

# Wild Fisheries



## West Coast Prawn, *Penaeus (Melicertus) latisulcatus* Fishery, 2010



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

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August 2011

Fishery Status Report to PIRSA Fisheries and Aquaculture



Government  
of South Australia

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This report documents the 2010 fishing season for the West Coast Prawn Fishery, and is part of SARDI Aquatic Sciences ongoing assessment program for South Australia's Prawn Fisheries. Both commercial logbook data and fishery-independent survey data are documented, building on the historical information for this fishery, which was previously updated in the 2009 fishery status report (SARDI Publication No. F2007/000772-3).

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## **EXECUTIVE SUMMARY**

1. This report updates the 2009 status report for the West Coast Prawn Fishery. It contains analyses of catch, effort and prawn survey data for the 2010 fishing year.
2. Annual catch was 89 t in 2010 which was the third consecutive year of catch >80 t. This follows a prolonged period of low catches (<32 t from 2002–2007).
3. Mean annual survey catch rate in 2010 was 47.4 kg/h. Mean annual survey catch rate has exceeded 40 kg/h during the last four years.
4. The mean size of prawns captured during surveys was considerably smaller during 2010 compared to recent years, suggesting an increase in the abundance of recruits in both Venus Bay and Ceduna fishing grounds.
5. Policy criteria regarding target size of prawns harvested was not met during any fishing night in April, June, July, August or September 2010.
6. A new suite of Performance Indicators (PIs) should be considered to reflect management needs of the fishery and available data. Indicators could include: mean survey catch rate; commercial catch (annual, early spawning period, mean daily); commercial effort; mean commercial CPUE, and; prawn size.
7. The last formal stock assessment for the West Coast Prawn Fishery was conducted in 2006. In the absence of a formal stock assessment and meaningful PIs, it is difficult to ascertain whether the harvest of small prawns during 2010 is likely to affect future sustainability. There is a need for formal stock assessment and to develop meaningful PIs for the fishery.

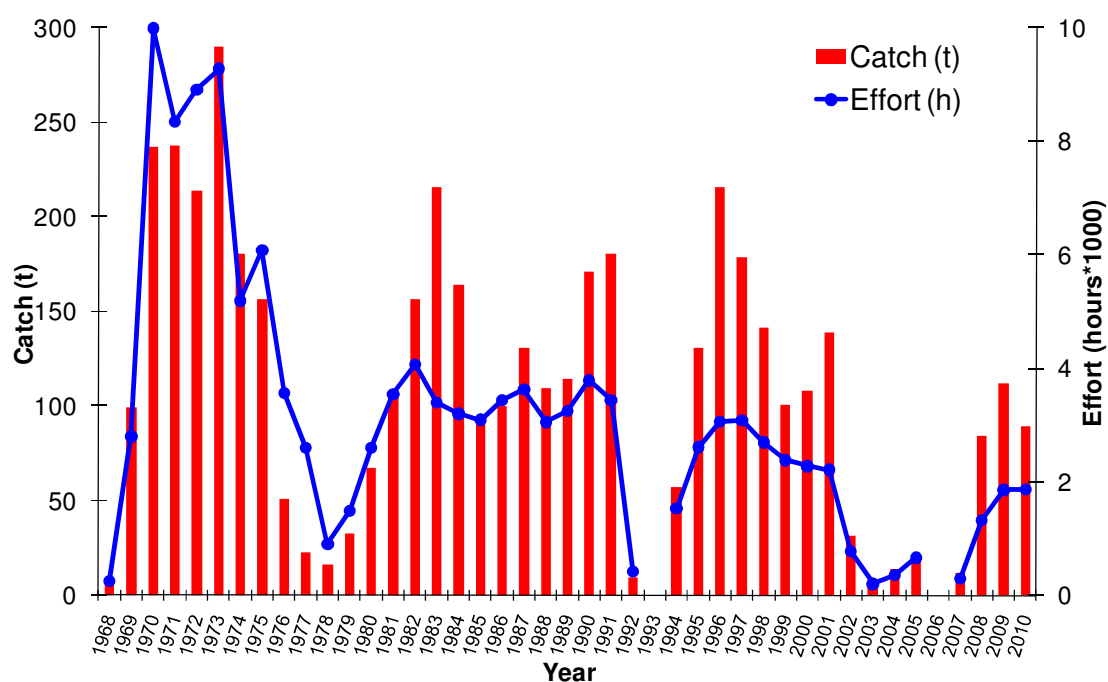
# 1. FISHERY STATISTICS

## 1.1 Catch and Effort

### 1.1.1 Inter-annual trends

The total commercial catch of 89.2 t in 2010 was a 20% decrease from the previous year (112 t). This was the third consecutive year of catches >80 t following six years of low catches (<32 t), however it was still below the long-term (1968-2010) average of 112 t (Figure 1.1).

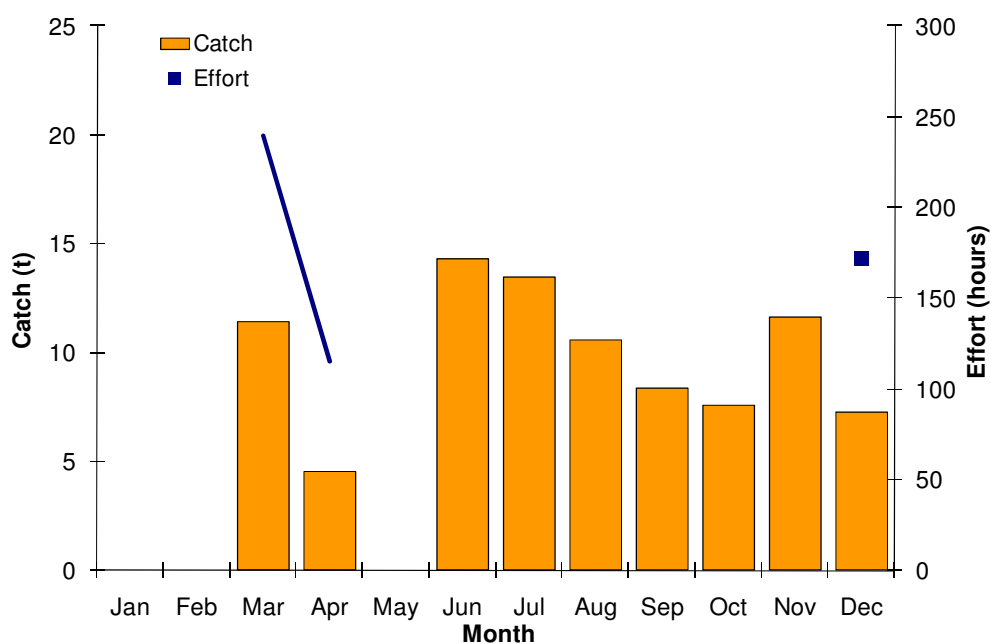
Total effort in 2010 was 1,860 trawl hours, which was similar to that from the previous year (1,857 hours). Whilst this was the highest level of effort recorded since 2001, it remains low in an historical context.



**Figure 1.1** Catch (t) and effort (h) for the West Coast Prawn Fishery from 1968–2010.

### 1.1.2 With-in season trends

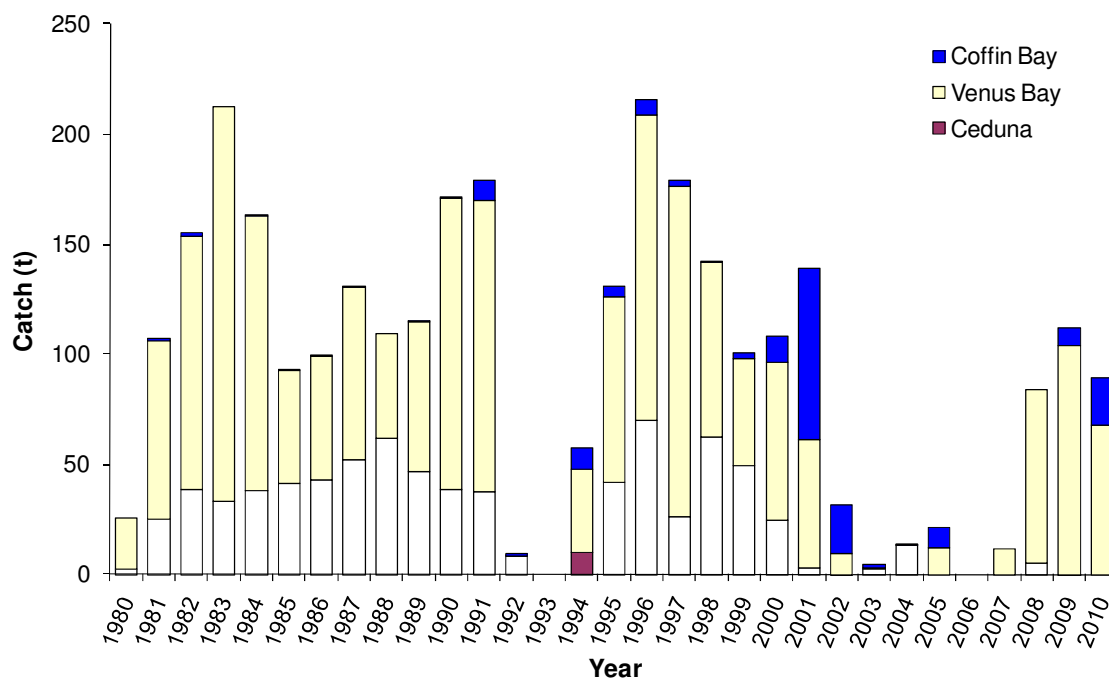
In 2010, fishing occurred from March to April and June to December (Figure 1.2). The highest catches were obtained in June (14.3 t) and July (13.5 t). The lowest catches were obtained in April (4.5 t) and December (7.3 t). Trends in effort reflected trends in catch, with the highest effort in July (280 h) and the lowest effort in April (115 h).



**Figure 1.2** Monthly catch (t) and effort (h) for the West Coast Prawn Fishery during 2010.

### 1.1.3 Inter-annual trends in catch among regions

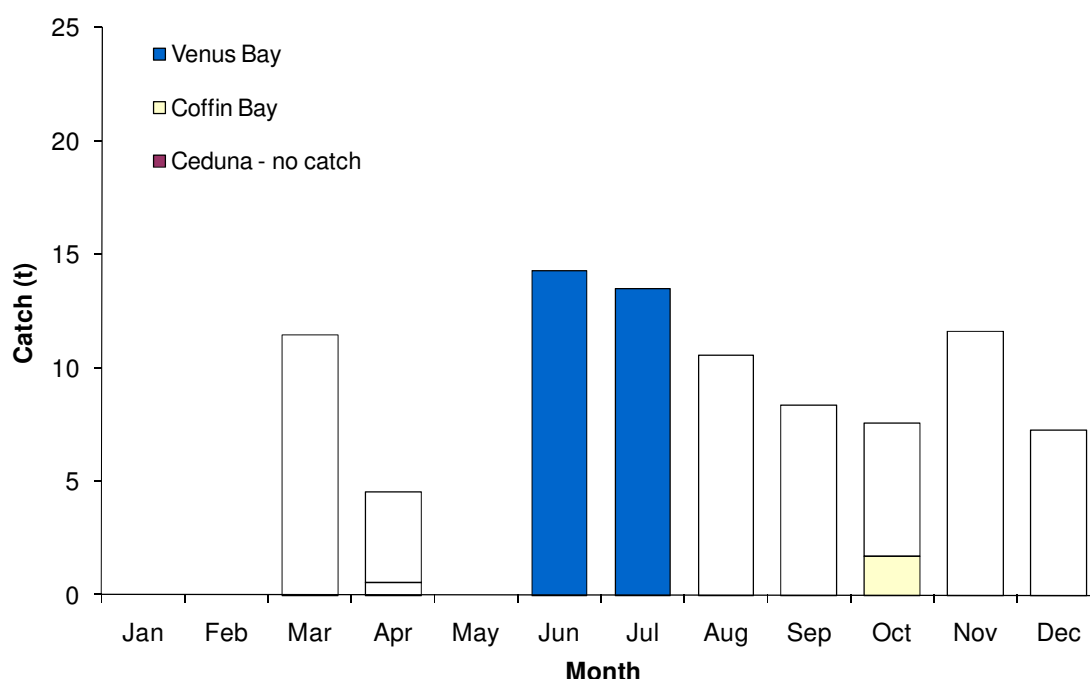
In 2010, 76% (68 t) of the catch was harvested from the Venus Bay region, 24% (21.2 t) from the Coffin Bay region and no catch was harvested from the Ceduna region (Figure 1.3 and Appendix 7.1).



**Figure 1.3** Annual catches from regions of the West Coast Prawn Fishery from 1980–2010.

#### 1.1.4 With-in season trends in catch among regions

In 2010, 99% of the catch harvested between March and September was from the Venus Bay region (62.1 t) and 1% from the Coffin Bay region (0.6 t). During October to December, catches of 5.9 t (22%) and 20.6 t (78%) were harvested from the Venus Bay and Coffin Bay regions, respectively (Figure 1.4).

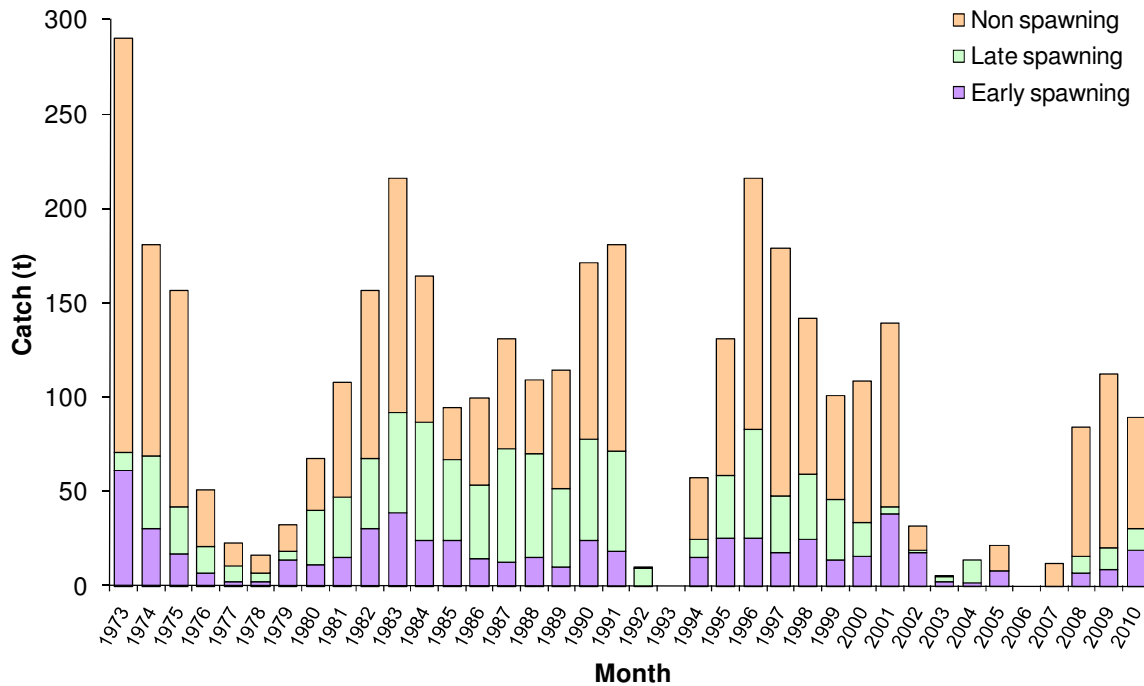


**Figure 1.4** Monthly catch (t) from regions of the West Coast Prawn Fishery during 2010.

#### 1.1.5 Catches during the spawning season

The spawning period for *P. 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 subsequent recruitment to the fishery.

In 2010, 21% (18.9 t) of the annual catch was harvested during the early spawning period (November and December), 13% (11.4 t) was harvested during the late spawning season (March) and 66% (58.8 t) of the catch was harvested during the non-spawning period (April to October; Figure 1.5). In 2010, the proportion of the catch harvested during the early spawning period (18.9 t) was similar to the long-term average (16.9 t since 1973).



**Figure 1.5** Catches during early spawning (November-December), late spawning (January-March) and non-spawning (April-October) periods from 1973–2010 for the West Coast Prawn Fishery.

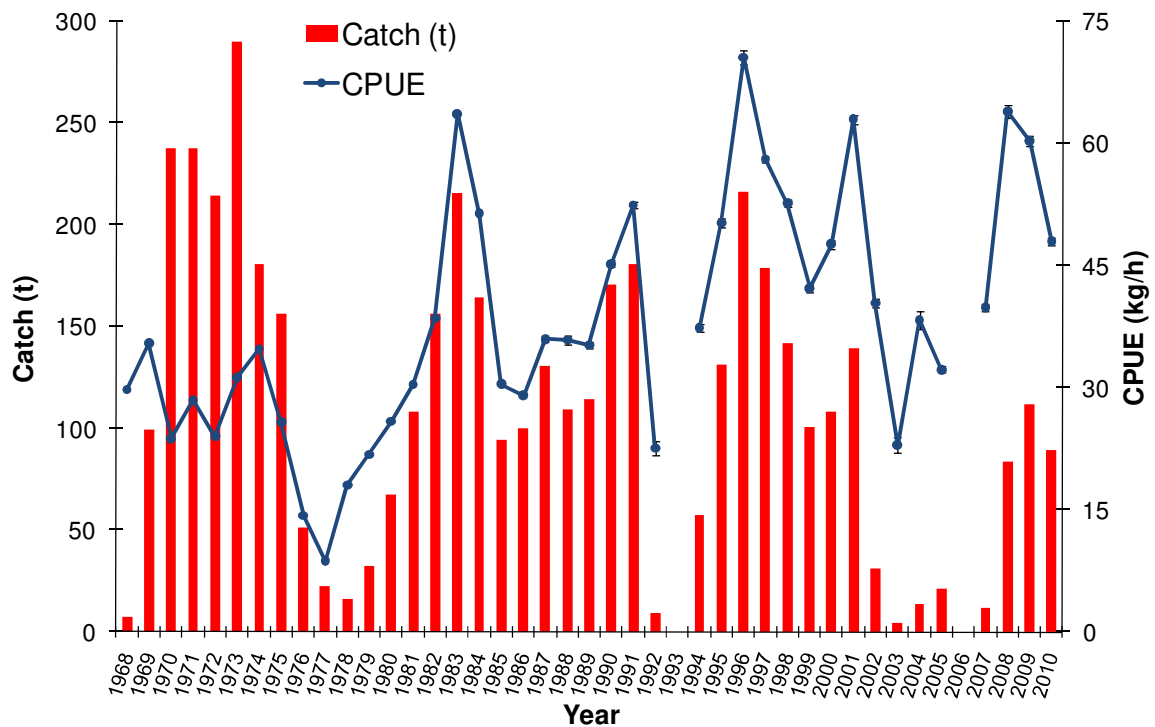
## 1.2 Catch-Per-Unit Effort (CPUE)

### 1.2.1 Inter-annual trends

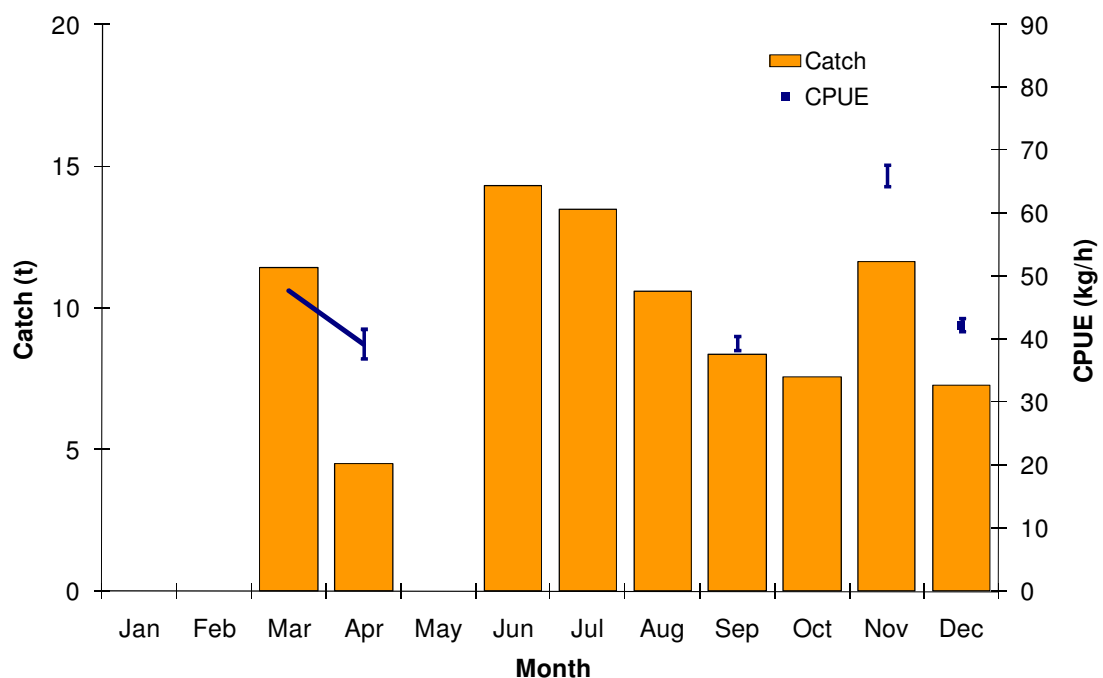
Annual (nominal) CPUE in 2010 was 47.9 kg/hr, a decrease of 21% compared to 2009 (60.3 kg/h). However, CPUE remains considerably higher than that observed from 2002 to 2007 (mean 34.8 kg/h; Figure 1.6). CPUE has only exceeded 60 kg/h on five previous occasions (1983, 1996, 2001, 2008 and 2009).

### 1.2.2 With-in season trends

During 2010, monthly CPUE was highest in November (66.0 kg/h) and June (57.1 kg/h) (Figure 1.7). CPUE was lowest in April (39.3kg/hr) and September (39.5 kg/h).



**Figure 1.6** Annual catch (t) and mean ( $\pm$  SE) CPUE for the West Coast Prawn Fishery from 1968–2010. Standard errors have been calculated from 1987 onwards (validated logbook data) using the ratio estimator method (Rice 1995).



**Figure 1.7** Monthly catch (t) and mean ( $\pm$  SE) CPUE for the West Coast Prawn Fishery during 2010. Standard errors have been calculated using the ratio estimator method (Rice 1995).

## 2. DAILY ESTIMATES OF TOTAL CATCH & PRAWN SIZE FOR 2010

Data on total catch and prawn size for each day's fishing are available for the West Coast Prawn Fishery from 2008. Rules regarding minimum catch per night and minimum prawn size are documented in the Management Policy for the fishery (Anon 2010) and are presented in Table 2.1.

Table 2.1 Rules regarding minimum catch per night and minimum prawn size for the West Coast Prawn Fishery.

| Region    | VENUS BAY                      |                         | CEDUNA                         |                         | COFFIN BAY                     |                         |
|-----------|--------------------------------|-------------------------|--------------------------------|-------------------------|--------------------------------|-------------------------|
|           | Ave. catch<br>per boat<br>(kg) | Ave.<br>bucket<br>count | Ave. catch<br>per boat<br>(kg) | Ave.<br>bucket<br>count | Ave. catch<br>per boat<br>(kg) | Ave.<br>bucket<br>count |
| November  |                                |                         | 300                            | 270                     | 300                            | 240                     |
| December  |                                |                         | 300                            | 270                     | 300                            | 240                     |
| January   |                                |                         |                                |                         |                                |                         |
| February  |                                |                         |                                |                         |                                |                         |
| March     | 300                            | 250                     | 300                            | 270                     | 300                            | 240                     |
| April     | 300                            | 250                     | 300                            | 270                     | 300                            | 240                     |
| May       | 300                            | 250                     | 300                            | 270                     | 300                            | 240                     |
| June      | 300                            | 240                     | 300                            | 270                     | 300                            | 240                     |
| July      | 300                            | 240                     | 300                            | 270                     | 300                            | 240                     |
| August    | 300                            | 240                     | 300                            | 270                     | 300                            | 240                     |
| September | 300                            | 240                     | 300                            | 270                     | 300                            | 240                     |
| October   | 300                            | 240                     | 300                            | 270                     | 300                            | 240                     |

### 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. In general, catches were relatively stable throughout each month and, unlike the Spencer Gulf Prawn Fishery, did not appear to be greatly affected by moon phase (see Dixon *et. al.* 2008). During 2010, mean daily catch was 461 kg (21% decrease compared to 2009) and was highest in June (595 kg) and November (555 kg), and lowest in December (347 kg). During 2010 the management guidelines for daily catch (<300 kg) were achieved during 62 of 65 fishing nights.

### 2.2 Daily prawn size

Data on prawn size were obtained from prawn grade data from commercial logbooks from 2008 to 2010. Commercial prawn grade data were provided by all fishers for each day's fishing during all 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 2.2.

Table 2.2 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            |
| 30+         | 78.1          | 12.8            |

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:

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

Where;

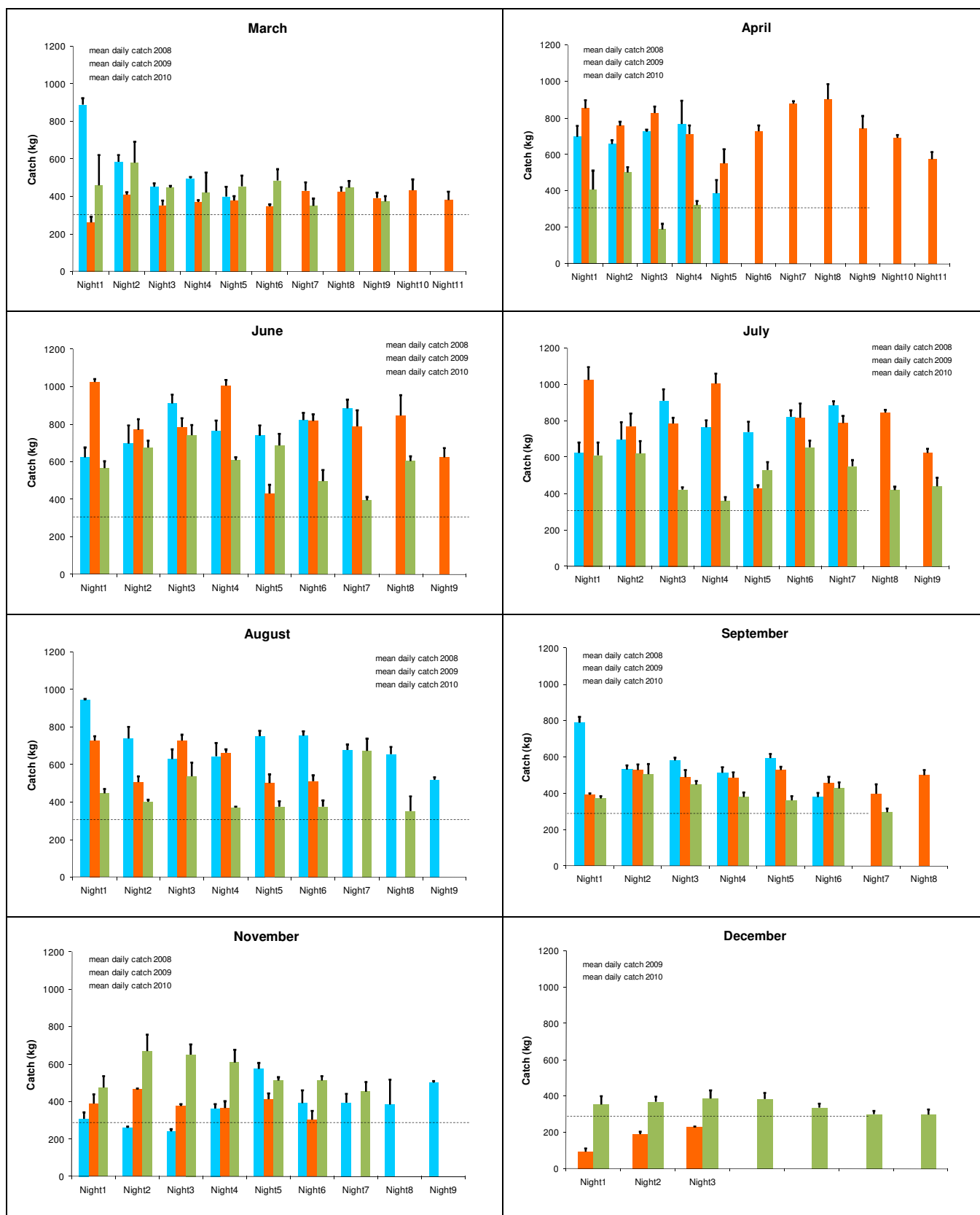
*catch* is the total daily catch (kg),

*ppkg* is the number of prawns per kg,

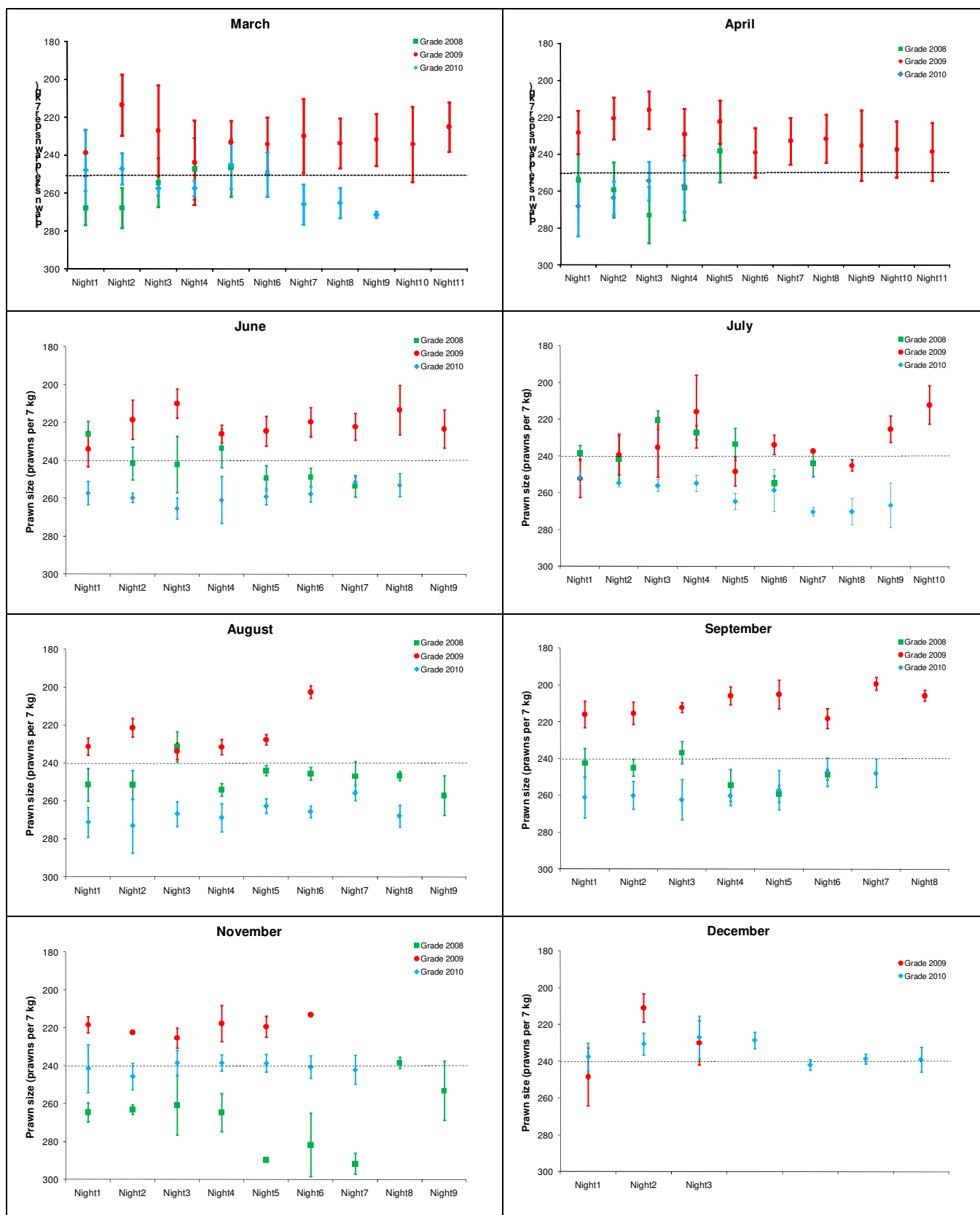
*grade* is the relevant prawn grade.

Prawns harvested in 2010 were generally smaller than those harvested in 2009 and marginally smaller than those harvested in 2008 (Figure 2.2). Mean daily prawn size was largest in November and December (235 and 241 prawns per 7 kg, respectively) and smallest in August, April and July (266, 261 and 261 prawns per 7 kg, respectively).

During 2010 the Management Policy for prawn size was only achieved during 15 of 65 fishing nights. Size criteria were not met for any fishing night during April, June, July, August and September.



**Figure 2.1** Mean daily catch per vessel from commercial logbook prawn grade data for the West Coast Prawn Fishery during 2008 to 2010. 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 to 2010. 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).

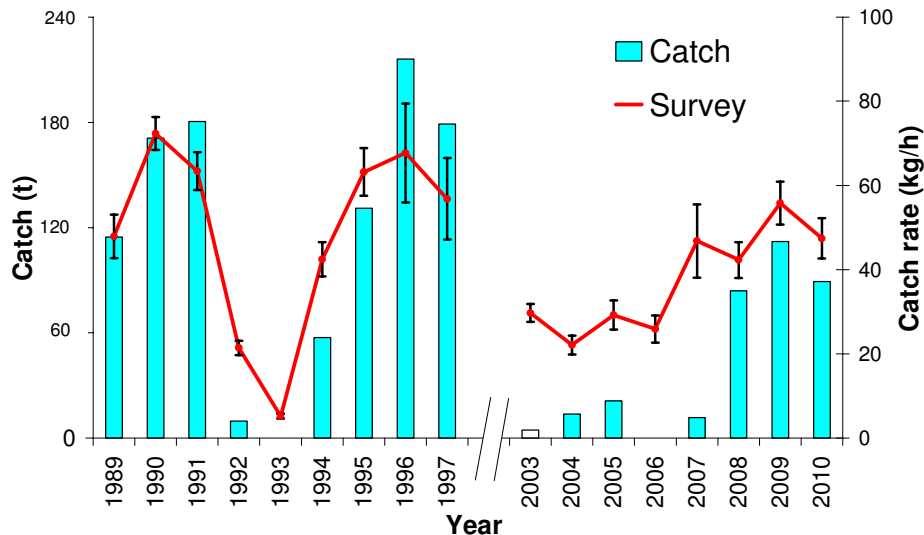
Table 3.1 Number of stock assessment survey shots within regions of the West Coast Prawn Fishery from November 1989 to November 2010.

| 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    | 2010 | Mar   | 7      | 10        |            | 17    |
|      |       |        |           |       |      | June  |        | 10        |            | 10    |
|      |       |        |           |       |      | Nov   | 6      | 10        |            | 16    |

## 3.2 Annual Trends

### 3.2.1 Mean catch rate

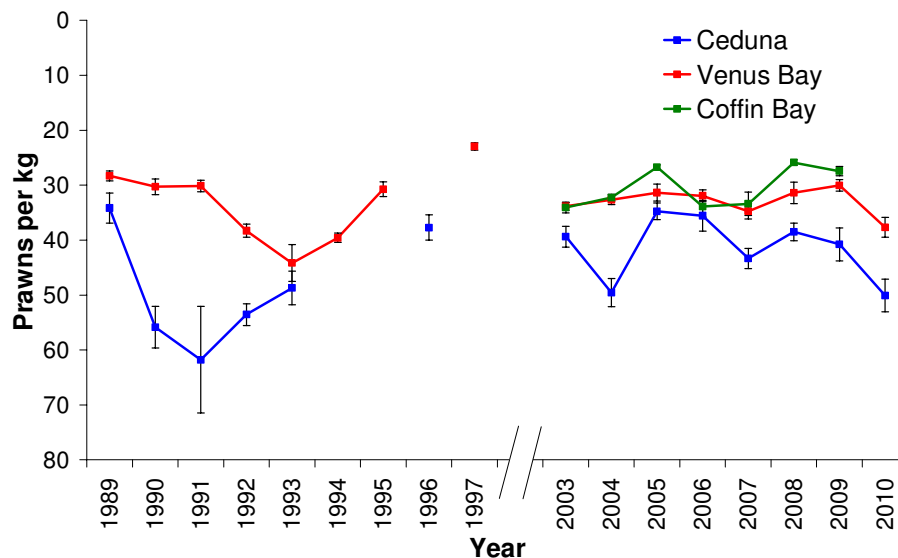
Mean annual survey catch rate has ranged from 42–56 kg/h during the last four years (47.4 kg/h in 2010) which was substantially higher than the catch rates observed from 2003 to 2006 (<32 kg/h; Figure 3.1). Trends in catch have generally reflected trends in survey catch rate with the exception of 2007, when commercial catches were low and increases in survey catch rate reflected the onset of recovery for the fishery.



**Figure 3.1** Total catch and mean ( $\pm$  SE) annual survey catch rate from 1989–2010.

### 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 the Venus Bay and Coffin Bay regions (Figure 3.2). During 2010, mean prawn size was the lowest observed since 1992 and 1994 in the Ceduna and Venus Bay regions, respectively.



**Figure 3.2** Mean ( $\pm$  SE) size of prawns measured during surveys from 1989–2010.

## 4. PERFORMANCE INDICATORS

In this section, performance of the fishery from 2006 to 2010 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 2006–2010 for the West Coast Prawn Fishery (MacDonald 1998)

| PI                          | Target RP | Limit RP | 2006 | 2007 | 2008 | 2009 | 2010 |
|-----------------------------|-----------|----------|------|------|------|------|------|
| Effort (days)               | 100–110   | 120      | 0    | 11   | 48   | 64   | 65   |
| Size at capture (prawns/kg) | <40/kg    | >40/kg   | N/A  | N/A  | 35.8 | 32.2 | 36.2 |
| Recruitment indices         | 40        | 35       | N/A  | 20.4 | N/A  | N/A  | 22.0 |
| % Virgin spawning biomass   | 50%       | 40%      | N/A  | 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 65 days during 2010 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 2010. The average size at capture was 36.2 prawns per kg (254 prawns per 7 kg), which was within the target reference range 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. Seven survey shots were conducted in Ceduna in March 2010. The mean recruitment index was 22.0, which was similar to that observed in 2007 (20.4) but below the target and limit reference points.

### 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 has shown continued signs of stock recovery with commercial catches of >80 t for the last three years and annual survey catch rates >40 kg/h for the last four years. This has followed a prolonged period of low abundance (2002–2006, commercial catch <32 t, survey catch rate <32 kg/h).

During 2010, the mean size of prawns captured during surveys was the lowest observed in almost 20 years in both the Venus Bay and Ceduna regions. Combined with high survey catch rates, the decrease in mean size indicates an increase in the abundance of recruits in the fishery. The high relative abundance of recruits led to a failure in meeting the target size criteria throughout most of the 2010 season which then resulted in a lower annual catch and commercial CPUE compared to 2009.

From the limited information in this report, it is difficult to ascertain whether the harvest of small prawns during 2010 is likely to affect future sustainability. The primary limitation of this assessment and indeed of the harvest strategy for the West Coast Prawn Fishery is a lack of meaningful Performance Indicators (PIs). For example, the current PI for recruitment (in the Spencer Gulf and West Coast Management Plan; McDonald 1998) was developed for the Spencer Gulf Prawn Fishery. Appropriate PIs on recruitment strength need to be established for the West Coast Prawn Fishery to inform future harvest levels.

A revised suite of PIs should be considered to reflect current management needs and could include: mean survey catch rate; recruitment measures; total annual catch; catch during the early spawning period; mean daily catch per vessel; total commercial effort; mean commercial CPUE, and; prawn size.

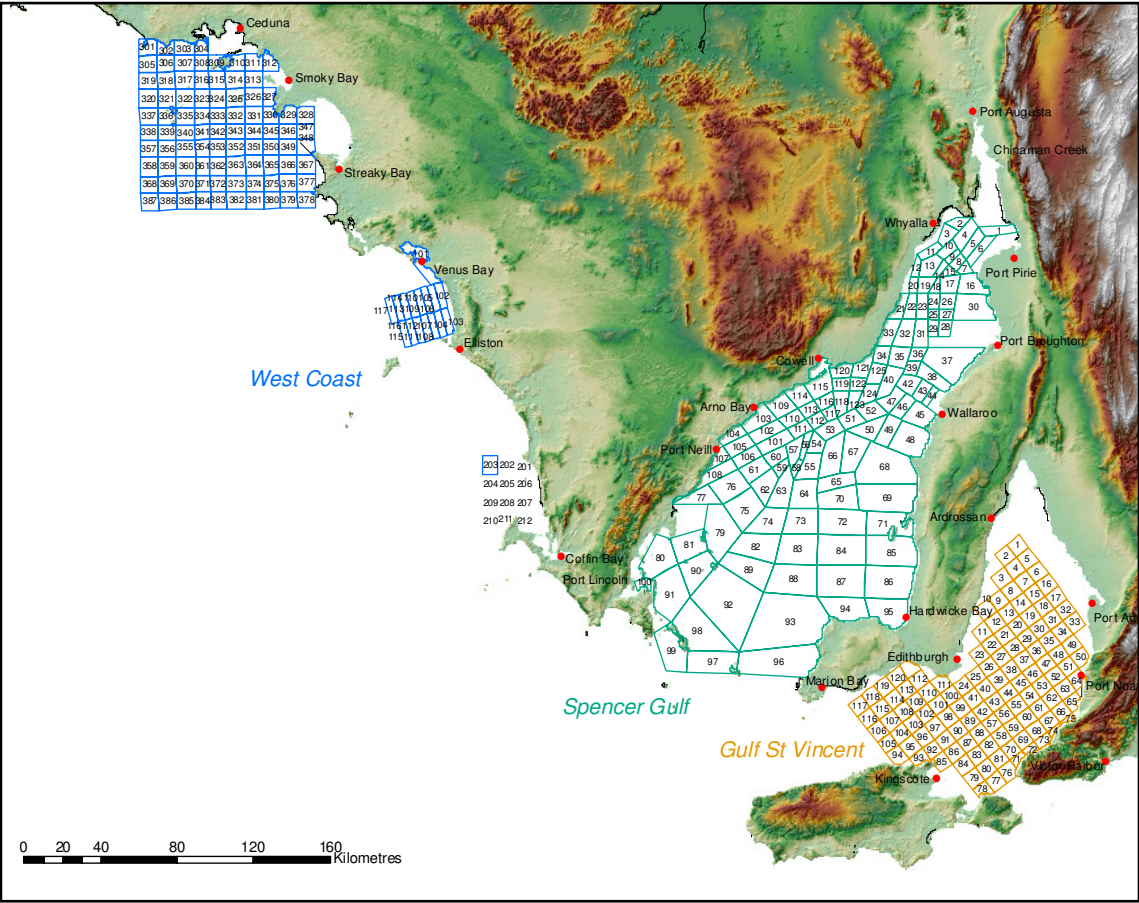
The last full stock assessment report for the West Coast Prawn Fishery was done in 2006 (Dixon and Roberts 2006). Since then, brief status reports have been provided annually (Roberts 2007; Dixon and Hooper 2008; Hooper, Dixon and Roberts 2009; Hooper, Dixon and Roberts 2010). A formal stock assessment that considers potential PIs for the fishery is warranted.

## 6. REFERENCES

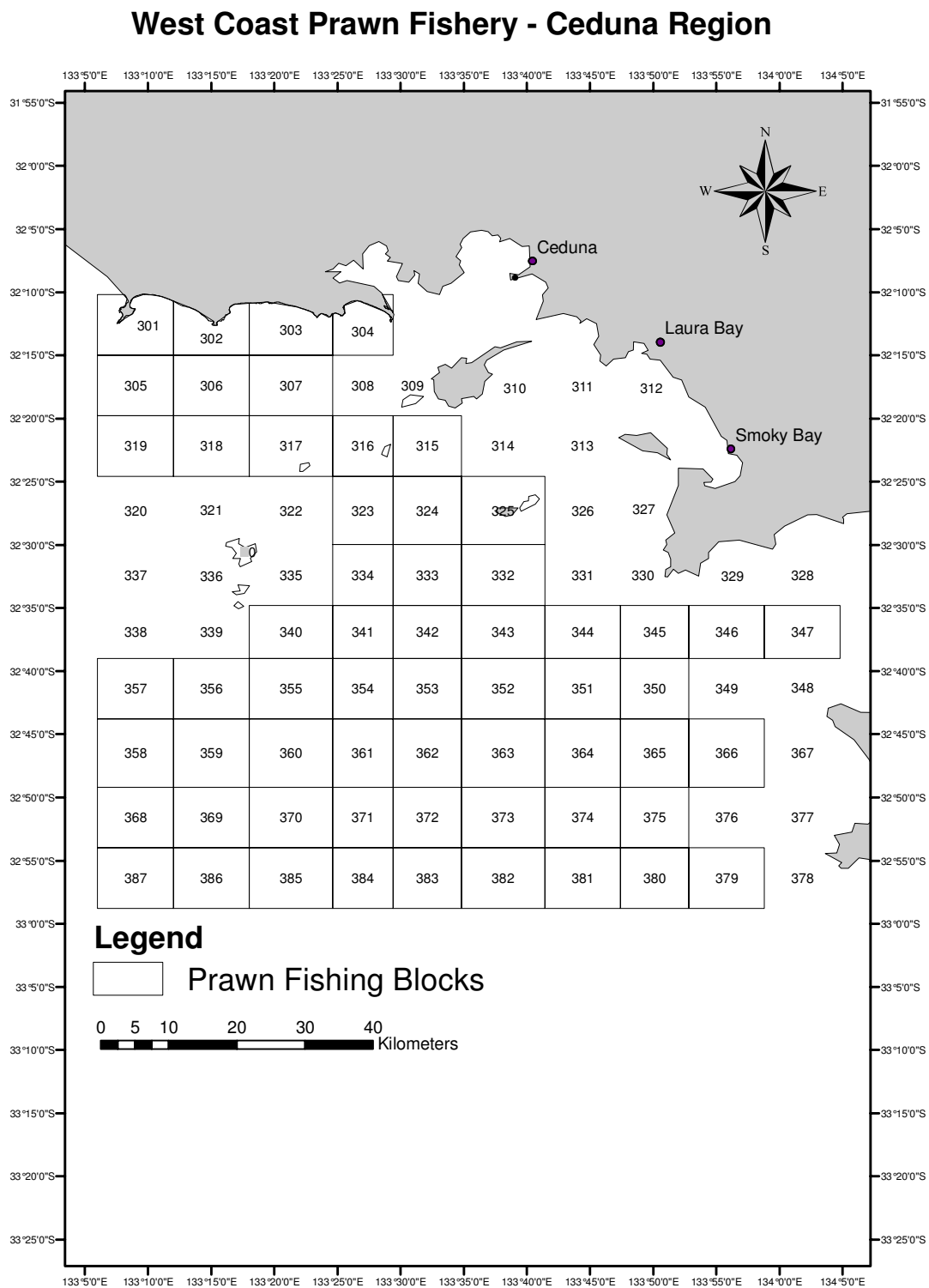
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7. APPENDIX

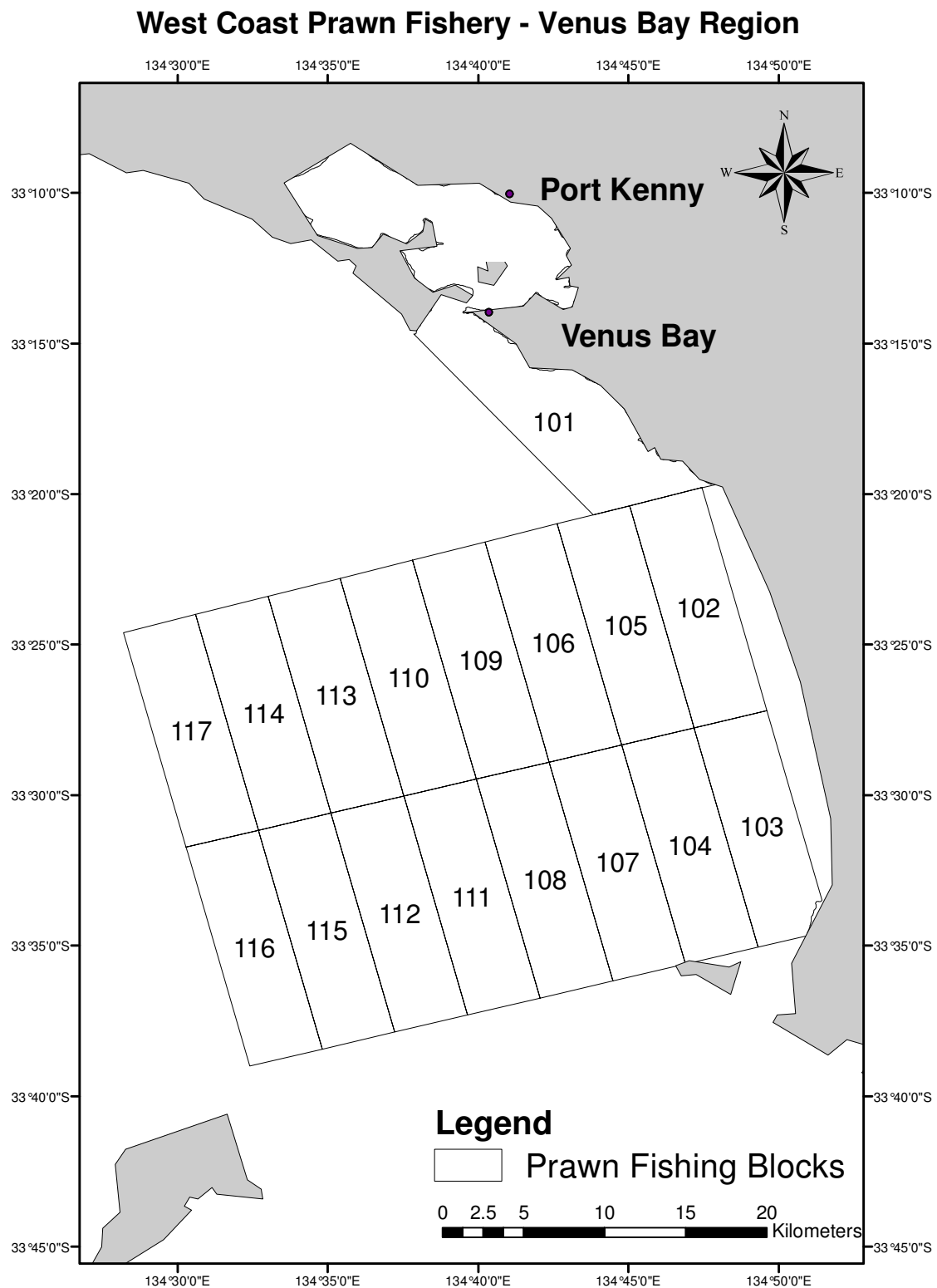
7.1 Location of South Australia’s three commercial Western King Prawn fisheries (West Coast, Spencer Gulf and Gulf St Vincent).



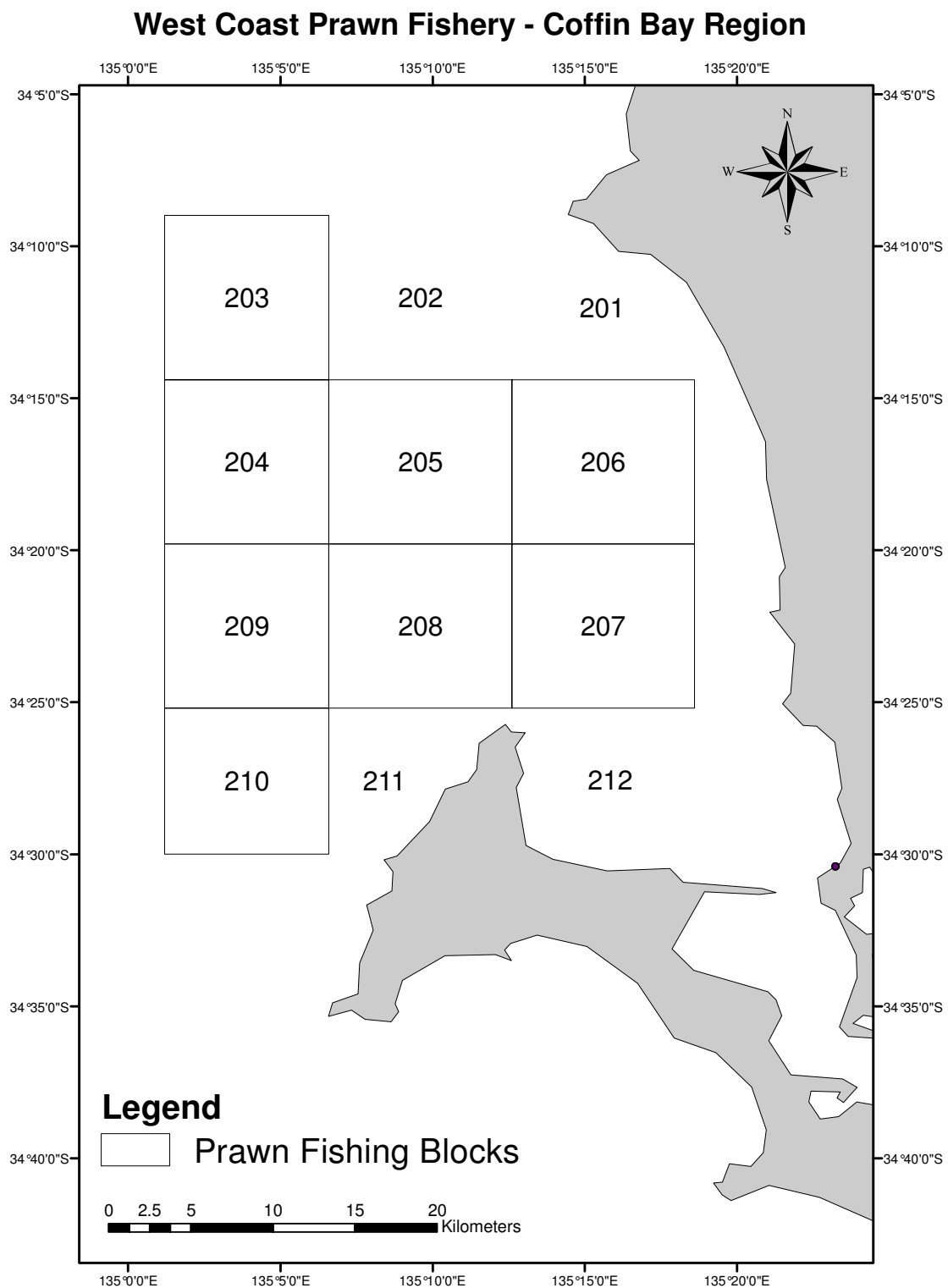
7.2 Fishing blocks in South Australia’s West Coast commercial western king prawn fisheries - Ceduna Region.



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 2010 in the West Coast prawn fishery.

### MARCH 2010

| AREA         | VESSEL       | LB/MIN | PP7KG | AREA      | VESSEL        | LB/MIN | PPKG |
|--------------|--------------|--------|-------|-----------|---------------|--------|------|
| Venus Bay_1  | Lincoln Lady | 5.2    | 38.3  | Ceduna_4  | Bosanquet Bay | 0.4    | 65.0 |
| Venus Bay_2  | Lincoln Lady | 0.6    | 34.1  | Ceduna_5  | Bosanquet Bay | 1.1    | 42.7 |
| Venus Bay_3  | Lincoln Lady | 0.2    | 11.0  | Ceduna_6  | Bosanquet Bay | 3.1    | 46.3 |
| Venus Bay_8  | Lincoln Lady | 0.9    | 32.7  | Ceduna_9  | Bosanquet Bay | 2.0    | 41.6 |
| Venus Bay_9  | Lincoln Lady | 1.0    | 16.4  | Ceduna_10 | Bosanquet Bay | 1.6    | 54.6 |
| Venus Bay_14 | Lincoln Lady | 0.8    | 31.1  | Ceduna_15 | Bosanquet Bay | 1.8    | 77.1 |
| Venus Bay_15 | Lincoln Lady | 0.5    | 27.4  | Ceduna_17 | Bosanquet Bay | 1.2    | 55.3 |
| Venus Bay_18 | Lincoln Lady | 0.1    | 7.4   |           |               |        |      |
| Venus Bay_19 | Lincoln Lady | 0.5    | 29.6  |           |               |        |      |
| Venus Bay_20 | Lincoln Lady | 2.6    | 47.1  |           |               |        |      |

### JUNE 2010

| AREA        | VESSEL        | LB/MIN | PPKG | AREA         | VESSEL        | LB/MIN | PPKG |
|-------------|---------------|--------|------|--------------|---------------|--------|------|
| Venus Bay_1 | Bosanquet Bay | 2.6    | 43.6 | Venus Bay_14 | Bosanquet Bay | 3.4    | 36.1 |
| Venus Bay_2 | Bosanquet Bay | 2.6    | 56.6 | Venus Bay_15 | Bosanquet Bay | 2.1    | 34.7 |
| Venus Bay_3 | Bosanquet Bay | 1.2    | 33.3 | Venus Bay_17 | Bosanquet Bay | 0.4    | 30.2 |
| Venus Bay_8 | Bosanquet Bay | 1.1    | 41.9 | Venus Bay_19 | Bosanquet Bay | 3.3    | 36.1 |
| Venus Bay_9 | Bosanquet Bay | 2.0    | 31.1 | Venus Bay_20 | Bosanquet Bay | 3.0    | 50.3 |

### NOVEMBER 2010

| AREA      | VESSEL | LB/MIN | PPKG | AREA         | VESSEL        | LB/MIN | PPKG |
|-----------|--------|--------|------|--------------|---------------|--------|------|
| Ceduna_12 | Limnos | 3.3    | 48.6 | Venus Bay_1  | Bosanquet Bay | 3.5    | 41.1 |
| Ceduna_13 | Limnos | 2.6    | 48.6 | Venus Bay_6  | Bosanquet Bay | 1.4    | 29.4 |
| Ceduna_14 | Limnos | 2.8    | 47.4 | Venus Bay_7  | Bosanquet Bay | 3.2    | 38.1 |
| Ceduna_19 | Limnos | 0.6    | 38.9 | Venus Bay_11 | Bosanquet Bay | 0.6    | 28.6 |
| Ceduna_25 | Limnos | 1.0    | 52.9 | Venus Bay_12 | Bosanquet Bay | 0.5    | 29.3 |
| Ceduna_29 | Limnos | 1.5    | 41.4 | Venus Bay_13 | Bosanquet Bay | 1.0    | 29.9 |
|           |        |        |      | Venus Bay_15 | Bosanquet Bay | 1.1    | 32.1 |
|           |        |        |      | Venus Bay_18 | Bosanquet Bay | 1.6    | 32.3 |
|           |        |        |      | Venus Bay_19 | Bosanquet Bay | 2.8    | 33.0 |
|           |        |        |      | Venus Bay_20 | Bosanquet Bay | 1.6    | 34.4 |