

## Fishery Statistics for the South Australian Marine Scalefish Fishery: 1983/84 - 2015/16



AJ Fowler, R McGarvey, MA Steer and JE Feenstra

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SARDI Aquatic Sciences  
PO Box 120 Henley Beach SA 5022

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Report to PIRSA Fisheries and Aquaculture

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## 1. EXECUTIVE SUMMARY

This report provides a summary of the fishery statistics that relate to South Australia's complex, multi-species, multi-gear, and multi-sector Marine Scalefish Fishery. They are presented at the State-wide scale, along with an assessment of the recent performance of the fishery against the guidelines specified in the Management Plan for the South Australian Commercial Marine Scalefish Fishery (PIRSA 2013).

Table 1.1 summarises the outcomes of the assessment of the general fishery performance indicators for the 20 taxa whose fishery statistics were considered. Across these taxa, performance indicators were assessed against trigger reference points in a total of 64 different combinations of taxa and catch, effort and catch per unit effort (CPUE) categories. A total of 22 of these combinations breached the trigger reference points, which included seven breaches for the four Primary species, 11 for the Secondary species and four for the Tertiary species. The breaches were distributed amongst the catch, effort and CPUE categories.

**Table 1.1.** Summary table showing the combinations of MSF categories and species/taxa for which catch and effort data were assessed against trigger reference points. The data indicate whether a trigger reference point was breached in assessing the data from 2015/16 for; total catch, targeted effort categories 1 and 2, and targeted CPUE categories 1 and 2. Y – trigger reference point breached, N – not breached, n.a. = not applicable.

Category	Species/taxon	Target effort category 1	Target effort category 2	Total catch	Target effort category 1	Target effort category 2	Target CPUE category 1	Target CPUE category 2
Primary	King George Whiting	handline	-	Y	Y	-	Y	-
	Snapper	handline	longline	N	Y	N	N	Y
	Southern Garfish	haul net	dabnet	Y	Y	N	N	N
	Southern Calamari	jig	haul net	N	N	N	N	N
Secondary	Yellowfin Whiting	tot target	haul net	N	N	N	Y	Y
	Australian Salmon	haul net	-	Y	N	-	N	-
	Australian Herring	tot target	haul net	Y	Y	Y	N	N
	Vongole	tot target	-	N	N	-	N	-
	Snook	haul net	troll line	Y	Y	Y	N	N
	Sand Crabs	tot target	crab net	N	N	N	N	Y
	Whaler Sharks	longline	-	N	N	-	N	-
	Mulloway	handline + fish pole	handline + fish pole	Y	N	-	N	-
Tertiary	Ocean Jackets	tot target	-	N	N	-	N	-
	Yelloweye Mullet	tot target	haul net	Y	Y	Y	N	N
	Bluethroat Wrasse	n.a.	n.a.	N	-	-	-	-
	Cuttlefish	n.a.	n.a.	N	-	-	-	-
	Silver Trevally	n.a.	n.a.	N	-	-	-	-
	Leatherjackets	n.a.	n.a.	N	-	-	-	-
Other	Gummy Sharks	n.a.	n.a.	N	-	-	-	-
	Rays and Skates	n.a.	n.a.	Y	-	-	-	-

Table 1.2 shows the results for the four Primary species of the comparisons between the proportional catches of the different commercial fisheries in 2015/16 against their proportional allocations (PIRSA 2013). There were no breaches for any of the trigger reference points for any of the Primary species.

**Table 1.2.** Summary table for Primary species showing results of assessment of catches in 2015/16 against allocations amongst commercial fisheries. Y – trigger reference point breached, N – trigger reference point not breached, n.a. = not applicable.

Species		MSF	SZRL	NZRL	LCF	GSVP	SGP	WCP
King George Whiting	Trigger 2 (%)	n.a.	N	N				
	Trigger 3 (%)	n.a.	N	N				
Snapper	Trigger 2 (%)	n.a.	N	N	N			
	Trigger 3 (%)	n.a.	N	N	N			
Southern Garfish	Trigger 2 (%)	n.a.	N	N				
	Trigger 3 (%)	n.a.	N	N				
Southern Calamari	Trigger 2 (%)	N		N		N	N	N
	Trigger 3 (%)	N		N		N	N	N

## 2. INTRODUCTION

This is the 12<sup>th</sup> annual report that summarises and assesses the fishery statistics for the Marine Scalefish Fishery (MSF) of South Australia (SA). The aims of the report are to provide a historical summary of the commercial and recreational fishery statistics at the State-wide scale, and to consider the recent performance of the fishery by assessing performance indicators against trigger reference points. The requirement for this annual series of reports was prescribed in the original Management Plan (Noell *et al.* 2006), and has continued in the current Management Plan for the South Australian Commercial Marine Scalefish Fishery (PIRSA 2013).

The report summarises the fishery statistics for 20 different species or taxonomic groups that are distributed across the 'Primary', 'Secondary', 'Tertiary' and 'Other' species categories, as defined in the Management Plan (PIRSA 2013) (Table 2.1). These taxa are largely consistent with those considered in previous stock status and fishery statistics reports (Fowler *et al.* 2011, 2012, 2013a, 2014, 2015), whilst the report also provides estimates of total catch for the remaining Marine Scalefish species, as listed under Schedule 1 of the Regulations.

For each species or taxon, the data presented are: a map that shows the relative catches in 2015/16 from the different South Australian Marine Fishing Areas; historical State-wide commercial catches and targeted fishery statistics from 1983/84 to 2015/16; and State-wide estimates of recreational catch from four recreational surveys (McGlennon and Kinloch 1997; Henry and Lyle 2003; Jones 2009; Giri and Hall 2015). The results of comparisons between fishery performance indicators in 2015/16 and trigger reference points calculated from the time-series of fishery statistics are also shown. Furthermore, for the Primary species (Table 2.1), the relative contributions to total commercial catch in 2015/16 by the various fisheries, such as the MSF, Northern and Southern Rock Lobster Fisheries (NZRLF, SZRLF) and Lakes and Coorong Fishery (LCF), were compared against their allocated shares.

**Table 2.1.** List of categories and species/taxa considered in this report, as specified in the Management Plan (PIRSA 2013). Also shown are the gear types for which annual targeted catch, effort and CPUE are reported for each taxon. n.a. = not applicable.

Category	Species/taxon	Catch & effort category 1	Catch & effort category 2
Primary	King George Whiting	handline	-
	Snapper	handline	longline
	Southern Garfish	haul net	dabnet
	Southern Calamari	jig	haul net
Secondary	Yellowfin Whiting	total target	haul net
	Australian Salmon	haul net	-
	Australian Herring	total target	haul net
	Vongole	total target	-
	Snook	haul net	troll line
	Sand Crabs	total target	crab net
	Whaler Sharks	longline	-
	Mulloway	handline + fish pole	handline + fish pole
Tertiary	Ocean Jackets	total target	-
	Yelloweye Mullet	total target	haul net
	Bluethroat Wrasse	n.a.	n.a.
	Cuttlefish	n.a.	n.a.
	Silver Trevally	n.a.	n.a.
	Leatherjackets	n.a.	n.a.
Other	Gummy Sharks	n.a.	n.a.
	Rays and Skates	n.a.	n.a.

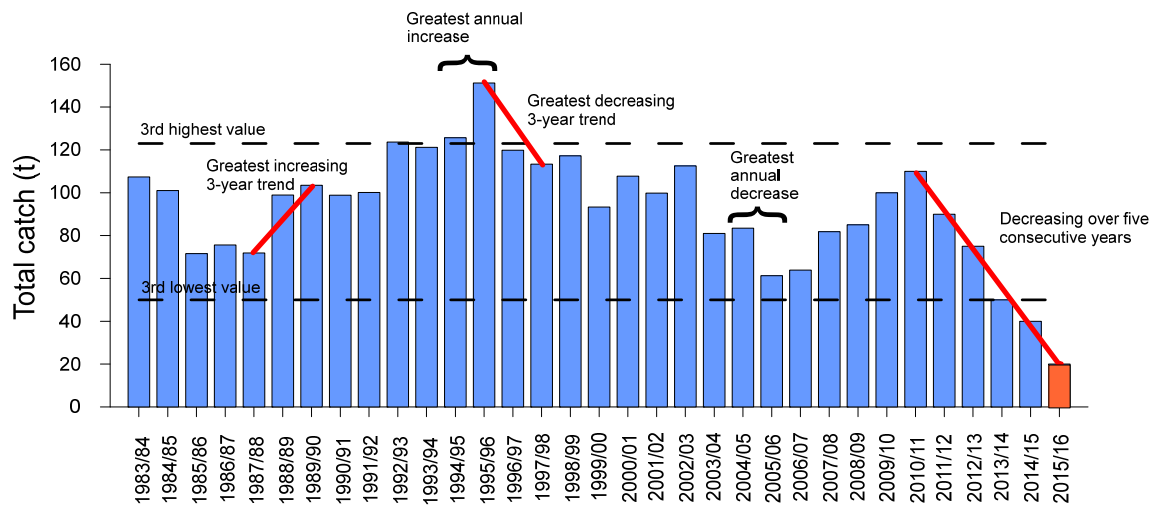
### 3. METHODS

Commercial catch and effort data were the primary data considered in this report. The data were considered at the State-wide scale rather than the regional or stock scales, as is the case for the stock assessment reports. The data for each taxon were extracted from the commercial Marine Scalefish Fisheries Information System, which records data for Marine Scalefish species from the catch returns that are submitted monthly by commercial fishers from the MSF, NZRLF and SZRLF fisheries. Data on Snapper catches from the LCF and by-product of Southern Calamari by the South Australian Prawn fisheries were also included. The data considered were from 1983/84 to 2015/16. For each of the Primary, Secondary and several Tertiary species, annual estimates were calculated and presented for: (1) total State-wide catch; (2) total catch by Marine Fishing Area (MFA) in 2015/16; and targeted State-wide (3) catch, (4) effort and (5) catch per unit effort (CPUE) for the particular gear types specified for each taxon in Table 2.1. Furthermore, for the three categories of taxa, time-series of the total annual catches combined amongst taxa are presented. Also, there is a time-series for the total catches for the four Primary species differentiating amongst the species, to show how they varied relative to each other over time. Two summary tables of total annual catches are also presented: one for the 20 species considered in detail (Table 4.21); and one that shows the estimates of total annual catch over the past five years for most of the remaining permitted species from Schedule 1 of the regulations (Table 4.22) (PIRSA 2013).

The recent performance of the fishery was considered at the State-wide scale by comparing the general performance indicators for 2015/16 against trigger reference points that were calculated from the historic data from 1983/84 to 2015/16. The performance indicators considered for the various taxa were: total commercial catch; targeted effort; and targeted CPUE for the specific gear types indicated in Table 2.1. The method of determining the trigger reference points is illustrated in Fig. 3.1. A trigger reference point was breached when the fishery performance in 2015/16 differed considerably from that in previous years, as determined by addressing the following questions:

- was the value of the indicator in 2015/16 among either the top three or bottom three values over the reference period?
- was the change in the indicator between 2014/15 and 2015/16, i.e. the two most recent years, the greatest inter-annual increase or decrease?
- was the slope of the linear trend over the last three years to 2015/16 (five years for Snapper), the greatest rate of increase or decrease through the reference period?
- did the indicator decrease over the last five consecutive years?

For each taxon, a table is presented that shows the outcomes of these comparisons indicating whether any trigger reference points were breached and the nature of any breaches.



**Figure 3.1** Schematic illustration of the assessment of trigger reference points for a hypothetical dataset for which the data from 2015/16 were assessed against those from the remainder of the reference period. The trigger reference points were: 3<sup>rd</sup> highest and 3<sup>rd</sup> lowest values over the reference period; the greatest inter-annual change (+ or -); the greatest rates of change over a three-year period (+ or -) (five-year period for Snapper); and decrease over five consecutive years to 2015/16.

There were some minor variations from the general protocol described above. For most Tertiary and Other species (Table 2.1), the only fishery performance indicator considered was total annual, State-wide, commercial catch. This meant that ‘targeted’ fishing effort and CPUE were not considered. For several Secondary species whose commercial fisheries were developed after 1983/84, truncated reference periods were considered when calculating the trigger reference points, i.e. for Ocean Jackets - 1988/89 to 2015/16 and for Vongole - 1985/86 to 2015/16. For all species, the presentation of data was limited by constraints of confidentiality, i.e. data could only be presented for years when summarised from five or more fishers. Furthermore, for each taxon, the graph for total commercial catch also shows the results from four recreational surveys, for comparison of catches between the two sectors. These recreational surveys were: the recreational boat ramp - creel survey done between 1994 and 1996 (McGlennon and Kinloch 1997); the National Recreational and Indigenous Fishing Survey that collected data between May 2000 and April 2001 (Henry and Lyle 2003); the State-wide telephone/diary survey of South Australian residents done from November 2007 to October 2008 (Jones 2009); and the State-wide telephone diary survey of South Australian residents done from December 2013 to November 2014 (Giri and Hall 2015).

For the four Primary species, the catches taken by the different commercial fisheries were compared amongst their allocated percentages, based on the catches taken in 2007/08 (PIRSA 2013). This was done by addressing the following two questions with respect to allocation triggers specified in Table 3.1 (from Table 9 of Management Plan):

- did the particular commercial fishery's contribution to total commercial catch exceed its allocation by the percentage nominated as Trigger 2 in Table 3.1 in three consecutive years or in four of the five previous years up to 2015/16?
- did the fishery's contribution in 2015/16 exceed its allocation of the total commercial catch by the amount nominated as Trigger 3 in Table 3.1?

Various quality assurance processes were implemented at each step during data handling and processing to ensure the accuracy of the final output. These included:

- 1) commercial catch and effort data were cross-checked by staff from SARDI's Fisheries - Information Services Group using validation processes that included:
  - a) random cross-checking of raw data transferred from commercial catch returns,
  - b) random cross-checking of data entered to the database by trained personnel,
  - c) automated filters and structured queries built into the fisheries statistics database;
- 2) extracted commercial catch and effort data were graphed into their species/gear/time categories and cross-checked with the time-series presented in various stock status and fishery statistics reports (Fowler *et al.* 2011, 2012, 2013a, 2014, 2015);
- 3) regular meetings of the authors were held to discuss data handling and interpretation;
- 4) prescribed trigger reference points were calculated using the 'R' statistical software. Plotted time-series were generated for each species/taxon and the calculations cross-checked by hand and visual inspection against graphs;
- 5) tabulated results included in the report were further cross-checked against the computer output before the report was submitted to SARDI's formal review process;
- 6) the report was formally reviewed by two SARDI scientists before approval for publication.

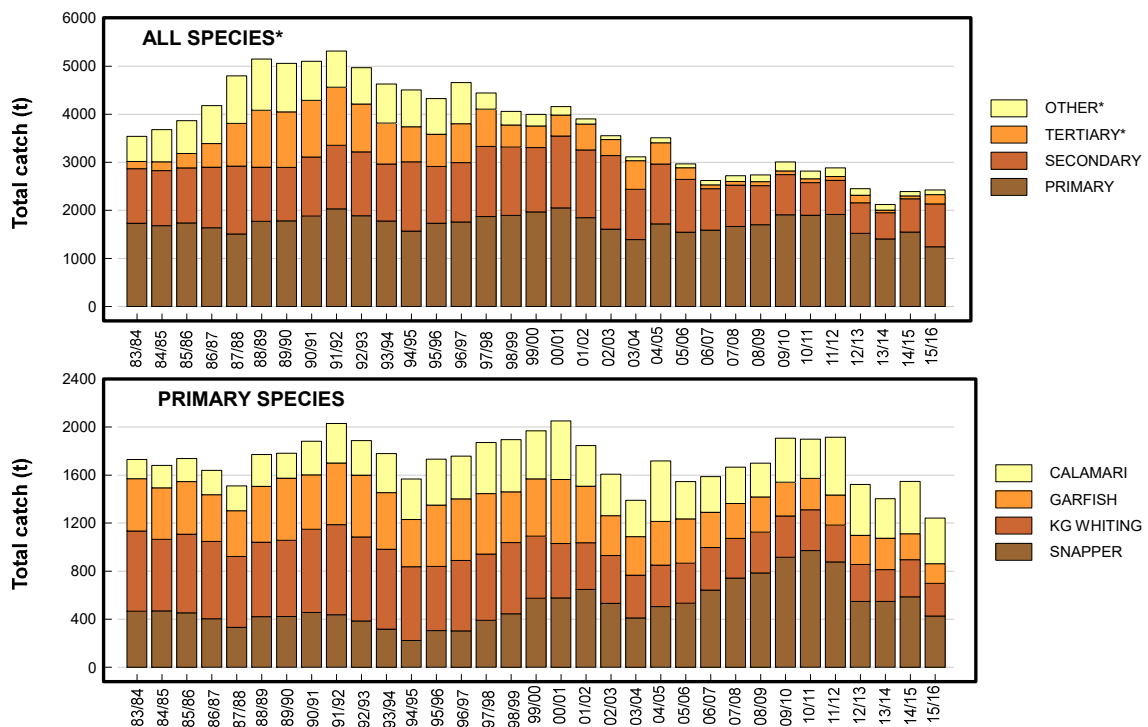


**Table 3.1.** Allocation triggers for the Primary species of the MSF. The table shows the percentage of the commercial allocation for each species to the various commercial fisheries that contribute to total commercial catch. It also shows the trigger reference points for each of Triggers 2 and 3 for each fishery. Note that when the commercial allocation is >95%, no trigger limits are set. Fisheries are MSF = Marine Scalefish Fishery, SZRLF = Southern Zone Rock Lobster Fishery, NZRLF = Northern Zone Rock Lobster Fishery, MISC = Miscellaneous Fishery, LCF = Lakes and Coorong Fishery, GSVPF = Gulf St. Vincent Prawn Fishery, SGPF = Spencer Gulf Prawn Fishery, WCPF = West Coast Prawn Fishery.

Species		MSF	SZRLF	NZRLF	MISC	LCF	GSVPF	SGPF	WCPF
King George Whiting	Commercial allocation	98.1	0.0	1.9	-	-	-	-	-
	Trigger 2	na	0.5	2.97					
	Trigger 3	na	0.75	3.96					
Snapper	Commercial allocation	97.5	1.78	0.68	-	0.04	-	-	-
	Trigger 2	na	2.68	1.3		0.75			
	Trigger 3	na	3.58	2.0		1.0			
Southern Garfish	Commercial allocation	99.79	0.16	0.05	-	-	-	-	-
	Trigger 2	na	0.75	0.75					
	Trigger 3	na	1.0	1.0					
Southern Calamari	Commercial allocation	90.91	-	0.73	-	-	0.73	7.47	0.16
	Trigger 2	92.7		1.46			1.46	8.2	0.75
	Trigger 3	95.4		2.19			2.19	11.2	1.0

### 4. RESULTS/DISCUSSION

Total production of the four various categories of taxa has varied considerably over time (Fig. 4.1a). The combined catches of the Primary species have been relatively consistent, compared with those in the Secondary, Tertiary and Other species categories, which have all declined considerably, particularly since the late 1990s. Nevertheless, total catches across the four Primary species have demonstrated some cyclical variation (Fig. 4.1b). Their total production was lowest in 2015/16, having declined since 2011/12. This recent decline primarily related to the declining catch of Snapper since 2010/11, but also reflected long-term declining trends for King George Whiting and Southern Garfish. The total catches of Southern Calamari have been relatively consistent since the early 1990s.



**Figure 4.1** State-wide annual commercial catches. (a) catches by category of taxa (Table 2.1); (b) catches of Primary species. \* Note that only species indicated in Table 2.1 are included.

For King George Whiting, targeted handline fishing effort has declined regularly since 1994/95, dropping to its minimum in 2015/16 (Fig. 4.2, Table 4.1a). Total catch declined marginally from that recorded in 2014/15, although handline CPUE remained high. For Snapper, considerable drops in total and targeted catches in 2015/16 reflected declines in targeted effort and CPUE, particularly for longlines (Fig. 4.3, Table 4.2a). Targeted handline catch and effort remained at historic lows. For Southern Garfish, the lowest ever catch was recorded in 2015/16, as related to a long-term trend of declining targeted

hauling net effort and a recent decline in CPUE (Fig. 4.4, Table 4.3a). Targeted dabnet catch and CPUE increased marginally. For Southern Calamari in 2015/16, all fishery performance indicators were at moderate levels, and so no trigger reference points were breached (Fig. 4.5, Table 4.4a). For the four Primary species, the catches by the different commercial sectors were compared against their allocations (PIRSA 2013). No trigger reference points for any species were breached (Tables 4.1b, 4.2b, 4.3b, 4.4b), indicating that the contributions of the various commercial fisheries to total catch did not vary significantly from their allocations.

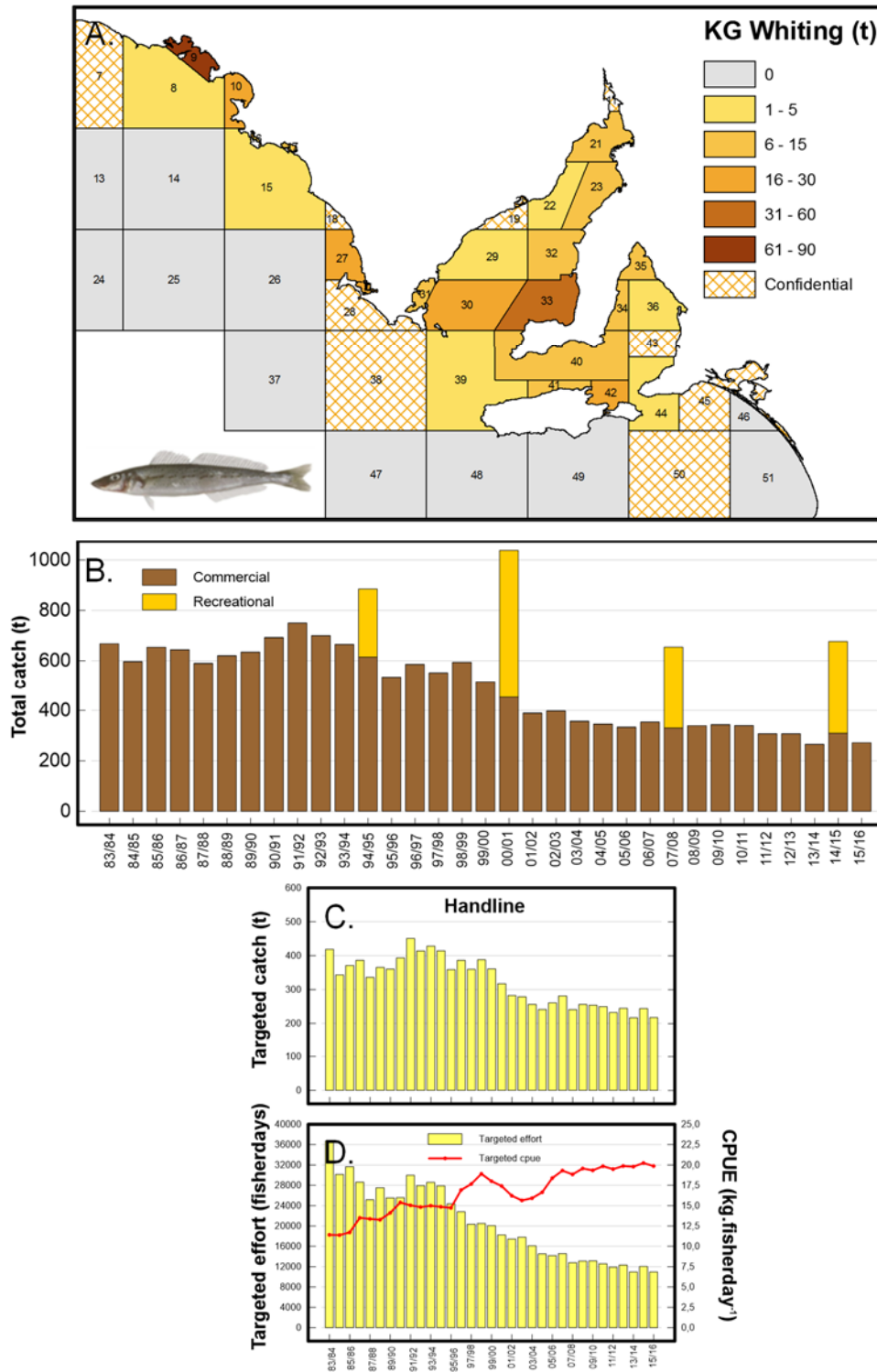
In 2015/16 for Yellowfin Whiting, there was a marginal increase in total catch despite the greatest annual declines in targeted CPUE levels for hauling nets and all gears combined (Fig. 4.6, Table 4.5a). Australian Salmon experienced its highest ever three-year increasing trend in catch, from the low levels recorded in 2012/13 and 2013/14 (Fig. 4.7, Table 4.6). For Australian Herring, total and targeted catch levels remained at their lowest levels, reflecting low levels of targeted effort and CPUE (Fig. 4.8, Table 4.7a). For Vongole in 2015/16, there were marginal increases in targeted catch, effort and CPUE, although these remained considerably below the maxima attained in previous years (Fig. 4.9, Table 4.8). Note that specific fishery indicators for Vongole, based on estimated biomass and trigger reference points, are considered elsewhere for the individual fisheries (Dent *et al.* 2012). In 2015/16, the 3<sup>rd</sup> lowest ever catch of Snook reflected low targeted hauling net catch and effort, and low targeted troll line catch due to the lowest-ever level of trolling effort (Fig. 4.10, Table 4.9a). For Sand Crabs, there was a marginal increase in total catch reflecting increases in targeted catch, effort and CPUE, including the highest crab net CPUE recorded (Fig. 4.11, Table 4.10a). For Yelloweye Mullet, the total catch in 2015/16 was the lowest ever, reflecting long-term declining levels of targeted catch and effort, despite on-going high levels of CPUE (Fig. 4.12, Table 4.11). The commercial catch for Mulloway was at its 3<sup>rd</sup> lowest level in 2015/16, reflecting low targeted effort (Fig. 4.13, Table 4.12a). For Whaler Sharks, annual catch has declined back to a moderate level from the record catch taken in 2009/10, reflecting a decrease in targeted longline effort and a recent decline in CPUE (Fig. 4.14, Table 4.13). In 2015/16, a low catch of Ocean Jackets was taken due to long-term low targeted effort (Fig. 4.15, Table 4.14).

In 2015/16, the results for the various Tertiary taxa did not vary substantially from previous years. Moderate catches were recorded for Bluethroat Wrasse (Fig. 4.16, Table 4.15), and Silver Trevally (Fig. 4.17, Table 4.16). Low catches for Leatherjackets (Fig. 4.18, Table 4.17), Rays and Skates (Fig. 4.20, Table 4.19) and Cuttlefish (Fig. 4.21,

Table 4.20) were recorded. Annual catches of Gummy Sharks increased slowly from 2002/03 to 2009/10, but have subsequently declined (Fig. 4.19, Table 4.18).

In 2015/16, total State-wide commercial catches for several Primary and Secondary species remained at near historic low levels, generally reflecting long-term declines in targeted effort. These species included King George Whiting, Southern Garfish, Australian Herring, Snook, Yelloweye Mullet and Mulloway. For most of these species the declines were associated with declining effort and/or CPUE in the hauling net sector. Furthermore, for Snapper in 2015/16, there were notable declines from the recent record levels of longline catch, effort and CPUE of recent years. The most notable increase in catch was that for Australian Salmon that occurred in 2014/15 and 2015/16. A total of 22 trigger reference points were breached across the 20 taxa, including seven breached for the three primary species of King George Whiting, Snapper and Southern Garfish.

### 4.1 King George Whiting (*Sillaginodes punctatus*)



**Figure 4.2** Fishery statistics for King George Whiting. (a) Map of South Australia's Marine Fishing Areas showing catches during 2015/16; (b) Total State-wide commercial and recreational catches; (c) Targeted annual handline catches; (d) Targeted annual handline effort and CPUE.

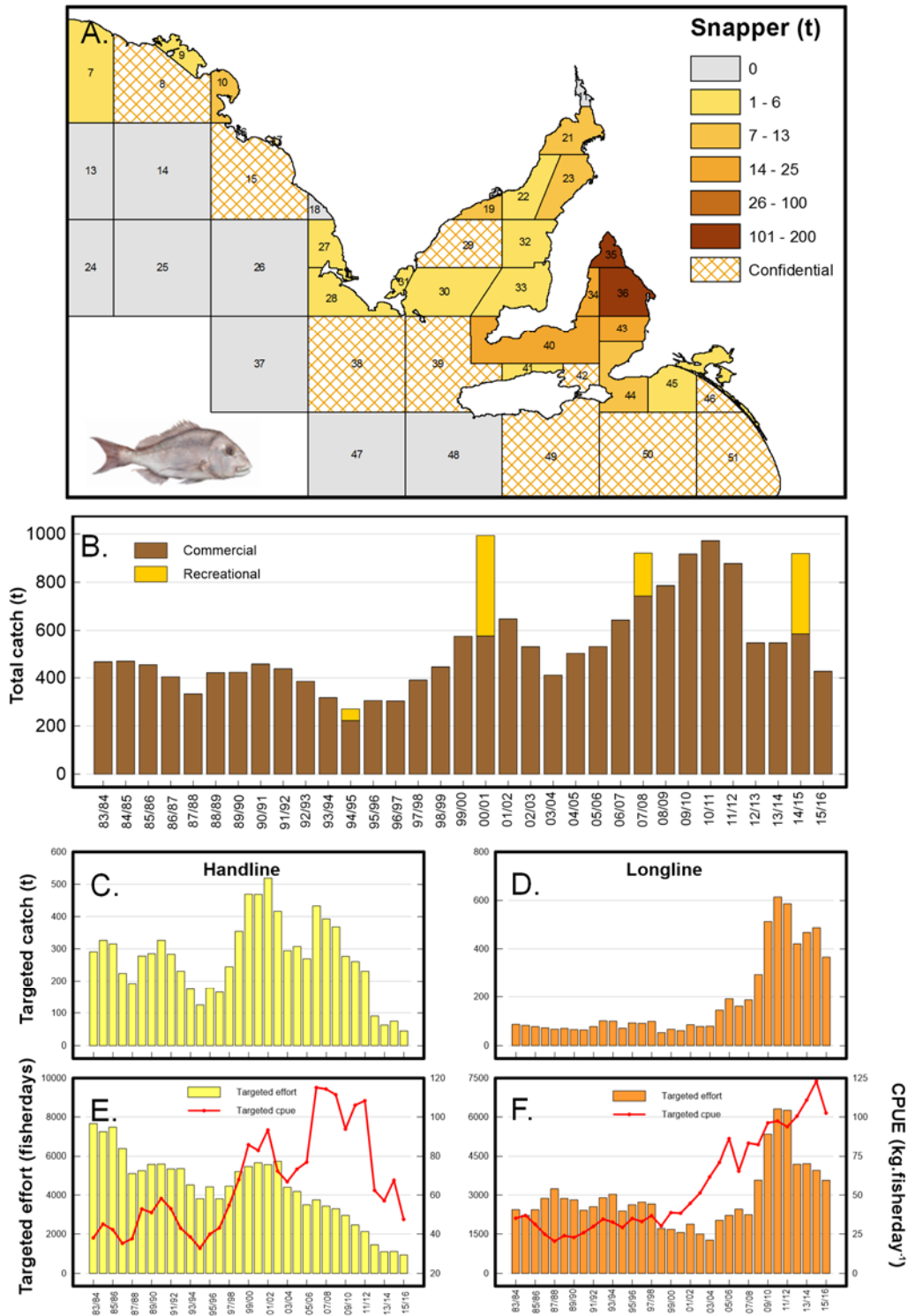
**Table 4.1a** Comparisons between performance indicators and trigger reference points for King George Whiting.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	2 <sup>nd</sup> Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B1. Targeted handline effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted handline CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	3 <sup>rd</sup> Highest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	

**Table 4.1b** Comparisons between the catches of King George Whiting by the different commercial fishery sectors in 2015/16 with allocation trigger limits specified in the Management Plan (PIRSA 2013).

Species		MSF	SZRL	NZRL	Total
King George Whiting	Commercial fishery catch (t)	268.9	0	2.5	271.4
	% of total	99.1	0	0.9	
	Commercial allocation	98.1	0	1.9	
	Trigger 2 (%)	n.a.	0.5	2.97	
	Trigger 3 (%)	n.a.	0.75	3.96	
	Trigger 2 breached (?)	n.a.	No	No	
	Trigger 3 breached (?)	n.a.	No	No	

### 4.2 Snapper (*Chrysophrys auratus*)



**Figure 4.3** Fishery statistics for Snapper. (a) Map of South Australia's Marine Fishing Areas showing catches during 2015/16; (b) Total annual State-wide commercial and recreational catches; (c) Targeted annual State-wide handline catch; (d) Targeted annual State-wide longline catch; (e) Targeted annual State-wide handline effort and CPUE; (f) Targeted annual State-wide longline effort and CPUE.

**Table 4.2a** Comparisons between performance indicators and trigger reference points for Snapper.

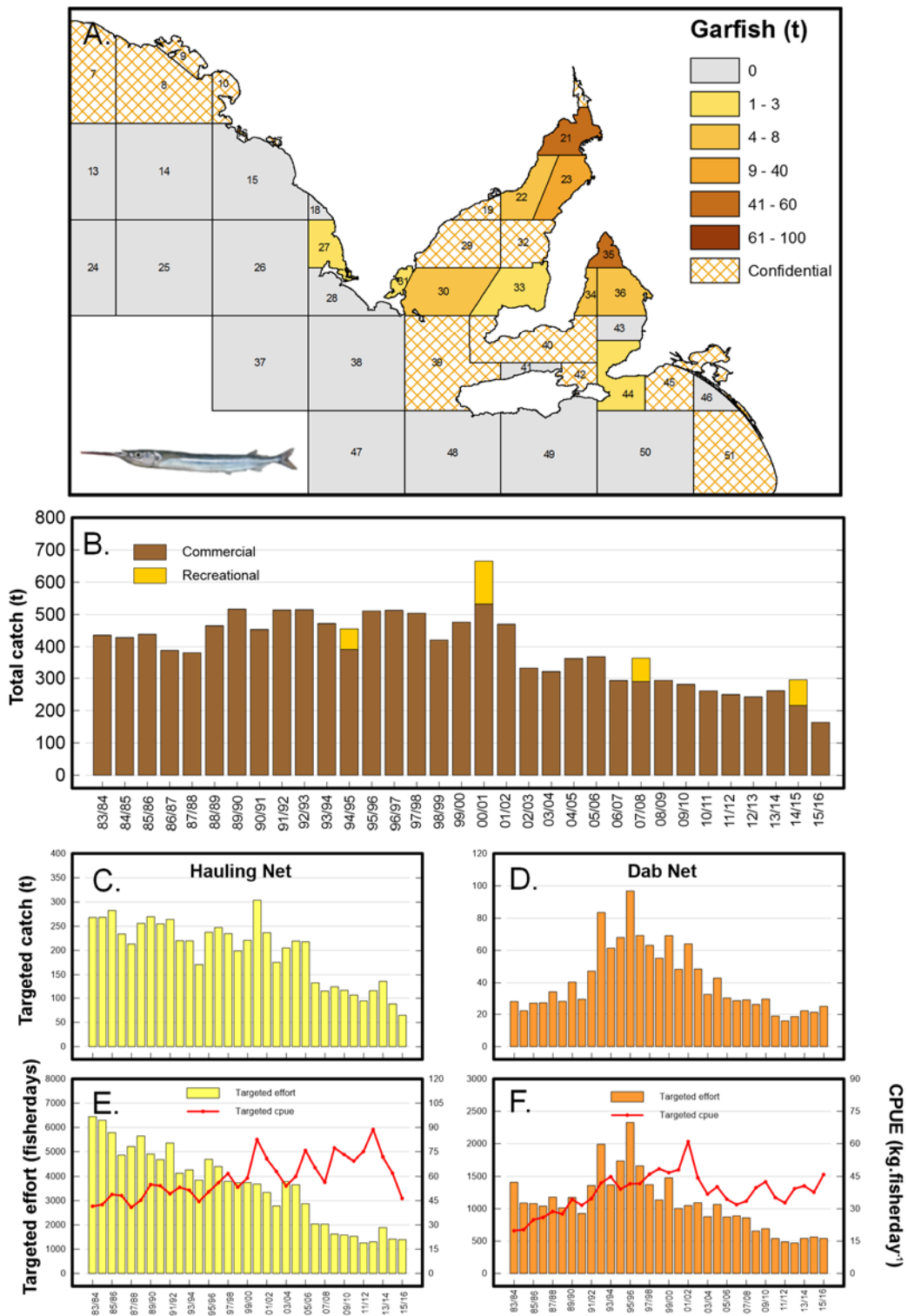
Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 5-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B1. Targeted handline effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	<b>Yes</b>	<b>Lowest</b>
	Greatest interannual change ( $\pm$ )	No	
	Greatest 5-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B2. Targeted longline effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 5-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted handline CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 5-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C2. Targeted longline CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	<b>Yes</b>	<b>3<sup>rd</sup> Highest</b>
	Greatest interannual change ( $\pm$ )	No	
	Greatest 5-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	

**Table 4.2b** Comparisons between the catches of Snapper by the different commercial fishery sectors in 2015/16 with allocation trigger limits specified in the Management Plan (PIRSA 2013).

Species		MSF	SZRL	NZRL	LC	Total
Snapper	Commercial fishery catch (t)	426.2	0.4	0.4	0	427.0
	% of total	99.8	0.1	0.1	0	
	Commercial allocation	97.5	1.78	0.68	0.04	
	Trigger 2 (%)	n.a.	2.68	1.3	0.75	
	Trigger 3 (%)	n.a.	3.58	2	1	
	Trigger 2 breached (?)	n.a.	No	No	No	
	Trigger 3 breached (?)	n.a.	No	No	No	



### 4.3 Southern Garfish (*Hyporhamphus melanochir*)



**Figure 4.4** Fishery statistics for Southern Garfish. (a) Map of South Australia's Marine Fishing Areas showing catches during 2015/16; (b) Total annual State-wide commercial and recreational catches; (c) Targeted annual State-wide hauling net catch; (d) Targeted annual State-wide dab net catch; (e) Targeted annual State-wide hauling net effort and CPUE; (f) Targeted annual State-wide dab net effort and CPUE.

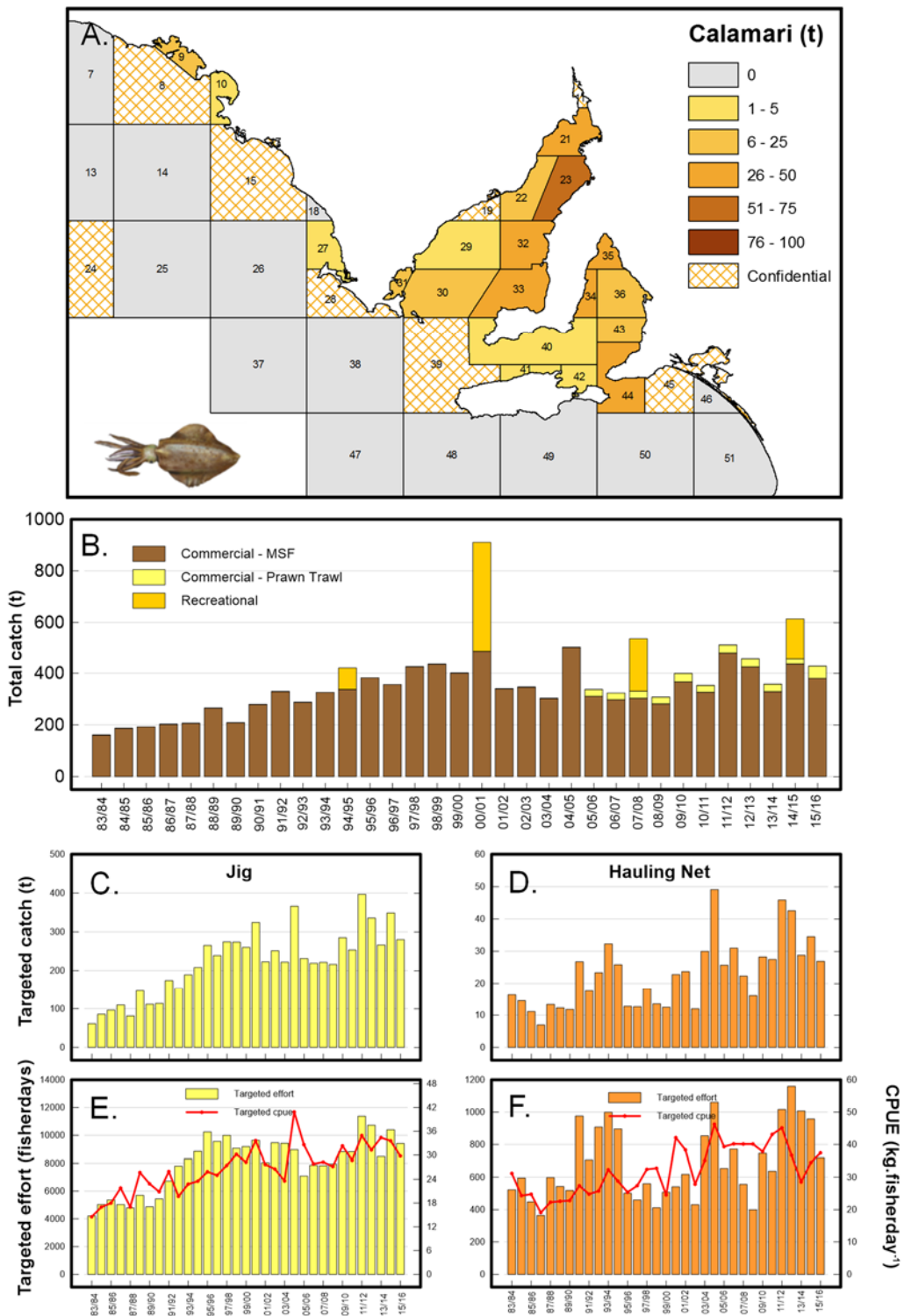
**Table 4.3a** Comparisons between performance indicators and trigger reference points for Southern Garfish.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B1. Targeted hauling net effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	3rd Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B2. Targeted dab net effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted hauling net CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C2. Targeted dab net CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	

**Table 4.3b** Comparisons between the catches of Southern Garfish by the different commercial fishery sectors in 2015/16 with allocation trigger limits specified in the Management Plan (PIRSA 2013). Crosses indicate confidential data.

Species		MSF	SZRL	NZRL	Total
Southern Garfish	Commercial fishery catch (t)	163.4	x	x	x
	% of total	x	x	x	
	Commercial allocation	99.79	0.16	0.05	
	Trigger 2 (%)	n.a.	0.75	0.75	
	Trigger 3 (%)	n.a.	1	1	
	Trigger 2 breached (?)	n.a.	No	No	
	Trigger 3 breached (?)	n.a.	No	No	

### 4.4 Southern Calamari (*Sepioteuthis australis*)



**Figure 4.5** Fishery statistics for Southern Calamari. (a) Map of South Australia’s Marine Fishing Areas showing catches during 2015/16; (b) Total annual State-wide commercial and recreational catches; (c) Targeted annual State-wide jig catches; (d) Targeted annual State-wide hauling net catches; (e) Targeted annual State-wide jig effort and CPUE; (f) Targeted annual State-wide hauling net effort and CPUE.

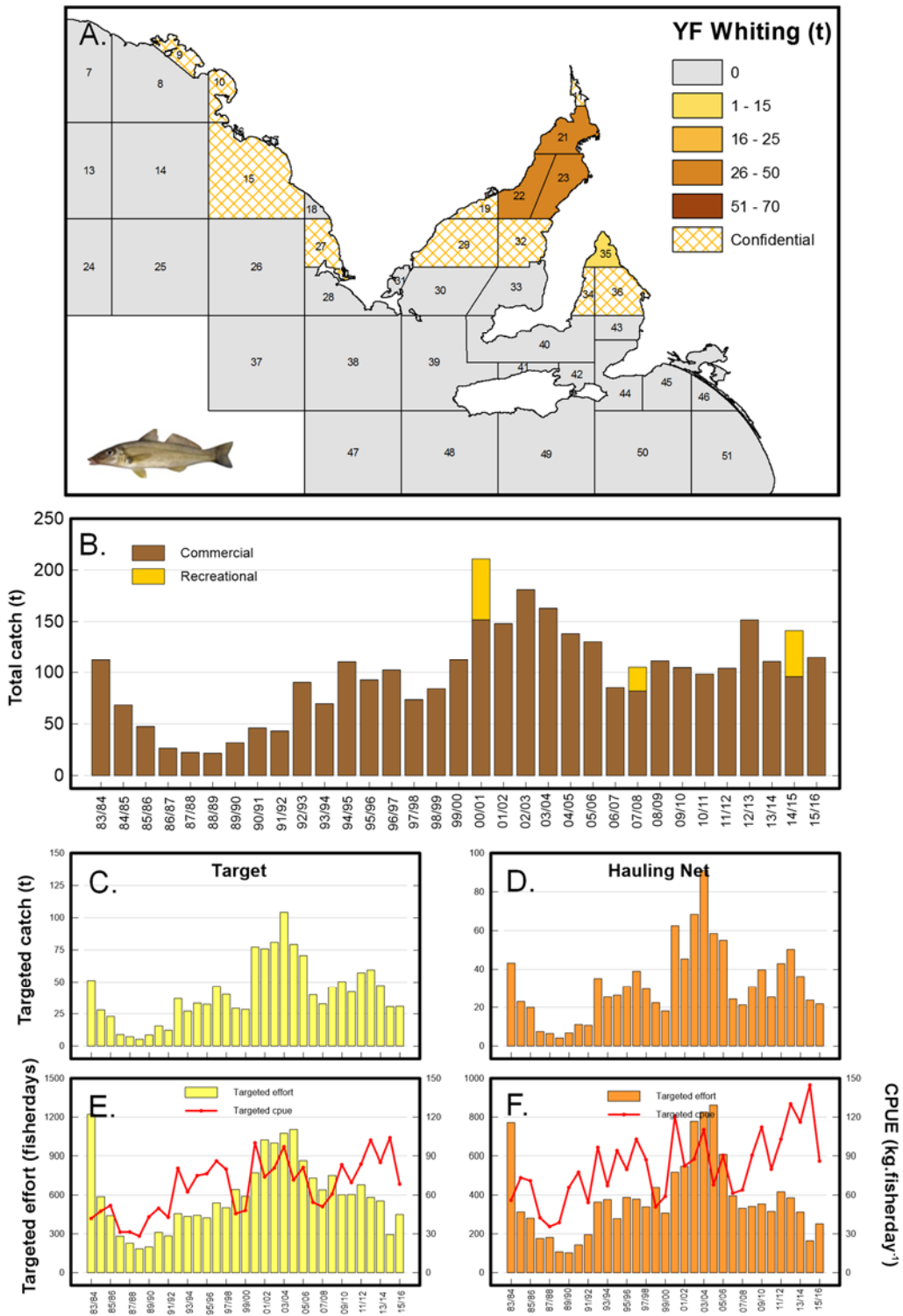
**Table 4.4a** Comparisons between performance indicators and trigger reference points for Southern Calamari.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B1. Targeted jig effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B2. Targeted hauling net effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted jig CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C2. Targeted hauling net CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	

**Table 4.4b** Comparisons between the catches of Southern Calamari by the different commercial fishery sectors in 2015/16 with allocation trigger limits specified in the Management Plan (PIRSA 2013). Crosses indicate confidential data.

Species		MSF	NZRL	GSVP	SGP	WCP	Total
Southern Calamari	Commercial fishery catch (t)	378.8	1.2	3.5	43.3	x	x
	% of total	x	x	x	x	x	
	Commercial allocation	90.91	0.73	0.73	7.47	0.16	
	Trigger 2 (%)	92.7	1.46	1.46	8.2	0.75	
	Trigger 3 (%)	95.4	2.19	2.19	11.2	1	
	Trigger 2 breached (?)	No	No	No	No	No	
	Trigger 3 breached (?)	No	No	No	No	No	

### 4.5 Yellowfin Whiting (*Sillago schomburgkii*)

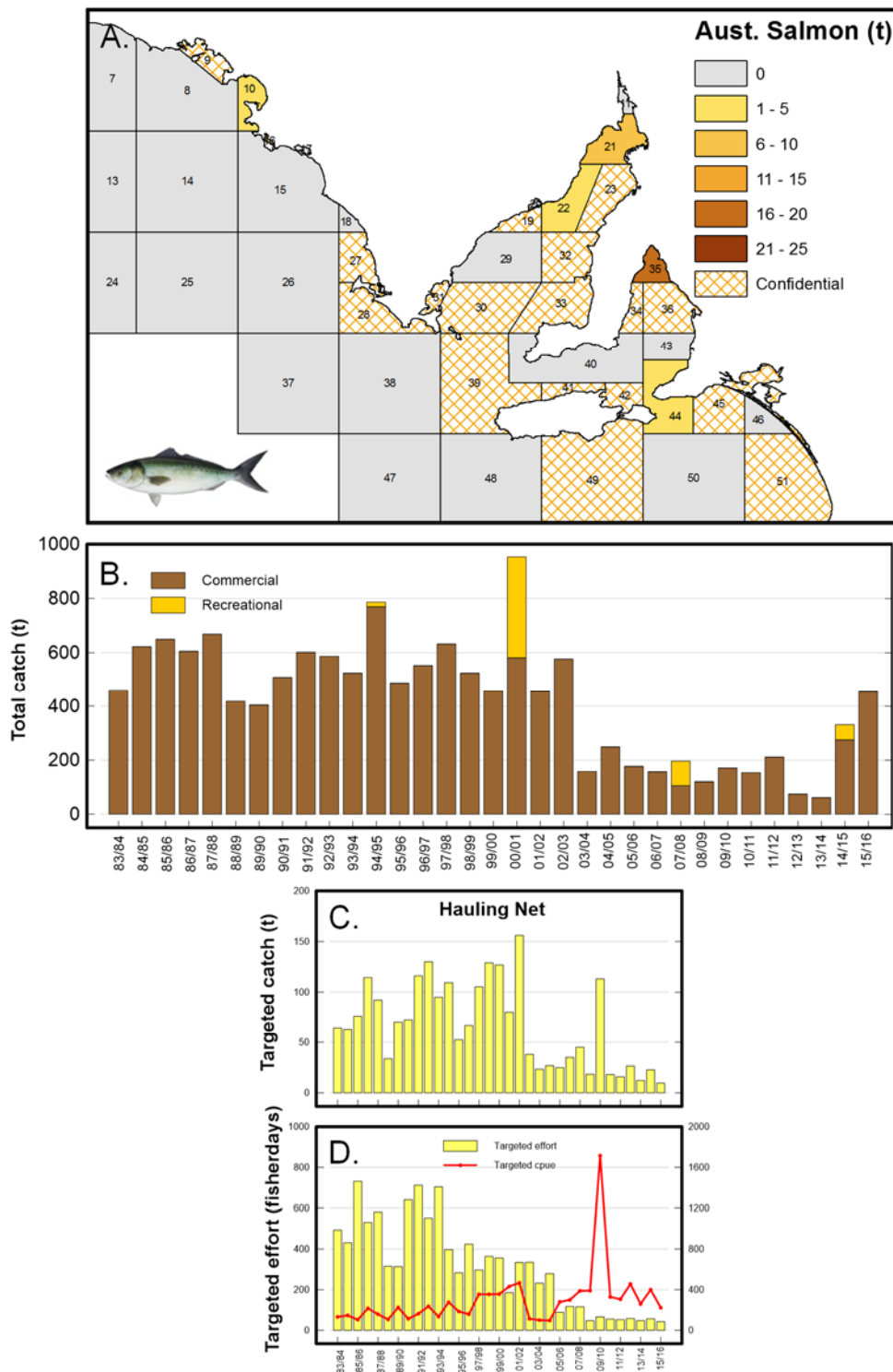


**Figure 4.6** Fishery statistics for Yellowfin Whiting. (a) Map of South Australia's Marine Fishing Areas showing catches during 2015/16; (b) Total annual State-wide commercial and recreational catches; (c) Targeted annual State-wide catches across all gear types; (d) Targeted annual State-wide hauling net catches; (e) Targeted annual State-wide effort and CPUE across all gear types; (f) Targeted annual State-wide hauling net effort and CPUE.

**Table 4.5a** Comparisons between performance indicators and trigger reference points for Yellowfin Whiting.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B1. Targeted effort – all gears	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B2. Targeted hauling net effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted CPUE – all gears	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	Yes	Greatest decrease
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C2. Targeted hauling net CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	Yes	Greatest decrease
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	

### 4.6 Australian Salmon (*Arripis truttaceus*)



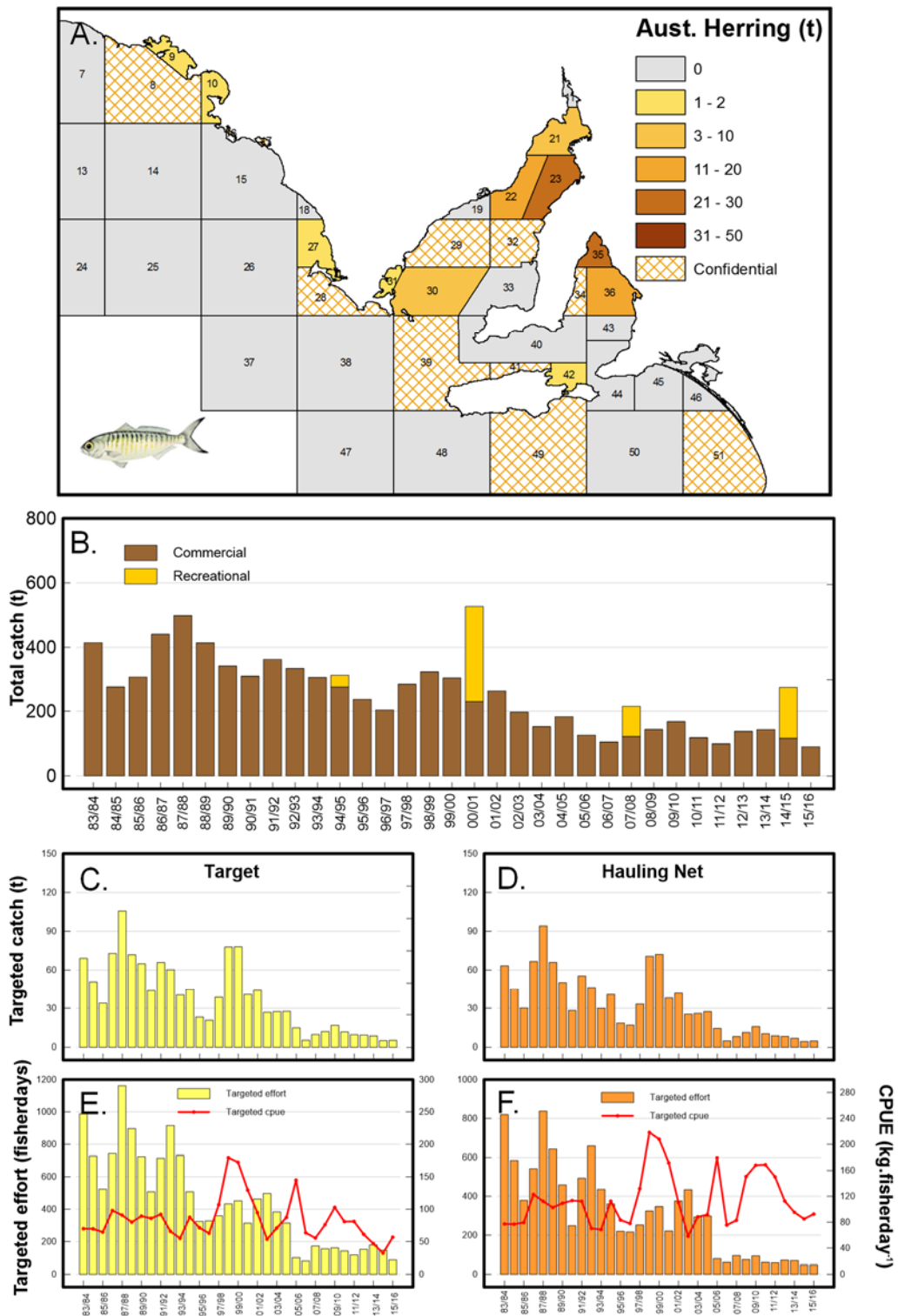
**Figure 4.7** Fishery statistics for Australian Salmon. (a) Map of South Australia's Marine Fishing Areas showing catches during 2015/16; (b) Total annual State-wide commercial and recreational catches; (c) Targeted annual State-wide hauling net catches; (d) Targeted annual State-wide hauling net effort and CPUE.

**Table 4.6** Comparisons between performance indicators and trigger reference points for Australian Salmon.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	<b>Yes</b>	<b>Greatest</b>
	Decrease over 5 consecutive years?	No	
B1. Targeted hauling net effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted hauling net CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	



### 4.7 Australian Herring (*Arripis georgianus*)

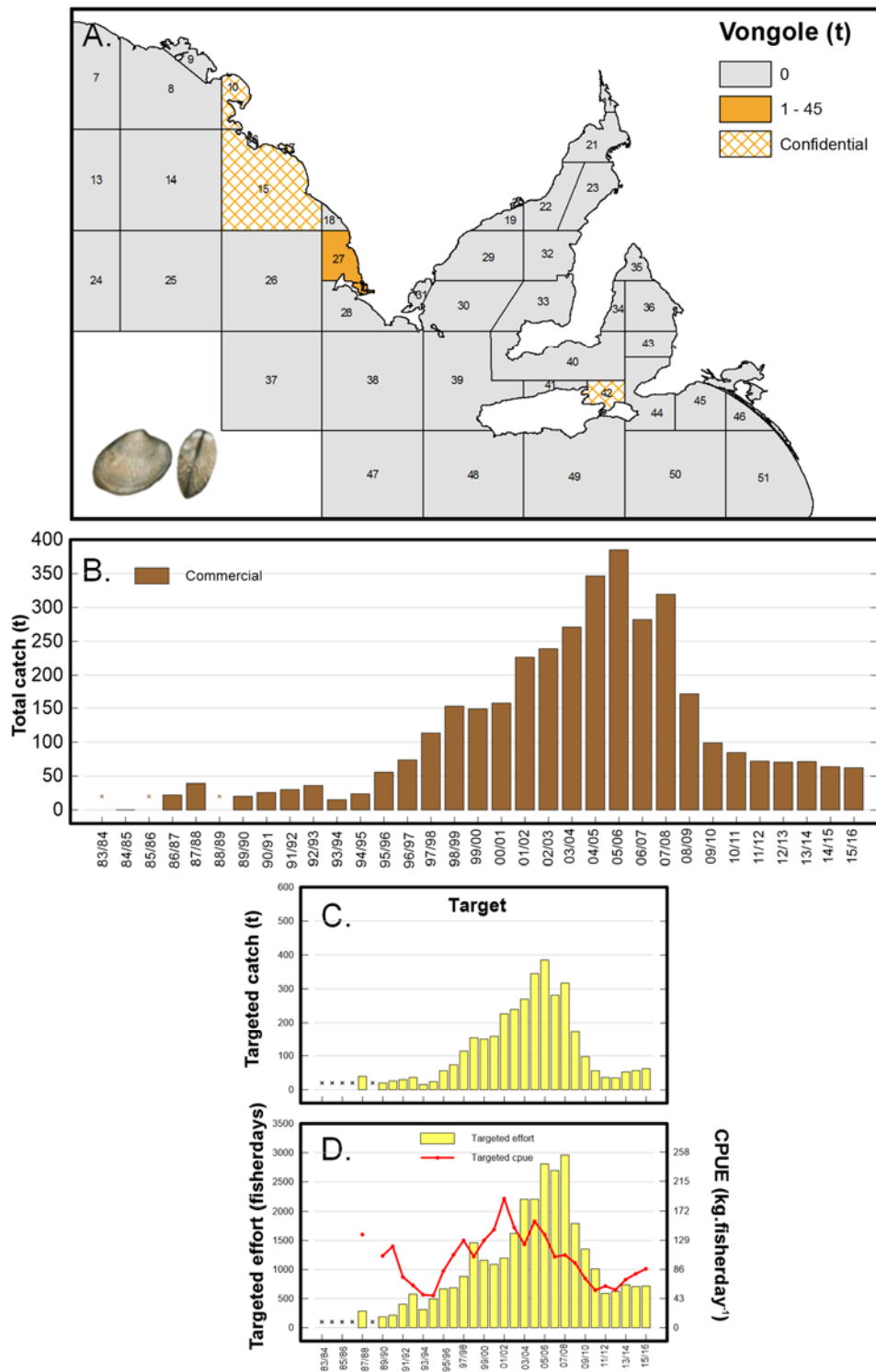


**Figure 4.8** Fishery statistics for Australian Herring. (a) Map of South Australia's Marine Fishing Areas showing catches during 2015/16; (b) Total annual State-wide commercial and recreational catches; (c) Targeted annual State-wide catches across all gear types; (d) Targeted annual State-wide hauling net catches; (e) Targeted annual State-wide effort and CPUE across all gear types; (f) Targeted annual State-wide hauling net effort and CPUE.

**Table 4.7a** Comparisons between performance indicators and trigger reference points for Australian Herring.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B1. Targeted effort – all gears	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	2 <sup>nd</sup> Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B2. Targeted hauling net effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted CPUE – all gears	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C2. Targeted hauling net CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	

### 4.8 Vongole (*Katelysia* spp.)

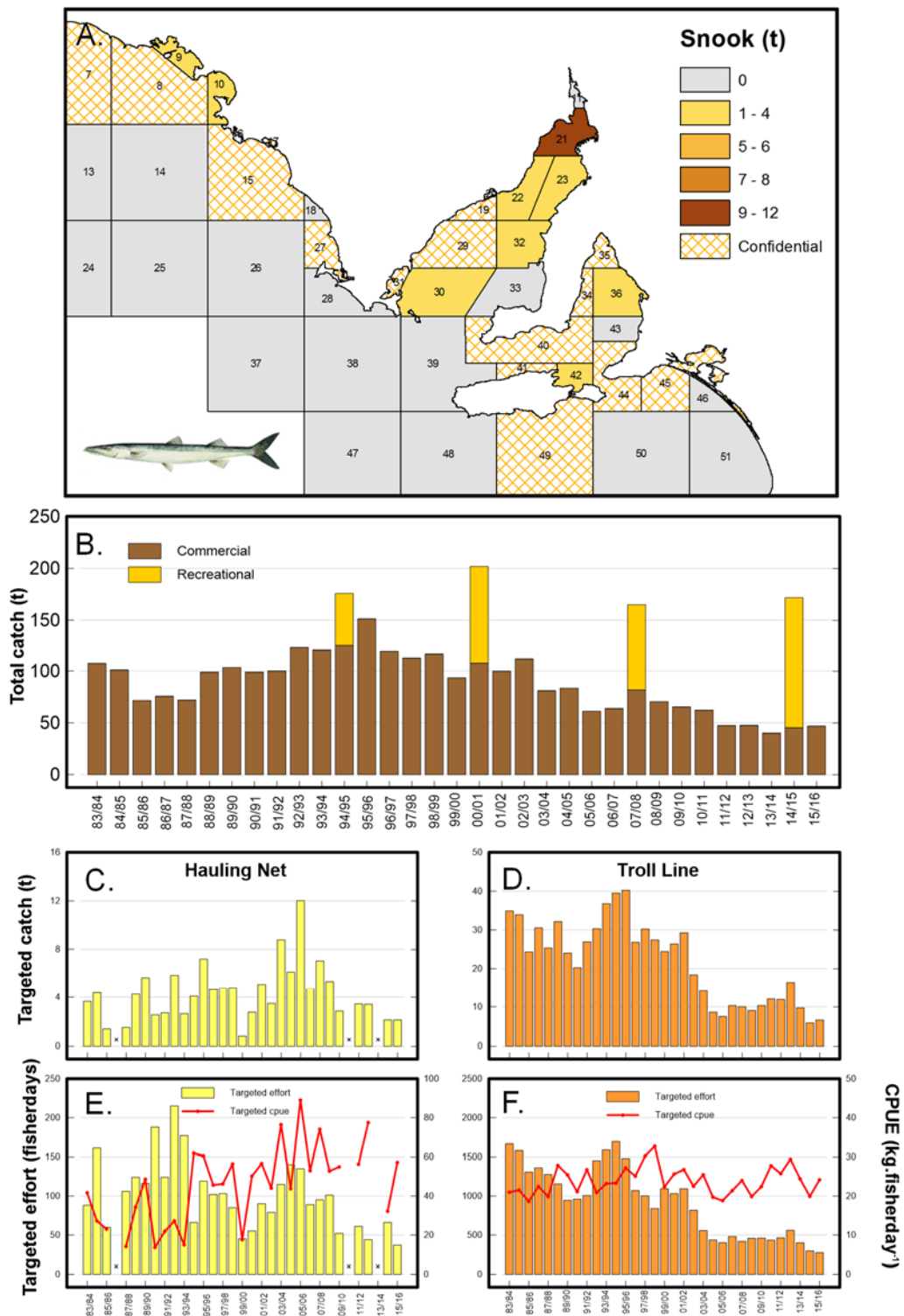


**Figure 4.9** Fishery statistics for Vongole. (a) Map of South Australia's Marine Fishing Areas showing catches during 2015/16; (b) Total annual State-wide commercial and recreational catches; (c) Targeted annual State-wide catches; (d) Targeted annual State-wide effort and CPUE. Crosses indicate confidential data.

**Table 4.8** Comparisons between performance indicators and trigger reference points for Vongole.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B1. Targeted effort – all gears	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted CPUE – all gears	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	

### 4.9 Snook (*Sphyræna novaehollandiæ*)

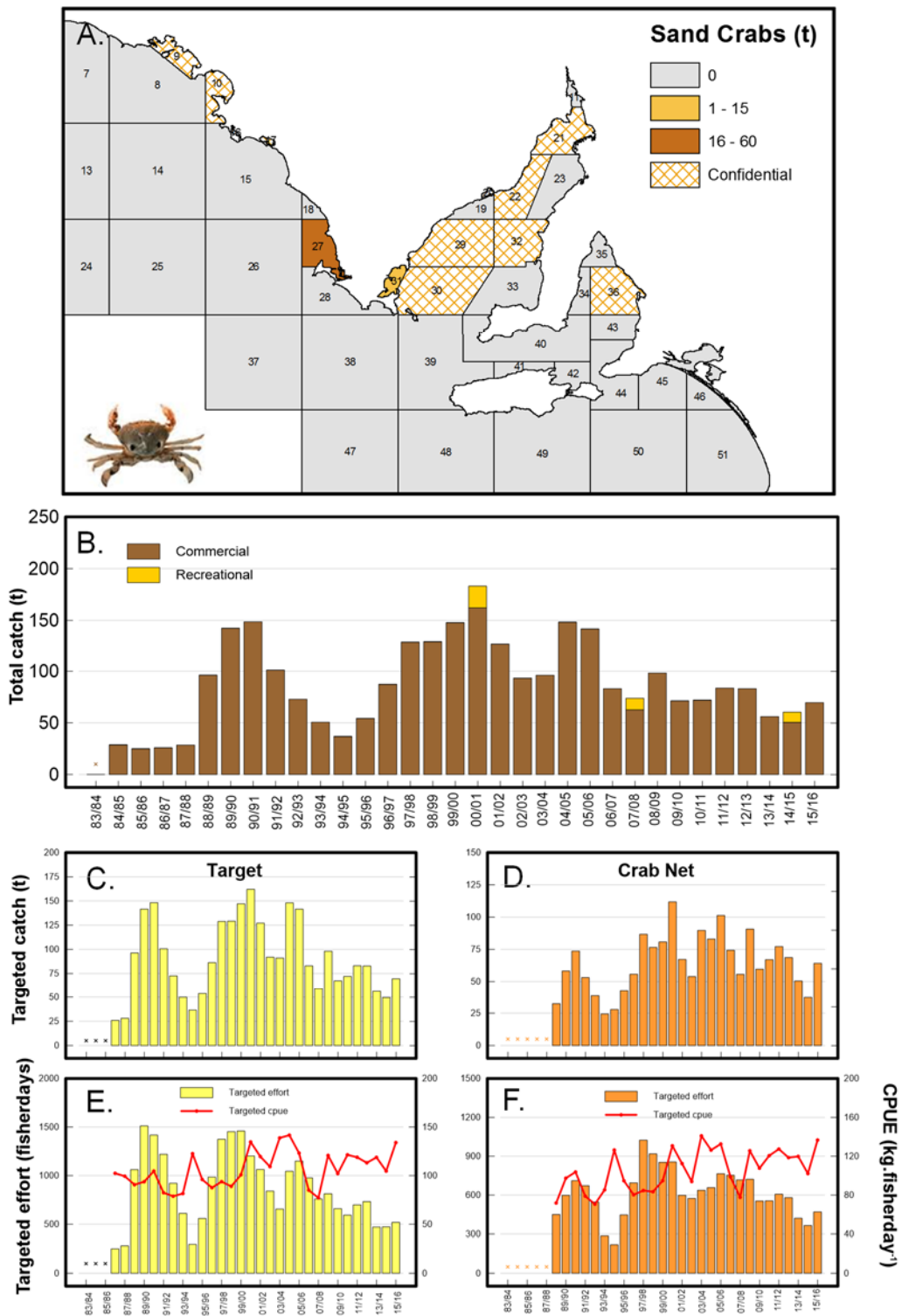


**Figure 4.10** Fishery statistics for Snook. (a) Map of South Australia's Marine Fishing Areas showing catches during 2015/16; (b) Total annual State-wide commercial and recreational catches; (c) Targeted annual State-wide hauling net catches; (d) Targeted annual State-wide troll line catches; (e) Targeted annual State-wide hauling net effort and CPUE; (f) Targeted annual State-wide troll line effort and CPUE. Crosses indicate confidential data.

**Table 4.9a** Comparisons between performance indicators and Trigger reference points for Snook.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	3 <sup>rd</sup> Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B1. Targeted hauling net effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	2 <sup>nd</sup> Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B2. Targeted troll line effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted hauling net CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C2. Targeted troll line CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	

4.10 Sand Crabs (*Ovalipes australiensis*)



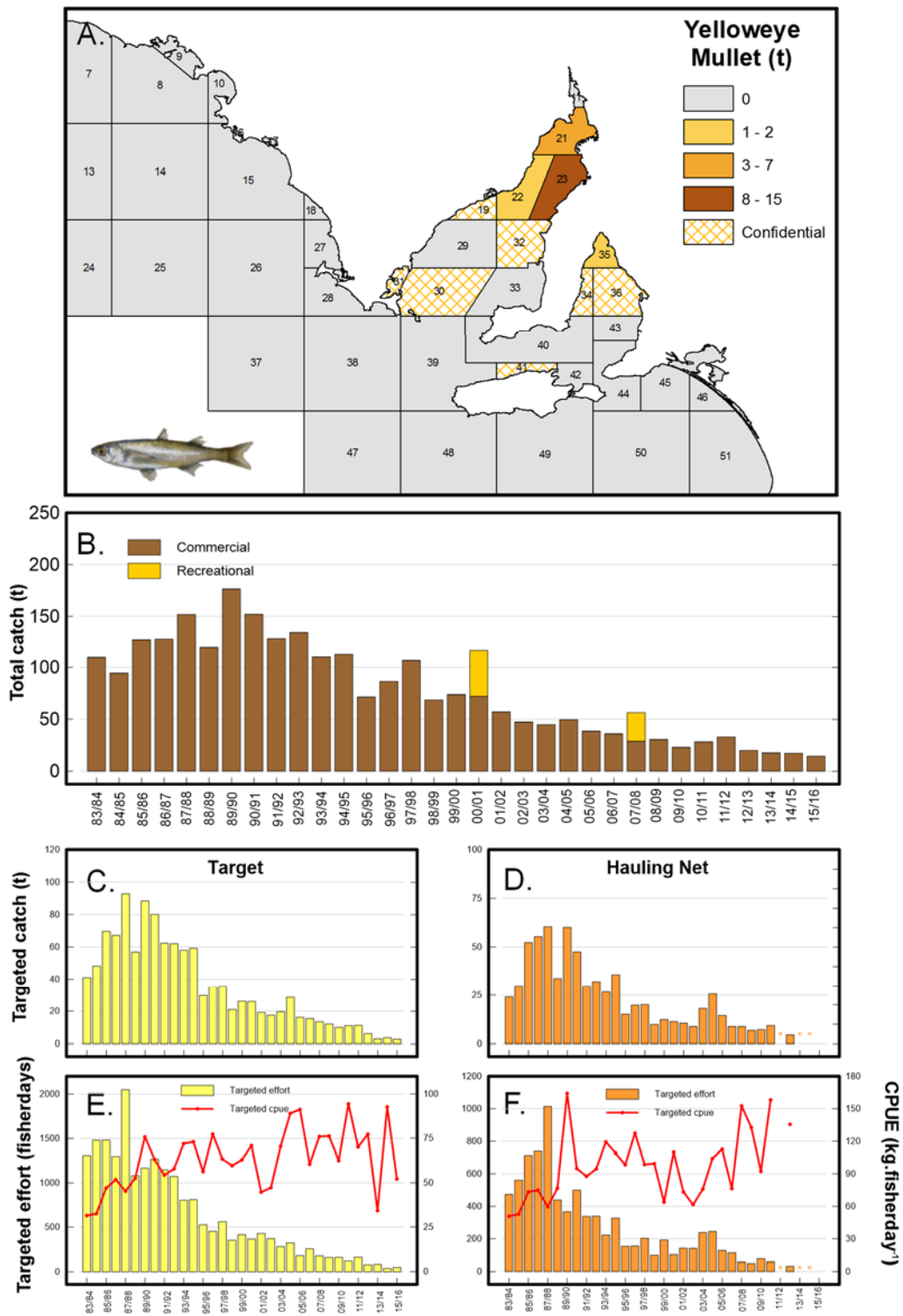
**Figure 4.11** Fishery statistics for Sand Crabs. (a) Map of South Australia’s Marine Fishing Areas showing catches during 2015/16; (b) Total annual State-wide commercial and recreational catches; (c) Targeted annual State-wide catches across all gears; (d) Targeted annual State-wide crab net catches; (e) Targeted annual State-wide effort and CPUE across all gear types; (f) Targeted annual State-wide crab net effort and CPUE. Crosses indicate confidential data.

**Table 4.10a** Comparisons between performance indicators and trigger reference points for Sand Crabs.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B1. Targeted effort – all gears	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B2. Targeted crab net effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted effort – all gears	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C2. Targeted crab net effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	<b>Yes</b>	<b>Highest</b>
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	



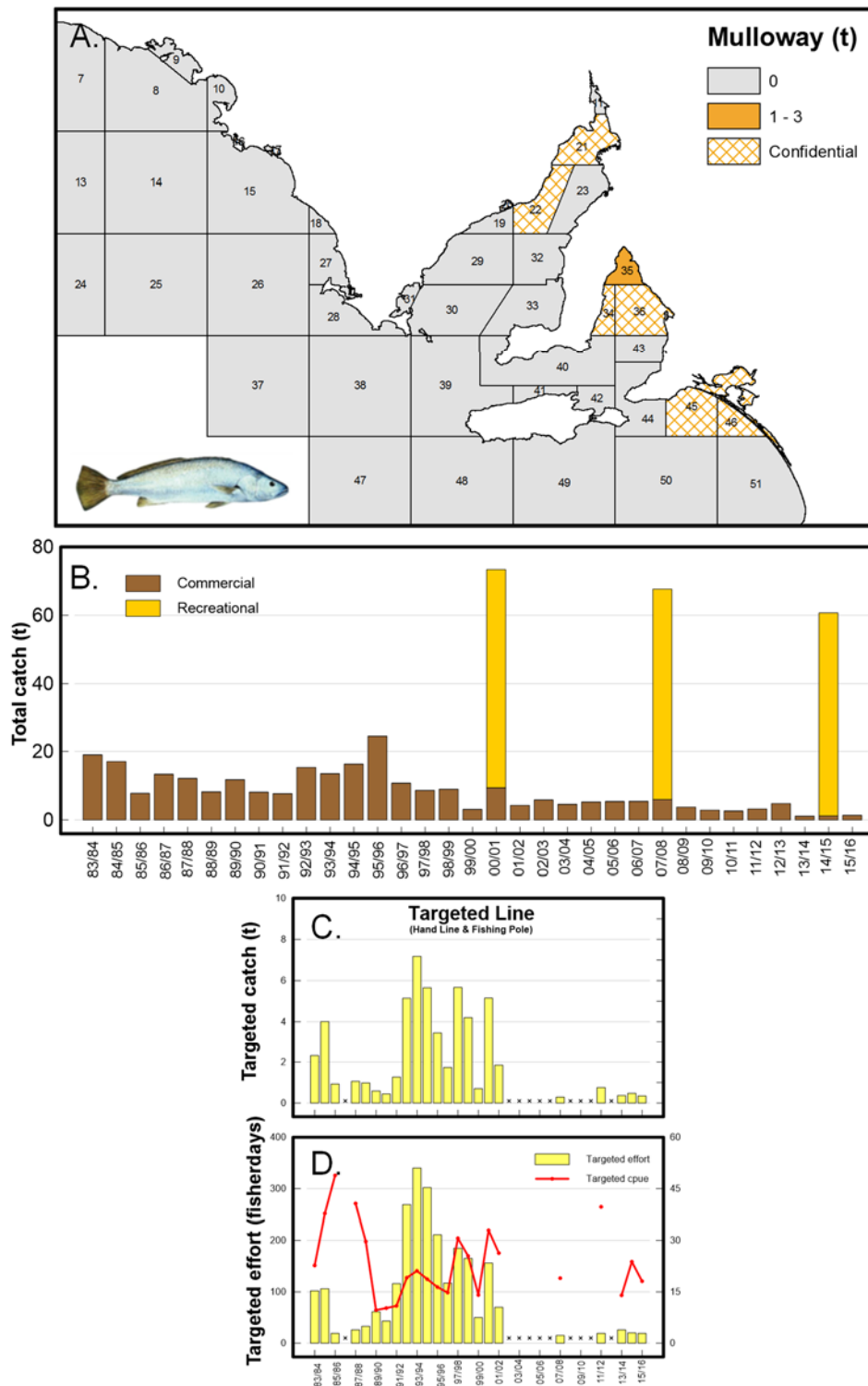
4.11 Yelloweye Mullet (*Aldrichetta forsteri*)



**Table 4.11** Comparisons between performance indicators and trigger reference points for Yelloweye Mullet.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B1. Targeted effort – all gears	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	2 <sup>nd</sup> Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B2. Targeted hauling net effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	2 <sup>nd</sup> Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted CPUE – all gears	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C2. Targeted hauling net CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	

### 4.12 Mulloway (*Argyrosomus japonicus*)

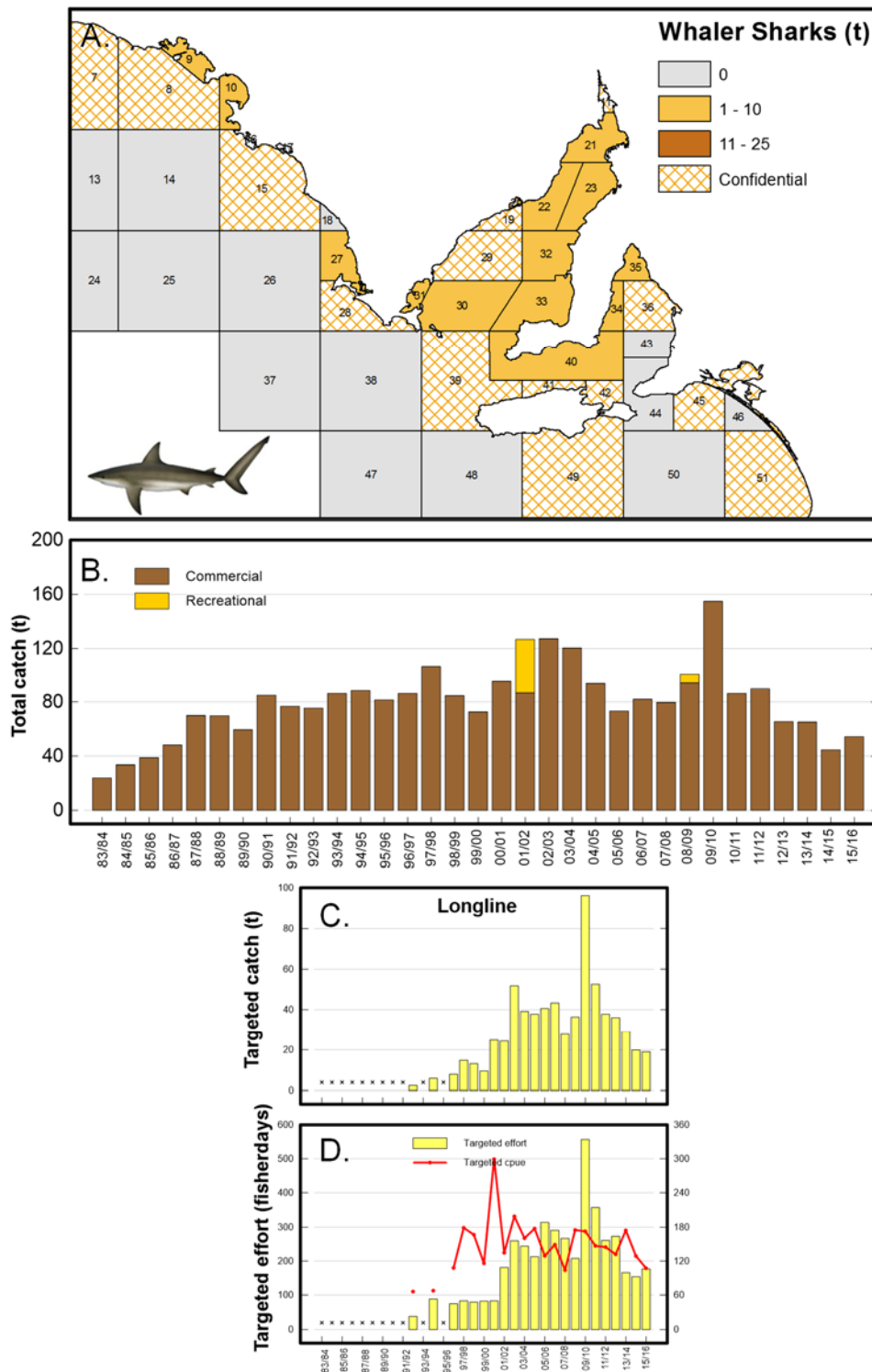


**Figure 4.13** Fishery statistics for Mulloway (excluding the Lakes and Coorong Fishery). (a) Map of South Australia’s Marine Fishing Areas showing catches during 2015/16; (b) Total annual State-wide commercial and recreational catches; (c) Targeted annual State-wide catches for handlines and fishing poles combined; (d) Targeted annual State-wide effort and CPUE for handlines and fishing poles combined. Crosses indicate confidential data.

**Table 4.12a** Comparisons between performance indicators and trigger reference points for Mulloway.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	3 <sup>rd</sup> Lowest
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B1. Targeted handline + fishing pole effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted handline + fishing pole CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	

**4.13 Bronze whaler (*Carcharhinus brachyurus*) and dusky whaler (*C. obscurus*)**



**Figure 4.14** Fishery statistics for Whaler Sharks. (a) Map of South Australia’s Marine Fishing Areas showing catches during 2015/16; (b) Total annual State-wide commercial and recreational catches; (c) Targeted annual State-wide longline catches; (d) Targeted annual State-wide longline effort and CPUE. Crosses indicate confidential data.

**Table 4.13** Comparisons between performance indicators and trigger reference points for Whaler Sharks.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B1. Targeted longline effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted longline CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	

4.14 Ocean Jackets (*Nelusetta ayraud*)

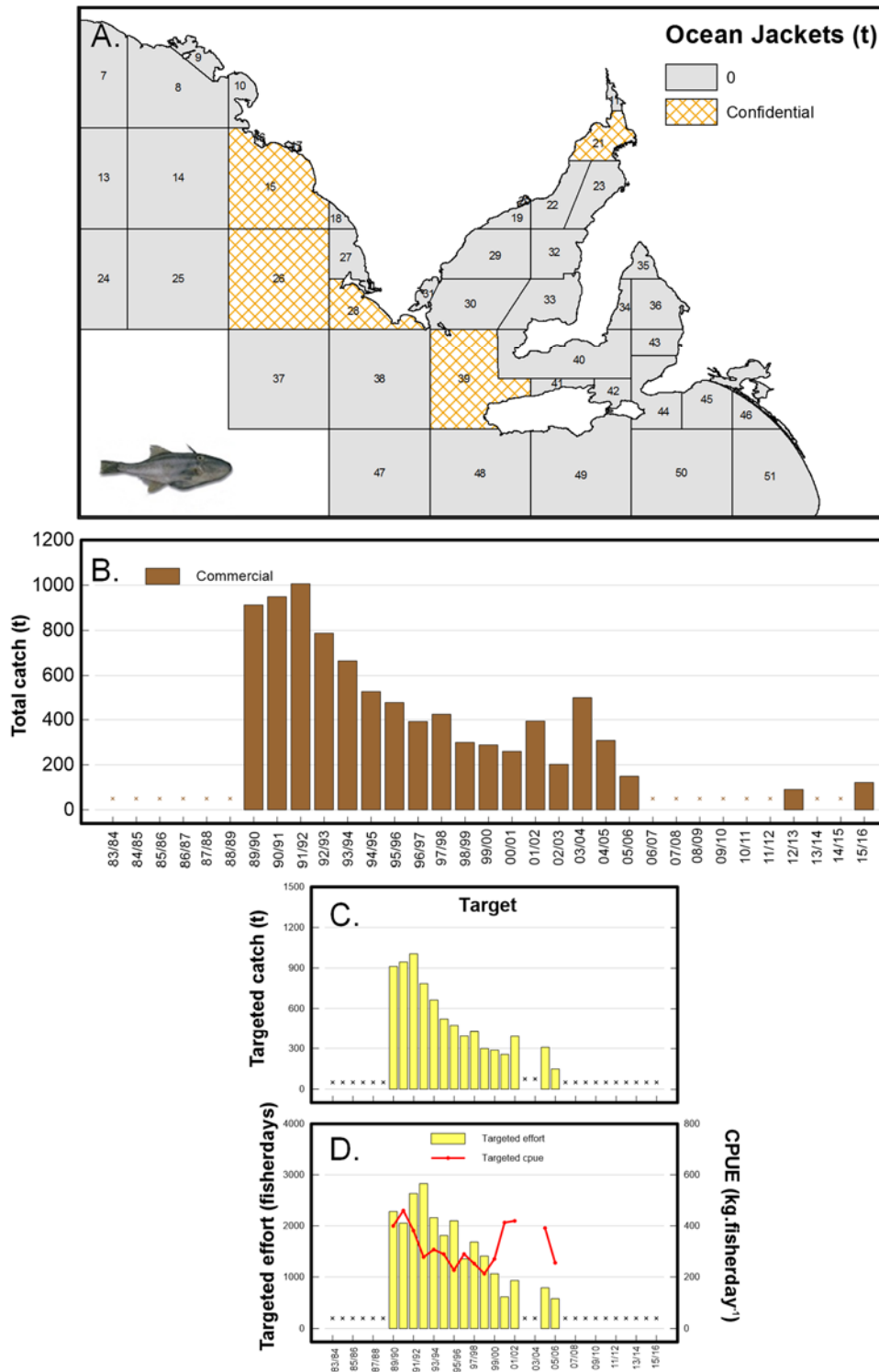


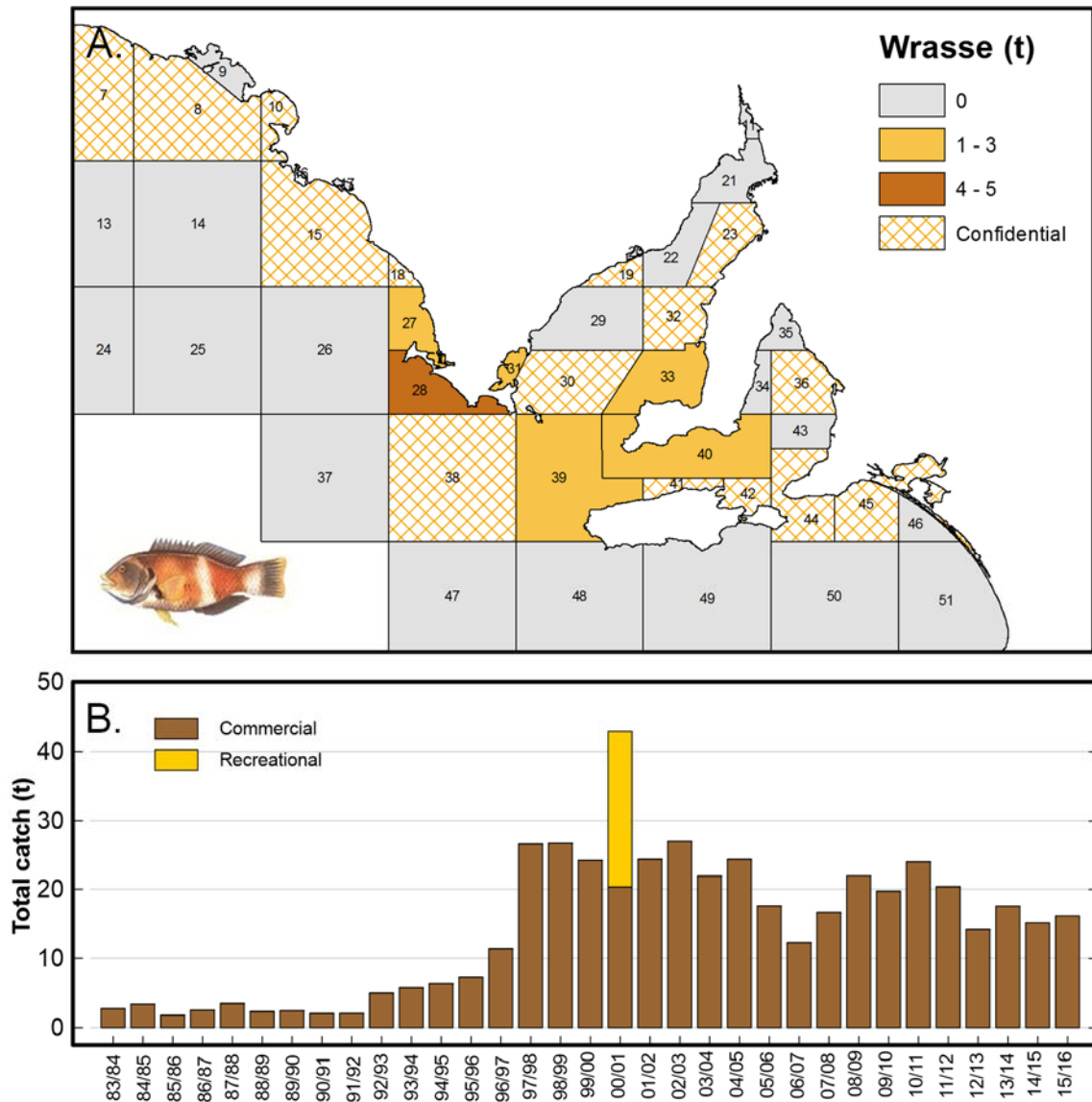
Figure 4.15 Fishery statistics for Ocean Jackets. (a) Map of South Australia's Marine Fishing Areas showing catches during 2015/16; (b) Total State-wide commercial catches; (c) Targeted annual catches; (d) Targeted effort and CPUE. Crosses indicate confidential data.

**Table 4.14** Comparisons between performance indicators and trigger reference points for Ocean Jackets.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
B1. Targeted effort	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	
C1. Targeted CPUE	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	



**4.15 Bluethroat Wrasse (*Notolabrus* spp.)**

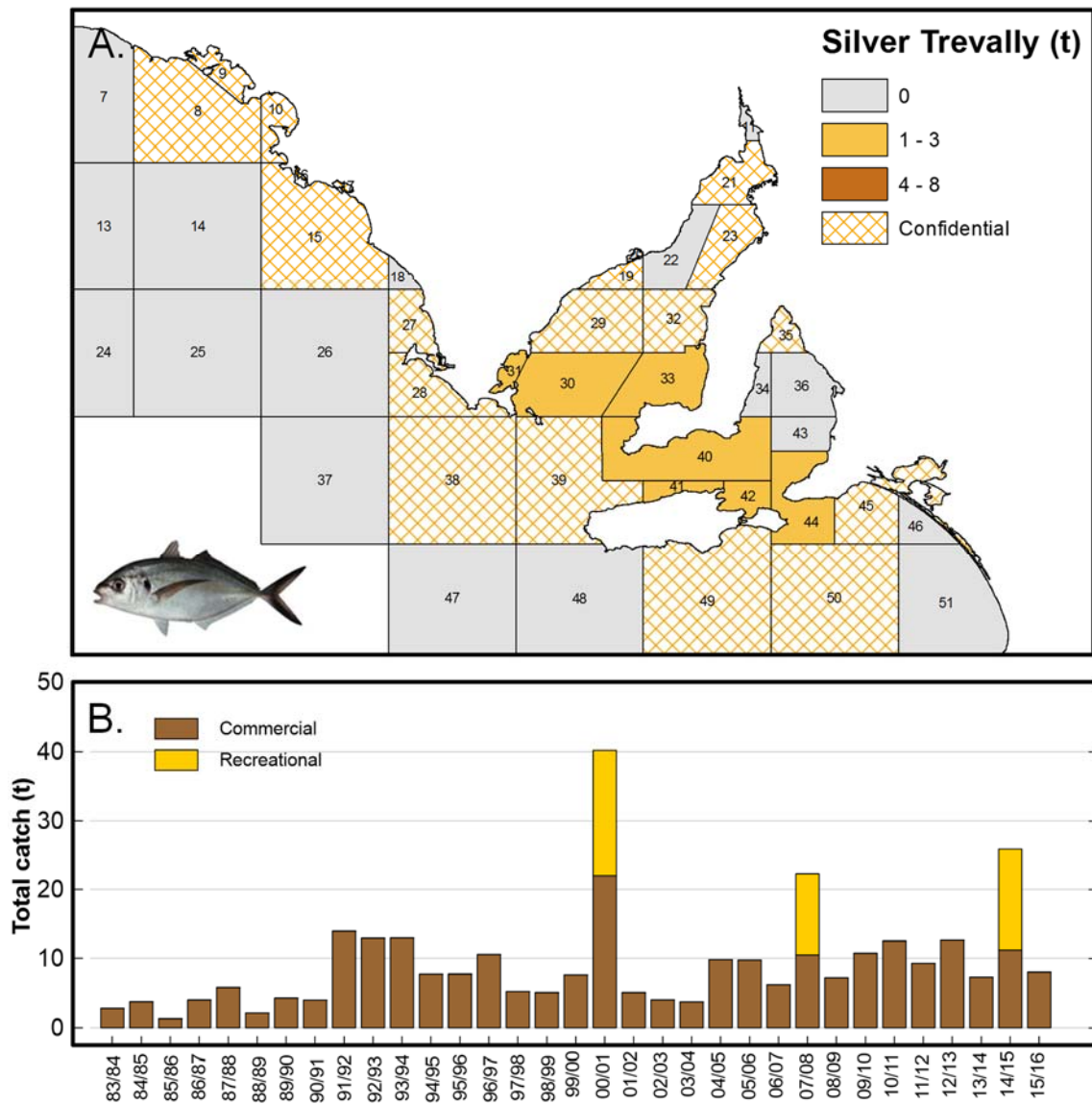


**Figure 4.16** Fishery statistics for wrasse. (a) Map of South Australia’s Marine Fishing Areas showing catches during 2015/16; (b) Total State-wide commercial catches.

**Table 4.15** Comparisons between performance indicators and trigger reference points for wrasse.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
	Decrease over 5 consecutive years?	No	

**4.16 Silver Trevally (*Pseudocaranx georgianus*)**

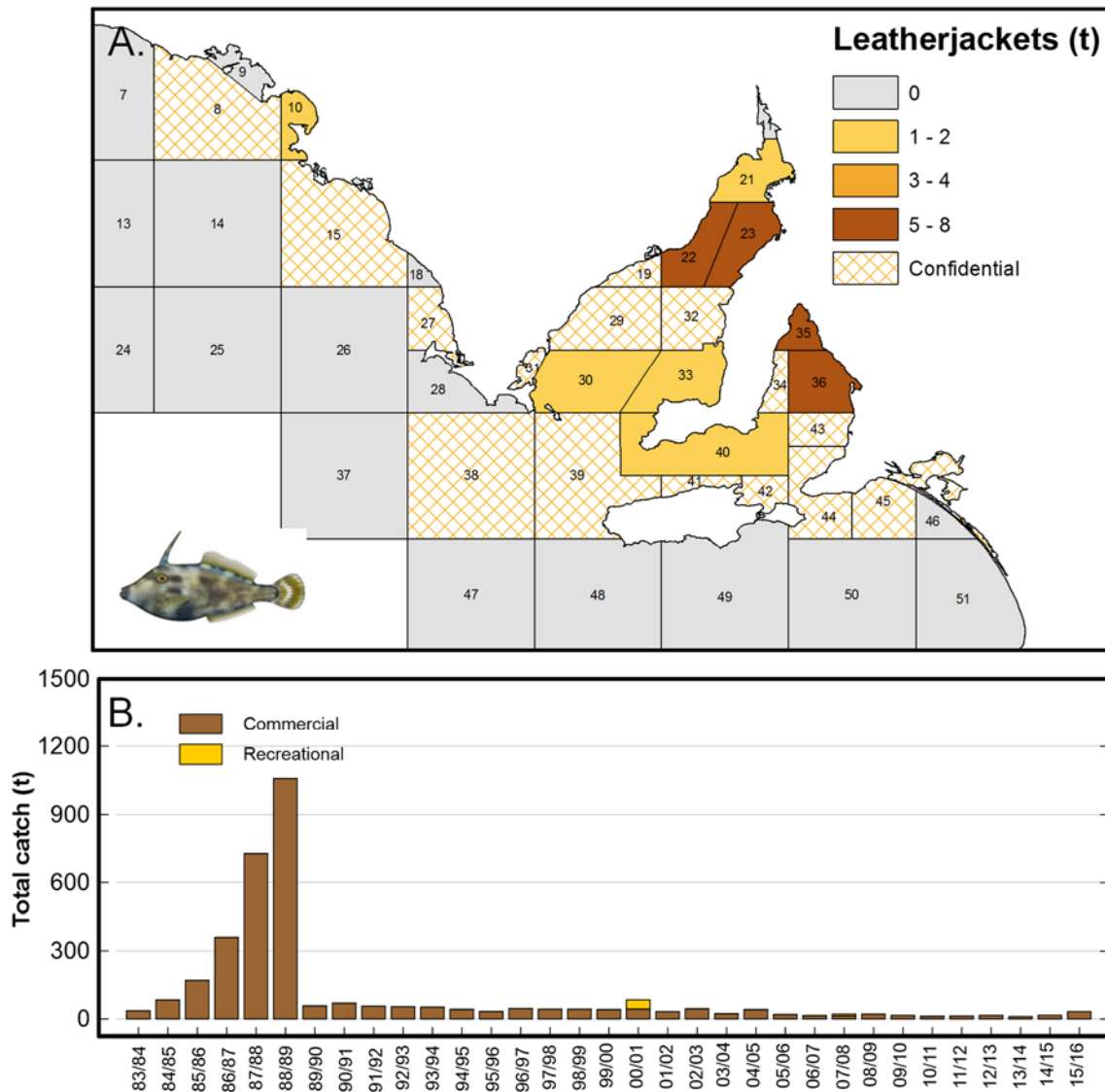


**Figure 4.17** Fishery statistics for Silver Trevally. (a) Map of South Australia’s Marine Fishing Areas showing catches during 2015/16; (b) Total State-wide commercial catches.

**Table 4.16** Comparisons between performance indicators and trigger reference points for Silver Trevally.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
	Decrease over 5 consecutive years?	No	

**4.17 Leatherjackets (Family Monacanthidae)**

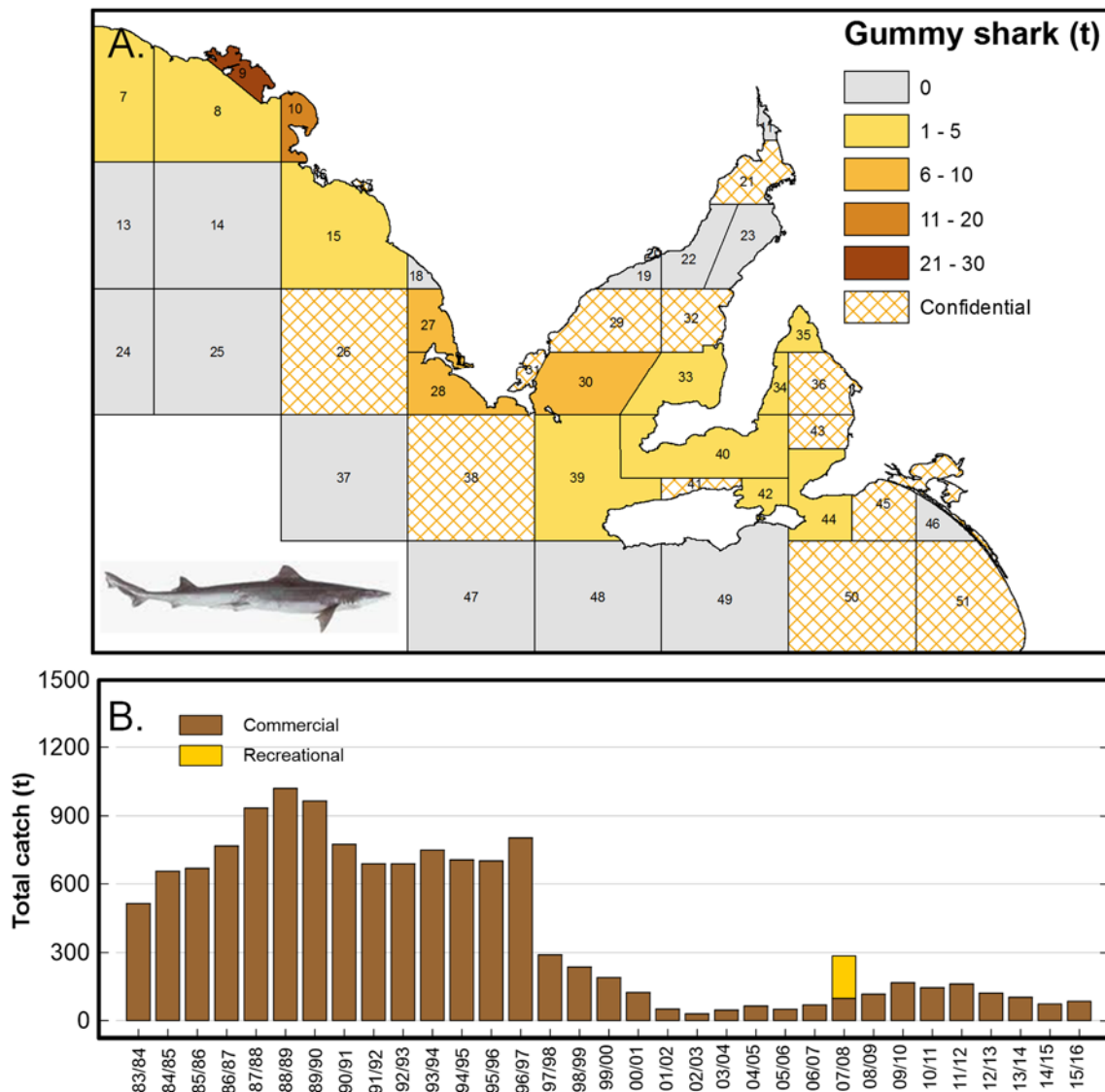


**Figure 4.18** Fishery statistics for Leatherjackets. (a) Map of South Australia's Marine Fishing Areas showing catches during 2015/16; (b) Total State-wide commercial catches.

**Table 4.17** Comparisons between performance indicators and trigger reference points for Leatherjackets.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
	Decrease over 5 consecutive years?	No	

### 4.18 Gummy Sharks (Family Triakidae)

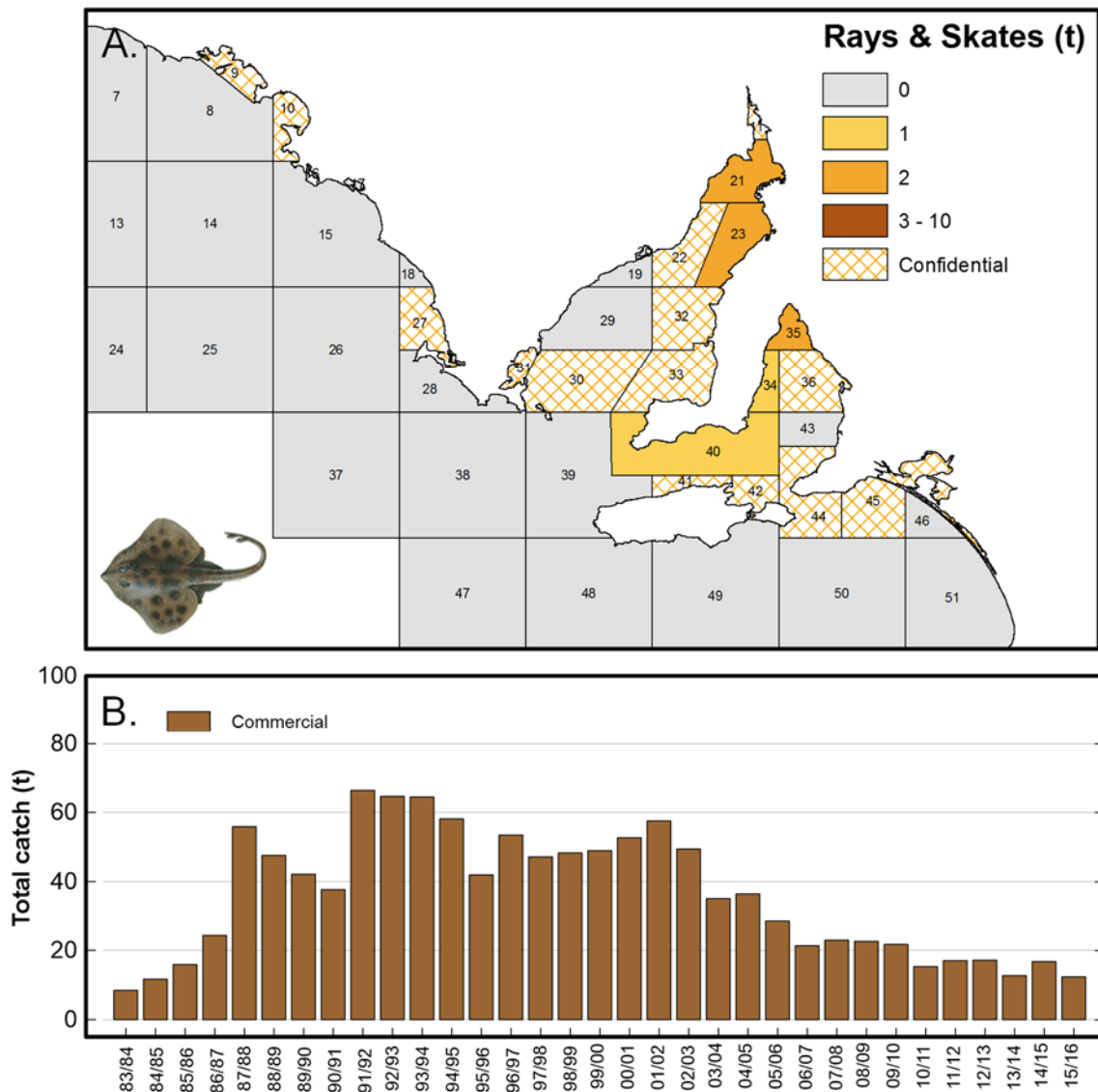


**Figure 4.19** Fishery statistics for Gummy Sharks. (a) Map of South Australia's Marine Fishing Areas showing catches during 2015/16; (b) Total State-wide commercial catches.

**Table 4.18** Comparisons between performance indicators and trigger reference points for Gummy Sharks.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
	Decrease over 5 consecutive years?	No	

**4.19 Rays and Skates (Class Elasmobranchii)**

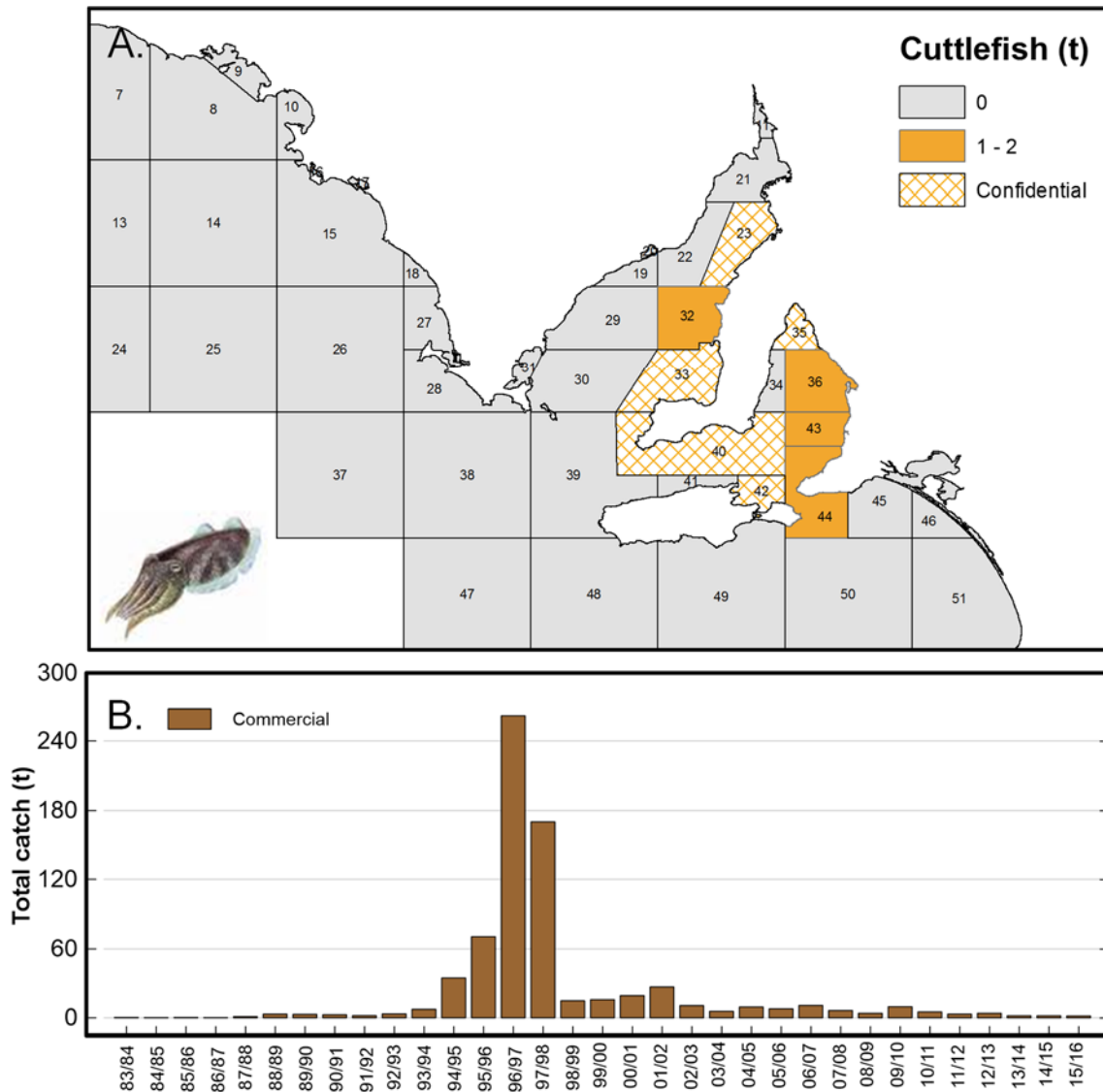


**Figure 4.20** Fishery statistics for Rays and Skates. (a) Map of South Australia's Marine Fishing Areas showing catches during 2015/16; (b) Total State-wide commercial catches.

**Table 4.19** Comparisons between performance indicators and trigger reference points for Rays and Skates.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	Yes	3 <sup>rd</sup> Lowest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
	Decrease over 5 consecutive years?	No	

**4.20 Cuttlefish (*Sepia apama*)**



**Figure 4.21** Fishery statistics for Cuttlefish. (a) Map of South Australia's Marine Fishing Areas showing catches during 2015/16; (b) Total State-wide commercial catches.

**Table 4.20** Comparisons between performance indicators and trigger reference points for Cuttlefish.

Performance Indicator	Trigger Reference Point	Breached?	Details
A. Total commercial catch	3 <sup>rd</sup> lowest/3 <sup>rd</sup> highest	No	
	Greatest interannual change ( $\pm$ )	No	
	Greatest 3-year trend ( $\pm$ )	No	
	Decrease over 5 consecutive years?	No	

**Table 4.21** Summary table showing the total commercial catches in tonnes by financial year for the twenty Marine Scalefish taxa (KGW = King George Whiting, S. Gar = Southern Garfish, S. Cal = Southern Calamari, YFW = Yellowfin Whiting, Aust. Salmon = Australian Salmon, Aust. Herring = Australian Herring, YE Mullet = Yelloweye Mullet, Bt Wrasse = Bluethroat Wrasse). Recent data presented for Australian Salmon include that from one licence holder from the Miscellaneous Fishery. Crosses indicate confidential data. Asterisk includes reported by-catch from prawn fisheries.

	KGW	Snapper	S. Gar	S. Cal	YFW	Aust. Salmon	Aust. Herring	Vongole	Snook	Sand Crabs	YE Mullet	Mull-oway	Whaler Sharks	Ocean Jackets	Bt Wrasse	Silver Trevally	Leather jackets	Gummy Sharks	Rays and Skates	Cuttlefish
1983/84	668	466	436	160	112	460	414	x	107	x	110	19	24	0	3	3	36	514	8	0
1984/85	596	469	429	187	68	622	275	0	101	29	94	17	34	0	3	4	83	656	12	0
1985/86	654	454	439	192	47	649	305	x	72	25	127	8	39	0	2	1	170	668	16	0
1986/87	644	404	389	202	26	605	441	22	76	26	128	13	48	0	3	4	359	767	24	0
1987/88	589	333	381	206	22	667	498	39	72	28	152	12	70	0	4	6	727	934	56	1
1988/89	620	421	465	265	22	418	414	x	99	96	120	8	70	x	2	2	1056	1019	48	3
1989/90	634	423	516	208	32	404	339	20	104	142	176	12	59	913	2	4	58	965	42	3
1990/91	692	457	454	279	46	508	308	26	99	149	152	8	85	949	2	4	69	775	38	3
1991/92	750	437	514	329	43	601	363	30	100	101	128	8	77	1006	2	14	56	689	66	2
1992/93	700	385	515	287	90	586	332	36	124	73	134	15	75	788	5	13	53	689	65	3
1993/94	665	317	472	325	69	524	304	15	121	51	111	13	86	665	6	13	52	749	64	7
1994/95	615	223	392	337	110	769	275	24	126	37	113	16	88	525	6	8	42	706	58	35
1995/96	534	306	511	382	93	487	236	56	151	54	71	24	81	476	7	8	33	701	42	71
1996/97	586	303	513	356	102	552	204	74	120	87	86	11	86	392	11	11	46	803	54	263
1997/98	552	391	504	425	73	632	284	113	113	129	107	9	107	424	27	5	43	290	47	170
1998/99	594	447	421	435	84	524	322	153	117	129	68	9	85	300	27	5	42	237	48	15
1999/00	517	577	477	400	112	457	303	149	93	148	74	3	73	288	24	8	41	190	49	16
2000/01	453	578	532	488	152	581	230	157	108	162	72	9	96	260	20	22	44	124	53	19
2001/02	389	647	470	340	148	455	262	227	100	127	57	4	87	395	24	5	31	51	57	27
2002/03	398	532	332	346	181	576	197	239	112	93	47	6	127	202	27	4	44	30	50	11
2003/04	356	411	321	303	163	158	152	271	81	96	45	5	120	498	22	4	22	46	35	6
2004/05	345	504	364	504	138	249	184	346	83	148	50	5	94	308	24	10	41	65	36	9
2005/06	333	533	369	336*	130	177	126	385	61	142	38	5	73	149	18	10	19	51	29	8
2006/07	354	644	293	323*	85	157	105	282	64	83	36	5	82	x	12	6	14	69	21	11
2007/08	330	743	290	331*	82	105	122	320	82	63	29	6	80	x	17	11	13	98	23	6
2008/09	339	786	294	307*	111	120	143	171	71	98	30	4	95	x	22	7	21	117	23	4
2009/10	343	917	281	399*	105	171	168	99	65	71	23	3	155	x	20	11	15	167	22	10
2010/11	340	971	261	353*	98	154	118	85	62	72	28	3	86	x	24	13	12	145	15	5
2011/12	307	878	250	513*	104	211	99	72	47	84	33	3	90	x	20	9	13	161	17	3
2012/13	307	549	242	459*	152	74	138	70	48	83	20	5	65	91	14	13	15	122	17	4
2013/14	265	549	261	358*	110	61	143	71	40	56	18	1	65	x	18	7	9	103	13	2
2014/15	310	586	216	435*	96	275	116	64	45	51	17	1	45	x	15	11	16	74	17	2
2015/16	271	427	163	427*	115	454	90	62	47	70	14	1	54	122	16	8	32	85	12	2

**Table 4.22** Summary table showing the total commercial catches in tonnes by financial year for the remaining permitted aquatic resources available to the Marine Scalefish fishery that were not dealt with separately in this report. Permitted aquatic resources are prescribed under Schedule 1 of the *Fisheries Management (Marine Scalefish Fisheries) Regulations 2006* (BS Crab = Blue Swimmer Crab, other shark includes those species not dealt with separately including Broadnose Shark, Dog Shark, Elephant Shark, Hammerhead Shark, Saw Shark, Thresher Shark, Whiskery Shark and Wobbegong). Crosses indicate confidential data. Data are for Marine Scalefish licence holders (B,M,N,S) and exclude data from the Miscellaneous Fishery.

Category	Species	2011/12	2012/13	2013/14	2014/15	2015/16
Secondary	BS Crab (outside gulfs)	53	58	57	41	31
Tertiary	Octopus spp.	13	9	x	11	10
Tertiary	Razorfish	8	6	4	4	5
Tertiary	Black Bream	x	0.7	1.4	7	8
Tertiary	Bight Redfish	13	13	6	9	13
Tertiary	Yellowtail Kingfish	0.2	x	0.4	2.6	1.2
Other	Flathead spp.	4	2	1	2.5	1
Other	Sea Sweep	3	2	2	2	1
Other	School Whiting	x	0.1	x	0.3	x
Other	Red Mullet	3	4	x	4	4
Other	Southern Rock Cod	x	x	x	x	x
Other	Barracouta	x	x	x	x	x
Other	Flounder	x	x	x	x	x
Other	Morwong spp.	2	1	1	1	1
Other	Blue Mackerel	x	1	x	x	x
Other	Jack Mackerel	x	x	x	x	x
Other	Mullet spp (except YE Mullet)	x	x	x	x	x
Other	Swallowtail	0.2	0.4	0.2	0.1	0.1
Other	Deep Sea Trevalla	x	x	x	x	x
Other	Ling	x	x	x	x	x
Other	Mirror Dory	x	x	x	x	x
Other	Anchovies	x	x	x	x	x
Other	Southern Sole	x	x	x	x	x
Other	School Shark	15	12	13	16	19
Other	Mako Shark	x	x	x	x	x
Other	other shark spp.	14	10	8	7	6
Other	Gould's Squid	x	x	x	x	x
Other	worm spp.	6	6	5	5	5
Other	Mussels	x	x	x	x	x
Other	Oyster	x	x	x	x	x
Other	Scallop	x	x	x	x	x
Other	velvet crab	x	x	x	x	x



## 5. REFERENCES

- Dent J, Mayfield S, Burch P, Gorman D, Ward T (2012). Distribution, harvestable biomass and fisheries biology of *Katylesia* spp. in the South Australian commercial mud cockle fishery. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2010/000263-2. SARDI Research Report Series No. 595. 23 pp.
- Fowler AJ, McGarvey R, Burch P, Feenstra JE, Jackson WB (2010a). Snapper (*Chrysophrys auratus*) Fishery. Fishery Assessment Report to PIRSA Fisheries. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, F2007/000523-2. SARDI Research Report Series No. 473. 109 pp.
- Fowler AJ, McGarvey R, Steer MA, Feenstra JE (2011). The South Australian Marine Scalefish Fishery – Stock Status Report. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, SARDI Publication No. F2007/000565-6, SARDI Research Report Series No. 586. 29 pp.
- Fowler AJ, McGarvey R, Steer MA, Feenstra JE (2012). The South Australian Marine Scalefish Fishery – Stock Status Report 2011/12. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, SARDI Publication No. F2007/000565-7, SARDI Research Report Series No. 681. 44 pp.
- Fowler AJ, McGarvey R, Steer MA, Feenstra JE (2013a). The South Australian Marine Scalefish Fishery Status Report – Analysis of Fishery Statistics for 2012/13. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, SARDI Publication No. F2007/000565-8, SARDI Research Report Series No. 747. 44 pp.
- Fowler AJ, McGarvey R, Steer MA, Feenstra JE (2014). The South Australian Marine Scalefish Fishery Status Report – Analysis of Fishery Statistics for 2013/14. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000565-9, SARDI Research Report Series No. 816. 44 pp.
- Fowler AJ, McGarvey R, Steer MA, Feenstra JE (2015). The South Australian Marine Scalefish Fishery Statistics for 1983/84 to 2014/15. Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000565-10, SARDI Research Report Series No. 882. 47 pp.
- Giri K, Hall K, (2015). South Australian Recreational Fishing Survey 2013/14. Fisheries Victoria, Internal Report Series No. 62. 66 pp.
- Henry GW, Lyle JM (2003). The National Recreational and Indigenous Fishing Survey. FRDC Final Report 99/158. 200 pp.
- Jones K (2009). The 2007/08 survey of SA residents who recreationally fished in South Australia. Part 1: Participation, Catch and Fishing Effort. South Australian Fisheries Management Series. Paper No. 54, 81 pp.
- McGlennon D, Kinloch MA (1997). Resource allocation in the South Australian Marine Scalefish Fishery. FRDC Final Report 23/249. 105 pp.
- Noell C, Presser J, Jones K (2006). Management Plan for the South Australian Marine Scalefish Fishery. PIRSA. South Australian Fisheries Management Series No. 45. 68 pp.
- PIRSA (2013). Management Plan for the South Australian Commercial Marine Scalefish Fishery. PIRSA Fisheries and Aquaculture, Adelaide. South Australian Fisheries Management Series Paper No. 59. 141 pp.