

# King George Whiting (2020)

*Sillaginodes punctatus*



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## STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Western Australia	Western Australia	Sustainable	Catch, age structure
Victoria	Victoria	Sustainable	Catch, CPUE, age/length structures, pre-recruit survey
South Australia	Gulf St. Vincent	Sustainable	Catch, CPUE, age structure, biomass
South Australia	South Australia West Coast	Sustainable	Catch, CPUE, age structure, biomass
South Australia	Spencer Gulf	Sustainable	Catch, CPUE, age structure, biomass

## STOCK STRUCTURE

Research on King George Whiting stock structure in southern Australia using genetic and otolith chemistry approaches indicates that separate stocks occur in each state jurisdiction (Western Australia, Victoria and South Australia), but with some genetic mixing between Victorian and South Australian populations [Jenkins et al. 2015]. King George Whiting sampled from northern Tasmania appear genetically different from those in the mainland states, although further sampling is required to confirm whether there are separate genetic stocks in Tasmania [Jenkins et al. 2015].

The South Australian population of King George Whiting is thought to be comprised of three biological stocks—Gulf St. Vincent, Spencer Gulf and the West Coast - Eyre Peninsula. This delineation has been determined based on understanding of the life history, including movement patterns of adult fish, knowledge of the location of spawning grounds and nursery areas [Fowler et al. 2000a, Fowler et al. 2002], and understanding of larval advection pathways and distances based on early life history and hydrodynamic modelling [Fowler et al. 2000b]. Recently, this stock structure has been called into question based on results from a detailed study of the early life history that included consideration of the larval movement processes. This involved studies that considered the microstructure and chemistry of otoliths from larvae and post-settlement juveniles [Rogers et al. 2019a, Rogers et al. 2019b], as well as biophysical oceanographic modelling [Rogers et al. 2020]. The complex findings from this study indicated

that there was potential for movement of larvae between the putative stocks. Nevertheless, given the lack of empirical evidence about the extent of such movement, it is considered preferable here to retain the original model of stock structure until further information becomes available. The Gulf St. Vincent biological stock occurs throughout Gulf St. Vincent, Investigator Strait and around Kangaroo Island. The Spencer Gulf biological stock occurs throughout the waters of Spencer Gulf and adjacent coastal waters from western Kangaroo Island to the Eyre Peninsula. The West Coast - Eyre Peninsula biological stock extends throughout all the bays and offshore areas of the west coast of Eyre Peninsula.

Further subdivision in biological stock structure is uncertain for Western Australian and Victorian populations. In Western Australia, King George Whiting occurs in the West Coast Bioregion (WCB) and South Coast Bioregion (SCB). Juveniles occur in inshore waters of both bioregions, but adults appear to be restricted to offshore waters of the WCB [Hyndes et al. 1998, Sulin 2012, Brown et al. 2013]. On this basis there is assumed to be a single biological stock in Western Australia, with the spawning component of the stock residing in the WCB. Similarly, there is assumed to be a single biological stock in Victorian waters, with juveniles occurring mostly in bays and estuaries and adults in coastal waters [Jenkins et al. 2015].

Here, assessment of stock status is presented at the jurisdictional level—Western Australia and Victoria; and at the biological stock level—Spencer Gulf, Gulf St. Vincent and West Coast - Eyre Peninsula (South Australia).

## STOCK STATUS

### **Gulf St. Vincent**

The most recent comprehensive stock assessment was completed in 2017, and considered data collected up until the end of 2016 [Steer et al. 2018a]. For that assessment the primary fishery performance indicators were: total catch, handline effort and handline CPUE; and population age compositions determined from commercial market sampling. All datasets pertaining to the fishery were integrated in a computer stock assessment model (WhitEst) that produced time-series of annual estimates of output parameters that included fishable biomass, recruitment, harvest fraction and egg production. Such comprehensive stock assessments are done on a triennial basis and stock status is determined using a weight-of-evidence approach. However, since then, stock status has also been determined annually based only on commercial fishery statistics [Steer et al. 2018b, Steer et al. 2020].

Annual commercial catches and effort for this stock were considerably higher during the 1990s compared to the 2000s, consistent with a long-term decline in the number of fishers participating in the fishery and targeting this species [Steer et al. 2018a]. In particular, there were considerable declines in commercial catch and effort between 2009 and 2013. Furthermore, whilst CPUE had shown a long-term increasing trend between 1984 and 2007, there was a period of consistent decline between 2007 and 2012 during which it fell by 25 per cent. In response, the estimates of biomass for the period of 2008 to 2012 from WhitEst showed a considerable decline of 12 per cent. This period of declining biomass was associated with declining recruitment. Based on these fishery performance indicators, the fishery was classified as transitional depleting [Fowler et al. 2014]. This led to an extensive review of management arrangements throughout 2016 that culminated in significant management changes that were implemented in December 2016. The legal minimum length was increased from 310 to 320 mm total length (TL); recreational bag and boat limits were reduced; and, a month-long spatial spawning closure was implemented in Investigator Strait and southern Spencer Gulf.

Since 2013, the estimates of commercial catch and effort have stopped declining and handline CPUE has increased by 20 per cent [Steer et al.

2020]. The years of 2016, 2017 and 2018 produced the three highest estimates of handline CPUE for the long-term data since 1984. Estimated biomass from WhitEst stabilised between 2011 and 2016 to an average of 670 tonnes (t), considerably higher than the lowest value of 513 t, estimated for 1986. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the **Gulf St. Vincent** biological stock is classified as a **sustainable stock**.

**South  
Australia  
West Coast**

The most recent comprehensive stock assessment, which considered data collected up until the end of 2016, was completed in 2017 [Steer et al. 2018a]. Assessment methods were the same as those applied for the Gulf St. Vincent biological stock. However, since then, stock status has also been determined annually based only on commercial fishery statistics [Steer et al. 2018b, Steer et al. 2020].

Between 2013 and 2018, total catch from this stock declined by 32.5 per cent [Steer et al. 2020]. Handline effort also declined over the same period by a similar percentage. Nevertheless, despite these declines in catch and effort, CPUE has remained at a high level, attaining the highest ever maximum of 26 kg.fisherday<sup>-1</sup> in 2018 [Steer et al. 2020]. The reductions in catch and effort through the late 2000s relate to the decline in the numbers of fishers rather than a reduction in the fishery catch rate.

The estimates of fishable biomass from WhitEst gradually increased between 1984 and 2016, particularly between 1984 and 1999 and 2008 and 2016 [Steer et al. 2018a]. The estimate of biomass for 2016 was approximately 2 500 t. The general increasing trend in biomass reflects long-term trends in increasing recruitment and declining exploitation rate. The latter was associated with the declining fishing effort that relates to declining numbers of commercial fishers. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the **South Australia West Coast** biological stock is classified as a **sustainable** stock.

**Spencer  
Gulf**

The most recent comprehensive stock assessment was completed in 2017, which considered data collected up until the end of 2016 [Steer et al. 2018a]. The assessment methods were the same as those applied for the Gulf St. Vincent biological stock. Since then, stock status has also been determined annually based only on commercial fishery statistics [Steer et al. 2018b, Steer et al. 2020].

Throughout the 1980s and 1990s, estimates of total catch and effort for this stock were higher than the levels that were recorded through the 2000s [Steer et al. 2020]. CPUE has varied cyclically over time but has demonstrated a long-term increasing trend [Steer et al. 2020]. However, between 2007 and 2013, catch, effort and CPUE all declined contemporaneously, which resulted in declining estimates of biomass from WhitEst [Steer et al. 2018a]. These declining trends were associated with a significant decline in recruitment. Based on these fishery performance indicators, this stock was classified as transitional depleting [Fowler et al. 2014]. There was an extensive review of management arrangements throughout 2016 that culminated in significant management changes that were implemented in December 2016: the legal minimum length

was increased from 310 to 320 mm TL; recreational bag and boat limits were reduced; and, a month-long spatial spawning closure was implemented in Investigator Strait and southern Spencer Gulf.

Between 2013 and 2017, there were notable increases in the fishery performance indicators that relate to commercial fishery statistics. Over this period, handline effort increased by 28 per cent, total catch by 41 per cent and handline CPUE by 21 per cent [Steer et al. 2018b]. Output from SnapEst indicated that from 2013 to 2016, there was a significant upward trend in recruitment that resulted in an 11 per cent increase in the fishable biomass to the highest estimate ever of approximately 1 500 t [Steer et al. 2018a]. Although in 2018 there were marginal declines in total catch, targeted effort and CPUE [Steer et al. 2020], nevertheless, CPUE remained at a near-record level. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the **Spencer Gulf** (South Australia) biological stock is classified as a **sustainable** stock.

## Victoria

King George Whiting occur in bays, estuaries and coastal waters throughout Victoria. The most productive fisheries occur in Port Phillip Bay (PPB), Corner Inlet-Nooramunga (CI) and Western Port (WP). Population dynamics are strongly influenced by climatic factors determining numbers of larvae transported to bay and estuarine nurseries from coastal spawning areas in spring [Jenkins and May 1994, Hamer and Jenkins 1996, Jenkins et al. 2000, Jenkins 2005]. As most King George Whiting leave the bays and inlets permanently by four years of age (prior to adulthood) [Hamer et al. 2004], these fisheries are based on just a few age classes at any one time, making catches highly variable over relatively short time scales. Over the past 60 years catches have shown peaks and troughs at about 10 to 12-year intervals. These cycles that are thought to be related to variation in westerly winds driving larval transport and survival [Jenkins 2005]. Effort is concentrated in bays and inlets implying that adults in coastal waters are subject to low fishing mortality.

Commercial effort for all gear types has decreased since 1999 due to a reduction in the number of licensed commercial fishers in Victorian waters [VFA 2017]. Commercial netting is being phased out in PPB and will cease by 2022. The main commercial fishery is now in CI, where the catch in 2018/19 returned to about 140 t after falling briefly to 32 t in 2016. The species remains highly targeted by recreational fishers in PPB, CI, and WP.

State-wide assessments were conducted in 2017 [VFA 2017] and 2019 [Conron et al. 2020], preceded by specific assessments of PPB, WP and CI in 2016 [Conron et al. 2016a, Conron et al. 2016b, Hamer and Giri 2016]. These indicated that CPUE for the main commercial gear (haul seine) increased from 2014–15 to 2015–16 in PPB and CI. Since 2015/16, commercial CPUE information is no longer informative for PPB due to removal of most of the haul seine effort. Recent fluctuations in CPUE in CI is consistent with surveys of post-larval recruitment in PPB that showed higher recruitment of post-larvae in spring 2013, followed by lower recruitment in 2014 and 2015 [VFA 2017, Conron et al. 2020]. Commercial catches in CI are consistently bimodal in structure with two dominant age classes, and few fish over 400 mm [Conron et al. 2016a]. Reduced catch and CPUE in CI can be attributed to natural fluctuations in availability [Conron et al. 2020].

Recent surveys of post-larvae recruitment have shown increased recruitment from 2016 to 2019, with 2017 being the third highest recruitment of post-larvae observed since surveys began in 1998 [Conron et al. 2020].

Creel surveys of recreational fishers in PPB and WP show highly variable annual

catch rates similar to those of commercial fishers. Catch rates during 2018–19 were the third highest on record in PPB and well above average in WP.

Although highly variable due to recruitment dynamics, none of the fishery CPUE or pre-recruit time series show persistently declining trends. This provides reassurance that the poorly known and lightly fished adult stock component in coastal waters is continuing to be replenished at rates sufficient to prevent declines in recruitment. Recent strong post-larval recruitment is expected to drive a rapid increase in CPUE over the next few years .

The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence above, the Victoria biological King George Whiting stock is classified as a **sustainable stock**.

## Western Australia

The current assessment of King George Whiting is primarily based on estimates of biomass and fishing mortality from a data-limited Catch-MSY assessment model, compared periodically to reference levels relating to estimates of Maximum Sustainable Yield (MSY). The estimated biomass expected to achieve MSY (BMSY) is considered as the threshold reference level for the stock, and 50 per cent BMSY is set as the limit reference level. The target level is considered as any stock levels above BMSY.

Annual catches of King George Whiting taken in Western Australia showed large fluctuations between approximately 35 and 150 t between 1976 and 2000. Since 2000, catches do not show the large fluctuations and remained around 20 to 40 t. The estimated fishing mortality experienced by the stock in 2019 was low at 0.06 .year<sup>-1</sup>, with narrow 95 per cent Confidence Limits (CLs) ranging from 0.04 to 0.08 .year<sup>-1</sup>. As the current value of this performance indicator is below the level of FMSY (the maximum rate of fishing mortality that will result in a population size of BMSY) (0.3 year<sup>-1</sup>), the stock is unlikely to deplete to a level at which recruitment could be impaired if the current catch level is maintained.

The point estimate for relative stock biomass in 2019 was high at 0.9 of the unfished level (95 per cent CLs = 0.8–0.9). As the current value of this performance indicator is above the threshold, the stock is considered not to be depleted to a level at which recruitment could be impaired.

A previous stock assessment of King George Whiting was completed in 2013 [Fisher et al. 2014] based on age structure data collected in 2010–12 in the WCB. Fishing mortality was estimated to be moderate in inshore waters where juveniles occur, but low in offshore waters where adults occur. The spawning potential ratio (SPR), which is used as a proxy for spawning biomass, was estimated to be around the target level of 40 per cent of the unfished level. Total annual catches (commercial plus recreational) have remained at a similar level since 2010–12, which suggests that the stock level is stable. On this basis, current fishing mortality and SPR are assumed to have remained similar and at the target level.

The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, the evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, King George Whiting in Western Australia is classified as a **sustainable stock**.

## BIOLOGY

**King George Whiting biology** [Hyndes et al. 1998, Fowler et al. 2000a, Hamer et al. 2004, Sulin 2012]

Species	Longevity / Maximum Size	Maturity (50 per cent)
King George Whiting	South Australia 22 years, 590 mm TL Western Australia at least 14 years, 620 mm TL Victoria at least 11 years, 600 mm TL	South Australia 3–4 years, 300–350 mm TL Western Australia 3–4 years, 410 mm TL Victoria unknown

## DISTRIBUTION



Distribution of reported commercial catch of King George Whiting

## TABLES

Fishing methods			
	South Australia	Victoria	Western Australia
<b>Charter</b>			
Rod and reel	✓		✓
<b>Commercial</b>			
Beach Seine			✓
Gillnet	✓		✓
Hand Line, Hand Reel or Powered Reels			✓
Handline	✓		
Haul Seine			✓
Hook and Line		✓	
Net		✓	

Seine Nets	✓		
Unspecified	✓		
<b>Recreational</b>			
Hook and Line	✓	✓	✓
Spearfishing	✓	✓	✓

<b>Management Methods</b>			
	<b>South Australia</b>	<b>Victoria</b>	<b>Western Australia</b>
<b>Commercial</b>			
Gear restrictions	✓	✓	✓
Licence		✓	
License	✓		✓
Limited entry	✓	✓	✓
Size limit	✓	✓	✓
Spatial closures	✓		✓
Spatial restrictions	✓	✓	
<b>Recreational</b>			
Bag and boat limits	✓		
Bag and possession limits			✓
Bag limits		✓	✓
Gear restrictions		✓	
Licence		✓	
Licence (boat-based sector)			✓
Size limit	✓	✓	✓
Spatial closures	✓	✓	

<b>Catch</b>			
	<b>South Australia</b>	<b>Victoria</b>	<b>Western Australia</b>
<b>Charter</b>			< 0.5 t
<b>Commercial</b>	229.768 t	117.654 t	17.0641 t
<b>Indigenous</b>	Unknown	Unknown	Unknown
<b>Recreational</b>	367 t (2013–14)	Unknown	29 t (2017/18)

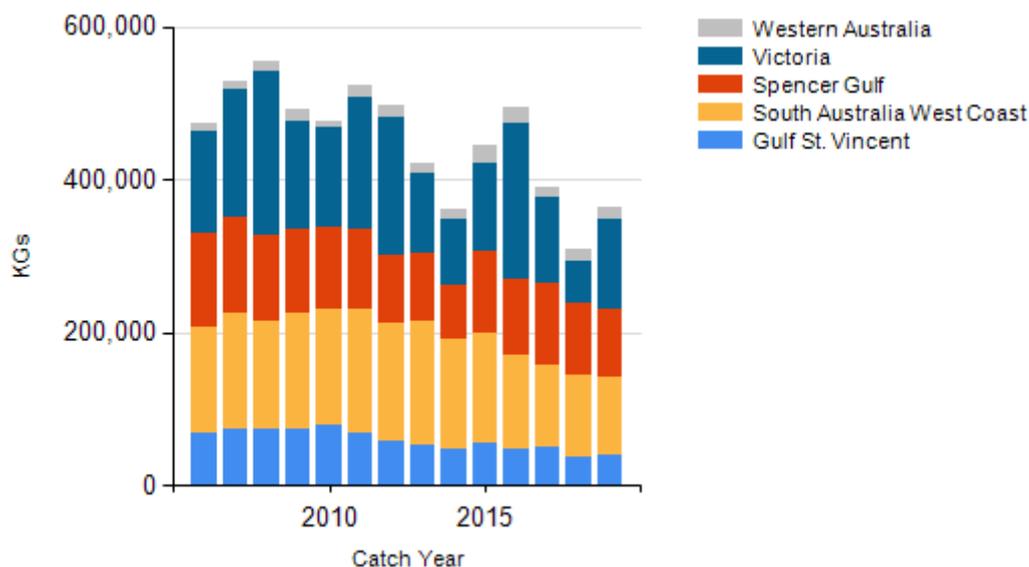
**Western Australia – Recreational (Management methods)** In Western Australia a recreational fishing licence is only required for fishing from a boat.

**Victoria – Recreational (Management methods)** Boat limits do not apply in Victoria. In Victoria a recreational fishing licence is required for all forms of recreational fishing, unless exempt.

**Victoria – Indigenous (Management Methods)** A person who identifies as Aboriginal or Torres Strait Islander is exempt from the need to obtain a Victorian recreational fishing licence, provided they comply with all other rules that apply to recreational fishers, including rules on equipment, catch limits, size limits and restricted areas. Traditional (non-commercial) fishing activities that are carried out by members of a traditional owner group entity under an agreement pursuant to Victoria's *Traditional Owner Settlement Act 2010* are also exempt from the need to hold a recreational fishing licence, subject to any conditions outlined in the agreement. Native title holders are also exempt from the need to obtain a recreational fishing licence under the provisions of the Commonwealth's *Native Title Act 1993*.

**South Australia - Recreational (Catch)** Giri and Hall [2015].

### CATCH CHART



Commercial catch of King George Whiting - note confidential catch not shown

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