Western King Prawn (2020)

Melicertus latisulcatus

Craig Noell: South Australian Research and Development Institute, **Crystal Beckmann**: South Australian Research and Development Institute, **Lachlan McLeay**: South Australian Research and Development Institute, **Mervi Kangas**: Department of Primary Industries and Regional Development, Western Australia, **Anthony Roelofs**: Department of Agriculture and Fisheries, Queensland

STOCK STATUS OVERVIEW

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

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—Exmouth Gulf Prawn Managed Fishery, North Coast Prawn Managed Fisheries, Shark Bay Prawn Managed Fishery, South West Trawl Managed Fishery (Western Australia); East Coast Otter Trawl Fishery (Queensland); Gulf St. Vincent Prawn Fishery, Spencer Gulf 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 45.9 kg per day, nominal catch rates for 2019 were at the upper end of this range [QFISH 2020]. 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 and effort (days fished) in 2019 were similar to 2013 when catches were below historical averages [QFISH 2020]. 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. Fishery-independent sampling of the spawning stock has been undertaken since 2016 and will be utilised in combination with the fishery dependent data when a sufficient time series is available. 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 2019, the Western King Prawn fishery-independent survey mean recruitment index was 47.6 kg per hour, well above 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 2019, the mean commercial catch rate was 30.4 kg per hour, above the target (25 kg per hour) [DoF 2014]. The fishery-independent survey in 2019 indicated a mean catch rate of 40.3 kg per hour in August and 29.2 kg per hour in September with an average over that period of 34.8 kg per hour, well above the target reference level [25 kg/hr, DOF 2014].

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 2020] (350–500 tonnes (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 more recent years (2007–16) of production, sets a revised catch range of 100-450 t and a mean catch rate target (11 kg per hour; range 5–19 kg per hour). The commercial catch for 2019 of 194 t was within the target range as was the mean commercial catch rate (7.9 kg per hour).

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 (CPUE); 2) standardised fishery-independent survey (FIS) CPUE; and 3) the Fisheries Recruitment Index (FRI). These are the primary indicators for biomass and fishing mortality.

The most recent stock assessment report was completed in 2020 [McLeay and Hooper 2020] and used data to the end of the 2019–20 season (1 November 2019–31 July 2020). In 2019–20, the total commercial catch of Western King Prawn in the Gulf St. Vincent Prawn Fishery was 132 t obtained from 204 vessel-nights that comprised 82 per cent of the Total Allowable Commercial Effort of 250 vessel-nights.

In 2019–20, standardised annual commercial CPUE was 792 kg per block per vessel-night, which was a 9 per cent decrease since 2018–19 (866 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). From 2013–14 to 2017–18, estimates of standardised FIS CPUE remained within the high range defined for this performance indicator (≥30 kg per trawl-shot). Since 2017–18, standardised FIS CPUE has decreased, and in 2019–20 was 22.1 kg per trawl-shot, which is within the trigger range defined for this performance indicator (≥20.0 to <25.0 kg per trawl-shot) [PIRSA 2017]. Estimates of FRI have remained in the high range defined for this performance indicator (≥ 600 recruits/h) in five out of seven surveys since 2014–15. In 2019–20, the FRI was 597 recruits/h and in the target range of ≥450 to <600 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 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 2020]. Total commercial catch for 2019 was 5.5 tonnes with the Nickol Bay prawn fishery landing the majority of the total catch. Only in the Broome Prawn Managed Fishery is Western King Prawn historically 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 briefly fished in this fishery and then only when transiting through the area to other more productive fisheries. No prawn landings were recorded in the Broome fishery in 2019. 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] hence low catches.

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 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 is 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 declined between 2012 and 2018 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. In 2019 the size composition for recruiting Western King Prawn had increased but not to sizes observed prior to 2012.

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 2019 indicated a mean catch rate (92.1 kg per hour) which was well above the target level, with a catch prediction between 800 and 1200 t [Gaughan and Santoro 2020]. 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 2019, the mean spawning stock survey catch rate was 61.2 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 2020] (950–1350 t). Total commercial catch for 2019 of 878 t was in the predicted range but below the target catch range [Gaughan and Santoro 2020, Kangas et al. 2015b]. Due to the lower recruitment level and reduced size of individual recruiting prawns which in combination with changes in the environmental conditions in Shark Bay precautionary management through reduction in overall effort was iimplemented for 2020.

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

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

Managed Fishery

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 2020]. Since 2005, until the last few years, an average of 168 boat days was 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 2019, for 32 days. The level of fishing pressure is unlikely to adversely impact the spawning biomass of Western King Prawn. 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 South West Trawl Managed Fishery (Western Australia) management unit is classified as a **sustainable stock**.

Spencer Gulf Prawn Fishery

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').

In 2019-20, the weighted average catch rate was 113 kg per hour for adult prawns which was above the trigger reference point. 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 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 Spencer Gulf Prawn Fishery management unit is classified as a **sustainable stock**.

West Coast Prawn Fishery

The West Coast Prawn Fishery harvests the Western King Prawn 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 harvest strategy for the West Coast Prawn Fishery includes defined performance indicators and associated reference levels (PIRSA 2019). Average catch rate is considered a proxy for biomass and mortality and is used as the primary performance indicator to assess this fishery. This performance indicator is the average of two key indicators; (1) nominal commercial catch per unit effort (CPUE) from at least three months of commercial fishing between March and September and (2) average fishery-independent survey CPUE measured from the March and June surveys undertaken in Venus Bay. Average catch rate is 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 2020] reported a total catch of 84 t during the 2019 season (calendar year), and this was below

the 10 year mean (147 t). The average catch rate in 2019 was 53 kg per hour; this was below the trigger reference point (54 kg per hour). In 2019, average catch rate declined by 37 per cent from 2018 (68 kg per hour) and this was the fourth year of successive decline since 2015. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. However, the above evidence indicates that, for the period from 2015–2019, the biomass declined and that the current level of fishing mortality is likely 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 **depleting stock**.

BIOLOGY

Western King Prawn biology [Kangas et al. 2015 a,b, Penn 1980, Noell and Hooper 2019]

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

Fishing methods			
	Queensland	South Australia	Western Australia
Commercial			
Otter Trawl	✓	✓	✓
Recreational			

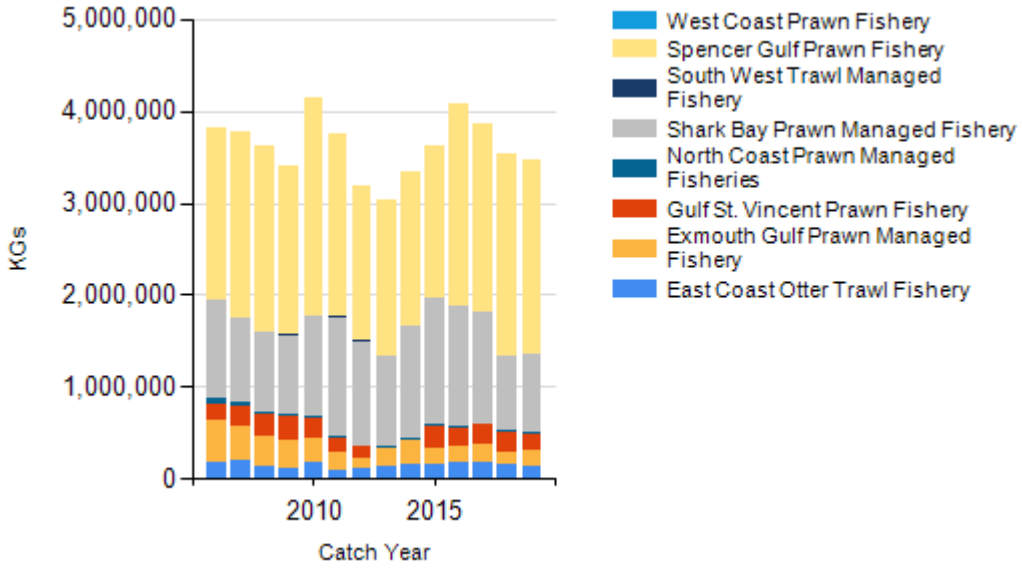
Dip Net			✓
Diving			✓
Hand collection			✓
Unspecified			✓

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			✓

Catch			
	Queensland	South Australia	Western Australia
Commercial	131.269 t	2333.36 t	1012.3 t
Indigenous	Unknown	Unknown	Unknown
Recreational	0t	0t	Unknown

Queensland – Indigenous (management methods) for more information see https://www.daf.qld.gov.au/business-priorities/fisheries/traditional-fishing

CATCH CHART



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

References

Beckmann and Hooper 2020,	Beckmann, CL and Hooper, GE 2020, Stock status report for the West Coast Prawn (Penaeus (Melicertus) latisulcatus) fishery in 2019. Report to PIRSA Fisheries and Aquaculture, South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000772-11, SARDI Research Report Series No. 1069, 24 pp.
Caputi et al. 1998,	Caputi, N, Penn, JW, Joll, LM and Chubb, CF 1998, Stock-recruitment-environment relationships for invertebrate species of Western Australia. Canadian Journal of Fisheries and Aquatic Sciences Special Publication, 125: 247–255.
Caputi et al. 2014a,	Caputi , N, de Lestang, S, Hart, A, Kangas, M, Johnston, D and Penn, J 2014a, Catch predictions in stock assessment and management of invertebrate fisheries using pre-recruit abundance—case studies from Western Australia, Reviews in Fisheries Science and Aquaculture, 22 (1) 36–54.
Caputi et al. 2014b,	Caputi, N, Feng, M, Pearce, A, Benthuysen, J, Denham, A, Hetzel, Y, Matear, R, Jackson, G, Molony, B, Joll, L and Chandrapavan, A 2014b, Management implications of climate change effect on fisheries in Western Australia: Part 1, final report, Fisheries Research and Development Corporation, project 2010/535, Fisheries Research Report, Western Australian Department of Fisheries.
Carrick 2003,	Carrick, NA 2003, Spencer Gulf Prawn (Melicertus latisulcatus) Fishery, Fishery Assessment Report to Primary Industries and Regions South Australia Fisheries, South Australian Research and Development Institute publication RD03/0079-2, SARDI Research Report Series 161, SARDI, Adelaide.
Carrick 2008,	Carrick, N 2008, Determining the impact of environmental variability on the sustainability, fishery dynamics and economic performance of the West Coast Prawn Fishery, final report, Fisheries Research and Development Corporation project 2005/082, FRDC and Fisheries and Environmental Consulting Services, Canberra.
Carrick and Ostendorf 2005,	Carrick, NA and Ostendorf, B 2005, Modelling prawn movement and spatial dynamics in the Spencer Gulf and West Coast Prawn Fisheries. Canberra, Australia.
DoF 2018,	DoF 2018, Exmouth Gulf Prawn Managed Fishery Harvest Strategy 2014–2019. Fisheries Management Paper No. 265. Department of Fisheries.
DoF 2014,	DoF 2014, Shark Bay Prawn Managed Fishery Harvest Strategy 2014–2019. Fisheries Management Paper No. 267. Department of Fisheries, WA.
Gaughan and Santoro 2020,	Gaughan, D and Santoro, K (eds.) 2020, State of the Fisheries and Aquatic Resources Report 2018/19, Western Australian Department of Primary Industries and Regional Development, Perth.
Grey at al. 1983,	Grey, DL, Dall, W and Baker, A 1983, A Guide to the Australian Penaeid Prawns, Northern Territory Department of Primary Production, Darwin.
Kangas et al. 2015a,	Kangas, MI, Sporer, EC, Hesp, SA, Travaille, KL, Moore, N, Cavalli, P and Fisher, EA 2015a, Exmouth Gulf Prawn Managed Fishery, Western Australian Marine Stewardship Council Report Series, 1: 273 pp.
Kangas et al. 2015b,	Kangas, MI, Sporer, EC, Hesp, SA, Travaille, KL, Brand-Gardner, SJ, Cavalli, P and Harry, AV 2015b, Shark Bay Prawn Managed Fishery, Western Australian Marine Stewardship Council Report Series, 2: 294 pp.

McLeay and Hooper 2020	McLeay, LJ and Hooper, GE 2020, Gulf St Vincent Prawn Penaeus (Melicertus) latisulcatus Fishery 2019/20. Fishery assessment report to PIRSA Fisheries and Aquaculture, South Australian Research and Development Institute (Aquatic Sciences), Adelaide, SARDI Publication No. F2007/000782-10, SARDI Research Report Series No. 1073, 44pp.
Pears et al. 2012,	Pears, RJ, Morison, AK, Jebreen, EJ, Dunning, MC, Pitcher, CR, Courtney, AJ, Houlden, B and Jacobsen, IP 2012, Ecological risk assessment of the East Coast Otter Trawl Fishery in the Great Barrier Reef Marine Park: technical report, Great Barrier Reef Marine Park Authority, Townsville.
Penn 1980,	Penn, JW 1980, Spawning and fecundity of the western king prawn, Penaeus latisulcatus, Kishinouye, in Western Australian waters, Australian Journal of Marine and Freshwater Research 31: 21–35.
Penn 1984,	Penn, JW 1984, The behaviour and catchability of some commercially exploited penaeids and their relationship to stock and recruitment, in: Gulland, JA and Rothschild, BJ (eds.), Penaeid shrimps – their biology and management, Fishing News Books Ltd, Farnham, pp. 173–186.
Penn and Caputi 1986,	Penn, JW and Caputi, N 1986, Spawning stock-recruitment relationships and environmental influences on the brown tiger prawn (Penaeus esculentus) fishery in Exmouth Gulf, Western Australia. Australian Journal of Marine and Freshwater Research, 37: 491–505.
PIRSA 2010,	PIRSA 2010, Management policy for the commercial West Coast Prawn Fishery. p. 18: Primary Industries and Resources SA.
PIRSA 2014,	PIRSA 2014, Management Plan for the South Australian Commercial Spencer Gulf Prawn Fishery, South Australian Fisheries Management Series, no. 74, Primary Industries and Regions South Australia, Adelaide.
PIRSA 2017,	PIRSA 2017, Management Plan for the South Australian Commercial Gulf St Vincent Prawn Fishery, South Australian Fisheries Management Series, no. 67, Primary Industries and Regions South Australia, Adelaide.
Pitcher et al. 2007,	Pitcher, CR, Doherty, P, Arnold, P, Hooper, J, Gribble, N, Bartlett, C, Browne, M, Campbell, N, Cannard, T, Cappo, M, Carini, G, Chalmers, S, Cheers, S, Chetwynd, D, Colefax, A, Coles, R, Cook, S, Davie, P, De'ath, G, Devereux, D, Done, B, Donovan, T, Ehrke, B, Ellis, N, Ericson, G, Fellegara, I, Forcey, K, Furey, M, Gledhill, D, Good, N, Gordon, S, Haywood, M, Jacobsen, I, Johnson, J, Jones, M, Kinninmoth, S, Kistle, S, Last, P, Leite, A, Marks, S, McLeod, I, Oczkowicz, S, Rose, C, Seabright, D, Sheils, J, Sherlock, M, Skelton, P, Smith, D, Smith, G, Speare, P, Stowar, M, Strickland, C, Sutcliffe, P, Van der Geest, C, Venables, W, Walsh, C, Wassenberg, T, Welna, A and Yearsley, G 2007, Seabed biodiversity on the continental shelf of the Great Barrier Reef World Heritage Area, Australian Institute of Marine Science, CSIRO, Queensland Museum, Queensland Department of Primary Industries and CRC Reef Research Centre, task final report, CSIRO Marine and Atmospheric Research.
Wise et al. 2007,	Wise, BS, ST John, J and Lenanton, R 2007, Spatial scales of exploitation among populations of demersal scalefish: Implications for management. Part 1: Stock status of the key indicator species for the demersal scalefish fishery in the West Coast Bioregion. Report to the FRDC on Project No. 2003/052. Fisheries Research Report No. 163. Department of Fisheries, WA, 130 pp.
SARDI, unpublished,	SARDI, unpublished, Spencer Gulf Prawn Fishery - 2019/20 stock status determination. Advice Note to PIRSA Fisheries and Aquaculture, 14 July 2020
QFISH 2020	QFish, Department of Agriculture and Fisheries, www.qfish.gov.au