

Spencer Gulf Prawn
Penaeus (Melicertus) latisulcatus
Fishery Status Report
2009/10

Fishery Status Report to PIRSA Fisheries

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

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SARDI Research Report Series No. 512

SARDI Aquatic Sciences
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November 2010

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This Fishery Status Report documents the 2009/10 fishing season for the Spencer Gulf 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 2008-09 fishery assessment report (SARDI Publication No. F2007/000770-4).

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	3
EXECUTIVE SUMMARY	4
1. INTRODUCTION	5
2. STOCK ASSESSMENT SURVEYS	6
2.1 Relative biomass (mean survey catch rate)	6
2.1.1 November Surveys	6
2.1.2 February surveys	7
2.1.3 April surveys	7
2.1.4 Annual measures	8
2.2 February recruitment	9
3 FISHERY STATISTICS	10
3.1 Catch and effort	10
3.1.1 Inter-annual trends	10
3.1.2 Intra annual trends	10
3.2 Catch-Per-Unit Effort (CPUE)	11
3.3 Prawn size	12
3.3.1 Inter-annual trends	12
3.3.2 Daily prawn grades	13
4. PERFORMANCE INDICATORS	14
4.1 Fishery independent surveys	14
4.2 Recruitment index	14
4.3 Total commercial catch	14
4.4 Mean commercial CPUE	14
4.5 Vessel nights with a mean prawn size >280 prawns/7 kg	14
4.6 Indices of future and current biomass	14
4.7 Harvest strategy decision rules	14
5. SUMMARY OF 2009/10	15
6. DISCUSSION	16
7. REFERENCES	17
8. APPENDIX	17
8.1 Spencer Gulf Prawn Survey Shot locations	17
8.2 Survey Reports to PIRSA	18
8.2.1 Spencer Gulf Prawn Fishery: November 2009 Survey	18
8.2.2 Spencer Gulf Prawn Fishery: February 2010 Survey	25
8.2.3 Spencer Gulf Prawn Fishery: April 2010 Survey	32
8.3 Spot Survey results during 2009/10 Spencer Gulf prawn season	38
8.3.1 December 15 th 2009 Spot Survey	38
8.3.2 March 15 th 2010 Spot Survey	38
8.3.3 May 13 th 2010 Spot Survey	38

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The report was reviewed by Dr Rowan Chick and Dr Rick McGarvey of SARDI Aquatic Sciences. Dr Anthony Fowler formally approved the report for release.

EXECUTIVE SUMMARY

1. This fishery status report provides a brief synopsis of the performance of the Spencer Gulf Prawn Fishery during the 2009/10 fishing year.
2. In comparison to historic averages, mean survey catch rates during 2009/10 were relatively low in November, high in February and substantially higher in April (the highest recorded).
3. Annual commercial catch during 2009/10 was 2361 t, a 30% increase from 2008/09 (1,821 t) and the third highest recorded for the fishery.
4. Annual (nominal) CPUE in 2009/10 (139 kg/h) was 36% higher than in 2008/09 (102 kg/h) and was 22% higher than the previous peak in 2000/01. The high CPUE was due to a) most catch being harvested after April when catch rates are highest and b) shorter trawl hours per night to avoid low catch rates associated with sunset and sunrise.
5. Low survey results in November 2009 required a conservative strategy for pre-Christmas fishing that resulted in a commercial catch of 358 t. This followed a conservative strategy for April 2009. These consecutive, conservative strategies facilitated a short term stock recovery that, combined with strong recruitment to the fishery, enabled very high late season catches in 2010.
6. The Performance Indicators for commercial catch, commercial CPUE, harvested prawn size and recruitment index were all within the limit reference range of the Management Plan.

1. INTRODUCTION

This fishery status report for the Spencer Gulf Fishery (SGPF) is a 'living document', updated annually, and is part of the ongoing assessment program for South Australian Prawn Fisheries by SARDI Aquatic Sciences. This report aims to provide an update on the status of the stock at the end of the fishing season, and as such provides results from analyses of the current available data only. Further data and a more comprehensive assessment of the fishery are provided in annual fishery assessment reports, which are generally published during the following season. Fishery assessment reports also provide detailed background information on the biology and management of the fishery, methodology for stock assessment, and should be referred to if additional information is required.

This report is divided into six sections. Section One is the Introduction which outlines the aims and structure of the report. Section Two presents fishery-independent survey data. Fishery-independent surveys provide data for both stock assessment and to assist harvest strategy development prior to each fishing period. Survey shots were done at semi-fixed sites (see Appendix 8.1), with up to 208 common shots surveyed since 2004/05. During 2009/10, interim survey reports were produced soon after each survey to provide data on the spatial distribution of catch rate and prawn size, which were used to determine subsequent harvest strategies. These reports are provided in Appendix 8.2. Industry also undertake Spot surveys throughout the season, usually between stock assessment surveys, so as to adjust harvest strategies in response to targeted prawn size as outlined in the Management Plan (Dixon and Sloan 2007), these data are provided in Appendix 8.3.

Section Three presents fishery statistics from dependent logbook data, while section Four provides assessment of the fishery against the Performance Indicators identified in the Management Plan. Section Five presents summary statistics of the 2009/10 season (fishing and survey), and Section Six provides a concluding summary of the status of the resource.

2. STOCK ASSESSMENT SURVEYS

2.1 Relative biomass (mean survey catch rate)

Measures of relative biomass for the fishery were obtained by comparing trawl shots surveyed consistently over time. Consistent shots were defined as those trawled on at least 75% of surveys. Following this, five separate measures of relative biomass were obtained, three seasonal measures were determined separately for each survey month: November, February and April, and two annual measures determined as a combination of surveys in November and February and surveys in November, February and April. Trends in survey catch rate using all shots are presented to provide historical data only.

2.1.1 November Surveys

November surveys were first conducted in 1982/83 (Figure 2.1). The number of shots surveyed steadily increased from 13 in the first year to 165 by 1988/89. After a five year hiatus, November surveys were conducted annually from 1994/95 at up to 245 shots each year. Mean catch rates from all shots varied greatly in the first three years, likely due to the low number of shots done. From 1994/95, mean catch rates from all shots and consistent shots have varied between 67 and 147 kg/h. The November 2009 catch rate from consistent shots was 101.5 kg/h, a 28% decrease from that observed during the previous November (140 kg/h).

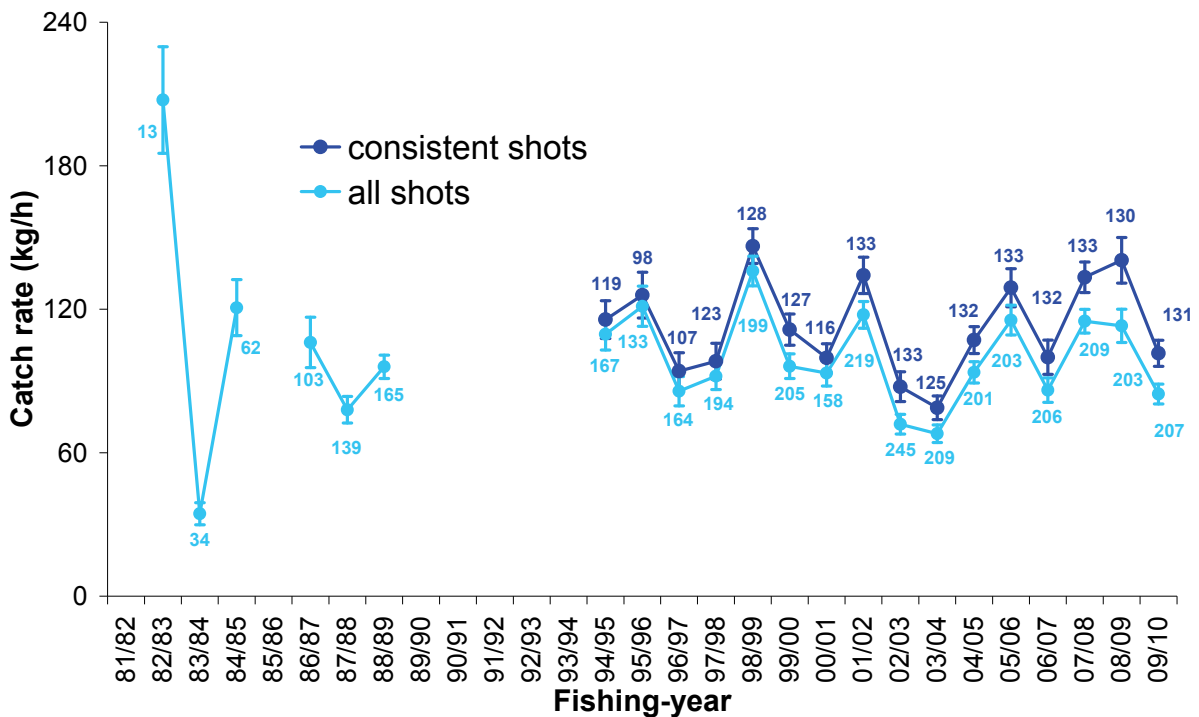


Figure 2.1 Mean (SE) catch rate (kg/h) obtained during November surveys from all shots and consistent shots conducted between 1981/82 and 2009/10. Labels indicate the number of shots surveyed.

2.1.2 February surveys

The first February survey was conducted in 1981/82 with only 55 shots completed (Figure 2.2). They were repeated between 1986/87 and 1988/89, with 175–177 shots surveyed on each occasion. February surveys were conducted annually from 1991/92 at up to 237 shots each year (Figure 2.2). Trends in mean catch rate for consistent shots surveyed in February generally increased between 1991/92 and 1995/96 and were highly variable between 1995/96 and 2004/05. Mean February catch rates from consistent shots were stable from 2004/05 to 2007/08. In 2008/09 catch rates increased to 183kg/h and increased further in 2009/10 to 192kg/h.

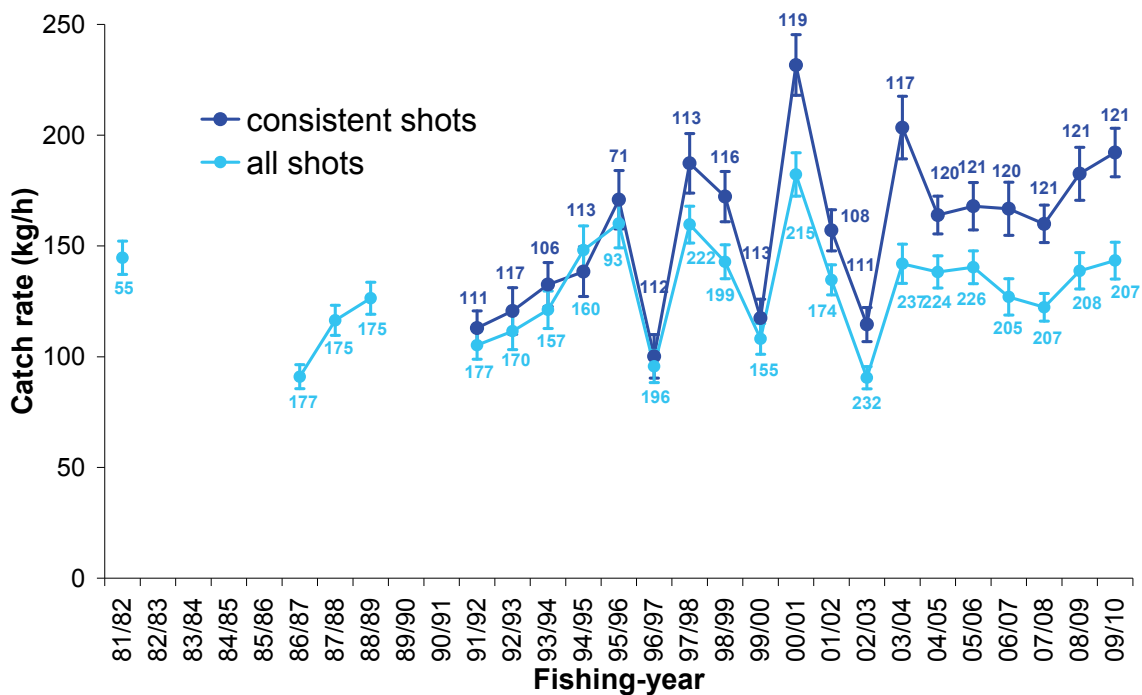


Figure 2.2 Mean (SE) catch rate (kg/h) obtained during February surveys from all shots and consistent shots conducted between 1981/82 and 2009/10. Labels indicate the number of shots surveyed.

2.1.3 April surveys

The first April survey was conducted in 1981/82 with only 59 shots completed (Figure 2.3). They were repeated sporadically until 2000/01, and have been conducted annually since. Until recently, April surveys were generally constrained to less than 150 shots in total, however between 110 and 121 of these shots were consistently surveyed. Since 2000/01, mean catch rates have varied considerably, ranging from 137–296 kg/h for consistent shots. In 2009/10, the April catch rate from consistent shots was 296 kg/h, a considerable increase from 179 kg/h observed during the previous April and the highest observed during April surveys.

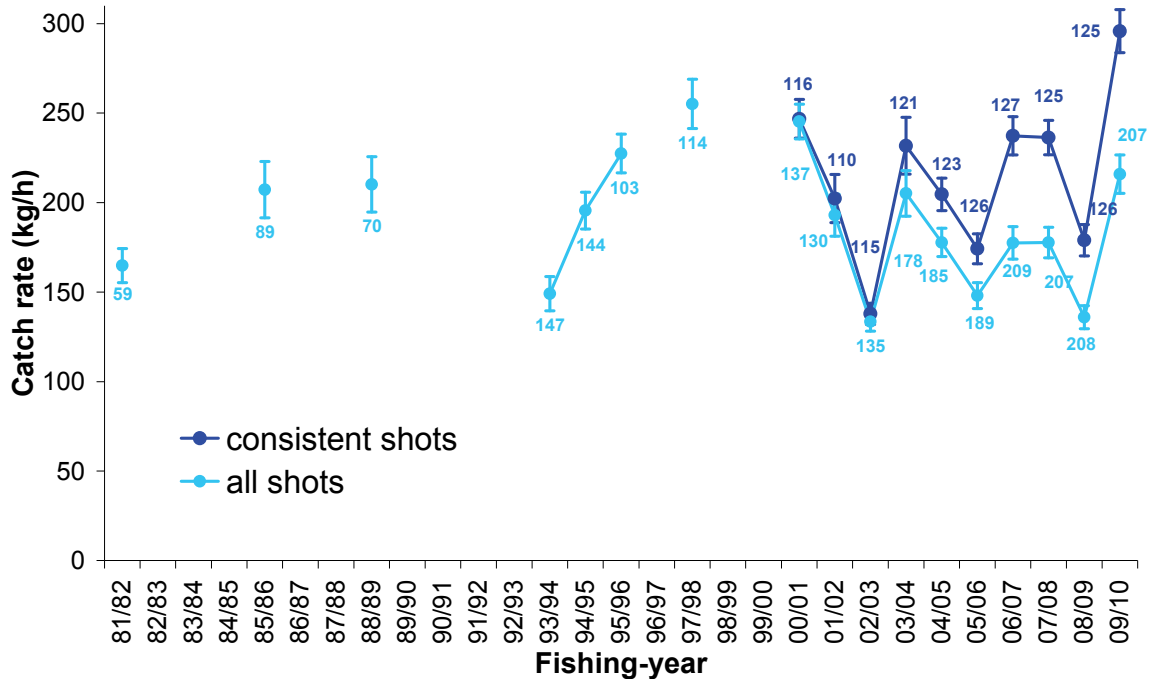


Figure 2.3 Mean catch rate (kg/h) obtained during April surveys from all shots and consistent shots conducted between 1981/82 and 2009/10. Labels indicate the number of shots surveyed.

2.1.4 Annual measures

The November and February annual measure was obtained from 153–227 shots surveyed since 2000/01. The annual measure for all months was obtained from 252–270 shots surveyed since 1994/95. Both measures were highly variable up until 2003/04 and have since stabilised or increased (Figure 2.4).

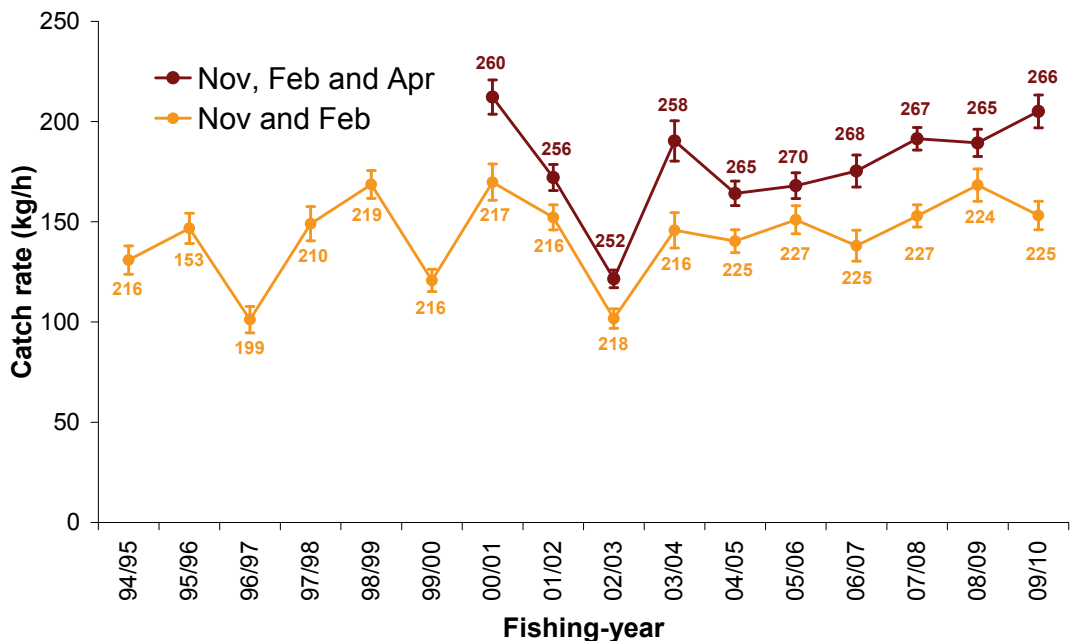


Figure 2.4 Mean (SE) catch rate (kg/h) obtained from consistent shots surveyed in i) November and February, and ii) November, February and April, between 1981/82 and 2009/10. Labels indicate the number of shots surveyed.

2.2 February recruitment

Recruitment was calculated as the square root transformation of the numbers of prawns (males <33 and females <35 mm carapace length) per nautical mile trawled from up to 39 stations in the north of the gulf during February surveys. Recruitment data were available for 20 February surveys conducted since 1982. During the 1982 surveys, 34 of the 39 recruitment shots were surveyed. Following rationalisation of the survey design, 33 shots were surveyed during 2007 and 34 shots were surveyed during 2008, 2009 and 2010. In all other years at least 36 were completed.

The recruitment index was lowest during 2000 (~30; Figure 2.5) and highest during 2001 (~60), which equates to a 4-fold difference for the untransformed data. The recruitment index has been above the limit reference level for ten consecutive years and for 19 of the 22 years that February surveys have been conducted since 1982. During 2010, the recruitment index was 50.5 which was the second highest recorded.

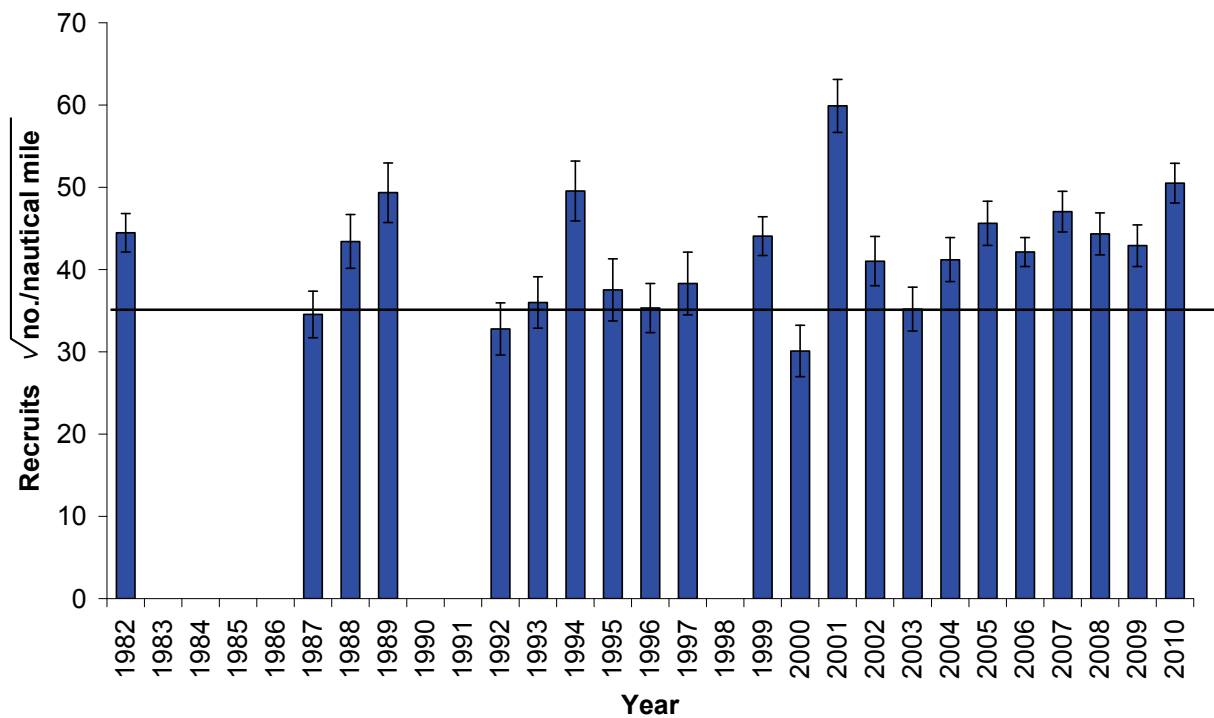


Figure 2.5 Mean (SE) recruitment index for up to 39 stations surveyed in February in the northern region of Spencer Gulf from 1982 to 2010. The line represents the limit reference point (35 recruits/nautical mile).

3 FISHERY STATISTICS

3.1 Catch and effort

3.1.1 Inter-annual trends

Total commercial catch for the Spencer Gulf Prawn Fishery in 2009/10 (2361 t) was 30% higher than that in 2008/09 (1820 t) (Figure 3.1). Total effort in 2009/10 was 17012 h, a decrease of 5 % from 2008/09 (17866 h) and the lowest since 1971.

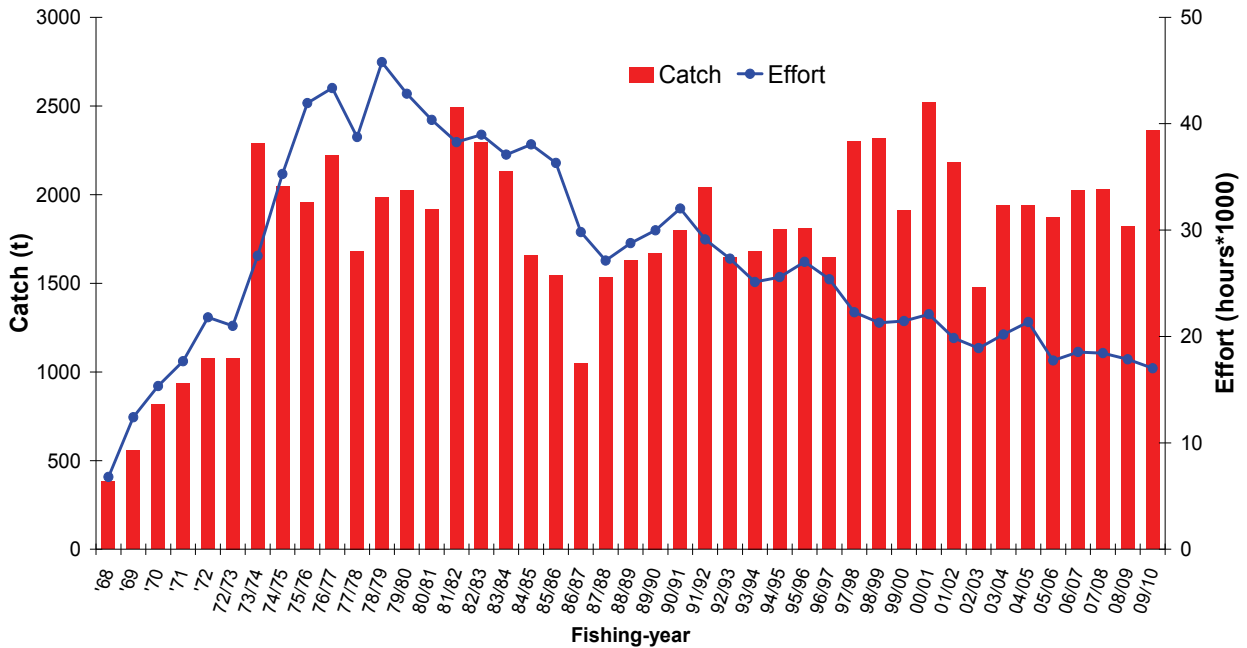


Figure 3.1 Total catch (t) and effort (h) for Spencer Gulf from 1968 to 2009/10. Data for 1968–1972 are reported as calendar year. Data for 1972/73 are from January to October 1973. From 1973/74 data are reported in fishing years.

3.1.2 Intra annual trends

The quantity of prawns harvested early in the season, November and December (early spawning period), may influence recruitment to the fishery (Dixon *et al.* 2010). The November and December catch in 2009 totalled 358 t, a decrease of 21 % compared to 2008 (452 t) for the same months (Figure 3.2). This was the lowest pre Christmas catch since 2003/04, a result of the conservative strategy approach undertaken in 2009/10. The catch harvested later in the season (March to June) in 2009/10 (2003 t) was the highest catch for that period since 2000/01 (2061 t).

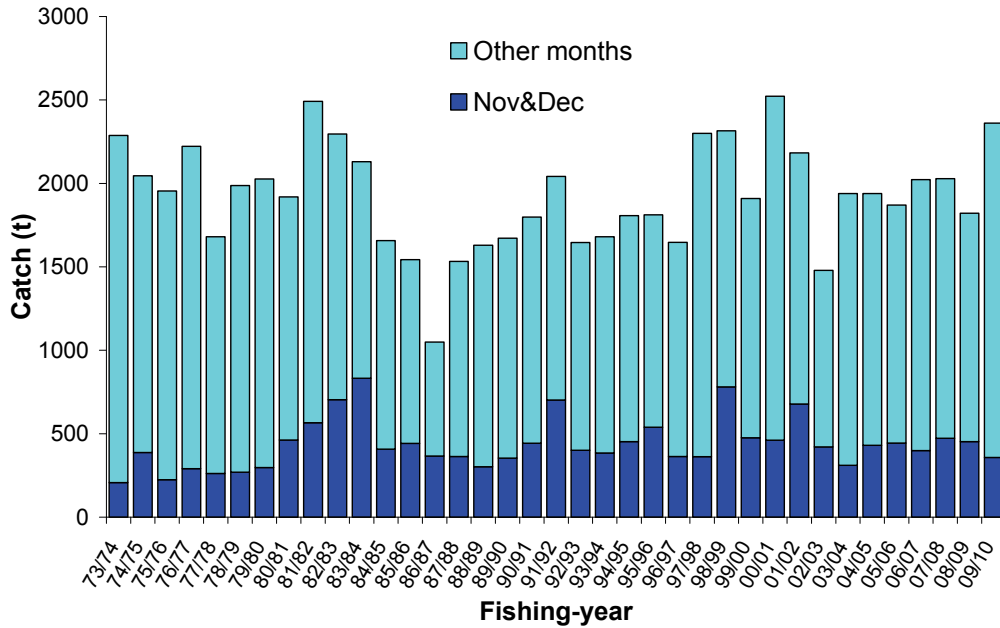


Figure 3.2 Intra annual catches for Spencer Gulf from the early spawning period (Nov-Dec) and other months of the year (February to June) from 1991/92 to 2009/10.

3.2 Catch-Per-Unit Effort (CPUE)

CPUE (kg/h) was calculated as the total catch (kg) divided by total effort (h). Annual (nominal) CPUE has generally increased since the inception of the fishery (Figure 3.3). In 2009/10, annual CPUE was 138.8 kg/h, a 36% increase from 2008/09 (101.9 kg/h) and the highest since the inception of this fishery.

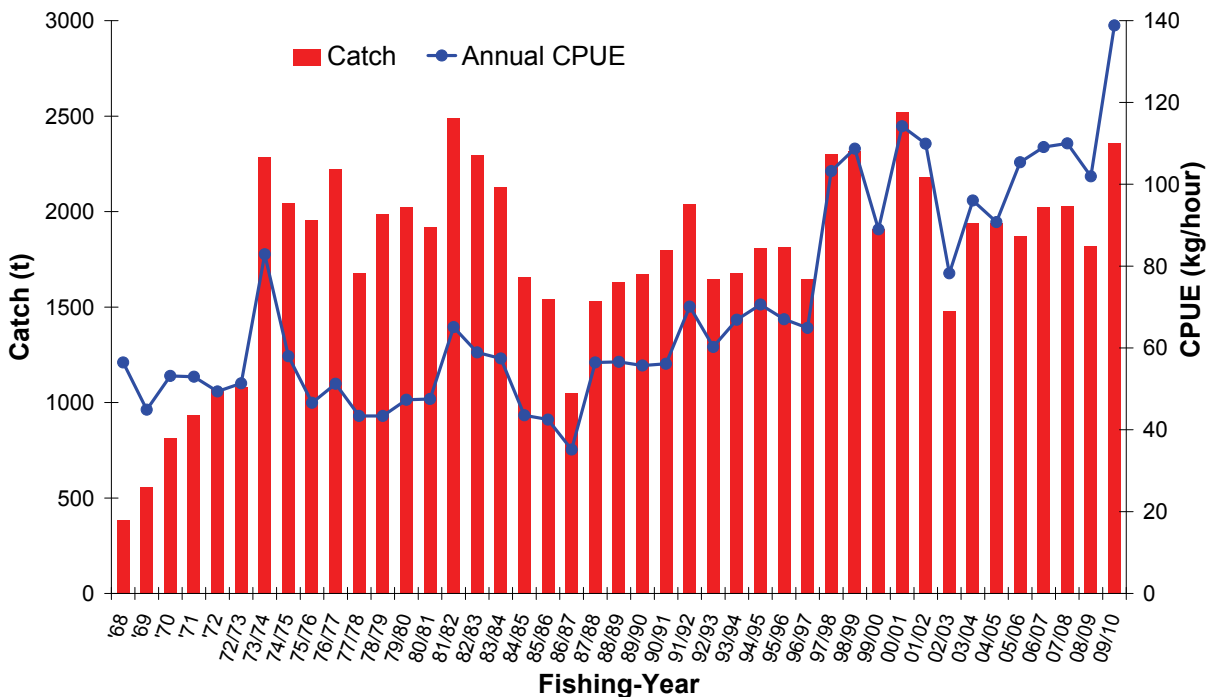


Figure 3.3 Annual catch and catch-per-unit-effort (CPUE) for Spencer Gulf from 1968–1972 are reported as calendar year. Data for 1972/73 are from January to October 1973. From 1973/74 data are reported in fishing years.

3.3 Prawn size

Information on prawn size was obtained from prawn-grade data. The grade was determined from the number of prawns to the pound (i.e. U10 = Under 10 prawns per pound, etc). To facilitate interpretation of the prawn-grade data among all fishing years, the data from 2002/03 to 2009/10 were converted to four size categories based on the decision rules provided in Table 3.1. A fifth category, Soft & Broken (SB) was established for prawns that could not be graded. Prawns in the U10, 10/15, 16/20, 20+ and Soft and Broken categories are referred to as XL, large, medium, small and SB respectively, in this report.

Table 3.1 Analytical categories assigned to reported prawn grades from commercial logbook data.

Prawn grade	Categories in logbook
U10 (XL)	U6, U8, U10, L, XL
10/15 (large)	10/15, 9/12, U12, 13/15, LM, 10/20 (50%), 12/18 (50%)
16/20 (medium)	16/20, M, 10/20 (50%), 12/18 (50%)
20+ (small)	20+, 19/25, 21/25, 21/30, 26+, 30+, 31/40, S, SM
Soft & Broken (SB)	S/B, B&D, MIX, REJ, SMS, blank, ERR

3.3.1 Inter-annual trends

In 1978/79, small prawns comprised >40% of the catch compared to <7% in recent years (since 1998/99 - Figure 3.4). The proportion of medium prawns in 1978/79 was similar to recent years. Large prawns comprise the majority of the catch and proportions in recent years were more than double that in 1978/79. The proportion of XL prawns comprise more than three times as much of the catch in recent years compared to 1978/79. During 2009/10, the proportion of prawns within each size category was generally similar to those observed since 1998/99.

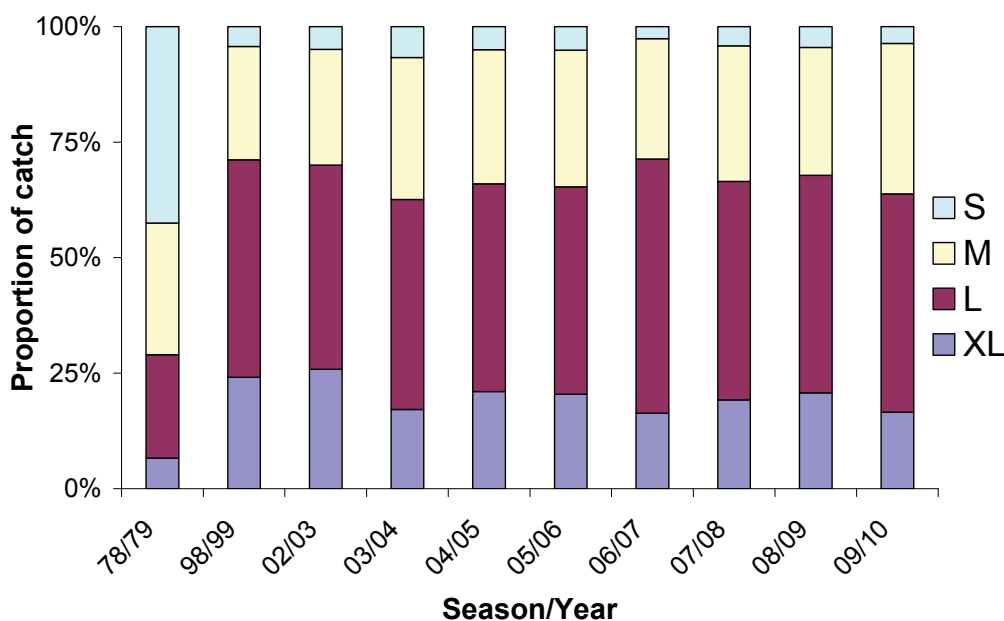


Figure 3.4 Size compositions in the commercial catch in 1978/79, 1998/99 and from 2002/03 to 2009/10.

3.3.2 Daily prawn grades

The mean and mode of daily prawn grade data continues to be relatively stable. During 2009/10, the mean prawn size (217 prawns per 7 kg) was similar than that observed during 2003/04 (221), 2004/05 (214), 2005/06 (216), 2007/08 (213) and 2008/09 (211), however was smaller than the mean size observed from 2006/07 (209), (Table 3.2). The modal size (220 prawns per 7kg) was the highest since 2003/04 which also observed 220 prawns per 7kg.

During 2009/10, the number of vessel nights when the average size of prawns harvested was >280 prawns per 7 kg was marginally higher than 2008/09, and considerably lower than that prior to 2004/05. The number of nights when prawn size was >220 per 7 kg was 5% (687) higher than 2008/09 (604), however the number of nights when prawn size was >240 per 7 kg was 2% (236) lower than 2008/09 (199). These proportions are relatively stable compared with those observed since 2004/05 for all size categories.

Table 3.2 Statistics associated with mean daily prawn size estimated from prawn grade data provided in commercial logbooks. Percentages represent the proportion of the number of vessel nights for each size category.

Year	Mode (no./7 kg)	Mean (no./7 kg)	Nights measured	Nights >220 no./7 kg	Nights >240 no./7 kg	Nights >280 no./7 kg
2002/03	200	206	1956	542 (28%)	230 (12%)	24 (1%)
2003/04	220	221	2088	919 (44%)	448 (22%)	66 (3%)
2004/05	210	214	2251	767 (34%)	244 (11%)	24 (1%)
2005/06	210	216	1903	624 (33%)	226 (12%)	16 (1%)
2006/07	210	209	1978	558 (28%)	158 (8%)	4 (0.2%)
2007/08	210	213	1938	702 (36%)	290 (15%)	12 (1%)
2008/09	210	211	1976	604 (31%)	199 (10%)	10 (1%)
2009/10	220	217	1902	687 (36%)	236 (12%)	18 (1%)

4. PERFORMANCE INDICATORS

In this section, performance of the fishery in 2009/10 was assessed against the Performance Indicators outlined in the Management Plan (Dixon & Sloan, 2007; Table 4.1).

Table 4.1 Performance Indicators for the Spencer Gulf Fishery (Dixon and Sloan 2007).

Performance Indicator	Limit Reference Point	2009/10
Fishery independent surveys	3 surveys completed	Yes
Recruitment index ($\sqrt{\text{rec./n.m.}}$)	> 35	50.5
Total commercial catch (t)	> 1,800	2361 t
Mean commercial CPUE (kg/h)	> 80	139 kg/h
% vessel nights with mean size >280prawns/7 kg	< 2%	0.95 %
Indices of future and current biomass (defined in the Plan)	Neither index is below lower threshold levels in 2 consecutive surveys	Not Assessed
Committee comply with harvest strategy decision rules	Committee develops all harvest strategies based on results of surveys and in accord with decision rules	Not Assessed

4.1 Fishery independent surveys

During 2009/10, three fishery-independent surveys were completed.

4.2 Recruitment index

The recruitment index of 50.5 recruits/nm was above the limit reference point (>35/nm).

4.3 Total commercial catch

Total commercial catch of 2361 t was above the limit reference point (>1,800 t).

4.4 Mean commercial CPUE

Mean commercial CPUE of 139 kg/h was above the limit reference point (>80 kg/h).

4.5 Vessel nights with a mean prawn size >280 prawns/7 kg

The percentage of vessel nights with a mean size greater than 280 prawns per 7 kg was 0.95% (18 nights). This was below the limit reference point (<2%).

4.6 Indices of future and current biomass

This Performance Indicator was not assessed in this status report.

4.7 Harvest strategy decision rules

This Performance Indicator was not assessed in this status report.

5. SUMMARY OF 2009/10

Stock assessment survey catch and catch rate were calculated using wet weights during surveys. During 2009/10, the total survey catch was 44.3 t. The mean survey catch rate was 148 kg/h, which was 14% higher than that observed during 2008/09 (Table 5.1). Mean survey catch rates decreased by 25% between years in November, increased by 3% in February and increased by 59% in April.

Total commercial catch for 2009/10 was 2361 t, a 30% increase from 2008/09. The highest catch (1411 t, 60% of the total) was harvested after the April survey, followed by 592 t (25%) harvested between the February and April survey and 358 t (15%) during the early spawning period (November and December). Compared to 2008/09, catches during 2009/10 were much lower during the early spawning period (↓21%) and after the February survey (↓21%) although notably much higher after the April survey (↑128%).

Mean commercial CPUE for 2009/10 was 139 kg/h, an increase of 36% on the previous year. The highest CPUE (184 kg/h) was after the April survey and the lowest was during the early spawning period (November and December) 77 kg/h. Compared to 2008/09, catch rates during 2009/10 were 10% lower during the early spawning period, 14% higher after the February survey and substantially higher after the April survey (90%).

Mean prawn size for 2009/10 was 217 prawns/7 kg. The sizes of prawns caught during November/December were larger (203 prawns/7kg) than those caught throughout the remainder of the season (range: 220 and 219 prawns/7 kg).

Table 5.1 Stock assessment survey and commercial catch and effort statistics for 2009/10. %Δ=difference compared to 2008/09. Underline denotes the month survey was undertaken.

Period	Survey catch (t)	Survey catch rate (kg/h)	% Δ catch rate	Comm. catch (t)	% Δ Catch	CPUE (kg/h)	% Δ CPUE	Mean size (no./7 kg)
<u>Nov.</u> – Dec.	8.4	85	↓ 25%	358	↓ 21%	77	↓ 10 %	203
<u>Feb.</u> – Apr.	14.5	143	↑ 3 %	592	↓ 21%	159	↑ 14 %	220
<u>Apr.</u> - June	21.4	216	↑ 59 %	1411	↑ 128%	184	↑ 90 %	219
Total/mean	44.3	148	↑ 14 %	2361	↑ 30%	139	↑ 36 %	217

6. DISCUSSION

Annual catch during 2009/10 (2361 t) was the third highest recorded in the 43 year history of the fishery (1981/82: 2491 t, 2000/01: 2522 t). Commercial CPUE was the highest recorded (139 kg/h) in the fishery and 22% higher than the previous peak in 2000/01 (114 kg/h). This large increase in CPUE reflects a shift in the distribution of fishing effort through 1) timing of harvest with most of the catch taken late in the year when catch rates are higher and 2) late night starts and early morning finishes to avoid the lower catch rates associated with dusk and dawn (Dixon *et al.* 2010).

Stock assessment survey catch rates were relatively low in November 2009 indicating historically below average levels of relative biomass. It should be noted that this followed low levels of relative biomass in April 2009 (Dixon *et al.* 2010). Consequently, conservative fishing strategies were applied and a low pre-Christmas harvest was obtained (358 t). By the February survey, relative biomass had appeared to recover to recent average levels. This was largely due to high recruitment, as the February recruitment index in 2010 (50.5) was the second highest recorded (behind Feb 2001, 59.9) in the last 28 years.

The strong recruitment was reflected in the April 2010 survey catch rates which were the highest recorded for the fishery. Subsequently, 1411 t was harvested during the remainder of the season, a 128% increase compared to the same period in 2008/09. From these brief analyses, it seems that two key elements of management resulted in the large catches observed late in 2010. Firstly, following consecutive below average survey results in April and November 2009, conservative harvest strategies did facilitate short term recovery of the biomass by February 2010. This recovery was further enhanced by strong recruitment to the fishery that resulted from the summer spawning in 2008/09, which reinforces the value of protecting spawning biomass.

Fishery performance during 2009/10 was assessed against the Performance Indicators of the Management Plan (Dixon and Sloan 2007). The measures for commercial catch, commercial CPUE, recruitment to the fishery and harvested prawn size, were all well within acceptable bounds. Performance indicators regarding indices of biomass and harvest strategy decision rules will be assessed in the 2009/10 stock assessment report.

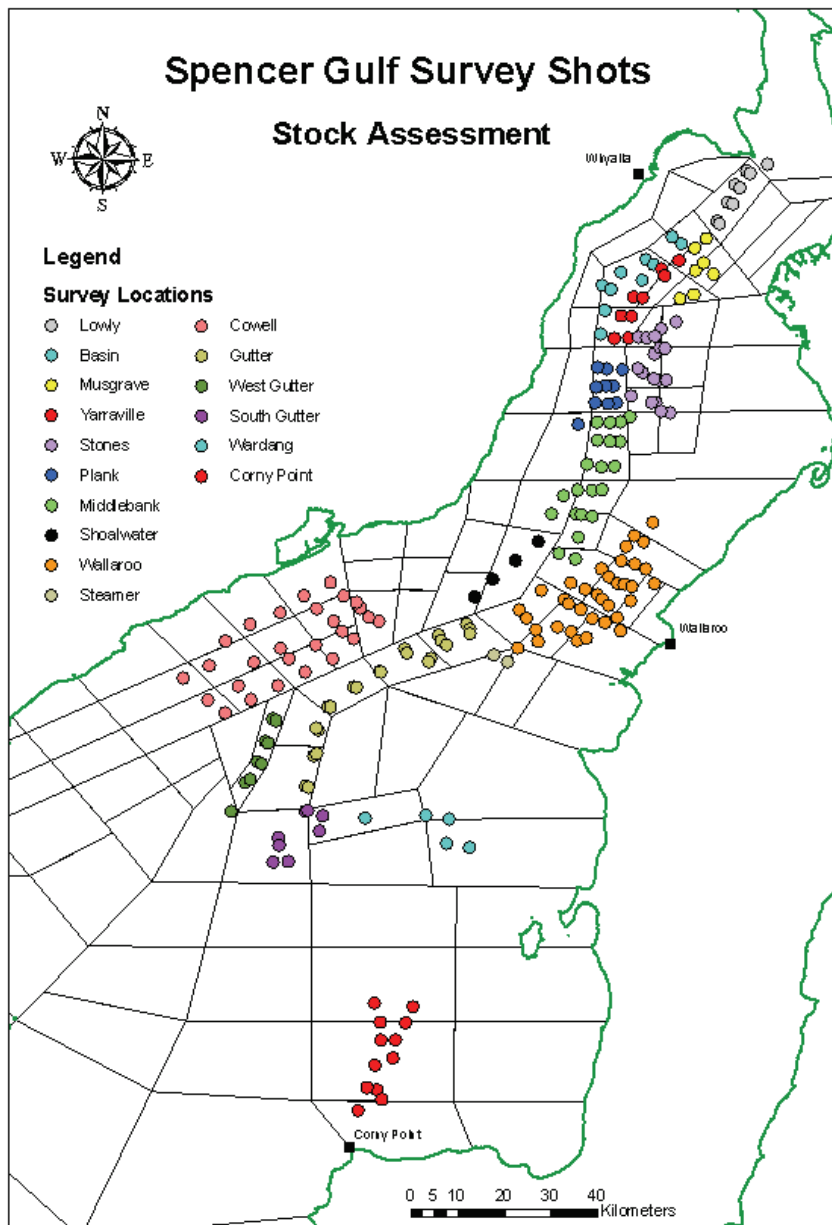
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8. APPENDIX

8.1 Spencer Gulf Prawn Survey Shot locations



8.2 Survey Reports to PIRSA

8.2.1 Spencer Gulf Prawn Fishery: November 2009 Survey

Prepared by Graham Hooper and Cameron Dixon SARDI Aquatic Sciences (Nov 2009)

Introduction

SARDI Aquatic Sciences conduct fishery-independent surveys for stock assessment and harvest strategy purposes during November, February and April of each fishing season in Spencer Gulf. Surveys provide data on the spatial distribution of catch rate and prawn size, reproductive status and recruitment. The data are also used to determine harvest strategies for subsequent fishing periods. This report documents the provisional November 2009 survey results and provides comparison with data from previous surveys.

Methods

Surveys are generally conducted on two consecutive nights over the new moon period in November, February and April. Observers are provided for each vessel. Surveys are conducted at 208 stations, covering most locations of the Gulf (Figure 1). Trawl shots conducted during the survey generally use two nets, although one net may be used for some shots where high catch rates of small prawns are expected. In these cases, catch rates are doubled to reflect the catch of two nets. Data collected on all surveys includes: catch rate, prawn size (prawns/7 kg), catch weight by prawn grade, sex ratio, sex-specific size-frequency, bottom temperature and depth. Data on reproductive status are generally collected during November and February surveys.

In this report, prawn size data are reported as prawns/7 kg to reflect the measurement of prawn size used by the fishery (7 kg = approximately 1 bucket of prawns). This report provides analyses of catch rate and prawn size (prawns/7 kg) data, reproductive status and recruitment index. Statistics regarding catch rates and prawn sizes are mean values only to enable the development of harvest strategies following the Management Plan. Additional analyses of survey data are provided in the annual status and stock assessment reports for the Spencer Gulf Prawn Fishery.

Bottom water temperature data were collected by attaching temperature loggers (Sensus Ultra, by Reefnet ®) to the otter board of each survey vessel. Weather forecasts and tidal predictions were obtained from the Australian Government Bureau of Meteorology website:

(<http://www.bom.gov.au>).

Quality Assurance

Quality assurance (QA) for data entry and analyses for survey reports include:

- All data were entered by two different staff.
- Both datasets were compared for differences.
- Observed differences in the data were resolved by returning to the original datasheets. When needed, the scientific observer that collected the data was questioned.
- Analyses were completed by both staff using the validated dataset.
- Analyses were compared for differences. No differences existed.

Data entry and analyses for this report were conducted by: Cameron Dixon & Graham Hooper

Results

Planned survey dates: November 16th & 17th, 2009.

Actual survey dates: November 16th & 17th, 2009.

Number of shots completed (from 208 planned): 207

Monday, November 16th, 2009

Survey vessels: Angelina, Bartalumba, Beauie J, Evelyn L, Liberty, Melanie B, Roslyn Ann, Grozdana B and Skandia.

Tides (Wallaroo): 03:49 h, 1.64 m; 11:49 h, 0.32 m; 18:21 h, 0.75 m; 20:26 h, 0.74 m.

(Times not adjusted for daylight savings which occurred on this night)

Tuesday 17th, 2009

Survey vessels: Angelina, Bartalumba, Beauie J, Evelyn L, Liberty, Melanie B, Roslyn Ann, Grozdana B and Skandia.

Tides (Wallaroo): 04:15 h, 1.73 m; 12:13 h, 0.30 m; 18:02 h, 0.74 m; 21:09 h, 0.69 m.

(Times not adjusted for daylight savings which occurred on this night)

Marine Weather Observations

Survey dates are in bold. Note that wind speed is reported as km/h.

Date	Day	Air Temp		Max Wind Gust			9am			3pm		
		Min	Max	Dir	Speed	Time	Air Temp	Dir	Speed	Air Temp	Dir	Speed
<u>Whyalla</u>												
16	Mo	21.7	29	SSW	57	17.44	23.1	S	30	26.5	S	33
17	Tu	18	29.8	SSW	41	19.15	22	SSW	24	28.9	S	22
18	We	16.9	33.6	SSE	37	12.15	25.3	SSW	20	31.4	S	20
<u>Kadina</u>												
16	Mo	17.3					24.3	SE	15	32.0	SSE	26
17	Tu		32.5	ESE	41	7.10	21.4	ESE	31	30.7	SW	26
18	We	17.3	37.9	WSW	48	13.27	31.2	E	19	25.5	SW	28
<u>Pt Lincoln</u>												
16	Mo	16	23.6	S	41	3.47	19	SSE	28	22.2	SE	28
17	Tu	15.5	23.1	E	33	9.41	17.9	ESE	22	21.8	S	17
18	We	15.9	30.7	SW	30	20.28	19.6	SE	11	26.8	S	9

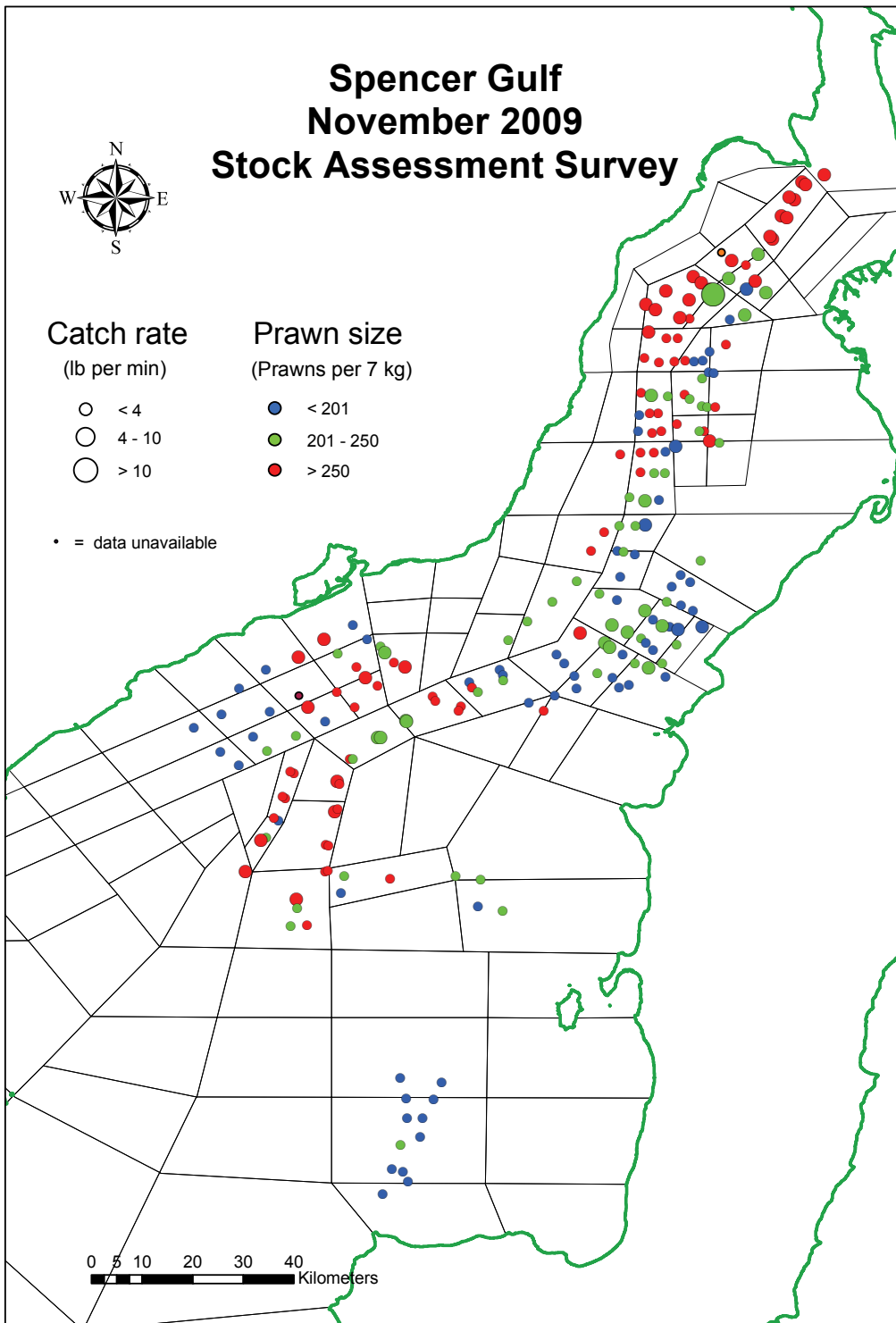


Figure 2: Catch rate and prawn size from surveys conducted during November 2009.

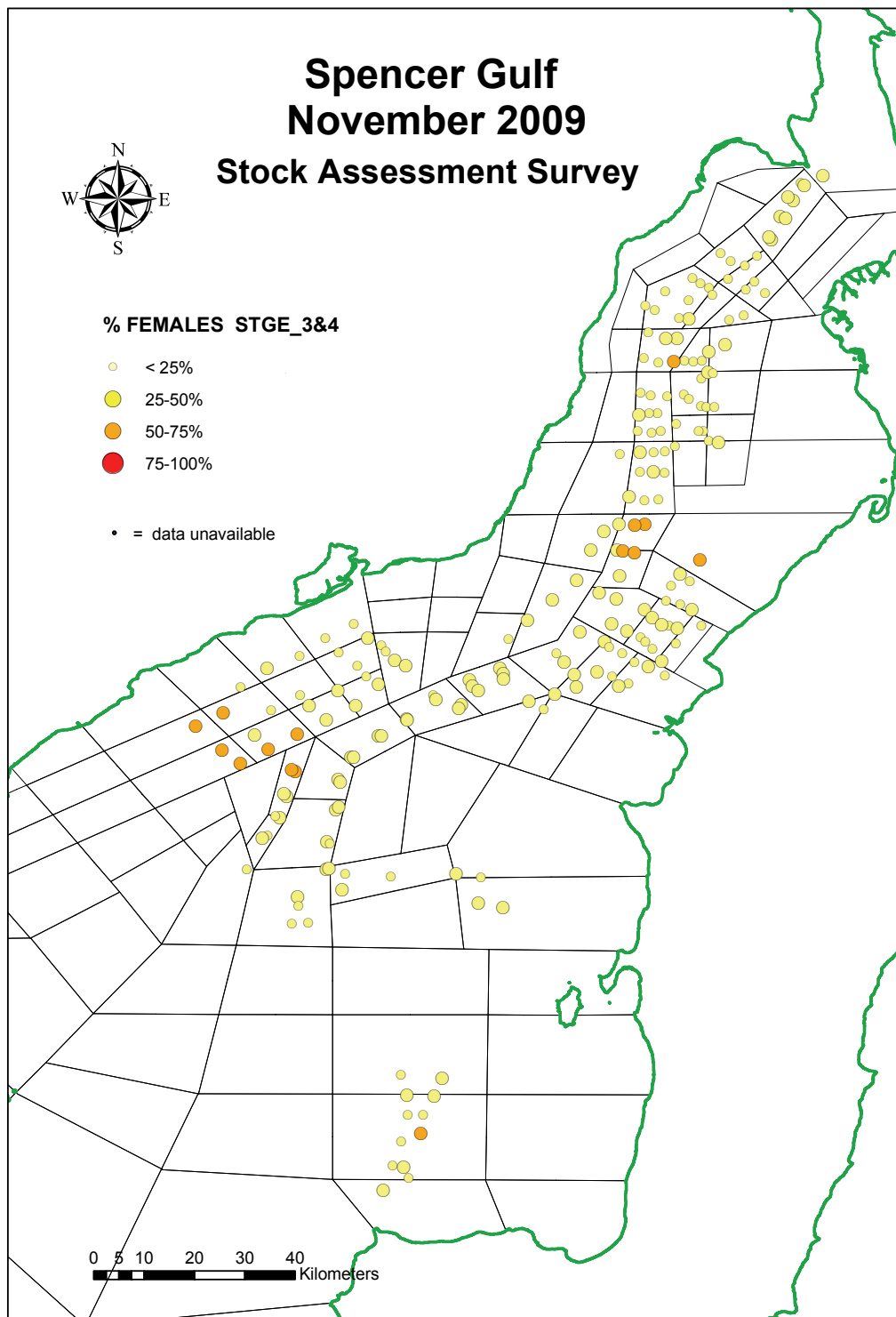


Figure 3: The percentage of female prawns at stage 3 and 4 (highly fecund) of the reproductive cycle, as determined from visual indices, during surveys conducted in Spencer Gulf in November 2009.

Table 1: Summary statistics from all data (up to 209 shots) on catch rate and prawn size from surveys conducted during November 2009 and November 2008.

*High-value shots are those that fall within size and catch rate criteria (<250 prawns/7 kg and >4 lb/min).

Locations (north to south)	2009					2008			
	No. of shots	High- value shots*	Mean catch rate (lb/min)	Mean size (p/7kg)	Bottom Temp (°C)	No. of shots	High- value shots*	Mean catch rate (lb/min)	Mean size (p/7kg)
Whole Gulf	207	11	3.1	234	20.8	203	31	4.1	255
Lowly	9	0	7.2	296	22.6	9	0	11.1	296
Basin	9	0	6.2	364	22.0	10	0	10.2	315
Musgrave	6	2	5.7	224	21.6	6	2	9.7	252
Yarraville	9	0	3.9	293	21.4	9	2	8.5	279
Stones	18	0	2.9	237	21.2	18	6	5.7	249
Plank	10	0	2.9	269	21.1	9	3	4.9	258
Middlebank	21	3	2.6	215	20.2	21	8	4.5	214
Shoalwater	4	0	1.4	219	20.1	4	0	1.8	214
Wallaroo	36	4	3.1	194	21.4	34	7	3.0	204
Steamer	2	0	2.8	163	21.3	2	0	2.0	155
Cowell	27	0	2.9	219	20.3	25	1	2.1	257
Gutter	22	2	3.0	247	20.1	22	2	2.2	242
West Gutter	9	0	2.5	281	20.1	9	0	1.8	265
South Gutter	8	0	1.5	250	19.0	8	0	2.2	268
Wardang	5	0	0.7	200	20.0	5	0	1.2	213
Corny Point	12	0	1.0	156	20.0	12	0	0.8	155

Table 2: Harvest strategy measures for 168 common shots surveyed during November between 2005 and 2009.

N/A: Not available.

Year	2005	2006	2007	2008	2009	
Harvest strategy measures	Current biomass: catch rate, kg/h (lb/min)	118 (4.34)	94 (3.45)	124 (4.54)	127 (4.65)	95 (3.47)
	Future biomass: 20+ catch rate, kg/h (lb/min)	24 (0.87)	26 (0.95)	21 (0.77)	36 (1.33)	26 (0.96)

Table 3: Data on prawn size (p/7kg), catch rate (lb/min) from surveys conducted in Spencer Gulf during November 2009. N/A: Data not available.

Area_shot	pp7kg	lb/min	Area_shot	pp7kg	lb/min	Area_shot	pp7kg	lb/min
Basin_23	331	8.8	Gutter_9C	217	2.5	Stones_18	212	3.7
Basin_25	N/A	N/A	Lowly_35	308	4.7	Stones_18B	175	2.3
Basin_26	335	4.7	Lowly_36	350	7.3	Stones_20B	163	1.9
Basin_27	344	6.2	Lowly_39	292	6.5	Stones_58	312	3.0
Basin_33	374	3.4	Lowly_40	300	6.0	Stones_58C	262	5.2
Basin_55	365	6.0	Lowly_41	273	7.3	Stones_71	247	2.0
Basin_73	400	7.8	Lowly_42	312	10.0	Stones_72	268	2.9
Basin_74	404	5.4	Lowly_44	275	4.7	Stones_72C	167	3.7
Basin_94	342	6.1	Lowly_45	267	8.6	Stones_72D	170	1.2
Basin_96	378	7.5	Lowly_57	284	9.4	Wallaroo_1	157	2.8
Corny Point_CP1	135	0.5	Middlebank_1	261	2.0	Wallaroo_10	185	2.8
Corny Point_CP10	125	0.9	Middlebank_2	219	2.3	Wallaroo_11	202	3.5
Corny Point_CP11	140	1.5	Middlebank_3	216	1.8	Wallaroo_12	224	6.6
Corny Point_CP12	247	1.5	Middlebank_60	244	1.3	Wallaroo_13	210	6.5
Corny Point_CP2	169	0.8	Middlebank_61	203	4.0	Wallaroo_14	229	4.7
Corny Point_CP3	162	1.0	Middlebank_62	190	3.3	Wallaroo_15	236	4.3
Corny Point_CP4	180	1.1	Middlebank_63	170	5.8	Wallaroo_16	133	0.5
Corny Point_CP5	187	0.4	Middlebank_64	218	3.3	Wallaroo_17	230	2.6
Corny Point_CP6	152	1.5	Middlebank_65	212	1.8	Wallaroo_18	209	5.9
Corny Point_CP7	121	0.4	Middlebank_66	198	2.0	Wallaroo_19	241	5.4
Corny Point_CP8	135	1.0	Middlebank_67	215	2.2	Wallaroo_2	206	1.8
Corny Point_CP9	125	0.8	Middlebank_68	172	3.2	Wallaroo_20	201	1.8
Cowell_C1	184	2.3	Middlebank_75	173	3.3	Wallaroo_21	236	3.4
Cowell_C11	280	7.4	Middlebank_76	258	2.2	Wallaroo_22	196	2.4
Cowell_C12	372	2.2	Middlebank_77	296	2.9	Wallaroo_23	164	0.8
Cowell_C13	301	4.2	Middlebank_78	264	1.8	Wallaroo_24	167	1.3
Cowell_C14	315	2.2	Middlebank_79	256	1.4	Wallaroo_26	171	1.1
Cowell_C2	239	3.3	Middlebank_80	185	4.4	Wallaroo_27	199	2.9
Cowell_C6	104	0.3	Middlebank_N21	187	1.6	Wallaroo_28	209	3.4
Cowell_C7	137	1.4	Middlebank_N22	221	2.9	Wallaroo_29	191	2.3
Cowell_C8	108	0.7	Middlebank_N23	164	1.4	Wallaroo_3	170	2.7
Cowell_C9	114	0.7	Musgrave_21B	205	5.2	Wallaroo_30	170	4.0
Cowell_Z1/1	152	0.5	Musgrave_21C	195	2.9	Wallaroo_31	177	3.9
Cowell_Z1/2	270	9.2	Musgrave_22B	230	5.6	Wallaroo_32	168	2.6
Cowell_Z1/3	363	4.6	Musgrave_81	195	6.8	Wallaroo_33	170	1.7
Cowell_Z1/4	126	0.5	Musgrave_90	278	6.3	Wallaroo_4	260	4.5
Cowell_Z1/5	104	0.0	Musgrave_91	240	7.3	Wallaroo_5	247	4.4
Cowell_Z2/1	226	1.1	Plank_10	261	1.8	Wallaroo_6	160	1.3
Cowell_Z2/10	128	0.7	Plank_4	239	3.4	Wallaroo_7	190	2.1
Cowell_Z2/11	273	11.3	Plank_5	258	3.2	Wallaroo_8	180	4.8
Cowell_Z2/13	266	2.5	Plank_6	315	2.7	Wallaroo_9	161	1.2
Cowell_Z2/14	228	7.3	Plank_69	147	2.1	Wallaroo_EWL1	179	3.1
Cowell_Z3/1	304	4.5	Plank_7	350	3.3	Wallaroo_EWL2	198	2.0
Cowell_Z3/10	230	2.6	Plank_8	263	3.2	Wallaroo_EWL3	187	1.8
Cowell_Z3/11	151	0.7	Plank_X1	248	4.1	Wallaroo_Y7	185	3.8
Cowell_Z3/12	270	3.4	Plank_X2	275	2.7	Wardang_WD2	214	1.2
Cowell_Z3/2	305	3.2	Plank_X3	338	3.0	Wardang_WD3	128	0.4
Cowell_Z3/8	130	0.9	Shoalwater_SHW1	199	0.5	Wardang_WD7	221	0.9
Cowell_Z3/9	227	1.2	Shoalwater_SHW2	216	1.0	Wardang_WD8	232	0.7
Gutter_10A	250	0.8	Shoalwater_SHW3	244	1.3	Wardang_WD9	205	0.3
Gutter_10B	254	0.3	Shoalwater_SHW7	218	2.6	West Gutter_11B	329	1.0
Gutter_1B	300	3.0	South Gutter_12B	237	2.0	West Gutter_WG1	386	4.5
Gutter_1C	250	1.3	South Gutter_12C	270	1.0	West Gutter_WG2	220	3.1
Gutter_2B	294	4.2	South Gutter_SG5	266	1.9	West Gutter_WG3	170	0.8
Gutter_2C	290	2.2	South Gutter_SG6	209	0.4	West Gutter_WG4	279	3.3
Gutter_3A	279	7.3	South Gutter_SG9	274	1.5	West Gutter_WG5	255	1.3
Gutter_3B	265	3.4	South Gutter_SGX1	241	0.4	West Gutter_WG6	269	1.4
Gutter_4B	317	1.3	South Gutter_SGX2	268	4.5	West Gutter_WG7	312	4.0
Gutter_4C	205	1.7	South Gutter_SGX3	236	0.1	West Gutter_WG8	306	3.2
Gutter_5B	249	5.2	Steamer_ST3	174	2.8	Yarraville_28	289	4.8
Gutter_5C	200	6.2	Steamer_ST4	152	2.8	Yarraville_29	284	3.9
Gutter_6B	214	7.2	Stones_11	289	3.9	Yarraville_30	353	3.2
Gutter_6C	227	7.8	Stones_12	263	3.3	Yarraville_31	290	2.5
Gutter_7A	349	1.3	Stones_13A	225	3.4	Yarraville_32	334	2.1
Gutter_7B	252	0.9	Stones_13B	240	2.8	Yarraville_48	262	3.9
Gutter_8A	193	1.5	Stones_13C	210	3.3	Yarraville_54	328	2.6
Gutter_8B	265	2.4	Stones_14	330	2.8	Yarraville_92	258	7.9
Gutter_8C	200	0.8	Stones_15	250	1.9	Yarraville_93	241	4.5
Gutter_9A	173	1.8	Stones_16W	226	2.1			
Gutter_9B	199	2.0	Stones_17	260	2.9			

8.2.2 Spencer Gulf Prawn Fishery: February 2010 Survey

Prepared by Graham Hooper and Cameron Dixon SARDI Aquatic Sciences (Feb 2010).

Introduction

SARDI Aquatic Sciences conduct fishery-independent surveys for stock assessment and harvest strategy purposes during November, February and April of each fishing season in Spencer Gulf. Surveys provide data on the spatial distribution of catch rate and prawn size, reproductive status and recruitment. The data are also used to determine harvest strategies for subsequent fishing periods. This report documents the provisional February 2010 survey results and provides comparison with data from previous surveys.

Methods

Surveys are generally conducted on two consecutive nights over the new moon period in November, February and April. Observers are provided for each vessel. Surveys are conducted at 208 stations, covering most locations of the Gulf (Figure 1). Trawl shots conducted during the survey generally use two nets, although one net may be used for some shots where high catch rates of small prawns are expected. In these cases, catch rates are doubled to reflect the catch of two nets. Data collected on all surveys includes: catch rate, prawn size (prawns/7 kg), catch weight by prawn grade, sex ratio, sex-specific size-frequency, bottom temperature and depth. Data on reproductive status are generally collected during November and February surveys.

In this report, prawn size data are reported as prawns/7 kg to reflect the measurement of prawn size used by the fishery (7 kg = approximately 1 bucket of prawns). This report provides analyses of catch rate and prawn size (prawns/7 kg) data, reproductive status and recruitment index. Statistics regarding catch rates and prawn sizes are mean values only to enable the development of harvest strategies following the Management Plan. Additional analyses of survey data are provided in the annual status and stock assessment reports for the Spencer Gulf Prawn Fishery.

Bottom water temperature data were collected by attaching temperature loggers (Sensus Ultra, by Reefnet ®) to the otter board of each survey vessel. Weather forecasts and tidal predictions were obtained from the Australian Government Bureau of Meteorology website:

(<http://www.bom.gov.au>).

Quality Assurance

Quality assurance (QA) for data entry and analyses for survey reports include:

- All data were entered by two different staff.
- Both datasets were compared for differences.
- Observed differences in the data were resolved by returning to the original datasheets. When needed, the scientific observer that collected the data was questioned.
- Analyses were completed by both staff using the validated dataset.
- Analyses were compared for differences. No differences existed.

Data entry and analyses for this report were conducted by: Cameron Dixon & Graham Hooper

Results

Planned survey dates: February 13th, 14th & 15th, 2010.

Actual survey dates: February 13th, 14th & 15th, 2010.

Number of shots completed (from 208 planned): 207

Saturday, February 13th, 2010.

Survey vessels: Atlas HB, Liberty, Melanie B, Night Stalker, Sandy S and Skandia.

Tides (Wallaroo): 04:36 h, 1.50 m; 12:10 h, 0.33 m; 18:19 h, 0.93 m; 22:54 h, 0.74 m.

(Times not adjusted for daylight savings which occurred on this night)

Sunday, February 14th, 2010.

Survey vessels: Atlas HB, Liberty, Melanie B, Night Stalker, Sandy S and Skandia.

Tides (Wallaroo): 05:07 h, 1.54 m; 12:17 h, 0.33 m; 18:09 h, 1.01 m; 23:28 h, 0.63 m.

(Times not adjusted for daylight savings which occurred on this night)

Monday, February 15th, 2010.

Survey vessels: Atlas HB, Liberty, Melanie B, Night Stalker, Sandy S and Skandia.

Tides (Wallaroo): 05:34 h, 1.54 m; 12:29 h, 0.32 m; 18:18 h, 1.12 m; 23:59 h, 0.56 m.

(Times not adjusted for daylight savings which occurred on this night)

Marine Weather Observations

Survey dates are in bold. Note that wind speed is reported as km/h.

Date	Day	Air Temp		Max Wind Gust			9am			3pm		
		Min	Max	Dir	Speed	Time	Air Temp	Dir	Speed	Air Temp	Dir	Speed
<u>Whyalla</u>												
13	Sa	17.8	28.5	S	50	17.11	22.3	SSW	19	27.5	SSE	22
14	Su	20.3	28.8	S	54	17.18	21.8	S	17	27.9	S	28
15	Mo	18.7	27.8	S	56	17.14	20.8	SE	19	26.2	S	30
<u>Kadina</u>												
13	Sa	14.6	30.7	SW	44	16.51	22.4	ESE	196	29.6	WSWE	20
14	Su	15.7	32.3	SSE	52	19.41	22.9	SE	31	30.7	S	26
15	Mo	13.4	29.9	SSE	52	12.13	21.4	SE	24	28.8	SE	31
<u>Pt Lincoln</u>												
13	Sa	16.9	25.7	S	43	15.51	19.9	SE	15	24.2	SE	19
14	Su	18.1	24.9	SSE	43	19.42	20	SSE	26	23.6	SE	28
15	Mo	17.1	24.6	SE	370	12.10	19.8	ESE	19	24.3	SE	22

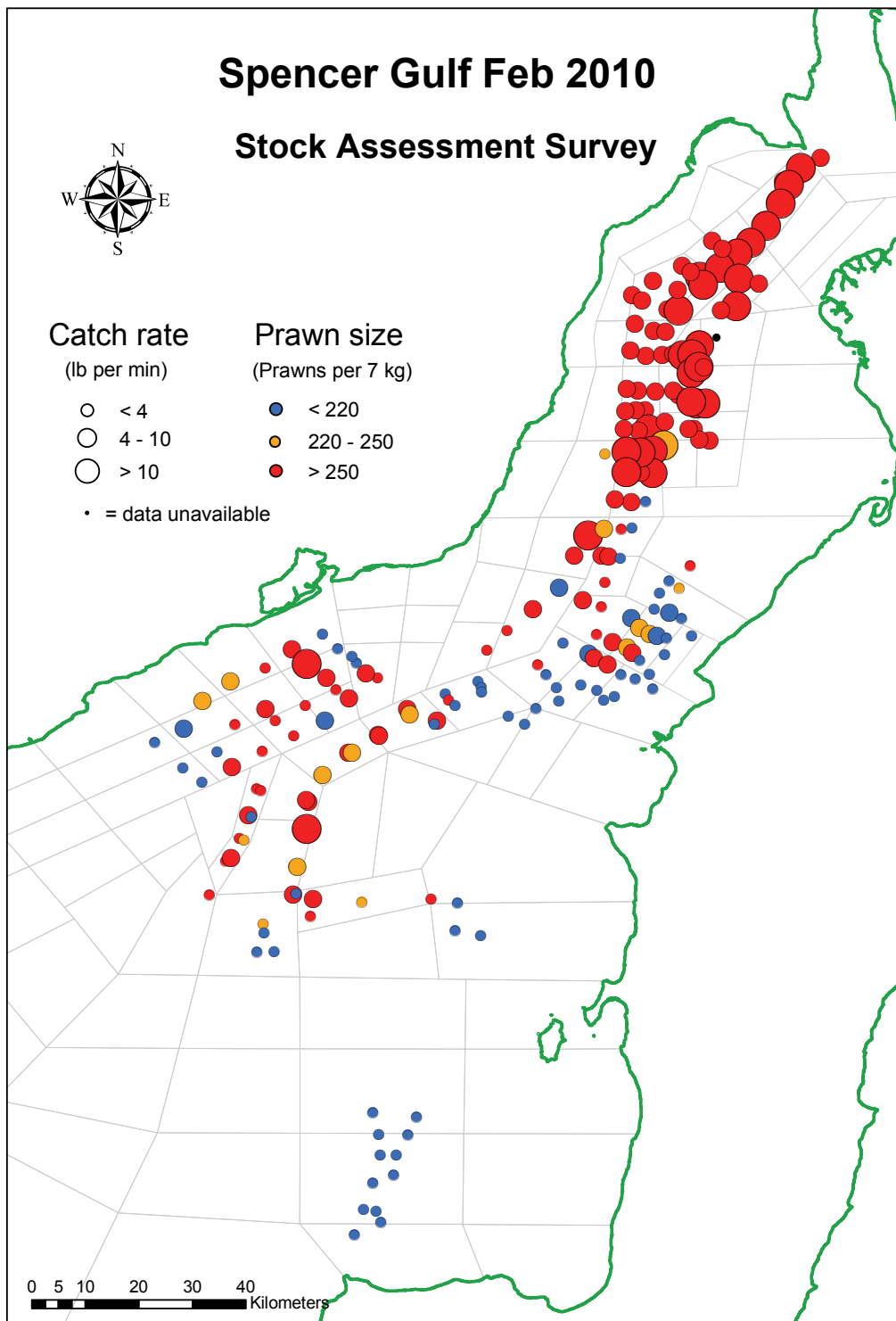


Figure 2: Catch rate and prawn size from surveys conducted during February 2010.

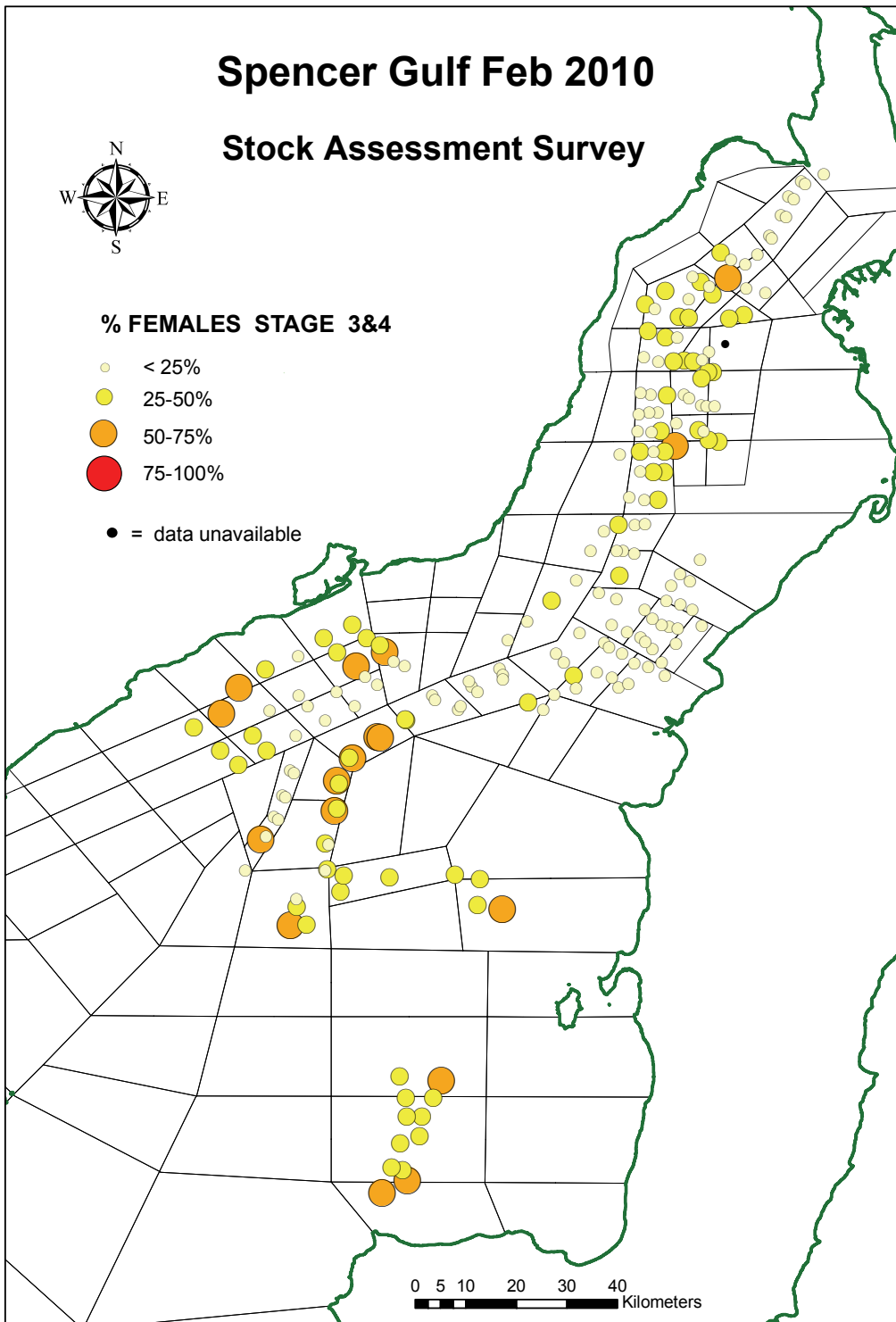


Figure 3. The percentage of female prawns at stage 3 and 4 (highly fecund) of the reproductive cycle, as determined from visual indices, during surveys conducted in Spencer Gulf in February 2010.

Table 1. Summary statistics from all data (up to 209 shots) on catch rate and prawn size from surveys conducted during February 2010 and February 2009.

*High-value shots are those that fall within size and catch rate criteria (<250 prawns/7 kg and >4 lb/min).

Locations (north to south)	2010				2009			
	No. of shots	High-value shots*	Mean catch rate (lb/min)	Mean size (p/7kg)	No. of shots	High-value shots*	Mean catch rate (lb/min)	Mean size (p/7kg)
Whole Gulf	207	7	5.3	335	208	23	5.1	255
Lowly	9	0	9.9	394	9	0	15.4	380
Basin	10	0	5.9	482	10	0	3.9	494
Musgrave	6	0	11.9	353	6	0	13.4	290
Yarraville	9	0	10.4	391	9	0	8.6	361
Stones	17	0	10.2	362	18	1	6.5	294
Plank	10	0	6.4	408	10	0	5.1	351
Middlebank	21	0	7.5	340	21	1	8.1	291
Shoalwater	4	1	2.9	279	4	0	2.8	234
Wallaroo	36	4	2.6	221	36	9	3.3	187
Steamer	2	0	0.4	127	2	0	0.5	138
Cowell	27	2	3.6	284	27	2	2.0	204
Gutter	22	0	4.7	267	22	8	5.4	230
West Gutter	9	0	3.4	273	9	0	2.6	218
South Gutter	8	0	2.1	253	8	1	2.4	228
Wardang	5	0	1.4	200	5	0	1.9	171
Corny Point	12	0	1.4	150	12	1	2.2	131

Table 2. Harvest strategy measures for common shots (up to 185) during February surveys conducted between 2005 and 2010. Pre-recruit index (PRI) from up to 39 historical recruitment shots, as outlined in the Management Plan, from February surveys conducted between 2005 and 2010.

Year	2005	2006	2007	2008	2009	2010	
Harvest strategy measures	Current biomass: catch rate, kg/h (lb/min)	136 (5.0)	146 (5.4)	134 (4.9)	130 (4.8)	146 (5.4)	152 (5.6)
	Future biomass: 20+ catch rate, kg/h (lb/min)	54 (2.0)	57 (2.1)	40 (1.5)	63 (2.3)	54 (2.0)	79 (2.9)
PI	PRI	45.6	42.1	47	44.3	46.0	50.5

Table 3. Data on prawn size (p/7kg), catch rate (lb/min), and reproductive status (% females at Stage ¾) from surveys conducted in Spencer Gulf during February 2009.

Location	shot	pp7kg	lb/min	%3-4	Location	shot	pp7kg	lb/min	%3-4	Location	shot	pp7kg	lb/min	%3-4
Basin_23		400	7.3	18.2	Gutter_9C		176	0.3	3.9	Stones_13A		362	12.0	21.9
Basin_25		475	5.7	28.6	Lowly_35		368	16.3	14.6	Stones_13B		386	12.2	15.6
Basin_26		435	6.2	21.9	Lowly_36		440	5.0	24.0	Stones_13C		355	10.1	15.4
Basin_27		405	5.2	26.9	Lowly_39		548	8.7	6.5	Stones_16W		444	8.1	10.9
Basin_33		450	4.8	22.9	Lowly_40		410	15.7	0.0	Stones_18B		262	8.2	41.9
Basin_55		615	6.4	29.8	Lowly_41		357	11.1	4.9	Stones_20B		-	-	-
Basin_73		565	4.5	41.9	Lowly_42		394	6.6	6.8	Stones_58C		352	6.3	44.7
Basin_74		525	7.8	20.0	Lowly_44		369	5.6	6.1	Stones_72C		350	18.8	16.3
Basin_94		430	5.2	22.9	Lowly_45		335	10.1	0.0	Stones_72D		295	15.1	23.8
Basin_96		520	5.5	30.2	Lowly_57		367	9.9	2.4	Walloo_1		199	2.1	3.0
Corny Point_CP1		163	1.1	71.4	Middlebank_1		424	11.9	24.4	Walloo_2		185	1.8	0.0
Corny Point_CP1C		141	1.7	59.3	Middlebank_2		374	10.0	26.3	Walloo_3		152	1.6	3.0
Corny Point_CP11		136	1.0	36.4	Middlebank_3		254	10.2	31.8	Walloo_4		232	7.4	4.0
Corny Point_CP12		157	1.1	50.0	Middlebank_60		404	6.5	9.0	Walloo_5		297	5.6	0.0
Corny Point_CP2		155	1.4	47.6	Middlebank_61		365	6.7	17.1	Walloo_6		118	0.4	5.0
Corny Point_CP3		150	1.2	45.2	Middlebank_62		172	2.0	37.1	Walloo_7		210	3.9	1.0
Corny Point_CP4		154	1.1	41.5	Middlebank_63		161	2.6	21.7	Walloo_8		162	1.7	5.0
Corny Point_CP5		160	1.3	42.9	Middlebank_64		320	3.1	25.0	Walloo_9		156	5.4	5.0
Corny Point_CP6		193	1.4	50.0	Middlebank_65		233	9.5	46.2	Walloo_10		208	3.7	1.0
Corny Point_CP7		132	2.1	63.3	Middlebank_66		351	8.5	16.7	Walloo_11		214	4.4	0.0
Corny Point_CP8		146	1.5	45.7	Middlebank_67		317	4.8	25.0	Walloo_12		320	4.7	2.0
Corny Point_CP9		134	2.1	50.0	Middlebank_68		142	0.2	21.4	Walloo_13		172	4.4	9.0
Cowell_C1		145	1.0	50.0	Middlebank_75		273	15.0	37.2	Walloo_14		270	4.1	1.0
Cowell_C11		305	4.0	4.0	Middlebank_76		412	10.3	19.0	Walloo_15		325	4.6	1.0
Cowell_C12		347	3.2	4.0	Middlebank_77		422	13.4	26.1	Walloo_16		131	0.2	5.0
Cowell_C13		385	2.4	0.0	Middlebank_78		414	10.0	6.3	Walloo_17		192	1.2	3.0
Cowell_C14		410	4.1	0.0	Middlebank_79		360	8.9	17.8	Walloo_18		373	1.8	13.0
Cowell_C2		295	11.1	29.5	Middlebank_80		246	12.9	64.0	Walloo_19		231	7.4	2.0
Cowell_C6		170	6.2	52.4	Middlebank_N21		280	3.0	29.0	Walloo_20		186	2.0	3.0
Cowell_C7		172	0.4	49.1	Middlebank_N22		421	7.3	10.8	Walloo_21		238	6.3	1.0
Cowell_C8		139	2.5	36.2	Middlebank_N23		297	1.4	14.7	Walloo_22		185	6.6	5.0
Cowell_C9		209	2.3	26.2	Musgrave_81		366	18.1	4.0	Walloo_23		182	0.5	7.0
Cowell_Z1/1		93	0.3	38.8	Musgrave_90		284	13.8	14.3	Walloo_24		119	0.4	9.6
Cowell_Z1/2		335	8.1	46.8	Musgrave_91		369	12.1	6.3	Walloo_26		111	0.7	22.5
Cowell_Z1/3		610	1.5	22.2	Musgrave_21B		373	12.4	33.3	Walloo_27		136	2.0	22.0
Cowell_Z1/4		225	6.0	50.0	Musgrave_21C		349	7.9	26.3	Walloo_28		142	1.0	27.1
Cowell_Z1/5		230	6.1	56.3	Musgrave_22B		392	7.3	23.0	Walloo_29		140	0.7	18.3
Cowell_Z2/1		130	0.5	46.0	Plank_4		321	10.7	34.0	Walloo_30		257	0.2	18.6
Cowell_Z2/10		270	0.8	17.9	Plank_5		419	6.9	16.3	Walloo_31		115	0.5	14.8
Cowell_Z2/11		322	4.2	23.1	Plank_6		420	7.8	15.8	Walloo_32		122	0.9	9.5
Cowell_Z2/13		310	8.1	59.6	Plank_7		454	5.2	13.7	Walloo_33		193	0.3	3.6
Cowell_Z2/14		195	3.2	53.7	Plank_8		431	4.8	23.1	Walloo_EWL1		159	0.6	4.0
Cowell_Z3/1		250	3.4	2.0	Plank_10		408	6.5	33.3	Walloo_EWL2		233	0.4	1.0
Cowell_Z3/10		354	2.0	13.7	Plank_69		223	2.1	7.1	Walloo_EWL3		191	2.6	5.0
Cowell_Z3/11		250	1.4	1.0	Plank_X1		430	9.7	22.2	Walloo_Y7		309	0.1	0.0
Cowell_Z3/12		197	4.6	4.0	Plank_X2		429	5.0	15.4	Wardang_WD2		178	2.0	46.4
Cowell_Z3/2		352	5.4	6.0	Plank_X3		492	5.4	4.0	Wardang_WD3		106	0.3	53.1
Cowell_Z3/8		192	1.0	28.8	Shoalwater_SHW:		209	4.2	25.0	Wardang_WD7		203	3.0	44.1
Cowell_Z3/9		342	4.4	33.3	Shoalwater_SHW:		282	4.3	29.5	Wardang_WD8		251	0.7	44.4
Gutter_10A		285	4.4	2.6	Shoalwater_SHW:		374	2.4	6.3	Wardang_WD9		225	1.1	48.0
Gutter_10B		149	0.1	15.4	Shoalwater_SHW:		354	0.7	7.0	West Gutter_11B		284	2.9	15.1
Gutter_1B		257	3.3	28.8	South Gutter_12B		262	4.8	10.0	West Gutter_WG1		255	5.6	0.0
Gutter_1C		246	4.8	15.4	South Gutter_12C		209	3.4	34.4	West Gutter_WG2		229	3.0	0.0
Gutter_2B		294	9.6	58.0	South Gutter_SG5		173	0.9	54.2	West Gutter_WG3		156	2.6	4.0
Gutter_2C		252	10.4	45.8	South Gutter_SG6		208	0.7	41.7	West Gutter_WG4		320	3.2	2.0
Gutter_3A		252	6.5	51.4	South Gutter_SG9		289	5.1	32.0	West Gutter_WG5		339	2.7	15.4
Gutter_3B		250	7.1	27.9	South Gutter_SG>		246	0.7	3.8	West Gutter_WG6		296	4.1	19.7
Gutter_4B		270	1.8	42.3	South Gutter_SG>		212	0.6	35.4	West Gutter_WG7		256	3.8	23.1
Gutter_4C		238	5.8	50.7	South Gutter_SG>		325	0.9	34.9	West Gutter_WG8		320	2.8	53.7
Gutter_5B		259	5.9	68.6	Steamer_ST3		131	0.6	33.9	Yarraville_28		395	10.8	20.6
Gutter_5C		235	4.8	66.6	Steamer_ST4		111	0.2	12.0	Yarraville_29		436	6.6	22.5
Gutter_6B		258	9.2	32.5	Stones_11		410	6.7	14.6	Yarraville_30		475	6.1	32.7
Gutter_6C		254	8.5	36.4	Stones_12		446	6.2	13.3	Yarraville_31		465	6.7	30.0
Gutter_7A		498	5.6	3.7	Stones_14		461	7.5	12.5	Yarraville_32		490	4.2	23.2
Gutter_7B		238	7.6	2.7	Stones_15		390	7.8	31.3	Yarraville_48		360	11.6	28.3
Gutter_8A		152	0.2	8.8	Stones_17		334	17.2	27.3	Yarraville_54		435	6.9	32.5
Gutter_8B		302	3.7	11.1	Stones_18		303	13.1	39.3	Yarraville_92		355	26.7	55.8
Gutter_8C		182	2.7	6.4	Stones_58		344	7.2	36.7	Yarraville_93		340	14.5	42.9
Gutter_9A		137	0.6	14.3	Stones_71		415	6.5	40.5					
Gutter_9B		172	1.5	10.9	Stones_72		410	10.8	36.2					

8.2.3 Spencer Gulf Prawn Fishery: April 2010 Survey

Prepared by Graham Hooper and Cameron Dixon SARDI Aquatic Sciences (May 2010).

Introduction

SARDI Aquatic Sciences conduct fishery-independent surveys for stock assessment and harvest strategy purposes during November, February and April of each fishing season in Spencer Gulf. Surveys provide data on the spatial distribution of catch rate and prawn size, reproductive status and recruitment. The data are also used to determine harvest strategies for subsequent fishing periods. This report documents the provisional April 2010 survey results and provides comparison with data from previous surveys.

Methods

Surveys are generally conducted on two consecutive nights over the new moon period in November, February and April. Observers are provided for each vessel. Surveys are conducted at 208 stations, covering most locations of the Gulf (Figure 1). Trawl shots conducted during the survey generally use two nets, although one net may be used for some shots where high catch rates of small prawns are expected. In these cases, catch rates are doubled to reflect the catch of two nets. Data collected on all surveys includes: catch rate, prawn size (prawns/7 kg), catch weight by prawn grade, sex ratio, sex-specific size-frequency, bottom temperature and depth. Data on reproductive status are generally collected during November and February surveys.

In this report, prawn size data are reported as prawns/7 kg to reflect the measurement of prawn size used by the fishery (7 kg = approximately 1 bucket of prawns). This report provides analyses of catch rate and prawn size (prawns/7 kg) data, reproductive status and recruitment index. Statistics regarding catch rates and prawn sizes are mean values only to enable the development of harvest strategies following the Management Plan. Additional analyses of survey data are provided in the annual status and stock assessment reports for the Spencer Gulf Prawn Fishery.

Bottom water temperature data were collected by attaching temperature loggers (Sensus Ultra, by Reefnet ®) to the otter board of each survey vessel. Weather forecasts and tidal predictions were obtained from the Australian Government Bureau of Meteorology website:

(<http://www.bom.gov.au>).

Quality Assurance

Quality assurance for data entry and analyses for survey reports include:

- All data were entered by two different staff.
- Both datasets were compared for differences.
- Observed differences in the data were resolved by returning to the original datasheets. When needed, the scientific observer that collected the data was questioned.
- Analyses were completed by both staff using the validated dataset.
- Analyses were compared for differences and discrepancies were resolved.

Data entry and analyses for this report were conducted by: Graham Hooper and Cameron Dixon

Results

Planned survey dates: April 13th & 14th, 2010.

Actual survey dates: April 13th & 14th, 2010.

Number of shots completed (from 208 planned): 204. Three trawl shots were dumped due to the high abundance of crabs. One shot was dumped after a bucket count was determined.

Tuesday, April 13th 2010

Survey vessels: (10) Angelina, Atlas, Bartalumba, Beauie J, Cvita B, Grozdana B, Kali II, Kylie, Roslyn Ann and Sandy S.

Tides (Wallaroo): 04:38 h, 1.15 m; 10:41h, 0.63 m; 16.55 h, 1.43 m; 23.29 h, 0.56 m.

Wednesday, April 14th 2010

Survey vessels: (9) Angelina, Atlas, Bartalumba, Beauie J, Cvita B, Grozdana B, Kali II, Kylie, and Sandy S.

Tides (Wallaroo): 05:04 h, 1.14 m; 10:54h, 0.60 m; 17.10 h, 1.57 m; 23.56 h, 0.48 m.

Marine Weather Observations

Note that wind speed is reported as km/h.

Date	Day	Air Temp		Max Wind Gust			Air Temp	9am		3pm		
		Min	Max	Dir	Speed	Time		Dir	Speed	Air Temp	Dir	Speed
<u>Whyalla</u>												
13	Tu	6.8	21.8	E	24	13.01	17.2	NNW	6	21.2	S	13
14	We	8.3	24.7	ESE	24	15.03	18	NNW	11	23.6	E	17
15	Th	7.9	24.9	ESE	22	12.06	18.6		CALM	24.1	ESE	17
<u>Kadina</u>												
13	Tu	6.5	22.4	E	30	00.07	16.4	E	19	21.0	WSW	15
14	We	7.6	23.9	WSW	28	16.49	15.3	ENE	13	23.0	WSW	17
15	Th	7.4	25.6	SE	28	20.30	17.7	ENE	15	24.2	W	15
<u>Pt Lincoln</u>												
13	Tu	10.7	20.0	ENE	30	11.50	17.9	ENE	20	18.7	E	19
14	We	10.9	21.0	ESE	28	2.21	18.6	E	7	18.9	ESE	20
15	Th	11.6	21.5	E	28	2.46	19.1	ENE	15	20.2	E	20

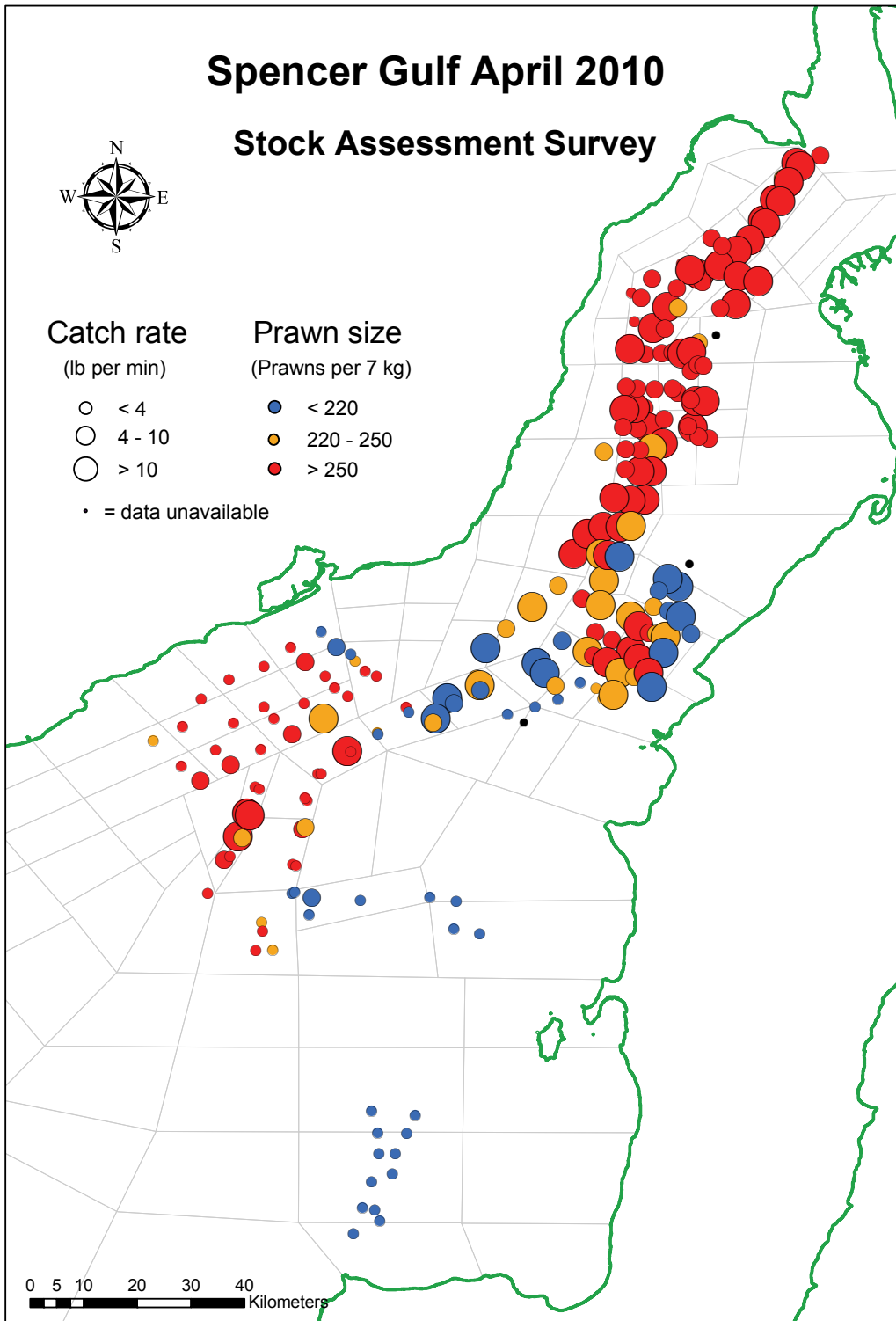


Figure 2: Catch rate and prawn size from surveys conducted during April 2010.

Table 1. Summary statistics from all data (up to 208 shots) on catch rate and prawn size from surveys conducted during April 2010 and April 2009.

*High-value shots are those that fall within size and catch rate criteria of <220 prawns/7 kg and >4 lb/min.

Locations (north to south)	2010				2009			
	No. of shots	High- value shots*	Mean catch rate (lb/min)	Mean size (p/7kg)	No. of shots	High- value shots*	Mean catch rate (lb/min)	Mean size (p/7kg)
Whole Gulf	205	19	7.9	281	208	28	5.0	270
Lowly	9	0	14.5	306	9	0	8.1	290
Basin	10	0	6.3	446	10	1	6.9	336
Musgrave	6	0	15.9	314	6	0	9.0	283
Yarraville	9	0	11.6	311	9	0	6.3	274
Stones	17	0	8.7	299	18	2	6.0	311
Plank	10	0	8.9	335	10	1	6.5	312
Middlebank	21	1	13.8	258	21	6	8.9	235
Shoalwater	4	1	11.8	213	4	0	4.6	229
Wallaroo	36	11	9.5	230	36	14	5.7	209
Steamer	2	0	0.5	150	2	1	4.4	152
Cowell	27	1	3.0	293	27	0	2.2	327
Gutter	22	4	5.8	263	22	2	3.5	325
West Gutter	9	0	7.5	372	9	0	2.3	360
South Gutter	8	1	2.5	237	8	0	1.7	271
Wardang	5	0	1.7	195	5	0	1.5	191
Corny Point	12	0	1.7	187	12	0	1.4	162

Table 2. Harvest strategy measures for common shots (up to 161) during April surveys conducted between 2005 and 2010.

Year		2005	2006	2007	2008	2009	2010
Harvest strategy measures	Current biomass: catch rate, kg/h (lb/min)	182 (6.7)	151 (5.5)	201 (7.4)	204 (7.5)	154 (5.7)	237 (9.4)
	Future biomass: 20+ catch rate, kg/h (lb/min)	52 (1.9)	50 (1.8)	43 (1.6)	65 (2.4)	44 (1.6)	58 (2.1)

Table 3 Data on prawn size (p/7kg) and catch rate (lb/min) from surveys conducted in Spencer Gulf during April 2010.

Area_shot	pp7kg	lb/min	Area_shot	pp7kg	lb/min	Area_shot	pp7kg	lb/min
Basin_23	7.1	304	Gutter_8C	9.7	191	Stones_13B	11.4	290
Basin_25	4.5	310	Gutter_9A	9.9	228	Stones_13C	10.1	305
Basin_26	4.0	300	Gutter_9B	15.2	224	Stones_14	11.6	283
Basin_27	10.8	281	Gutter_9C	9.8	202	Stones_15	7.3	372
Basin_33	11.8	575	Lowly_35	20.7	308	Stones_16W	8.1	301
Basin_55	2.8	693	Lowly_36	13.9	311	Stones_17	9.4	284
Basin_73	3.4	694	Lowly_39	18.3	371	Stones_18	6.5	274
Basin_74	6.2	692	Lowly_40	20.6	315	Stones_18B	7.6	255
Basin_94	8.7	305	Lowly_41	16.8	283	Stones_58	6.0	393
Basin_96	4.3	600	Lowly_42	7.7	238	Stones_58C	9.7	328
Corny Point_CP1	0.8	185	Lowly_44	10.4	290	Stones_71	7.9	354
Corny Point_CP10	1.5	186	Lowly_45	12.7	271	Stones_72	11.7	283
Corny Point_CP11	2.0	181	Lowly_57	9.2	303	Stones_72C	11.0	264
Corny Point_CP12	1.7	187	Middlebank_1	6.3	293	Stones_72D	7.9	249
Corny Point_CP2	1.2	186	Middlebank_2	15.3	278	Wallaroo_1	10.8	218
Corny Point_CP3	2.4	201	Middlebank_3	10.7	252	Wallaroo_10	6.1	231
Corny Point_CP4	2.0	192	Middlebank_60	13.2	277	Wallaroo_11	12.8	235
Corny Point_CP5	2.0	181	Middlebank_61	22.7	274	Wallaroo_12	7.8	255
Corny Point_CP6	2.2	176	Middlebank_62	11.4	252	Wallaroo_13	18.8	235
Corny Point_CP7	1.2	163	Middlebank_63	15.4	242	Wallaroo_14	9.9	255
Corny Point_CP8	1.6	203	Middlebank_64	24.2	250	Wallaroo_15	11.4	260
Corny Point_CP9	2.2	194	Middlebank_65	20.3	258	Wallaroo_16	10.6	223
Cowell_C1	5.1	184	Middlebank_66	16.9	247	Wallaroo_17	5.1	248
Cowell_C11	3.3	298	Middlebank_67	21.3	255	Wallaroo_18	7.1	265
Cowell_C12	2.5	348	Middlebank_68	14.8	212	Wallaroo_19	7.3	243
Cowell_C13	1.9	321	Middlebank_75	11.0	246	Wallaroo_2	10.3	216
Cowell_C14	2.4	318	Middlebank_76	7.8	280	Wallaroo_20	12.2	253
Cowell_C2	4.5	305	Middlebank_77	6.5	353	Wallaroo_21	12.6	255
Cowell_C6	1.5	265	Middlebank_78	10.1	289	Wallaroo_22	9.9	237
Cowell_C7	1.9	237	Middlebank_79	13.1	255	Wallaroo_23	10.7	247
Cowell_C8	0.8	448	Middlebank_80	13.2	269	Wallaroo_24	3.6	222
Cowell_C9	1.1	385	Middlebank_N21	11.3	240	Wallaroo_26	2.8	226
Cowell_Z1/1	0.6	124	Middlebank_N22	8.2	254	Wallaroo_27	3.7	220
Cowell_Z1/2	1.7	294	Middlebank_N23	17.2	227	Wallaroo_28	6.8	221
Cowell_Z1/3	1.4	521	Musgrave_21B	19.1	308	Wallaroo_29	10.4	185
Cowell_Z1/4	2.5	256	Musgrave_21C	9.1	298	Wallaroo_3	14.5	224
Cowell_Z1/5	1.1	338	Musgrave_22B	14.8	265	Wallaroo_30	18.3	201
Cowell_Z2/1	3.9	185	Musgrave_81	10.6	332	Wallaroo_31	1.3	168
Cowell_Z2/10	3.3	353	Musgrave_90	26.4	333	Wallaroo_32	0.6	127
Cowell_Z2/11	1.7	510	Musgrave_91	15.6	330	Wallaroo_33	6.4	209
Cowell_Z2/13	2.5	374	Plank_10	9.2	300	Wallaroo_4	7.4	258
Cowell_Z2/14	3.6	244	Plank_4	10.4	264	Wallaroo_5	11.0	273
Cowell_Z3/1	1.8	256	Plank_5	8.8	283	Wallaroo_6	18.1	255
Cowell_Z3/10	1.6	526	Plank_6	8.2	379	Wallaroo_7	9.4	201
Cowell_Z3/11	4.4	273	Plank_69	9.5	245	Wallaroo_8	17.9	209
Cowell_Z3/12	12.2	230	Plank_7	8.9	468	Wallaroo_9	9.9	215
Cowell_Z3/2	2.7	264	Plank_8	6.4	306	Wallaroo_EWL1	18.8	199
Cowell_Z3/8	6.1	286	Plank_X1	6.3	304	Wallaroo_EWL2	10.9	212
Cowell_Z3/9	4.4	397	Plank_X2	11.2	317	Wallaroo_EWL3	7.7	217
Gutter_10A	10.2	211	Plank_X3	10.3	439	Wallaroo_Y7	0.7	
Gutter_10B	6.2	226	Shoalwater_SHW1	9.8	226	Wardang_WD2	1.8	200
Gutter_1B	1.6	307	Shoalwater_SHW2	13.2	241	Wardang_WD3	1.4	161
Gutter_1C	3.9	316	Shoalwater_SHW3	8.1	227	Wardang_WD7	2.1	208
Gutter_2B	7.1	355	Shoalwater_SHW7	16.1	175	Wardang_WD8	2.2	206
Gutter_2C	5.8	227	South Gutter_12B	3.4	207	Wardang_WD9	0.9	176
Gutter_3A	2.0	340	South Gutter_12C	3.3	197	West Gutter_11B	2.7	374
Gutter_3B	1.9	441	South Gutter_SG5	2.7	294	West Gutter_WG1	3.7	283
Gutter_4B	1.1	461	South Gutter_SG6	1.3	227	West Gutter_WG2	5.8	227
Gutter_4C	3.8	419	South Gutter_SG9	4.2	206	West Gutter_WG3	17.7	345
Gutter_5B	11.1	391	Sth Gutter_SGX1	1.5	227	West Gutter_WG4	0.0	526
Gutter_5C	3.8	344	Sth Gutter_SGX2	1.3	482	West Gutter_WG5	3.5	451
Gutter_6B	2.3	242	Sth Gutter_SGX3	2.4	202	West Gutter_WG6	12.1	458
Gutter_6C	1.4	212	Steamer_ST3	0.9	150	West Gutter_WG7	14.5	382
Gutter_7A	3.9	306	Steamer_ST4	na		West Gutter_WG8	7.3	398
Gutter_7B	2.6	201	Stones_11	7.1	323	Yarraville_28	16.8	267
Gutter_8A	na		Stones_12	6.0	302	Yarraville_29	7.9	279
Gutter_8B	14.4	216	Stones_13A	9.3	282	Yarraville_30	13.3	384

8.3 Spot Survey results during 2009/10 Spencer Gulf prawn season

8.3.1 December 15th 2009 Spot Survey

Area_shot	pp7kg	lb/min	Area_shot	pp7kg	lb/min	Area_shot	pp7kg	lb/min
Middle Bank_76	248	1.9	Stones_13A	249	5.7	Musgrave_22B	276	5.2
Plank_5	268	2.7	Stones_13B	283	4.4	Musgrave_21B	241	11.5
Plank_X2	266	3.2	Stones_15	359	2.8	Musgrave_21C	257	4.0
Plank_X1	279	3.9	Stones_16	289	5.5	Stones_18	213	2.4
Plank_4	241	3.6	Yarraville_93	250	3.9	Stones_17	229	3.8
Stones_16W	264	2.8	Yarraville_92	216	5.1	Stones_72C	220	2.9
Stones_12	272	4.1	Musgrave_91	229	6.6	Stones_72	260	2.1
Stones_99	247	5.3	Musgrave_81	198	3.3	Stones_71	240	1.6

8.3.2 March 15th 2010 Spot Survey

Area_shot	pp7kg	lb/min	Area_shot	pp7kg	lb/min	Area_shot	pp7kg	lb/min
Wardang_WD3	161	0.3	Gutter_1B	263	1.0	Wallaroo_28	160	3.8
Wardang_WD2	217	6.2	Gutter_2B	280	3.6	Wallaroo_29	150	2.2
Wardang_WD7	221	11.8	Gutter_3B	326	4.9	Wallaroo_30	104	0.4
Wardang_WD8	215	1.3	Gutter_4B	394	1.5	Wallaroo_33	160	2.5
Wardang_WD9	220	0.9	Gutter_5B	536	4.7	Wallaroo_13	261	16.4
Sth Gutter_SGX3	277	1.8	Gutter_6B	201	3.0	Wallaroo_15	298	15.8
Sth Gutter_SGX1	259	3.4	Gutter_7A	386	3.3	Wallaroo_17	265	7.9
Sth Gutter_SG6	241	2.6	Gutter_8A	123	0.1	Wallaroo_25	230	8.6
Sth Gutter_SG4	187	2.5	Gutter_9A	202	3.9	Wallaroo_23	258	18.7
Sth Gutter_SG5	196	1.1	Gutter_9B	208	9.9	Wallaroo_26	220	20.6
Sth Gutter_SGX2	439	0.6	Gutter_8B	222	13.3	Wallaroo_31	140	1.7
Sth Gutter_SG12B	204	2.9	Gutter_7B	198	1.3	Wallaroo_32	95	0.8
Sth Gutter_SG9	243	8.1	Gutter_10A	285	19.1	Steamer_ST2	0	0
			Gutter_10B	163	0.7			
			Gutter_8C	191	5.7			

8.3.3 May 13th 2010 Spot Survey

Area_shot	pp7kg	lb/min	Area_shot	pp7kg	lb/min	Area_shot	pp7kg	lb/min
Shoalwater_SHW2	229	13.0	Middle Bank_N23	225	9.5	Middle Bank_80	228	8.53
Shoalwater_SHW1	200	10.7	Wallaroo_18	228	5.9	Middle Bank_75	230	11.33
Middle Bank_79	247	11.5	Wallaroo_12	235	5.4	Middle Bank_76	256	6.88
Middle Bank_78	257	10.7	Wallaroo_11	210	9.1	Middle Bank_3	227	11.72
Middle Bank_60	252	11.0	Wallaroo_19	244	10.3	Middle Bank_62	218	15.90
Middle Bank_1	245	6.8	Wallaroo_5	254	10.8	Middle Bank_63	203	21.89
Middle Bank_2	228	14.9	Wallaroo_15	249	12.5	Middle Bank_68	186	10.23
Middle Bank_61	233	34.4	Wallaroo_16	195	10.8	Middle Bank_N21	216	10.61
Middle Bank_65	236	22.9	Wallaroo_21	232	10.4	Middle Bank_N22	230	11.55
Middle Bank_66	228	21.5	Wallaroo_4	220	8.3	Wallaroo_33	204	13.15
Middle Bank_67	230	19.0	Wallaroo_22	232	11.7	Wallaroo_13	209	12.60
Middle Bank_64	224	20.6	Wallaroo_6	212	13.9	Wallaroo_14	232	7.54