

# TIGER PRAWNS (2020)

*Penaeus esculentus, Penaeus semisulcatus*



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## STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Commonwealth	Northern Prawn Fishery (Brown Tiger Prawn)	Sustainable	Spawning stock size, effort
Commonwealth	Northern Prawn Fishery (Grooved Tiger Prawn)	Sustainable	Spawning stock size, effort
Commonwealth	Torres Strait Prawn Fishery (Brown Tiger Prawn)	Sustainable	Biomass estimate, catch, effort
Western Australia	Exmouth Gulf Prawn Managed Fishery (Brown Tiger Prawn)	Sustainable	Biomass and recruitment surveys, catch, CPUE
Western Australia	North Coast Prawn Managed Fisheries (Brown Tiger Prawn)	Sustainable	Catch, effort

Western Australia	Shark Bay Prawn Managed Fishery (Brown Tiger Prawn)	Sustainable	Biomass and recruitment surveys, catch, CPUE
Queensland	East Coast Otter Trawl Fishery (Brown and Grooved Tiger Prawn)	Sustainable	Biomass estimate, catch rate, catch, effort
New South Wales	New South Wales (Brown Tiger Prawn)	Negligible	

## STOCK STRUCTURE

The standard name ‘Tiger Prawn’ refers to the species *Penaeus esculentus*, *Penaeus semisulcatus* and *Penaeus 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) (Commonwealth); Torres Strait Prawn Fishery (Brown Tiger Prawn) (Jointly managed); 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 financial year, estimated the Maximum Sustainable Yield (MSY) for Tiger Prawns in the north and south Great Barrier Reef Marine Park (GBRMP) regions and for the Brown Tiger Prawn in Moreton Bay to be 1 107 tonnes (t), 728 t and 197 t, respectively [Wang et al. 2015]. Catches from these regions are estimated to 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. The assessment is due to be updated in 2020–21. Average catches over 2000 to 2012 declined by 69 per cent to well below MSY levels. Catches have increased since, and have been below MSY in the south GBRMP region since 2000; in the north GBRMP region since 2007; and in Moreton Bay from 2007 with the exception of 2017 when the catch exceeded MSY by 23 per cent [QFISH 2020].

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, 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 [Larcombe et al. 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 [QFISH 2020]. From 2005, Tiger Prawn effort in Moreton Bay has been below EMSY [QFISH 2020].

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 ensures 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 2019, achieving an average catch rate of 42.7 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 the years after the heatwave. 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 2019 Brown Tiger Prawn catch prediction (based on the recruitment surveys) was 370–550 t. The total 2019 catch of 418 t was within both the target catch and catch prediction ranges [Caputi et al. 2014b, Gaughan and Santoro 2020]. The level of fishing effort has reduced from historical levels of 35 000–50 000 hours (standardised to twin gear) to 24 599 trawl hours in 2019. 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**.

<b>New South Wales (Brown Tiger Prawn)</b>	<p>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 2014–19 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.</p>
<b>North Coast Prawn Managed Fisheries (Brown Tiger Prawn)</b>	<p>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 with reference to a target catch range as an indicator of acceptable performance and for evaluating whether 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 2019, all the North Coast Prawn Managed Fisheries combined landed 34 t of Brown Tiger Prawn [Gaughan and Santoro 2020] reflecting an increase in landings in Nickol Bay. The fishing effort in the Kimberley and Nickol Bay Prawn Managed Fisheries is primarily directed at White Banana Prawns and the overall annual mean fleet effort in the Nickol Bay Prawn Managed Fishery was higher in 2019 due to a higher abundance of White Banana Prawns which in turn resulted in an increased level of effort on Brown Tiger Prawn. 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 2019 it was 353 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). Only one boat operated for 28 nights in total in the Onslow Prawn Managed Fishery in 2019. 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.</p> <p>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 <b>sustainable stock</b>.</p>
<b>Northern Prawn Fishery (Brown Tiger Prawn)</b>	<p>The base-case estimate of the size of the Brown Tiger Prawn spawner stock at the end of 2017 as a percentage of spawner stock size at maximum sustainable yield (MSY) (S2017/SMSY) was 78 per cent (range across sensitivities 69–79 per cent) (Deng et al. 2018). The base-case estimate of the size of the spawner stock as a percentage of stock size at MEY (S2017/SMEY) was 75 per cent (range across sensitivities 67–76 per cent). These results indicate a decline in biomass compared with the 2015 assessment. This decline appears to be largely due to poor recruitment in recent years (Deng et al. 2018), which is of some concern, particularly if this trend continues. However, the abundance indices are within the range of historical variability (Deng et al. 2018), and the 2019 recruitment survey showed that recruitment increased in 2019 (Hutton 2019). For the most recent assessment, the estimate of effort in 2017 as a percentage of effort at MSY (E2017/EMSY) was 52 per cent. The estimate of effort in 2017 as a percentage of effort at MEY (E2017/EMEY) was 42 per cent. Catch of Brown Tiger Prawn in 2019 was 908 t, up from 366 t in 2018 and below the base-case estimate of MSY (1 083 t). Recent fishing pressure is unlikely to cause the management unit to become recruitment impaired [Parsa et al. 2020].</p> <p>On the basis of the evidence provided above, the Brown Tiger Prawn management unit in the Northern Prawn Fishery (Commonwealth) is classified as a <b>sustainable stock</b></p>

**Northern  
Prawn  
Fishery  
(Grooved  
Tiger  
Prawn)**

The base-case estimate of the size of the Grooved Tiger Prawn spawner stock at the end of 2017 as a percentage of spawner stock size at MSY ( $S_{2017}/S_{MSY}$ ) was 74 per cent (range across sensitivities 69–84 per cent) (Deng et al. 2018). The base-case estimate of the size of the spawner stock as a percentage of spawner stock size at MEY ( $S_{2017}/S_{MEY}$ ) was 63 per cent (range across sensitivities 58–64 per cent), indicating a substantial decline in biomass compared with the 2015 grooved tiger prawn assessment. This decline appears to be largely due to poor recruitment in recent years (Deng et al. 2018). For the most recent assessment, the estimate of effort in 2017 as a percentage of effort at MSY ( $E_{2017}/E_{MSY}$ ) was 49 per cent. The estimate of effort in 2017 as a percentage of effort at MEY ( $E_{2017}/E_{MEY}$ ) was 71 per cent. The 2019 catch of grooved tiger prawn (1 178 t) was up from 2018 (1097 t) but still below the base-case estimate of long-term average MSY (1 654 t). In summary, although spawner biomass has declined recently, these declines are within the range of historical variability. Recent fishing pressure is unlikely to cause the management unit to become recruitment impaired [Parsa et al. 2020].

On the basis of the evidence provided above, the Grooved Tiger Prawn management unit in the Northern Prawn Fishery (Commonwealth) 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 spawning 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 2020].

A spawning stock–recruitment relationship is evident for Brown Tiger Prawns [Caputi, 1993, Penn et al. 1995, Caputi et al. 1998] 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 2020]. Brown Tiger Prawns are managed to achieve target 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 2019 northern spawning area stock survey showed a mean standardised catch rate of 32.3 kg per hour, which was above the target level of 25 kg per hour [DoF 2014]. A second survey in July at the start of the main spawning season provided a catch rate of 17.4 kg per hour, below the target level, with the overall index for the two time periods at the target level of 25 kg per hour. 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 2019, the Brown Tiger Prawn catch prediction (based on the recruitment surveys) was 315–475 t and the season catch achieved (395 t) was just below the target catch range however within the 2019 predicted catch range [Gaughan and Santoro 2020, 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 2019 being 34 485 trawl hours. The combined evidence above indicates that the current level of fishing mortality 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 Torres Strait Prawn Fishery operates in the eastern part of the Torres Strait and south in nearby Queensland waters. This fishery is shared by Australia and Papua New Guinea under formal arrangements articulated in the Torres Strait Treaty. Brown Tiger Prawns are harvested at night using demersal otter trawl.

The last full stock assessment, using fishery-independent surveys and biological data, of Brown Tiger Prawn in Torres Strait was completed in 2006 (O'Neill and Turnbull 2006). Since the 2006 assessment, additional biological and stock structure information has been collected (Turnbull et al. 2009) and further assessments using updated catch-and-effort data have been conducted. The most recent assessment update was in 2019, using updated information on fishing power and catch-and-effort data up to 2018 (Turnbull 2019).

The 2019 assessment update indicates that Brown Tiger Prawn biomass has been steady over the recent decade, ranging between 60 per cent and 88 per cent of the unfished (1980) biomass. The assessment also found that fishing power has remained constant since 2000 (Turnbull 2019). The updated delay–difference model, using a Beverton–Holt spawner–recruitment curve and recent estimates of catch-per-unit-effort (CPUE), calculated MSY for tiger prawns to be about 617 t (90 per cent confidence interval (CI) 507–763 t), which is comparable with the 2006 assessment of MSY (676 t) (O'Neill and Turnbull 2006).

Estimated effort at MSY (EMSY) has dropped substantially, from 8 389 to 3 846 fishing nights (90 per cent CI 3 165–4 757 nights), because of the substantial increase in recent CPUE (mean ~160.3 kg/day) relative to that used in the 2006 assessment (mean ~73.5 kg/day) (O'Neill and Turnbull 2006; Turnbull 2019).

Except for 2017, recent nominal CPUE for Brown Tiger Prawn (100–200 kg/day) has remained generally well above levels reported in the 1990s and early 2000s (50–90 kg/day) (Turnbull and Cocking 2019).

Catch of Brown Tiger Prawn have fluctuated over time, closely linked to effort and ranging from a high of 965 t in 1998 to a low of 111 t in 2017. Catch has recently increased to 329 t in 2018 and 515 t in 2019.

Although some uncertainty remains for this stock due to the absence of fishery-independent data (and particularly an independent index of abundance), total effort and total catch in 2019 were substantially below the updated EMSY and MSY, and biomass appears to be substantially above the limit reference point [Butler and Steven 2020]. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. The above evidence also indicates that the current level of fishing mortality is

unlikely to cause the stock to become recruitment impaired.

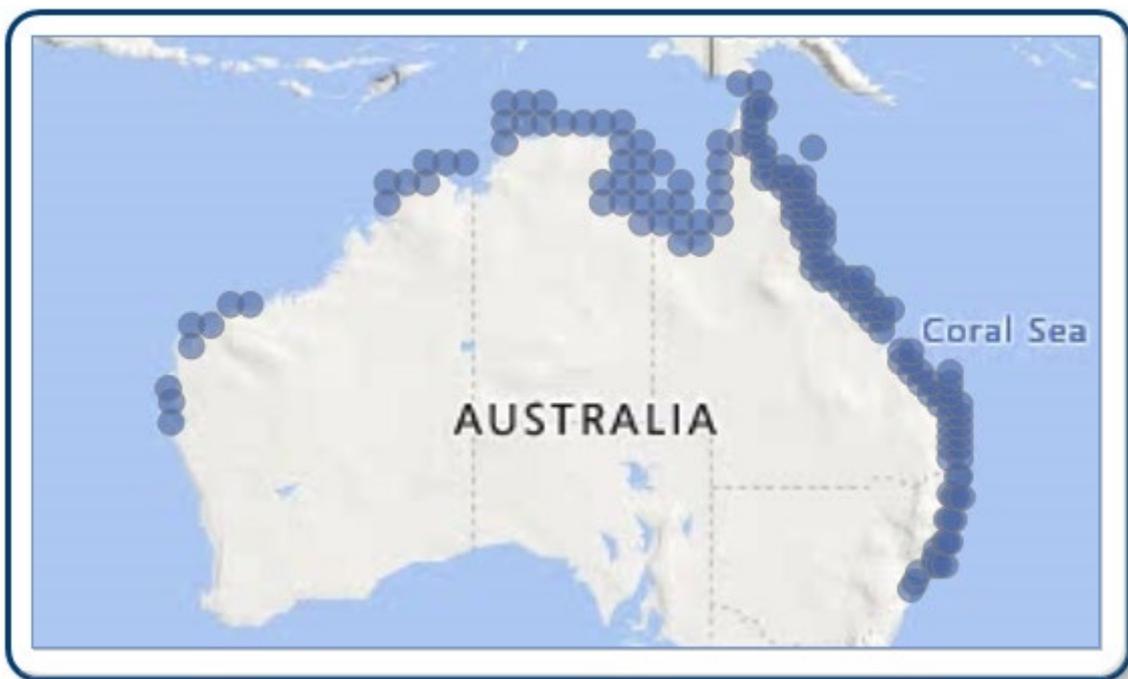
On the basis of the evidence provided above, the Torres Strait Prawn Fishery (Brown Tiger Prawn) management unit is classified as a **sustainable stock**.

## BIOLOGY

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

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

Fishing methods	Commonwealth	New South Wales	Queensland	Western Australia
<b>Commercial</b>				
Beam Trawl			✓	
Otter Trawl	✓		✓	✓
Various		✓		
<b>Recreational</b>				
Cast Net			✓	
Unspecified				✓

Management Methods			
	Commonwealth	Queensland	Western Australia
<b>Commercial</b>			
Effort limits	✓	✓	✓
Gear restrictions	✓	✓	✓
Limited entry	✓	✓	✓
Spatial closures	✓	✓	✓
Temporal closures	✓	✓	✓
Vessel restrictions	✓	✓	
<b>Recreational</b>			
Possession limit		✓	

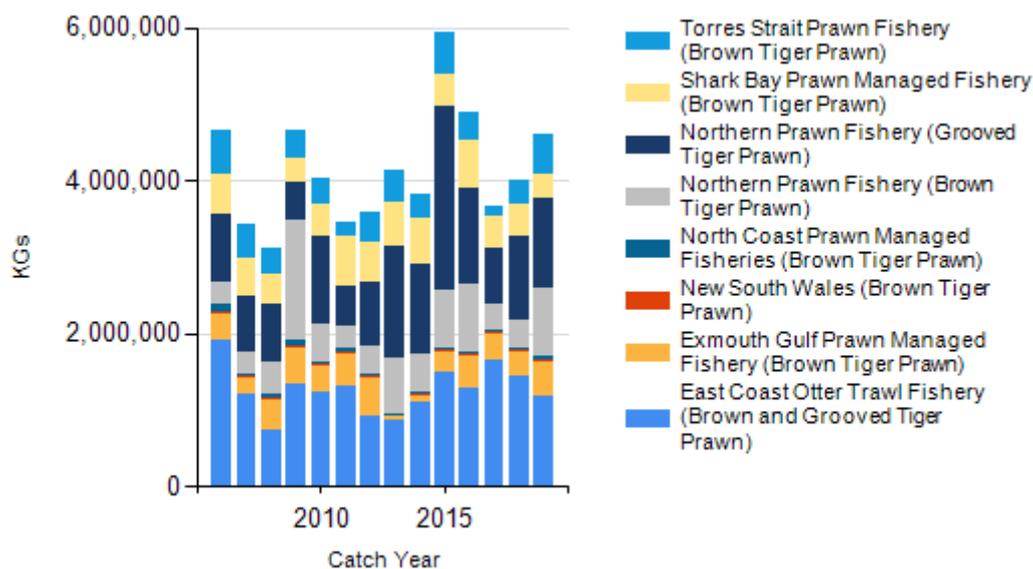
Catch				
	Commonwealth	New South Wales	Queensland	Western Australia
<b>Commercial</b>	2600.97 t	4.4004 t	1190.72 t	815.292 t
<b>Indigenous</b>	Unknown		Unknown	No Catch
<b>Recreational</b>			Unknown	No Catch

**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 (management methods)** for more information see <https://www.daf.qld.gov.au/business-priorities/fisheries/traditional-fishing>

## CATCH CHART



Commercial catch of Tiger Prawns - note confidential catch not shown

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