 1 – The Giant Crab resource is maintained at ecologically sustainable levels

This goal relates to the sustainability of the target stock. The objectives of this policy in relation to sustainability are:

- Giant Crab stocks are maintained at sustainable levels based on performance indicators in the harvest strategy
- Information collected is sufficient to manage the fishing activity to sustainable levels

These objectives aim to ensure that Giant Crab resources in South Australia are harvested within sustainable limits as defined by performance indicators relative to reference points described in the harvest strategy at Section 5.

Goal 2 – Enable optimum utilisation and equitable distribution

This goal relates to the economic and social benefits derived from the activity and aims to optimise the economic benefits of the commercial activity. Optimising the use of the activity focuses on allowing for economic efficiency of fishing operations. The objective of this policy in relation to optimum utilisation is:

- Optimise economic performance within biologically sustainable limits
- Manage the resource to allow for equitable distribution within biologically sustainable limits

It is noted that fishing for Giant Crabs is predominately a commercial activity by virtue of the depth that Giant Crabs inhabit. The objectives in this policy allows for access of the resource in line with requirements under the *Fisheries Management Act 2007*.

Goal 3 – Protect and conserve aquatic resources, habitats and ecosystems

This goal relates to the management of the activity using an ecosystem-based fisheries management approach. The objectives of this policy to achieve this goal are:

- Fishing impacts on by-catch, by-product, Threatened, Endangered and Protected Species (TEPS) are within sustainable levels

- Fishing impacts on benthic habitat and associated biological communities are within ecologically sustainable levels

Goal 4 – Enable cost effective and participative management of the fishing activity

This goal relates to co-management of the activity, planning of management activities and the recovery of the costs of management of the activity. The overall objectives of this goal are to ensure that stakeholders and government fisheries administration share responsibility and have involvement in the decision-making processes for developing and implementing management arrangements, and to ensure that management arrangements are complied with. The cost effectiveness of these arrangements also needs to be considered in the development process as the management costs are recovered from fishers in accordance with the Government's cost recovery policy.

The operational objectives of this policy are:

- Industry participation in management through the appropriate consultation with licence holders with access to the Giant Crab resource.
- Maximise stewardship of fisheries resources.
- Management costs of the activity are funded by relevant licence holders.

Table 2: Goals, Objectives and strategies for commercial fishing for Giant Crab

Objective	Strategies	ESD risk addressed	Performance indicator	Description	Reference point
Goal 1: The Giant Crab resource is maintained at ecologically sustainable levels					
1a Giant Crab stocks are maintained at sustainable levels based on performance indicators in the harvest strategy	1ai. TACC set annually informed by the harvest strategy 1aii. Set input and output controls that support sustainable use of the resource 1aiii. Controls on number of licences	Impacts on Giant Crab	5-year average commercial catch rate (CPUE)	5-year average commercial catch rate (CPUE) calculated from the average of the current and previous four fishing seasons. Commercial catch rate is weight (kilograms) of legal sized Giant Crabs/potlift	5-year average commercial catch rate (CPUE) is ≥ 1.30 kg/potlift
1b: Information is collected sufficient to manage commercial harvest operations to sustainable levels.	1bi. Fishery-dependent information collected through commercial catch and effort logbooks (periodic returns) and catch disposal records		Provision of periodic returns and catch disposal records	Spatial and temporal catch and effort data provided by all commercial operators	Total catch and effort in the GCF are reported and monitored
Goal 2: Enable optimum utilisation and equitable distribution					
2a Economic performance is optimised within biologically sustainable limits	2ai. TACC set annually informed by the harvest strategy 2aaii. Management arrangements allows for commercial activities that take into account sustainability objectives	Economics	TACC set annually informed by the harvest strategy		TACC set annually informed by the harvest strategy

Objective	Strategies	ESD risk addressed	Performance indicator	Description	Reference point
Goal 3: Impacts on aquatic resources, habitats and ecosystems are sustainable.					
3a Fishing impacts on by-catch, by-product, threatened, endangered and protected species (TEPS) are within sustainable levels	3ai. Control of the number of licences with access to Giant Crab 3aii. Escape gaps are fitted to pots where required 3aiii. Interactions with TEPS are reported and monitored		Number of fishing licences with access to Giant Crab Number of interactions with TEPS reported in the Wildlife Interaction Logbook		Number of fishing licences with access to Giant Crab does not exceed the number of licences when this policy was implemented Interactions with TEPS is monitored
3b Fishing impacts on benthic habitat and associated biological communities are within ecologically sustainable levels	3bi. Total number of pots in the fishing activity is not increased		Number of pots that can be used to harvest Giant Crabs		Number of pots that can be used to harvest Giant Crab does not exceed the number of pots when this policy was implemented

Goal 4: Enable effective and participative management of the fishing activity.					
Objective	Strategies	ESD risk addressed	Performance indicator	Description	Reference point
4a Industry participation in management through the appropriate consultation with licence holders with access to the Giant Crab resource	4ai. Stakeholder have input to the management of the commercial fishing activity through appropriate consultative processes 4a.ii. Arrangements are communicated to the wider community	External factors affecting fishing	Consultation with relevant industry members where appropriate Management information is available on PIRSA website	Information related to management of the activity is correct and relevant on PIRSA website	Consultation with relevant industry members where appropriate is conducted to provide input into management decisions PIRSA website information is updated as required
4b Maximise stewardship of fisheries resources	4bi. Cost-effective compliance and monitoring program implemented to address identified risks 4b.ii. Management arrangements are communicated to the wider community		Number of prosecutions. Management information is available on PIRSA website.	Number of prosecutions related to the fishing activity Information related to management of the fishing activity is correct and relevant on PIRSA website	Number of prosecutions over three years does not increase significantly. PIRSA website information is updated as required
4c Management costs of the activity are funded by relevant licence holders	4ci. Recover licence fees from relevant commercial licence holders in accordance with the Government's cost recovery policy		Costs attributed to managing commercial fishing for Giant Crab are recovered through licence fees		Costs attributed to managing commercial fishing for Giant Crab are recovered through licence fees

4 Research and monitoring

PIRSA Fisheries and Aquaculture contracts research services for each fishing activity. SARDI Aquatic Sciences is currently the primary research provider for core scientific stock status assessment and reporting for commercial fishing for Giant Crabs. Costs of the annual research program for the activity are recovered through licence fees in accordance with the government's cost recovery policy. External funding sources, such as the Fisheries Research and Development Corporation (FRDC) may also provide funding for specific research projects.

4.1 Data collection and analysis

To achieve the research and monitoring needs for the activity, a variety of fishery-dependent data are collected and analysed (McLeay 2016).

- Commercial catch and effort logbook data
- Wildlife interaction logbook data
- Catch disposal records

There are currently no fishery-independent data available for commercial fishing for Giant Crabs.

4.2 Fishery-dependent monitoring

Licence holders are required to complete a daily catch and effort logbook report detailing their fishing activities and harvest. The data from these logbooks are entered into a database maintained by SARDI Aquatic Sciences and validated (McLeay 2016). Fishers are also required to complete catch disposal records on each offload of Giant Crab from commercial vessels. The data from these records are entered and maintained by PIRSA Fisheries and Aquaculture in order to monitor the quota for the fishing activity.

PIRSA Fisheries and Aquaculture implemented a generic data recording logbook in 2007 for recording wildlife interactions (including TEPS) for all South Australian commercial fisheries. The wildlife interaction logbook was implemented to ensure consistent reporting practices for interactions with TEPS. SARDI Aquatic Sciences collate and archive the data from the wildlife logbooks and summarise these in an annual report (see Mackay et al. 2017).

4.3 Reporting

SARDI Aquatic Sciences provide stock status reports for commercial fishing for Giant Crabs annually. The stock status synthesises information available for the fishing activity, assesses the status of the resource, and evaluates the performance of the activity with respect to performance indicators and reference points described in the harvest strategy (section 5). Stock status reports are available on the PIRSA website at http://www.pir.sa.gov.au/fishing/commercial_fishing/fisheries/miscellaneous_fishery

5 Harvest Strategy

5.1 Background

This harvest strategy has been developed based on fishing activity over the period 2000 to 2009 when it was considered it was operating at a level that maintained the resource at a relatively consistent. A key management arrangement in place for the activity includes an annual Total Allowable Commercial Catch (TACC) of 22.1 tonnes in place since 2000. This harvest strategy has also been developed to be consistent with the South Australian Harvest Strategy Policy and Guidelines (PIRSA 2015a and b).

SARDI conducted a review of performance indicators for commercial fishing for Giant Crab in 2017 (SARDI internal document) and the outcomes from this review were considered in developing this harvest strategy. The key recommendations from this review were:

- Commercial catch per unit effort (CPUE) from 2000 is likely to provide reliable information related to abundance of harvestable (legal-sized) Giant Crab and is recommended as a single primary biological performance indicator (PI).
- A suitable target reference point is proposed as the mean estimate of CPUE from 2000/01 to 2009/10 being a relatively stable period within the data time series available.

5.2 Defined operational objectives

The primary aim of this harvest strategy is sustainability of the Giant Crab resource in South Australia consistent with goal one described at section 3 of this policy.

Operational objective: Maintain the 5-year average commercial catch rate (Catch Per Unit Effort – CPUE) at or above 1.30 kg per potlift.

5.3 Performance indicators

The primary biological performance indicator used in this harvest strategy is a 5-year average commercial catch rate defined as CPUE calculated from the average of the current and previous four fishing seasons. Commercial catch rate is weight (kilograms) of legal sized Giant Crabs per potlift.

5.4 Reference points

The Target Reference Point (RP_{targ}) is set at the average CPUE for the years 2000-2009 as these years were considered to represent a stable and sustainable period of fishing (Figure 1) and represents a level of biomass at maximum sustainable yield (B_{MSY}). Consistent with the National Harvest Strategy Policy (Sloan et al. 2014) the Limit Reference Point (RP_{lim}) is set at 50% of RP_{targ} . The Trigger Reference Point (RP_{trig}) is set at 75% of RP_{targ} as a level below B_{MSY} but well above RP_{lim} (Table 3).

Table 3: Five-year average catch rate reference points

5-year average commercial catch rate	Reference point	Description
Target Reference Point (RP_{targ})	2.60 kg/potlift	Average commercial CPUE for 2000-2009
Trigger Reference Point (RP_{trig})	1.95 kg/potlift	75% of the Target Reference Point
Limit Reference Point (RP_{lim})	1.30 kg/potlift	50% of the Target Reference Point

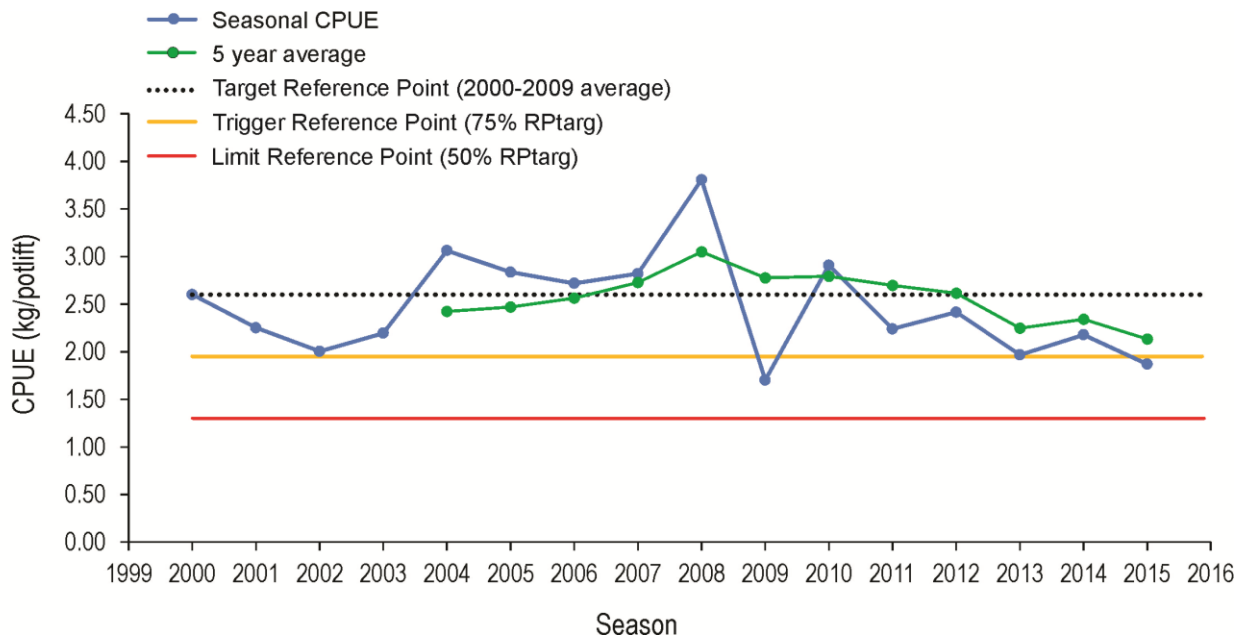


Figure 1: Five-year average catch rate showing reference points. Season refers to fishing seasons beginning in the year indicated.

5.5 Monitoring strategy

Commercial CPUE is derived from catch and effort data reported in commercial Giant Crab fishing catch and effort logbooks from commercial licences endorsed with Giant Crab quota units throughout the fishing season. SARDI report commercial catch rate data and the five-year average CPUE in the annual stock status report or an advice note prior to the beginning of the next fishing season. Further details about the reporting of commercial catch and effort is provided in section 4.

5.6 Assessment of fishing performance

The stock status of the fishing activity is defined consistent with the National Status of Fish Stocks framework (Stewardson et al. 2016). The stock status for the South Australian Giant Crab resources is categorised as sustainable if the five-year average catch rate is ≥ 1.95 kg/potlift.

5.7 Decision rules

In consideration of the primary performance indicator being the most recently available estimate of the five-year average catch rate for the activity, the following decision rules will be considered to guide the setting of management arrangements and TACC for commercial fishing for Giant Crab in the following fishing season.

1. When the five-year average catch rate is ≥ 1.95 kg/potlift it is recommended the TACC be set at 22.1 t for the entire area of the activity with 13.4 t of that TACC set for the Northern Zone and 8.7 t set for the Southern Zone.
2. When the five-year average catch rate is < 1.95 kg/potlift and ≥ 1.30 kg/potlift a review of the commercial fishing activity will be undertaken.
3. When the five-year average catch rate is < 1.30 kg/potlift a review of the commercial fishing activity will be undertaken and appropriate management arrangements may be introduced for the fishing activity in a timely fashion.

5.8 Review process

If the Trigger Reference Point is breached, a review of the commercial fishing activity will be conducted by PIRSA in consultation with relevant key stakeholders, including industry stakeholders (licence holders). The review should consider (but not be limited to) any relevant factual information as well as external factors that may have impacted on the activity that are not related to stock abundance such as market fluctuations, environmental conditions, higher grading etc.

A review would be conducted in a timely manner, and in normal circumstances would be completed within one year. Amendments to management arrangements identified in the review including changes to TACC may be considered for implementation.

5.9 Review of the harvest strategy

A process to review this policy, including the harvest strategy is set out in Section 8.

At the time of developing this harvest strategy consideration was given to the use of CPUE standardised for soak time as a performance indicator consistent with a recommendation from the review of performance indicators for the activity conducted in 2017 (SARDI internal document). Soak time was introduced as a reporting field in the catch and effort logbooks for the activity from the 2017/18 fishing season. In the future, if data are available to inform a decision on inclusion of CPUE standardised for soak time in the harvest strategy, this harvest strategy may be amended.

6 Other commercial fishing

Some research activities are undertaken as part of a commercial enterprise, where the fish caught as part of the research fishing are sold for the purposes of funding the research. The *Fisheries Management (Miscellaneous Research Fishery) Regulations 2013* under the *Fisheries Management Act 2007* have provisions to issue permits for research activities with a commercial element. Other non-commercial research activities may be authorised by exemption. These activities are not covered in this policy.

Broodstock and seedstock collection is the taking of aquatic resources or part of resources for the purposes of commercial aquaculture. Only low levels of this type of activity are permitted. Large scale collection must be done under a fishery licence by arrangement between a fishery licence holder and aquaculture licence holder on a commercial basis. If the species is part of an existing commercial fishery, broodstock and seedstock collection activities will be considered through a permit system under the *Fisheries Management Act 2007*.

Applications for exploratory and developmental fishing for species that are not part of an existing activity are dealt with under the *Fisheries Management (Miscellaneous Developmental Fishery) Regulations 2013* under the *Fisheries Management Act 2007*. Exploratory and developmental fishing in the area of the fishing activity for Giant Crabs, is not considered under this policy.

7 Compliance and monitoring

Objectives

PIRSA Fisheries and Aquaculture runs a compliance program consistent with the National Fisheries Compliance Policy that has dual objectives:

- To maximise voluntary compliance with fisheries rules²; and
- To create effective deterrence to breaching fisheries rules.

Voluntary compliance is maximised by ensuring that fishers are aware of the rules that apply to their fishing activities, understand the rules and the purpose of those rules and operate in a culture of compliance. Effective deterrence is created through the presence of Fisheries Officers and awareness of compliance operations, as well as through detection and prosecution of illegal activity³.

Planning

PIRSA Fisheries and Aquaculture compliance programs are developed through a three-year planning cycle. This planning cycle is designed to ensure that compliance programs:

- support the fisheries management objectives for each fishing activity;
- identify compliance risks in each fishing activity;
- respond to key risks within each three-year period;
- have an appropriate mix of tools designed to maximise voluntary compliance and create effective deterrence; and
- establish benchmarks against which to measure responses to risks.

A compliance risk assessment is undertaken every year for each fishing activity. A major risk assessment is undertaken periodically (approximately every three years) or is triggered by a major change in management arrangements. In intervening years that risk assessment is updated. The risk assessment identifies and prioritise the compliance risks that exist in the fishing activity ranked according to the likelihood and consequence of the risk occurring. This risk assessment is used to inform annual compliance planning processes.

Compliance activities are planned to respond to the risks identified in each fishing activity, with an emphasis on the most serious risks. Responses must include measures aimed at both maximising voluntary compliance and creating effective deterrence.

Benchmarks are established by which to measure compliance activities. These benchmarks are used to guide the allocation of resources in compliance planning.

² Rules include regulations, licence conditions, closure notices or any other enforceable instrument under the *Fisheries Management Act 2007*.

³ Prosecution may include the issuing of a formal caution or an expiation notice, in addition to prosecution through the courts.

Each year a report is to be prepared assessing the compliance status of commercial fishing for Giant Crab. This report:

- describes the compliance program for the previous three years including an overview of activities and relevant statistics;
- describes how the program has been implemented to achieve both voluntary compliance and create effective deterrence;
- describes the risks that have been addressed as a priority over that period;
- comments on any changes to the risk profile of the fishing activity during that period;
- analyses the compliance status of the fishing activity (including information about intelligence reports received); and
- makes suggestions for future compliance planning.

8 Review of the policy

This policy, including the harvest strategy, may be reviewed at any time to incorporate such measures into the management framework of the fishing activity required to address any significant issues that were not anticipated when the policy and harvest strategy were developed.

A review of the policy may include a review of the performance indicators against the policy objectives as described in Table 2 to ascertain the performance of the management arrangements for the fishing activity to meet the identified objectives. In the absence of a recognized management advisory committee for the activity, PIRSA would coordinate the review process. In conducting this review PIRSA may consult with relevant stakeholders including licence holders and other relevant non-industry stakeholders including conservation groups, recreational fishers and other government departments.

9 Appendices

9.1 Summary of ESD Reporting

A summary table of identified risks is provided in Table 4

Table 4: Summary of National ESD Reporting Framework outcomes for Giant Crab fishing in SA.

Component Trees	Extreme	High	Moderate	Low	Negligible	Total
Retained Species			1	1	1	3
Non-retained species				3	6	9
General Ecosystem					2	2
General Community				1	7	8
Governance				3		3
External Factors		1	7	3	4	15
Total		1	8	11	20	40

Issue	Risk Priority	Objective Developed	Indicator Measured	Performance Measure	Current Performance	Robustness	Actions
Retained Species							
Giant Crab	Moderate	Yes	Yes	Yes	Undefined	High	*
Non-Retained Species							
N/A							
General Ecosystem Impacts of Fishing							
N/A							
Community							
N/A							
Governance							
N/A							
External factors affecting performance of the activity							
Oceanographic	Moderate	No	No	No	N/A	N/A	**
Climate change	High	No	No	No	N/A	N/A	**
Temperature	Moderate	No	No	No	N/A	N/A	**

Weather	Moderate	No	No	No	N/A	N/A	**
Upwellings	Moderate	No	No	No	N/A	N/A	**
Mining / exploration activities	Moderate	No	No	No	N/A	N/A	**
Economic	Moderate	No	No	No	N/A	N/A	**
Other commercial fishing	Moderate	No	No	No	N/A	N/A	**

Table 5 Performance report for Extreme, High and Moderate Risk elements of Giant Crab ESD Risk Assessment (PIRSA 2018). * = Review under development of new management policy; ** = Review at next major ESD assessment,

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