

TIGER PRAWNS (2018)

Penaeus esculentus, Penaeus semisulcatus



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Commonwealth	Northern Prawn Fishery (Brown Tiger Prawn)	NPF	Sustainable	Spawning stock size, effort
Commonwealth	Northern Prawn Fishery (Grooved Tiger Prawn)	NPF	Sustainable	Spawning stock size, effort
Commonwealth	Torres Strait Prawn Fishery (Brown Tiger Prawn)	TSPF	Undefined	Biomass estimate, catch, effort
Western Australia	Exmouth Gulf Prawn Managed Fishery (Brown Tiger Prawn)	EGPMF	Sustainable	Biomass and recruitment surveys, catch, CPUE
Western Australia	North Coast Prawn Managed Fisheries (Brown Tiger Prawn)	KPMF, KPMF NBPMF OPMF, NBPMF, OPMF	Sustainable	Catch, effort
Western Australia	Shark Bay Prawn	SBPMF	Sustainable	Biomass and recruitment surveys, catch, CPUE

	Managed Fishery (Brown Tiger Prawn)			
Queensland	East Coast Otter Trawl Fishery (Brown and Grooved Tiger Prawn)	ECOTF	Sustainable	Biomass estimate, catch rate, catch, effort
New South Wales	New South Wales (Brown Tiger Prawn)	N/A	Negligible	

NPF Northern Prawn Fishery (CTH), TSPF Torres Strait Prawn Fishery (CTH), N/A Not Applicable (NSW), ECOTF East Coast Otter Trawl Fishery (QLD), EGPMF Exmouth Gulf Prawn Managed Fishery (WA), KPMF Kimberley Prawn Managed Fishery (WA), NBPMF Nickol Bay Prawn Managed Fishery (WA), OPMF Onslow Prawn Managed Fishery (WA), SBPMF Shark Bay Prawn Managed Fishery (WA), KPMF || NBPMF || OPMF Various Fisheries combined due to 3 boat rule (WA)

STOCK STRUCTURE

The standard name ‘Tiger Prawn’ refers to the species *Penaeus esculentus*, *P. semisulcatus* and *P. japonicus*. Only *P. esculentus* (Brown Tiger Prawn) and *P. semisulcatus* (Grooved Tiger Prawn) are considered in this chapter; *P. japonicus* is not caught commercially in Australian waters.

Brown Tiger Prawns are endemic to tropical and subtropical waters of Australia, while Grooved Tiger Prawns have a wider Indo–West Pacific distribution. There is some genetic evidence of separation of Brown Tiger Prawn stocks from the east and west coasts of Australia [Ward et al. 2006].

Here, assessment of stock status is presented at the management unit level—Northern Prawn Fishery (Brown Tiger Prawn), Northern Prawn Fishery (Grooved Tiger Prawn), Torres Strait Prawn Fishery (Brown Tiger Prawn) (Commonwealth); Shark Bay Prawn Managed Fishery (Brown Tiger Prawn), Exmouth Gulf Prawn Managed Fishery (Brown Tiger Prawn) (Western Australia), North Coast Prawn Managed Fisheries (Brown Tiger Prawn) (Western Australia); East Coast Otter Trawl Fishery (Brown and Grooved Tiger Prawn) (Queensland); and at the jurisdictional level—New South Wales (Brown Tiger Prawn).

STOCK STATUS

East Coast Otter Trawl Fishery (Brown and Grooved Tiger Prawn) The most recent stock assessment, using a weekly delay-difference analysis of catch and effort data up to 2013, estimated Tiger Prawn MSY in north and south Great Barrier Reef Marine Park (GBRMP) regions and the Brown Tiger Prawn MSY in Moreton Bay to be 1 107 t, 728 t and 197 t, respectively [Wang et al. 2015]. Eighty per cent of the 2017 total Tiger Prawn landings in Queensland were taken from the north and south GBRMP regions. Catches from these regions are estimated have been above MSY levels prior to 2000, reducing spawning stock biomass to 80–90 per cent of estimated BMSY, [Wang et al. 2015], although still well above a 0.2BMSY limit.

Average catches over 2000–12 declined by 69 per cent to well below MSY levels. Catches have increased since, but have remained below MSY in the south GBRMP region since 2000; in the north GBRMP region since 2007; and in Moreton Bay over 2007–16. The Moreton Bay catch increased in 2017 to exceed MSY by 23 per cent [QDAF 2018]. Nonetheless, since 2000, nominal annual catch rates have generally increased in high abundance grids in north and south GBRMP regions as well as in Moreton Bay [QDAF 2018], indicating increasing

biomass. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Prior to 2000, Tiger Prawn fishing effort levels in Queensland were at an historic high, averaging above 40 000 days per year [QDAF 2018]. From 2000–07 a 35 per cent decline in Tiger Prawn fishing effort occurred as a result of structural adjustment of the Queensland East Coast Trawl fleet, following expansion of GBRMP no-fishing zones; as well as due to adverse weather and economic conditions [Larcombe et al. 2016]. Since 2007, total Tiger Prawn effort has been consistently below the 2000–06 annual average of 29 826 days. Average annual fishing effort on the stock has increased by 8 per cent since 2009, but effort levels are still well below those required to achieve *MSY* (*EMSY*) in the north and south GBRMP region [QDAF 2018]. From 2009–15, Tiger Prawn effort in Moreton Bay was at about *EMSY*. In 2016–17 effort increased slightly above *EMSY*, but remained well below 5 710 days—the 95 per cent upper confidence limit for the *EMSY* [QDAF 2018].

The GBRMP ecological risk assessment found that overfishing risk was low for Brown Tiger Prawn, but was intermediate for Grooved Tiger Prawn at 2009 Tiger Prawn effort levels [Pears et al. 2012]. The Southern East Coast Trawl Fishery ecological risk assessment found that the overfishing risk for Brown Tiger Prawn south of the GBRMP was low at 2009 effort levels [Jacobsen et al. 2018]. This level of fishing pressure is unlikely to cause the stocks within the management unit to become recruitment impaired.

On the basis of the evidence provided above, the East Coast Otter Trawl Fishery (Queensland) Brown and Grooved Tiger Prawn management unit is classified as a **sustainable stock**.

**Exmouth
Gulf Prawn
Managed
Fishery
(Brown
Tiger
Prawn)**

Stock assessments for this management unit are undertaken using similar methods to those used in the Shark Bay Prawn Managed Fishery (Western Australia). The management objective is to maintain the spawning biomass (using catch rate as a proxy for biomass) above the historically determined biological reference points [Penn et al. 1995] with a target of 25 kg per hour and a limit of 10 kg per hour in the spawning stock surveys [DoF 2018]. Daily monitoring of catch rates ensure cessation of fishing when catch rates drop below the target level within the key spawning area or in early-August, whichever comes first. Three standardised Brown Tiger Prawn spawning stock surveys were carried out from August–October 2017, achieving an average catch rate of 44.9 kg per hour, well above the target level. The fishery has recovered from the effects of the 2010–11 marine heatwave [Caputi et al. 2014a, 2016] that may have affected survival of recruits in the inshore nursery habitat in recent years. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Standardised commercial catch per unit effort (*CPUE*) data are used as an additional indicator of abundance to monitor changes in stock levels from year-to-year. The commercial catches and catch rates are compared with 10 year (1989–98) reference points [Gaughan and Santoro 2018]. The 10 year reference point sets an annual target catch range of 250–550 t and the revised 2017 Brown Tiger Prawn catch prediction (based on the recruitment surveys) was 410–620 t. The total 2017 catch of 366 t was within the target catch range but below the 2017 catch prediction [Gaughan and Santoro 2018, Caputi et al. 2014b]. The level of fishing effort has reduced from historical levels of 35 000–50 000 hours (standardised to twin gear) to 24 000 trawl hours in 2017. The total number of vessels has also reduced significantly over time from 23 to six larger vessels operating with quad trawl gear. The above evidence indicates that the current level of fishing pressure is unlikely to cause the stock within the management unit to become recruitment overfished.

On the basis of the evidence provided above, the stock within the Exmouth Gulf Prawn Managed Fishery (Western Australia) Brown Tiger Prawn management

unit is classified as a **sustainable stock**.

New South Wales (Brown Tiger Prawn) Stock status for the New South Wales stock is reported as Negligible due to historically low catches in this jurisdiction, and the stock has generally not been subject to targeted fishing. The New South Wales commercial catch in 2012–17 averaged less than 0.5 per cent of landings from neighbouring jurisdictions, and Tiger Prawn is not a major component of recreational landings. Fishing is unlikely to be having a negative impact on the stock.

North Coast Prawn Managed Fisheries (Brown Tiger Prawn) Small quantities of Brown Tiger Prawns have been landed from the North Coast prawn fisheries in recent years, with Brown Tiger Prawn only being a key target species in the Onslow Prawn Managed Fishery. These fisheries use annual catch in reference to a target catch range as an indicator of acceptable performance and evaluating if the stock is subjected to overfishing. Where the annual catch falls outside of the range this needs to be adequately explained or additional investigations undertaken. In 2017, all the North Coast Prawn Managed Fisheries combined landed less than 10 t of Brown Tiger Prawn [Gaughan and Santoro 2018] reflecting the low effort expended in these fisheries, particularly for this species. Only one boat operated for five nights in total in the Onslow Prawn Managed Fishery in 2017. The fishing effort in the Kimberley and Nickol Bay Prawn Managed Fisheries is primarily directed at White Banana Prawns. The overall annual mean fleet effort in the Nickol Bay Prawn Managed Fishery was higher in 2017 due to a higher abundance of White Banana Prawns but very little effort was directed to Brown Tiger Prawns, which is reflected in the low landings. The overall annual mean fleet effort in the Nickol Bay Prawn Managed Fishery has reduced since 2007 with 700 boat days fished between 1990 and 2005 and in 2017 it was 283 boat days. In the Kimberley, the number of operators actively fishing each year has declined from around 20–50 boats (in excess of 1 000 boat days) in the 1990s and early 2000s to less than 15 since 2009 (less than 500 boat days). The above evidence indicates the biomass of this management unit is unlikely to be depleted and recruitment is unlikely to be impaired. Furthermore, the current level of fishing mortality 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) Brown Tiger Prawn management unit is classified as a **sustainable stock**.

Northern Prawn Fishery (Brown Tiger Prawn) Brown and Grooved Tiger Prawn stocks are assessed as part of an integrated bioeconomic model analysis conducted for the Northern Prawn Fishery (Commonwealth) [Buckworth et al. 2016]. The base-case estimate of the size of the Brown Tiger Prawn spawner stock at the end of 2015, as a percentage of spawner stock size (S) at maximum sustainable yield (MSY; S2015/SMSY), was 175 per cent [Buckworth et al. 2016]. This estimate is higher than the base-case estimate of the size of the Brown Tiger Prawn spawner stock at the end 2013 which was 140 per cent of SMSY. Based on this, the management unit is not considered to be recruitment impaired [Larcombe et al. 2018]. In 2015, fishing effort was only 36 per cent of the level that would achieve MSY [Buckworth et al. 2016]. This level of fishing pressure is unlikely to cause the management unit to become recruitment impaired.

On the basis of the evidence provided above, the Northern Prawn Fishery (Commonwealth) Brown Tiger Prawn management unit is classified as a **sustainable stock**.

Northern Prawn Fishery The base-case estimate of the size of the Grooved Tiger Prawn spawner stock at the end of 2015, as a percentage of spawner stock size at MSY (S2015/SMSY), was 185 per cent [Buckworth et al. 2016]. This estimate is higher than the base-

(Grooved Tiger Prawn)

case estimate of the size of the Grooved Tiger Prawn spawner stock at the end 2013, which was 173 per cent of SMSY. The management unit is not considered to be recruitment impaired [Larcombe et al. 2018]. In 2015, fishing effort on Grooved Tiger Prawns was 83 per cent of the level that would achieve MSY [Buckworth et al. 2016]. Based on the above, this level of fishing pressure is unlikely to cause the management unit to become recruitment impaired [Larcombe et al. 2018].

On the basis of the evidence provided above, the Northern Prawn Fishery (Commonwealth) Grooved Tiger Prawn management unit is classified as a **sustainable stock**.

Shark Bay Prawn Managed Fishery (Brown Tiger Prawn)

The status of Brown Tiger Prawn stocks is assessed annually using fishery-independent biomass and recruitment surveys and a weight-of-evidence approach that considers a range of relevant information [Wise et al. 2007]. The assessment approach is primarily based on separate monitoring of fishery-independent indices (survey catch rates) of recruitment and spawning stock levels relative to specified reference points [DoF 2014, 2015]. Surveys provide an index of annual recruitment that is used for predicting annual Brown Tiger Prawn catches. Other information collected throughout the season (for example, commercial catches, effort and environmental data) are also evaluated to provide insight into, for example, operational factors that might affect fishery performance, or spawning stock and environmental factors affecting prawn recruitment.

Standardised commercial CPUE data are used as an additional indicator of abundance, to monitor changes in stock levels from year-to-year. The annual commercial catches and catch rates are compared with 10 year (1989–98) average catch and catch rate reference points [Gaughan and Santoro 2018].

A spawning stock–recruitment relationship is evident for Brown Tiger Prawns [Caputi, 1993, Caputi et al. 1998, Penn et al. 1995] and therefore the maintenance of adequate spawning stock (using a target catch rate) to ensure adequate recruitment is the key management objective [Gaughan and Santoro 2018]. Brown Tiger Prawns are managed to achieve reference catch rate levels through control rules [DoF 2014, 2015] that trigger a management response in the form of either a review of season/management arrangements if catch rates are at, or below, a threshold reference level, or changes to management arrangements if catch rates are at, or below, the limit reference level. A mandatory closure of the Brown Tiger Prawn northern spawning area is also enforced from June onwards to protect the spawning stock. Once fishing ceases, fishery-independent surveys are conducted to verify catch rates in the closed northern and southern (open) spawning areas.

The June 2017 an initial northern spawning stock survey showed a mean standardised catch rate of 21 kg per hour, which was below the target level of 25 kg per hour [DoF 2014]. However, a second survey in August at the start of the main spawning season provided a catch rate of 28 kg per hour, which was above the target level. This standardised catch rate indicates that the biomass within this management unit is unlikely to be depleted and that recruitment is unlikely to be impaired.

The 10 year reference point sets an annual target catch range for the fishery of 400–700 t. For 2017, the Brown Tiger Prawn catch prediction (based on the recruitment surveys) was 305–460 t and the season catch achieved (422 t) were within the target catch range and the 2017 predicted catch range [Gaughan and Santoro 2018, Caputi et al. 2014b]. The level of fishing effort since 2007 has remained between 33 000 and 41 000 trawl hours (standardised to twin nets) with fishing effort in 2017 being 40 500 trawl hours. The combined evidence above indicates that the current level of fishing pressure is unlikely to cause the stock within the management unit to become recruitment impaired.

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

Torres Strait Prawn Fishery (Brown Tiger Prawn)

The most recent assessment of Brown Tiger Prawn in the Torres Strait Prawn Fishery (Commonwealth) used two separate modelling approaches, producing two separate estimates of MSY and effort at MSY (EMSY) [O'Neill and Turnbull 2006]. Some components of the assessment were updated in 2007 [Taylor et al. 2007], providing a biomass estimate of between 60 and 80 per cent of the unfished (1980) level in the year 2006. This was considerably higher than the biomass that supports MSY (BMSY) which was estimated to be in the range of 28–38 per cent of the unfished level) [O'Neill and Turnbull 2006, Taylor et al. 2007]. The outputs from the 2007 stock assessment for Brown Tiger Prawn have become less relevant over time, with increased uncertainty due to highly variable recruitment, short life span, changes in fleet dynamics and vessel efficiency, and changes in catch and effort. Additionally, nominal catch rates for Tiger Prawn have declined since 2013, but remain above levels reported in the 1990s and early 2000s [Turnbull and Cocking 2018]. Uncertainty around the current level of biomass is increasing with time since the assessment, and the cause of recent declines in catch rates is unclear. The 2007 stock assessment is no longer regarded as a sound basis for determining current levels of biomass depletion. The above evidence indicates uncertainty over whether the biomass of this management unit is recruitment impaired.

The 2007 stock assessment [Taylor et al. 2007] estimates of MSY ranged from 606 to 676 tonnes (t) and catch has been below those levels since 2005. The estimated fishing effort at MSY (EMSY) ranged from 8 245 to 9 197 fishing nights and, similarly, effort in the fishery has been well below those levels since 2004 with less than 50per cent of available fishing nights used each year since 2008. However, uncertainty around the current level of MSY, and therefore EMSY, is increasing with time since the most recent stock assessment. The above evidence indicates uncertainty over whether the current level of fishing pressure is likely to cause the management unit to become recruitment impaired.

On the basis of the evidence provided above, the Torres Strait Prawn Fishery (Commonwealth) Brown Tiger Prawn management unit is classified as an **undefined stock**.

BIOLOGY

Brown and Grooved Tiger Prawn biology [Kangas et al. 2015 a,b, Somers 1987, Yearsley et al. 1999]

Species	Longevity / Maximum Size	Maturity (50 per cent)
TIGER PRAWNS	1–2 years, 55 mm CL	East Coast: ~6 month, 32–39 mm CL West coast: ~6 months, 27–35 mm CL Northern Australia: ~6 months, 32–39 mm CL

DISTRIBUTION



Distribution of reported commercial catch of Tiger Prawns

TABLES

Commercial Catch Methods	Commonwealth	New South Wales	Queensland	Western Australia
Beam Trawl			✓	
N/A		✓	✓	
Otter Trawl	✓		✓	✓

Fishing methods			
	Commonwealth	Queensland	Western Australia
Commercial			
Beam Trawl		✓	
Otter Trawl	✓	✓	✓
Recreational			
Cast Net		✓	

Management Methods			
	Commonwealth	Queensland	Western Australia
Charter			
Possession limit		✓	
Commercial			
Effort limits	✓	✓	✓
Gear restrictions	✓	✓	✓
Limited entry	✓	✓	✓
Spatial closures	✓	✓	✓

Temporal closures	✓	✓	✓
Vessel restrictions	✓	✓	
Recreational			
Possession limit		✓	

Active Vessels	Commonwealth	New South Wales	Queensland	Western Australia
	52 Vessels in NPF, 13 Vessels in TSPF,	10 Fishing Business in EGF, 34 Fishing Business in OTF,	221 in ECOTF,	6 in EGPMF, 7 in KPMF, 7 in NBPMF, <3 in OPMF, 18 in SBPMF,

NPF Northern Prawn Fishery(CTH)

TSPF Torres Strait Prawn Fishery(CTH)

EGF Estuary General Fishery(NSW)

OTF Ocean Trawl Fishery(NSW)

ECOTF East Coast Otter Trawl Fishery(QLD)

EGPMF Exmouth Gulf Prawn Managed Fishery(WA)

KPMF Kimberley Prawn Managed Fishery(WA)

NBPMF Nickol Bay Prawn Managed Fishery(WA)

OPMF Onslow Prawn Managed Fishery(WA)

SBPMF Shark Bay Prawn Managed Fishery(WA)

Catch	Commonwealth	New South Wales	Queensland	Western Australia
Commercial	1080t in NPF, 111.026t in TSPF,		1618.26t in ECOTF,	366.253t in EGPMF, 9.427t in KPMF NBPMF OPMF, 421.514t in SBPMF,
Indigenous	Unknown		Unknown	No Catch
Recreational	Unknown		Unknown	No Catch

NPF Northern Prawn Fishery (CTH), TSPF Torres Strait Prawn Fishery (CTH), N/A Not Applicable (NSW), ECOTF East Coast Otter Trawl Fishery (QLD), EGPMF Exmouth Gulf Prawn Managed Fishery (WA), KPMF Kimberley Prawn Managed Fishery (WA), NBPMF Nickol Bay Prawn Managed Fishery (WA), OPMF Onslow Prawn Managed Fishery (WA), SBPMF Shark Bay Prawn Managed Fishery (WA), KPMF || NBPMF || OPMF Various Fisheries combined due to 3 boat rule (WA),

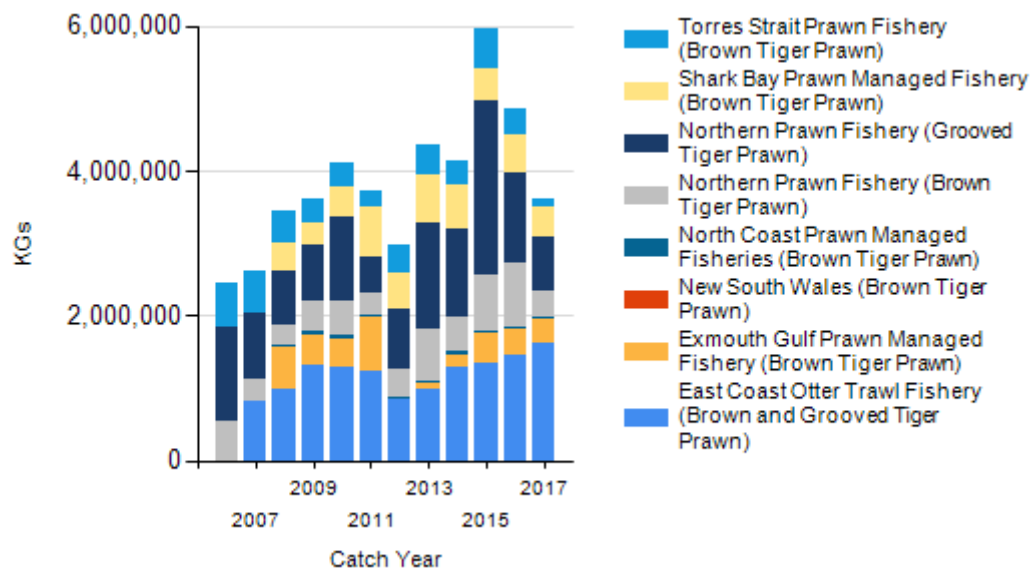
Commonwealth – Recreational The Australian Government does not manage recreational fishing in Commonwealth waters. Recreational fishing in Commonwealth waters is managed by the state or territory immediately adjacent to those waters, under its management regulations.

Commonwealth – Indigenous The Australian Government does not manage non-commercial Indigenous fishing in Commonwealth waters, with the exception of the Torres Strait. In general, non-commercial Indigenous fishing in Commonwealth waters is managed by the state or territory immediately adjacent to those waters. In the Torres Strait, both commercial and non-commercial Indigenous fishing is managed by the Torres Strait Protected Zone Joint Authority

(PZJA) through the Australian Fisheries Management Authority (Commonwealth); the Department of Agriculture, Fisheries and Forestry (Queensland); and the Torres Strait Regional Authority. The PZJA also manages non-Indigenous commercial fishing in the Torres Strait.

Queensland – Indigenous In Queensland, under the *Fisheries Act 1994* (Qld), Indigenous fishers 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 can be obtained through permits.

CATCH CHART



Commercial catch of Tiger Prawns - note confidential catch not shown

EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

ENVIRONMENTAL EFFECTS on TIGER PRAWNS

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