Torres Strait Prawn Fishery Data Summary 2016

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Torres Strait Prawn Fishery Data Summary 2016

If you have any comments or questions relating to this document please contact

Lisa Cocking

Senior Management Officer

Torres Strait Prawn Fishery

AFMA Phone: (02) 6225 5451

Email: lisa.cocking@afma.gov.au

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

Contents

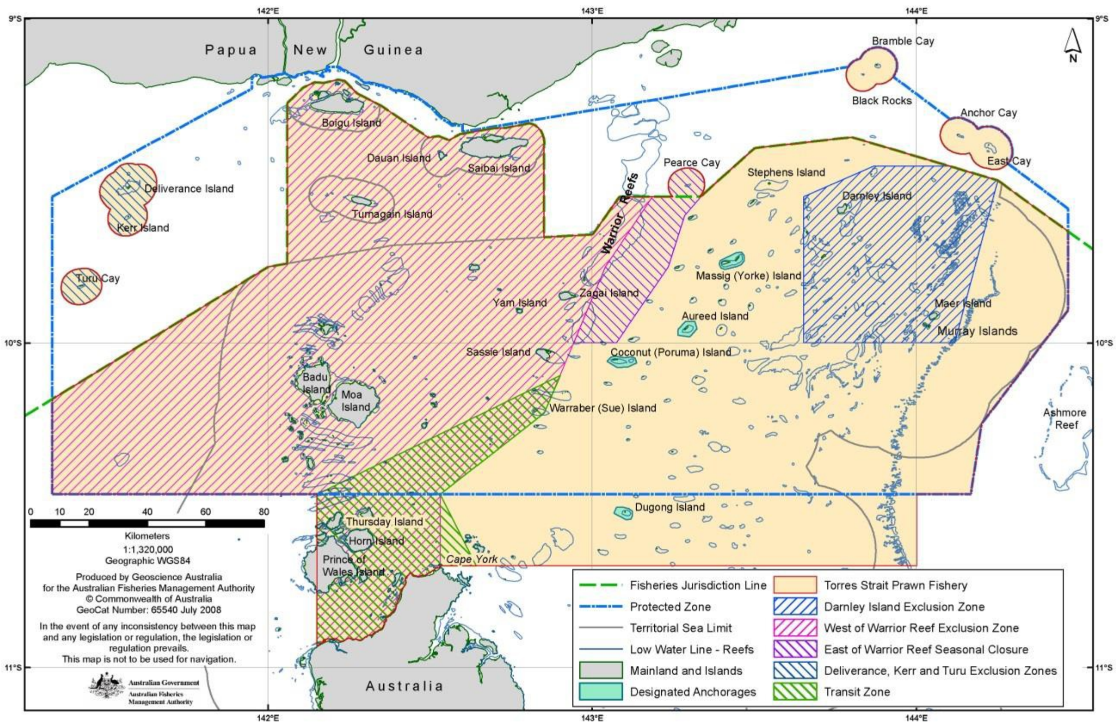
Introduction

This document summarises catch and effort information for the Torres Strait Prawn Fishery (TSPF) from the 2016 fishing season and in comparison to previous years. It is the second report of its kind for the TSPF and in future years may be expanded to include more data and information as required for the management of the fishery by Government or as requested by industry. 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 39 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

Torres Strait Prawn Fishery and Closures



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. 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. 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 logbooks and an automatic Vessel Monitoring System. The VMS is a satellite monitoring system which collects information on boat locations and speed. 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.

Because logbooks have only been compulsory In the TSPF since 1989, the total catch prior to 1989 was estimated from unload records. The voluntary logbook records from some operators provided the catch rate information.

In 1993 each license holder was allocated "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.

Methods Used For Preparing Data Summary

The data used to prepare the Torres Strait Prawn Fishery Data Summary is comprised of logbook information (NP16 and e-log) and VMS data. This information is stored by AFMA on the Torres Strait Prawn database.

The data used in this summary was extracted during January 2017. 97% of logbook sheets for the 2016 season had been submitted by this time. 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 (Nights Fished) and the Vessel Monitoring System data (VMS). Prior to 1989 the "Nights Fished" and catches are estimated from voluntary logbook records and unload records. The "VMS" plots are slightly higher than the "Nights Fished" plots 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 nights if they can verify that they were not fishing but often do not if it is near the end of the season and they have unused fishing nights .

Catch and Effort Data for the Torres Strait Prawn Fishery

Total fishing days in the area of the fishery

The total fishing days in the area of the Torres Strait Prawn Fishery (TSPF) from 1993- 2016 are plotted in Figure 1 and the total percentage of days used in 2016 is shown in Figure 2.

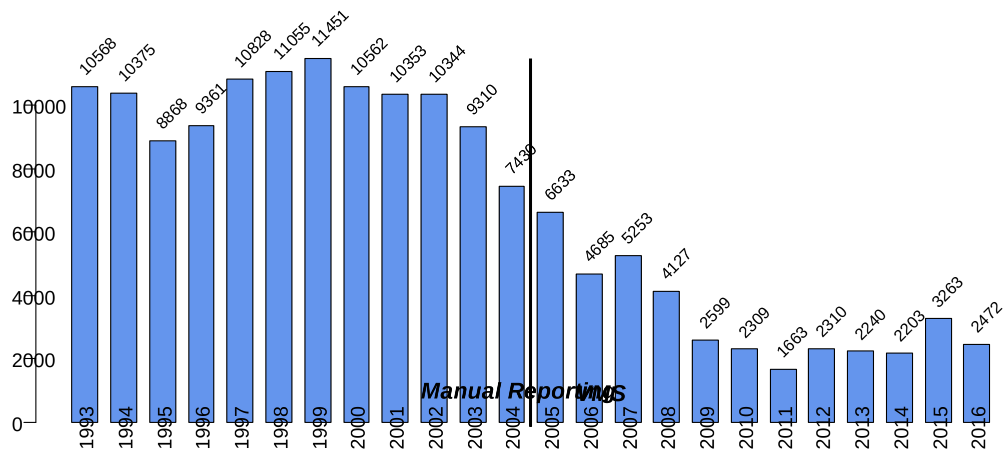


Figure 1 Total days fished in the area of the fishery 1993-2016.

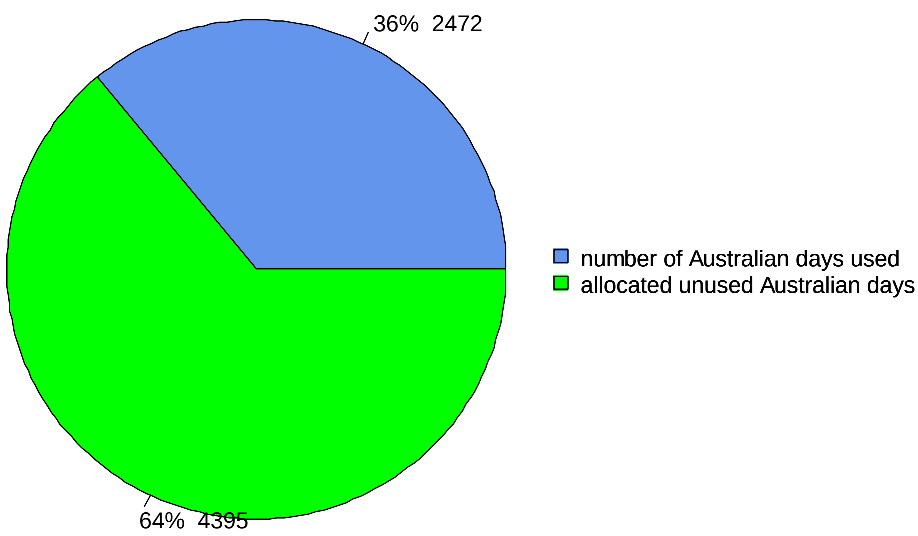


Figure 2 Proportion of the total allocated fishing days used in the TSPF for the 2016 season.

Catch and effort by year

The final estimates of catch for 2016 may be slightly higher than the values presented in this data summary because the logbook data for 2016 was only 97% complete when downloaded for analysis in late January 2017.

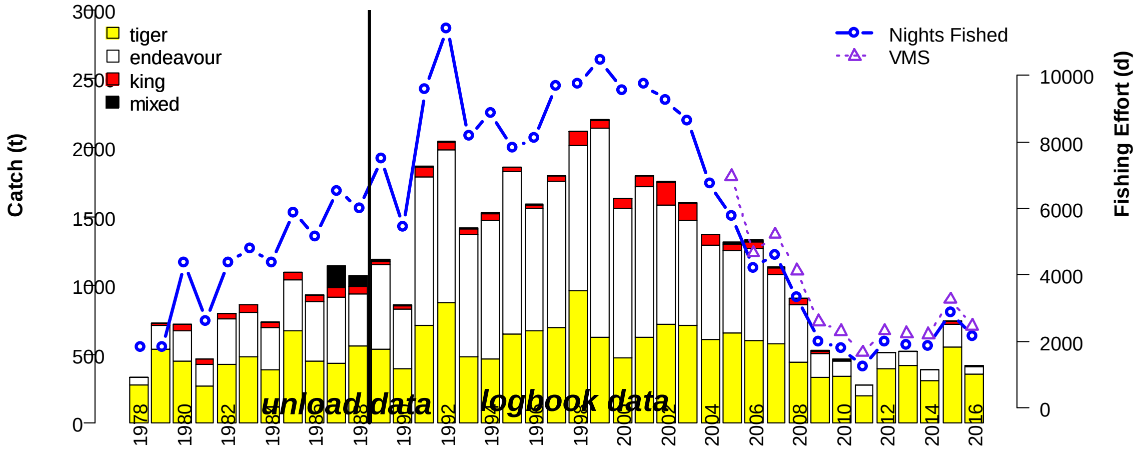


Figure 3 Prawn catches by species as stacked bars. The overall height of each bar is the total prawn catch. The fishing effort estimates are lines.

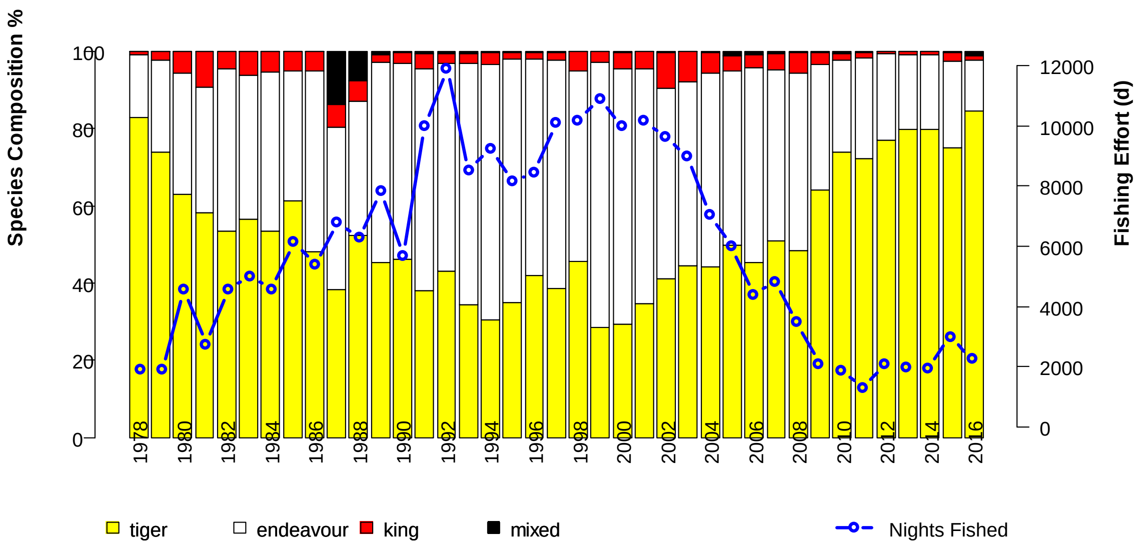


Figure 4 The percentage species composition of the prawn harvest by weight (bars) and fishing effort (line).

Figures 3 shows that as fishing effort increased during the developmental years of the fishery 1978-1991, the endeavour prawn catch increased, then as the effort dropped during 2001–2011, so did the endeavour prawn catch. In contrast the tiger prawn catch has been relatively stable although higher during the years of highest effort (1991-2001). Therefore the trend in the overall prawn catch is mainly a result of changes in the endeavour catch. The species catch composition since 2009 (Figure 4) has been similar to the early fishery years. During the period when fishing effort was highest the percentage of endeavour prawn was also highest (48-60%). Post 2011 fishing effort has stabilised at around 2,000 nights and tiger prawn has comprised more than 70% of the catch. Last season (2016) had the highest percentage of tiger prawn (85%) since 1978.

During the years 2001 to 2007 the tiger prawn catch remained close to the long term average despite the large decrease in fishing effort whereas endeavour prawn catch tracked downward, mirroring the decrease in effort. After 2007 the catch of both tiger and endeavour prawn tracked downward and reached their lowest points in 2011 when fishing effort was at its lowest.

Changes in the species composition of the harvest result from variability in the annual recruitment and changes in the landed value of each species. The landed prices influence which species are targeted by fishers. Recruitment, which is effected by the level of fishing effort, determines the abundance of each species on the sea bed. The period of highest fishing effort (1990s) matches the time of highest endeavour prawn abundance and lowest tiger abundance, as indicated by Catch Per Unit of Effort (Table 1, Figures 5 & 6).

The decline in fishing effort after 2001 was mainly driven by increasing fuel prices and decreasing produce value making it less profitable to fish. The decrease in the endeavour prawn catch occurred first because it is the lower value product and it was more profitable for fishers to target areas of higher tiger prawn catch rates. 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 catch rates often only a few miles away from areas of lower tiger prawn catch rates but higher endeavour prawn catch rates. Some TSP fishers have stated that they “target dollars rather than a particular species”; i.e. the species mix that provides the highest return.

The 2016 tiger prawn catch (357 t) was lower than for 2015 but higher than 2014 and the years 2009-11. In contrast, the 2016 endeavour prawn catch (55 t) was the lowest recorded since 1979 when the estimate of fishing effort was approximately 2,000 nights. The 2015 tiger prawn catch was the highest since 2008 and the endeavour prawn catch was the highest since 2009. This was a result of the highest fishing effort since 2008 and higher Catch Per Unit of Effort (Table 1).

Although the 2016 fishing season was 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 a 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.

Table 1 Yearly totals and average annual Catch Per Unit of Effort since the 2005 effort reduction.

Year	Nights Fished	VMS	Catch (t)					Catch Per Unit of Effort (kg/d)		
	days	days	prawn	Tiger	Endeavour	King	Mixed	prawn	Tiger	Endeavour
2005	6,007	6,957	1,317	654	597	51	14	226	112	103
2006	4,402	4,654	1,330	601	672	45	12	308	139	156
2007	4,816	5,218	1,136	580	502	49	5	242	127	107
2008	3,475	4,127	911	441	419	48	2	268	138	124
2009	2,101	2,599	528	338	173	16	1	258	166	84
2010	1,878	2,309	464	344	110	9	2	252	187	61
2011	1,305	1,663	281	203	73	4	1	221	160	58
2012	2,080	2,310	517	398	115	3	0	254	195	59
2013	1,986	2,240	525	419	103	3	0	269	215	56
2014	1,951	2,203	393	314	76	3	0	207	165	41
2015	2,993	3,263	742	556	166	17	2	252	189	57
2016	2,248	2,472	421	357	55	5	5	193	163	31
Average (2012-16)	2,252	2,498	519	409	103	6	2	235	186	49
Average (1991-01)	9,781		1,806	659	1,087	56	5	191	70	115
	Emsy	9,197	MSY	676	1,044					

It was during November 2005 that allowable fishing effort was reduced to implement the Total Allowable Effort (TAE) of 9,200 effort units. The two average rows at the bottom of Table 1 compare catch and effort for the last 5 years with the period of highest effort (1991-2001). The boxes below the table list the estimates of tiger prawn Effort at Maximum Sustainable Yield (Emsy) and Maximum Sustainable Yield (MSY) in tonnes for tiger and endeavour prawns from stock assessments.

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 species that are found in the Torres Strait are only a few percent of the catch. King prawn has always been a small component of the catch and is regarded as a by-product of fishing for tiger and endeavour prawns. During March to May of 2002 and 2003 the monthly catches were the highest recorded and the proportion of king prawns was higher than the long term average (Figure 4) suggesting that these were years of above average recruitment for Red Spot King prawn.

Fishing catch rates and stock biomass

Figures 5 and 6 show the trends in “catch rates” or “Catch Per Unit of Effort” (CPUE) for tiger prawn and endeavour prawn. This is measured as the average kilograms of catch per boat day of fishing (kg/d). CPUE is an indication of the numbers of prawns on the seabed. High CPUE indicates a large prawn biomass while low CPUE indicates a small prawn biomass.

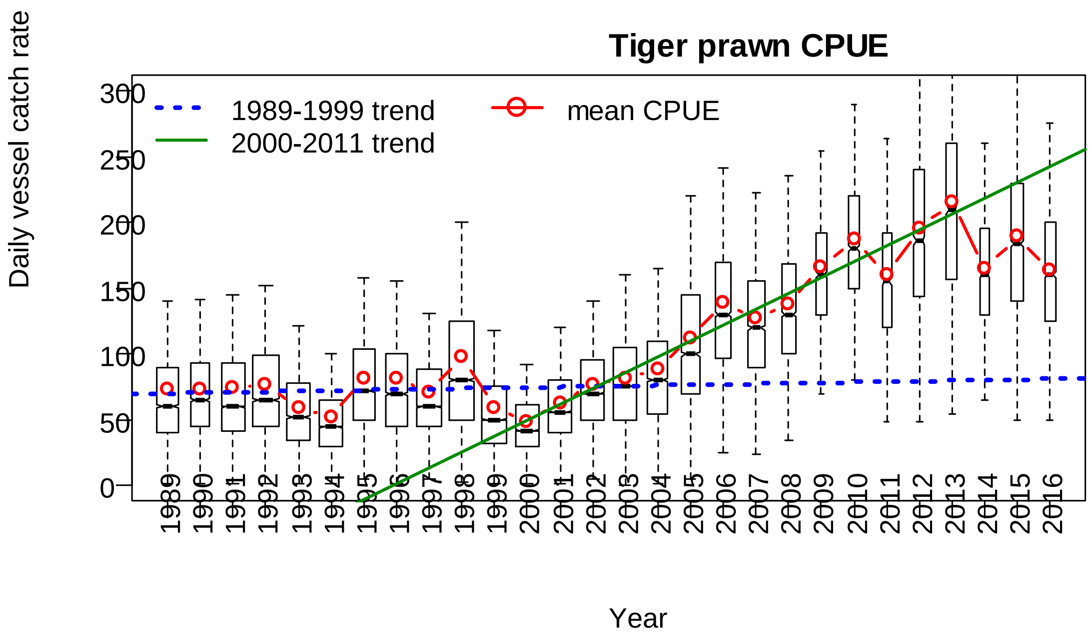


Figure 5 Yearly CPUE indices for tiger prawn catch.

The CPUE plots show the “mean” or average catch rate for each season (the red line with circles). The data has also been plotted as “box plots” which show the “median” or middle catch rate for each season and the spread of individual daily vessel catch rates around the median. Fifty percent of the records are within the rectangles and the “notch and line” near the middle is the “median” catch rate. The “whiskers or dotted lines” extending from the rectangles show the overall range of the catch rates that occurred each season. 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.

During the 1989-1999 fishing seasons tiger prawn CPUE (Figure 5) was variable but there is no overall upward or downward trend in the data therefore suggesting that the tiger prawn stock was relatively stable. In contrast, during the seasons 2000-2011 which corresponds with the period of decline in fishing effort, there is an obvious upward trend in the CPUE. The tiger prawn stock assessment conducted in 2004 indicates that the increasing CPUE was the combined result of fishers becoming more efficient at catching tiger prawns and an increasing tiger prawn stock biomass. Fishing effort stabilised at around 2,000 post 2011 and as a result of this the increasing tiger prawn CPUE appears to have stabilised at around 150-200 kg/day.

Endeavour prawn CPUE trend was flat from 1989 to 2009, varying around 100 kg/day (Figure 6). Since 2010-11 which was the end of the large decline in fishing effort (Figure 3), endeavour prawn CPUE has been around 50 kg/day (Figure 6).

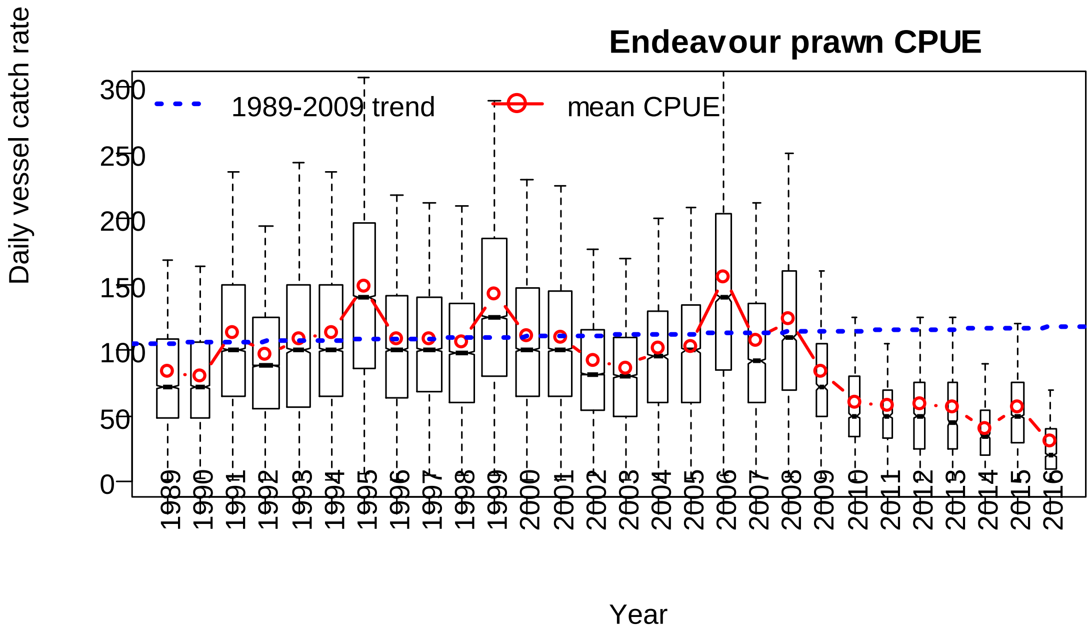


Figure 6 Yearly CPUE indices for endeavour prawn catch.

Although CPUE is an indicator of the numbers of prawns on the seabed there are many 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.

The increase in tiger prawn CPUE since 2000 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 2001-06, was at a higher level than during the 1990s and was above Bmsy (The biomass that supports Maximum Sustainable Yield (MSY)).

During the years 2010-14 fishing effort was approximately a quarter of the Emsy based TAE of 9,200 days and the average effort for the years 1991-2001. The tiger prawn harvest was around 50% of the high effort years (1991-01) and the estimate of Maximum Sustainable Yield (MSY). Tiger prawn catch rates (CPUE) since 2010, however, were the highest recorded since 1989 (Figure 5). These high CPUEs combined with the lower harvest of tiger prawns in recent years suggests that the tiger prawn stock is still well above the Biomass associated with MSY (Bmsy), which is used as a sustainability reference point.

Due to the very low level of effort in the fishery and fishers targeting the higher value tiger prawn, the monthly CPUE of endeavour prawns can be easily biased by which vessels are fishing and where they are fishing; therefore the current CPUE indices for endeavour prawn are a poor index of the stock biomass. The below average endeavour prawn catch rates since 2009 (Figure 6) most likely reflect fishers focusing on the higher value tiger prawns. Since 2001 the endeavour prawn catch has dropped to approximately 10% of historic levels and the estimate of MSY (Table 1). Therefore the impact of fishing (fishing mortality) on the endeavour prawn stock has been quite low compared with the 1990s when fishing mortality was much higher due to fishers targeting endeavour prawns, more vessels and much higher fishing effort. There is nothing to indicate that the endeavour stock has been overfished. This species is more resilient to high fishing effort than tiger prawns and in the early years of this fishery the endeavour prawn stock appeared to increase with increased fishing effort.

Spatial distribution of fishing effort and catches

The spatial distribution of fishing effort and catches, summarised to the 6 minute grid level are presented for the 2005, 2015 and 2016 fishing seasons in Figure 7 and Figure 8. To abide with logbook confidentiality requirements the data for grids where less than five vessels fished during the season are not shown. Because the Fisheries Jurisdiction Line passes through the lower sections of some grids along the border region the catch of these grids 'appear' to be in PNG waters as the grid centre is north of the line. Catches in grids that are within the East of Warrior closure occurred during August to November when this area is open to fishing.

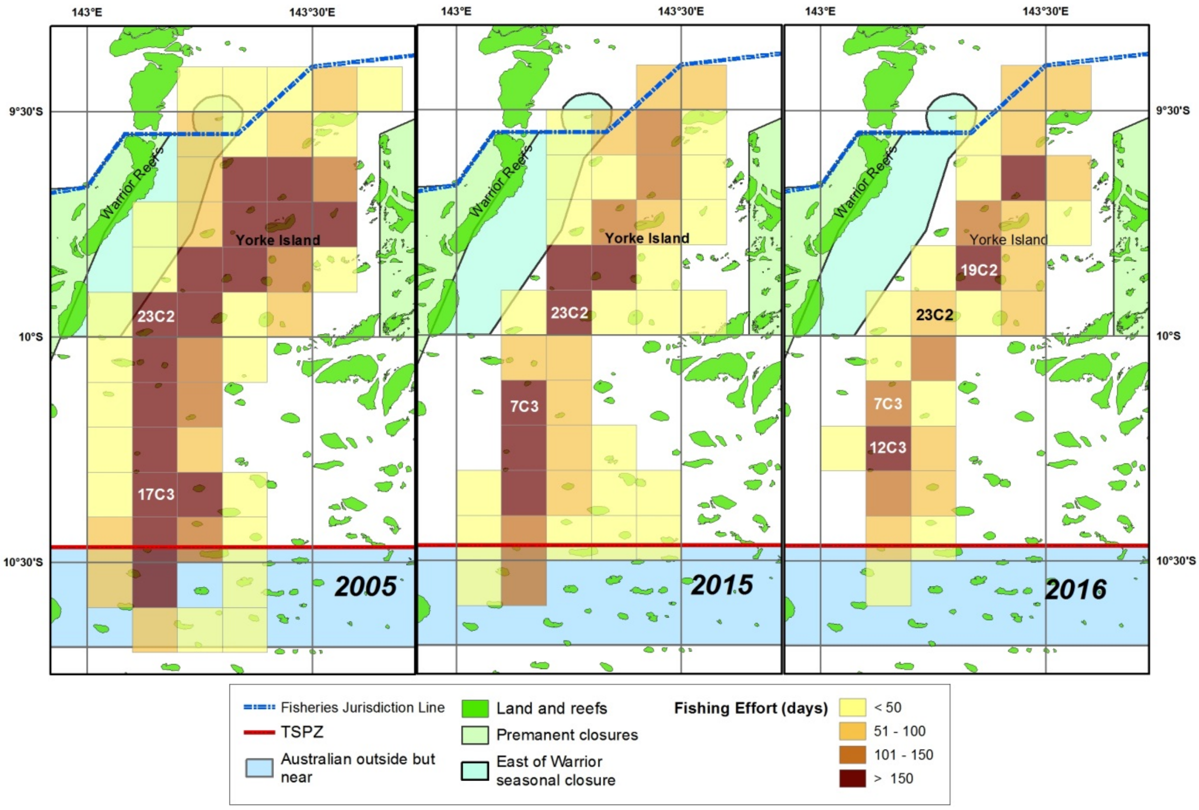


Figure 7 Effort distribution (fishing days) within the TSPF for the 2005, 2015 and 2016 fishing seasons by 6- minute grid.

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 (5,966 days) was approximately 60% of the years of highest effort (1991-2001) and the 2005 tiger prawn catch (651t) was just below the 1991-01 average (659t) and the estimate of MSY (676t). There were 16 grids where fishing effort was above 150 days during the 2005 fishing season (Figure 7). The grid with the highest effort and catch in 2005 was 17C3 where 407 days of effort from 53 vessels produced 39t of tiger prawn, 47t of endeavour prawn and 2.3t of king prawn.

During the 2015 season there were six grids with effort greater than 150 days. These grids match with 2005 grids that had greater than 150 days of effort. Grid 23C2 had the highest effort and catch; 19 vessels, 282 effort days, 54t tiger prawn and 17t of endeavour prawn. In contrast, during the 2005 season the same grid (23C2) was fished by 52 vessels and 350 days of effort, had a lower tiger prawn catch of 35t but a much higher endeavour prawn catch (40t). The grid with the second highest effort and catch during 2015 was 7C3; 21 vessels, 214 effort days, 51t tiger prawn and 11t of endeavour prawn.

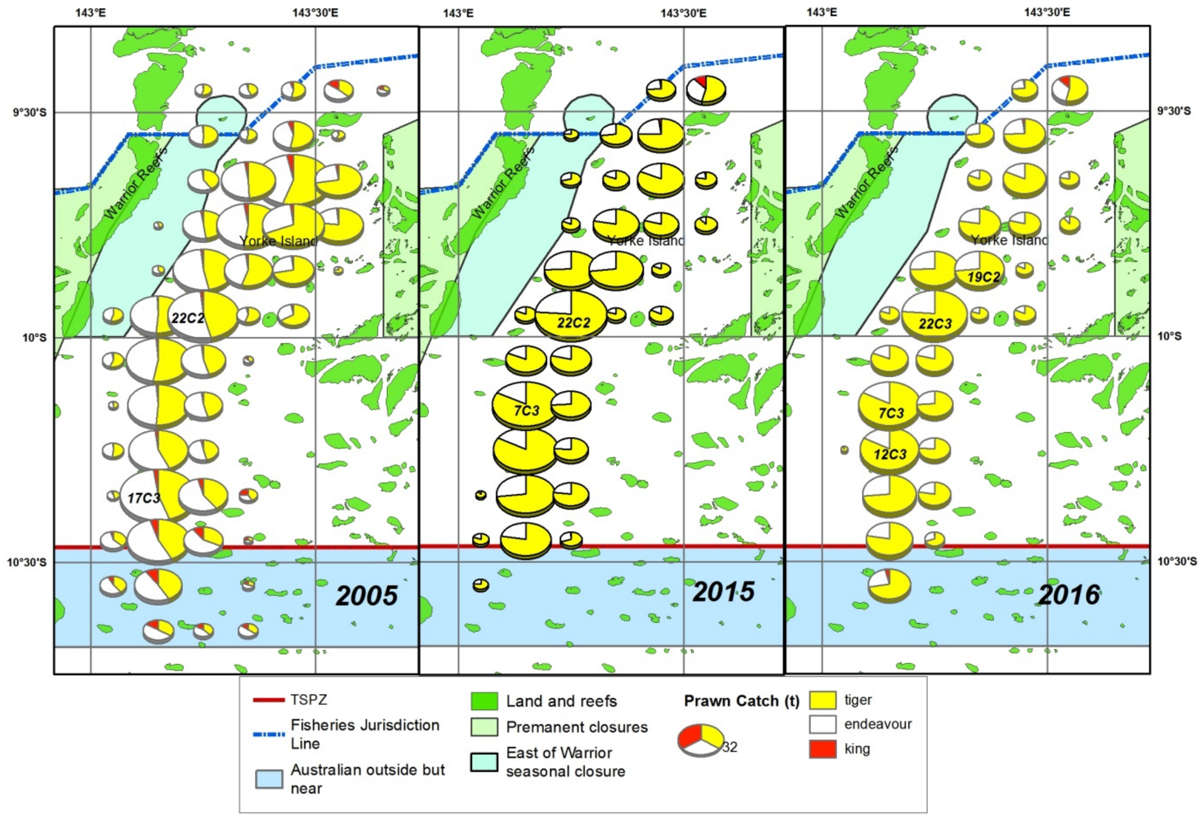


Figure 8 Spatial distribution of catch during the 2005, 2015 and 2016 fishing seasons. The diameters of the pie charts are scaled by the total prawn catch for each grid.

Although grids 23C2 and 7C3 had the highest and second highest prawn catch for 2016 (71t and 63t respectively) there were at least 4 other grids with higher fishing effort. The grid with the highest effort in 2016 was 19C2; 209 days of fishing by 18 vessels producing 30t of tiger prawn and 11t of endeavour prawn. Grid 12C3 had the second highest effort in 2016 (170 days and 14 vessels) and produced 47t of tiger prawn and 11t of endeavour prawn. In contrast, grid 23C2 produced 54t of tiger prawn and 17t of endeavour prawn from 97 days of fishing effort and 17 vessels. The estimates of effort and catch for 2016 could change slightly when all of the logbook data is available.

Although the 2005 pie graphs indicates that the proportion of endeavour prawn was slightly higher in the southern half of the fishery (Figure 8), the pie graphs for 2015 and 2016 shows that the reduction in the proportion of endeavour prawn in catches after 2005 occurred over the whole fishery.

Monthly trends in catch and effort

The following figures compare the monthly trends for the last two seasons with the average of the years 1989-14. The range markers on the “average line” indicate the minimum and maximum values that occurred in each month from 1989 to 2014. The 2016 logbook coverage at the time of analysis was close to 100 percent as indicated by the small difference between the “2016 VMS” and “2016 Nights Fished” lines in Figure 9. Therefore the catches reported for 2016 should be close to the final estimates.

The 2016 monthly fishing effort was consistently lower than the corresponding months in 2015, whereas it was slightly higher than the corresponding months in 2014 except for March and September – November (Figure 9). Generally the highest effort is at the start of the season and tracks downward over the season, following the general trend in the monthly prawn CPUE. Fishing effort for February 2016 which was open for the first time since 1988 was slightly lower than most of the other months of the season and was higher than for most months of the 2014 season.

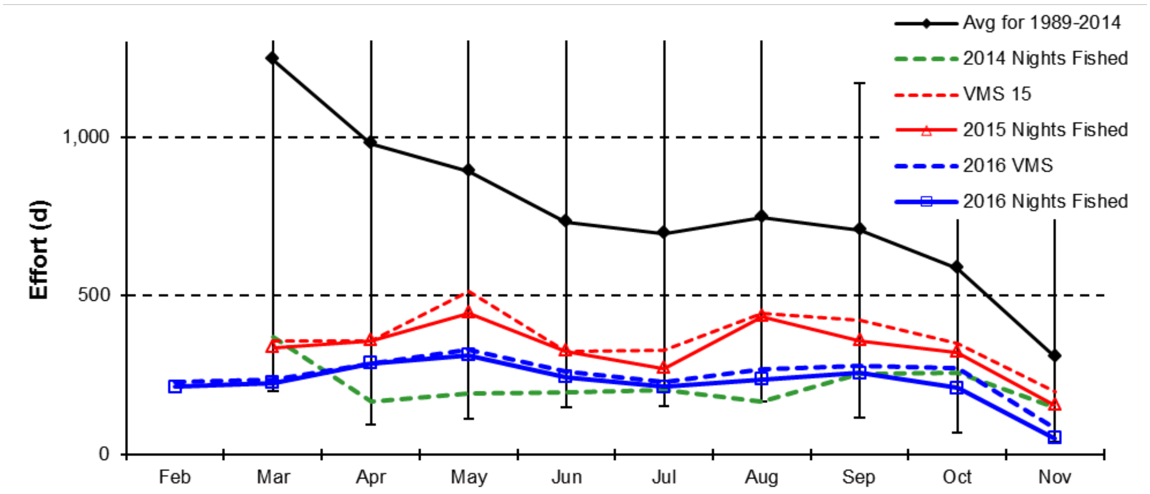


Figure 9 Monthly fishing effort in days. The blue solid and dotted lines show the 2016 VMS and logbook measures of monthly effort and the red lines show the 2015 fishing effort. The green dotted line is the 2014 Nights Fished measure of fishing effort.

The 2016 tiger prawn catch (Figure 10a) was lower than for the corresponding months in 2015 but higher than the 2014 catch for the months of April to August. The February 2016 catch was similar to the average November catch due to both the number of nights fished and CPUE being similar to that for the end of the season (Figure 9 and Figure 10b). The March and April 2015 tiger prawn catch was below average but tiger catch for the remainder of the season was above the long term average (Figure 10a). The highest 2015 tiger prawn catch was in May and the

August catch was higher than the adjacent months. The trend in the 2015 monthly tiger prawn catch (Figure 10a) was mainly a result of the pattern of fishing effort for 2015 (Figure 9).

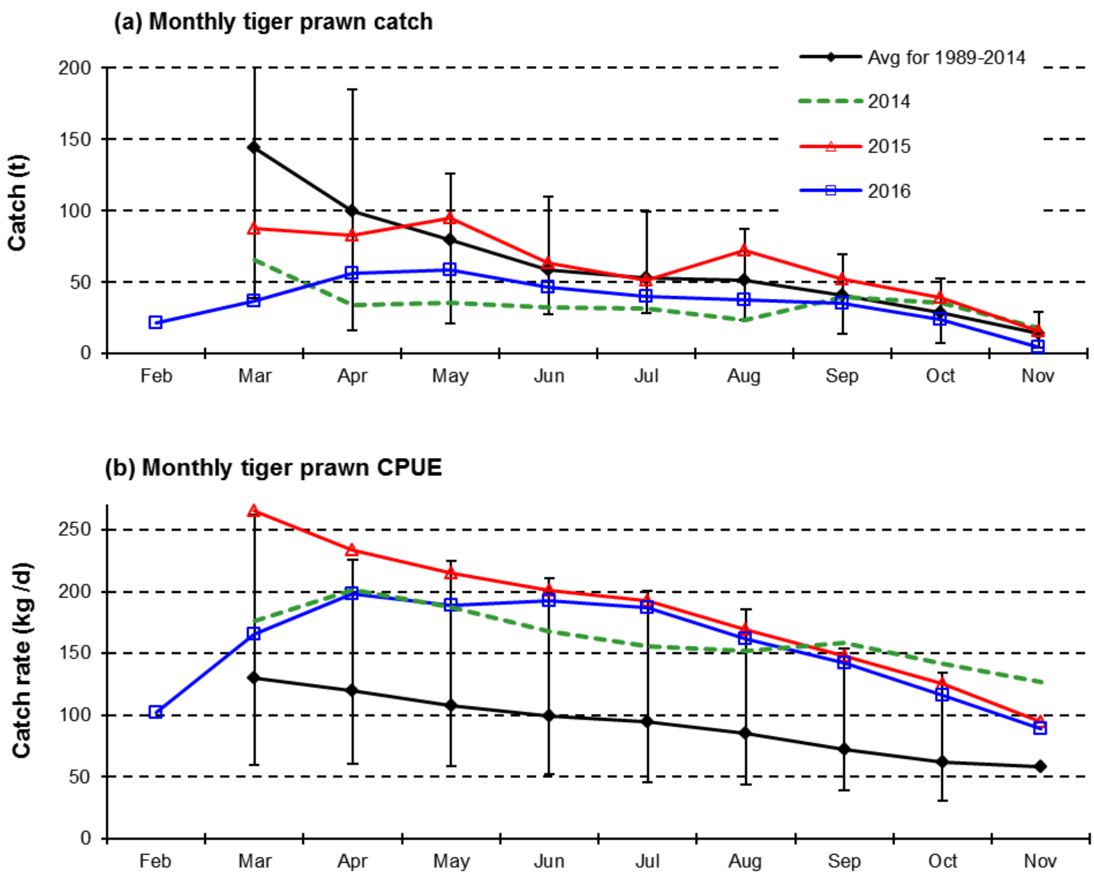


Figure 10 Monthly tiger prawn catches and catch rates (CPUE)

The 2016 and 2014 tiger prawn CPUE ramped up during the early months of the season (Figure 10b), indicating that the main recruitment of tiger prawn into the fishery may have been 1-2 months later than usual. This would also explain the low catch rate (CPUE) for February of 2016. If February of 2014 had been open to fishing it would probably have had a similar CPUE to February 2016. In contrast the 2015 tiger prawn CPUE started high and trended downward over the fishing season. This matches with the average tiger prawn CPUE but at a higher level, indicating that recruitment occurred at the normal time in 2015.

The 2016 monthly endeavour prawn CPUEs were the lowest recorded to date (Figure 11b). As a result this year's endeavour prawn catches are the lowest annual catch since full logbook records started in 1989. Endeavour CPUEs were highest during July to September which matches with the long term trends in monthly catch and CPUE. The data suggests that a poor recruitment of endeavour prawn for the first half of the 2016 fishing season could be the reason that last year's annual endeavour prawn catch was so low. Endeavour prawn recruitment at the start of the season is generally stronger than mid-season recruitment.

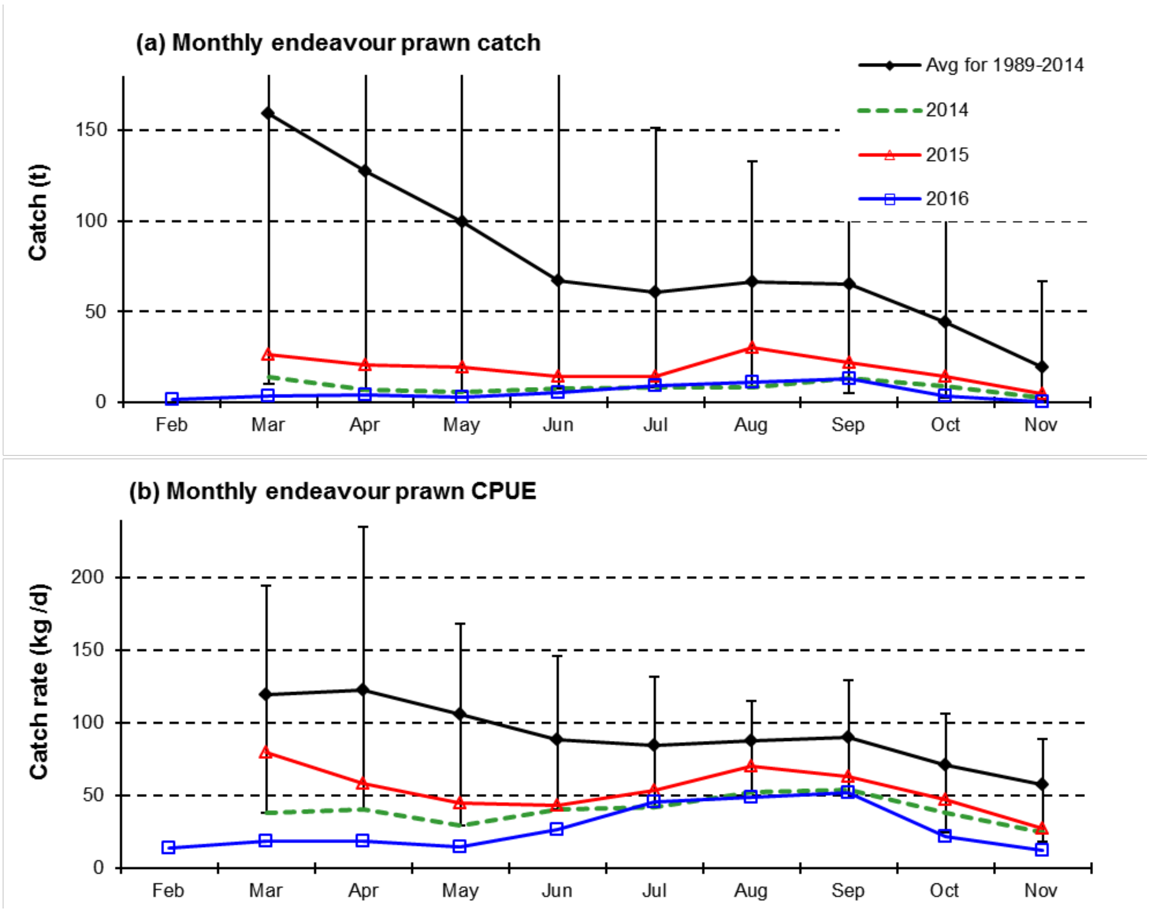


Figure 11 Monthly endeavour prawn catches and catch rates (CPUE).

The monthly catches of endeavour prawns in 2015 were higher than for the corresponding months in 2016 (Figure 11a) reflecting the slightly higher monthly CPUE and increased monthly fishing effort (Figure 9) during the 2015 season.

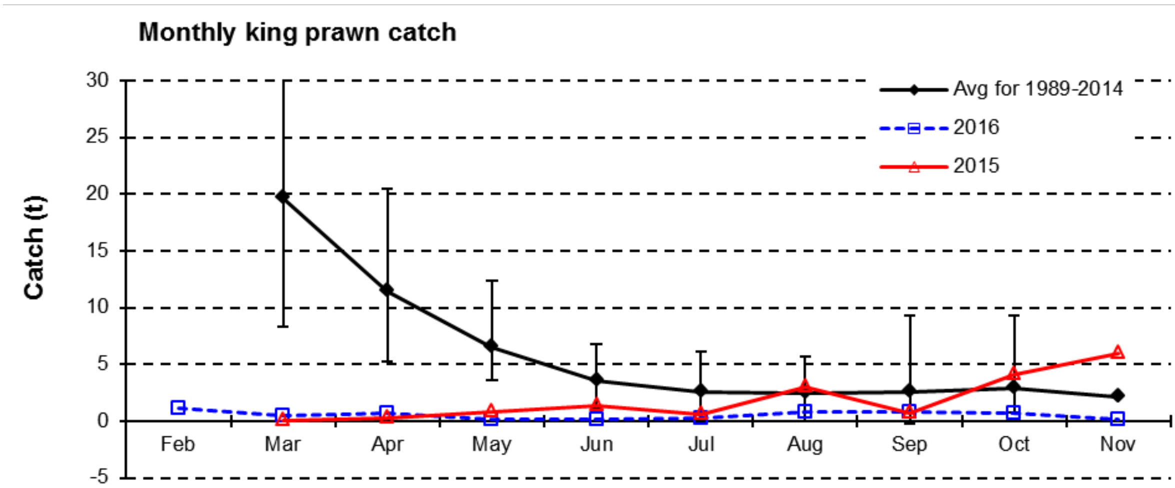


Figure 12 Monthly king prawn catches.

The 2016 king prawn catch was very low throughout the whole season (Figure 12). The 2015 monthly king prawn catches were well below average except for August and the last two months of the season. In past years when effort was higher most of the king prawn catch came from the first two months of the season.

Summary

1. The 2016 catch of tiger prawn and fishing effort are between the 2014 and 2015 levels.
2. The 2016 and 2014 tiger prawn CPUE ramped up during the early months of the season, indicating that the main recruitment of tiger prawn into the fishery may have been 1-2 months later than usual.
3. In terms of catches 2015 was the best year since around 2008 due to some of the highest tiger prawn catch rates (CPUE) for the first two months of the season and increased fishing effort.
4. The 2016 endeavour prawn catches are the lowest since full logbook records started in 1989. This may be due to a poor recruitment of endeavour prawn during the first half of the 2016 fishing season and also due to vessels targeting tiger prawns rather than endeavor prawns.
5. The 2016 catches reported in this data summary are close to final as there is only a small difference between the VMS and logbook measures of fishing effort for last season.

Details by month of catches and effort since 1989

The tables below provide a summary of catch and effort for each month of each year since 1989.

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 3 Tiger prawn catch in tonnes by month and year.

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Feb																												21
Mar	13*		217	245	90	124	187	246	172	261	129	121	133	195	177	141	194	191	116	87	81	63	39	84	99	65	88	37
Apr	169	99	67	147	87	87	120	90	109	185	89	74	124	141	134	111	165	116	126	81	51	43	16	69	56	33	82	56
May	126	76	117	102	64	64	107	68	92	117	96	52	88	112	79	80	95	79	111	71	44	32	21	71	60	36	95	58
Jun	64	41	110	87	40	51	73	71	59	108	74	61	75	57	61	61	51	45	57	37	45	31	28	54	47	32	63	46
Jul	60	66	56	62	51	42	53	58	53	99	76	59	64	46	77	65	31	45	40	51	28	31	32	52	49	31	51	40
Aug	43	46	42	87	72	41	45	57	74	77	62	42	56	54	74	67	36	49	46	46	28	58	38	32	35	24	72	37
Sep	30	34	49	67	37	26	36	40	69	60	49	36	48	48	54	44	44	38	40	30	30	52	20	14	30	39	52	35
Oct	25	22	31	52	30	20	20	29	43	43	35	23	24	44	36	22	28	28	31	24	25	23	7	15	27	36	39	23
Nov	9	11	20	29	16	10	9	10	23	15	18	10	10	24	20	16	10	11	12	13	7	11	3	9	15	18	15	4

Table 4 Endeavour prawn catch in tonnes by month and year.

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Feb																												2
Mar	32*		293	222	172	202	279	241	236	190	263	279	290	225	165	116	117	186	124	87	43	20	10	15	32	14	26	4
Apr	135	64	81	160	148	215	222	141	189	165	308	200	227	174	163	129	124	177	113	93	31	14	6	21	12	7	21	4
May	125	67	172	119	99	146	189	98	149	130	239	136	177	110	89	102	100	95	87	71	22	10	7	23	11	6	19	3
Jun	71	35	136	104	57	112	131	78	92	120	189	101	89	67	48	65	54	51	42	34	24	7	9	18	8	8	15	5
Jul	73	57	86	79	69	86	105	82	76	134	151	102	82	49	60	73	31	41	30	34	13	9	14	17	12	8	14	9
Aug	59	65	73	122	123	102	92	97	118	110	133	88	73	62	78	85	44	40	36	42	14	23	14	12	13	8	30	11
Sep	55	69	125	125	93	78	97	85	111	90	113	96	91	76	75	67	66	41	36	33	16	20	8	5	9	13	22	13
Oct	48	54	70	104	82	50	45	47	67	85	80	58	47	68	52	33	47	32	27	19	8	6	3	3	5	9	15	3
Nov	15	24	43	67	42	21	19	24	26	27	33	19	19	33	29	19	14	7	6	6	2	1	1	2	1	3	5	0

Table 5 King prawn catch in tonnes by month and year.

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Feb																												1.1
Mar	3*		30.0	20.3	12.0	13.2	9.6	9.6	6.3	29.4	19.3	33.8	27.6	75.5	48.0	26.2	11.8	15.7	18.8	16.1	5.2	2.4	0.2	0.2	0.2	0.3	0.1	0.4
Apr	5.7	5.3	5.5	8.0	7.0	10.9	6.3	5.9	7.3	24.6	13.2	18.2	14.3	45.1	26.0	16.1	13.5	12.3	12.1	11.9	3.7	1.6	0.2	0.8	0.2	0.2	0.3	0.7
May	6.2	6.6	8.8	5.2	5.4	8.3	6.1	2.7	4.4	13.7	6.3	6.1	6.2	15.4	15.2	8.1	9.8	6.2	6.0	4.9	1.8	1.1	0.2	0.4	0.5	0.1	0.8	0.2
Jun	3.2	2.7	5.9	5.6	2.8	3.8	2.8	1.4	3.1	9.5	4.1	4.3	2.6	4.5	7.2	4.7	4.6	2.6	3.2	2.3	2.3	0.7	1.0	1.2	0.2	0.1	1.4	0.2
Jul	1.7	3.2	4.4	2.5	3.5	2.3	2.7	1.3	1.5	5.8	3.6	3.8	1.3	2.6	5.0	3.8	1.4	2.0	2.2	4.9	1.2	0.4	1.2	0.2	0.3	0.8	0.6	0.2
Aug	1.4	2.0	3.3	3.3	4.7	2.1	1.2	0.9	2.9	6.0	3.0	2.0	1.6	2.1	4.3	4.0	2.3	2.5	2.2	4.1	0.6	1.1	1.0	0.0	0.3	0.5	3.0	0.8
Sep	1.5	1.5	4.5	4.3	1.3	1.2	1.0	1.2	2.6	5.8	3.8	2.1	5.4	4.1	5.6	4.8	3.5	2.1	1.6	2.3	0.7	1.1	0.1	0.2	0.4	0.7	0.7	0.8
Oct	1.7	0.8	4.6	2.9	1.3	1.0	0.8	1.1	3.2	6.8	3.9	1.6	9.6	8.2	8.4	4.0	3.3	1.3	1.7	1.4	0.7	0.3	0.1	0.1	0.2	0.2	4.1	0.7
Nov	0.6	1.5	3.0	3.1	0.6	2.2	0.1	0.4	3.4	2.7	3.5	0.8	8.6	7.2	6.2	2.6	0.8	0.5	1.3	0.6	0.1	0.2	0.2	0.0	1.3	0.1	5.9	0.1

Table 6 Number of nights recorded as fished in Torres Strait by the fleet.

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Feb																												212
Mar	184*		2,431	2,218	1,115	1,570	1,610	1,709	1,672	1,694	1,387	1,892	1,835	1,916	1,797	1,123	1,124	1,144	1,021	534	436	321	199	364	407	371	334	225
Apr	1,370	910	596	1,453	1,076	1,494	1,249	1,080	1,488	1,371	1,332	1,506	1,565	1,506	1,573	1,107	1,182	877	871	535	298	222	93	276	221	166	357	288
May	1,605	1,005	1,228	1,377	1,016	1,160	1,147	882	1,306	1,126	1,479	1,101	1,365	1,445	1,066	844	912	578	703	531	237	172	112	335	245	193	445	313
Jun	1,062	509	1,531	1,358	645	956	970	877	1,092	1,099	1,505	1,061	1,206	864	620	675	603	358	431	341	284	149	167	275	185	194	323	244
Jul	1,064	867	1,030	1,084	794	921	868	918	853	1,199	1,335	1,154	1,063	715	765	788	386	315	342	369	192	153	204	294	238	203	271	216
Aug	812	812	734	1,209	1,440	1,161	842	1,078	1,209	1,104	1,252	934	1,056	851	930	984	451	356	425	413	194	307	253	220	185	165	434	237
Sep	744	724	1,046	1,170	949	887	763	833	1,157	1,051	1,148	1,098	1,082	970	1,007	802	615	360	431	297	199	309	170	116	197	254	357	256
Oct	670	543	856	1,184	933	734	488	736	853	1,031	964	835	700	908	794	447	549	304	409	285	202	163	67	122	181	256	321	210
Nov	282	318	531	854	557	361	221	340	467	507	502	398	285	466	448	271	185	110	183	170	59	82	40	78	127	149	159	51

Australian Government
Australian Fisheries Management Authority

AFMA | 2017
Moon phase calendar

New moon First quarter Full moon Last quarter

JANUARY

Mo	Tu	We	Th	Fr	Sa	Su
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

FEBRUARY

Mo	Tu	We	Th	Fr	Sa	Su
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28					

MARCH

Mo	Tu	We	Th	Fr	Sa	Su
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL

Mo	Tu	We	Th	Fr	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY

Mo	Tu	We	Th	Fr	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE

Mo	Tu	We	Th	Fr	Sa	Su
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

JULY

Mo	Tu	We	Th	Fr	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

AUGUST

Mo	Tu	We	Th	Fr	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER

Mo	Tu	We	Th	Fr	Sa	Su
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER

Mo	Tu	We	Th	Fr	Sa	Su
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

NOVEMBER

Mo	Tu	We	Th	Fr	Sa	Su
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER

Mo	Tu	We	Th	Fr	Sa	Su
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

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