

Western King Prawn (2018)

Melicertus latisulcatus



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Western Australia	Exmouth Gulf Prawn Managed Fishery	EGPMF	Sustainable	Survey catch rates, size composition, catch, catch rates
Western Australia	North Coast Prawn Managed Fisheries	BPMF, BPMF NBPMF, NBPMF	Sustainable	Catch
Western Australia	Shark Bay Prawn Managed Fishery	SBPMF	Sustainable	Survey catch rates, size composition, catch, catch rates
Western Australia	South West Trawl Managed Fishery	SWTMF	Sustainable	Catch
Queensland	East Coast Otter Trawl Fishery	ECOTF	Sustainable	Catch, effort, ecological risk assessment
South Australia	Gulf St. Vincent Prawn Fishery	GSVPF	Sustainable	Survey and commercial catch rates, recruitment
South Australia	Spencer Gulf Prawn Fishery	SGPF	Sustainable	Survey catch rates, catch
South Australia	West Coast Prawn Fishery	WCPF	Sustainable	Survey catch rates, catch

ECOTF East Coast Otter Trawl Fishery (QLD), GSVPF Gulf St Vincent Prawn Fishery (SA), SGPF Spencer Gulf Prawn Fishery (SA), WCPF West Coast Prawn Fishery (SA), BPMF Broome Prawn Managed Fishery (WA), EGPMF Exmouth Gulf Prawn Managed Fishery (WA), NBPMF Nickol Bay Prawn Managed Fishery (WA), SBPMF Shark Bay

Prawn Managed Fishery (WA), SWTMF South West Trawl Managed Fishery (WA), BPMF || NBPMF Various Fisheries combined due to 3 boat rule (WA)

STOCK STRUCTURE

Western King Prawn is distributed throughout the Indo–West Pacific [Grey et al. 1983]. No research has been conducted into Western King Prawn biological stock structure in Western Australia or Queensland, and status in those states is therefore reported at the management unit level. In South Australia, one study of the genetic structure of Western King Prawn found no differences between the three fisheries [Carrick 2003], however, each fishery functions as an independent population at time scales relevant to management, with distinct adult and juvenile habitats and independent variations in recruitment and abundance. Each fishery in South Australia is therefore assessed and managed as a separate management unit.

Here, assessment of stock status is presented at the management unit level—Shark Bay Prawn Managed Fishery, Exmouth Gulf Prawn Managed Fishery, North Coast Prawn Managed Fisheries, South West Trawl Managed Fishery (Western Australia); East Coast Otter Trawl Fishery (Queensland); Spencer Gulf Prawn Fishery, Gulf St. Vincent Prawn Fishery and West Coast Prawn Fishery (South Australia).

STOCK STATUS

East Coast Otter Trawl Fishery Long-term (1998–2017) nominal catch rates for Western King Prawns range from 31.0–58.3 kg per day. At 49.3 kg per day, nominal catch rates for 2017 were at the higher end of this range [QDAF 2018]. In 2013, an ecological risk assessment (ERA) for the East Coast Otter Trawl Fishery (Queensland) found that Western King Prawns were at low risk of becoming recruitment overfished within the Great Barrier Reef Marine Park (GBRMP) [Pears et al. 2012]. This is in part driven by the biology of the species, which exhibits protracted spawning behaviour, and partly by low levels of susceptibility to trawling, given the extent of area closed to the fishery. The above evidence indicates that the biomass of this management unit is unlikely to be depleted and that recruitment is unlikely to be impaired.

Total catch of Western King Prawns in 2017 has increased since 2013 when catches were below historical averages [QDAF 2018]. The GBRMP accounts for around 90 per cent of the total Western King Prawn catch in Queensland waters and has experienced a 23 per cent decline in otter trawl effort since 2009 (the trawl ERA representative fishing year). Given this decline in effort, it is unlikely that the risk of this species being recruitment overfished has increased from the original 'low risk' evaluation. This is supported by research which has shown that around 40 per cent of the Western King Prawn biomass is afforded protection from trawl fishing through permanent closures within the GBRMP [Pitcher et al. 2007]. These closures remain in place and provisions governing the use of these areas have not been the subject of significant amendments since the last *Status of Australian Fish Stocks* assessment. The above 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 East Coast Otter Trawl Fishery (Queensland) management unit is classified as a **sustainable stock**.

Exmouth Gulf Prawn Managed Fishery As with the Shark Bay management unit, the status of stocks is assessed annually using a weight-of-evidence approach that considers all available information about the stocks [Wise et al. 2007]. The assessment is based on a combination of fishery-independent and fishery-dependent catch rates where fishery-independent surveys provide the recruitment indices and fishery-dependent data provide the spawning stock indices. Analysis of these two indices from the 1970s to 1990s provide no evidence of a stock-recruitment relationship for Western King Prawn [Caputi et al. 1998], with no indication of reduced recruitment in relation to spawning stock sizes over this period.

Elevated temperatures since 2011 in this region appears to be contributing to lower than average recruitment levels [Caputi et al. 2014a], in response to which conservative harvesting strategies have been introduced, resulting in reduced annual landings.

Fishery-independent recruitment surveys have been undertaken in March and April each year since 1985 to assess prawn abundance and size structure and are used for a catch prediction [Caputi et al. 2014b] and management decisions such as spatial-temporal opening of fishing areas [Kangas et al. 2015a, DoF 2014]. In 2017, the Western King Prawn fishery-independent survey mean recruitment index was 29.5 kg per hour which was just below the target [DoF 2018] (30 kg per hour). The spawning stock commercial catch rate index in August–September in key Western King Prawn fishing grounds provides a long-term dataset of spawning stock abundance. For 2017, the mean commercial catch rate was 19.9 kg per hour, below the target (25 kg per hour) but above the limit reference level [DoF 2014]. A fishery independent survey of Western King Prawn grounds during August and September commenced in 2016 to provide additional spawning stock abundance information. The fishery-independent survey in 2017 indicated a mean catch rate of 33.9 kg per hour in August and 19.4 kg per hour in September with an average over that period of 26.7 kg per hour, just above the commercial catch rate target.

Historical commercial catch and catch rates from 1989–98, when it was known that recruitment was not affected by fishing effort, were used as the basis for calculating target total catch ranges for this stock [Gaughan and Santoro 2018] (350–500 t) and a mean commercial catch rate target (12 kg per hour; range 8–14 kg per hour). However, due to the apparent negative impacts of increased water temperature on Western King Prawn recruitment and with the level of effort having declined for the fishery as a result of fleet reductions and targeting larger prawns, a catch range based on the last 10 years (2007–16) of production, sets a revised catch range of 100–340 t and a mean catch rate target (11 kg per hour; range 5–19 kg per hour). The commercial catch for 2017 of 130 t was within the target range with a mean commercial catch rate (5 kg per hour) at the low end of the target catch rate range.

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

On the basis of the evidence provided above, the Exmouth Gulf Prawn Managed Fishery (Western Australia) management unit is classified as a **sustainable stock**.

Gulf St. Vincent Prawn Fishery

Management arrangements for the Gulf St. Vincent Prawn Fishery have evolved since the fishery's inception in 1967 and the fishery has gone through a number of cycles characterised by increasing catches, subsequent declines in recruitment and fishery performance, and resulting closure periods (1991–92 to 1992–93 and 2012–13 to 2013–14). The latest management plan for the fishery was implemented in April 2017 and provides the decision rules for classifying stock status relative to limit, trigger and target reference points defined for three performance indicators relating to relative stock biomass and recruitment [PIRSA 2017]. The performance indicators are: 1) standardised annual commercial catch per unit effort (CPU E); 2) standardised fishery-independent survey (FIS) CPUE; and 3) the Fisheries Recruitment Index (FRI). These are the primary indicators for biomass and fishing mortality. A weight of evidence approach is used to assess the stock status.

The most recent stock assessment report was completed in 2017 [McLeay et al. 2017] and used data to the end of the 2016–17 season (1 November 2016–31 July 2017). In 2016–17, the total commercial catch of Western King Prawn in the GSVPF was 224.6 t obtained from 287 vessel-nights that comprised 96 per

cent of the Total Allowable Commercial Effort of 300 vessel-nights.

Standardised annual commercial CPUE was 892 kg per block per vessel-night, which was similar to that recorded in 2014–15 when the fishery reopened (890 kg per block per vessel-night) and within the target range defined for this performance indicator (≥ 750 to < 900 kg per block per vessel-night). Estimates of standardised FIS CPUE have remained within the high range defined for this performance indicator (≥ 30 kg per trawl-shot) in the last four surveys and, in 2016–17, standardised FIS CPUE was 32.7 kg per trawl-shot. Estimates of FRI have remained within the high range defined for this performance indicator (≥ 600 recruits/h) in the last two surveys and, in 2016–17, the FRI was 784.4 recruits/h. 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 above 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 Prawn Fishery (South Australia) management unit is classified as a **sustainable stock**.

North Coast Prawn Managed Fisheries The North Coast Prawn Managed Fisheries (Western Australia) management unit is made up of four separate multispecies prawn fisheries but is reported as one unit due to minimal catches. Western King Prawn forms a very minor part of total prawn landings in these fisheries and in some years no Western King Prawns are landed in at least one of these four fisheries [Gaughan and Santoro 2018]. Total commercial catch for 2017 was less than 1 t. Only in the Broome Prawn Managed Fishery is Western King Prawn the key target species, but costs and logistics of fishing in this fairly remote fishery has meant that since 2008 only one or two out of five licensed boats have fished. Prior to 2008, between 1 200 and 4 200 trawl hours were recorded annually for a mean catch rate between 14 and 43 kg per hour. Since 2008, 30–275 hours of trawling have been conducted annually for a similar mean catch rate range. In 2017, less than 20 hours of trawling was recorded. As for Exmouth Gulf, elevated water temperatures since 2011 in these North Coast Prawn Managed Fisheries may be contributing to lower than average recruitment levels [Caputi et al. 2014a].

The above evidence indicates that the biomass of the management unit is unlikely to be depleted and that recruitment is unlikely to be impaired. The evidence also indicates that the current level of fishing pressure is unlikely to cause the management unit to become recruitment impaired.

On the basis of the evidence provided above, the North Coast Prawn Managed Fisheries (Western Australia) management unit is classified as a **sustainable stock**.

Shark Bay Prawn Managed Fishery The status of the stocks of Western King Prawns in Shark Bay is assessed annually using a weight-of-evidence approach that considers all available information about the stocks [Wise et al. 2007]. The assessment approach is primarily based on monitoring of fishery-independent survey indices of recruitment (March–April) and spawning stock levels (June–August) relative to reference points specified in terms of survey catch rates for these two periods [DoF 2014]. Although these abundance indices are the key indicators for the stocks, other information collected throughout the season (such as commercial catch, effort, grade categories and environmental data) is also evaluated to provide insight on, for example, operational factors that might affect fishery performance, or environmental factors affecting prawn recruitment.

Western King Prawns are comparatively more resilient to fishing than the Brown Tiger Prawn (the other key target species) because they are less catchable (strongly nocturnal and readily bury themselves when disturbed) and have a protracted spawning period [Penn 1984, Penn and Caputi 1986]. The two

species overlap in their spatial distribution within Shark Bay, and the rates of fishing that maintain the spawning biomass of Brown Tiger Prawn near target levels are considered to be below those that could result in Western King Prawn becoming recruitment overfished [Caputi et al. 1998].

Spatial and temporal analysis of historical commercial catch and effort data complemented by research sampling to identify key recruitment and spawning grounds provided no evidence of reduced recruitment for Western King Prawns across the range of spawning biomass levels in the 1970s–90s [Caputi et al. 1998], indicating that the spawning stock was never reduced to levels that affected recruitment. During this period, recruitment remained relatively stable despite substantial environmental changes, including variations in the Leeuwin Current, La Niña, and El Niño. There was also no significant correlation between spawning stock and recruitment indices derived from fishery-independent surveys for the Western King Prawn since 2000 [Kangas et al. 2015b] and examination of water temperature effects indicate a positive relationship with recruitment. This relationship is the opposite to what has been experienced in Exmouth Gulf which probably due to the average water temperatures in Shark Bay being 2–3[o]C cooler than Exmouth. The fishery-independent recruitment surveys undertaken each year since 2000 assess size structure and are used for catch prediction [Kangas et al. 2015b, Caputi et al. 2014b] and to inform management decisions regarding spatial-temporal opening of fishing areas. These surveys however, have indicated that the mean size of recruiting prawns has declined since 2012 for both Western King and Brown Tiger prawns and the cause of this is being investigated given the environmental changes occurring in Shark Bay resulting from the heatwave event (2010–11) and the long-term winter cooling trend.

There is no evidence of a declining trend in recruitment in fishery-independent survey indices since 2000 with the annual recruitment indices remaining well above the target reference level each year (25 kg per hour) [DoF 2014]. The fishery-independent recruitment survey in 2017 indicated a mean catch rate (101 kg per hour) which was well above the target level, with a catch prediction between 850 and 1270 t [Gaughan and Santoro 2018]. The introduction of seasonal, moon and area-closures since the early 1990s limits the overall fishing effort, providing protection for the breeding stock of Western King Prawn [Kangas et al. 2015b]. Although the spawning stock surveys conducted in Shark Bay target key Brown Tiger Prawn areas, they also cover some of the Western King Prawn spawning areas and are considered to be indicative of overall spawning stock abundance for this species [Kangas et al. 2015b] and a target survey catch rate level of 25 kg per hour is set for this area. In 2017, the mean spawning stock survey catch rate was 45.0 kg per hour.

Historical catch from 1989–98, when it was known that recruitment was not affected by fishing effort, were used as the basis for calculating target total catch ranges for this stock [Gaughan and Santoro 2018] (950–1350 t). Total commercial catch for 2017 of 1184 t was within the target catch range [Gaughan and Santoro 2018, Kangas et al. 2015b].

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

On the basis of the evidence provided above, the Shark Bay Prawn Managed Fishery (Western Australia) management unit is classified as a **sustainable stock**.

**South West
Trawl
Managed
Fishery**

The South West Trawl Managed Fishery (Western Australia) (SWTMF) management unit is a comparatively small, low-activity fishery, in which effort has been related to either the abundance of Western King Prawn or Ballot's Saucer Scallop (*Ylistrum balloti*) in any given year, which can be highly variable

due to sporadic scallop recruitment. Only 2–4 vessels have operated in the fishery since 2005, and they have only covered approximately 1–3 per cent of the allowable fishery area [Gaughan and Santoro 2018]. Since 2005, until the last few years, an average of 168 boat days have been recorded annually, with a catch range of Western King Prawn of 3–14 t, compared to 490 boat days on average over the previous 10 years (1995–2004), with a catch range of 9–37 t. Only one boat fished in the SWTMF in 2017, for 41 days, due to low Ballot's Saucer Scallop abundance. The level of fishing pressure is unlikely to adversely impact the spawning biomass of Western King Prawn. The above evidence indicates that the fishing pressure is unlikely to cause the stock to become recruitment impaired. It also indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

On the basis of the evidence provided above, the South West Trawl Managed Fishery (Western Australia) management unit is classified as a **sustainable stock**.

Spencer Gulf Prawn Fishery

While time series and spatial distribution of commercial catches are presented by calendar year, the stock status for South Australia's Gulf St. Vincent Prawn Fishery and Spencer Gulf Prawn Fishery management units refer to the 2016–17 financial year as it more closely aligns with the fishing seasons for those fisheries (October–June or September).

The primary indicator for biomass and fishing mortality in Spencer Gulf is the weighted average catch rate of adult prawns (defined as 20 or fewer prawns per pound), obtained during fishery-independent surveys conducted yearly in November, February and April [PIRSA 2014]. This index of relative biomass is evaluated against limit and trigger reference points of 48 and 68 kg per hour, respectively, where the trigger reference point is considered to be the minimum catch rate at which future recruitment to the fishery will be adequate (that is, the level that delineates a stock status classification of 'sustainable' from 'depleting').

The most recent stock assessment [Noell and Hooper 2017] concluded that the fishery was sustainable in 2014–15 and 2015–16. In 2016–17, the weighted average catch rate was 107 kg per hour for adult prawns which was above the trigger reference point. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Fishery-independent surveys and fishery-dependent data have demonstrated a long history of stable recruitment (above the limit reference point of 1 225 recruits per nautical mile trawled) and commercial catch (generally between 1 600 and 2 400 t, Noell and Hooper 2017). The above 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 Prawn Fishery (South Australia) management unit is classified as a **sustainable stock**.

West Coast Prawn Fishery

The West Coast Prawn Fishery (South Australia) harvests from an oceanic stock that shows large fluctuations in recruitment, thought to be environmentally-driven [Carrick and Ostendorf, 2005, Carrick, 2008], and consequently has experienced large fluctuations in commercial catch. The Management Policy for the West Coast Prawn Fishery does not contain any defined reference levels of performance indicators [PIRSA 2010]. Proxies for biomass and fishing mortality for the West Coast biological stock are the total commercial catch and the annual average catch rate from fishery-independent surveys (conducted annually in March, June and November). Historical catch rate trends from fishery-independent surveys are considered to be a reliable proxy for biomass and fishing mortality because (1) the fishery-independent sampling design has remained relatively consistent since inception in 2002 and (2) there is contrast in

the data as they span the most recent low catch period from 2002 to 2007 and the more recent, relatively higher level.

The most recent stock assessment [Beckmann and Hooper unpublished] reported a total catch of 162 tonnes (t) during the 2017 season (calendar year), and this was above the 10 year mean (144 ± 12 t). The mean survey catch rate in 2017 was 53 ± 5 kg per hour; this was the lowest observed since 2012 but substantially higher than the low levels observed during 2002–06 (range: 13–29 kg per hour). 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 above 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 West Coast Prawn Fishery (South Australia) management unit is classified as a **sustainable stock**.

BIOLOGY

Western King Prawn biology [Kangas et al. 2015 a,b, Penn 1980, Noell and Hooper 2017]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Western King Prawn	2–3 years, maximum 4 years South Australia: males 46 mm CL, females 57 mm CL Western Australia: males 45 mm CL, females 60 mm CL	6–7 months, 25 mm CL

DISTRIBUTION



Distribution of reported commercial catch of Western King Prawn

TABLES

Commercial Catch Methods	Queensland	South Australia	Western Australia
Otter Trawl	✓	✓	✓
Fishing methods			

	Queensland	South Australia	Western Australia
Commercial			
Otter Trawl	✓	✓	✓
Recreational			
Dip Net			✓
Diving			✓
Hand collection			✓
Management Methods			
	Queensland	South Australia	Western Australia
Commercial			
Catch limits		✓	
Effort limits	✓	✓	✓
Limited entry	✓	✓	✓
Spatial closures	✓	✓	✓
Vessel restrictions	✓	✓	✓
Recreational			
Bag limits			✓
Charter licensing			✓
Gear restrictions			✓
Limited entry			✓
Passenger restrictions			✓
Recreational fishing licence			✓
Spatial zoning			✓
Active Vessels			
	Queensland	South Australia	Western Australia
	110 in ECOTF,	10 Licences in GSVPF, 39 Licences in SGPF, 3 Licences in WCPF,	<3 in BPF, 6 in EGPMF, 4 in NBPMF, 18 in SBPMF, <3 in SWTMF,

ECOTF East Coast Otter Trawl Fishery(QLD)

GSVPF Gulf St Vincent Prawn Fishery(SA)

SGPF Spencer Gulf Prawn Fishery(SA)

WCPF West Coast Prawn Fishery(SA)

BPMF Broome Prawn Managed Fishery(WA)

EGPMF Exmouth Gulf Prawn Managed Fishery(WA)

NBPMF Nickol Bay Prawn Managed Fishery(WA)

SBPMF Shark Bay Prawn Managed Fishery(WA)

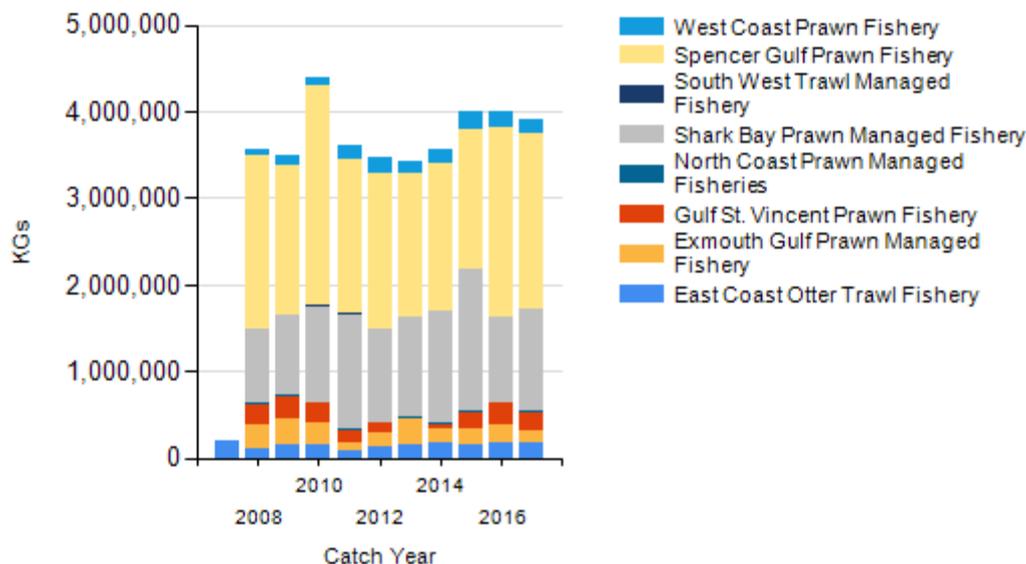
SWTMF South West Trawl Managed Fishery(WA)

Catch	Queensland	South Australia	Western Australia
Commercial	175.79t in ECOTF,	236.792t in GSVPF, 2010.5t in SGPF, 162.09t in WCPF,	0.0665t in BPMF NBPMF, 130.141t in EGPMF, 1184.18t in SBPMF,
Indigenous	0t	Unknown	Unknown
Recreational	0t	0t	Unknown

ECOTF East Coast Otter Trawl Fishery (QLD), GSVPF Gulf St Vincent Prawn Fishery (SA), SGPF Spencer Gulf Prawn Fishery (SA), WCPF West Coast Prawn Fishery (SA), BPMF Broome Prawn Managed Fishery (WA), EGPMF Exmouth Gulf Prawn Managed Fishery (WA), NBPMF Nickol Bay Prawn Managed Fishery (WA), SBPMF Shark Bay Prawn Managed Fishery (WA), SWTMF South West Trawl Managed Fishery (WA), BPMF || NBPMF Various Fisheries combined due to 3 boat rule (WA),

Queensland - Indigenous In Queensland, under the *Fisheries Act 1994* (Qld), Indigenous fishers in Queensland are able to use prescribed traditional and non-commercial fishing apparatus in waters open to fishing. Size and possession limits, and seasonal closures do not apply to Indigenous fishers. Further exemptions to fishery regulations may be applied for through permits.

CATCH CHART



Commercial catch of Western King Prawn - note confidential catch not shown

EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

ENVIRONMENTAL EFFECTS on Western King Prawn

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