

South Australian Giant Crab (*Pseudocarcinus gigas*) Fishery Status Report 2008/09

Status Report to PIRSA Fisheries



David R. Currie

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EXECUTIVE SUMMARY

1. During the 2008/09 season, 21 tonnes of giant crab were harvested from South Australian waters. Most of this catch (74%) was harvested by two miscellaneous licence holders. Rock lobster fishers with giant crab quota entitlements accounted for 17% of the total, while the remainder (9%) was taken as by-product by commercial rock lobster fishermen not holding giant crab quota.
2. The majority of the catch in 2008/09 (12.8 tonnes; 61%) was harvested from eight offshore Marine Fishing Areas (MFAs) in the Northern Zone (NZ), while the remainder (8.2 tonnes; 39%) was harvested from five MFAs in the Southern Zone (SZ).
3. Total catch has remained relatively stable since the introduction of sectoral quotas in 2002/03, but in most recent seasons the TACC (22.1 tonnes) has not been fully harvested. During 2008/09, dedicated giant crab catches were approximately 8% and 10% less than the targeted TACC for the NZ and SZ, respectively.
4. Most of the current shortfall in catch (0.5 tonnes NZ + 0.7 tonnes SZ) can be attributed to under-catch in the rock lobster quota sector. Notably, no fishing effort was applied in the SZ during 2008/09 by rock lobster fishers holding quota.
5. Total fishing effort across all sectors (i.e. miscellaneous + quota + by-product) has increased by ~59% since 2006/07, due mainly to increases in non-targeted effort by the lobster by-product sector.
6. Overall catch rates have progressively increased since the commercialisation of the fishery. During 2008/09, average CPUE was highest in the miscellaneous licensed sector (4.24 kg.pot lift⁻¹), and substantially lower in the rock lobster quota and rock lobster by-product sectors (0.88 and 0.11 kg.pot lift⁻¹, respectively).
7. Data were available to assess fishery performance against six of the seven interim performance indicators (PI) in each zone. Four of these PI (mean weight in NZ and SZ, fishing effort in the SZ, and pre-recruit abundance in the SZ) were below the interim lower reference points.
8. The mean weights of landed giant crabs have declined in the NZ and increased in the SZ over the last eight-year period. During 2008/09, for the second season in succession, mean landed weights were marginally higher in the SZ (2.87 kg) than in the NZ (2.84 kg).
9. The PI breach in the SZ effort highlights record low levels of fishing in the SZ by dedicated giant crab fishers (i.e. miscellaneous + quota). Most of this decline in effort is due to reduced participation by rock lobster fishers holding quota.
10. The PI breach in the SZ pre-recruit abundance highlights the lowest number of undersized crabs on record (1.49 crabs.pot lift⁻¹). This may indicate reduced levels of recruitment. By comparison, numbers of pre-recruits during 2008/09 were near record levels in the NZ (2.78 crabs.pot lift⁻¹).
11. The relatively small number of dedicated giant crab fishers and the lack of data prevent an unambiguous assessment of its current status. During the most recent season, most of quota allocated to the dedicated giant crab fishers was landed, at catch rates equivalent to historically high levels. There is no evidence to suggest that current levels of catch are unsustainable. However, declining numbers of females in the SZ over the last eight years, and associated declines in pre-recruits may influence the magnitude of future catches.

1 INTRODUCTION

This *Status Report* for the South Australian giant crab fishery updates previous *Stock Assessment Reports* for this species (Currie and Ward, 2005; Currie *et al.*, 2006; Currie, 2008; Currie and Ward, 2009) and is part of SARDI Aquatic Science's ongoing assessment program for this fishery. This document summarises information collected in commercial logbook returns over the period 1 January 1986 to 31 May 2009.

2 FISHERY STATISTICS

2.1 Catch

The total annual catch of giant crab landed by the commercial sector (i.e. dedicated "miscellaneous" licence holders + rock lobster licence holders with giant crab quota + rock lobster licence holders with crab by-product entitlement) has varied markedly since 1986/87 (Figure 1a). In the earliest years of the fishery less than 500 kg of crab were taken annually, but as markets developed for live product in the early 1990's, landings increased sharply to 7.4 tonnes in 1992/93. Catches continued to rise over the next two seasons and reached 28 tonnes in 1994/95. This decreased over the next two seasons but reached a historical high of 34.6 tonnes during 1998/99. Catches declined annually following the introduction of quotas in 1999, but have remained relatively stable (18 - 21 tonnes) over the last 7 seasons (2002/03 - 2008/09). During 2008/09, 21 tonnes of giant crab were harvested by commercial fishers from South Australian waters (Table 1).

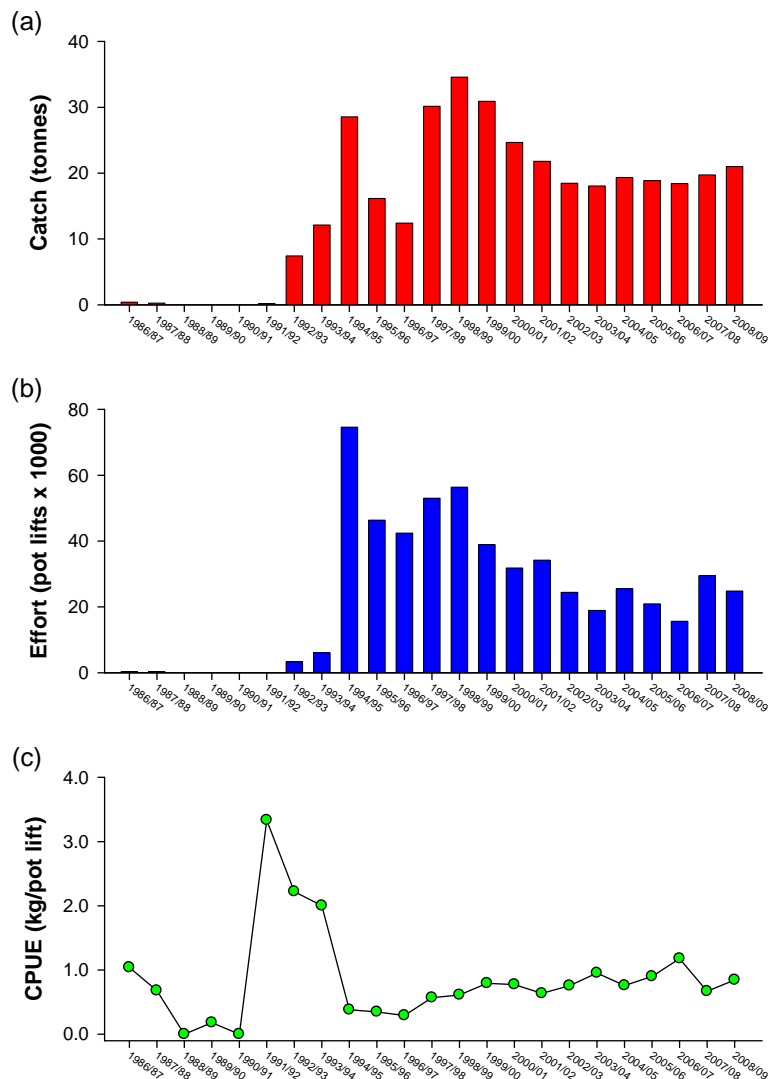


Figure 1. Inter-annual variation in a) total catch, b) fishing effort, and c) catch per unit effort (CPUE) for giant crab *Pseudocarcinus gigas* in South Australian waters.

Table 1. Total catch (kg) of giant crab taken in South Australian waters in each fishing zone since the establishment of TACC's in 1999. Note that no sectoral quotas are allocated prior to 2002/03, as the fishery was operated under a fully competitive TACC.

Season	Commercial Sector	Northern Zone	Southern Zone	Total Catch	Allocation
1999/00	Miscellaneous	15,104	4,535	19,639	-
	Rock Lobster Quota	3,254	4,082	7,336	-
	Rock Lobster By-product	1,081	2,843	3,924	-
	Total	19,439	11,460	30,899	-
	Total Allowable Commercial Catch (TACC)	13,400	12,600	26,000	-
2000/01	Miscellaneous	11,600	7,176	18,776	-
	Rock Lobster Quota	1,862	1,442	3,304	-
	Rock Lobster By-product	1,595	969	2,564	-
	Total	15,683	8,961	24,644	-
	Total Allowable Commercial Catch (TACC)	13,400	8,700	22,100	-
2001/02	Miscellaneous	9,016	5,514	14,530	-
	Rock Lobster Quota	2,478	1,329	3,807	-
	Rock Lobster By-product	1,984	1,457	3,441	-
	Total	13,478	8,300	21,778	-
	Total Allowable Commercial Catch (TACC)	13,400	8,700	22,100	-
2002/03	Miscellaneous	7,473	6,421	13,894	14,069
	Rock Lobster Quota	1,203	799	2,002	6,926
	Rock Lobster By-product	1,880	710	2,590	1,105
	Total	10,556	7,930	18,486	22,100
	Total Allowable Commercial Catch (TACC)	13,400	8,700	22,100	-
2003/04	Miscellaneous	7,814	6,407	14,221	14,565
	Rock Lobster Quota	2,033	149	2,182	6,430
	Rock Lobster By-product	1,290	363	1,653	1,105
	Total	11,137	6,919	18,056	22,100
	Total Allowable Commercial Catch (TACC)	13,400	8,700	22,100	-
2004/05	Miscellaneous	7,056	6,311	13,367	14,565
	Rock Lobster Quota	3,223	9	3,232	6,430
	Rock Lobster By-product	2,521	230	2,751	1,105
	Total	12,800	6,550	19,350	22,100
	Total Allowable Commercial Catch (TACC)	13,400	8,700	22,100	-
2005/06	Miscellaneous	7,430	8,664	16,084	16,065
	Rock Lobster Quota	1,522	14	1,536	4,930
	Rock Lobster By-product	805	415	1,220	1,105
	Total	9,757	9,093	18,850	22,100
	Total Allowable Commercial Catch (TACC)	13,400	8,700	22,100	-
2006/07	Miscellaneous	8,016	8,313	16,329	16,151
	Rock Lobster Quota	1,423	12	1,435	4,844
	Rock Lobster By-product	500	156	656	1,105
	Total	9,939	8,481	18,420	22,100
	Total Allowable Commercial Catch (TACC)	13,400	8,700	22,100	-
2007/08	Miscellaneous	6,597	7,521	14,118	16,151
	Rock Lobster Quota	3,558	59	3,617	4,844
	Rock Lobster By-product	1,151	851	2,002	1,105
	Total	11,306	8,431	19,737	22,100
	Total Allowable Commercial Catch (TACC)	13,400	8,700	22,100	-
2008/09	Miscellaneous	8,144	7,447	15,591	16,151
	Rock Lobster Quota	3,559	0	3,559	4,844
	Rock Lobster By-product	1,120	729	1,849	1,105
	Total	12,823	8,176	20,999	22,100
	Total Allowable Commercial Catch (TACC)	13,400	8,700	22,100	-

2.2 Effort

Total fishing effort by the commercial sector has declined over the last decade (Figure 1b). In 2008/09, the total effort was 24,832 potlifts, which is 56% less than in 1998/09 (56,391 potlifts).

2.3 CPUE

Catch rates for giant crab have generally increased over the last decade (Figure 1c), and in 2008/09 the combined CPUE for all commercial sectors was 0.85 kg.pot lift⁻¹.

2.4 Catch, Effort and CPUE by Fishing Sector

In 2008/09, 91% of all giant crab landed in the Southern Zone and 63% of crabs landed in the Northern Zone were caught by miscellaneous licence holders (Figure 2a). All of the remaining catch in the Southern Zone (9%) was taken as a by-product of lobster fishing, with no crabs landed by rock lobster fishers holding giant crab quota. Of the remaining catch in the NZ, 28% were landed by rock lobster fishers holding giant crab quota, and 9% was landed as a by-product of lobster fishing.

In the Southern Zone during 2008/09, the rock lobster by-product and miscellaneous fisheries accounted for 82% and 18% of the total fishing effort respectively, while no fishing effort was applied by rock lobster fishers with quota (Figure 2b). In the Northern Zone during 2008/09, the rock lobster quota, rock lobster by-product and miscellaneous fisheries comprised 27%, 61% and 12% of the total effort respectively.

Over the last ten seasons, catch rates in the miscellaneous fishery (i.e. Northern and Southern Zones) have been at least 4 times higher than those of the rock lobster quota fishery, and over 10 times higher than those in the rock lobster by-product fishery (Figure 2c). During 2008/09, catch rates for the miscellaneous fishery were higher in the Northern Zone (4.41 kg.pot lift⁻¹) than in the Southern Zone (4.08 kg.pot lift⁻¹).

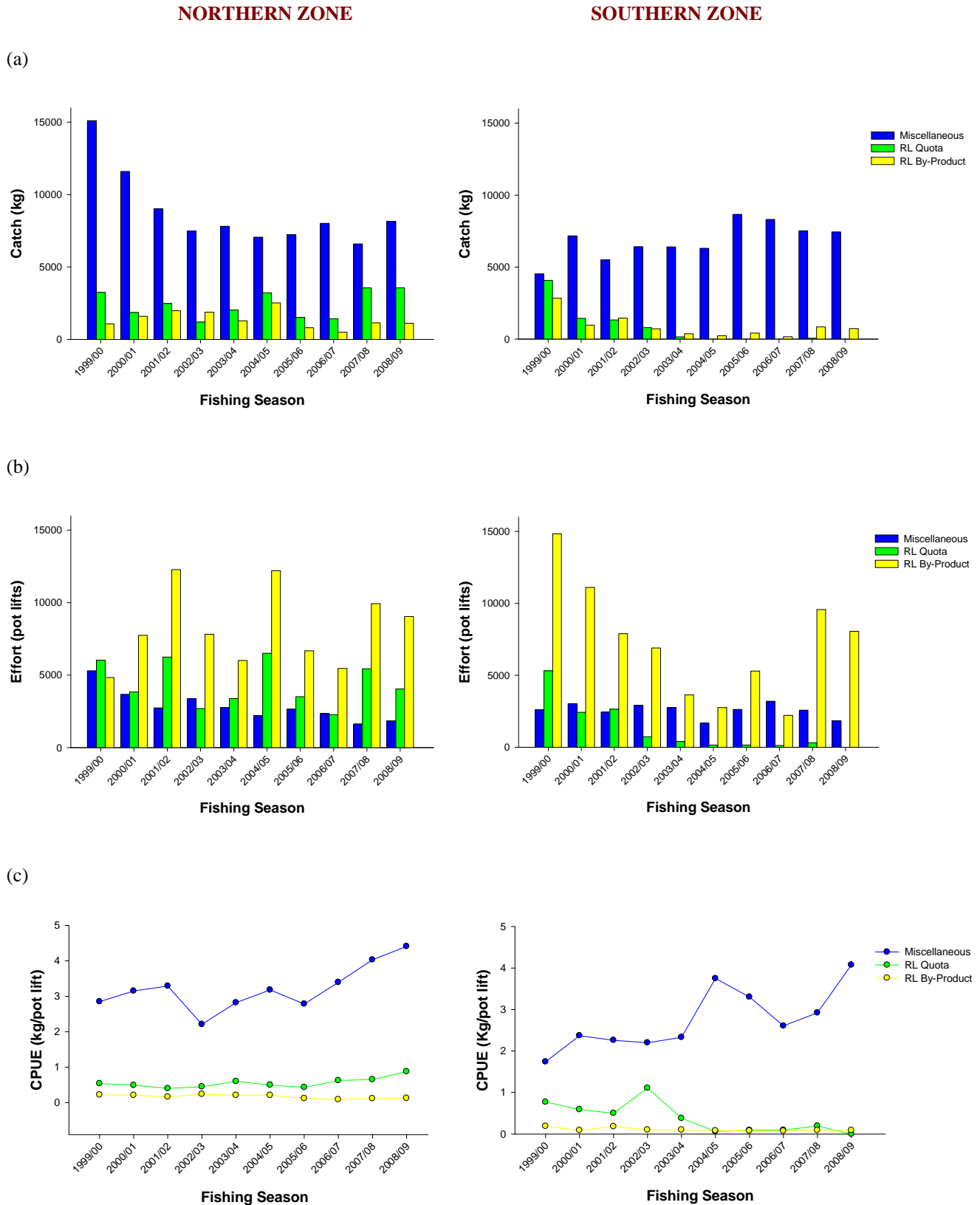


Figure 2. Plots of inter-annual differences in a) total giant crab catch, b) total fishing effort, and c) catch per unit effort between different fishing sectors (Miscellaneous, Rock Lobster Quota, and Rock Lobster By-product) and fishing zones (Northern and Southern) over the period 1999/00 to 2008/09.

2.5 Changes in Quota Holdings

Significant changes in quota holdings have occurred among fishing sectors since 2002/03, with rock lobster quota holders transferring permanently, and leasing temporarily, progressively larger volumes of their allocated catch to the miscellaneous sector (Table 2). As a result of permanent quota transfers, the total quota held by the miscellaneous sector has increased by 15% (2.1 tonnes) over the last seven seasons. Most of this increase has resulted from quota transfers by rock lobster quota holders in the Southern Zone (1.5 tonnes), with transfers by quota holders in the Northern Zone accounting for less than a third of the total increase (0.6 tonnes).

Despite recent changes in quota holdings, on average 13% of the combined TACC has remained un-harvested each season since 2002/03. Most of this shortfall can be attributed to under-catch in the rock lobster quota sector. Over the last seven seasons, 25-70% of the catch allocated to the rock lobster quota sector (4844-6926 tonnes) has not been landed. In 2008/09, 0.5 tonnes of crab in the Northern Zone, and 0.7 tonnes of crab in the Southern Zone remained uncaught by the rock lobster quota sector. By comparison, the catch allocated to the miscellaneous sector over the last seven seasons has generally been landed.

Table 2. Giant crab quota (tonnes) allocated to each fishing sector and zone since the establishment of TACC's in 1999. No sectoral quotas are allocated prior to 2002/03, as the fishery was operated under a fully competitive TACC.

Season	Quota		Miscellaneous		By-product		Total
	NZ	SZ	NZ	SZ	NZ	SZ	
1999/00	-	-	-	-	-	-	26,000
2000/01	-	-	-	-	-	-	22,100
2001/02	-	-	-	-	-	-	22,100
2002/03	4,690	2,236	8,040	6,029	670	435	22,100
2003/04	4,690	1,740	8,040	6,525	670	435	22,100
2004/05	4,690	1,740	8,040	6,525	670	435	22,100
2005/06	4,190	740	8,540	7,525	670	435	22,100
2006/07	4,104	740	8,626	7,525	670	435	22,100
2007/08	4,104	740	8,626	7,525	670	435	22,100
2008/09	4,104	740	8,626	7,525	670	435	22,100

3 PERFORMANCE INDICATORS

This section provides a report on the performance of the fishery against the interim performance indicators and reference points for the giant crab fishery defined in Sloan (2003). Insufficient data were available to assess the abundance of spawning females. Further, no upper or lower reference points are defined for sex ratio or spawning female abundance. Values of each PI in 2008/09 were derived from data provided by the miscellaneous and rock-lobster quota licence holders only.

3.1 Northern Zone

There are seven biological PI's specified for giant crabs in the NZ (Table 3; Figure 3). Data are available to assess fishery performance against six:

The targeted catch in the NZ in 2008/09 was 11.70 tonnes (Table 3). This represented 91.9% of the TACC (12.73 tonnes). This is above the lower reference point (85% of the TACC).

Total effort in the NZ was 5,899 potlifts in 2008/09. This value was within the reference range (4,637 – 8,987 potlifts).

During 2008/09, the catch rate in the NZ was 1.98 kg.potlift⁻¹. This value was within the reference range (1.5 – 3 kg.potlift⁻¹).

The mean weight of crabs harvested in the NZ in 2008/09 was 2.84 kg. This value was outside the reference range (2.96 – 3.65 kg), but did not exceed the lower reference point by more than 15%.

During 2008/09, the pre-recruit abundance in the NZ was 2.78 crabs.potlift⁻¹. This value was outside the reference range (1.6 – 1.7 crabs.potlift⁻¹), and more than 15% greater than the upper reference point.

The sex ratio (males:females) in the NZ in 2008/09 was 1:1.13.

3.2 Southern Zone

There are seven biological PI's specified for giant crabs in the SZ. Data are available to assess fishery performance against six:

The targeted catch in the SZ in 2008/09 was 7.45 tonnes (Table 3). This represented 90.1% of the TACC (8.27 tonnes). This exceeds the lower reference point (85% of the TACC).

Total effort in the SZ was 1,827 potlifts in 2008/09. This value was outside the reference range (1,836 – 5,458 potlifts), but was not below the lower reference point by >15%.

During 2008/09, the catch rate in the SZ was 4.08 kg.potlift⁻¹. This value was outside the reference range (1.5 – 3 kg.potlift⁻¹), and more than 15% greater than the upper reference point.

The mean weight of crabs harvested in the SZ in 2008/09 was 2.87 kg. This value was outside the reference range (2.96 – 3.65 kg), but was not below the lower reference point by >15%.

During 2008/09, the pre-recruit abundance in the SZ was 1.49 crabs.potlift⁻¹. This value was outside the reference range (1.6 – 1.7 crabs.potlift⁻¹), but was not below the lower reference point by >15%.

The sex ratio (males:females) in the SZ in 2008/09 was 1:0.57.

Table 3. Key performance indicator estimates for the South Australian giant crab fishery in 2008/09. Note that all estimates presented here are derived from the miscellaneous and rock lobster quota fishers only, and do not include information obtained from rock lobster by-product sector. Note also that the reference points for fishing effort have been calculated for the period 2001/00 – 2007/08, as they were not defined in the management plan. Values below the lower reference point are highlighted in red, while values exceeding the upper reference point are highlighted in green.

Location	Indicator	Upper Reference Point	Lower reference Point	Value in 2008/09
NZ	Catch (tonnes)	TACC	85% of TACC	91.9% of TACC
	Effort (pot lifts)	8,987	4,637	5,899
	Catch rate (kg.potlift ⁻¹)	3	1.5	1.98
	Mean weight (kg)	3.65	2.96	2.84
	Pre-recruit abundance (no.potlift ⁻¹)	1.7	1.6	2.78
	Sex ratio (M:F)	Not defined	Not defined	1:1.13
	Spawning female abundance	Not defined	Not defined	No data
SZ	Catch (tonnes)	TACC	85% of TACC	90.1% of TACC
	Effort (pot lifts)	5,458	1,836	1,827
	Catch rate (kg.potlift ⁻¹)	3	1.5	4.08
	Mean weight (kg)	3.65	2.96	2.87
	Pre-recruit abundance (no.potlift ⁻¹)	1.7	1.6	1.49
	Sex ratio (M:F)	Not defined	Not defined	1:0.57
	Spawning female abundance	Not defined	Not defined	No data

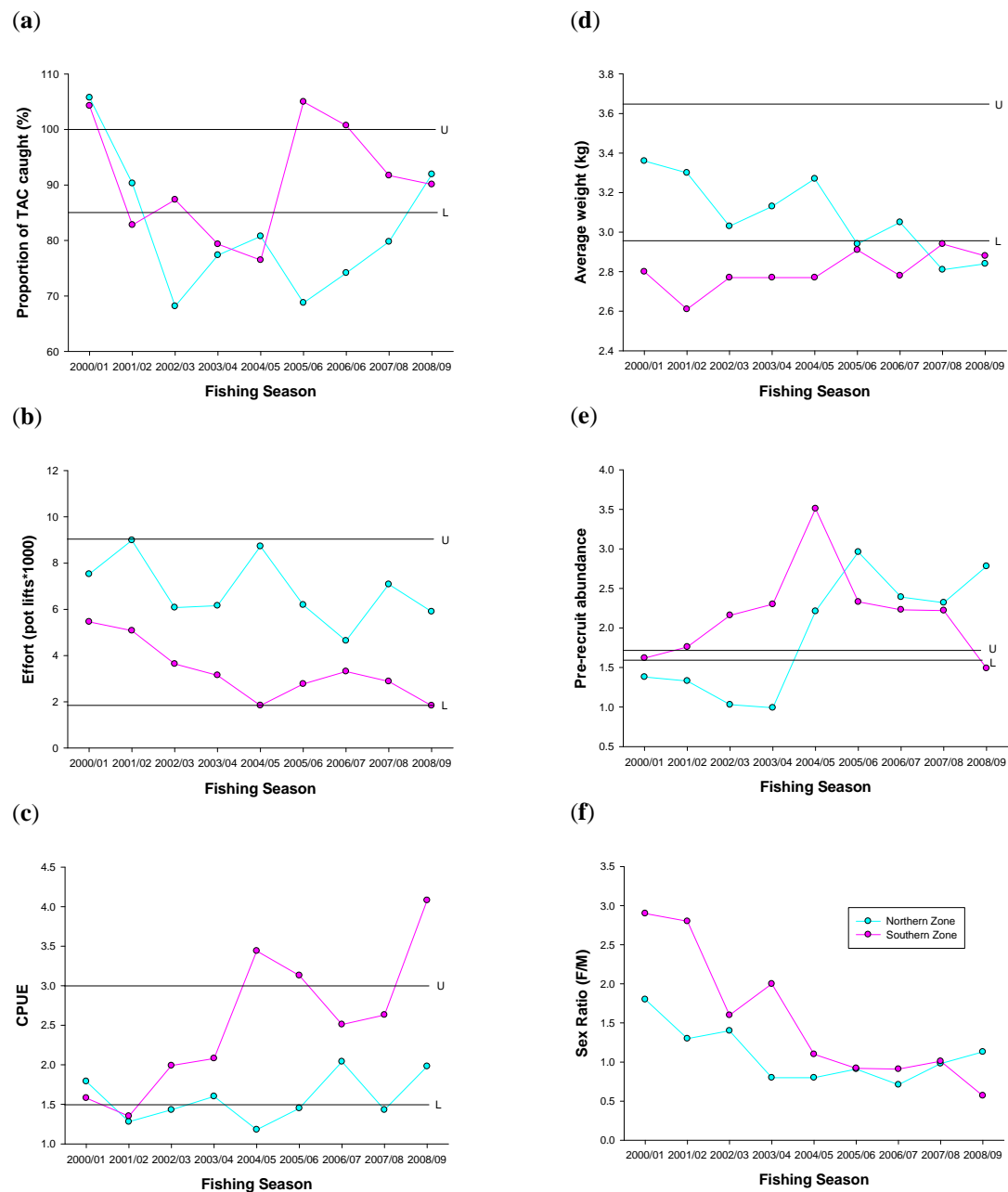


Figure 3. Plots of inter-seasonal differences in key performance indicators for the Northern Zone fishery (solid blue lines) and Southern Zone fishery (solid purple lines). Plots include a) catch as percentage of the targeted TACC, b) fishing effort, c) catch per unit effort (kg.pot lift^{-1}), d) mean crab weight \pm s.e., e) abundance of undersized ($<150\text{mm}$) crabs per pot lift, and f) the sex ratio. Horizontal lines in each graph indicate the upper (U) and lower (L) performance reference points. Note that all estimates presented here are derived from combined miscellaneous and rock lobster quota data only (i.e. they do not include information obtained from the rock lobster by-product sector).

4 SUMMARY

Current assessment of the South Australian Giant Crab Fishery is complicated by the lack of fishery and biological data. Nevertheless, there is no evidence to suggest that current levels of catch are unsustainable. During 2008/09, the majority of the quota allocated to the dedicated giant crab fishers was landed, at catch rates equivalent to record high levels. However, the magnitude of future crab catches, especially in the Southern Zone, may be strongly influenced by declines in the percentage of females harvested and the large reduction in pre-recruit numbers since 2004/05. The collection, collation and analysis of commercial length-frequency data would provide a sound basis for evaluating the veracity of such trends.

The quality of this assessment may be further improved by more detailed recording of the catch and effort data at finer spatial scales. At present, commercial logbooks make no provision for reporting catch and effort information separately in the NZ and SZ, when fishing trips straddle the boundary line of the two fishing zones. On such occasions, all data are allocated to the zone in which the fishing commenced. A re-designed logbook that allows fishers to record catch and effort data separately for each zone when fished on the same trip, would remove this uncertainty from the data. An alternatively solution, may be to combine and report the catch and effort data for the NZ and SZ together. This strategy appears to have a sound biological basis, as the giant crab stock is believed to be genetically homogeneous (Levings *et al.*, 2001), and separation of the population by zone is probably unwarranted.

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