

**RESEARCH DATA REGARDING A SEASONAL CRABBING CLOSURE IN AREA II  
OF THE WEST COAST ESTUARINE FISHERY (PEEL-HARVEY ESTUARY).04**

**August 2009**

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**BACKGROUND**

The recent collapse of blue swimmer crab stocks in Cockburn Sound has led to concern over the potential for a similar decline in crab stocks in the Peel-Harvey Estuary. The conversion from gill nets to hourglass pots by Cockburn Sound commercial fishers during the mid 1990s enabled the level of fishing effort in that fishery to increase substantially over the winter months when the catch is composed mainly of female crabs. Combined with four successive years of below average water temperature and subsequent poor recruitment during the mid 2000s, this increase in winter effort led to over-fishing of the relatively depleted stocks of mated, pre-spawn females and is considered to be the most likely cause for the collapse of crab stocks in Cockburn Sound.

The estuarine nature of the Peel-Harvey ecosystem provides some protection for crab stocks, with freshwater flushed into the shallow estuary from winter rains lowering salinity and forcing the majority of adult crabs to exit the estuary. Despite this protection, however, the high level of commercial and recreational crab catch removed from the Peel-Harvey Estuary has caused concern. Although there has been a 17% reduction in commercial effort in the Peel-Harvey Estuary over the last decade, the commercial catch has steadily risen nearly 40% over the same period.

In a precautionary move to provide protection to pre-spawn female crabs, the previous Minister for Fisheries introduced a ban in September 2007 on the take of blue swimmer crabs by both commercial and recreational fishers in the Peel-Harvey Estuary during the months of September and October. In the two years since the closure, concern has been raised about the high proportion of undersize crabs in both the commercial and recreational catch during the early part of the Peel-Harvey season in November and December. Regional Services in Mandurah have reported a noticeable increase in the number of recreational fishers caught with undersize crabs during this period.

Following the closure of the Cockburn Sound Crab Fishery in December 2006, funding from the Development and Better Interest Fund was made available to undertake a three-year project to

examine the causes of the stock collapse in Cockburn Sound and to monitor the recovery of the fishery. Funding was also provided to undertake a comprehensive 12-month survey to quantify recreational catch and effort in the Peel-Harvey Estuary, and a commercial catch monitoring program and fishery-independent field program to assess the status of stocks in the Peel-Harvey Estuary. Preliminary data from the Peel-Harvey research program, along with data from previous research projects (ie. FRDC project 1998-2001; recreational survey in 1998/99) are presented to provide Research advice to assist with the determination of management changes to seasonal crabbing closures in the Peel-Harvey Estuary. The information that will be presented is:

1. Commercial catch and effort by month;
2. Recreational effort and catch proportion by month;
3. The percentage of undersize crabs in the commercial catch by month.

## **RESULTS**

### **Commercial catch and effort by month in the Peel-Harvey Estuary**

Historically, little commercial fishing for blue swimmer crabs has taken place in the Peel-Harvey Estuary over the winter months, with less than 10% of the annual catch and 20% of annual effort occurring between July and November inclusive (Table 1; Figure 1). Over the last decade, an average of just 2.2 t (or 3% of the annual commercial catch) and 1.1 t (2%) was taken in the months of July and August respectively. The average catch was even lower in September (0.6 t; 1%) and October (0.8 t; 1%) before increasing slightly to almost 2 t (3%) in November (Table 1.; Figure 1). The level of catch and effort from the winter/spring period has been further decreased by the ban imposed in 2007 on the take of blue swimmer crabs in the Peel-Harvey Estuary during September and October. Consequently, 75% of the annual commercial catch and 65% of the commercial effort occurs in the summer and autumn months from December through to April.

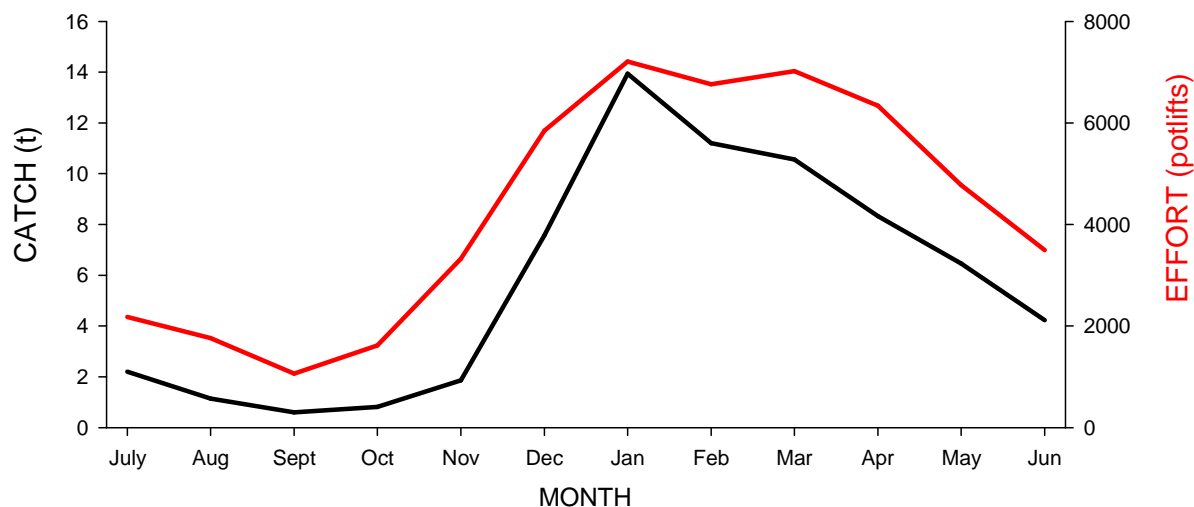
The low level of commercial catch and effort over the winter and spring period is largely due to the ecology of the Peel-Harvey system. Heavy winter rains in June and July are channeled into the Peel-Harvey Estuary via the Murray and Harvey (River) catchment systems, and this influx of freshwater dramatically lowers the ambient salinity. Adult blue swimmer crabs are susceptible to large changes in salinity, with female crabs in particular requiring full salinity to spawn. Therefore, the majority of the residual stock moves out from the estuary into the adjacent oceanic environment.

While this flushing effect over the winter months provides some protection to the brood stock from fishing pressure within the estuary, mated, pre-spawn female crabs become susceptible to capture in the marine environment outside as one crab trap fisher and three trawlers operate in Comet Bay and another crab trap fisher operates south of the Dawesville Cut between Mandurah and Bunbury.

There is also potential for a slight increase in commercial fishing during winter months as a result of the permanent marine habitat that now exists in the vicinity of the entrance of the Dawesville Cut into the Estuary. Further advice on the stock status of crabs in this entire region will be provided when the current research program has been completed.

**Table 1.** Mean monthly catch and effort for commercial fishers in Area II of the West Coast Estuarine Managed Fishery (Peel-Harvey Estuary) between 1998/99 and 2007/08. Data from fisher's statutory monthly returns. Note closure of September and October since 2007.

MONTH	CATCH			EFFORT			
	TONNES	%	CUMUL. %	NUMBERS of FISHERS	POTLIFTS	%	CUMUL. %
Jul	2.2	3	3	4	2179	4	4
Aug	1.1	2	5	2	1765	3	7
Sep	0.6	1	6	2	1063	2	9
Oct	0.8	1	7	2	1620	3	13
Nov	1.9	3	10	5	3329	7	19
Dec	7.6	11	21	7	5847	11	31
Jan	13.9	20	41	8	7209	14	45
Feb	11.2	16	57	8	6761	13	58
Mar	10.6	15	73	8	7018	14	72
Apr	8.3	12	85	8	6338	12	84
May	6.5	9	94	6	4777	9	93
Jun	4.2	6	100	4	3495	7	100

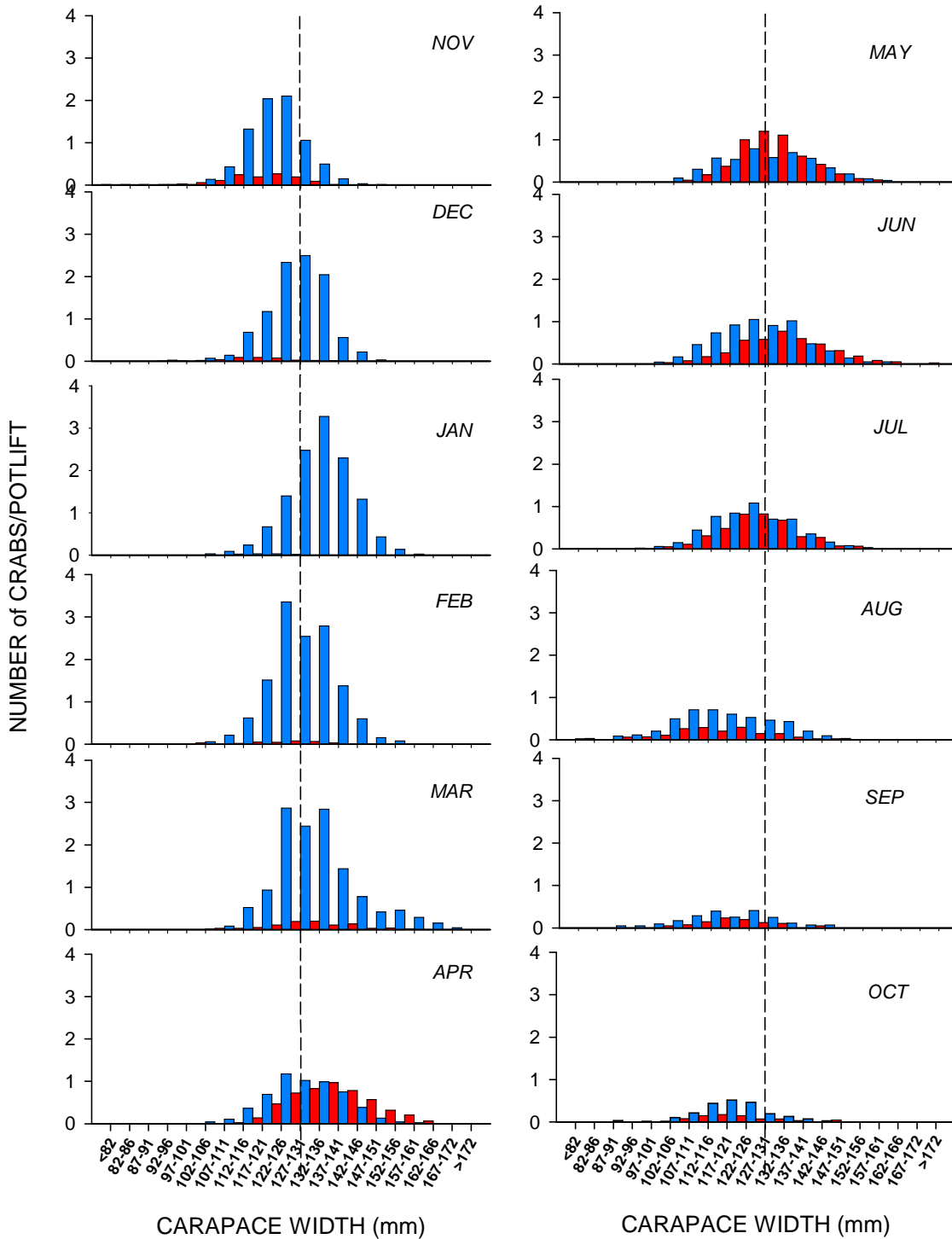


**Figure 1.** Mean monthly catch (—) and effort (—) for commercial fishers in Area II of the West Coast Estuarine Managed Fishery (Peel-Harvey Estuary) between 1998/99 and 2007/08. Data from fisher's statutory monthly returns. Note closure of September and October since 2007.

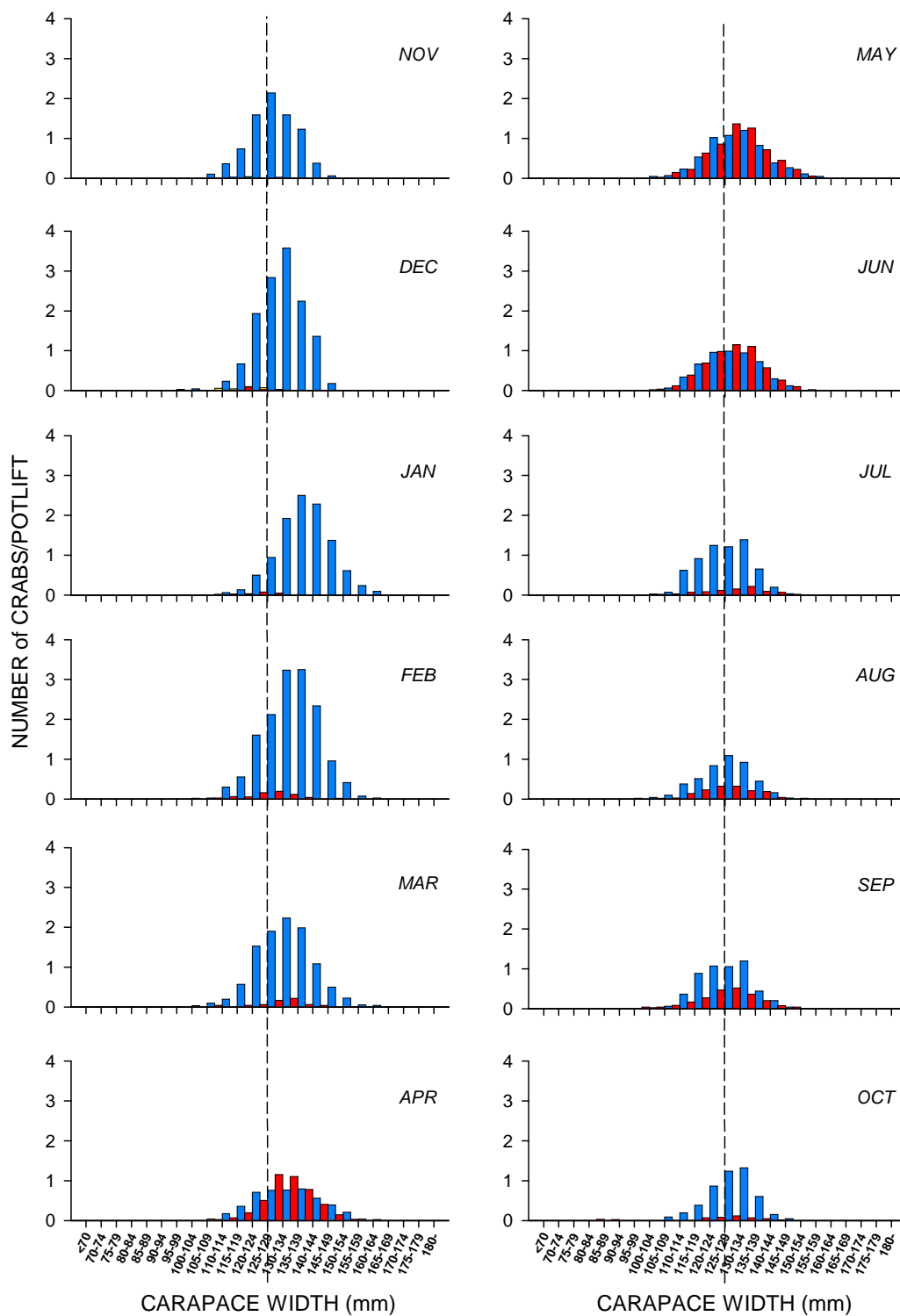
**Table 2.** Monthly catch (t) for commercial fishers in Area II of the West Coast Estuarine Managed Fishery (Peel-Harvey Estuary) between 1998/99 and 2007/08. Data from fisher's statutory monthly returns.

Financial Year	MONTH												TOTAL
	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
1998-99	0.7	1.4	0.8	1.8	2.6	9.3	13.4	10.5	9.9	7.2	3.8	2.8	64
1999-00	2.1	1.4	0.6	0.9	1.8	6.6	10.6	10.1	8.4	6.8	6.6	4.2	60
2000-01	1.8	0.7	0.6	0.3	1.6	10.2	11.9	11.5	12.1	8.9	6.7	3.6	70
2001-02	2.6	1.9	0.9	0.9	2.8	8.9	13.4	9.4	10.2	8.4	5.0	3.9	68
2002-03	1.7	1.0	0.7	1.9	2.5	5.9	9.0	7.2	4.6	5.4	3.6	2.0	46
2003-04	1.1	0.0	0.0	0.0	1.4	7.7	13.1	10.4	10.1	9.2	3.7	3.4	60
2004-05	2.8	1.8	1.3	1.0	1.9	10.1	16.0	12.5	12.8	8.2	6.4	3.9	79
2005-06	1.1	0.4	0.0	0.0	0.9	3.1	14.8	11.1	11.4	7.8	9.6	6.2	66
2006-07	5.0	2.4	1.2	1.4	2.8	9.3	18.4	13.2	11.8	10.9	10.4	7.7	95
2007-08	3.1	0.4	*	*	0.2	4.7	18.8	16.2	14.4	10.5	8.9	4.5	82
<b>Mean</b>	<b>2.2</b>	<b>1.1</b>	<b>0.6</b>	<b>0.8</b>	<b>1.9</b>	<b>7.6</b>	<b>13.9</b>	<b>11.2</b>	<b>10.6</b>	<b>8.3</b>	<b>6.5</b>	<b>4.2</b>	<b>69</b>

\* Sept-Oct seasonal closure introduced in September 2007.



**Figure 2:** Mean length frequency distributions of male (■), female (■) and ovigerous female (■) blue swimmer crabs by month from catch monitoring surveys aboard commercial vessels in Area II of the West Coast Estuarine Managed Fishery (Peel-Harvey Estuary) between July 2007 and June 2009. Two monitoring surveys were conducted each month, with each survey consisting of 42 potlifts.



**Figure 3:** Mean length frequency distributions of male (■), female (■) and ovigerous female (■) blue swimmer crabs by month from catch monitoring surveys aboard commercial vessels in Area II of the West Coast Estuarine Managed Fishery (Peel-Harvey Estuary) between December 1998 and June 2001. Two monitoring surveys were conducted each month, with each survey consisting of 42 potlifts.

### Recreational catch and effort proportion by month in the Peel-Harvey Estuary

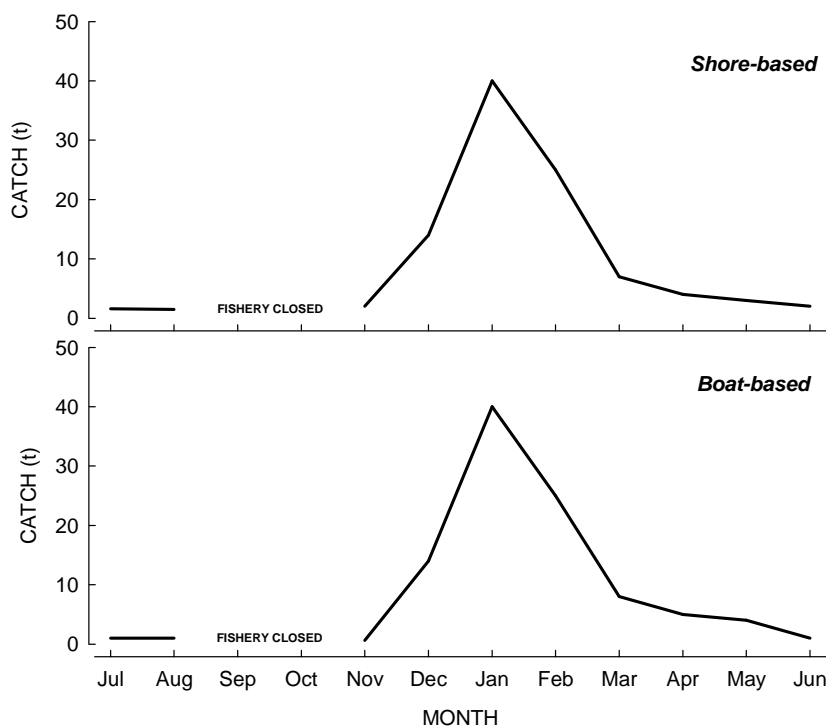
The seasonal patterns of catch and effort recorded for the commercial blue swimmer crab fishers in the Peel-Harvey Estuary are mirrored by the monthly variation for both boat-based and shore-based fishers in the preliminary estimates of the recreational fishery survey for 2007/08. As with the commercial sector, the majority of the recreational catch and effort occurred over the summer and autumn months from December to April. This period accounted for 95% and 93% of the boat-based recreational catch and effort respectively (Table 3; Figure 4), and 92% and 90% of the shore-based recreational catch and effort (Table 4; Figure 4). Conversely, very little recreational catch and effort took place in the winter and spring months, with the proportions of recreational catch and effort for the months of June through to November being even less than the catch and effort for the commercial sector over this period.

**Table 3.** Mean proportions of monthly catch and effort for boat-based recreational blue swimmer crab fishers in the Peel-Harvey Estuary between November 2007 and October 2008.

<b>MONTH</b>	<b><u>CATCH</u></b>		<b><u>EFFORT</u></b>	
	<b>%</b>	<b>CUMUL. %</b>	<b>%</b>	<b>CUMUL. %</b>
<b>Jul</b>	0.1	0.1	0.3	0.3
<b>Aug</b>	0.1	0.1	0.4	0.7
<b>Sep</b>	FISHERY CLOSED		FISHERY CLOSED	
<b>Oct</b>	FISHERY CLOSED		FISHERY CLOSED	
<b>Nov</b>	0.8	1	3	3
<b>Dec</b>	19	20	18	21
<b>Jan</b>	34	54	32	53
<b>Feb</b>	21	75	20	73
<b>Mar</b>	14	89	15	88
<b>Apr</b>	7	97	8	96
<b>May</b>	3	99	3	99
<b>Jun</b>	0.1	100	0.4	100
<b>TOTAL</b>	<b>100</b>		<b>100</b>	

**Table 4.** Mean monthly catch and effort proportion for recreational blue swimmer crab fishers operating from the shore or from jetties in the Peel-Harvey Estuary between November 2007 and October 2008.

MONTH	CATCH		EFFORT	
	%	CUMUL. %	%	CUMUL. %
Jul	1	1	1.6	1.6
Aug	1	2	1.5	3
Sep	FISHERY CLOSED		FISHERY CLOSED	
Oct	FISHERY CLOSED		FISHERY CLOSED	
Nov	0.6	3.6	2	5
Dec	14	17	14	19
Jan	40	57	40	59
Feb	25	82	25	84
Mar	8	90	7	91
Apr	5	95	4	95
May	4	99	3	98
Jun	1	100	2	100
<b>TOTAL</b>	<b>100</b>		<b>100</b>	



**Figure 4.** Estimates of mean monthly catch proportion (—) for recreational boat-based and shore-based fishers in Area II of the West Coast Estuarine Managed Fishery (Peel-Harvey Estuary) between November 2007 and October 2008.

## **Undersize crabs in the commercial catch from the Peel-Harvey Estuary**

The proportion of undersize crabs (<127mmCW) in the catch measured during monitoring surveys aboard commercial crab vessels in the Peel-Harvey Estuary over 1999-2001 and 2007-2009 was highest during the winter and spring months from July through to November (Fig. 4).

The proportion of undersize crabs in the commercial catch was most pronounced in the later sampling period from July 2007 to June 2009. During this period, an average of 58% of the commercial catch was under the legal size of 127mmCW in the month of July. This mean proportion increased to 67%, 72% and 80% of the commercial catch in August, September and October respectively, before falling slightly to 76% in November (Table 5; Figure 4). As the water temperature increased into the summer months, the 1+ year old stock began to moult to legal size and the proportion of undersize crabs in the catch fell. Less than half of the commercial catch measured in the month of December was undersize, dropping further to just 21% of the catch in January. December appears to be a month of transition where the percentage of undersize drops from a relatively high level at the start of the month to a lower level. The proportion of undersize crabs in the catch increased from this point as commercial and recreational fishing pressure removed legal size crabs from the fishery (Fig. 6). Forty five percent of the commercial catch measured during monitoring surveys in February was undersize, compared to 38 to 46% of the catch in the months of March to June (Table 5; Figure 5).

While the mean monthly proportions of undersize crabs in the commercial catch sampled between July 1999 and June 2001 were lower than those from the 2007-09 period (Fig. 5), a similar pattern was evident. Highest proportions of undersize crabs were again recorded over the winter and spring months, dropping in December and January, before increasing with fishing pressure from February through to June. The mean proportion of undersize crabs ranged from 51% in July to 40% in November, before dropping to 19% in December and just 14% in January. The proportion gradually increased then from 21% (February) to 43% (June) (Table 5; Figure 5).

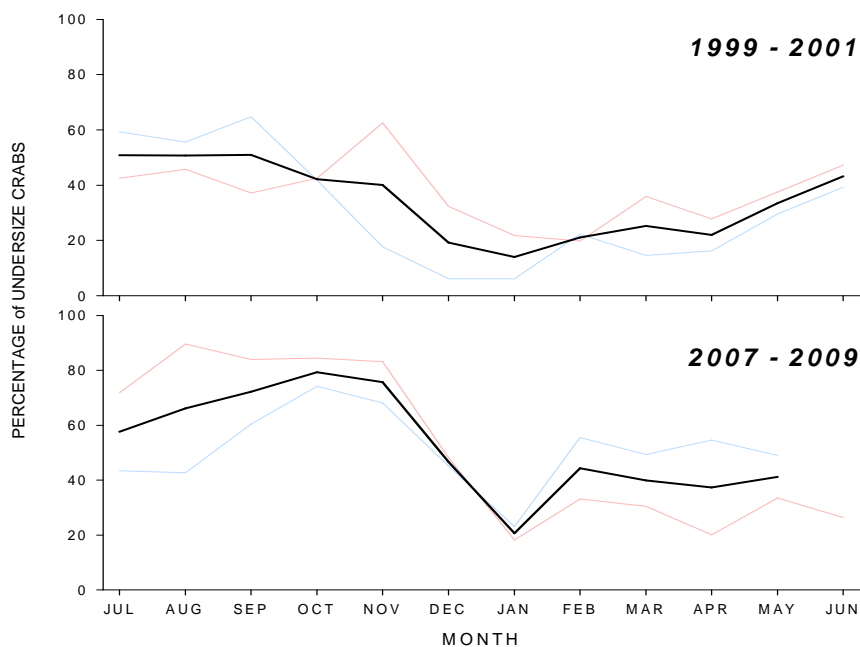
While the intra-annual trend in the monthly proportion of undersize crabs in the commercial catch in the Peel-Harvey Estuary was consistent across years, it should be noted that significant inter-annual variation exists in the proportion of any given month. During the month of September, for example, the proportion of undersize crabs in the catch ranged from 37% in 1999, to 60%, 65% and 84% in 2008, 2000 and 2007 respectively (Table 5; Figure 5).

### **Management options for reducing capture of undersize crabs**

1. Extend September-October closure to include November
2. Extend September-October closure to include November and 1-14 December

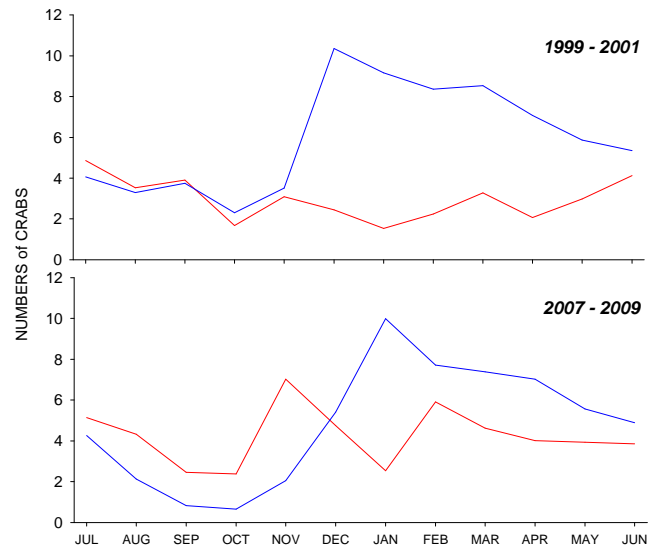
**Table 5.** Percentages of undersize blue swimmer crabs in the commercial catch measured during catch monitoring surveys aboard commercial crab vessels in Area II of the West Coast Estuarine Managed Fishery (Peel-Harvey Estuary) between July 1999 and June 2001 and again between July 2007 and June 2009.

MONTH	1999 – 2001 SAMPLING			2007 - 2009 SAMPLING		
	MEAN	99/00	00/01	MEAN	07/08	08/09
JUL	51	42	59	58	72	43
AUG	51	46	56	67	90	43
SEPT	51	37	65	72	84	60
OCT	42	43	42	80	85	74
NOV	40	63	18	76	83	68
DEC	19	32	6	47	48	45
JAN	14	22	6	21	18	23
FEB	21	20	22	45	33	56
MAR	25	36	15	40	30	49
APR	22	28	16	38	20	55
MAY	34	38	29	41	33	49
JUN	43	47	39	46	26	65



**Figure 5.** Percentages of undersize blue swimmer crabs in the catch measured during monitoring surveys aboard commercial crab vessels in Area II of the West Coast Estuarine Managed Fishery (Peel-Harvey Estuary) between July 1999 and June 2001 (1999/00 —, 2000/01 —, and the mean over this period —) and between July 2007 and June 2009 (2007/08 —, 2008/09 —, and the mean over this period —). Two to five monitoring surveys were conducted each month during the 1999-2001 sampling period

with each survey ranging from 29–42 potlifts; two monitoring surveys were conducted each month during the 2007-2009 sampling period, with each survey consisting of 42 potlifts.

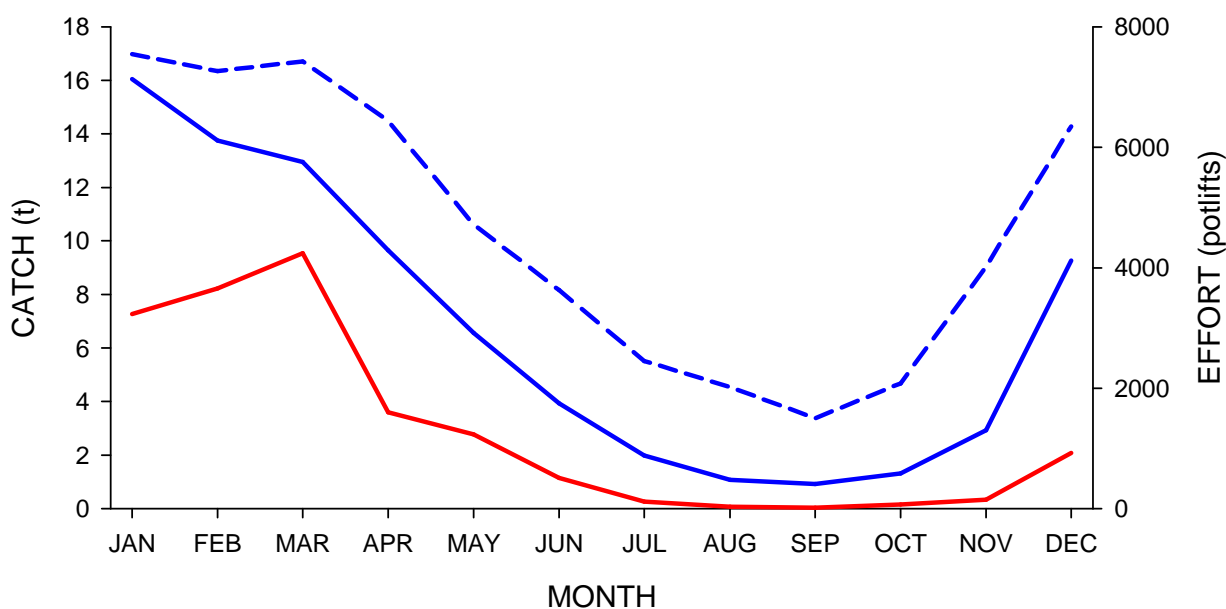


**Figure 6.** Numbers of undersize (—) and legal size (—) blue swimmer crabs per potlift captured during catch monitoring surveys aboard commercial crab vessels in Area II of the West Coast Estuarine Managed Fishery (Peel-Harvey Estuary) between July 1999 and June 2001 (two monitoring surveys were conducted each month, with each survey consisting of 42 potlifts) and between July 2007 and June 2009 (between two and five monitoring surveys were conducted each month).

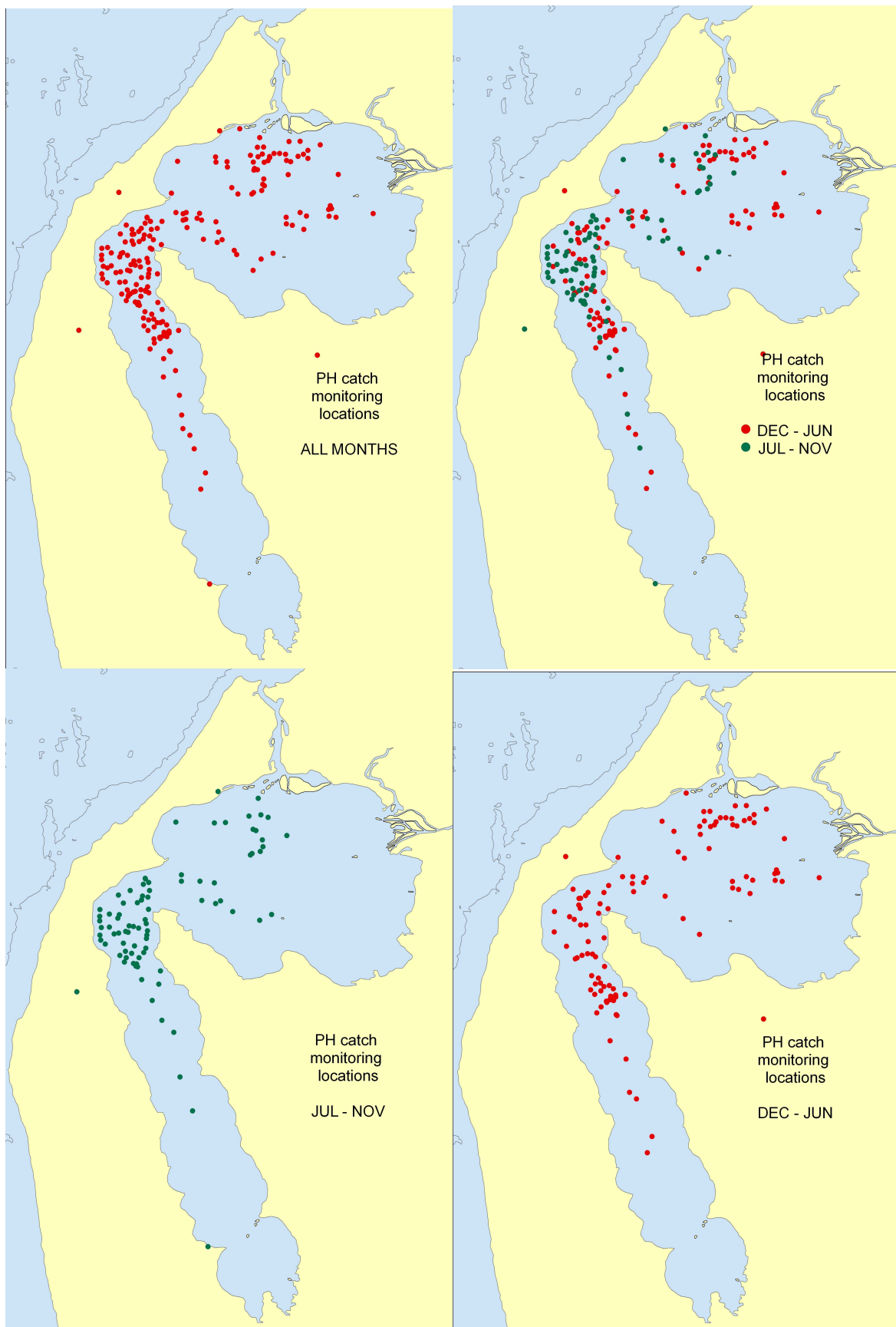
## Increased winter fishing around Dawesville Cut entrance

**Table 1.** Mean monthly catch of blue swimmer crabs from commercial fishers operating in the Peel-Harvey Estuary before the Dawesville Cut was opened (1976-1993) and mean monthly catch (t) and effort (potlifts) from commercial fishers operating in the Peel-Harvey Estuary after the Dawesville Cut was opened (1994-2008).

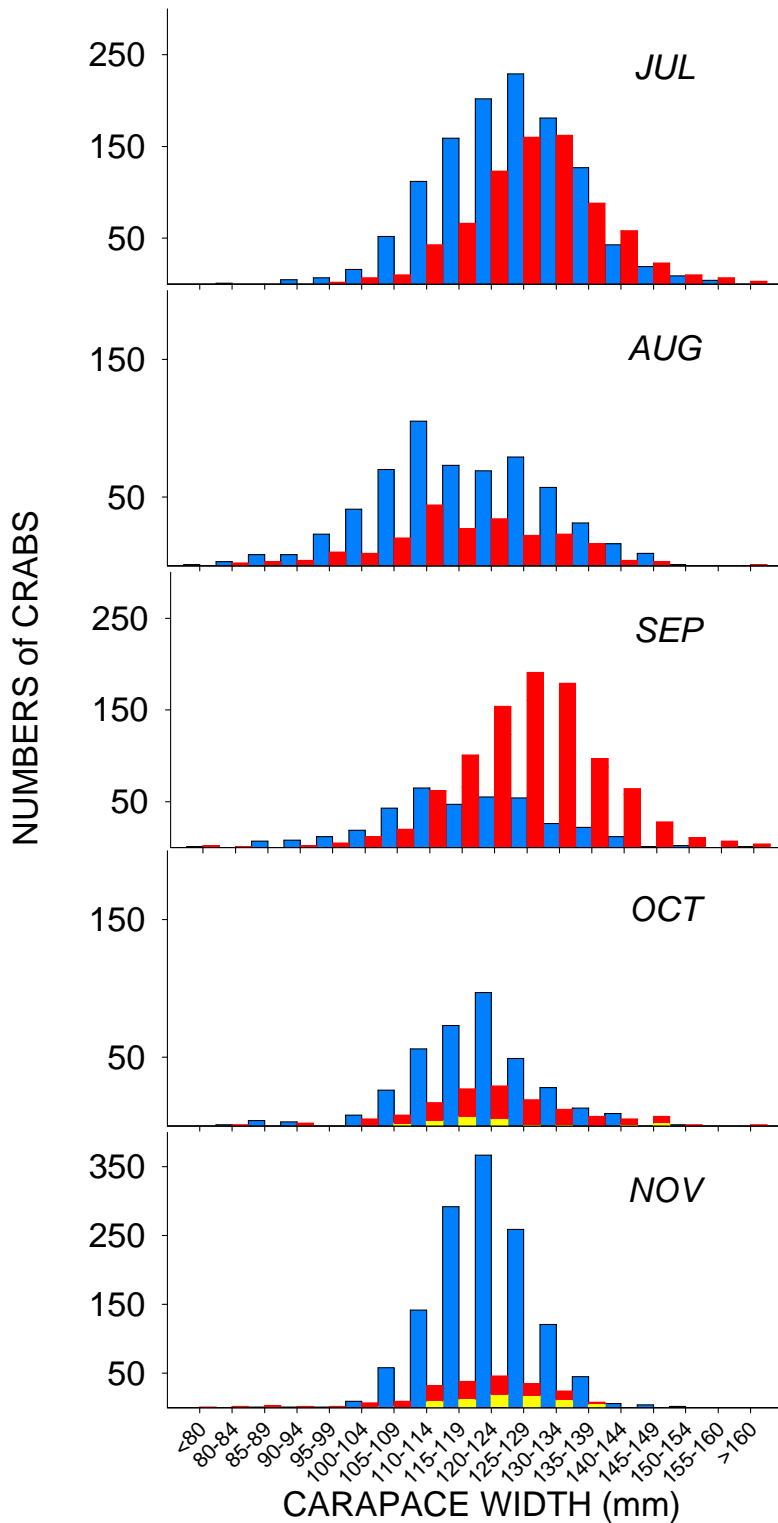
		MONTH											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PRE-CUT	CATCH (t)	7.3	8.2	9.5	3.8	2.9	1.4	0.4	0.3	0.1	0.3	0.5	2.3
POST-CUT	CATCH (t)	15.5	12.8	12.1	9.1	6.2	3.8	2.0	1.1	0.9	1.2	2.9	9.1
POST-CUT	EFFORT (potlifts)	7547	7261	7425	6437	4718	3625	2447	2019	1497	2078	4015	6346



**Figure 1.** Mean monthly catch (—) of blue swimmer crabs from commercial fishers operating in the Peel-Harvey Estuary before the Dawesville Cut was opened (1976-1993) and mean monthly catch (—) and effort (---) from commercial fishers operating in the Peel-Harvey Estuary after the Dawesville Cut was opened (1994-2008).



**Figure 2.** Potline locations from catch monitoring surveys conducted aboard commercial vessels operating in the Peel-Harvey Estuary between March 2007 and July 2009.



**Figure 3.** Mean monthly length frequency distributions of male (■), non-berried female (■) and berried female (■) blue swimmer crabs for the months of July through to November captured aboard commercial fishing vessels operating in the Peel-Harvey Estuary between March 2007 and July 2009.