

**West Coast Prawn
Penaeus (Melicertus) latisulcatus
Fishery 2009**

Fishery Status Report to PIRSA Fisheries

G.E. Hooper, C.D. Dixon and S.D. Roberts

**SARDI Publication No. F2007/000772-3
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**SARDI Aquatic Sciences
PO Box 120 Henley Beach SA 5022**

June 2010

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South Australian Research and Development Institute

SARDI Aquatic Sciences

2 Hamra Avenue

West Beach SA 5024

Telephone: (08) 8207 5400

Facsimile: (08) 8207 5406

<http://www.sardi.sa.gov.au>

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Author(s): G.E. Hooper, C.D. Dixon and S.D. Roberts

Reviewers: A. Linnane and S. Mayfield

Approved by: T. Ward
Assoc Prof – Wild Fisheries

Signed: 

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EXECUTIVE SUMMARY

1. This report updates the 2008 status report for the West Coast Prawn Fishery. It contains analyses of catch, effort and prawn survey data for 2009.
2. Annual catch has progressively increased from 12 t in 2007, to 84 t in 2008 and 112 t in 2009. The 2009 catch was the highest since 2001.
3. Catch during the early spawning season of 2009 was low (8.5 t, 8%). The continuation of a precautionary approach to fishing during spawning periods should aid stock recovery.
4. Commercial CPUE during 2008 (64 kg/h) and 2009 (60 kg/h) was substantially higher than that observed from 2002-2007 (mean 34.8 kg/h).
5. Prawns harvested in 2009 were larger than those harvested in 2008. The difference in size between years likely reflects continued stock recovery with a higher proportion of older prawns in the stock.
6. Mean annual survey catch rate has increased considerably since 2006 and in 2009 (55.8 kg/h) was the highest observed since 1997.
7. A new suite of Performance Indicators (PIs) should be developed that reflect management of the fishery and available data. Indicators should include: mean survey catch rate; commercial catch (annual, early spawning period, mean daily); commercial effort; mean commercial CPUE, and; prawn size.
8. Recent increases in survey catch rate, total annual catch, commercial CPUE and harvested prawn size suggest that the resource upon which the West Coast Prawn Fishery is based has improved considerably since 2006. Conservative harvest strategies, particularly during the early spawning period, should continue to promote stock recovery.
9. The last formal stock assessment for the West Coast Prawn Fishery was conducted in 2006. With recent increases in commercial catch as the stock has recovered, it is recommended that another formal stock assessment is conducted, with particular regard to developing meaningful PIs for the fishery.

1. FISHERY STATISTICS

1.1 Catch and Effort

1.1.1 Inter-annual trends

The total commercial catch of 112.0 t in 2009 was the highest catch since 2001. Catch has steadily increased in recent years from zero in 2006 to 11.7 t in 2007 and 84.0 t in 2008 (Figure 1.1).

Total effort in 2009 was 1,857 trawl hours. Whilst this was the highest level of effort recorded since 2001, it was low in an historical context.

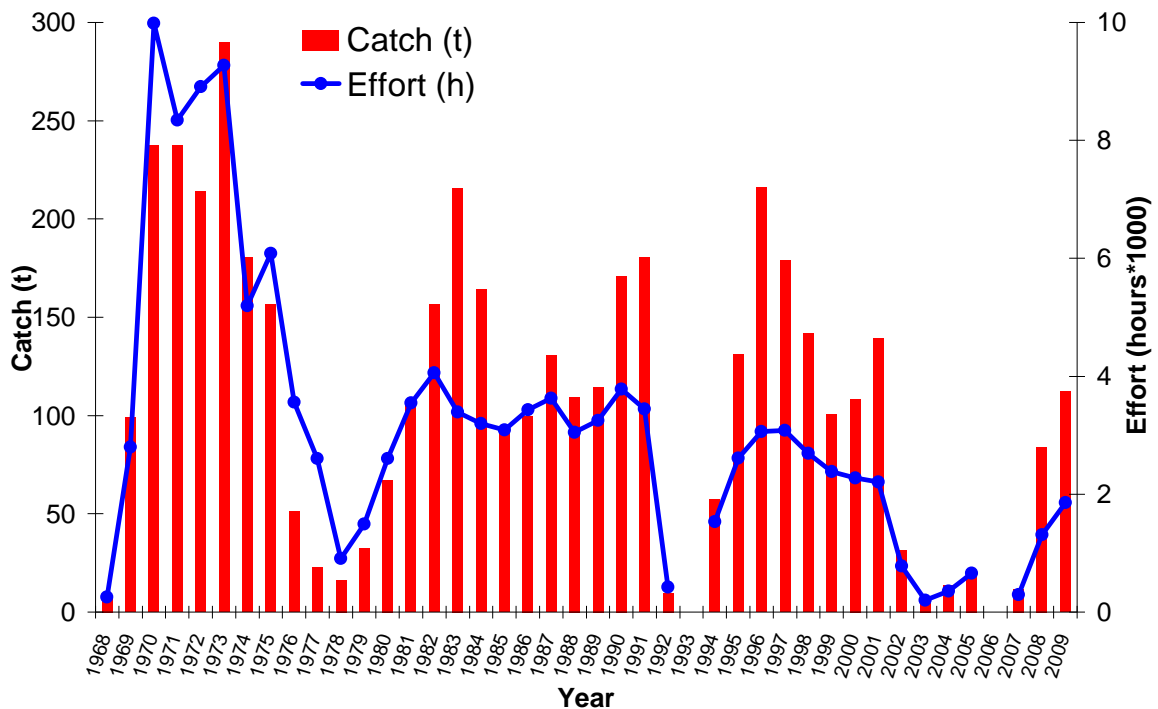


Figure 1.1 Catch (t) and effort (h) for the West Coast Prawn Fishery from 1968–2009.

1.1.2 With-in season trends

In 2009, fishing occurred from March to September and in November and December (Figure 1.2). The highest catches were obtained in April (24.1 t) and July (22.9 t). The lowest catches were obtained in May and December (1.5 t). Trends in effort reflected trends in catch, with the highest effort in April (328 h) and the lowest effort in May (31 h) and December (57 h).

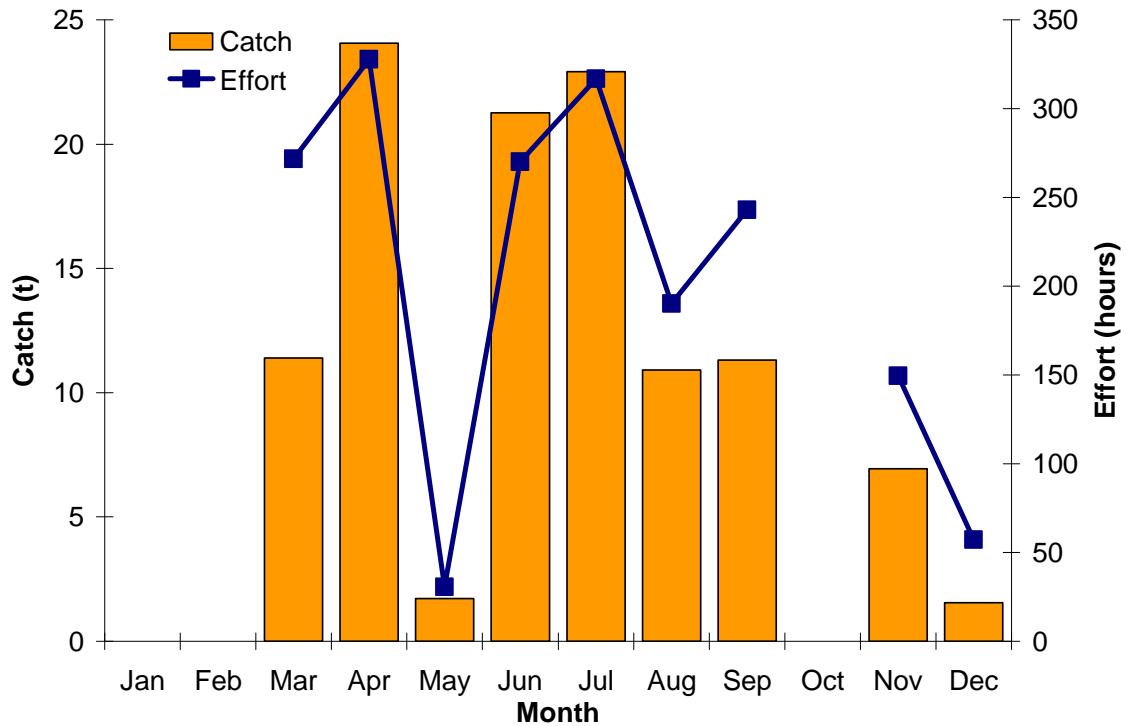


Figure 1.2 Monthly catch (t) and effort (h) for the West Coast Prawn Fishery during 2009.

1.1.3 Inter-annual trends in catch among regions

In 2009, 92.4% (103.6 t) of the catch was harvested from the Venus Bay region, 7.3% (8.2 t) from the Coffin Bay region and 0.3% (0.3 t) from the Ceduna region (Figure 1.3 and Appendix 7.1).

1.1.4 With-in season trends in catch among regions

In 2009, all of the catch harvested between March and September was from the Venus Bay region (103.6 t). During November and December, catches of 6.9 t and 1.3 t, respectively, were harvested from the Coffin Bay region. In December, 0.3 t was harvested from the Ceduna region (Figure 1.4).

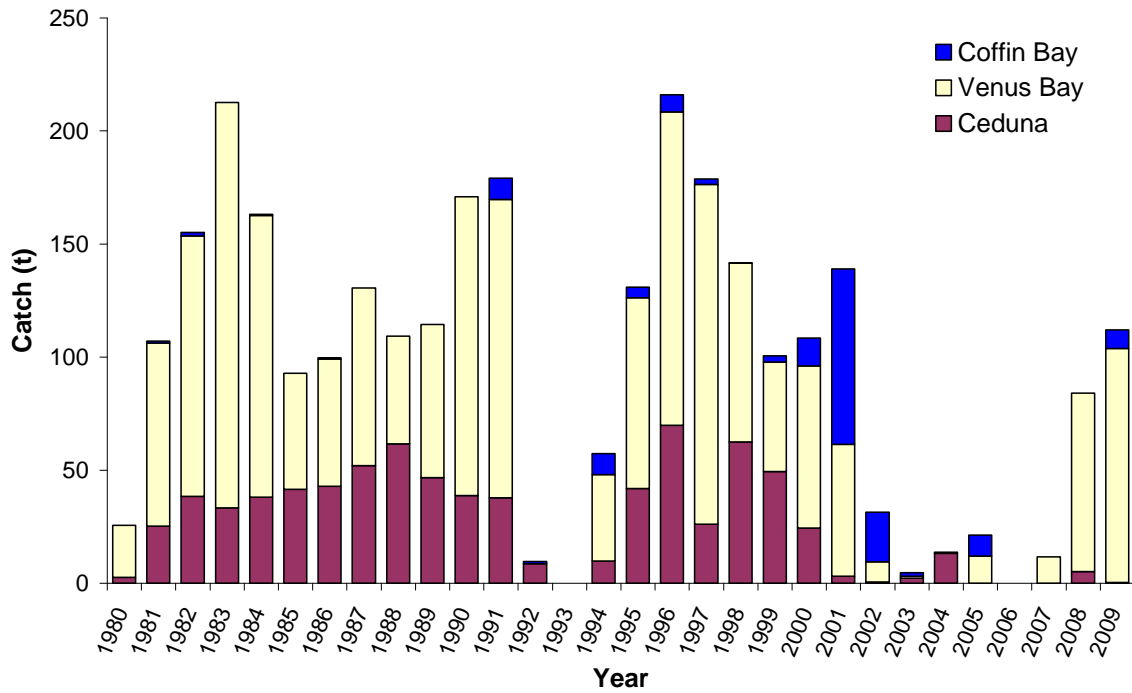


Figure 1.3 Annual catches from regions of the West Coast Prawn Fishery from 1980–2009.

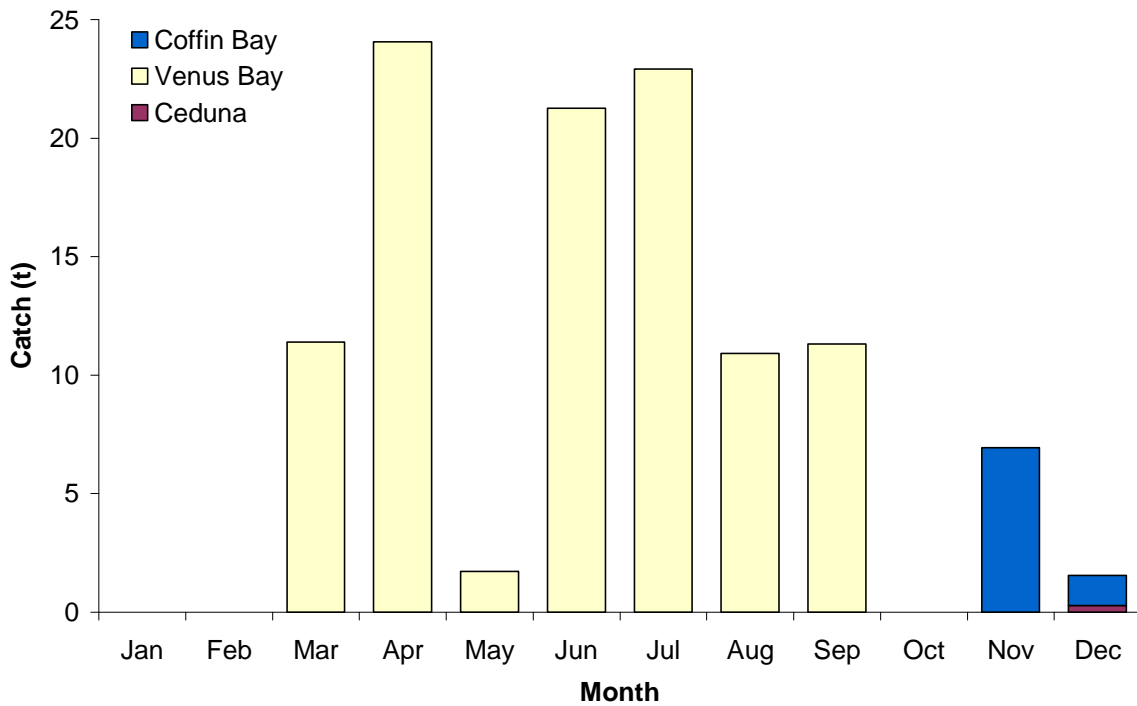


Figure 1.4 Monthly catch (t) from regions of the West Coast Prawn Fishery during 2009.

1.1.5 Catches during the spawning season

The spawning period for *M. latisulcatus* in the West Coast Prawn Fishery extends from November to March. Hence, catches obtained during this period, particularly of large spawning females, have implications for the sustainability of the resource.

In 2009, 8% (8.5 t) of the annual catch was harvested during the early spawning period (November and December), 10% (11.4 t) was harvested during the late spawning season (March) and 82% (92.2 t) of the catch was harvested during the non-spawning period (April to October; Figure 1.5). Overall, the proportion of the catch harvested during spawning periods in 2009 was low in a historic context. Continued precautionary catches during the early spawning period should aid sustained stock recovery.

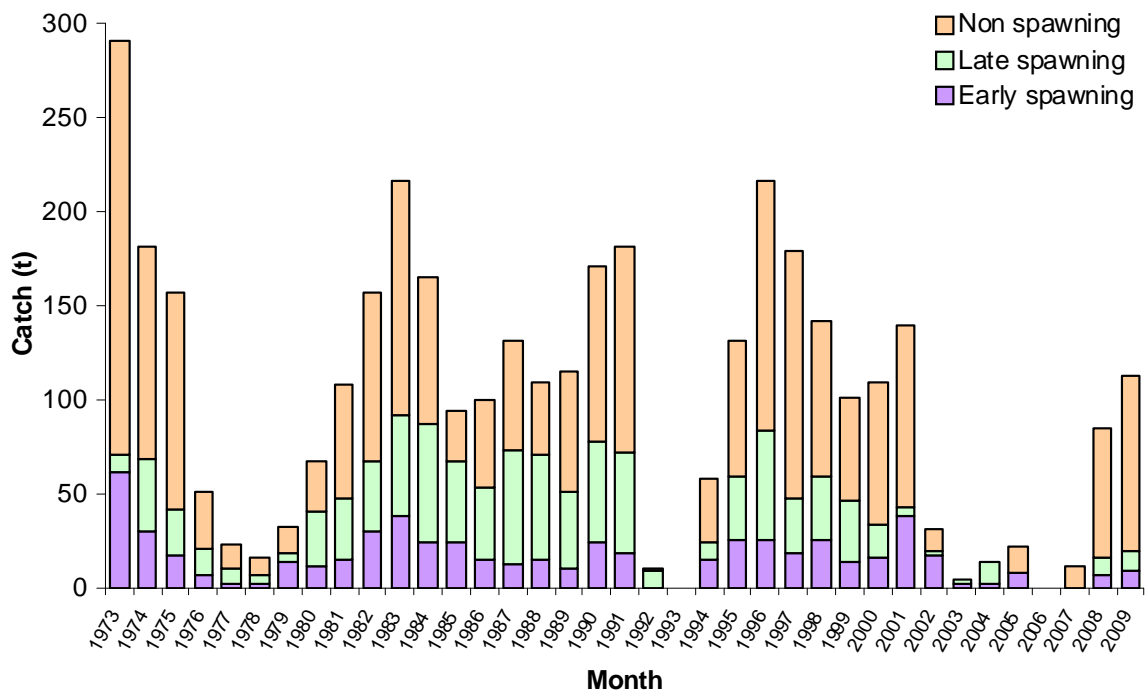


Figure 1.5 Catches during early spawning (November-December), late spawning (January-March) and non-spawning (April-October) periods from 1973–2009 for the West Coast Prawn Fishery.

1.2 Catch-Per-Unit Effort (CPUE)

1.2.1 Inter-annual trends

Annual (nominal) CPUE exceeded 60 kg/h in 2008 (63.9 kg/h) and 2009 (60.3 kg/h) and was substantially higher than that observed from 2002-2007 (mean 34.8 kg/h; Figure 1.6). CPUE has only exceeded 60 kg/h on three previous occasions (1983: 63.6 kg/h, 1996: 70.5 kg/h, 2001: 60.9 kg/h). While this indicates considerable stock recovery in recent years, comparisons of CPUE over longer time periods are likely to be considerably affected by increases in vessel power.

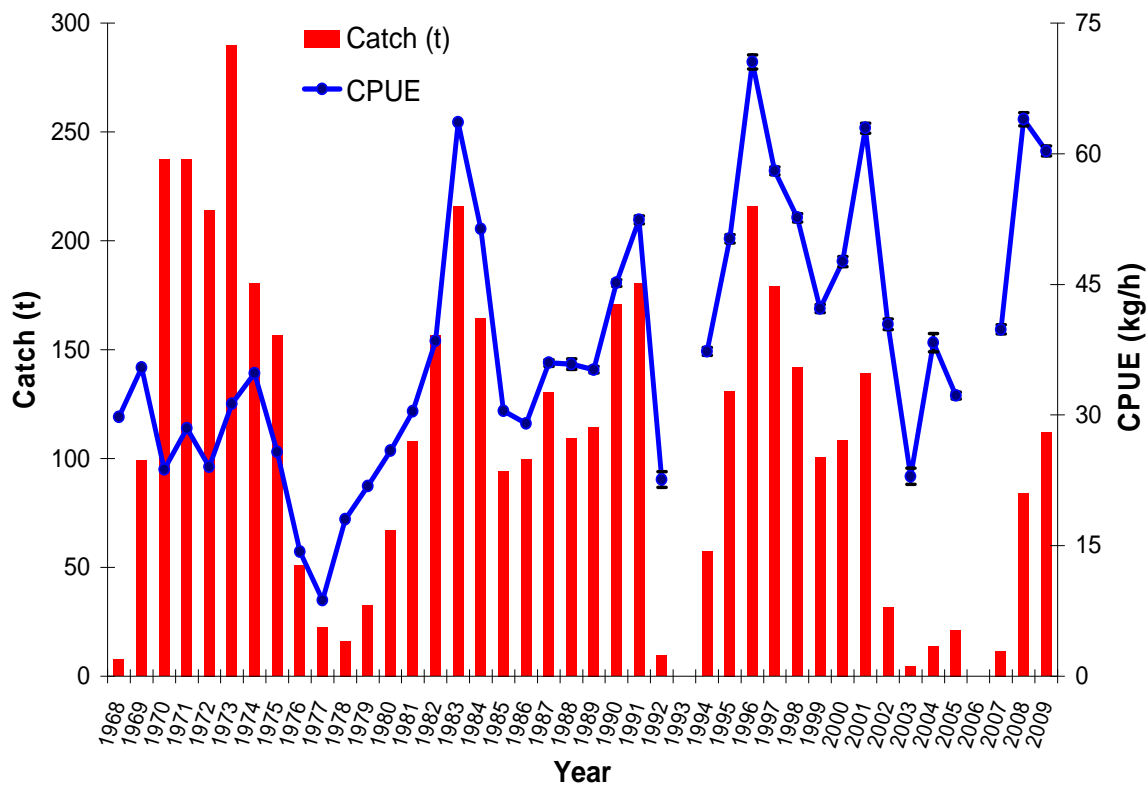


Figure 1.6 Annual catch (t) and mean (\pm SE) CPUE for the West Coast Prawn Fishery from 1968–2009. Standard errors have been calculated from 1987 onwards (validated logbook data) using the ratio estimator method (Rice 1995).

1.2.2 With-in season trends

During 2009, monthly CPUE was highest in June (78.7 kg/h), April (73.4 kg/h) and July (72.4 kg/h) (Figure 1.7). CPUE declined steadily after July reaching 27.0 kg/h in December.

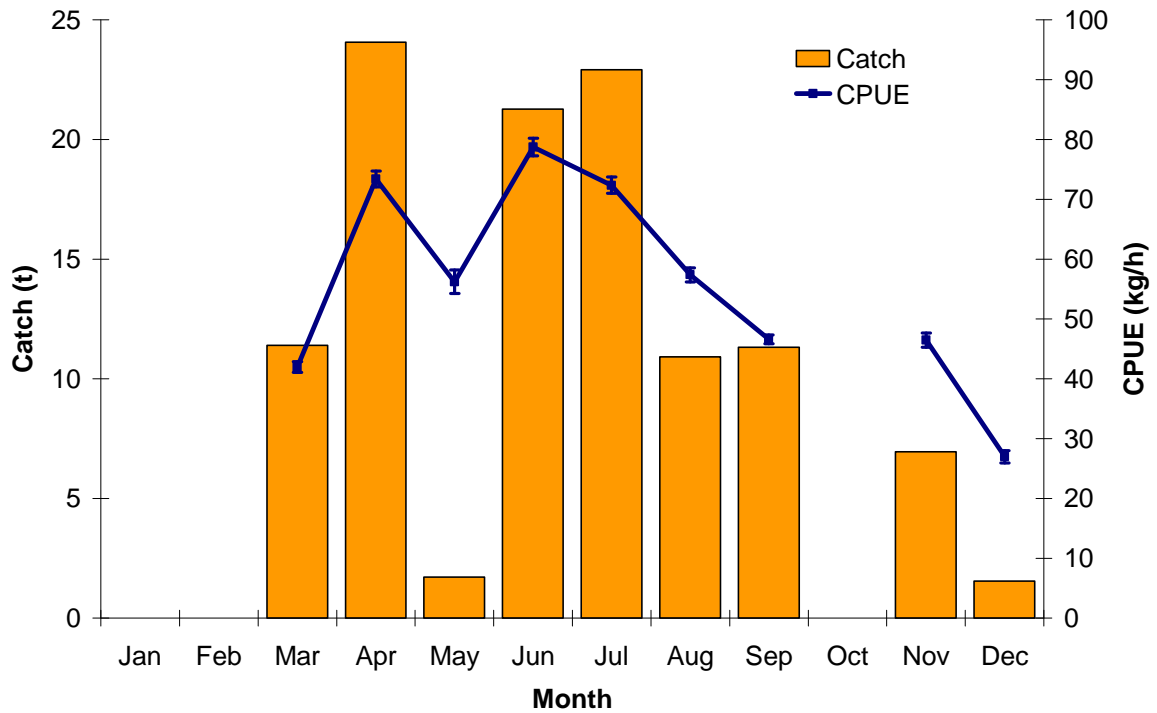


Figure 1.7 Monthly catch (t) and mean (\pm SE) CPUE for the West Coast Prawn Fishery during 2009. Standard errors have been calculated using the ratio estimator method (Rice 1995).

2. DAILY ESTIMATES OF TOTAL CATCH & PRAWN SIZE FOR 2009

Data on total catch and prawn size for each day's fishing provide useful information for the real time management of the Gulf St Vincent and Spencer Gulf Prawn Fisheries. Data on daily catch and prawn size were first assessed for the West Coast Prawn Fishery in 2008 and the following analyses compare trends from the last two years.

2.1 Daily catch

Catch data were obtained from commercial logbooks and are presented as the mean (SE) daily catch per vessel (Figure 2.1). Note that only two vessels (of the three in total) fished during November 2008. A minimum catch of 300 kg per vessel night over two consecutive nights was used as a management guideline during 2008 & 2009 (Alice Fistr, PIRSA Fisheries pers. comm.).

In general, catches were relatively stable throughout each month and, unlike the Spencer Gulf Prawn Fishery, appeared not to be greatly affected by moon phase (see Dixon *et. al.* 2008). During 2009, mean daily catch was 584 kg and was highest in June (788 kg) and July (764 kg), and lowest in December (172 kg). During 2009 the management guideline of <300 kg was not met for one night in March and three consecutive nights in December. It should be noted that the first night in December was conducted in the Ceduna region and the last two nights were conducted in the Coffin Bay region.

2.2 Daily prawn size

Data on prawn size were obtained from prawn grade data from commercial logbooks during 2008 and 2009. Management guidelines on prawn size were <240 prawns per 7 kg for Venus Bay and Coffin Bay and <250 prawns per 7kg in Ceduna (Alice Fistr, PIRSA Fisheries pers. comm.).

Commercial prawn grade data were provided by all fishers for each day's fishing during both years. The number of prawns per kilogram for each of nine commercial prawn grades was estimated from the prawn grade name (i.e. prawn grade 10/15 was estimated as 12.5 prawns per pound equalling 27.5 prawns per kg) and are presented in Table 2.1.

Table 2.1 The number of prawns per kg estimated for reported prawn grades from the commercial logbook data.

Prawn grade	Prawns per kg	Mean weight (g)
U6	13.2	75.8
U8	15.4	64.9
U10	19.8	50.5
10/15	27.5	36.4
10/20	33.0	30.3
16/20	39.6	25.3
21/25	50.6	19.8
21/30	56.1	17.8
26+	61.6	16.2

The average number of prawns per 7 kg (one bucket) for each vessel's daily catch was calculated from the catch by grade data provided in commercial logbooks and the number of prawns per kg for each grade using the equation:

$$\frac{\sum(\text{catch}[\text{grade}] \times (\text{ppkg}[\text{grade}] \times 7))}{\sum(\text{catch}[\text{grade}])}$$

Where;

catch is the total daily catch (kg),

ppkg is the number of prawns per kg,

grade is the relevant prawn grade.

Prawns harvested in 2009 were typically larger than those harvested in 2008 (Figure 2.2). Mean daily prawn size was largest in September and November (210 and 219 prawns per 7 kg, respectively) and smallest in March and December (231 and 234 prawns per 7 kg, respectively).

During 2009 the management guidelines for prawn size were achieved during 60 of 64 fishing nights. The target size for prawns was not achieved during one night in March and three nights in July 2009.

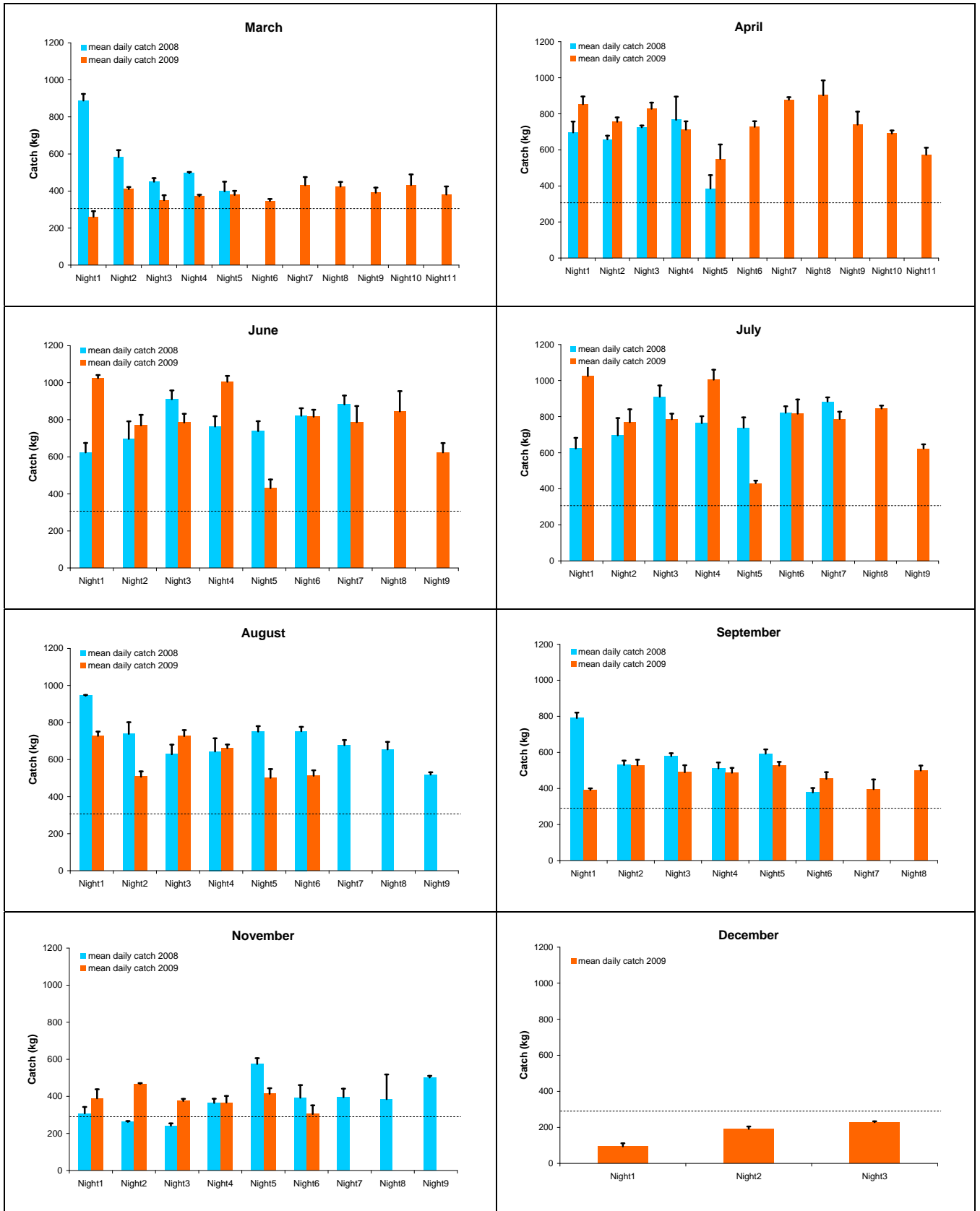


Figure 2.1 Mean daily catch per vessel from commercial logbook prawn grade data for the West Coast Prawn Fishery during 2008 and 2009. Dotted line represents the management guideline of 300kg minimum catch limit per night.

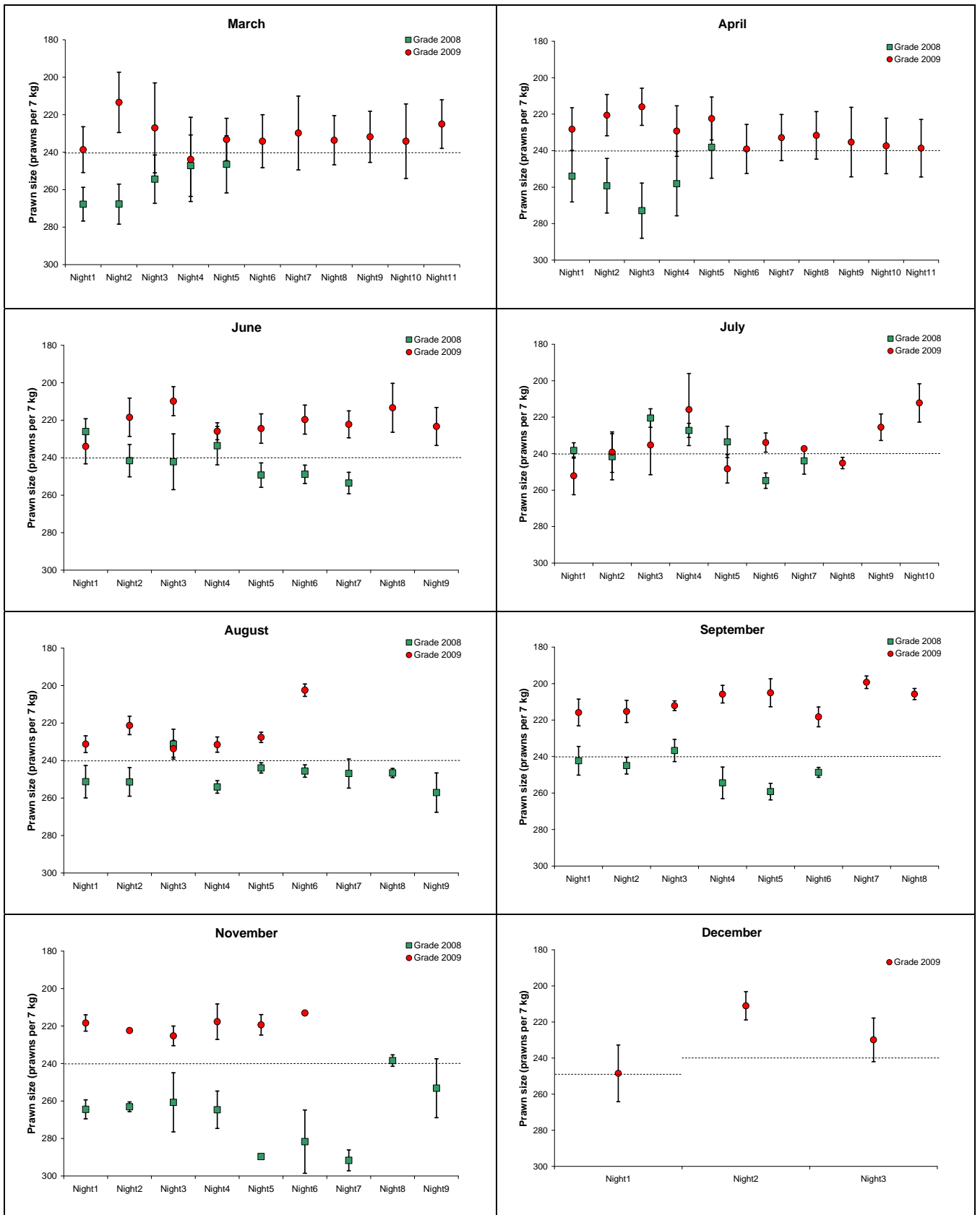


Figure 2.2 Mean daily prawn size estimated from commercial logbook prawn grade data for the West Coast Prawn Fishery during 2008 and 2009. Dotted line represents management guidelines for prawn size,

3. STOCK ASSESSMENT SURVEYS

3.1 Annual Survey Shots

Stock assessment surveys, using industry vessels (with observers) have been undertaken in most years since 1989. A summary of the number of survey trawl shots within regions that comprise the fishery-independent dataset for the West Coast Prawn Fishery is provided in Table 3.1. Since 2005, surveys have been conducted three times a year, i.e. early in the year (February-March), the middle of the year (June-August) and during the early spawning season (October-November).

Table 3.1 Number of stock assessment survey shots within regions of the West Coast Prawn Fishery from November 1989 to November 2009.

Year	Month	Ceduna	Venus Bay	Total	Year	Month	Ceduna	Venus Bay	Coffin Bay	Total
1989	Nov	7	19	26	2003	Jul		14		14
1990	Feb	6	20	26		Oct	9	10	10	29
	Apr	6	20	26		Nov	7	9	10	26
	Jun	6		6	2004	Apr		13		13
	Nov	7	20	27		Jun	9	13	8	30
1991	Feb	17	20	37		Oct	9	11	9	29
	Apr	17	20	37	2005	Feb	8	11		19
	Jun	17	20	37		Jun		14		14
	Nov	16	11	27		Nov	6	10	8	24
1992	Feb	17	20	37		Dec	7			7
	Apr	17	20	37	2006	Feb	8	11		19
	Jun	17	20	37		Jun		13		13
	Jul	9	12	21		Nov	7	11	10	28
	Oct	16	20	36	2007	Mar	14	11	8	33
1993	Feb	17	20	37		Aug		10		10
	Apr		11	11		Nov	6	10		16
	Jun	17	20	37	2008	Mar	7	10	5	22
1994	Jun		20	20		Jun		8		8
1995	Jan	16		16		Oct	7	10	10	27
	Feb		20	20	2009	Mar		10		10
	Jul		26	26		June		10		10
1996	Feb	16	19	35		Nov	6	10	10	26
1997	Feb		22	22						

3.2 Annual Trends

3.2.1 Mean catch rate

Mean annual survey catch rate has increased steadily since 2006 and in 2009 (55.8 kg/h) was the highest observed since 1997 (56.8 kg/h; Figure 3.1). Trends in catch have generally reflected trends in survey catch rate. It should be noted that mean annual survey catch rate is affected considerably by the timing and location of surveys.

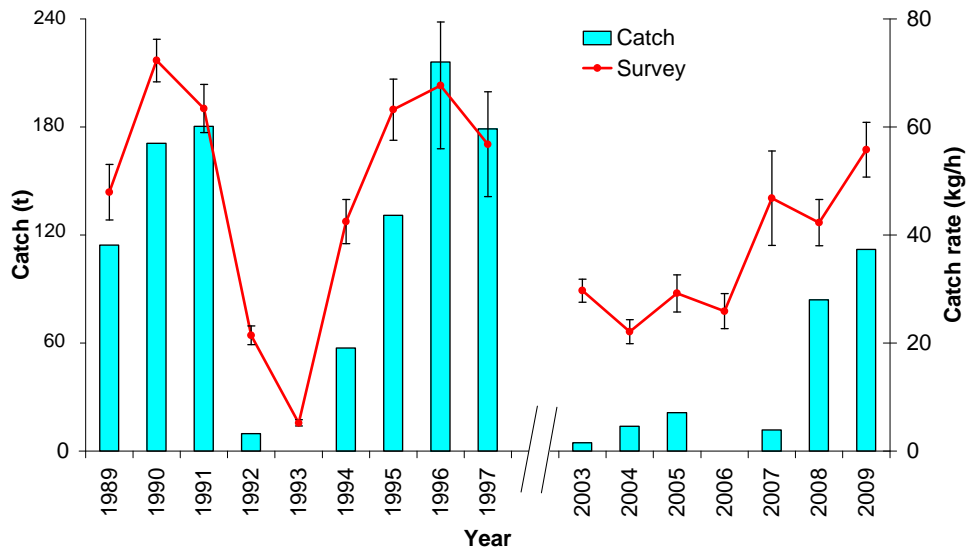


Figure 3.1 Total catch and mean (\pm SE) annual survey catch rate from 1989–2009.

3.2.2 Prawn size

The mean size of prawns (no. prawns/kg) measured on surveys varied among regions, with prawns from the Ceduna region smaller than those from Venus Bay and Coffin Bay regions (Figure 3.2). Mean prawn size increased in the Venus Bay region but decreased in the Coffin Bay and Ceduna regions between 2008 and 2009.

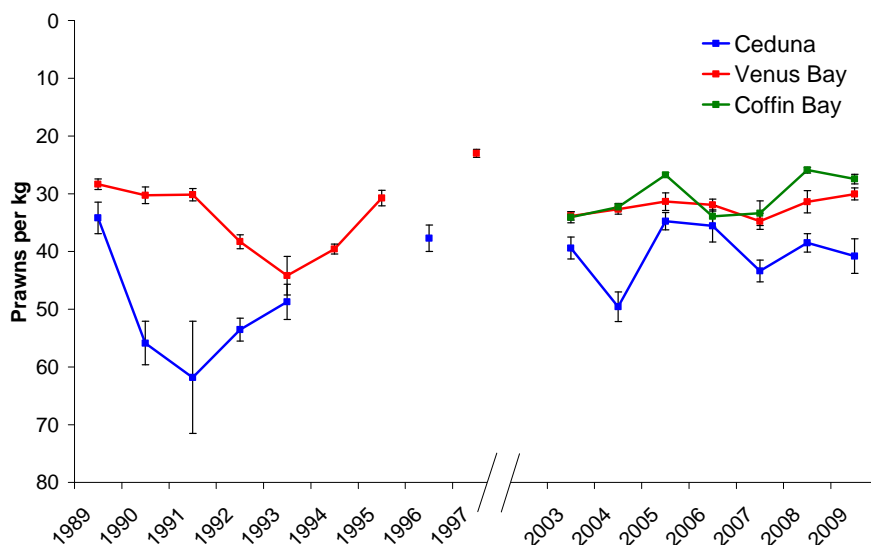


Figure 3.2 Mean (\pm SE) size of prawns measured during surveys from 1989–2009 in regions of the West Coast Prawn Fishery.

4. PERFORMANCE INDICATORS

In this section, performance of the fishery from 2006 to 2009 was assessed against the Performance Indicators outlined in the Management Plan (MacDonald 1998) (Table 4.1).

Table 4.1 Summary of Performance Indicators (PI) and Reference Points (RP) from 2006–2009 for the West Coast Prawn Fishery (MacDonald 1998)

PI	Target RP	Limit RP	2006	2007	2008	2009
Effort (days)	100–110	120	0	11	48	64
Size at capture (prawns/kg)	<40/kg	>40/kg	N/A	N/A	35.8	32.2
Recruitment indices	40	35	N/A	20.4	N/A	N/A
% Virgin spawning biomass	50%	40%	N/A	N/A	N/A	N/A

N/A: Could not be calculated

4.1 Fishing Effort

Fishing effort was reported as nominal days of effort for each vessel over the calendar year. Fishing effort was 64 days during 2009 which was below both the target and limit reference points.

4.2 Size at Capture

Size at capture data were obtained from commercial prawn grade data for each vessel and fishing day during 2009. The average size at capture was 32.2 prawns per kg (226 prawns per 7 kg), which was below the RP for this PI.

4.3 Recruitment indices

Recruitment indices were calculated as the square-root transformation of the numbers of prawns (males <33 and females <35 mm carapace length) per nautical mile trawled (after Carrick 2003) in the Ceduna region during surveys conducted in February or March. As no surveys were undertaken in the Ceduna region during 2009, the mean recruitment index could not be calculated.

4.4 Proportion of virgin spawning biomass

The proportion of virgin spawning biomass could not be calculated from the available data.

5. DISCUSSION

The West Coast Prawn Fishery suffered stock collapse in 2002 and subsequently had six consecutive years of low commercial catch. There is clear evidence to suggest that the stock has recovered considerably in recent years. This includes: increases in survey catch rates between 2006 and 2009; consecutive increases in commercial catch during the last three years with the catch and effort in 2009 (112 t, 64 nights) the highest observed since 2001; high commercial CPUE in 2008 (63.9 kg/h) and 2009 (60.3 kg/h), and; increases in mean harvested prawn size between 2008 and 2009.

Catches during the early spawning season (Nov and Dec: 8.5 t) in 2009 represented a low proportion (8%) of the total catch. The protection of spawning biomass is important to ensure the maximum opportunity for recruitment success.

During the 2008 and 2009 fishing years, real time management measures of minimum catch per vessel and prawn size (bucket counts) were used as decision rules for the continuation of fishing throughout each period. The guideline for minimum daily catch was an average vessel catch of 300 kg per night over two consecutive nights. Guidelines for mean daily prawn size were set at <240 prawns per 7 kg in Venus Bay and Coffin Bay and <250 prawns per 7 kg in Ceduna. If either of these guidelines is not met then fishing is to cease in that location (Alice Fistr, PIRSA Fisheries pers comm.).

The minimum catch per night was achieved for 60 of 64 nights during 2009. Although the target catch was not achieved for three consecutive nights in December, harvest strategy guidelines were met as fishers moved from the Ceduna region to Coffin Bay after the first night. Grade data collected in 2009 indicated that the target size of prawns was achieved on 60 of 64 fishing days. The four nights when minimum size was not achieved occurred in March (1 night) and July (3 nights). This was a considerable improvement in size at harvest compared to 2008 and likely indicates that the biomass during 2008 was at the onset of stock recovery and as such was predominately comprised of smaller prawns.

Harvest strategies for South Australia's prawn fisheries in Gulf St Vincent and Spencer Gulf are based on the results of fishery-independent surveys. Surveys are conducted regularly throughout the fishing year to monitor levels of current and future biomass and adjust harvest strategies accordingly. For example, lower than average survey catch rates result in conservative harvest strategies that aim to reduce total effort in the

fishery for the subsequent fishing period. Survey results from the West Coast Prawn Fishery do not directly affect the level of effort imparted on the resource. Whilst surveys do aid spatial harvest strategy development (in regard to prawn size) for the months that surveys are conducted (March, June and November), the draft harvest policy for the fishery utilises only the outputs from commercial fishing activity (prawn size and minimum daily catch) to determine effort levels. Thus, to ensure sustainability for the West Coast Prawn Fishery, there is an increased focus on stock assessment outcomes, in particular assessment against the Performance Indicators (PIs) for the fishery.

The current PIs for the West Coast Prawn Fishery (MacDonald 1998) do not provide a meaningful basis for fishery assessment. A new suite of PIs should be developed that reflect the current management arrangements. Potential indicators include:

- mean survey catch rate,
- total annual catch,
- catch during the early spawning period,
- mean daily catch per vessel,
- total commercial effort,
- mean commercial CPUE,
- prawn size.

The last full stock assessment report for the West Coast Prawn Fishery was done in 2006 (Dixon and Roberts 2006). Brief status reports have been provided annually thereafter (Roberts 2007; Dixon and Hooper 2008; Hooper, Dixon and Roberts 2009) reflecting a prolonged period of low biomass and commercial catch. As the stock continues to recover and commercial catch increases, there is an increased need for robust stock assessment. It is recommended that another formal stock assessment is conducted, with particular regard to developing meaningful Performance Indicators for the fishery.

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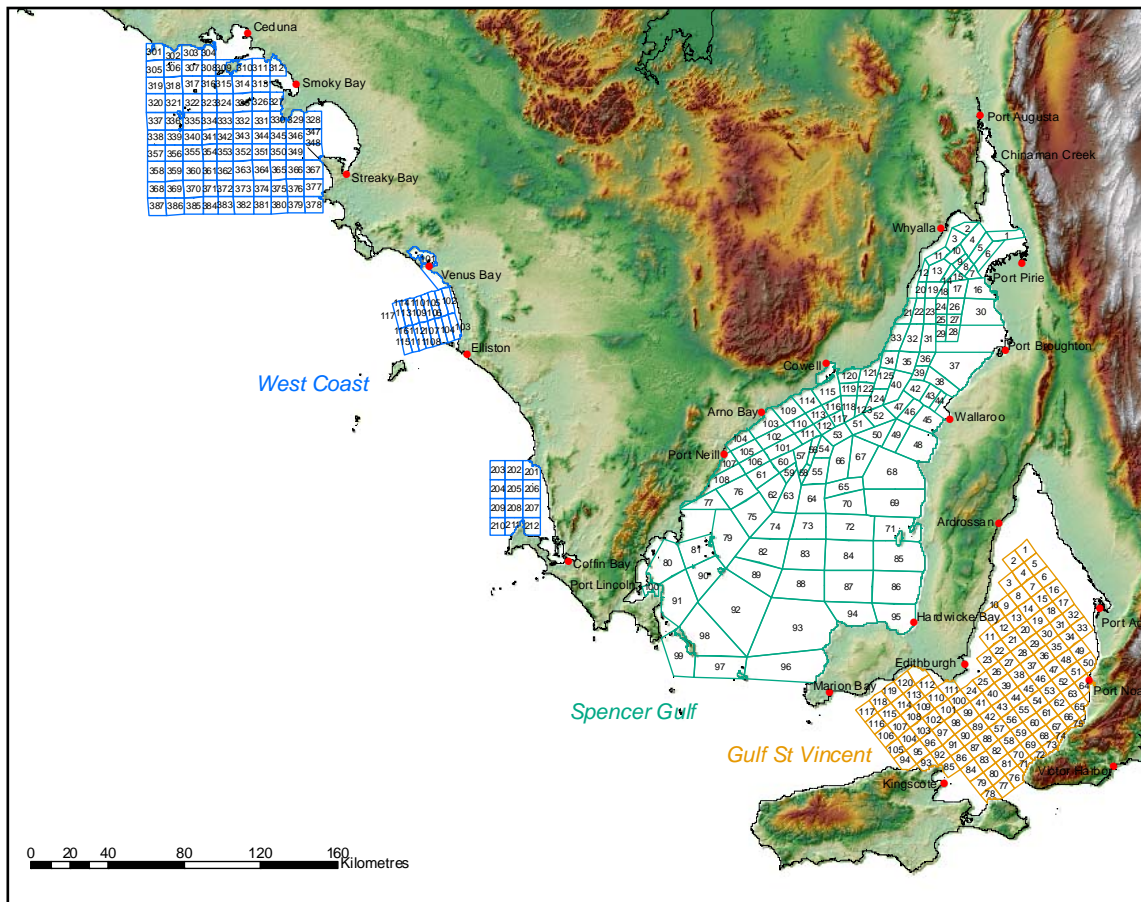
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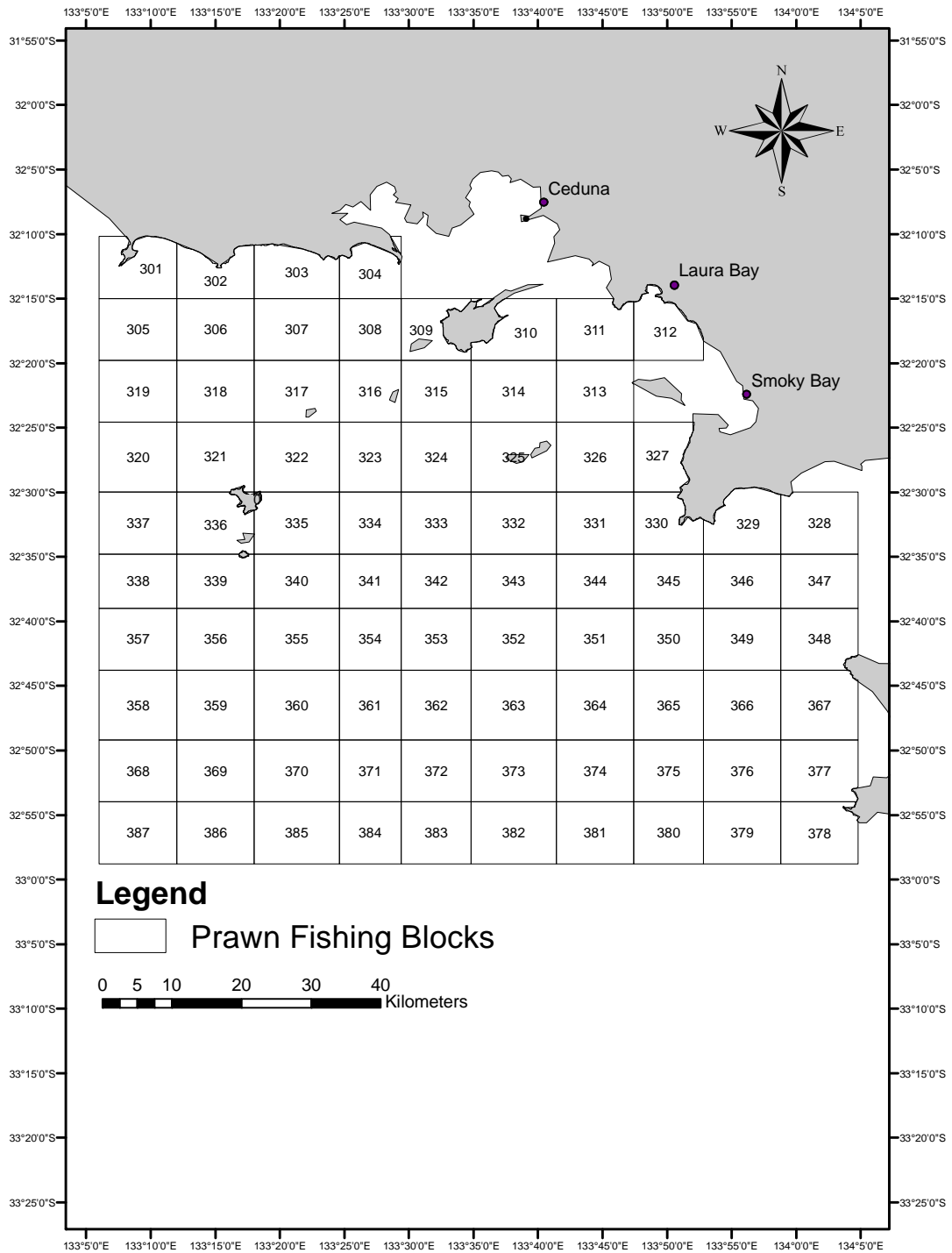
7. APPENDIX

7.1 Location of South Australia's three commercial western king prawn fisheries (West Coast, Spencer Gulf and Gulf St Vincent).

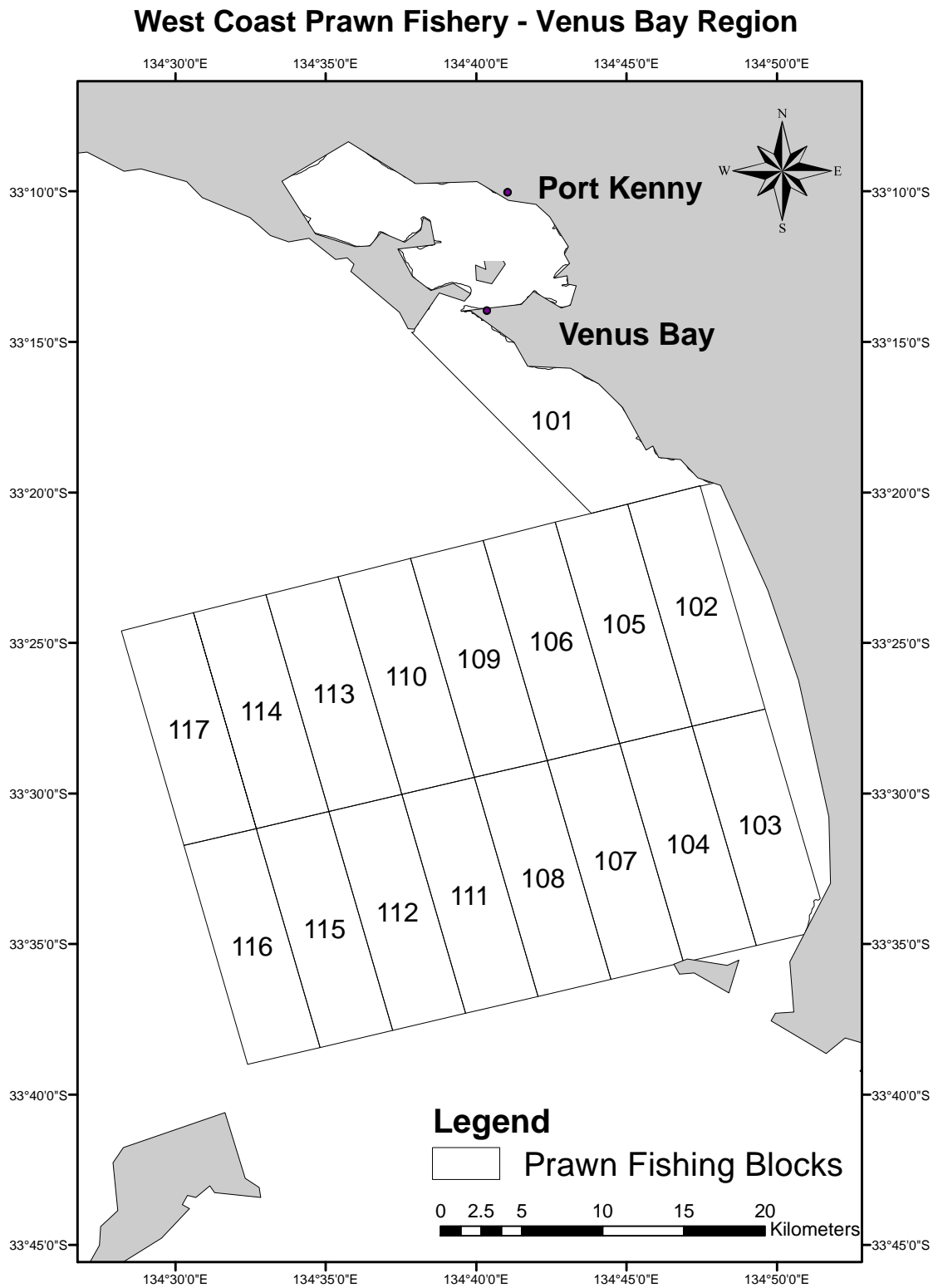


7.2 Fishing blocks in South Australia's West Coast commercial western king prawn fisheries - Ceduna Region.

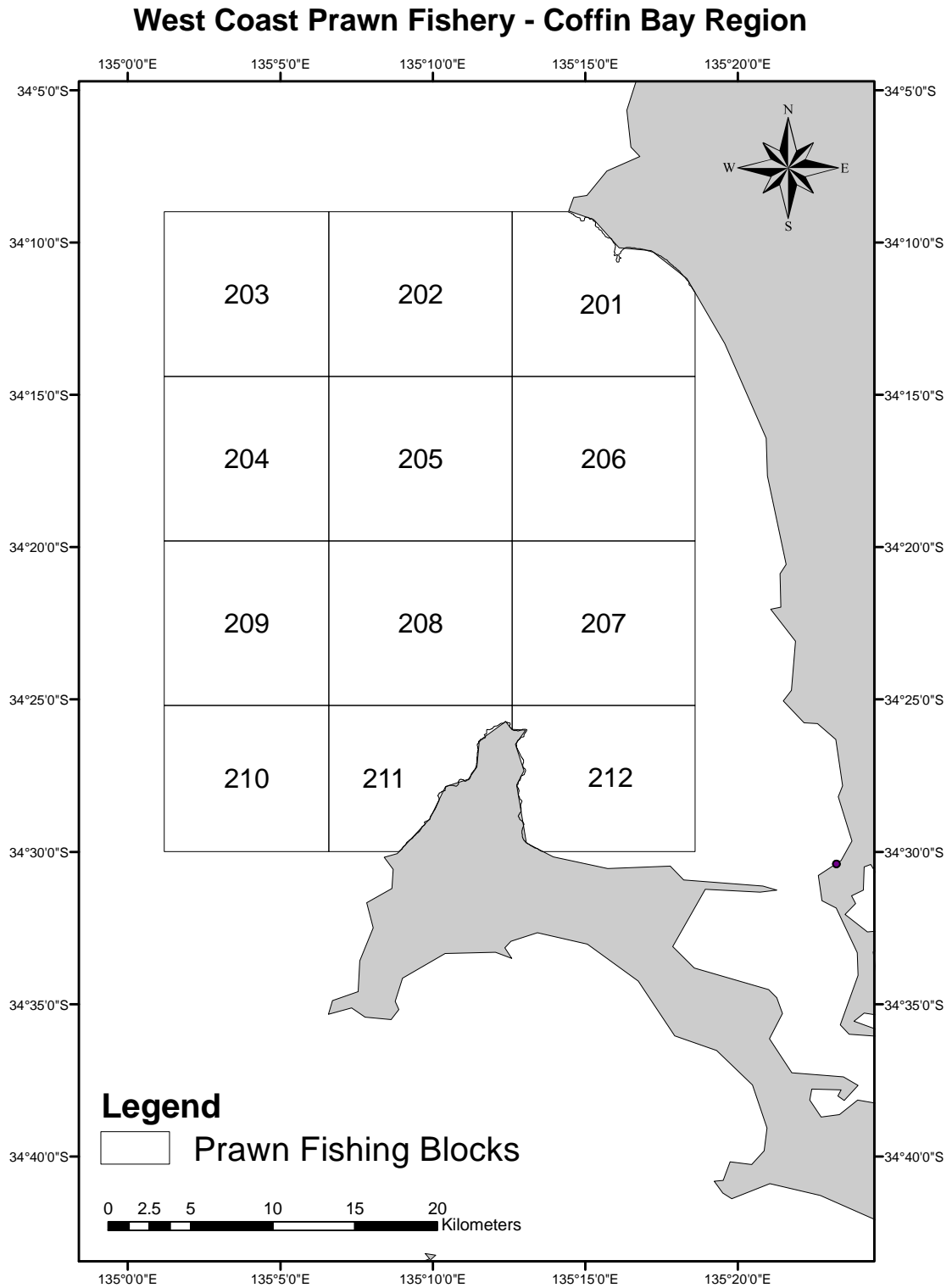
West Coast Prawn Fishery - Ceduna Region



7.3 Fishing blocks in South Australia's West Coast commercial western king prawn fisheries - Venus Bay Region.



7.4 Fishing blocks in South Australia's West Coast commercial western king prawn fisheries – Coffin Bay Region.



7.5 Survey results during 2009 in the West Coast prawn fishery.

MARCH 2009 – Spot survey

AREA	VESSEL	LB/MIN	PP7KG	AREA	VESSEL	LB/MIN	PPKG
Venus Bay_1	Bosanquet Bay	1.0	26.7	Venus Bay_14	Bosanquet Bay	1.8	26.6
Venus Bay_2	Bosanquet Bay	1.4	28.3	Venus Bay_15	Bosanquet Bay	0.5	n/a
Venus Bay_3	Bosanquet Bay	0.3	n/a	Venus Bay_18	Bosanquet Bay	1.4	27.1
Venus Bay_8	Bosanquet Bay	1.5	31.1	Venus Bay_19	Bosanquet Bay	0.5	n/a
Venus Bay_9	Bosanquet Bay	0.5	26.1	Venus Bay_20	Bosanquet Bay	1.5	28.7

JUNE 2009

AREA	VESSEL	LB/MIN	PPKG	AREA	VESSEL	LB/MIN	PPKG
Venus Bay_5	Lincoln Lady	2.5	26.4	Venus Bay_13	Lincoln Lady	3.1	36.0
Venus Bay_6	Lincoln Lady	3.0	31.0	Venus Bay_18	Lincoln Lady	4.2	33.6
Venus Bay_7	Lincoln Lady	3.0	45.4	Venus Bay_19	Lincoln Lady	3.7	36.9
Venus Bay_11	Lincoln Lady	2.1	24.6	Venus Bay_20	Lincoln Lady	0.2	45.2
Venus Bay_12	Lincoln Lady	3.1	28.9	Venus Bay_21	Lincoln Lady	3.6	27.3

NOVEMBER 2009

AREA	VESSEL	LB/MIN	PPKG	AREA	VESSEL	LB/MIN	PPKG
Ceduna_2	Limnos	2.9	50.3	Venus Bay_18	Bosanquet Bay	1.1	24.0
Ceduna_3	Limnos	1.2	43.3	Venus Bay_19	Bosanquet Bay	2.8	27.0
Ceduna_4	Limnos	1.1	45.4	Venus Bay_20	Bosanquet Bay	3.0	33.9
Ceduna_9	Limnos	1.4	30.0	Coffin Bay_1	Lincoln Lady	0.8	25.6
Ceduna_15	Limnos	1.1	34.9	Coffin Bay_2	Lincoln Lady	3.0	31.2
Ceduna_17	Limnos	2.4	40.9	Coffin Bay_3	Lincoln Lady	0.1	22.8
Venus Bay_1	Bosanquet Bay	5.9	36.4	Coffin Bay_4	Lincoln Lady	1.7	27.1
Venus Bay_6	Bosanquet Bay	3.0	28.5	Coffin Bay_5	Lincoln Lady	1.7	29.5
Venus Bay_7	Bosanquet Bay	3.9	29.7	Coffin Bay_6	Lincoln Lady	2.7	29.8
Venus Bay_11	Bosanquet Bay	1.2	24.6	Coffin Bay_7	Lincoln Lady	1.0	27.6
Venus Bay_12	Bosanquet Bay	1.1	23.4	Coffin Bay_8	Lincoln Lady	4.3	29.4
Venus Bay_13	Bosanquet Bay	2.8	27.0	Coffin Bay_9	Lincoln Lady	1.2	25.0
Venus Bay_15	Bosanquet Bay	2.1	26.7	Coffin Bay_7A	Lincoln Lady	1.6	26.6