

# King George Whiting (2016)

*Sillaginodes punctatus*



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## STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Western Australia	Western Australia	SCEMF, WCEMF, WL (SC)	Sustainable	Catch, CPUE, recruitment, fishing mortality, per recruit analysis
Victoria	Victoria	CIF, GLF, OF, PPBF	Sustainable	Catch, CPUE, age/length structures, pre-recruit surveys
South Australia	Gulf St. Vincent	MSF	Transitional-depleting	Catch, CPUE, age structures, biomass
South Australia	Spencer Gulf	MSF, NZRLF	Transitional-depleting	Catch, CPUE, age structures, biomass
South Australia	West Coast - Eyre Peninsula	MSF, NZRLF	Sustainable	Catch, CPUE, age structures, biomass

MSF Marine Scalefish Fishery (SA), NZRLF Northern Zone Rock Lobster Fishery (SA), CIF Corner Inlet Fishery (VIC), GLF Gippsland Lakes Fishery (VIC), OF Ocean Fishery (VIC), PPBF Port Phillip Bay Fishery (VIC), SCEMF South Coast Estuarine Managed Fishery (WA), WCEMF West Coast Estuarine Managed Fishery (WA), WL (SC) Open Access in the South Coast (WA)

## STOCK STRUCTURE

Recent research on King George Whiting stock structure in southern Australia using genetic and otolith approaches indicates that separate genetic stocks occur in each state jurisdiction (Western Australia, Victoria and South Australia) but with some genetic mixing between Victorian and South Australian populations[1]. The research also indicated that whiting sampled from northern Tasmania were genetically distinct from those in the mainland states[1].

The biological stock structure within Western Australia and Victoria is unclear, but they are considered to be separate, single biological stocks, for management purposes, and separate from the South Australian biological stocks. The South Australian population of King George Whiting comprises three biological stocks[2–4]. Gulf St. Vincent, Spencer Gulf and the west coast of Eyre Peninsula. This delineation has been determined based on a detailed

understanding of the life history, including movement patterns of adult fish, knowledge of the location of spawning grounds and nursery areas[2,4] and understanding of larval advection pathways and distances based on early life history and hydrodynamic modelling[3].

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** In South Australia's multispecies Marine Scalefish fishery, King George whiting is the premium species attracting the highest price per unit weight for commercial fishers. The most recent assessment was completed in July 2014[2].

The Gulf St. Vincent biological stock is found throughout the Gulf St. Vincent, Investigator Strait and around Kangaroo Island. Handline effort for this stock has declined since 2009, and handline CPUE has declined since 2007[2]. Both of these declining trends are consistent with a declining level of biomass as, given the value of the species, it is expected that effort would remain high or consistent if biomass was available. The model-estimated biomass for this stock has been relatively flat since 1984, when fishery statistics were first recorded. However, because the estimates of effort and CPUE used in the model do not take into account likely increases in the 'effective' effort, relating to technological advancements, and because of uncertainty in the time-series of recreational catch and effort, the decline in fishable biomass may have been greater than estimated by the model. While it is estimated that the biomass of King George Whiting declined between 2009 and 2013, the stock is not yet considered to be in a recruitment overfished state. However, the above evidence indicates that the current level of fishing pressure is likely to cause the stock to become recruitment overfished.

On the basis of the evidence provided above, the Gulf St. Vincent (South Australia) biological stock is classified as a **transitional–depleting stock**.

**Spencer Gulf** In South Australia's multispecies Marine Scalefish fishery, King George whiting is the premium species attracting the highest price per unit weight for commercial fishers. The most recent assessment was completed in July 2014[2].

This stock extends throughout the northern and southern regions of Spencer Gulf. There have been recent declining trends in both catch and effort for this region, culminating in the lowest recorded values in 2013[2]. Despite the effort decline, CPUE has declined for this region since 2007. As for the Gulf St. Vincent stock, such trends for this high-value species are consistent with a declining biomass. This is reflected in the assessment model outputs, which indicated a slight decline in biomass of 3.3 per cent between 2009 and 2013. Because the estimates of effort and CPUE used in the model do not take into account likely increases in 'effective' effort that relate to technological advancements, and because of uncertainty in the time-series of recreational catch and effort, the decline in fishable biomass may have been greater than estimated by the model. Although declining slowly, the stock is not yet considered to be in a recruitment overfished state. However, the above evidence indicates that the current level of

fishing pressure is likely to cause the stock to become recruitment overfished.

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

## Victoria

Stock status assessment of King George Whiting in Victoria uses a weight-of-evidence approach that considers catch per unit effort (CPUE) from both commercial and recreational sectors, fishery-independent annual surveys of pre-recruit (post-larval) catch rates in Port Phillip Bay, and age and length composition of the catch. Importantly, the indicator data are derived from bay and estuary fisheries that only catch juvenile King George Whiting. When describing the status of the Victorian King George Whiting stock it is important to consider how the life history characteristics influence the above indicators.

The dynamics of King George Whiting populations and fisheries in Victorian bays and estuaries are strongly influenced by climatic factors that influence the numbers of larvae transported into the bay and estuary nursery grounds from coastal spawning areas during spring each year[9–12]. Because most King George Whiting leave these nursery areas permanently by 3–4 years of age (prior to adulthood)[13], the fisheries in bays and estuaries are based on only a few age classes/cohorts at any point in time. This means that the Victorian King George Whiting fisheries are highly variable at short time scales. Over the past 60 years King George Whiting fisheries production in Victoria's bays and estuaries has shown peaks and troughs at approximately 10-year intervals[10]. It also means that the adult fish, which migrate into deeper waters at maturity (3–4 years), are subject to low fishing mortality.

The most recent state-wide King George Whiting stock assessment was conducted in 2010[14], although more recent general fishery assessments for the Port Phillip Bay[15], and Corner Inlet-Nooramunga[16] fisheries have included King George Whiting. These assessments indicated for both fisheries that King George Whiting catch rates for the main fishing method (haul seine) have increased dramatically over the past year. This recent increase is consistent with the pre-recruit survey in spring 2013 that showed a major increase in the abundance of post-larval juveniles recruiting in Port Phillip Bay[15]. These fish have now fully recruited to the bay and estuary fisheries, contributing to increased catches and catch rates. The increase in commercial CPUE in recent years[15,16] is consistent with environmental influences driving increased larval supply to bays and estuaries in the spring of 2013. However, the current increase in CPUE will likely be limited to 1–2 years as post-larval recruitment in 2014 and 2015 was poor, and the fish from the 2013 year class will leave the bays and estuaries by 2017–18. Mature fish that escape the inshore fishery and migrate offshore will contribute to an increased adult population for a longer period.

Effort for all gear types in Victoria has decreased since 1999 as a result of a reduction in the number of licensed commercial fishers in Victorian waters, and a recent permanent decrease in commercial effort for Port Phillip Bay due to a Government buy-out policy to remove all commercial net fishing from Port Phillip Bay by 2022. From April 2016 onwards, the main Victorian King George Whiting commercial fishery will be the Corner Inlet-Nooramunga Fishery. 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 biomass to become recruitment overfished.

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

**West Coast - Eyre Peninsula** In South Australia's multispecies Marine Scalefish fishery, King George whiting is the premium species attracting the highest price per unit weight for commercial fishers. The most recent assessment was completed in July 2014[2].

This stock extends throughout all the bays and offshore areas of the west coast of Eyre Peninsula. Handline fishing effort for this stock has been relatively stable in recent years. Catch increased gradually by 27 per cent between 2002 and 2013, whilst CPUE increased over the same period by 62 per cent to its highest recorded level[2]. Output from the stock assessment model showed trends of increasing estimated recruitment rates and levels of biomass between 2004 and 2013. Furthermore, between 1984 and 2013, the exploitation rate fell considerably, as a result of declines in commercial and recreational fishing effort over this period. 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 biomass to become recruitment overfished.

On the basis of the evidence provided above, the West coast Eyre Peninsula (South Australia) biological stock is classified as a **sustainable stock**.

**Western Australia** The life cycle of King George Whiting in Western Australia involves both inshore and offshore habitats, juveniles occupy inshore waters in estuaries and protected coastal embayments before migrating to deeper waters as they mature (at around 400 mm; aged 3–4 years), where they remain[5,6]. The current assessment of stock status uses a weight-of-evidence approach that includes estimates of fishing mortality, per recruit analyses, catch, catch rates, and fishery-independent juvenile recruitment indices[7,8]. The latest stock assessment of King George Whiting was conducted in 2013[7].

Annual trends in fishery catches in inshore areas appear to correlate with trends in recruitment, with a time lag of 2–3 years. Estimated annual recruitment has been highly variable since recruitment surveys began in 1999, with higher recruitment levels being observed during strong Leeuwin Current (La Niña) years. Catch and catch rates in the main commercial fisheries may not be reliable indices of abundance due to the multispecies nature of these net method fisheries, which makes it difficult to quantify targeted effort and species-specific catch rates. The 2015 catch is, however, similar to the historical range. In the South Coast Estuarine Managed Fishery, the catch (15 tonnes [t]) in 2015 was equal to the long-term (1980–2014) average of 15 t. At current estimated levels of fishing mortality for King George Whiting, based on age data collected from 2010–12, the spawning potential ratio (based on the spawner biomass per recruit) is estimated to be at a sustainable level (42 per cent of the unfished level)[8]. The above evidence indicates that the biomass of this stock is unlikely to be recruitment overfished.

The inshore component of the stock, which is entirely comprised of immature fish, is exposed to relatively high fishing pressure. However, the offshore component (the breeding stock) is offered some protection by its location in deeper waters, where individuals are less easily targeted than the inshore component. The above evidence indicates that current fishing pressure is unlikely to cause the stock to become recruitment overfished.

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[1,3,5,6,13,14]

Species	Longevity / Maximum Size	Maturity (50 per cent)
King George Whiting	South Australia: 22 years ; 59 cm <u>TL</u> Western Australia: 14 years; 62 cm <u>TL</u> Victoria – at least 11 years; 60 cm <u>TL</u>	South Australia: 3-4 years; 30-35 cm <u>TL</u> Western Australia: 3-4 years, 41 cm <u>TL</u> Victoria - unknown

## DISTRIBUTION



Distribution of reported commercial catch of King George Whiting

## TABLES

Commercial Catch Methods	South Australia	Victoria	Western Australia
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Gillnet	✓		
Hand Line, Hand Reel or Powered Reels	✓		
Haul Seine	✓	✓	
Line		✓	
Mesh Net		✓	
Otter Trawl		✓	
Unspecified		✓	
Unspecified - Seine		✓	
Various			✓

<b>Fishing methods</b>			
	<b>South Australia</b>	<b>Victoria</b>	<b>Western Australia</b>
<b>Commercial</b>			
Gillnet	✓		
Hand Line, Hand Reel or Powered Reels	✓		
Haul Seine	✓	✓	
Line		✓	
Mesh Net		✓	
Unspecified		✓	
Unspecified - Seine		✓	
Various			✓
<b>Indigenous</b>			
Hand Line, Hand Reel or Powered Reels	✓		✓
Spearfishing	✓	✓	✓
<b>Recreational</b>			
Hand Line, Hand Reel or Powered Reels	✓	✓	✓
Spearfishing	✓	✓	✓
<b>Management Methods</b>			
	<b>South Australia</b>	<b>Victoria</b>	<b>Western Australia</b>
<b>Commercial</b>			
Gear	✓	✓	✓

restrictions			
Limited entry	✓	✓	✓
Size limit	✓	✓	✓
Spatial restrictions and closures (nets)	✓	✓	✓
Temporal closures			✓
Vessel restrictions			✓
<b>Indigenous</b>			
Bag and boat limits	✓	✓	✓
Size limit	✓	✓	✓
<b>Recreational</b>			
Bag and boat limits	✓	✓	✓
Licensing		✓	✓
Size limit	✓	✓	✓

Active Vessels	South Australia	Victoria	Western Australia
	244 license in MSF, 11 Vessel in NZRLF,	18 Fisher in CIF, 8 Fisher in GLF, 10 Fisher in OF, 31 Fisher in PPBF,	27 License in SCEMF, 11 License in WCEMF, 20 Vessel in WL (SC), 1 Vessel in WCDSCMF,

**MSF** Marine Scalefish Fishery(SA)

**NZRLF** Northern Zone Rock Lobster Fishery(SA)

**CIF** Corner Inlet Fishery(VIC)

**GLF** Gippsland Lakes Fishery(VIC)

**OF** Ocean Fishery(VIC)

**PPBF** Port Phillip Bay Fishery(VIC)

**SCEMF** South Coast Estuarine Managed Fishery(WA)

**WCDSCMF** West Coast Deep Sea Crustacean Managed Fishery(WA)

**WCEMF** West Coast Estuarine Managed Fishery(WA)

**WL (SC)** Open Access in the South Coast(WA)

Catch	South Australia	Victoria	Western Australia
<b>Commercial</b>	272.612t in	74.69t in CIF.	15.311t in

	MSF,	1.937t in GLF, 4.863t in OF, 75.182t in PPBF,	SCEMF, 0.765t in WCEMF, 8.263t in WL (SC),
<b>Indigenous</b>	Unknown	Unknown	Unknown
<b>Recreational</b>	367 t (2013/14)	155 t (2006/07)	18 t (2013–14) Boat-based only

MSF Marine Scalefish Fishery (SA), NZRLF Northern Zone Rock Lobster Fishery (SA), CIF Corner Inlet Fishery (VIC), GLF Gippsland Lakes Fishery (VIC), OF Ocean Fishery (VIC), PPBF Port Phillip Bay Fishery (VIC), SCEMF South Coast Estuarine Managed Fishery (WA), WCEMF West Coast Estuarine Managed Fishery (WA), WL (SC) Open Access in the South Coast (WA),

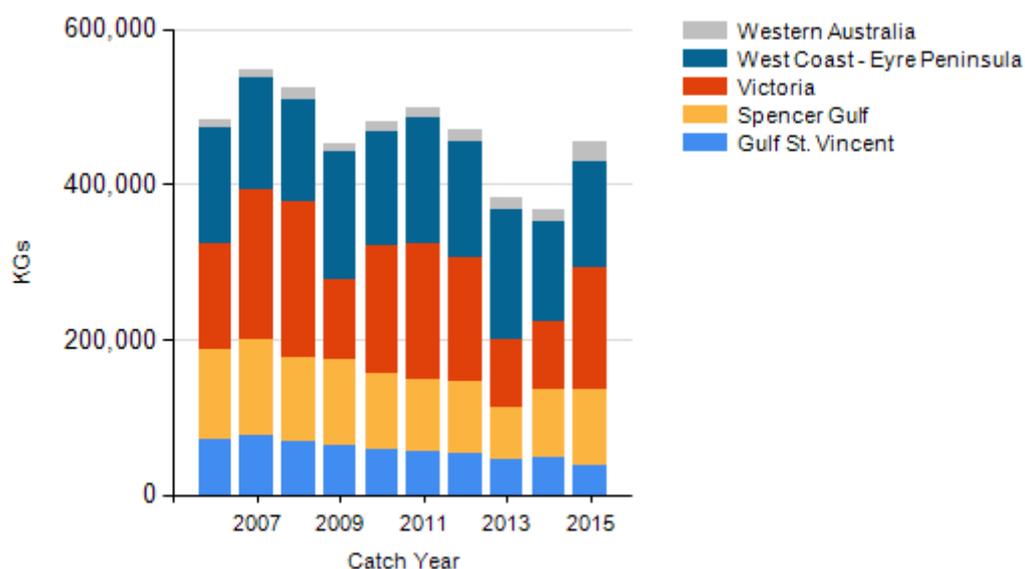
**a Victoria – Recreational (Management methods)** Boat limits do not apply in Victoria.

**b Western Australia – Recreational (Management methods)** In Western Australia a recreational fishing licence is only required for fishing from a boat. In Victoria a recreational fishing licence is required for all forms of recreational fishing, unless exempt.

**c Victoria – Indigenous (management method)** In Victoria, regulations for managing recreational fishing are also applied to fishing activities by Indigenous people. Recognised Traditional Owners (groups that hold native title or have agreements under the Traditional Owner Settlement Act 2010 [Vic]) are exempt (subject to conditions) from the requirement to hold a recreational fishing licence, and can apply for permits under the Fisheries Act 1995 (Vic) that authorise customary fishing (for example, different catch and size limits or equipment). The Indigenous category in Table 3 refers to customary fishing undertaken by recognised Traditional Owners. In 2015, there were no applications for customary fishing permits to access King George Whiting.

**d Victoria – Indigenous (management method)** Subject to the defence that applies under Section 211 of the Native Title Act 1993 (Cth), and the exemption from a requirement to hold a Victorian recreational fishing licence, the non-commercial take by indigenous fishers is covered by the same arrangements as that for recreational fishing.

## CATCH CHART



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

## EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

- Some bycatch is expected from net or line fishing methods used to target King George

Whiting. There has been one major study on the effects of haul seine fishing on seagrass (fine leaf, eel grass, *Zostera*) habitat[20]. In that study there was limited evidence of significant damage to seagrass beds by haul net fishing, although the study had some limitations and recommended longer-term replicated studies involving industry, and studies on other seagrass species (broad leaf, *Posidonia*)[20]. However, as a result of targeted fishing and the nature of the methods used, the effects of fishing for King George Whiting on the marine environment are considered to be low.

### ENVIRONMENTAL EFFECTS on King George Whiting

- Historically, catch and catch rates in Victoria have followed an approximate 10-year cyclic pattern. Fluctuations in these biomass indicators are likely to result from environmental conditions affecting spawning success and/or, more likely, recruitment of the post-larval stages to the bay and estuary fishing areas from oceanic spawning areas to the west[10,21]. A significant relationship has been found between the strength of zonal westerly winds in south-eastern Australia and abundance of post-larvae recruiting into Port Phillip Bay, Victoria, during spring each year[10,21]. The zonal westerly wind index has shown a long-term downward trend since about 1970, suggesting that the strength of the westerly wind flow over Victoria has decreased over the past 40 years. The decline in zonal westerly winds is consistent with the prediction that westerly winds will weaken in southern Australia under climate change because of a southward migration of the high-latitude westerly wind belt south of Australia[22]. This may ultimately have a significant impact on the average abundance of larvae that enter Victoria's bays and inlets.
- While westerly winds[10] and oceanic water temperatures[23] during the winter larval dispersal phase play an important role in determining recruitment patterns to the bay and estuary fisheries in Victoria the availability of suitable nursery habitat (primarily seagrass[9,12,24]) is another critical factor that could influence survival and growth of the young fish, and therefore fisheries productivity in all states. Significant long-term loss of seagrass habitat in bays and estuaries would impact production of this species.
- Similar to Victoria, annual recruitment by juvenile King George Whiting is highly variable in other states, most likely as a result of various complex interactions with the environment, on both a broad- and local-scale. In Western Australia, relatively strong recruitment occurred in 1999, 2000 and 2008, which coincided with a strong Leeuwin Current in these years. The warm water temperatures associated with this southward flowing current may have led to increased larval growth and survival rates. The positive influence of warmer water temperatures on larval growth rates has also been observed for King George whiting along the Victorian coast[25].

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