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PIRSA**

Management options for King George Whiting in South Australia

JANUARY 2016

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**Government
of South Australia**

Primary Industries
and Regions SA

MANAGEMENT OPTIONS FOR KING GEORGE WHITING IN SOUTH AUSTRALIA

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Introduction

Fish stocks are constantly changing and require continual monitoring. As such, fisheries managers and fishers must regularly review management arrangements to ensure the long term sustainability of South Australian fisheries.

The *Fisheries Management Act 2007* aims to ensure the sustainable harvest of the South Australia's aquatic resources.

The purpose of this options paper is to seek informed feedback from all stakeholders on future management arrangements for the King George Whiting stocks in Spencer Gulf and Gulf St Vincent/Kangaroo Island.

This review is being undertaken in response to concerns about the sustainability of the King George Whiting stocks in Spencer Gulf and Gulf St Vincent/Kangaroo Island, which have been assigned the stock status classification of 'transitional depleting'.

When a fish stock is classified as 'transitional depleting', it means the stock is deteriorating – that the biomass is not yet recruitment overfished, but fishing pressure is too high and moving the stock in the direction of becoming recruitment overfished. Under this status, management action is needed to reduce fishing pressure and ensure that the biomass does not decline to an overfished state.

In terms of fishing pressure, stock status considers whether the current level of fishing pressure is adequately controlled to ensure that the stock abundance is not reduced to a point where production of juveniles is significantly reduced (Flood *et al.* 2014).

Note that management changes for the King George Whiting stock in the West Coast of South Australia are not being considered as part of this review as this stock is currently classified as 'sustainable' based on trends of increasing catch per unit effort and estimated fishable biomass, as well as increasing estimates of recruitment from the fishery stock assessment model 'WhitEst'.

The aim of this review is to establish management arrangements that:

- Ensure the Spencer Gulf and Gulf St Vincent/Kangaroo Island stocks return to a 'sustainable' stock classification
- Maintain quality recreational fishing opportunities, both now and into the future
- Ensure the continued supply of commercially harvested, premium seafood from South Australia's clean waters
- Maintain the proportional catches taken by each fishing sector within the allocated shares provided by the *Management Plan for the South Australian Commercial Marine Scalefish Fishery*.

The King George Whiting fishery

King George Whiting is harvested by the recreational fishing sector (including the Charter Boat Fishery), commercial fishing sector and Aboriginal traditional fishing sector. It is an iconic and highly valued species and its eating quality is renowned across Australia.

The *Fisheries Management Act 2007* provides that a fishery management plan must specify the share of the fishery to be allocated to each fishing sector, based on the existing shares at the time the first

management plan is requested. The *Management Plan for the Commercial Marine Scalefish Fishery* has formally allocated the King George Whiting resource between the three fishing sectors as follows:

- Commercial 50.5%
- Recreational 48.5%
- Aboriginal traditional 1%.

State-wide catches of King George Whiting were shared almost equally between commercial and recreational fishers at this time. A nominal share of 1% was allocated for the Aboriginal traditional fishing sector to allow for the resolution of Indigenous Land Use Agreements. There is limited information available to inform estimates of Aboriginal traditional catches of King George Whiting.

King George Whiting is a significant target species of the recreational fishery and is the most frequently caught marine finfish species by recreational fishers in South Australia (Jones 2009; Giri and Hall 2015). The recreational sector uses handlines and rods and line to take this species.

The 2013/14 recreational fishing survey estimated that the total numbers of King George Whiting caught by recreational fishers increased by 11.4% from 1.8 million fish in 2007/08 to 2.0 million fish in 2013/14. Release rates decreased slightly from just above 30% in 2007/08 to 26.7% in 2013/14. The estimated recreational harvest, of 1.46 million fish or 367 tonnes, was more than half (58.1%) of the total state-wide harvested weight in 2013/14.

Recreational fishing surveys have also showed that a larger proportion of King George Whiting is taken by the recreational sector within Spencer Gulf and Gulf St Vincent, while the commercial sector takes a larger proportion of the catches along the West Coast. The 2007/08 recreational fishing survey showed the proportion of the total regional catch taken by the recreational sector was 60.1% in Southern Spencer Gulf, 43.9% in Northern Spencer Gulf and 60.5% in Gulf St Vincent/Kangaroo Island (Fowler *et al.* 2011). See Figure 1 below for a map showing the locations of the regional King George Whiting stocks.

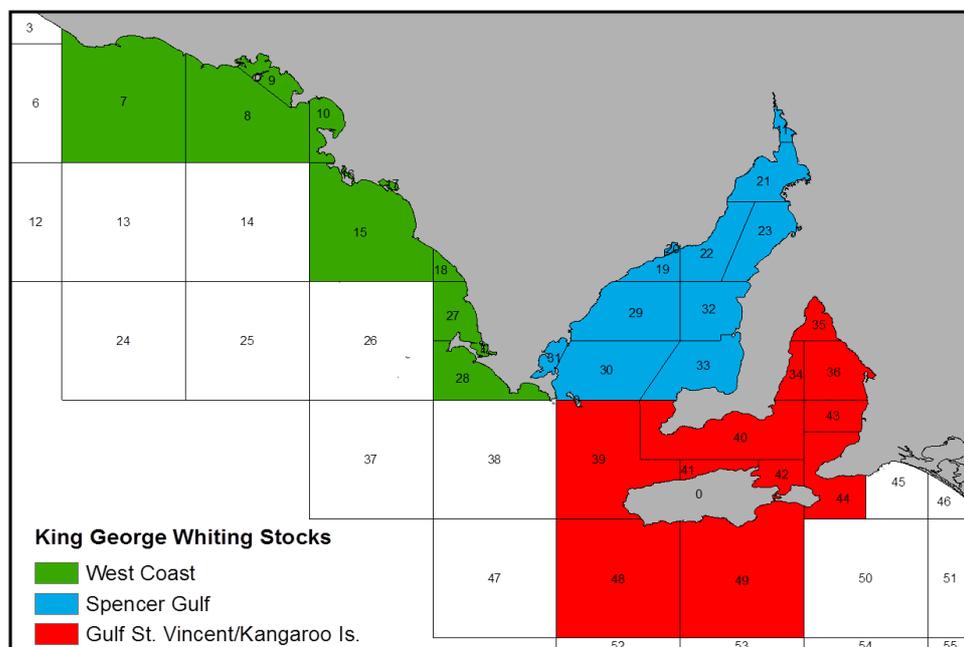


Figure 1: Map of King George Whiting regional stocks

Until recently, King George Whiting was historically the highest value species in the commercial Marine Scalefish Fishery. It is targeted by the commercial sector using rods and line, handlines, hauling nets and gill nets with approximately 80% of the commercial catch taken by rod and line/handlines. In recent years, the Far West Coast has accounted for the highest commercial catch by region, followed by Southern Spencer Gulf (Fowler et al. 2014).

The King George Whiting fishery is thought to be a 'gauntlet' fishery, which relates to their migratory behaviour and targeting by fishing sectors of juvenile fish en route to their spawning grounds. When the fish reach approximately three years of age and approximately 30 cm in length, they undertake a once-off migration between the shallow, protected waterways to deeper, offshore waters (Fowler *et al.* 2002). As they do this, they run the gauntlet of fishing lines and nets that are used to target them. A proportion of the population must complete this migration in order to replenish the populations of mature, adult fish that undertake the reproductive activity.

SA KING GEORGE WHITING FISHERY PROFILE

Recreational harvest:

324 tonnes (including Charter Boat Fishery harvest of 18.5 tonnes) in 2007/08

367 tonnes (including Charter Boat Fishery harvest of 11.7 tonnes) in 2013/14

Aboriginal traditional harvest:

No estimates of catch available

Commercial harvest:

330 tonnes in 2007/08

265 tonnes in 2013/14

Commercial gross value of production (GVP):

King George Whiting GVP of \$4.389 million in 2013/14

Overall Marine Scalefish Fishery GVP of \$23 million in 2013/14

Number of commercial licences:

317 Marine Scalefish Fishery licences and 280 other fishing licences with limited access to marine scalefish species

Gear:

Hand lines, rod and line, hauling nets, gill nets

Area of fishery:

South Australian coastal marine waters, primarily captured in the two gulfs and West Coast bays.

Allocated shares:

Commercial 50.5% (Marine Scalefish Fishery 49.5%; Northern Zone Rock Lobster Fishery 1.0%)

Recreational 48.5% (Recreational 45.5%; Charter Boat Fishery 3.0%)

Aboriginal traditional 1%

Recreational fishery

The recreational fishery is regulated through size, bag and boat limits, possession limits and restrictions on fishing gear. Legal minimum lengths in South Australia are generally set so that most fish will have the chance to reach their most productive size and spawn at least once. Size limits for King George Whiting are designed to provide a level of protection to allow for an adequate proportion of fish to survive the gauntlet of fishers, to spawn in offshore areas. This allows the replenishment of stocks for the species. Recreational daily bag limits are also a management measure for protecting and maintaining fish stocks, as this restricts the number of fish taken by fishers. Bag limits also serve to provide equitable fishing

opportunities between recreational fishers. Restrictions apply to the specification and number of hand lines and rods and line that may be used by recreational fishers.

King George Whiting is one of only a few South Australian fish species subject to a recreational possession limit. The possession limit was implemented in September 2012 due to community concerns that fish stocks were being depleted by recreational fishers from within South Australia and from interstate, who visit areas of the State specifically to take and stockpile large quantities of fish.

Commercial fishery

The commercial fishery is largely managed through the use of input controls which aim to limit the total effort that can be directed into the fishery and therefore the overall harvest capacity of fishers. Commercial fishers are also subject to the same size limits as the recreational sector. Significant area closures to net fishing and a number of restrictions on the specification and amount of fishing gear are in place to manage commercial net fishing. These fishing activities are restricted to relatively small areas within the northern gulfs. A net buy-back administered by PIRSA in 2005 significantly reduced the number of haul nets in the commercial fishery that effectively represented 45% of commercial hauling net fishing effort during 2000 to 2003. The buyout removed 54% of net licences at a cost to the Government of \$10.8 million. Twenty-four full licences were surrendered and a further 37 net endorsements were surrendered, which resulted in the reduction of net endorsements on 61 licences out of a total 113 licences. At that time further spatial closures to the net fishery were implemented in large parts of the State's inshore waters reducing the permitted area of operation. In addition, there is an ongoing commercial licence amalgamation scheme, where there is a requirement for new commercial entrants to amalgamate two licences to enter the Marine Scalefish Fishery, and there is a restriction on the number of agents that may fish from a licence. Like the recreational sector, handlines are limited to 2 per person with a maximum of 3 hooks per line. The majority of the commercial King George Whiting catch is taken by handlines, which accounted for 86% of the commercial catch in 2013.

These restrictions are aimed at limiting commercial fishing effort, as well as the impacts on fish stocks and the broader marine ecosystem. Licence numbers and the number of commercial fishers targeting King George Whiting have both been declining over time. Commercial catch and effort levels have also been declining over time, with the lowest catch and effort on record in the Spencer Gulf and Gulf St Vincent/Kangaroo Island regions of the fishery occurring in 2013 (Fowler *et al.* 2014).

Background on the issue

Additional management action is needed to ensure that the King George Whiting stocks of Spencer Gulf and Gulf St Vincent/Kangaroo Island regions return to a sustainable status and to manage recreational catches within the allocated catch shares in the *Management plan for the South Australian Commercial Martine Scalefish Fishery*.

The King George Whiting (*Sillaginodes Punctatus*) Fishery Assessment Report produced by SARDI Aquatic Science in 2014 used the best available information to determine the status of the South Australian King George Whiting stocks against an agreed national reporting framework. The Spencer Gulf stock was classified as 'transitional depleting' based on declining trends for some key fishery performance indicators: modelled biomass as estimated from the computer model 'WhitEst', commercial catch, commercial effort, and commercial catch per unit effort (CPUE) that is used as an index of abundance. The Gulf St Vincent/Kangaroo Island stock was also classified as 'transitional depleting' due to declining trends in key performance indicators for fishery statistics and fishable biomass. For both stocks there were record low catches and effort recorded in 2013 (Fowler *et al.* 2014).

There were uncertainties in the recent classification of King George Whiting stock status in Spencer Gulf and Gulf St Vincent/Kangaroo Island, including:

- A limited time series data of recreational catch and effort
- Potential changes in effective commercial fishing effort, which are not accounted for in the modelled biomass estimates that rely heavily on commercial catch rates (CPUE)
- The extent to which egg production may have been disrupted by targeted fishing on spawning aggregations, which in recent years have become more accessible with advancements in fishing boat technology (Fowler *et al.* 2014).

Given these uncertainties, scientists undertook a precautionary interpretation of the data which suggested these stocks are best described as 'transitional depleting' (Fowler *et al.* 2014).

The 2007/08 recreational fishing survey estimated total recreational catch to be nearly 50% of the total state-wide catch and informed the allocation of shares between fishing sectors in the fishery's management plan (PIRSA 2013). The proportion of the total catch taken by the recreational sector was higher than the commercial catch in the Spencer Gulf and Gulf St Vincent/Kangaroo Island regions (Fowler *et al.* 2011).

The estimated recreational harvest in the 2013/14 recreational fishing survey, 1.46 million fish or 367 tonnes, was more than half (58.1%) of the total harvest weight. The *Fisheries Management Act 2007* requires that catches taken by each sector are managed within their allocated resource shares.

Desired outcomes

Key objectives in selecting appropriate management measures for returning King George Whiting stocks to a 'sustainable' classification are outlined below. These conceptual objectives are consistent with the objectives from the King George Whiting harvest strategy in the *Management Plan for the South Australian Commercial Marine Scalefish Fishery*. They include:

- Ensure the long term sustainable harvest of King George Whiting
- Maintain catches within agreed allocations for each sector.

PIRSA considers that an effective management strategy to return stocks to sustainable levels would include translating the above conceptual objectives into the following operational objectives for Spencer Gulf and Gulf St Vincent and Kangaroo Island stocks, to:

- Increase spawning biomass and recruitment from levels as reported in the 2014 stock assessment report (Indicator: Output from the stock assessment model showing trends of increasing recruitment rates and levels of biomass)
- Increase King George Whiting abundance from the levels as reported in the 2014 stock assessment report (Indicator: Commercial handline effort and CPUE as an indicator of abundance. Note that hand line effort and CPUE are derived from commercial logbook data and provide a direct measure of the relative abundance of the stock)
- Maintain recreational and commercial catches within their allocated shares.

Proposed management options

There are number of management options available to manage the King George Whiting fishery. Each option may have positives and negatives which have been outlined in the section below. It should be noted that while each option has impacts due to the additional constraints imposed, without suitable management action/s the result will likely be further decline in the stocks that support the fishery. This would have much greater biological, social and economic impacts on South Australian communities.

Therefore, management action is necessary but should strike a balance between providing adequate protection for King George Whiting stocks and equitably sharing the resource between fishing sectors, while minimising impacts on fishers, seafood consumers and associated regional communities.

A combination of the following management options may be suitable to achieve the objectives.

1. Implement a maximum size limit

A slot limit is a form of size regulation that sets both a minimum and a maximum legal size to create a window between which fish can be taken, i.e. fish can only be taken when their length is within a prescribed size “slot”. Slot limits protect the larger breeding fish from harvest and by doing so create a higher brood stock population. The width of the slot limit (between the minimum and maximum size limits) can be used to reduce total harvest because the narrower slot width, the less fish are available to be removed from the population. Maximum size limits are often used to reduce the take of larger mature fish that are necessary for breeding purposes, while minimum size limits protect the small or juvenile ones and allowing them to grow, enabling the medium-sized fish to be taken by the fishery.

Maximum size limits need to consider post-release survivability. For King George Whiting the release mortality is thought to be lower than most species. This is based on observations of released King George Whiting returning to bottom. More formal estimates of release mortality by Kumar *et al.* (1995) found quite low rates of release mortality and a combined pre- and post- release mortality rate of 3%, which suggest they can survive release better than many other species.

King George Whiting females grow to a larger size than males. As such, a slot limit needs to ensure that both males and females are left in the water to breed for the strategy to be effective.

Minimum size limits are in place but there is currently no maximum size limit for King George Whiting. They can grow to 59 cm however these size fish are very rare in commercial and recreational catches. Available information on the size structure of King George Whiting catches shows that there is generally a small proportion of fish represented in the size range above 40 cm. An exception is the Kangaroo Island/Investigator Strait region where there is a larger proportion of 40 - 50 cm sized fish captured by fishers (e.g. 19% to 29% of fish measured were 40 - 50 cm).



Figure 2 Current minimum legal size limits for King George Whiting

Proposed management option: For all waters east of longitude 136°E, introduce a maximum size limit of 40 cm and maintain the existing minimum size limit of 31 cm to apply to all fishing sectors. This would effectively introduce a slot limit for King George Whiting in these waters.

What are the likely outcomes and benefits?

- Increase to egg production and recruitment by leaving more large fish in the water to breed
- Reduce fishing pressure/exploitation rate on the Spencer Gulf and Gulf St Vincent/Kangaroo Island stocks. A slot limit would reduce the fish available to be harvested in the fishery. This reduces the overall King George Whiting catch, which allows more King George Whiting to live longer to reach a larger average weight and age, therefore producing more eggs and potentially increasing replenishment (recruitment) to the fishery
- Equally applies to both the recreational and commercial sectors
- Slot limits are easy for everyone to understand and comply with and simple for enforcement.

What are the potential impacts and other considerations?

- Potential for fish to suffer from post-release mortality due to barotrauma from being caught in deep water; however, King George Whiting are thought to be less susceptible to these impacts than other species
- Larger fish are generally found in high abundance in the southern gulfs and near the West Coast islands. A slot limit may impact on some regions more than others due to difference in the size structure of fish populations across regions.

2. Implement Spawning Spatial Closures

Spawning closures that would be suitable for King George Whiting include both temporal (time) and spatial (area) closures for key spawning locations periods. The purpose of spawning closures are to reduce capture of larger breeding King George Whiting, minimise disturbances to breeding fish caused by fishing activities, as well as reduce the fishing pressure/exploitation rate on the stocks.

The spawning period for the South Australian Spencer Gulf and Gulf St Vincent/Kangaroo Island stocks of King George Whiting generally occurs from March to June. The location of spawning occurs at the offshore grounds to which fish migrate. The better known spawning grounds are located in Investigator Strait along the northern coast of Kangaroo Island; south-eastern tip of Yorke Peninsula in Gulf St Vincent (Tapley Shoal and Troubridge point); and south-eastern Spencer Gulf off Corny Point and Wardang Island. Spawning closures would apply to all fishing sectors (recreational, charter and commercial fishers).

It is noted that existing sanctuary zones implemented by the Department for Environment, Water and Natural Resources in the Southern Spencer Gulf, lower Yorke Peninsula and Western Kangaroo Island marine parks for habitat protection and biodiversity conservation purposes may also provide some protection to spawning King George Whiting in some locations.

A research project proposal to the Fisheries Research and Development Corporation (FRDC) has been developed for King George Whiting. One of the key aims of the research project is to determine key King George Whiting spawning areas through the southern gulf systems of South Australia. This proposed research would be undertaken through water sampling of eggs, similar to another method currently being investigated for Snapper to develop an estimate of stock biomass. In the future, this information could also be used to inform a review of the key spawning areas. The proposed project would be undertaken from July 2016 to June 2019.

Proposed management option: Introduce spawning spatial closures to apply to all sectors (recreational, charter and commercial fishers):

- a) A closure to fishing for King George Whiting spawning spatial closures from **March to May (majority of the spawning period)** in the areas indicated in Figure 3; or
- b) A closure to fishing for King George Whiting from **April (peak spawning period)** in the areas indicated in Figure 3.

The rules for the spawning spatial closures would include a prohibition on the take of, fishing activities for, and possession of King George Whiting within the closure areas during the specified period.

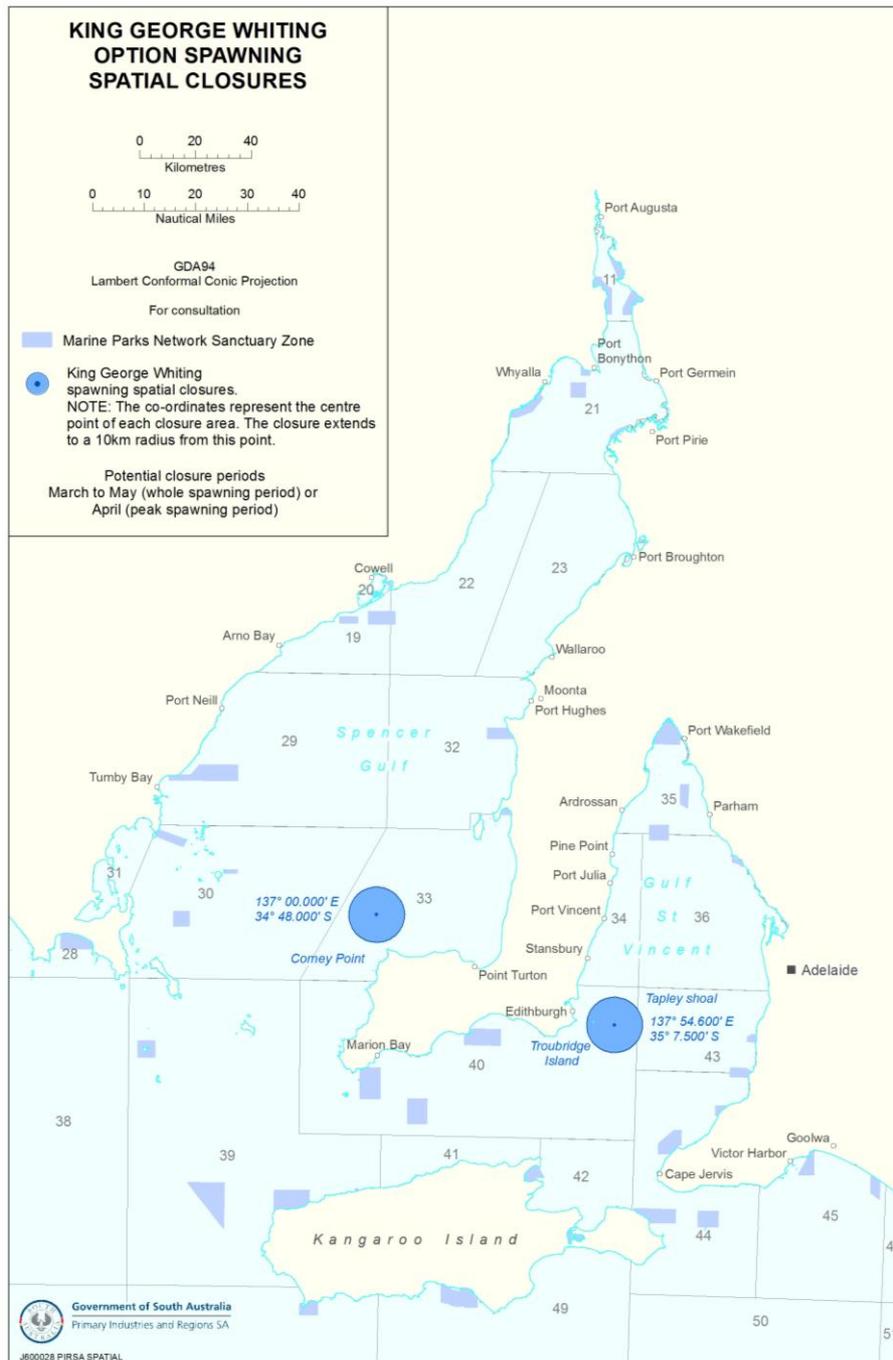


Figure 3 Map of proposed location of spawning spatial closures

What are the likely outcomes and benefits?

- Reduce fishing pressure/exploitation rate. A spawning closure would reduce fishing effort and catch for the period of the closure. This would reduce the overall King George Whiting catch, allowing more King George Whiting to live longer to reach a larger average weight and age, therefore producing more eggs and potentially increasing the stocks
- Protect spawning aggregations during a critical reproductive time by reducing impacts to fish behaviour from fishing activity during spawning, recognising that fish behaviour may play a role in successful spawning
- Equally applies to both the recreational and commercial sectors. However the proportion of commercial and recreational activities fishing spawning aggregations in these locations is not well understood.
- Spatial spawning closures are easy for everyone to understand and comply with and simple for enforcement.

What are the potential impacts and other considerations?

- Potential impacts on recreational fishing holidays and associated regional tourism located near to the spawning areas, noting that the closures would be most effective between March and May, or April
- May impact Charter Boat Fishing activities and income for charter operations who fish the King George Whiting spawning areas during this period
- Would impact some fishers that more frequently target larger King George Whiting in the Southern Gulfs during this period
- King George Whiting fishers currently fishing in these closures locations may increase fishing effort on other species during the closure period.

3. Implement Seasonal Closure

The spawning period for the South Australian Spencer Gulf and Gulf St Vincent/Kangaroo Island stocks of King George Whiting generally occurs from March to June. A seasonal closure that prohibits fishing for King George Whiting for a specified amount of time within this period would provide additional protection to the spawning biomass during this critical reproductive phase. Seasonal closures also reduce capture of larger breeding King George Whiting, minimise disturbance to breeding fish caused by fishing activities, as well as reduce fishing pressure/exploitation rate on the stocks.

Proposed management option: Introduce a seasonal closure to apply to all sectors (recreational, charter and commercial fishers):

- a) A closure to fishing for King George Whiting from **March to May (majority of the spawning period)** in all waters east of longitude 136°E; or
- b) A closure to fishing for King George Whiting during **April (peak spawning period)** in all waters east of longitude 136°E.

The rules for the seasonal closure would include a prohibition on the take of King George Whiting in all waters east of longitude 136°E during the specified period (refer to Figure 2 for map).

What are the likely outcomes and benefits?

- Protects spawning aggregations during the critical time.

- The behaviour of the fish during spawning may play a role in success of spawning and therefore future recruitment into the fishery
- May provide for maximum recruitment. Enhanced recruitment would also mean increased production in the fishery
- Seasonal closures may also reduce overall fishing pressure/exploitation rate or catch
- Equally applies to both the recreational and commercial sectors
- Closure is simple, easy for everyone to comply with and for compliance to enforce.

What are the potential impacts and other considerations?

- Impacts on recreational fishing holidays/regional tourism during holiday periods between March and May, including charter fishing activities
- Market prices may fall for a short period of time once the fishery re-opens after the closure if markets are over supplied; however fishing for King George Whiting in waters west of longitude 136°E outside of the spatial closures would be permitted during this period, which would reduce the likelihood of this impact
- Commercial fishers may increase effort on the other target species during the closure period
- Schools of spawning fish that aggregate during a seasonal closure may become more susceptible to targeted fishing activities if the length of the closure is not sufficient or if the fishery reopens while the peak spawning period is still occurring.

4. Reduction to the Recreational Bag and Boat limits

Bag and boat limits restrict the number of a particular fish species that can be taken by a fisher in a day. Bag limits are typically put in place for a number of biological and social reasons including:

- Conserving fish stocks by limiting overall total catch and ensuring enough fish remain in the water to maintain an adequate spawning population
- Sharing the catch between recreational fishers and with other users
- Encouraging responsible and ethical use of fisheries resources.

Boat limits are intended to limit the overall recreational fishing catch and prevent the circumvention of personal daily bag limits by individual fishers through the carrying of non-fishing passengers in a boat.

The current King George Whiting personal bag limit is 12. A possession limit of one of the following also applies: 72 fish, or 10 kg of fillets or 36 fish or 5kg of fillets where a person has both fish and fillets. A reduction to the King George Whiting bag limit would reduce the recreational harvest (including charter). A possession limit for King George Whiting may also need to be revised proportionally in line with a revised bag limit.

Proposed management option: A reduction to the recreational bag limit (including for the Charter Boat Fishery) in all waters east of longitude 136°E

- a) A daily bag limit of 10 (boat limit of 30) King George Whiting with a proportional reduction to the possession limit; or
- b) A daily bag limit of 8 (boat limit of 24) King George Whiting with a proportional reduction to the possession limit.

What are the likely outcomes and benefits?

- Reduce fishing pressure/exploitation rate. A reduction to the overall King George Whiting catch, allows more King George Whiting to live longer to reach a larger average weight and age, therefore producing more eggs and promoting stock increase.
- Given the recreational catch has increased beyond the sector's allocated share, a reduction to the bag limit would reduce the recreational catch to a level within the allocated share

What are the potential impacts and other considerations?

- Only applies to the recreational sector, including charter boat fishing
- May have a financial impact for the broader recreational industry, such as tackle shops and other associated businesses
- May result in higher amounts of catch and release fishing with potential impacts to released fish

5. Increase minimum size limit

Size limits are limits on the length of fish that can be legally taken. Size limits are typically based on the size of the fish at sexual maturity. Minimum size limits generally allow fish to spawn at least once before becoming vulnerable to capture in the fishery. King George Whiting is an exception to this with it being a gauntlet fishery. The current size limit for King George Whiting for the Spencer Gulf and Gulf St Vincent/Kangaroo Island stocks is 31cm in all waters east of longitude 136°E. The size of maturity for King George Whiting is 32 cm total length (Fowler et al. 2014).

Proposed management option: Increase the minimum size limit to 32 cm, which is the size at maturity for King George Whiting, in all waters east of longitude 136°E

What are the likely outcomes and benefits?

- Reduce the number of sub-adult fish captured, and increase the number of fish reaching breeding size/age and contributing to replenishing the population
- Increase egg production/recruitment in the fishery
- Possible market benefits for the commercial fishing sector
- Reduce fishing pressure/exploitation rate
- Minimum size limits are easy for everyone to understand and comply with and simple for enforcement

What are the potential impacts and other considerations?

- Regional impacts may occur in the northern gulfs where smaller sub-adult King George Whiting occur more frequently. An increase to the minimum size limit may therefore reduce the areas where legal sized King George Whiting may be caught, where sub-adult King George Whiting occur in the gauntlet fishery and there are fewer fish greater than 32 cm in size available.
- Most haul net fishing occurs in the sheltered gulf waters, where sub-adult King George Whiting occur. This option would impact the commercial sector catches in the northern gulfs, by reducing the commercial hauling net catch of King George Whiting. Haul nets are already unable to operate in large areas closed to net fishing in the southern gulfs and as such have limited opportunity to relocate their haul net fishing operations

6. Commercial effort day limits or catch quotas

A range of management arrangements are available to regulate commercial effort or catch. This can be done by allocating effort or catch units on fishery licences and then limiting overall effort or catch i.e. through Individual Transferable Effort days (ITEs) or Individual Transferable Quota (ITQ). Under such a system, effort or catch allocated to individual commercial fishers or vessel owners can be transferred to others within the fishery. Once fishers have caught their quota or fished their days, they are no longer able to fish for the remainder of the fishing season.

Proposed management option: Additional management arrangements are developed to apply to commercial fishing effort or catch

What are the likely outcomes and benefits?

- Constrain effort and/or catch in the commercial sector by limiting the total number of days that can be fished or total catch for King George Whiting
- Reduce fishing pressure/exploitation rate. A reduction to the overall King George Whiting catch, allows more King George Whiting to live longer to reach a larger average weight and age, therefore producing more eggs and promoting stock increase.

What are the potential impacts and other considerations?

- Existing management arrangements (amalgamation scheme, netting closures, netting buyback, owner operator controls and restrictions on the number of masters) have resulted in declining effort and catch of King George Whiting (see Figure 2 for the most recent commercial catch and effort).
- Introducing an ITQ system would lead to a smaller more defined group of King George Whiting fishers, which may exclude a large number of fishers from being viable. In a multi species fishery this would lead to a significant shift in effort onto the other key species (such as Garfish, Snapper and Southern Calamari) and secondary species (such as Australian Herring and Silver Whiting etc). To implement this system would require consideration of a structural adjustment process first, as there are currently too many licences to easily transition to an alternative management regime.
- The costs of administering and enforcing a commercial effort days/quota system can be high in some fisheries. Commercial management systems in multi species fisheries generally are very complex and have flow on issues for the management of other species in the fishery, which would also need to be addressed.
- An ITQ/ITE system would change the social and regional structure of the commercial fishery which would have regional impacts. Quota entitlements are generally rationalised over time, resulting in a concentration of access to a smaller number of fishers, which would impact on the flow of benefits to regional communities.
- This proposed management change would likely have a disproportional impact the commercial sector catch shares, as this management option only applies to the commercial sector. It would also result in a reallocation of catch shares between the sectors.

Public consultation process

PIRSA Fisheries and Aquaculture invites anyone with an interest in the King George Whiting fishery to make a submission regarding the proposed options outlined in this paper. A submission is a way to provide information, express your opinion and your preferred course of action, including any alternative approaches you may suggest.

Respondents are encouraged to reference the particular option or section of the report they wish to comment on. Please:

- Refer each point to the appropriate section in the options paper
- Clearly state your point of view
- Indicate your reasoning or source of information

You may wish to agree, disagree, or comment on either general or specific matters outlined in the paper or introduce other options. If you disagree with a particular option please try to suggest alternative ways to address or resolve the issues identified in the paper. Clear reasons should be included in your response so that your views can be properly considered. The questions in the feedback form have been designed to assist you in providing comments and putting your information into context.

You may choose to make an individual submission or collaborate with a group of people to make a joint submission.

All submissions will be treated as public documents unless specifically marked confidential, and may be quoted in full or in part in any further reports. Following consideration of the matters raised in the submissions on the options paper, the Minister for Agriculture, Food and Fisheries will make a decision on future management arrangements. Legislative changes may then be required to implement the new arrangements.

The closing date for submissions is 29 April 2016.

Feedback can be submitted via an online feedback form available at www.pir.sa.gov.au/recfishingreview or by email at PIRSA.recfishing@sa.gov.au or in hard copy. A feedback form is also attached to this paper.

Hard copy submissions should be addressed to:
King George Whiting Review
PIRSA Fisheries and Aquaculture
GPO Box 1625
Adelaide SA 5001

Key Literature:

Fowler AJ, McGarvey R, Burch P, Feenstra JE (2011). King George Whiting (*Sillaginodes punctatus*) Fishery Fishery Assessment Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000843-3. SARDI Research Report Series No. 562. 89 pp.

Folwer, AJ, McGarvey, R, Caroll, J, and Feenstra, JE (2014). King George Whiting (*Sillaginodes Punctatus*) Fishery, Fishery Assessment Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute, (Aquatic Sciences), Adelaide, F2007/000843-4. SARDI Research Report Series No. 801. 85pp

Fowler A. McLeay L and Short D (1999). Reproductive mode and spawning information based on gonad analysis for the King George whiting (*Percoidei: Sillaginidae*) from South Australia. Marine and Freshwater Research 50:1-14

Giri K and Hall K (2015). *South Australian Recreational Fishing Survey 2013/14*. Fisheries Victoria Internal Report Series No. 62

Jones, K. (2009). *2007-08 South Australian Recreational Fishing Survey*. South Australian Fisheries Management Series No. 55, PIRSA Fisheries, Adelaide. 84pp

Kumar M.S., Hill R., Partington D.(1995). The impact of commercial hauling nets and recreational line fishing on the survival of undersize King George whiting (*Sillaginodes punctata*). SARDI Research Report Series 1995;6. 1324-2083 60 pp.

PIRSA (2013). *Management Plan For The South Australian Commercial Marine Scalefish Fishery*. The South Australian Fisheries Management Series Paper number 59. Primary Industries and Regions South Australia, Adelaide. 141pp

PIRSA (2015). *Status of South Australian Fisheries Report*. *South Australian Fisheries Management Series*, Paper number 69. Primary Industries and Regions SA, Adelaide.137pp

Attachment 1: Feedback form

Management Options for King George Whiting in South Australia

Submissions should be addressed to:
King George Whiting Review
PIRSA Fisheries and Aquaculture
GPO Box 1625,
Adelaide SA 5001
PIRSA.recfishing@sa.gov.au

Alternatively, feedback can be provided via an online submission form that can be found online at www.pir.sa.gov.au/recfishingreview

Name: _____

Gender:

- Male
- Female

Age (optional):

- 5-14
- 15-29
- 30-44
- 45-59
- 60+

Address: _____

Post code: _____

Email: _____

What is your interest in the management of King George Whiting?

- Recreational Fishing
- Tourism
- Aboriginal Traditional Fishing
- Commercial Fishing – Licence # _____
- Local Government
- Conservation
- Other (please enter details below)

How important is King George Whiting to you and why?

Which proposed management option/s do you support and why? (please tick to indicate your support)

- Implement a maximum size limit to complement the existing minimum size limit (i.e. a slot limit)
- Implement spawning spatial closure for the period March to May (majority spawning period)
- Implement spawning spatial closure for the period of April (peak spawning period)
- Implement seasonal closure for the period March to May (majority spawning period)
- Implement seasonal closure for the period of April (peak spawning period)
- Reduction of the recreational bag and boat limits with a daily bag limit of 10 (boat limit of 30) King George Whiting with a proportional reduction to the possession limits
- Reduction of the recreational bag and boat limits with a daily bag limit of 8 (boat limit of 24) King George Whiting with a proportional reduction to the possession limits
- Increase minimum size limit
- Commercial effort day limits or catch quotas
- I do not support any change

Are there options you do not support (please provide your reasons why they are not supported)?

Do you have alternative locations for spatial closures?

If you prefer one closure period over another, please provide your reasoning

Do you have any alternative options for management of the King George Whiting Fishery that have not been identified in the options paper?

If you fish, do you fish for other species besides King George Whiting?

Where do you generally fish?

- Southern Spencer Gulf
- Southern Gulf St Vincent
- Northern Spencer Gulf
- Northern Gulf St Vincent
- Outside the Gulfs (Where) _____

What months do you fish for King George Whiting and why?

Jan Feb Mar April May June July Aug Sept Oct Nov Dec

Could any of the options in the paper have economic and/or social impacts on you or your community? If so, what could these impacts be?

Additional comments

Thank you for your feedback

5.3 King George Whiting (*Sillaginodes punctatus*)

Authors: Anthony Fowler and Michelle Besley



Table 77: Stock status determination for the King George Whiting Fishery of South Australia.

Stock	Spencer Gulf	Gulf St Vincent	West Coast
Status	Transitional-depleting	Transitional-depleting	Sustainable
Primary indicator	Weight of evidence	Weight of evidence	Weight of evidence

Stock structure

South Australia's King George Whiting (*Sillaginodes punctatus*) population is genetically homogeneous (Fowler and McGarvey 2000). Nevertheless, several stocks are recognised based on our understanding of the spatial aspects of the life history that involve: the interaction between adult movement determined from tag/recapture studies; reproductive biology with respect to the location of spawning grounds and nursery areas; and larval advection pathways and distances, based on early life history and hydrodynamic modelling (Fowler et al. 1999, 2000, 2002). So, for management and stock assessment purposes, the King George Whiting population is divided into three adjacent stocks: Gulf St Vincent; Spencer Gulf; and west coast of Eyre Peninsula (Figure 46).

Fishery overview

King George Whiting is the largest and most valuable member of the family Sillaginidae (Australian whittings) (Kailola et al. 1993). It is endemic to southern Australia where it is distributed along the southern coastline from south Western Australia to central New South Wales, including northern Tasmania. Throughout this distribution it is one of the most significant inshore fishery species. Its habitat use varies throughout its life cycle: nursery areas are shallow protected embayments; juveniles and young adults are found in shallow coastal waters; while the larger, older adults occur in deeper offshore waters and even in continental shelf waters to 200 m (Kailola et al. 1993).

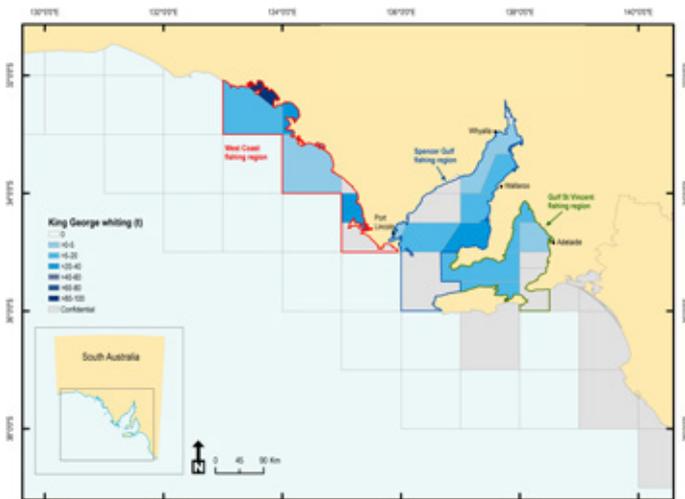
In South Australia, King George Whiting are heavily targeted by commercial and recreational fishers, reflecting their relatively high abundance and high quality as a table fish. They are targeted by the commercial sector using handlines, hauling nets and gill nets, while the recreational sector use handlines and rods and line.

The fishery is geographically extensive and includes all coastal waters from the South East of the State to Denial Bay on the west coast of Eyre Peninsula. The commercial fishery is managed as part of South Australia's complex, multi-species, and multi-gear Marine Scalefish Fishery.

King George Whiting are also a significant target catch of the recreational fishery, being the most frequently caught marine finfish species in South Australia by recreational fishers (Jones 2009). Recreational fishers target King George Whiting with rod and line; from boats, shore and jetties. A small number are taken by spears. A large portion (67%) of the recreational catch is taken by boat-based fishers. The majority (79%) of the recreational catch is taken from the two gulfs and around Kangaroo Island (Jones 2009).

The King George Whiting Fishery has generally been described as a 'gauntlet' fishery, which relates to the migration behaviour that the fish undertake. When the fish reach approximately three years of age and approximately 30 cm in length, they undertake a once-off migration between the shallow, protected waterways to deeper, offshore waters (Fowler et al. 2002). As they do this, they run the

Figure 46: Distribution of commercial catch of King George Whiting in 2013.



Note: to avoid disclosure of confidential data, levels of catch are not shown for areas that relate to less than five licences.

Table 78: Key biological traits of King George Whiting.

Parameter	Description
Range	Port Jackson in the east, along the southern coastline to Jurien Bay in the west, including northern Tasmania.
Depth	Intertidal to 200 m
Longevity	22 years
Maximum size	59 cm total length
Size at maturity	Age: 3 years Size: 32 cm total length
Spawning season	March to June

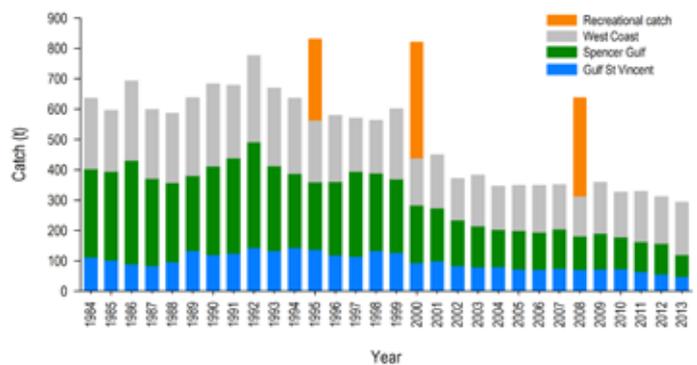
gauntlet of fishing lines and nets that are used to target them. Some fish must complete this migration in order to replenish the populations of mature, adult fish that undertake the reproductive activity.

Catch trends

The annual statewide estimates of commercial catch for King George Whiting were variable but increased to 1992 when the record catch of 776 t was recorded (Figure 47). Since then, they have declined substantially. The largest single annual decline occurred in 2000 after which there has been a further gradual decline to the lowest commercial catch of 293 t in 2013. The declines are most evident for Spencer Gulf and Gulf St Vincent (Figure 47). The falling catches reflect declines in targeted effort for each of the main gear types of handlines, gill nets and hauling nets, which reflect reductions in the numbers of commercial fishers who target King George Whiting with the different gear types.

The creel survey undertaken in 1994-96 gave an estimate of statewide recreational catch of 266 t (McGlennon and Kinloch 1997) (Figure 47). Since then, two telephone surveys completed in 2000-01 and 2007-08 provided estimates of recreational catch of 382 t and 324 t, respectively, (Jones and Doonan 2005, Jones 2009). These accounted for 46.5% and 49.6% of total catch in the respective years (Fowler et al. 2011).

Figure 47: Annual catch information (by calendar year) for the King George Whiting Fishery.



Data for recreational catch (orange) have only been collected in 1994-95, 2000-01 and 2007-08 during recreational fishing surveys.

Management arrangements

Management arrangements for the fishery are provided in the *Management Plan for the South Australian Commercial Marine Scalefish Fishery*, the *Fisheries Management (General) Regulations 2007*, licence conditions and the fishery specific regulations for each of the fisheries e.g. *Fisheries Management (Marine Scalefish Fisheries) Regulations 2011*.

Licence holders from four different commercial fisheries have access to King George Whiting in their respective fishery (ie. Marine Scalefish Fishery, Northern Zone Rock Lobster Fishery, Southern Zone Rock Lobster Fishery and Lakes and Coorong Fishery).

The commercial fishery is largely managed through the use of input controls, which aim to limit the total effort that can be directed into the fishery. The principal gears used to commercially target King George Whiting are rod and lines, hauling nets and gill nets. Significant net closures and gear restrictions govern the use of the nets and restrict their area of operation to relatively small areas within the northern gulfs. A net buy-back in 2005 significantly reduced the number of nets operating, effectively accounting for 45% of commercial hauling net fishing effort during 2000 to 2003.

In 2014, 12 licences in the Marine Scalefish Fishery and 2,814 effort days associated with these licences were surrendered through the South Australia Marine Parks: Commercial Fisheries Voluntary Catch/Effort Reduction Program.

King George Whiting minimum legal size limits were reviewed in 2004 and increased to reduce fishing pressure on the juveniles.

In addition, there is an ongoing commercial licence amalgamation scheme which requires two licences to be amalgamated on transfer and limits the number of agents that may fish from a licence. These restrictions are aimed at limiting fishing effort, as well as the impact on the marine ecosystem.

The recreational fishing sector is currently managed through a range of input and output controls designed to ensure that the total catch remains sustainable and is shared equitably between recreational fishers and other fishing sectors. These controls include bag, boat and size limits, and gear restrictions.

King George Whiting is subject to a possession limit. This was implemented in September 2012 due to community concern that fish stocks were being depleted by recreational fishers from within South Australia and interstate who visit areas of the State specifically to take and stockpile large quantities of fish.

A management review is being undertaken to respond to the recent decline in King George Whiting stock abundance. Consultation will be undertaken as part of this review.

Harvest strategy

Trigger points are set for each indicator. The King George Whiting harvest strategy does not prescribe specific management responses to breaches of trigger reference points. Instead breaches of trigger reference points are reviewed by the Marine Scalefish Fishery Management Advisory Group and reported to the Minister (or his/her delegate). If further action is required then specific management

responses will be developed through the existing co-management framework that will be consistent with the objectives of the harvest strategy (PIRSA 2013b).

Monitoring and assessment

Fishery-dependent data are collected to monitor the King George Whiting fishery. Commercial catch and effort information provides the primary data on which the biological status of the fishery is assessed and on which the majority of fisheries management decisions are based. These fishery-dependent data are collected through daily fishing logbooks. Stock status is determined on the basis of fishery performance indicators by a weight of evidence approach (PIRSA 2013b).

A market sampling program undertaken at the SAFCOL fish market in Adelaide, and commercial fish processing plants on the west coast of Eyre Peninsula and Kangaroo Island, has provided information on the sizes and ages of fish captured in the fishery in most years since 2000. This sampling provides a view of population structure from which the recent demographic processes can be inferred, thereby providing an insight into stock status. The recent regional age structures for the three stocks are assessed for change over the most recent five years and longer time periods by comparison against historical age structures that were developed through the 1990s (Fowler and McGarvey 2000).

Handline effort and CPUE are derived from commercial logbook data and provide a direct measure of the relative abundance of the stock.

The stock assessment model uses a combination of fishery-dependent catch and effort information and the size and age structure information to estimate population biomass, exploitation rate and annual recruitment rates.

Reviews of the *Marine Scalefish Fishery Status Report* and *King George Whiting Stock Assessment Report* are undertaken within the existing co-management framework (principally by the Marine Scalefish Fishery Management Advisory Group) within one month of their release. Reviews consider all information in the reports with particular emphasis on the primary and secondary performance indicators and the performance against the trigger reference points and objectives outlined in the harvest strategy.

Current biological status

The *Management Plan for the South Australian Commercial Marine Scalefish Fishery* does not have fishery performance indicators or trigger reference points that are framed around recruitment overfishing. Rather, the stock assessment utilises a weight of evidence approach that considers commercial catch and effort data,

Table 79: Harvest strategy components for the South Australian Commercial King George Whiting Fishery.

Harvest strategy component	Whole of fishery
Objectives	Maintain the primary performance indicators within acceptable trigger reference points
Performance indicators	<ul style="list-style-type: none"> > Handline effort (by region) (fisher days) > Handline CPUE (by region) (kg/fisher day) > Age structure/composition > Fishable biomass > Exploitation rate (harvest fraction)
Limit reference points	No
Target reference points	No
Trigger reference points	Yes
Decision rules	Yes

Table 80: Summary of management arrangements for the South Australian Commercial King George Whiting Fishery in 2013-14.

Management arrangements	Marine Scalegfish Fishery	Northern Zone Rock Lobster Fishery (NZRL), Southern Zone Rock Lobster Fishery (SZRL)	Lakes and Coorong Fishery
Limited entry (number of licences)	311 Restricted 7 Owner/operator	NZRL – 63 SZRL – 180 Owner/operator outside Rock Lobster season	36 Owner/operator
Minimum legal size limit	31 cm in all waters east of longitude 136° E (runs through Cape Catastrophe just south of Port Lincoln) including all waters of Spencer Gulf and Gulf St Vincent 30 cm in all waters west of longitude 136° E		
Commercial gear	> Rod and line > Hauling net > Gill net		
Commercial gear restrictions	> Net <ul style="list-style-type: none"> • Net length, depth, mesh size • Fish must be retrieved from hauling nets using a brailing net • Restrictions on the use of hauling nets in conjunction with other devices • Maximum depth for setting haul net is 5 m • Gill nets must be attended > Rod and line <ul style="list-style-type: none"> • Number of rod and handlines • Number of hooks 		
TACC	No		
Spatial closures	Yes		
Temporal closures	Yes		
Vessel Monitoring System	No		

Table 81: Summary of management arrangements for the South Australian Recreational King George Whiting Fishery in 2013-14.

Management arrangements	Recreational Fishery
Recreational gear	> Handlines > Rod and line > Spear
Recreational gear restrictions	> Number of rod and handlines > Number of hooks > Spear - restrictions on their use apply in some areas and they cannot be used to take fish while using SCUBA or hookah gear and if they have an explosive cartridge.
Minimum legal size limit	31 cm in all waters east of longitude 136° E (runs through Cape Catastrophe just south of Port Lincoln) including all waters of Spencer Gulf and Gulf St Vincent 30 cm in all waters west of longitude 136° E
Recreational bag and boat limits	Bag limit: 12 fish per day Boat limit: 36
Temporal closures	No
Spatial closures	No
Possession limits	Yes

recreational fishery data, biological information on population size and age structures, as well as output parameters from the fishery stock assessment model (Fowler and McGarvey 2000). The primary indicators are handline effort and CPUE, and exploitation rate and biomass from the assessment model. The most recent assessment was completed in August 2014 (Fowler et al. 2014).

Gulf St Vincent

Handline effort and CPUE have declined since 2009 (Fowler et al. 2014). These declining trends are consistent with declining levels of biomass. The model-estimated biomass for this stock indicated a declining trend subsequent to a peak estimate in 2008 (Figure 48). Since the estimates of effort and CPUE used in the model did not take into consideration likely increases in effective effort (eg. advancements in fishing gear, power of vessels and electronic equipment) and because of uncertainty in the time-series of recreational catch and effort, the decline in fishable biomass may have been greater than suggested by the model output. Although it appears that the biomass of King George Whiting has declined between 2009 and 2013, the stock is not yet considered to be in a recruitment overfished state.

On the basis of the evidence available, the King George Whiting resource in the Gulf St Vincent management unit is categorised as **transitional-depleting**.

In response to the status for King George Whiting in Gulf St Vincent, a review of management options for King George Whiting in response to the latest scientific advice has commenced. The full suite of management options will be explored and consultation will occur with key stakeholder groups. Management changes will be introduced during 2015.

Spencer Gulf

There are recent declining trends for both catch and effort for this region culminating in the lowest recorded values in 2013 (Fowler et al. 2014). Furthermore, CPUE has declined since 2007. Such trends in fishery statistics are consistent with declining biomass. This is reflected in the model outputs, which show a marginal decline in biomass between 2008 and 2013 (Figure 48). Since the estimates of effort and CPUE used in the model did not take into consideration likely increases in 'effective' effort and because of uncertainty in the time-series of recreational catch and effort, the decline in fishable biomass may have been greater than suggested by the model output. Although declining slowly, the stock is not yet considered to be in a recruitment overfished state.

On the basis of the evidence available, the King George Whiting resource in the Spencer Gulf management unit is categorised as **transitional-depleting**.

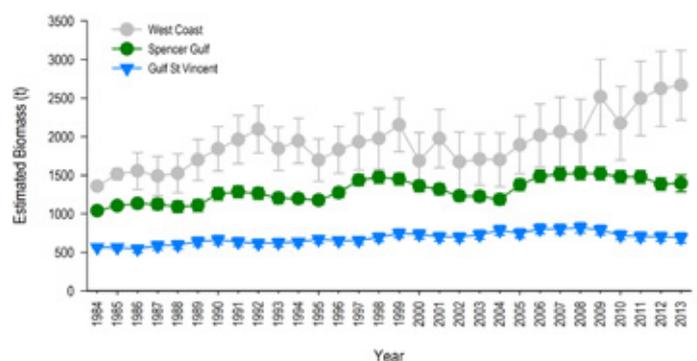
In response to the status for King George Whiting in Spencer Gulf, a review of management options for King George Whiting in response to the latest scientific advice has commenced. The full suite of management options will be explored and consultation will occur with key stakeholder groups. Management changes will be introduced during 2015.

West Coast

For this stock in recent years, handline fishing effort was relatively stable; catch increased; and handline CPUE increased to 2013, reaching the highest ever recorded level (Fowler et al. 2014). Output from the stock assessment model showed trends of increasing recruitment rates and levels of biomass between 2004 and 2013. Furthermore, between 1984 and 2013 the exploitation rate fell, relating to long-term declines in commercial and recreational fishing effort. The above evidence indicates that the biomass of this stock is unlikely to be recruitment overfished and that the current level of fishing mortality is unlikely to cause the fishable biomass to become recruitment overfished.

On the basis of the evidence available, the King George Whiting resource in the West Coast management unit is categorised as **sustainable**.

Figure 48: Time-series of fishable biomass of King George Whiting estimated by the stock assessment model for each of the three stocks.



Effects of fishing on the marine environment

An ESD Risk Assessment of the South Australian Marine Scalefish Fishery was undertaken in July 2011, in preparing the *Management Plan for the South Australian Commercial Marine Scalefish Fishery* (PIRSA 2013b). The moderate, high and extreme risks were predominately related to governance and external factors affecting the performance of the fishery. Two general ecosystem risks of moderate were identified related to fishing and the introduction of marine pests or aquatic diseases. King George Whiting was ranked as low risk through this process (PIRSA 2011b). The moderate and higher risks have strategies outlined in the management plan to address those risks.

King George Whiting are targeted by the commercial sector using handlines, hauling nets and gill nets (small mesh). These activities are considered to pose a low to negligible risk to habitat and ecosystem function. None of these gear types are likely to cause considerable damage to the benthic habitats in which they are deployed.

There are potential impacts on the ecosystem through the capture of unwanted species (by-catch) and unintended mortality of non-target species with each of the gear types. Of these, hauling nets pose a higher risk to the capture of non-target species, with a large range of species captured during fishing operations. A by-catch study by Fowler et al. (2009) demonstrated that hauling nets have the potential to capture large numbers of species. The risk to such by-catch species is mitigated, to some extent, through regulations that require catches to be sorted in-water (as this increases the likelihood that species are released alive). The low numbers of discarded fish were generally released in relatively good condition; however, the relatively few fish that had become enmeshed in the wing of the net were discarded in poor condition. The study demonstrated that when handlines were used to target King George Whiting they were highly selective, producing relatively low capture rates of by-catch species.

The Marine Scalefish Fishery has been assessed by the Australian Government Department of the Environment against the *Guidelines for Ecological Sustainable Management of Fisheries*, which are set out in the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. The South Australian Marine Scalefish Fishery was provided with an exemption to September 2015 from the export controls of the Act, subject to a number of recommendations and conditions.

Social and economic information

Commercial and recreational King George Whiting fishing brings economic, social and tourism benefits to a number of coastal fishing communities. The commercial fishery is owner/operator run with fishing undertaken by the licence owner. King George Whiting is sold domestically and contributes to seafood supply and tourism. It is highly valued as a premium seafood species in South Australia.

Many of the commercial fishers live in small communities. There is a high level of involvement by family and friends in the fishing business. Around half have a family history of involvement in commercial fishing. Fishers may fish on a part-time or full-time basis with some defining their fishing operation as a lifestyle that has its own culture and customs.

Key regions where King George Whiting fishing has a high regional impact, in terms of economic spending, membership of community groups and historical links to the local area, are the West Coast (principally Ceduna, Thevenard and Streaky Bay), Yorke Peninsula, Kangaroo Island and Port Lincoln.

Recreational catches of King George Whiting are taken mostly within the two gulfs and from the far West Coast from boats. Recreational fishing contributes to the well-being of recreational fishers, particularly for fishers that rate the following aspects as important when fishing; spending time in the outdoors, spending time with family, eating their own catch and getting away from people.

Table 82: Socio-economic information for the South Australian Commercial King George Whiting Fishery, 2012-13 (source: EconSearch 2014b).

Socio-economic indicator	Combined sectors
GVP – King George Whiting (\$ million)	4.8
Contribution to GSP (\$ million) from Marine Scalefish Fishery*	49.7
Total employment (direct and indirect jobs) from the Marine Scalefish Fishery*	587

* GSP and employment figures are the total contribution of all species from the Marine Scalefish Fishery.

Education and awareness, deterrence and enforcement

Table 83: Compliance summary for the South Australian Marine Scalefish Fishery for 2012-13.

	Commercial	Recreational*
Key risks	<ul style="list-style-type: none"> > Take of under-size fish > Take of fish using illegal gear > Reporting accuracy by commercial fishers > Take of fish during closures > Exceeding trip limits (Snapper, Gummy Shark and School Shark only) 	<ul style="list-style-type: none"> > Take of under-size fish or exceeding bag/boat limit > Take of fish in closed areas > Take of fish in closed seasons (Snapper and Bream only) > Illegal sales of recreationally caught fish
Control measures	<p>Education and awareness</p> <ul style="list-style-type: none"> > Direct contact with fishers > Attend and contribute to fishing industry meetings > Publish Information through media, Fishwatch, website and printed material 	<p>Education and awareness</p> <ul style="list-style-type: none"> > Fisheries Officers and Fishcare Volunteers patrolled popular fishing locations providing education material to recreational fishers about fishing rules > Fishcare Volunteers attended and contributed to boating and camping shows and regional field days > Provided information through media, Fishwatch, SMS Fish, Recreational Fishing Guide App, measuring gauges, website and printed materials
	<p>Deterrence</p> <ul style="list-style-type: none"> > Inspections on the water, at landing, in transport, at fish processors and at unregistered fish processors > Published articles in media about compliance activities > Monitoring and audits on reports of fishing activities by commercial fishers, consigned weights, sales docketts and logbooks 	<p>Deterrence</p> <ul style="list-style-type: none"> > Inspections of catches taken by recreational fishers at points of landing, in transit and on the water > Publish information in media about compliance activities > Monitor fishing activity during closed seasons and in closed areas
	<p>Enforcement</p> <ul style="list-style-type: none"> > Covert and overt observations and conduct intelligence driven operations > Address non-compliance where appropriate with issuing of cautions, expiations and prosecutions before court 	<p>Enforcement</p> <ul style="list-style-type: none"> > Intelligence driven operations > Address non-compliance where appropriate with issuing of cautions, expiations and prosecutions before court
Compliance effort and outcomes	<ul style="list-style-type: none"> > Routine, random and targeted inspections of commercial fishers and fish processors > Licence holders provided advice by Fisheries Officers, including new entrants into the Commercial Marine Scalefish Fishery > Fisheries Officers attended industry meetings and maintained ongoing contact with fishers > Haul nets inspected to ensure compliance with newly legislated net dimensions 	<ul style="list-style-type: none"> > 1,108 inspections conducted at sea and 8,651 inspections at points of landing or land based fishing locations in the recreational fishery > 16,974 contacts with recreational fishers were made by Fisheries Officers and Fishcare Volunteers > 55 community events attended by Fishcare Volunteers and Fisheries Officers > 50 media releases were produced in relation to the recreational fishery
Trends/issues	<ul style="list-style-type: none"> > Participated in the development of Snapper spatial closure areas in conjunction with PIRSA Fisheries and Aquaculture Policy 	

* The South Australian Recreational Fishery is managed as one fishery statewide. As such, most control measures and compliance effort and outcomes are not species specific. They cover all key marine scalefish species, including Snapper, Southern Garfish, Southern Calamari and King George Whiting.