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TORRES STRAIT PRAWN FISHERY

DATA SUMMARY 2022

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Torres Strait Prawn Fishery Data Summary 2022

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Also note that this Data Summary is available on the PZJA website.

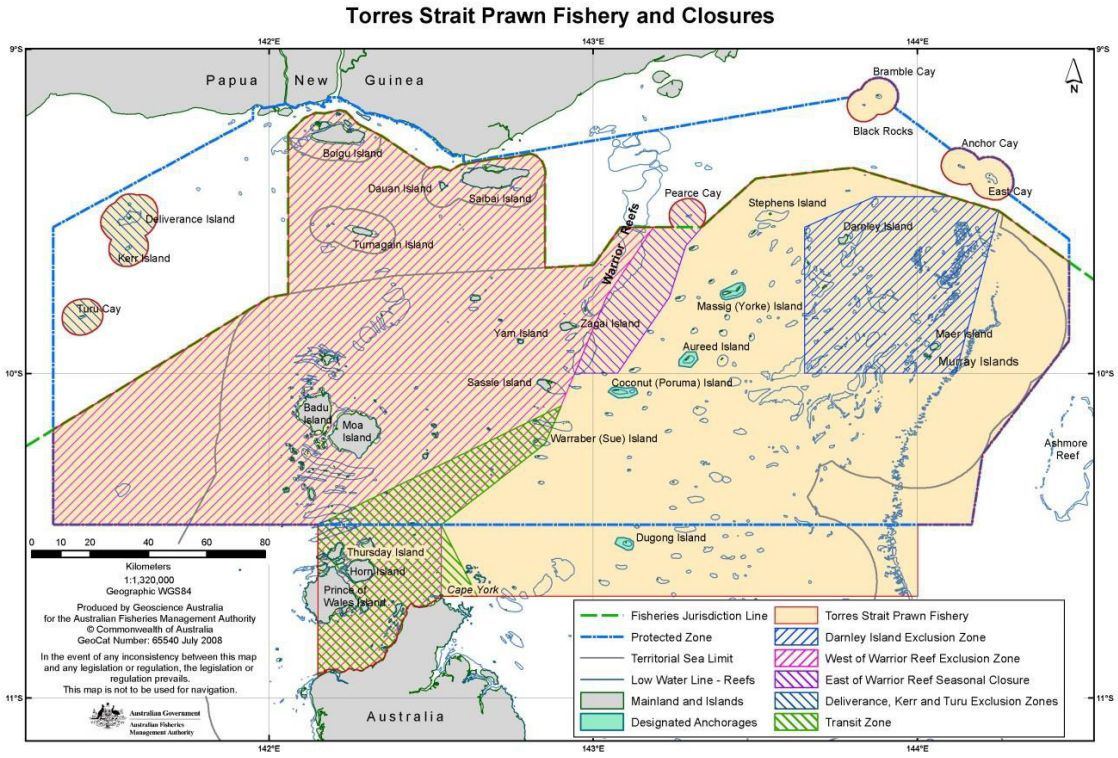
Contents

Introduction

This document summarises catch and effort information for the Torres Strait Prawn Fishery (TSPF) from the 2021 fishing season in comparison to previous years. The data summary is a valuable tool for providing feedback to stakeholders on logbook data received by AFMA. It is also used by the Torres Strait Prawn Management Advisory Committee in guiding management recommendations and discussions. The data summary is sent to license holders annually but is available to all stakeholders via the PZJA website (www.pzja.gov.au).

Thank you to the cooperative trawler skippers for submitting their logbook information, an essential record of catches and effort for the fishery has been built up over many years. This “time-series” of data spans 44 years (1978 to present) and is used to monitor trends in fishing effort, catches and catch rates by area (spatial trends), time (temporal trends) and species. A long time-series with wide variations in fishing effort and catches is needed for stock models. These models are used to estimate the level of fishing effort and catch that will ensure sustainability of the harvest while maximising the productivity of the fishery.

Description of the Torres Strait Prawn Fishery



The TSPF is a multi-species prawn fishery which operates in the eastern part of the Torres Strait. Brown tiger prawns (*Penaeus esculentus*) and blue endeavour prawns (*Metapenaeus endeavouri*) are the key target species. Red Spot king prawns (*Melicertus longistylus*), Moreton Bay bugs (*Thenus spp.*), scallops (*Amusium* spp.), slipper and shovel-nosed lobster (*Scyllaridae*) and squid (*Teuthooidea*) are taken as by-product.

Fishing is permitted in the TSPF from 1 February to 1 December each year and is limited by a Total Allowable Effort (TAE) in the form of fishing days. Individual fishers receive an annual use entitlement which is converted based on the TAE and the number of units of fishing capacity (UFC) they hold. Fishing for prawns in the TSPF occurs at night, primarily using the otter trawl method which involves towing two, three or four trawl nets behind a vessel. However, effort is referred to as fishing days due to definitions in the legislation. The TSPF has restrictions on the quantity of net (governed by head and footrope length) and length of vessel that can be used to operate in the fishery.

For detailed information on the management of the TSPF you can download the TSPF Handbook from the PZJA website (www.pzja.gov.au).

Data Collection Program

Logbooks

The PZJA collect data for the TSPF through both operator completed daily fishing logbooks and an automatic Vessel Monitoring System (VMS). The VMS is a satellite monitoring system which collects information on boat locations. A boat is recorded to be fishing if it moves more than 250m at any time between 1800 local time on that day and 0600 on the next day, isn't within a designated anchorage or if a boats VMS system is failing to poll.

VMS was introduced in 2005 and is mandatory on all boats in the TSPF. All TSPF operators are also required to complete a daily fishing logbook, which collects information on the boat, gear, area fishing and catch. The logbooks are available in electronic form, and are the simplest way to submit logbooks, avoiding the need to carry and order paper logbooks and manually submit logbooks which can sometimes be difficult to do at sea. Alternatively operators can complete the 'Northern and Torres Strait Prawn Fisheries Daily Fishing Log' (NP16), a paper logbook on a daily basis (see Torres Strait Fisheries Logbook Instrument 2015). Both paper logbook and e–log data are included in this data summary.

In 1993 each license holder was allocated a quota of "days of fishing access" which reduced the allowable effort in the fishery greatly. The allocation was based on their prior history of fishing in the TSPF and a manual reporting system was introduce to track the number of days that each vessel was within the Torres Strait Zone and hence deemed as fishing (1993-2004). This system was replaced by a VMS based quota tracking system in 2005 because there was full VMS coverage of the TSPF fleet.

Methods Used For Preparing Data Summary

The data used to prepare this summary is comprised of logbook information (NP16 and e-log) and Vessel Monitoring System data (VMS) data. VMS data is collected using satellite transceivers which can record the area fished and fishing speed, allowing AFMA to deduct days fished and monitor closed areas. This data is stored by AFMA. The data is checked using species and fishing positions constraints to identify any records that have been incorrectly assigned to the TSPF. These records are filtered out and returned to the AFMA data section for checking and correction.

Plots of fishing effort post 1988 are based on the number of daily vessel logbook records (days fished) and the VMS. The "VMS" days fished are slightly higher than the logbook "days fished" because vessels are automatically flagged as fishing when steaming at trawl speed or if the VMS unit fails to poll. Fishers can claim back these fishing days if they verify that they were not fishing but often do not if it is near the end of the season and they still have unused days.

Prior to 1989 there was only partial logbook coverage of the fishery. All NPF endorsed vessels were required to records their catches whilst in the TSPF and a small percentage of the non-NPF operators voluntarily filled out NPF logbooks. The unload records that were collected for the fishery during 1978 to 1988 allowed an estimate of "logbook coverage" for the years of partial logbook coverage (1980-88). This was used to estimate of the total number of days fished and vessel numbers for 1980 to 1988.

Summary of the 2022 fishing season

1. The 2022 tiger prawn catch rate (CPUE) of 207 kg/d was above the mean of 180 kg/d for 2009-2022 and the highest since the 2013 season. Similarly the 2022 endeavour prawn CPUE of 81 kg/d was above the mean of 58 kg/d for 2009-2022 and the highest since 2019.

2. Although the 265 tonne of tiger prawn and 87 tonne of endeavour prawn caught during the 2022 season were the highest since 2019, they were still below the 2009-2022 means of 329 and 106 tonne for tiger and endeavour prawn.

3. The 2022 fishing effort of 1303 days was slightly higher than the 1285 and 1036 days for 2021 and 2020. However the 2022 fishing effort was still below the mean of 1851 days for the years 2009-2022.

4. Comments from industry members suggest the lack of fishing effort during the 2020 season was a result of; the COVID-19 pandemic, good catch rates for prawn on the Queensland east coast, and less frequent mothership operations into the Torres Strait. These factors encouraged many of the TSP endorsed fishers to operate closer to their home port to where fuel, travel and transport costs are lower.

5. In conclusion, the low fishing effort in the TSPF during the 2020 and 2021 and to a lesser extent the 2022 season, despite higher than average tiger prawn CPUE and average endeavour prawn CPUE can be attributed to the ongoing COVID-19 pandemic combined with the higher cost and difficulty of operating in a remote fishery.

Fishing Effort and Catch Data for the Torres Strait Prawn Fishery

Total fishing days in the area of the fishery

The total percentage of days used in 2022 (Figure 1) was 19% of the allowable Australian proportion of the effort (6,867 days). Post 2005 the percentage of days used by Australian vessels has ranged from 70% (2007) to 14% (2017). Note that 2006 was the first year where the TAE of 9200 days applied.

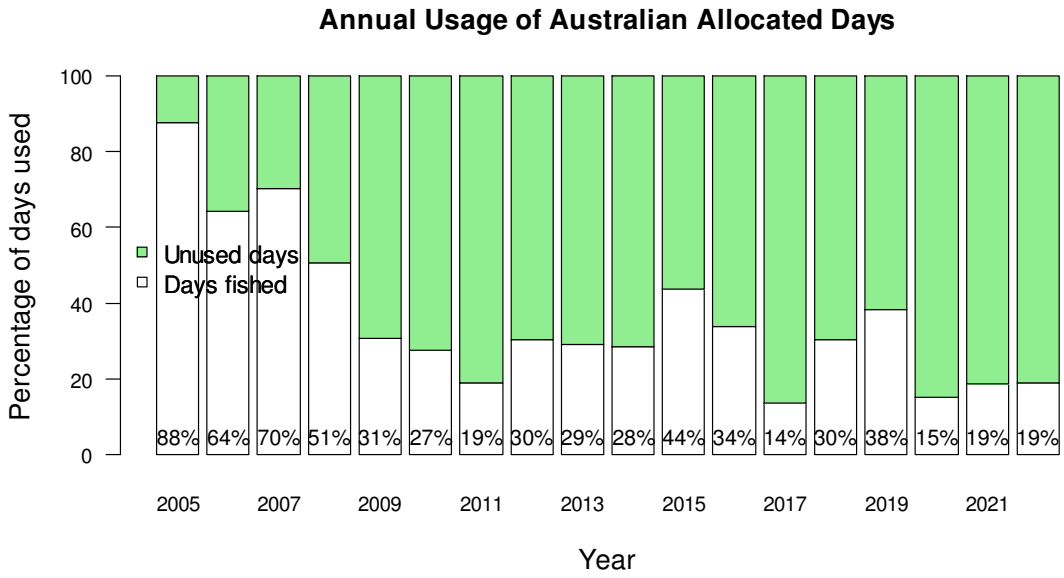


Figure 1 Proportion of the total TSPF Australian allocation (total of 6,867) of fishing days fished in each season since 2005.

Fishing Effort and Catch by year

The historical fishing effort in the TSPF is plotted in Figure 2 as days fished and number of active vessels. Fishing effort increased from an estimated 3000 days in the early 1980's to around 10,000 days during 1991-2003, then decreased to around 2,000 days by 2008 and has oscillated around 2,000 during the last ten years.

The number of vessels fishing in the TSPF has decreased from 115 vessels in 1989 to around 20 vessels over the last ten years. The estimated number of vessels active in the fishery prior to 1989 was about 100 vessels (Figure 2). Note that the estimates of total active vessels for 1980 and 1988 are unrealistically high. This is probably a result of the low logbook coverage for those years (<14%) and NPF endorsed vessels fishing Torres Strait for a few days on their way to or from the Northern Prawn Fishery.

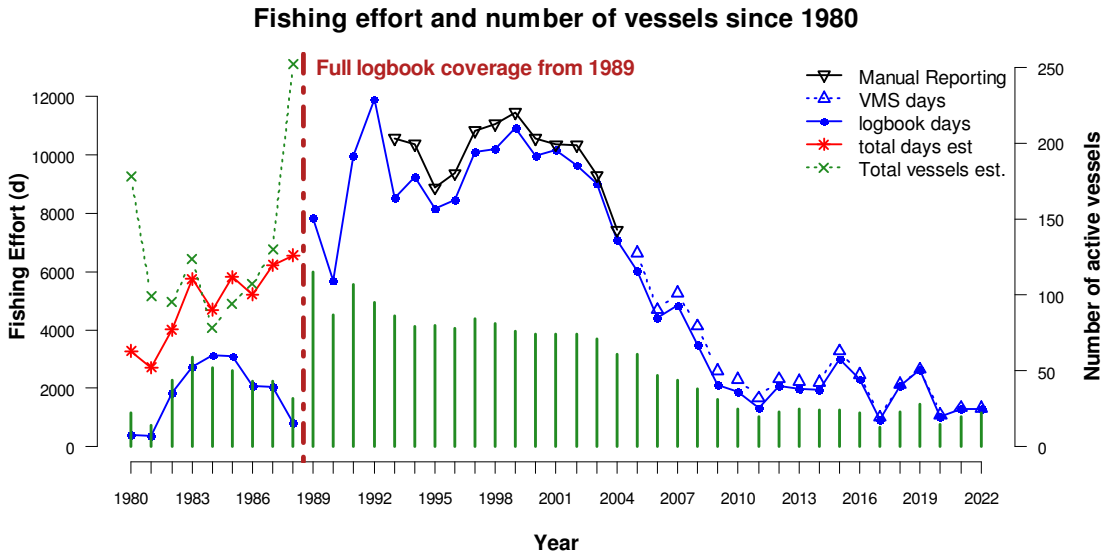


Figure 2 The total days fished in the Torres Strait Prawn Fishery since 1980; displayed as manually reported fishing days (1993-2004), quota usage from the Vessel Monitoring System (2005-2022), logbook days (1980-2022). The "Total Days est." (1980-1988) is from logbook days adjusted by the logbook coverage of the total catch. The green vertical lines show the number of active vessels each year based on the logbook data. The yearly estimates of all active vessels during 1980-88 are plotted as "Vessel Number est". Note there was only partial coverage of the fishery by logbooks prior to 1989.

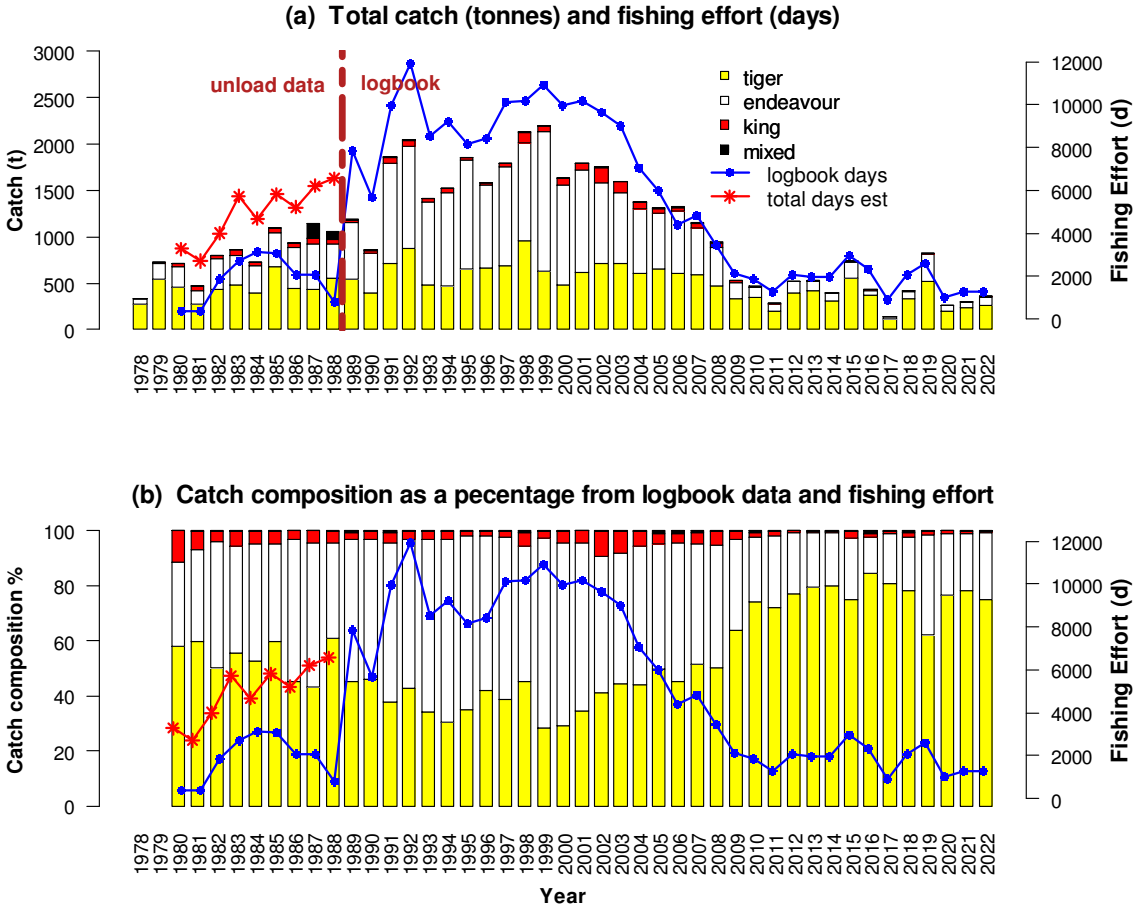


Figure 3 (a) Total catch in tonnes from unload data (1978-1988) and logbook day (1989-2022). Fishing effort (days) is from logbook data (1989-2022) and the "total days estimate" for 1980-88 is

from logbook data adjusted by the logbook coverage. (b) Catch composition as a percentage from logbook data. Note that the 1980-1988 logbook data is from a subset of the fleet.

Table 1 Summary of catches and fishing effort over 4 time periods between 1978 and 2021.

Fishing period	Years	Annual fishing effort	Number of vessels	Annual tiger prawn catches (t)	Annual endeavour prawn catches (t)
Developmental period	1978 to 1991	Increased from 3000 to 9978 days	NA	Increased from 340 to 1871 (combined tiger and endeavour)	
Period of highest fishing effort	1991 to 2003	9699 mean (8155:11903)	81 mean (71:107)	668 mean (465:965)	1044 mean (758:1511)
Decreasing fishing effort	2003 to 2008	Decreased from 8996 to 3477 days	NA	Decreased from 712 to 441 tonnes	Decreased from 758 to 420 tonnes
Post 2008	2009 to 2022	1881 mean (935:3002)	23 mean (13:31)	329 mean (111:559)	106 mean (25:299)

Based on the history of fishing effort and catches (Figures 2, 3 and Table 1) there are four distinct time-periods for the TSPF.

1. "Developmental period" 1978–1991; annual fishing effort increased from an estimated 3000 days in the early 1980's to 9,978 days in 1991 when there were 107 active vessels. The prawn catch increased from 340 tonnes of mainly tiger prawn (83%) in 1978 to 1,871 tonnes that was 58% endeavour prawn in 1991.

2. "Period of highest fishing effort" 1991-2003; the mean annual fishing effort was 9699 (8155:11903)[1] days by 81 (71:107) vessels. The mean annual catches were 668 (465:965) tonnes of tiger prawn and 1044 (758:1511) tonnes of endeavour prawn. The annual catches are similar to the Maximum Sustainable Yield (MSY) estimates from stock assessments; 676 (95%CI[2] 523:899) tonnes for tiger prawn (O'Neill and Turnbull 2006) and 1105 (95%CI 1060:1184) tonnes for endeavour prawn (Turnbull et.al 2009). The 2004 tiger prawn stock assessment estimated the fishing effort that should produce a tiger prawn catch of MSY (E_{mys}) as being 9197 (95% CI 7116:11907) days.

3. "Decreasing fishing effort" 2003–2008; fishing effort decreased from 8996 days in 2003 to 3477 days in 2008. At the same time endeavour catch dropped significantly (45%) from 758 to 420 tonnes in 2008. There was a smaller decrease (38%) in tiger prawn catch from 712 to 441 tonnes.

[1] The numbers in brackets are the range; minimum : maximum.
[2] 676 is the mean estimate of MSY and 95% of the model estimates lie between 523 and 899 tonnes i.e. the 95% Confidence Interval

4. “Post 2008” (2009–2022); the mean annual fishing effort was 1851 (935:3002) days by 23 (13:31) vessels. The mean annual tiger and endeavour prawn catches were 329 (111:559) and 106 (25:299) tonnes. The 2016 season had the highest percentage of tiger prawn (85%) since 1978 (Figure 3b).

During discussions with TSPF fishers it was hypothesized that the decline in fishing effort after 2003 was mainly driven by increasing fuel prices and decreasing produce value making it less profitable to fish. The endeavour prawn catch declined first because it is the lower value product and it was more profitable for fishers to target areas of higher tiger prawn CPUE. Although tiger and endeavour prawns are almost always caught together, fishers can target a specific species to a certain degree, as the distribution of prawn stocks on the seabed is “patchy”. There are areas of higher tiger prawn CPUE often only a few miles away from areas of lower tiger prawn CPUE but higher endeavour CPUE. Some TSP fishers have stated that they “target dollars rather than a particular species”; i.e. the species mix that provides the highest return.

Although the 2016-2022 fishing seasons were a month longer than previous years (1 February season opening instead of 1 March) catches can be directly compared with the earlier years because catch is dependent on catch rates (CPUE) and the total number of “allocated days of fishing access” that are utilised by the fleet. Making the season longer does not change the days of fishing access allocated to each vessel, just extends the time period in which they can catch it.

During November 2005 allowable fishing effort was reduced to implement the Total Allowable Effort (TAE) cap of 9,200 days. The two average rows at the bottom of Table 2 compare catch and effort for the post 2008 years (2009-2020) with the period of highest effort (1991-2003).

In Torres Strait the prawn harvest is comprised of three main species; the brown tiger prawn (*Penaeus esculentus*), the blue endeavour prawn (*Metapenaeus endeavouri*) and the Red Spot king prawn (Melicertus longistylus). The other tiger, endeavour and king prawn species that are found in the Torres Strait are only a few percent of the catch (Turnbull et.al 2009). King prawn (98% Red Spot king and 2% western king) has always been a small component of the catch and is regarded as a by-product of fishing for tiger and endeavour prawns.

Table 2 Annual catch and effort data for the years 2005-2022. Data includes total catch (tonnes) and catch rates (Catch Per Unit of Effort as average kilograms per day per boat) both annually as well as the average for the post 2008 years (2009-2022) and the period of highest fishing effort (1991-2003). The numbers in brackets in the average rows are the range; (min: max).

Year	Days fished (logbook)	VMS days fished	Number of Vessels	Catch (tonnes)					Catch rates CPUE (kg/day/ boat)		
				All prawn	Tiger	Endeavour	King	Mixed	All prawn	Tiger	Endeavour
2005	6020	6633	61	1319	655	599	51.2	14.3	225	112	103
2006	4406	4685	47	1331	602	672	45.2	11.8	308	139	156
2007	4829	5253	44	1152	594	503	49.2	5.1	244	126	107
2008	3477	4127	38	942	472	420	48.5	1.8	277	139	124
2009	2105	2599	31	529	338	173	16.3	1	258	166	84
2010	1879	2309	25	465	344	110	8.8	2.2	253	187	61
2011	1309	1663	20	283	204	74	4.7	0.9	222	160	58
2012	2081	2310	23	517	398	115	3.1	0	253	195	58
2013	1993	2240	25	528	420	103	4.1	0.3	270	215	57
2014	1954	2203	24	393	315	76	2.8	0.3	205	164	40
2015	3002	3263	24	745	559	167	16.8	2.5	252	190	57
2016	2322	2472	22	433	367	57	5.4	4.5	191	162	30
2017	935	1004	13	137	111	25	1	0.2	152	123	31
2018	2076	2135	23	420	329	81	6.5	2.7	206	162	41
2019	2632	2652	28	827	515	299	10.9	2.1	320	200	117
2020	1036	1087	15	265	203	60	2.4	0	261	200	59
2021	1285	1336	20	297	233	62	2.7	0.3	236	185	49
2022	1303	1314	22	354	265	87	2	0.2	277	207	71
Average 2009-2022	1851 (935-3002)	2042 (1004-3263)	23 (13-31)	442 (137-827)	329 (111-559)	106 (25-299)	6.3 (1-16.8)	1.2 (0-4.5)	240 (152-320)	180 (123-215)	58 (30-117)
Average 1991-2003	9710 (8158-11907)	NA	81 (71-107)	1785 (1416-2202)	668 (465-965)	1044 (758-1511)	70 (25-165)	4.12 (0.02-11.7)	190 (167-234)	71 (49-98)	111 (87-149)

Catches, Catch Rate (CPUE) and Stock Biomass

Figures 4 and 5 show the historical “catch rates” or “Catch Per Unit of Effort” (CPUE) and is an indication of the numbers of prawns on the seabed. CPUE is measured as the average “kilograms of catch per boat day of fishing” (kg/d). When calculating CPUE the small percentage (3-10%) of daily vessel records that are flagged as representing a partial day of fishing (hours trawled < 9) are excluded. Although generally a high CPUE indicates a large prawn biomass and conversely, low CPUE a small prawn biomass; there are other factors that can impact on the CPUE of an individual vessel in addition to prawn abundance. These factors are; vessel size, engine power, type of nets, time of the year, moon phase, area within the fishery, fisher experience etc. The standardised CPUE used in the stock assessment models are slightly different to those presented in this data summary because they are adjusted for the factors that can affect individual vessel catch rates. This ensures that the catch rates can more accurately reflect the stock size or biomass of prawns on the seabed.

Although the annual tiger prawn CPUE’s of 207, 185 and 200 kg/d for 2022, 2021, and 2020 were above the 2009-2022 mean of 180 kg/d, the tiger prawn catches of 265, 203, 233 tonnes were below the 2009-2022 mean of 329 tonnes. This was a result of the low level of fishing effort; 1303, 1036, 1285 and days compared with the 2009-2022 mean of 1851 days.

The 2019 season had the highest tiger prawn CPUE (200 kg/d) since 2013 and endeavour prawn CPUE (117 kg/d) since 2008 resulting in the highest prawn (tiger + endeavour + king + mixed) CPUE (321 kg/d) since the start of full logbook records in 1989. The “red” trend line fitted to the 2009-2021 tiger prawn CPUE’s (Figure 4a) is roughly double the CPUE for 1991-2003 (green line). The highest tiger prawn CPUE occurred in 2013 and the lowest CPUE since 2005 was in 2017. During the period of highest fishing effort (1991-2003), tiger prawn CPUE (Figure 4(a)) was variable but there is no overall upward or downward trend in the CPUE data as indicated by the green trend line for the year’s 1991-2003 in Figure 5.

During the years of decreasing fishing effort (2004-2008) the trend in CPUE was upward. This is most likely due to the combined effect of fishers targeting tiger prawn in preference to endeavour prawn and the higher abundance of tiger prawn due to the decrease in fishing effort. This is supported by stock assessment results which indicate that the tiger prawn biomass was increasing during 2001-2006, was at a higher level than during the 1990s and was above Bmsy (The biomass that supports Maximum Sustainable Yield (MSY)).

Tiger prawn catch during 1991-2003 varied around the estimate of MSY (675t) with the higher catches generally occurring in years of higher CPUE and the lower catches in years of lower CPUE (Figures 4b). After 2003 the tiger prawn catch was below MSY and since 2009 has varied around a mean of 332 tonnes which is about 1/2 of MSY. The highest tiger prawn catch since 2009 was in 2015 (553t) due to the

highest fishing effort (2969 days) since 2009 combined with a high catch rate (189 kg/d). Conversely 2017 had the lowest tiger prawn catch (111 t) due to the lowest fishing effort (934 days) since 1989 and the lowest tiger prawn CPUE (123 kg/d) since 2005.

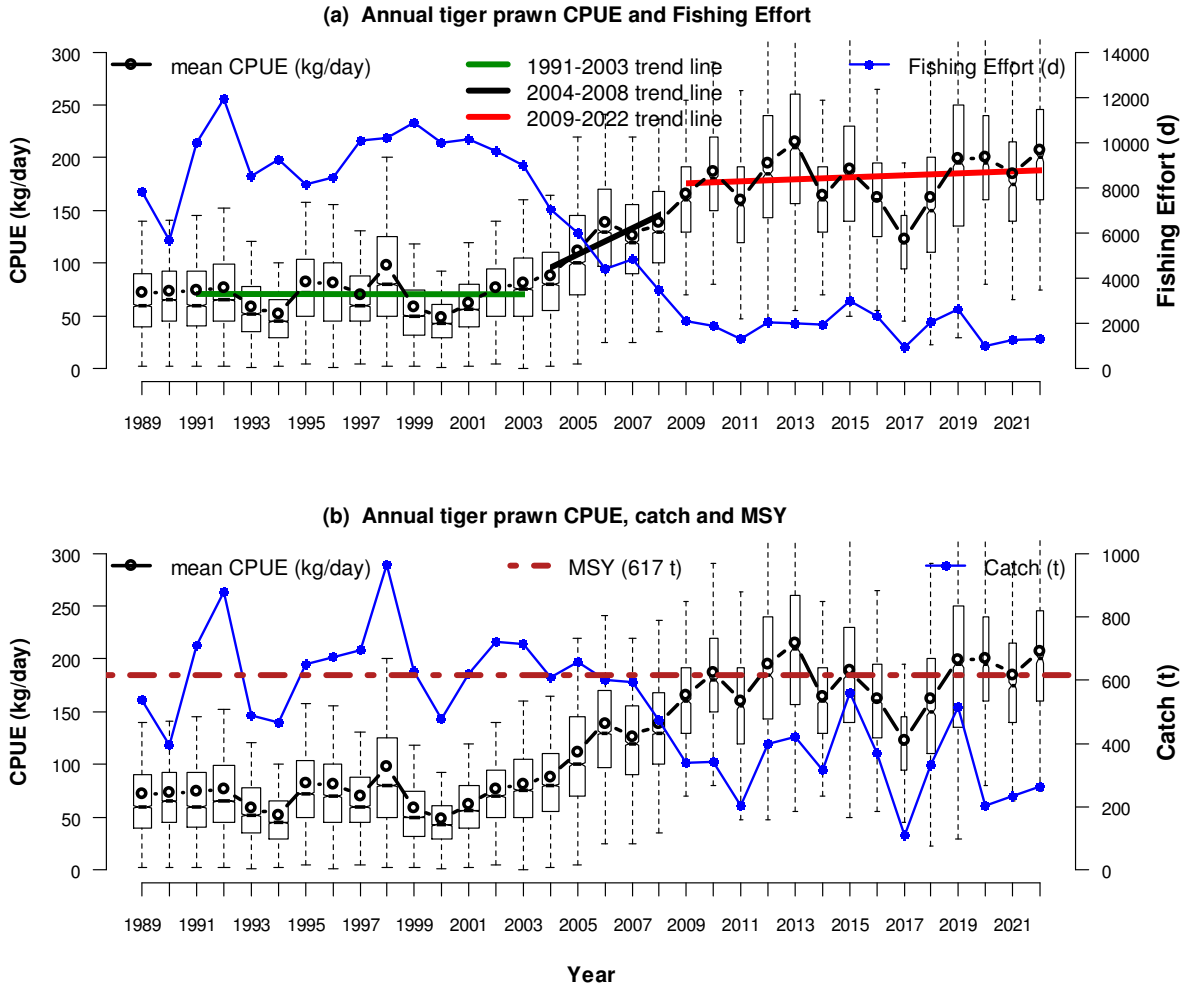


Figure 4 Tiger prawn catch rates (CPUE) as kilograms per vessel per day fished (kg/d) compared with (a) fishing effort in days and (b) catch in tonnes. The boxplots show the range of daily vessel CPUE's for each year. The median CPUE is indicated by notch and line near the middle of the boxes and black line with circles is plot of the mean (average) CPUE for each year. Fifty percent of the records are within the rectangles. The "whiskers or dotted lines" extending from the rectangles show the overall range. The width of the rectangles indicates the number of records for each season. As a result the rectangles for the years 1991-2003 are wider due to the higher level of fishing effort.

The 2022 endeavour prawn CPUE (71 kg/d) was above the mean of 58 kg/d for the years 2009-2022 suggesting an above average endeavour prawn recruitment. The 2021 and 2020 endeavour prawn CPUEs (49, 60 kg/d) were close to the 58 kg/d mean for the years post 2008 (Figure 5(a) and Table 2). The 2019 CPUE of 117 kg/d was above the 111 kg/d mean for the years 1991-2008. In contrast to tiger prawns, the CPUE for endeavour prawn in most seasons' post 2008 has been lower than during the years of high and declining fishing effort which is evidence for this species being more productive and hence more abundant, when fishing effort is high. The

trend line fitted to the endeavour prawn CPUE data for 1991-2008 (Figure 5a) is horizontal with a mean of 112 kg/d. The “red” trend line is fitted to the year’s post 2008 and is at approximately half (57 kg/d) of the “green” line. Endeavour prawn CPUE remained high during the years where fishing effort and endeavour prawn catch was decreasing (2003-2008). The halving of endeavour prawn CPUE occurred at the end of the decline in catch and effort.

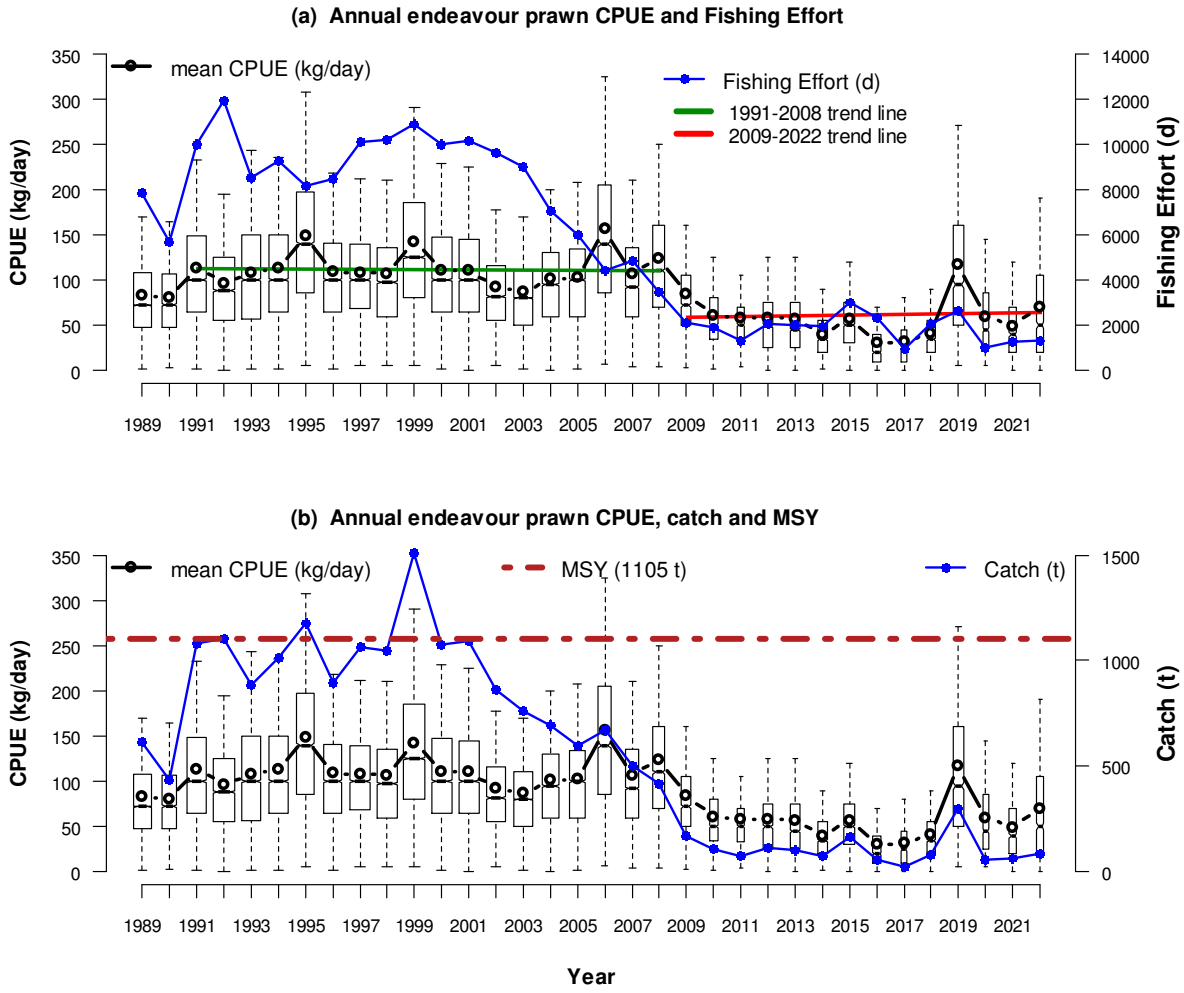


Figure 5 Endeavour prawn catch rates (CPUE) as kilograms per vessel per day fished (kg/d) compared with (a) fishing effort in days and (b) catch in tonnes. The boxplots show the range of daily vessel CPUE’s for each year. The median CPUE is indicated by notch and line near the middle of the boxes and black line with circles is plot of the mean (average) CPUE for each year. Fifty percent of the records are within the rectangles. The “whiskers or dotted lines” extending from the rectangles show the overall range. The width of the rectangles indicates the number of records for each season. As a result the rectangles for the years 1991-2003 are wider due to the higher level of fishing effort.

Endeavour prawn catch (Figure 5b) oscillated around the estimate of MSY (1105t) during the years of high fishing effort, and then decreased as effort decreased, to an annual mean of 107 (25:298) tonne for the year’s post 2008. The decrease in endeavour prawn catch is a result of the decrease in fishing effort to 1/5th of what it was during the high effort years (Figure 5a) and the halving of endeavour prawn CPUE post 2008.

Spatial Distribution of Fishing Effort and Catch

Figures 6 to 9 compare the spatial distribution of fishing effort and prawn catch for the 2005 with the two most recent seasons. The position information of each daily vessel record was used to group days fished and catch into 6 minute (6 x 6 nautical miles) grid squares. The fishing effort and catch recorded for the grids within the East of Warrior closure occurred during August to November when this area is open to fishing.

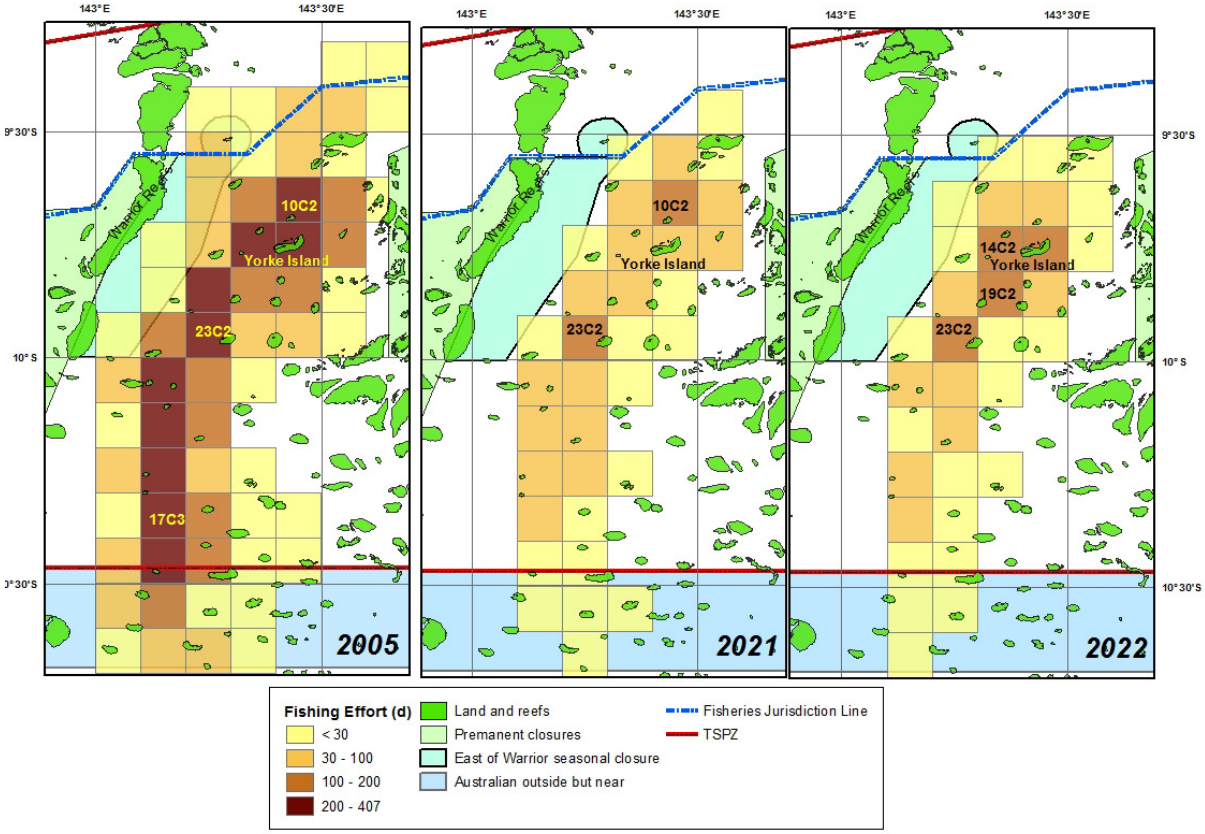


Figure 6 The spatial distribution of fishing effort (days) within the TSPF for the 2005, 2021 and 2022 fishing seasons by 6-minute grid.

The 2005 fishing season was chosen as a base year for comparison with the two most recent fishing seasons because in November 2005 there was a pro rata effort reduction for the fishery to a 9,200 day cap. Also, the 2005 fishing effort was approximately 60 percent of the years of highest effort (1991-2001) and the 2005 tiger prawn catch of 655 tonne was just below the 1991-2003 mean of 668 tonne and the estimate of MSY (676 t). Although there were 10 grids where fishing effort was above 200 days during the 2005 fishing season (Figure 6), in recent years fishing in all grids has been less than 200 days and only a few grids have more than 100 days of effort. The three highest efforts grids in 2005 were 17C3, 10C2 and 23C2. These grids recorded; 407, 364 and 350 days of fishing and produced 39, 48.2 and 34.9 tonne of tiger prawn and 48, 35 and 40 tonne of endeavour prawn.

Fishing effort in the 2022 season was only 22 percent of the 2005 effort and only four grids were fished for more 100 days. Fewer grids were fished, especially in the

southern half of fishery and the higher effort grids were concentrated in the northern half of the fishery. The grids 23C2 (174 d), 19C2 (156 d) and 14C2 (136 d) had the highest effort in 2022. During 2021 only two grids 23C2 (175 d) and 10C2 (174 d) in the north of the fishery were fished for more than 100 days.

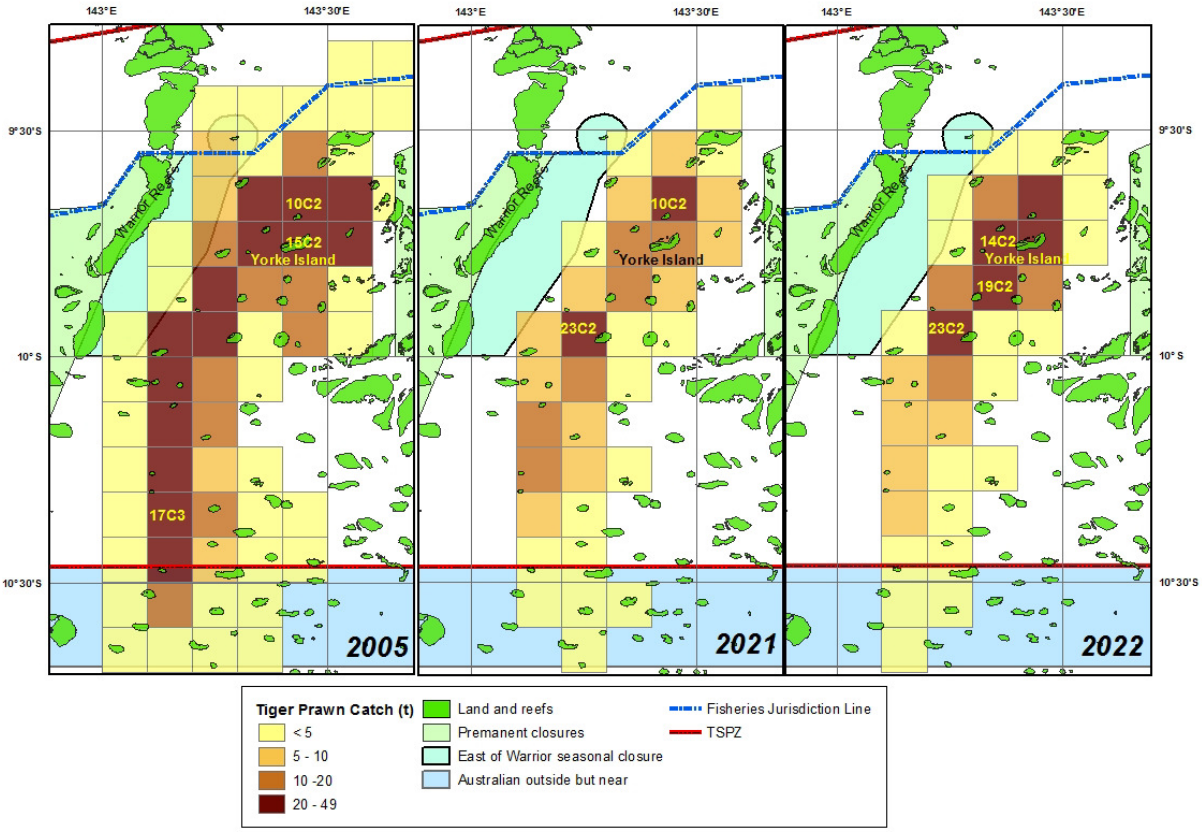


Figure 7 The spatial distribution of tiger prawn catch (tonnes) within the TSPF for the 2005, 2021 and 2022 fishing seasons by 6-minute grid.

In 2005 the grids 10C2, 15C2 (near Yorke Islands) and 17C3 (in the south of the fishery) recorded the highest tiger prawn catches; 48, 40 and 39 tonne respectively (Figure 7). The distribution of the higher tiger prawn catch grids (>20 t) was more concentrated in the north of the fishery (9 grids) and there was a band of five high tiger prawn catch grids (>20 t) running vertically through the southern half.

Compared with 2005 the spatial distribution of the tiger prawn catch in 2022 was more concentrated in the northern half of the fishery and there were only 5 grids with catches above 20 tonne. The grids with the highest tiger prawn catches were 23C2 (39 t), 19C2 (35 t) and 14C2 (33 t). As a result of the lower fishing effort there were only two grids in 2021 with catches of tiger prawn greater than 20 tonne; 23C2 (35 t) and 10C2 (34 t).

The spatial distribution of the endeavour prawn catch (Figure 8) for 2022 and 2021 is similar to that of 2005 but the endeavour prawn catches are lower due to lower fishing effort and lower CPUE. The grids with the highest endeavour prawn catch in 2005 were; 17C3, 23C2, 10C2 with 48, 40 and 35 tonne of endeavour catch.

During 2022 and 2021 only one gird recorded more than 10 tonne of endeavour prawn catch. The grids with the highest catches in 2022 were 23C2 (18 t), 19C2 (7 t) and 17C3 (5.6 t). In 2021 the grids with the most endeavour prawn catch were 23C3 (11.5 t) , 10C2 (5.7 t) and 7C3 (5.6 t).

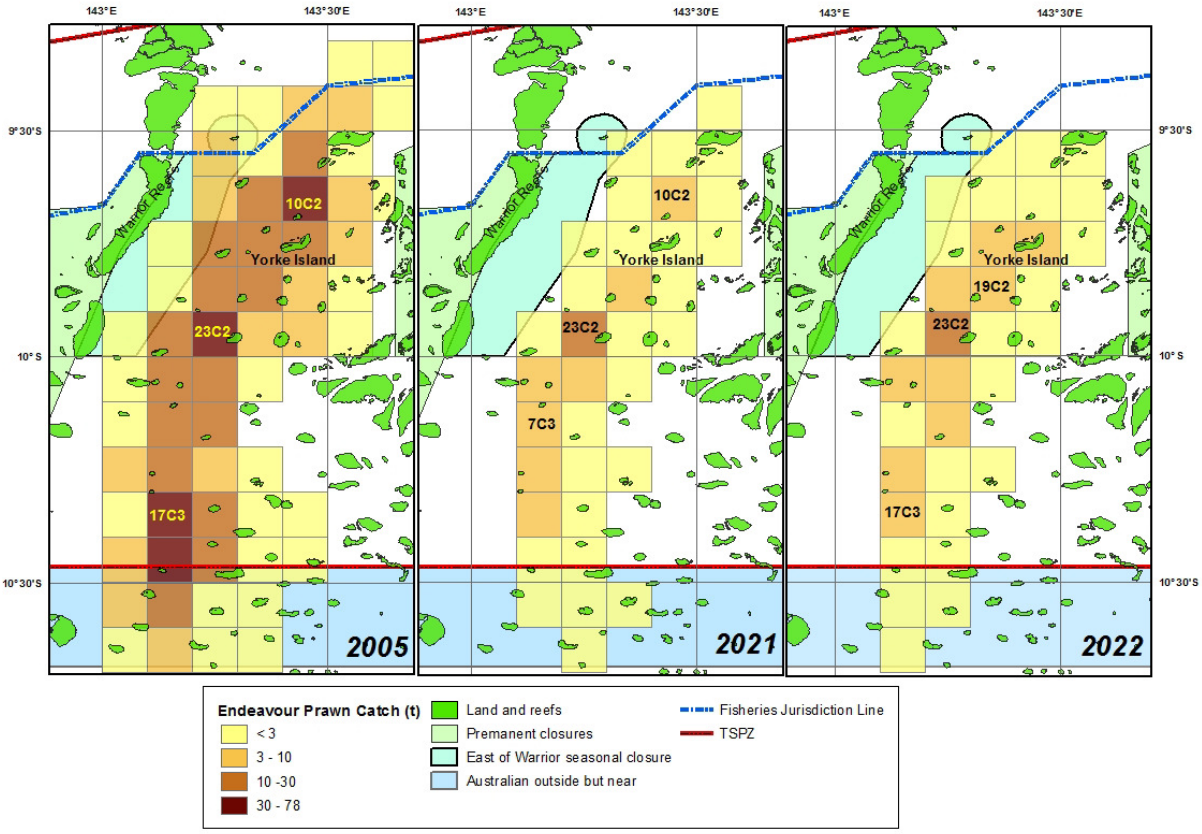


Figure 8 The spatial distribution of endeavour prawn catch (tonnes) within the TSPF for the 2005, 2021 and 2022 fishing seasons by 6-minute grid.

Historically a small amount of king prawn catch has occurred through the fishery with higher abundance at the south end of the fishery and north of Yorke Island The 2005 grid map in Figure 9 is a good example of this distribution. There is a cluster of five grids in the south and two grids in the north where the king prawn catch was greater than 2 tonnes. The grids with the highest catches in 2005 were; 2C4, 22C3 and 10C2 producing of 3.7, 3.2 and 3.2 tonne of king prawn.

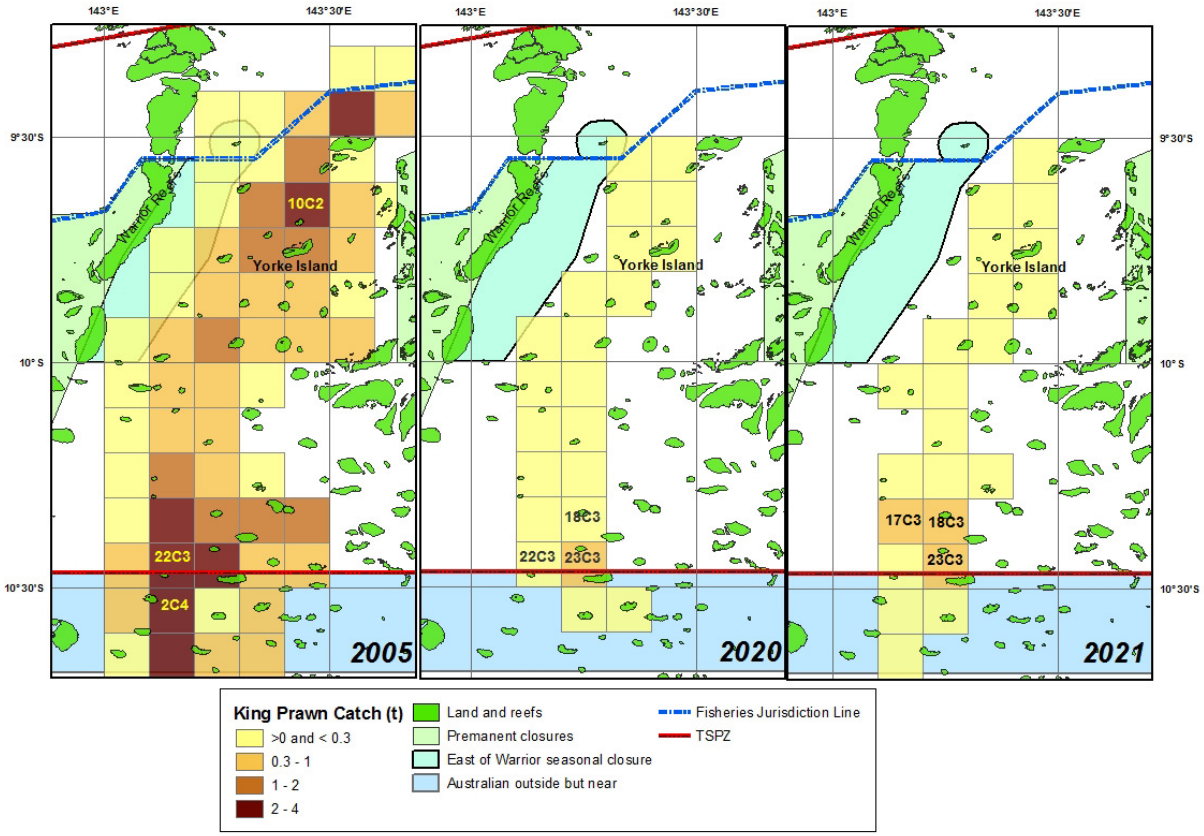


Figure 9 The spatial distribution of king prawn catch (tonnes) within the TSPF for the 2005, 2021 and 2022 fishing seasons by 6-minute grid.

The 2022 and 2021 distributions are typical of recent years nd the area of highest king prawn catch is now concentrated near the southern end of the fishery. During 2022 small amounts of king prawn were recorded from 22 of the 34 grids that were fished and the grids; 24C3, 17C3 and 18C3 recorded the highest catches; 0.66, 0.6 and 0.6 tonne respectively. Similarly during 2021 small amounts of king prawn was recorded from 23 of the 35 grids that were fished and the highest catches were from grids 23C3, 18C3 and 22C3 with 0.34, 0.15 and 0.13 tonnes of king prawn. It is possible that the king prawn catch is slightly higher than recorded because when the king prawn catch is insufficient to box up separately fishers mix it in with the endeavour prawn catch.

Monthly trends in Fishing Effort and Number of active Vessels

Figures 10 and 11 show that effect of the large reduction in fishing effort since 2003 on the monthly trends in fishing effort and the number of vessels fishing each month.

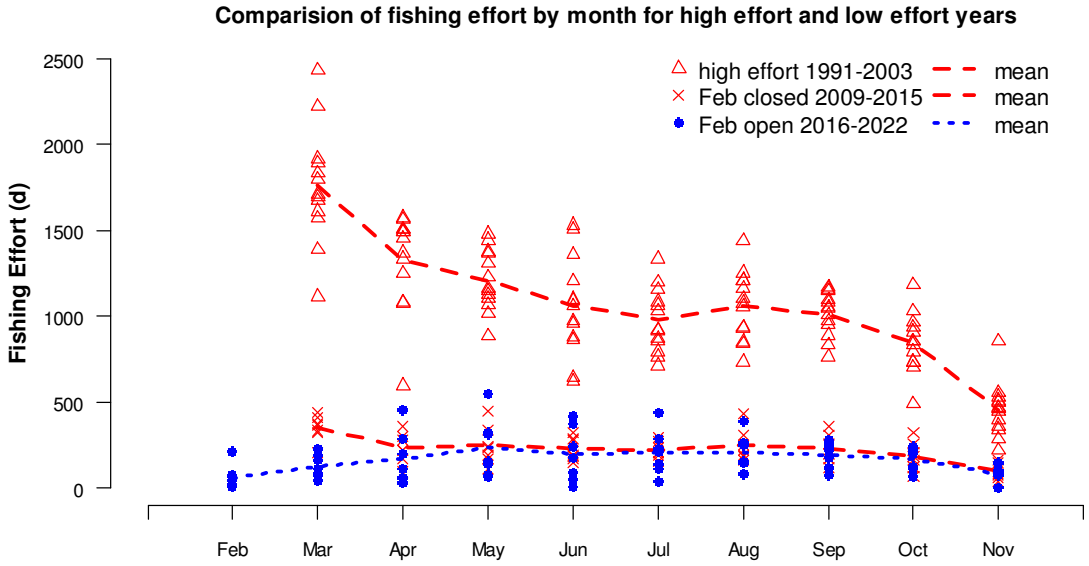


Figure 10 The monthly fishing effort (days) for the years of high fishing effort (1991-2003 △) compared to the recent years of low fishing effort grouped by whether February was closed (2009-2015 x) or open (2016-2022 ●) to fishing. The dotted and dashed lines are the means.

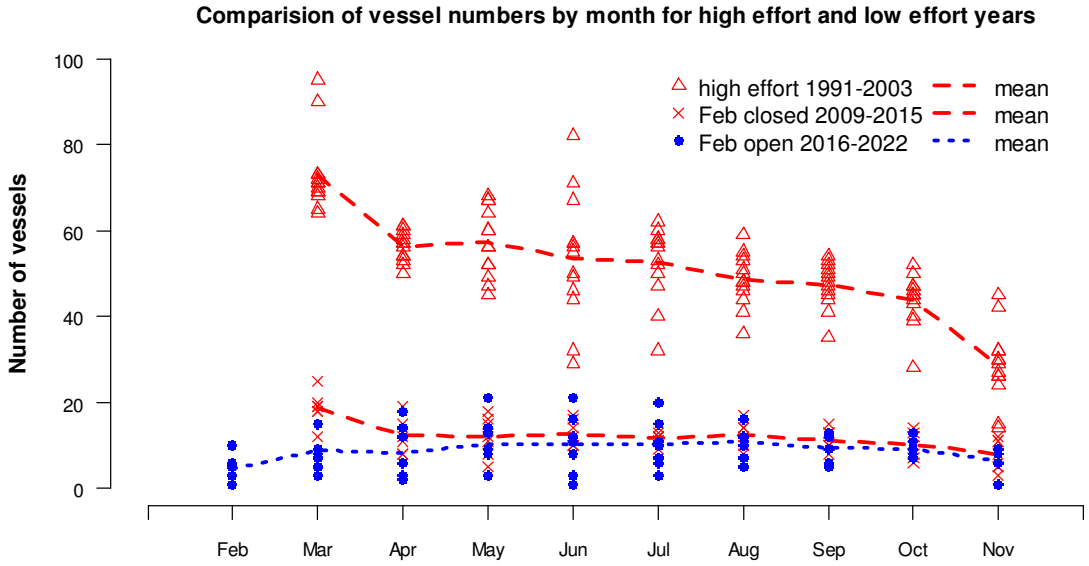


Figure 11 The monthly vessel numbers for the years of high fishing effort (1991-2003 △) compared to the recent years of low fishing effort grouped by whether February was closed (2009-2015 x) or open (2016-2022 ●) to fishing. The dotted and dashed lines are the means.

During the years of high annual fishing effort (1991-2003) the monthly fishing effort was generally highest at the start of the season (March), decreased until June, and was level until September then decreased until the end of the season. The trend in the number of vessels is similar. In contrast the trends in monthly fishing effort and

vessel numbers since 2009 has been much lower and almost level across the season. The mean fishing effort for March of the years 1991-2003 was 1800 days by an average of 70 vessels. March of 1991 was the maximum with 95 vessels fishing a total of 2477 days. The year by month tables in the appendix provide the individual values for each month.

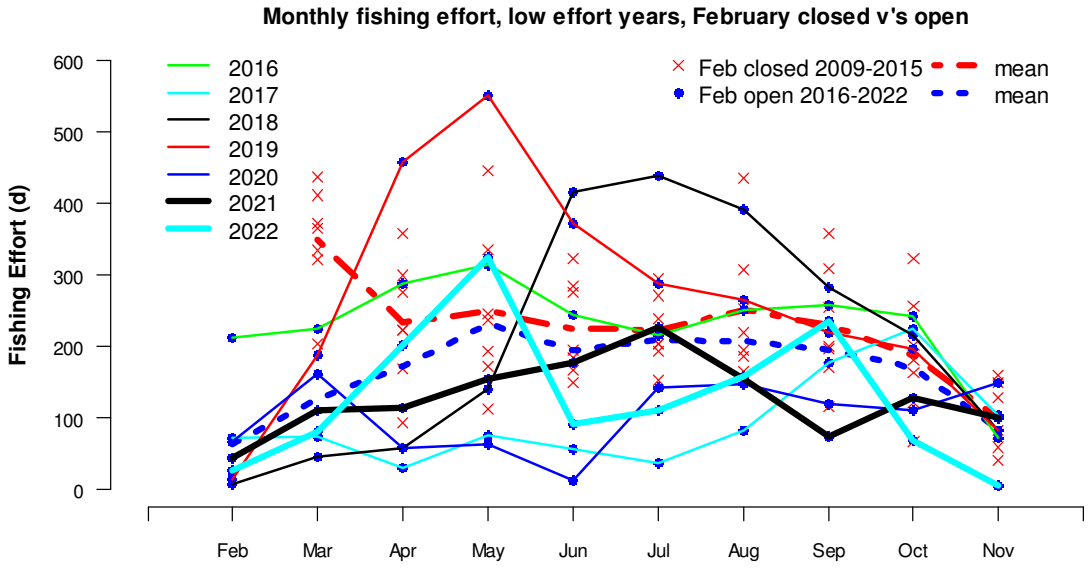


Figure 12 Monthly fishing effort for the years of low fishing effort grouped into the seasons where February was closed (2009-2015 x) compared to the years where February was open to fishing (2016-2022 ●). The dotted and dashed lines are the means. The solid lines show the monthly trajectory for each year since 2016.

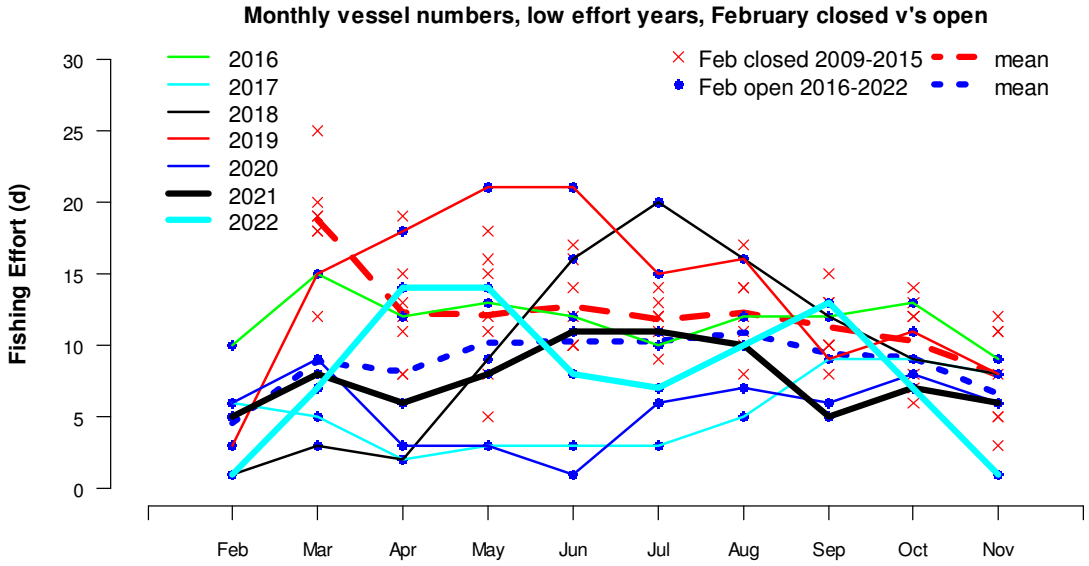


Figure 13 Monthly vessel numbers for the years of low fishing effort grouped into the seasons where February was closed (2009-2015 x) compared to the years where February was open to fishing (2016-2022 ●). The dotted and dashed lines are the means. The solid lines show the monthly trajectory for each year since 2016.

Figures 12 and 13 compare the monthly fishing effort and vessel numbers for the years where February was open (2016-2022) with the mean of those years and with the mean monthly fishing effort for the seasons where February was closed (2009-2015). These indicate that when February is closed the highest fishing effort is on average in March. This is similar to the high effort years but at a much lower level. In contrast when February is open to fishing the highest monthly effort generally occurs later in the season (April to June) with a gradual ramp up of effort and vessels numbers from the start of the season. The pulse of fishing effort and vessels numbers that has historically occurred in March has not occurred with the earlier opening. It is worth noting that the few vessels that fish in February generally enter the fishery during mid to late February.

The 2022 monthly fishing effort and numbers of vessels was below average during June-July and in November, whereas during 2021 the fishing effort and vessel numbers peaked in July. During February and March of 2020, the fishing effort and number of vessels was close to the average (mean) of the years 2016 to 2020. In April to June of 2020 the days fished each month were less than 65 and vessel numbers were 3 or less. Comments from industry (Marshall Betzel, pers. com.) attribute the reduced fishing effort to the economic impact of the COVID19 pandemic. A proportion of the trawl industry in Queensland was closed down for part of March - April and Fishers were initially concerned that they may not be able to sell their product. Prawn catch rates on the Queensland east coast were as good as in the Torres Strait. Therefore, when fishing resumed after the COVID19 “lockdown” many TSP endorsed fishers opted to operate closer to their home port to reduce their operating cost (fuel and product transport).

These industry comments are validated by the logbook CPUE data presented in Figures 14 and 15. Monthly 2020 tiger prawn CPUE (Figure 14) was well above the mean CPUE for the years 2016-2020. Endeavour prawn CPUE (Figure 15) was also above the mean expect for April and May of 2020.

The 2019 fishing effort rapidly increased until May then gradually decreased, this contrasts with 2018 where most fishing occurred from June until end of the season. The 2017 season was the year of lowest annual fishing effort and the days fished each month and vessel numbers were the lowest on record from April to August. During September a few more vessels entered the fishery so fishing effort and vessel number were near the average for the remainder of the 2017 season. Fishing effort in February and March of 2018 was lower than for 2017 as only three vessels fished the first three months of the season. However, the number of vessels increased to 20 and monthly days fished rose to 437 by July which was the month of highest fishing effort for the 2018 season. The 2016 season had the second highest annual fishing effort post 2015 and the monthly vessel numbers and days fished was relatively constant across the season.

Monthly trends in CPUE

In Figure 14 the tiger prawn catch Per Unit of Effort (CPUE) as kilograms per day for the low effort years with February open to fishing (2016-2022) are compared with the years of high fishing effort and February closed (1991-2003). The mean CPUE of the years 2016-2022 is much higher than both the mean of the high effort year (1991-2003) and the individual year/month data points **(△)**.

During the high effort years the highest tiger prawn CPUE was often at the start of the season (March). In contrast, in the years of low effort with February open to fishing (2016-2022), the highest CPUE generally occurs later in the season (April or May). The exception to this trend is 2019. However the exceptionally high CPUE in February – March of 2019 are probably a result of a good recruitment combined with only 1-2 vessels fishing the start of the season. In contrast, the 2016, 2018, 2020, 2021 and 2022 tiger prawn CPUE's increased from February to a seasonal maximum in April to June. The 2017 monthly tiger prawn CPUE's for February to June were the lowest since 2008 indicating a poor recruitment during the early months of the season.

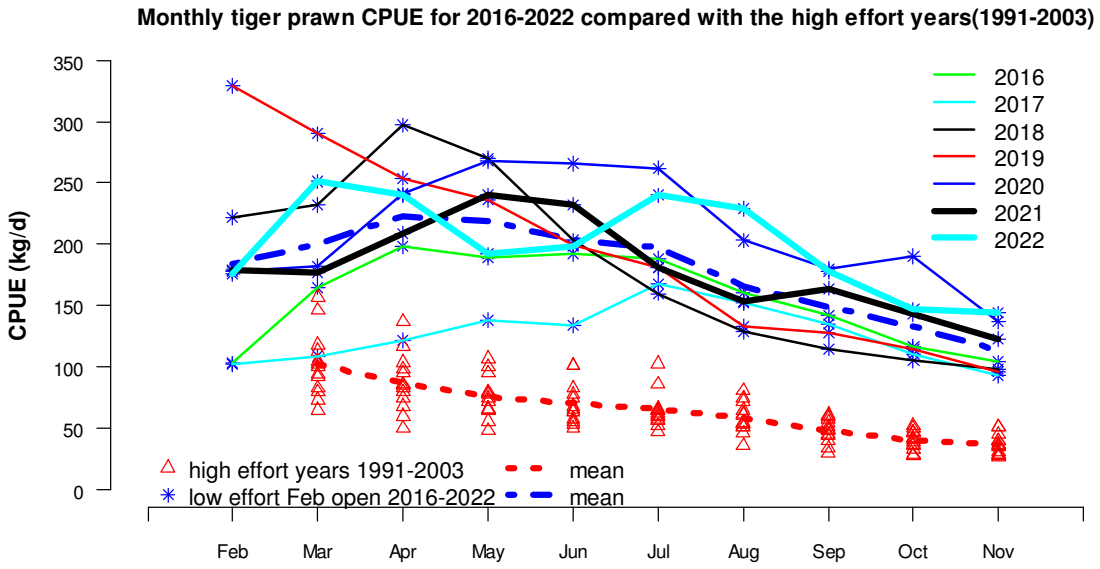


Figure 14 Tiger prawn catch Per Unit of Effort (CPUE) as kilograms per day for the low effort years with February open to fishing (2016-2022) compared with the years of high fishing effort and February closed (1991-2003). The point symbols (△ ✳) show the individual monthly CPUE and the dotted and dashed lines are the means. The solid lines in plot show the monthly trajectory for each year since 2016.

The 2022 monthly endeavour prawn CPUE (Figure 15) was above the 2016-2022 mean until September whereas the 2021 CPUE closely following the mean of the seasons with February open to fishing. The 2020 monthly endeavour prawn CPUE was above the mean (2016-2022) except for April and May. The lower CPUE in those months of 2020 could be a result of only 1-3 vessels fishing and targeting mainly tiger prawn.

The monthly endeavour prawn CPUE's for 2019 were much higher the mean of the years 2016-2022 and are in the range observed during the high effort years (1991-2003). At the January 2020 TSPMAC meeting industry members noted that there had not been any change in the way the fishery was operating and that endeavour prawn CPUE's were also higher in the adjacent Northern Prawn Fishery (NPF) and East Coast Otter Trawl (ECOT) fisheries during 2019. This suggests an increase in the endeavour prawn biomass above the levels observed in the TSPF during 2009-2018.

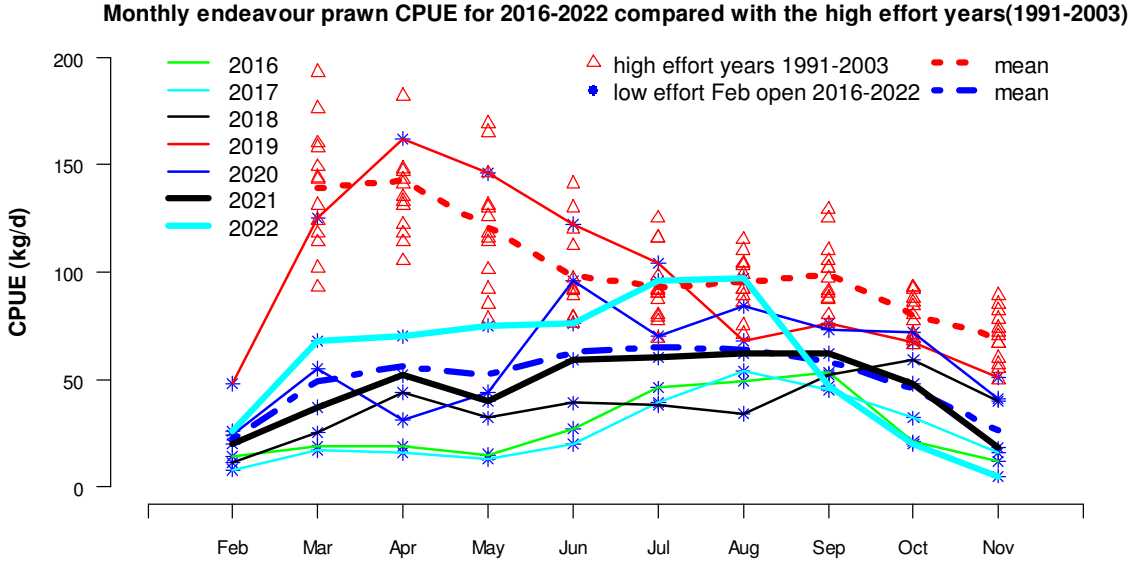


Figure 15 Endeavour prawn catch Per Unit of Effort (CPUE) as kilograms per day for the low effort years with February open to fishing (2016-2022) compared with the years of high fishing effort and February closed (1991-2003). The point symbols (△ ∗) show the individual monthly CPUE and the dotted and dashed lines are the means. The solid lines in plot show the monthly trajectory for each year since 2016.

The monthly CPUE of endeavour prawn during 2016-2022 was much lower than for the years of highest fishing effort (1991-2003). During 1991-2003 the mean endeavour prawn CPUE was highest in March-April, decreased until May, was level until September then decreased to November (Figure 12(b)). In contrast, the mean endeavour prawn CPUE for the years 2016-2022 is much lower than the 1991-2003 mean, especially during the first half of the season. Since 2016 the higher endeavour prawn CPUE tends to occur during June to October. The 2019 endeavour prawn CPUE is quite different to 2016-2018 and 2020 with a rapid increase from February to a maximum in April followed by a slow decline that roughly matches the mean for the years 1991-2003. This suggests that there was higher recruitment of endeavour prawn during February to April of 2019 than has occurred in the other year's post 2015.

Fuel Price and Prawn Value

At TSPMAC 20 it was agreed that current fuel prices and landed product values for Torres Strait prawn would be recorded in future editions of the Data Summary as metadata that could assist with the analysis of the current seasons fishing effort.

The information in Tables 3 and 4 was extracted from a sample of sales dockets supplied in confidence by a few members of the industry. The authors thank those licence holders for providing this information.

Table 3 shows the premium applied to fuel supplied to vessels in Torres Strait and matches with the industry comments that it was more economical to fish close to home during 2020.

Table 3 The price of diesel price for 2019-2020 as dollars per litre. The "Cairns" column is for fuel purchased in port and "Torres Strait" is for fuel purchased in Torres Strait from supply barges.

Date	Cairns	Torres Strait
22-Mar-19	1.32	
15-May-19	1.37	
09-Jun-19		1.70
23-Jun-19		1.60
18-Feb-20	1.25	
06-Mar-20		1.57
28-Oct-20	0.99	
14-Nov-20		1.30

In March and April of 2020 the landed value of tiger prawn, especially the larger grades, was lower than during 2019 (Table 4) due to COVID19 which temporarily closed international markets and the restaurants that utilised that local prawn produce. The value of prawn produce increased towards the end of the 2020 as the "home consumption market" developed in place of the depressed restaurant market.

Table 4 Torres Strait prawn product price as dollars per kg. Note this is the “beach” or “landed” value of the product.

Species and grade	Jun-19	Aug-19	Mar-20	Apr-20	Dec-20
tiger U10	22	22	16	14	23
tiger 10/20	15	14	10		17
tiger 10/15		15	12	12	19
tiger 16/20				10	
tiger 21/30	12	11	8	8	12
tiger 30+	8	8	5	5	
tiger soft & broken	8.5	8	5	5	8.5
endeavour 10/20	8	8	8	8	12
endeavour 21/30	6	6	6	6	10
mixed endeavour prawn 30+	5	5	5	5	7
endeavour soft & broken	5	5	3	3	5
king U10					24
king 10/20				10	20
king 21/30				8	15

Analysis of prawn grades

The breakup of each year's catch of tiger and endeavour prawns as a proportion by the major grade categories (U10, 10/20, 21/30 and 30+) is shown in Figures 16(a) & 157a). There are small amounts of other less common categories (10/15, 15/20 etc.) in the data. Where possible these less common categories were assigned to the four major categories for these plots. If this was not possible they were group into the "other" category.

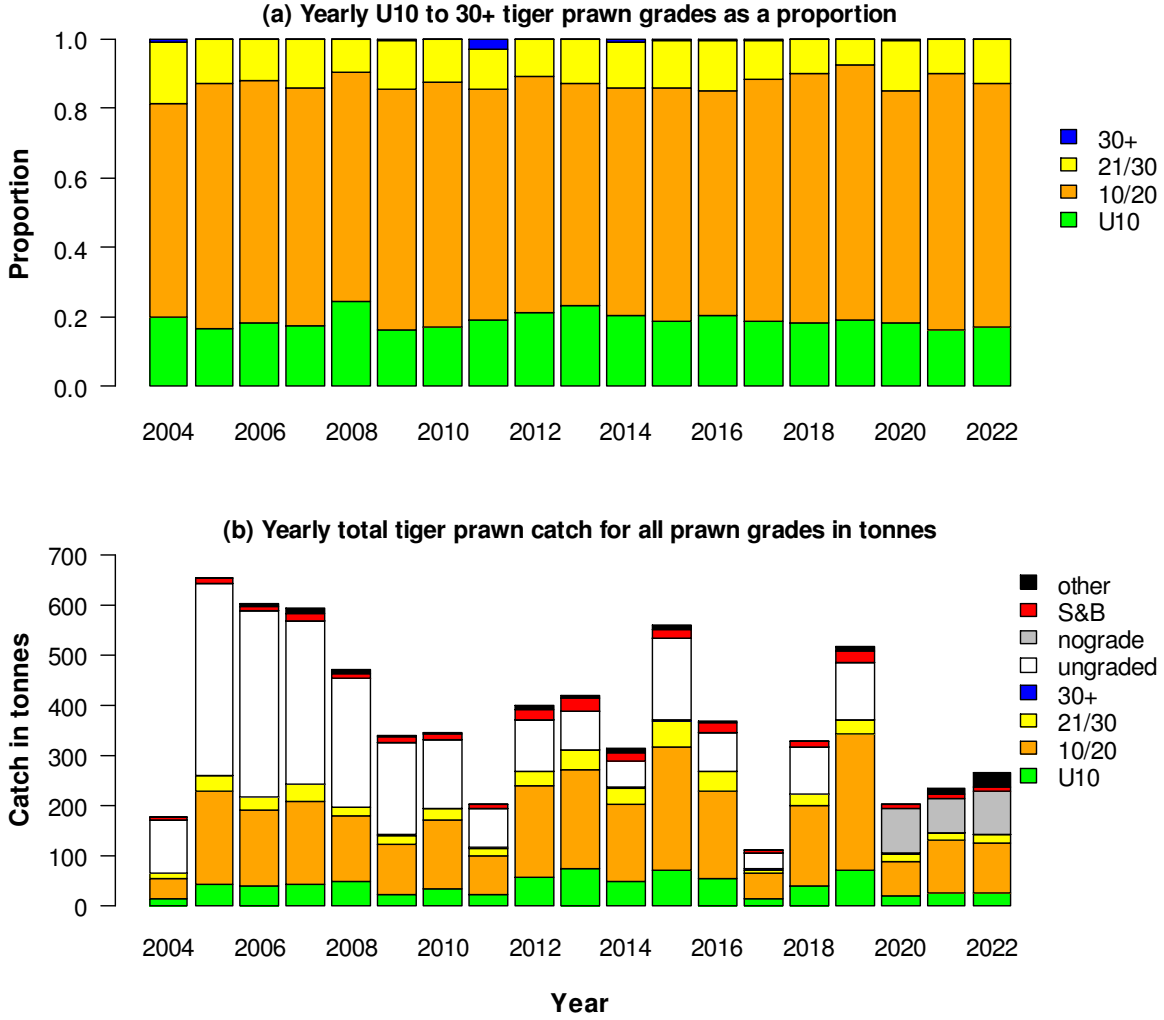


Figure 16 (a) The yearly U10 to 30+ tiger prawn grades as a proportion for 2004-2022. (b) Yearly total tiger prawn catch for all grades in tonnes. Note: that 2004 is only partial data due the phasing in of the new logbook format that included grade. No grading information is shown as "nograde" and for the years prior to 2020 this category was entered as "ungraded" in the database.

There is no trend across the years in the tiger and endeavour prawn grades (sizes). Tiger prawn catch is dominated by the 10/20 grade whereas endeavour prawn catch is dominated by 21/30 grade. This reflects the growth characteristics of the two species. Tiger prawns, females in particular, grow to a large size and hence weight than endeavour prawns.

Figures 16(b) & 17(b) are stacked bar plots that show the yearly total catch weights divided into each grade category. These plots include the four main grades (U10,

10/20, 21/30 and 30+ and the categories; “ungraded”, “nograde” (logbook records with no information for grade), “soft and broken” (S&B) and “other” which includes a range of non-standard grade descriptions that could not be assigned to any of the other categories.

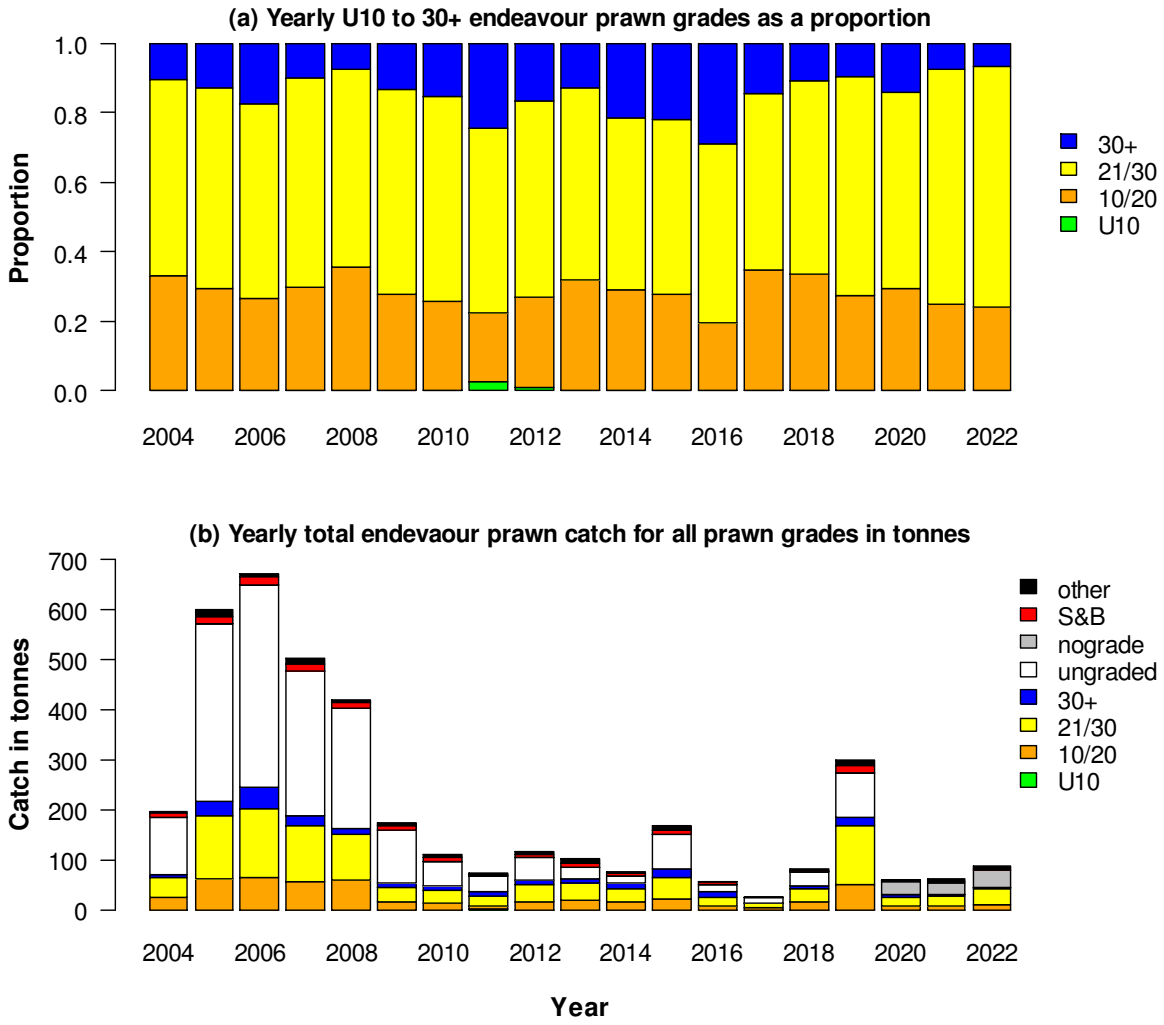


Figure 17 (a) The yearly U10 to 30+ endeavour prawn grades as a proportion for 2004-2022. (b) Yearly total endeavour prawn catch for all grades in tonnes. Note: that 2004 is only partial data due the phasing in of the new logbook format that included grade. No grading information is shown as “nograde” and for the years prior to 2020 this category was entered as “ungraded” in the database.

Prior to 2020 records with no grading information (nograde) were entered into the AFMA logbook database under the code for “ungraded”. Therefore most of the “ungraded” prawn prior to 2020 is probably for records with no grading information. Industry members on the TSMPAC have noted that there should only be a small amount of “ungraded” product from the TSPF.

Note: that 2004 is only partial data due the phasing in of the new logbook format that included grade. The height of the bars for 2004 in plots 16(b) at 17(b) would be equal to 606 tonnes for tiger prawn and 690 tonnes for endeavour prawn if grade data was available for all of the 2004 logbook records.

By-product and Threatened, Endangered and Protected species catches

Table 5 lists the annual catches of by-product species for the year 2005-2022. The main by-product species in the TSPF include king prawns and various species of bugs (Morton bay bugs and shovel nosed and slipper lobsters). Cuttlefish and squid are also taken some years in reasonable quantities. Occasionally a small amount of scallop has been retained. The mixed prawn category includes both target and bycatch prawn species (endeavour, red spot king and tiger prawn) and are generally soft and broken prawns. They are put in this category as soft and broken prawns are generally not abundant enough make up a whole box for sale.

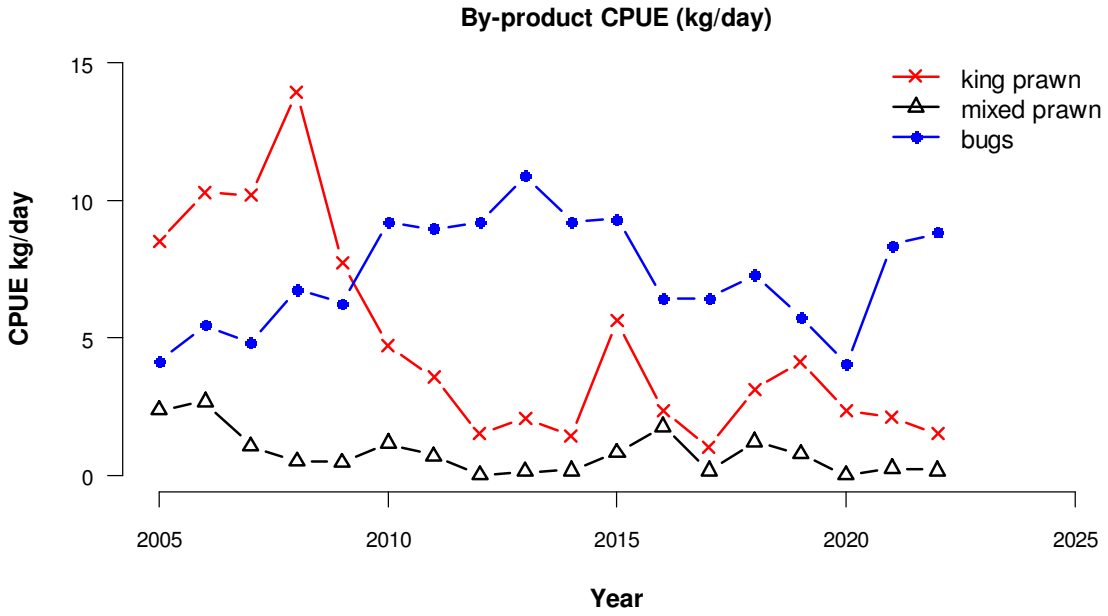


Figure 18 By-product CPUE (kg/d) for king prawn (the combined red spot king prawn + king prawn mixed columns listed it table 3), prawn mixed and bugs for the years 2005 to 2022.

In the logbooks king prawns are recorded as either “king prawn” or as “red spot king prawn” (Table 3). Random research trawl surveys conducted in the fishery during May, June, September and November of 2007-2008 (Turnbull et.al 2009) indicate that ~98% of the king prawn catch is red spot king (prawns (*Melicertus longistylus*) and the rest (~2%) is the western king prawn (*Melicertus latisulcatus*).

The mean annual CPUE (kg/day) of bugs and “prawns mixed” was fairly consistent over the years 2005–2022 whereas the CPUE of king prawn has been lower since 2009. This is probably because effort has reduced in the southern grids that have historically produced the higher catch rates of king prawn (Figures 6 and 9).

Table 5 Logbook catches of the 8 main by-product species groups that were caught in the TSPF during 2005 -2022

Year	Effort (days)	Prawns mixed (t)	King prawn mixed (t)	Red spot king prawn (t)	Bugs (t)	Cuttlfish mixed (kg)	Squid (kg)	Octupus (kg)	Scallops (kg)
2005	6020	14.3	45.68	5.52	25.03	1212	802	184	0
2006	4406	11.77	36.46	8.76	24.02	362	1293	191	0
2007	4829	5.1	41.35	7.85	23.41	971	2322	478	0
2008	3477	1.78	38.65	9.83	23.5	1152	2482	77	0
2009	2105	0.98	13.19	3.1	13.19	923	1008	224	0
2010	1879	2.21	5.16	3.67	17.31	206	426	41	200
2011	1309	0.9	3.85	0.81	11.73	111	139	45	5
2012	2081	0.03	2.09	1.04	19.15	22	455	73	0
2013	1993	0.28	3.12	1.02	21.72	54	34	100	0
2014	1954	0.33	2.61	0.17	18.02	113	131	104	0
2015	3002	2.47	15.98	0.86	27.95	531	282	45	0
2016	2322	4.12	4.58	0.82	14.96	611	40	134	0
2017	935	0.16	0.96	0	6.02	513	59	25	7790
2018	2076	2.54	3.77	2.7	15.11	1179	524	167	0
2019	2632	2.07	7.32	3.56	15.17	1312	840	284	0
2020	1036	0	1.15	1.3	4.21	252	125	162	0
2021	1285	0.33	1.58	1.14	10.74	213	245	74	0
2022	1303	0.23	1.05	0.92	11.5	153	92	32	0

Table 6 Threatened, Endangered and Protected Species caught (individuals) for 2005-2022. Three animals were misreported as common sawshark and have been moved to the sawfishes category.

Year	Flatback Turtle	Green Turtle	Hawksbill Turtle	Leatherback Turtle	Loggerhead Turtle	Pacific (Olive) Ridely Turtle	Turtles	Sawfishes	Seahorses & pipefishes	Seasnakes	Effort (days)
2005	1	2			1					1152	6020
2006	1	2							3	1105	4406
2007	3	2	2	2		1		1	16	1585	4829
2008	1	2						3		1090	3477
2009	1							1		1003	2105
2010	1	2							1	1532	1879
2011										1168	1309
2012		4					1	1	69	1550	2081
2013		2					2	1		1204	1993
2014		1					4	1		1337	1954
2015		1					6	1		673	3002
2016	1		1				2	2	9	638	2322
2017							1	6		274	935
2018						1	1			723	2076
2019		1	1					2		1035	2632
2020								1		637	1036
2021								3		354	1285
2022		1								203	1303
Totals	**9**	**20**	**4**	**2**	**1**	**2**	**17**	**23**	**98**	**17263**	

The majority of the Threatened, Endangered and Protected (TEP) species caught in the TSPF are seasnakes, followed by sygnathids (seahorses and pipefish). Occasionally turtles and sawfish are caught (Table 6). Only 2% of seasnakes were observed as “dead”; 62% were noted as being alive and the condition of 36% was “unknown” when returned to the sea.

Figure 19 plots the annual number of interactions with seasnake against the number of fishing days for each year. The rate of interactions with seasnakes (i.e. Catch Per Unit of Effort) expressed as number of interactions per days was 0.6 – 0.9 animals per day during the years 2010-14 and 2020, whereas during the remainder of the time-series (before and after these years) the rate was 0.2 – 0.5 animals per day.

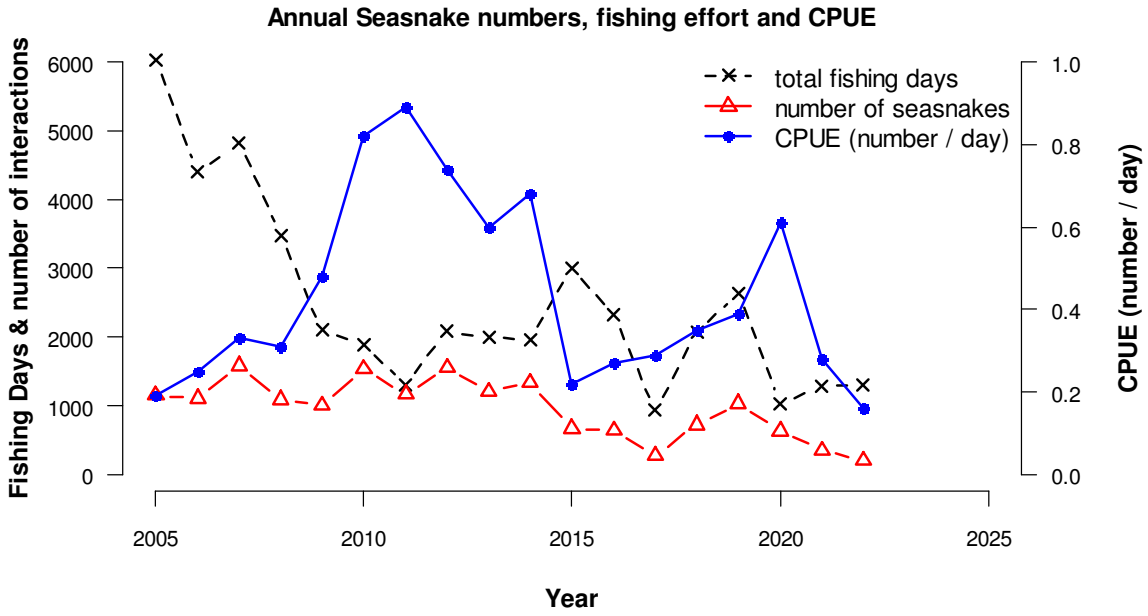


Figure 19 The annual number of interactions (reported in logbooks) with seasnake (red line with triangles) plotted against the number of fishing days (black dotted line with x) and both are scaled to the left y-axis. The solid blue line with circles is the Rate of interactions with seasnake (i.e. CPUE) expressed as number of interactions per fishing day and is scaled to the right y-axis.

References

O'Neill, M. F. and C. T. Turnbull (2006). Stock assessment of the Torres Strait tiger prawn fishery (Penaeus esculentus). Queensland, Department of Primary Industries and Fisheries.

Turnbull, C.T., Tanimoto, M., O’Neill, M.F., Campbell, A. and Fairweather, C.L. (2009) Torres Strait Spatial Management Research Project 2007-09. Final Report for DAFF Consultancy DAFF83/06. Department of Employment, Economic Development and Innovation, Brisbane, Australia

Appendix Details by Year and Month of Fishing Effort and Catches since 1989

The appendix tables provide a summary by year and month of fishing effort, catch and CPUE since 1989; the year when full logbook coverage commenced.

Note: Only the southern section of Torres Strait was open during March of 1989 so this data was neither presented nor used to calculate the averages displayed in the previous monthly figures.

Table 7 Tiger prawn catch in tonnes by month for the years 1989 to 2022.

year	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1989		13	169	126	64	60	43	30	25	9
1990			99	76	41	66	46	34	22	11
1991		217	67	117	110	56	42	49	31	20
1992		245	147	102	87	62	87	67	52	29
1993		90	87	64	40	51	72	37	30	16
1994		124	87	64	51	42	41	26	20	10
1995		187	120	107	73	53	45	36	20	9
1996		246	90	68	71	58	57	40	29	10
1997		172	109	92	59	53	74	69	43	23
1998		261	185	117	108	99	77	60	43	15
1999		129	89	96	74	76	62	49	35	18
2000		121	74	52	61	59	42	36	23	10
2001		133	124	88	75	64	56	48	24	10
2002		195	141	112	57	46	54	48	44	24
2003		177	134	79	61	77	74	54	36	20
2004		141	111	80	61	65	67	44	23	16
2005		194	165	96	51	31	36	44	28	10
2006		191	117	79	45	45	49	38	28	11
2007		121	126	112	60	40	46	42	34	13
2008		95	86	77	41	51	49	34	27	15
2009		81	51	44	45	28	28	30	25	7
2010		63	43	32	31	31	58	52	23	11
2011		39	16	21	28	32	38	20	7	3
2012		84	69	71	54	52	32	14	15	9
2013		100	56	60	47	49	35	30	27	15
2014		65	34	36	32	31	24	40	36	18
2015		88	82	95	65	51	72	52	39	15
2016	21	37	56	58	46	40	39	36	27	7
2017	7	8	4	10	7	6	12	23	24	10
2018	2	10	17	37	82	69	49	32	22	8
2019	5	53	114	128	72	51	34	28	22	8
2020	11	29	14	17	3	37	30	21	21	20
2021	8	20	23	36	41	41	23	12	18	12
2022	5	20	48	61	18	26	35	41	10	1

Table 8 The endeavour prawn catch in tonnes by month for the years 1989 to 2022. Note the data is rounded integers therefore "0" indicates an endeavour prawn catch of less than 0.5 tonnes and blanks indicate no endeavour prawn catch for that year and month.

year	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1989		32	135	125	71	73	59	55	48	15
1990			64	67	35	57	65	69	54	24
1991		293	81	172	136	86	73	125	70	43
1992		222	160	119	104	79	122	125	104	67
1993		172	148	99	57	69	123	93	82	42
1994		202	215	146	112	86	102	78	50	21
1995		279	222	189	131	105	92	97	45	19
1996		241	141	98	78	82	97	85	47	24
1997		236	189	149	92	76	118	111	67	26
1998		190	164	130	120	134	110	90	85	27
1999		263	308	239	189	151	133	113	80	33
2000		278	200	136	101	102	88	95	58	19
2001		290	226	177	89	82	73	91	47	19
2002		225	174	110	67	48	62	76	68	33
2003		165	163	89	48	60	78	75	52	29
2004		116	129	101	65	73	85	67	35	19
2005		117	124	101	54	31	44	66	47	14
2006		186	178	95	51	41	40	41	32	8
2007		124	113	87	43	30	36	36	27	6
2008		87	93	71	34	34	42	33	19	6
2009		43	31	22	24	13	14	16	8	2
2010		20	14	10	7	9	23	20	6	1
2011		11	6	7	9	14	14	8	3	1
2012		15	21	23	18	17	12	5	3	2
2013		33	12	11	8	12	13	9	5	1
2014		14	7	6	8	8	8	13	9	3
2015		26	21	19	15	14	30	22	15	5
2016	2	4	4	3	5	9	12	13	4	1
2017	0	1	0	1	1	1	4	8	7	1
2018	0	1	3	4	15	16	13	14	12	3
2019	1	23	73	79	44	30	17	16	13	4
2020	1	9	2	3	1	9	12	9	8	6
2021	1	4	6	6	10	13	9	5	6	2
2022	0	5	14	23	7	11	15	11	1	0

Table 9 King prawn catch in tonnes by month for the years 1989 to 2022. Note "0" indicates a king prawn catch of less than 0.05 tonnes and blanks indicate no king prawn catch for that year and month.

year	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1989		3.3	5.7	6.2	3.2	1.7	1.4	1.5	1.7	0.6
1990			5.3	6.6	2.7	3.2	2	1.5	0.8	1.5
1991		30	5.5	8.8	5.9	4.4	3.3	4.5	4.6	3
1992		20.3	8	5.2	5.6	2.5	3.3	4.3	2.9	3.1
1993		12	7	5.4	2.8	3.5	4.7	1.3	1.3	0.6
1994		13.2	10.9	8.3	3.8	2.3	2.1	1.2	1	2.2
1995		9.6	6.3	6.1	2.8	2.7	1.2	1	0.8	0.1
1996		9.6	5.9	2.7	1.4	1.3	0.9	1.2	1.1	0.4
1997		6.3	7.3	4.4	3.1	1.5	2.9	2.6	3.2	3.4
1998		29.4	24.5	13.7	9.5	5.8	6	5.8	6.8	2.7
1999		19.3	13.2	6.3	4.1	3.6	3	3.8	3.9	3.5
2000		33.8	18.2	6.1	4.3	3.8	2	2.1	1.6	0.8
2001		27.6	14.3	6.2	2.6	1.3	1.6	5.4	9.6	8.6
2002		75.5	45.1	15.4	4.5	2.6	2.1	4.1	8.2	7.2
2003		48	26	15.2	7.2	5	4.3	5.6	8.4	6.2
2004		26.2	16.1	8.1	4.7	3.8	4	4.8	4	2.6
2005		11.8	13.6	9.9	4.6	1.4	2.3	3.5	3.3	0.8
2006		15.7	12.3	6.2	2.6	2	2.5	2.1	1.3	0.5
2007		18.8	12.1	6	3.3	2.2	2.2	1.6	1.7	1.4
2008		16.1	11.9	4.9	2.3	4.9	4.1	2.3	1.4	0.6
2009		5.2	3.7	1.8	2.3	1.2	0.6	0.7	0.7	0.1
2010		2.4	1.6	1.1	0.7	0.4	1.1	1.1	0.3	0.2
2011		0.7	0.2	0.2	1	1.2	1	0.1	0.1	0.2
2012		0.2	0.8	0.4	1.2	0.2	0	0.2	0.1	0
2013		0.7	0.3	0.5	0.2	0.3	0.3	0.4	0.1	1.3
2014		0.3	0.2	0.1	0.1	0.8	0.5	0.7	0.2	0.1
2015		0.1	0.3	0.8	1.4	0.6	3	0.7	4.1	5.9
2016	1.1	0.4	0.7	0.2	0.2	0.2	0.9	0.8	0.8	0.2
2017	0	0.1	0	0	0	0	0	0.1	0.4	0.2
2018	0	0	0	0	0.3	0.6	0.6	0.6	3.1	1.3
2019	0	0.5	2.1	3.4	1.7	0.7	0.9	0.3	0.4	0.8
2020	0	0.2	0	0	0	0.2	0	0.1	0	1.9
2021	0	0.1	0	0	0.1	0	0.5	0.3	0.4	1.3
2022	0	0.1	0.6	0.6	0.1	0.1	0.1	0.2	0.1	0

Table 10 Number of days recorded as fished in Torres Strait by the fleet by month for the years 1989 to 2022.

year	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1989		184	1370	1605	1062	1064	812	744	670	282
1990			910	1005	509	867	812	724	543	318
1991		2431	596	1228	1531	1030	734	1046	856	531
1992		2218	1453	1377	1358	1084	1209	1170	1183	854
1993		1115	1076	1016	645	794	1440	949	933	557
1994		1570	1494	1160	956	921	1161	887	734	361
1995		1610	1249	1147	970	868	842	763	488	221
1996		1709	1080	882	877	918	1078	833	736	340
1997		1672	1488	1306	1092	853	1209	1157	853	467
1998		1694	1369	1126	1098	1199	1104	1051	1029	507
1999		1387	1332	1479	1505	1334	1252	1147	964	502
2000		1889	1506	1101	1060	1153	933	1094	835	398
2001		1833	1562	1365	1206	1063	1056	1082	700	284
2002		1916	1506	1443	864	714	851	970	908	466
2003		1797	1573	1066	620	765	930	1007	794	447
2004		1123	1107	843	675	788	984	809	460	270
2005		1128	1184	914	606	386	451	616	550	185
2006		1144	878	578	358	316	356	361	304	111
2007		1021	871	703	442	342	425	431	409	185
2008		534	535	531	341	370	414	297	285	170
2009		437	299	237	284	193	194	200	202	59
2010		321	223	172	149	153	307	309	163	82
2011		203	93	112	167	204	253	170	67	40
2012		365	276	335	275	294	220	116	122	78
2013		411	222	245	185	238	186	197	181	128
2014		371	168	193	194	203	165	255	256	149
2015		334	357	445	323	271	434	357	322	159
2016	212	225	288	313	244	216	251	258	242	73
2017	72	74	30	76	56	38	83	177	225	104
2018	8	46	59	141	415	438	390	282	215	82
2019	14	188	457	550	372	288	264	219	197	83
2020	67	162	59	64	12	143	148	120	111	150
2021	45	111	114	155	177	227	154	74	128	100
2022	26	81	202	324	92	111	158	235	69	5

Table 11 Number of vessels recorded as fished in Torres during each month for the years 1989 to 2022.

year	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
	year	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
3	1989		27	95	84	69	64	43	41	37
12	1990			70	56	30	46	39	36	30
20	1991		95	54	60	82	57	36	50	47
29	1992		90	58	56	71	58	48	52	52
38	1993		65	52	52	32	58	59	51	44
47	1994		72	59	49	46	60	54	44	46
56	1995		68	50	47	50	53	44	35	28
65	1996		73	54	45	49	57	53	41	40
74	1997		73	60	56	55	50	50	48	45
83	1998		70	53	52	56	56	51	54	50
92	1999		64	61	67	67	62	55	53	47
101	2000		71	57	64	57	52	46	49	43
110	2001		69	57	68	57	47	47	47	39
119	2002		71	56	67	44	32	41	45	45
128	2003		69	61	60	29	40	48	46	45
137	2004		46	53	45	36	40	47	40	30
146	2005		52	54	50	36	28	31	32	31
155	2006		42	40	32	22	22	23	20	17
164	2007		42	44	38	29	21	26	27	23
173	2008		29	25	28	22	19	20	21	16
182	2009		25	19	15	17	12	14	13	13
191	2010		18	12	11	10	9	14	13	12
200	2011		12	8	5	12	12	12	10	6
209	2012		19	11	16	14	14	10	8	7
218	2013		20	13	12	10	12	8	10	8
227	2014		18	8	8	10	11	11	10	12
236	2015		19	15	18	16	13	17	15	14
245	2016	10	15	12	13	12	10	12	12	13
255	2017	6	5	2	3	3	3	5	9	9
265	2018	1	3	2	9	16	20	16	12	9
275	2019	3	15	18	21	21	15	16	9	11
285	2020	6	9	3	3	1	6	7	6	8
295	2021	5	8	6	8	11	11	10	5	7

Table 12 Tiger prawn CPUE (kg/d) by month for the years 1989 to 2022.

year	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1989		70	129	82	63	58	56	42	40	34
1990			112	79	85	80	60	50	43	36
1991		92	117	100	75	57	61	49	39	40
1992		113	104	78	66	60	75	60	47	35
1993		83	83	65	64	66	51	40	33	29
1994		80	60	56	54	47	36	30	28	28
1995		118	98	95	78	63	55	48	42	40
1996		146	85	80	83	65	55	49	41	29
1997		105	75	72	56	65	62	61	52	51
1998		157	137	107	101	86	72	58	42	31
1999		94	68	66	50	58	51	44	37	36
2000		65	50	48	58	52	46	34	29	27
2001		73	80	66	64	61	54	45	36	37
2002		103	95	79	68	65	65	51	50	51
2003		100	86	75	101	103	81	55	46	45
2004		127	101	96	92	84	70	56	51	64
2005		176	143	107	88	84	80	73	52	57
2006		170	135	139	130	143	141	108	93	96
2007		121	148	162	140	121	112	99	84	72
2008		179	163	146	123	140	121	115	97	90
2009		189	175	190	162	153	151	153	128	116
2010		200	195	193	217	205	192	173	143	130
2011		197	178	188	168	163	152	120	108	89
2012		233	251	213	200	180	148	122	123	120
2013		250	257	250	257	214	193	156	154	119
2014		176	201	187	168	157	152	158	143	123
2015		266	233	215	205	193	170	148	126	100
2016	103	165	198	189	192	188	161	142	117	104
2017	102	109	122	138	134	168	152	135	111	93
2018	222	232	297	270	203	160	129	115	105	98
2019	329	290	254	236	199	181	133	128	115	96
2020	178	182	241	268	266	262	203	180	190	137
2021	179	177	209	240	232	181	153	164	143	123
2022	176	251	240	192	198	240	229	178	147	144

Table 13 Endeavour prawn CPUE (kg/d) by month for the years 1989 to 2022.

year	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
[1] "ecpue"										
year	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1989		180	103	81	70	71	76	79	76	56
1990			72	70	72	68	84	101	103	81
1991		124	143	146	92	87	104	125	88	85
1992		102	114	92	79	77	104	110	93	82
1993		158	141	101	92	90	89	102	92	78
1994		131	148	130	120	98	92	91	71	60
1995		176	182	169	141	125	115	129	93	89
1996		143	133	114	91	91	92	105	66	74
1997		144	131	116	89	92	99	97	80	57
1998		114	122	118	112	116	103	88	84	55
1999		193	235	165	130	116	110	102	86	67
2000		149	135	126	97	90	96	90	71	50
2001		160	147	131	76	79	71	87	69	70
2002		118	118	78	79	69	75	80	77	72
2003		93	105	85	79	80	86	76	68	67
2004		104	118	124	99	95	90	86	78	72
2005		108	109	113	94	82	100	111	88	76
2006		166	207	169	147	132	116	118	107	68
2007		125	132	126	99	91	89	87	68	34
2008		168	175	136	103	94	105	114	69	35
2009		98	104	96	87	73	75	84	41	29
2010		62	65	59	53	58	75	67	36	22
2011		53	71	59	57	71	58	53	44	40
2012		43	80	71	65	60	58	48	26	24
2013		84	58	47	46	53	70	49	32	19
2014		38	41	30	40	41	53	54	36	22
2015		80	59	45	43	54	70	63	47	32
2016	14	19	19	15	27	46	49	53	21	12
2017	8	17	16	13	20	39	54	45	32	16
2018	11	25	44	32	39	38	34	52	59	40
2019	48	125	162	146	122	104	68	76	67	51
2020	24	55	31	44	96	70	84	73	72	41