The South Australian Marine Scalefish Fishery
Stock Status Report

Report to PIRSA

A.J. Fowler, R. McGarvey, M.A. Steer and J.E. Feenstra

SARDI Publication Number F2007/000565-5
SARDI Research Report Series No. 507

SARDI Aquatic Sciences
PO Box 120 Henley Beach SA 5022

November 2010

The South Australian Marine Scalefish Fishery
Stock Status Report

Report to PIRSA

A.J. Fowler, R. McGarvey, M.A. Steer and J.E. Feenstra

SARDI Publication Number F2007/000565-5
SARDI Research Report Series No. 507

November 2010

This publication may be cited as:
Fowler, A.J., McGarvey, R., Steer, M.A., Feenstra, J.E (2010). The South Australian Marine Scalefish Fishery – Stock Status Report. Report to PIRSA. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000565-5. SARDI Research Report Series No. 507. 29pp.

South Australian Research and Development Institute
SARDI Aquatic Sciences
2 Hamra Avenue
West Beach SA 5024

Telephone: (08) 8207 5400
Facsimile: (08) 8207 5406
http://www.sardi.sa.gov.au

DISCLAIMER

Printed in Adelaide: November 2010

SARDI Publication No. F2007/000565-5
SARDI Research Report Series No. 507

Author(s): A.J. Fowler, R. McGarvey, M.A. Steer and J.E. Feenstra

Reviewer(s): Dr T. Ward and G. Ferguson

Approved by: Dr T. Ward
Assoc Prof – Wild Fisheries

Signed: 

Date: 4 November 2010

Distribution: PIRSA Fisheries, SAASC Library and University of Adelaide Library

Circulation: Public Domain

Table of Contents

List of Tables

List of Figures

Acknowledgements

We gratefully acknowledge Angelo Tsolos of the Information Systems and Database Support Unit at SARDI (Aquatic Sciences) for providing the catch and effort data from the SARDIP Information Management System. The presentation of the report was improved through comments from Tim Ward and Greg Ferguson. The report was approved for publication by Dr Tim Ward.

1.0 Introduction

This is the sixth annual stock status report produced for the Marine Scalefish Fishery of South Australia. The annual series of reports is prescribed in the Management Plan. Its aim is to provide an overview of the current status of the most significant taxa in the fishery, based on the assessment of key fishery performance indicators (Noell et al. 2006). The report considers 21 different species or taxonomic groups, most of which fall into the 'Primary' and 'Secondary' species categories, as defined in the Management Plan, but with some also from the 'Tertiary' category (Table 1.1). These categories were originally determined on the basis of the relative value of the different species to the commercial, recreational and community sectors (Noell et al. 2006). The species considered here are the same as those considered in the previous stock status reports (Fowler 2005, Steer et al. 2006, Fowler et al. 2007, Fowler et al. 2008, Fowler et al. 2009).

The determination of stock status for the various species or taxonomic groups was based only on consideration of the commercial catch and effort data, which were assessed by developing fishery performance indicators and comparing them with limit reference points. It should be noted that the particular indicators and reference points that are specified in the Management Plan were not used in the analyses for this report. After the first few applications of those performance indicators and reference points in previous years, the Marine Scalefish Fishery Management Committee (MSFMC) considered that they should be revised. At a meeting of the MSFMC held on 17th February 2006, new performance indicators and reference points were adopted (Minutes of meeting No. 98 of MSFMC). The new performance indicators are; total commercial catch, targeted effort and targeted CPUE. The new limit reference points that relate to these indicators, and which were used in the comparisons that underpin the results presented were:

- the 3rd highest and 3rd lowest values over the reference period (only 3rd highest considered for targeted effort);
- the greatest (%) inter-annual variation (+ and -) over the reference period;
- the greatest rate of change (trend) over periods of three or five years (+ and -) through the reference period, depending on the species (Fig 1.1).

Table 1.1. List of MSF species/taxa considered in this report. The table shows the three categories and the species/taxa that they include, as specified in the Management Plan (Noell et al. 2006). The level of reporting varied amongst the various taxa, as indicated (see Methods for definitions of 'full', 'part' and 'minor' reporting). The gear types for which annual targeted catch, effort and CPUE were reported for each species are also indicated.

Category	Species/taxon	Report Category	Targeted catch and effort categories
Primary	King George whiting	Full	handline
	Snapper	Full	handline, longline
	Southern garfish	Full	haulnet, dabnet
	Southern calamary	Full	jig, haulnet
Secondary	Yellowfin whiting	Part	total target, haulnet
	Australian salmon	Part	haulnet, salmon net
	Australian herring	Part	total target, haulnet
	Mud cockles	Part	total target
	Snook	Part	haulnet, troll line
	Sand crabs	Part	total target, crab net
	Bronze and dusky whalers	Part	longline, shark net
	Ocean jackets	Part	total target
	Parrotfish	Minor	n.a.
	Cuttlefish	Minor	n.a.
Tertiary	Yelloweye mullet	Part	total target, haulnet
	Mulloway	Part	handline, fishing pole
	Western striped grunter	Minor	n.a.
	Silver trevally	Minor	n.a.
	Leatherjackets	Minor	n.a.
	Gummy sharks	Minor	n.a.
	Rays and skates	Minor	n.a.

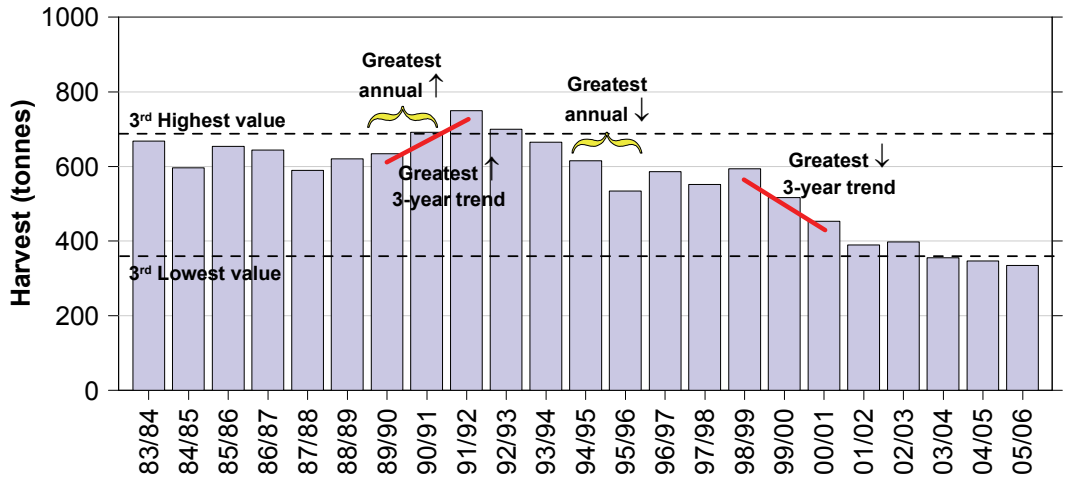

Figure 1.1. A schematic illustration of the limit reference points used in this study: 3rd highest and 3rd lowest values over the reference period; the greatest inter-annual variation (+ and -); and the greatest rates of change (trend) over a three-year period (+ and -) (five-year period used for snapper).

2.0 Methods

The commercial catch and effort data presented in this report were extracted from the commercial Marine Scalefish catch and effort database, which contains data from the catch returns that are submitted on a monthly basis by the commercial fishers. For comparison, the results from three recreational surveys are also reported. The first of these was the recreational boat ramp - creel survey that was done between 1994 and 1996 that provided estimates for seven Primary and Secondary species (McGlennon and Kinloch 1997). The second survey was the National Recreational and Indigenous Fishing Survey that collected data from May 2000 until April 2001 (Henry and Lyle 2003). The third survey was the State-wide telephone/diary survey of South Australian residents from November 2007 to October 2008 (Jones 2009).

Only data from the commercial sector were used in the comparisons of fishery performance indicators and limit reference points. For each of the 21 taxonomic groups that are specified in Table 1.1, annual totals of commercial catch and targeted catch, effort and CPUE by gear type(s) were calculated for each financial year from 1983/84 to 2009/10. The appropriate limit reference points were then derived from these different time-series of data. The estimates of indicators for 2009/10 were then compared with the limit reference points that had been calculated for the appropriate time series for each species or taxonomic group. For each taxon, a results table was prepared that shows the outcomes of the comparisons, with respect to whether the limit reference points were breached or not.

There were different levels of reporting and analysis undertaken for the different taxonomic groups (Table 1.1). For the four Primary species, full reporting was done. For these species, all the fishery performance indicators, i.e. State-wide estimates of total catch, targeted catch and effort and targeted CPUE were presented for the period of 1983/84 to 2009/10. The data on targeted effort and CPUE are gear-specific for the different species and the report has concentrated on those gear types that are considered most likely to be informative about the biomass for each particular taxon. The specific gear types are the same as those considered in the previous stock status reports (Fowler 2005, Steer et al. 2006, Fowler et al. 2007, Fowler et al. 2008, Fowler et al. 2009) (Table 1.1). The estimates of performance indicators for 2009/10 were compared against limit reference points calculated for the 27-year period of 1983/84 to 2009/10. Furthermore, for these species, the specific commercial catch and effort data from the rock lobster fishers were extracted from the State-wide totals, and performance indicators and reference points were calculated for these data sub-sets. The latter data and the results of the comparisons between indicators and reference points were presented separately. This separate analysis of catch and effort data from the rock lobster fishers for the Primary Marine Scalefish species conforms to a request from the MSFMC that was made in 2006.

For those species for which only part-reporting was done, the data considered were the total State-wide estimates from the MSF fishery, but excluded the specific analysis of data from the rock lobster fishers. Furthermore, for some of these species the data were not considered for the whole 27-year time-series, depending on when each species-specific fishery developed after 1983/84. In these cases, truncated time-series of data were considered in the comparisons between performance indicators and limit reference points. For example, for ocean jackets the reference period was 1988/89 to 2009/10, whilst for mud cockles it was 1985/86 to 2009/10.

For the species for which only a minor level of reporting was done, which were mostly Tertiary species, the only fishery performance indicator considered was total commercial catch.

For all species, regardless of whether full, partial or minor reporting was done, the presentation of data was limited by constraints of confidentiality, i.e. data could only be presented when summarised from five or more fishers.

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

1) commercial catch and effort data were cross-checked by a number of validation processes by the SARDI Fisheries Statistics Unit prior to delivery, including:
   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 necessary species/gear/time categories and cross-checked with the time-series presented in the previous stock status reports (Steer et al. 2006, Fowler et al. 2007, Fowler et al. 2008, Fowler et al. 2009);
3) regular meetings of the authors were held to discuss data handling and interpretation;
4) calculation of the prescribed limit reference points was done using the computer-programming package (S+). Output was generated for each species/category and the calculations cross-checked by hand and visual inspection against graphs (e.g. Fig. 1.1);
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 scrutinised by two internal reviewers before approval for publication.

3.0 Results

For the commercial fishery statistics of 2009/10, there were limit reference points breached for three of the four Primary species. For King George Whiting (pg 6) a single breach related to the 2nd highest handline CPUE yet recorded. In contrast, for Snapper (pg 8) there were seven breaches of reference points. These related to the highest levels and increases in commercial catch in history, which in turn related to high levels of longline fishing effort and CPUE. For Southern Calamary (pg 10), the catch and effort data in 2009/10 did not differ markedly from previous years and there were no breaches of reference points. For Southern Garfish (pg 12), the lowest ever catch was recorded in 2009/10, which reflected low levels of haul net and dab net effort. For the fishery statistics from rock lobster fishers there were several breaches of limit reference points. For King George Whiting (pg 7) there were six breaches, which reflected the highest and greatest increases in catch reflecting increases in handline fishing effort. Similarly, in 2009/10 the Snapper catch by rock lobster fishers (pg 9) was the highest, resulting from a substantial increase in longline fishing effort. Their catch of Southern Calamary was the 2nd highest yet recorded, reflecting considerable annual increases in jig effort and CPUE (pg 11). Their fishing effort for Southern Garfish in recent years has been minimal (pg 13).

In 2009/10, there were notable trends in the catch and effort data for some Secondary species. For Yellowfin Whiting, recent trends of declining catch, effort and CPUE were reversed, but only for haul net CPUE was there a breach of a limit reference point (pg 14). For Australian Salmon there was an extraordinarily high estimate of haul net CPUE in 2009/10 (pg 15). For Australian Herring, total catch and targeted catch and effort remained at relatively low historic levels despite marginal increases since 2006/07, whilst targeted CPUE has been highly variable (pg 16). Declines in catch, effort and CPUE for Mud Cockles continued in 2009/10, resulting in two limit reference points being triggered (pg 17). For Snook, the 3rd lowest catch was recorded, relating to a decrease in haul net effort (pg 18). For Sand Crabs, there were no breaches of limit reference points in 2009/10 (pg 19). The lowest catch of Yelloweye Mullet was recorded due to the long-term declining fishing effort (pg 20). For Mulloway, the lowest commercial catch was recorded (pg 21). For Whaler Sharks, numerous limit reference points were triggered due to a substantial increase in catch relating to a more than doubling in longline effort (pg 22). For Ocean Jackets, no limit reference points were triggered (pg 23).

For the seven Tertiary taxa, there were no results in 2009/10 that varied dramatically from previous years. Moderate to high catches were recorded for Parrot Fish, Western Striped Grunter, Silver Trevally and rays and skates, whilst historically low catches of leatherjackets and Cuttlefish were recorded. The catch of Gummy Sharks has increased slowly since 2002/03.

3.1a King George Whiting (*Sillaginodes punctatus*) – State-wide total

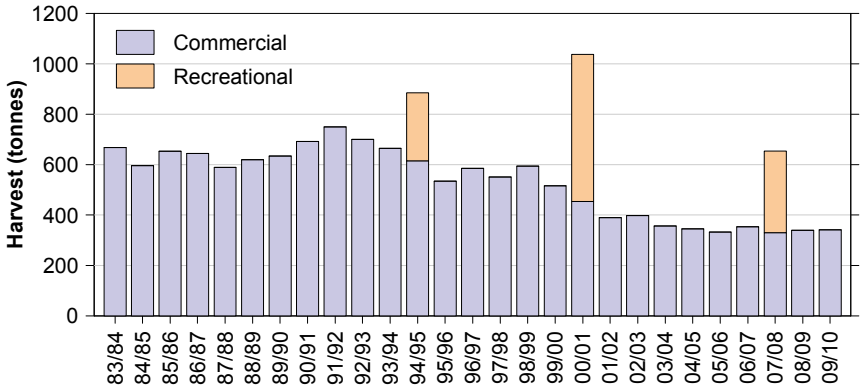

Figure 3.1 Total State-wide commercial and recreational catches of King George whiting.

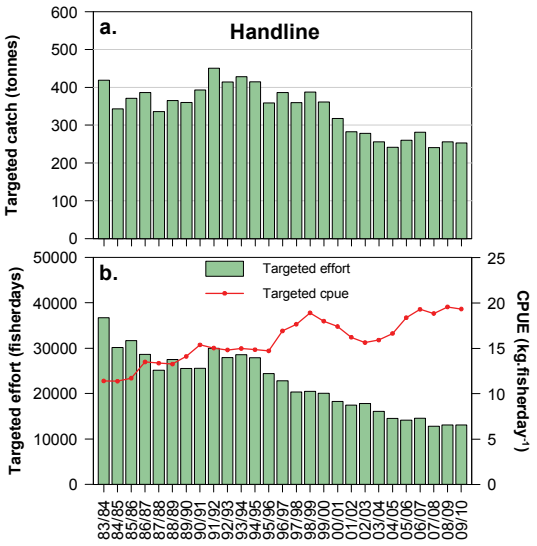

Figure 3.2 (a) Targeted handline catch of King George Whiting; (b) Targeted handline effort and CPUE.

Table 3.1 Comparisons between performance indicators and limit reference points for King George Whiting.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted handline effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted handline CPUE	3rd lowest/3rd highest	**Yes**	**2nd highest**
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.1b King George Whiting (*Sillaginodes punctatus*) – rock lobster fishers

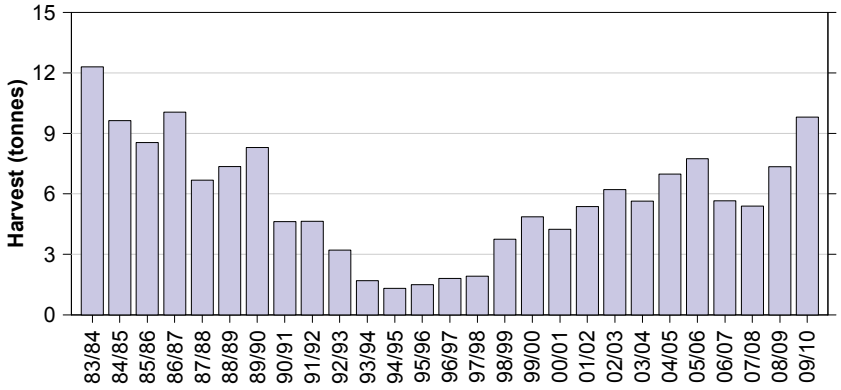

Figure 3.3 Total catch of King George Whiting by rock lobster fishers.

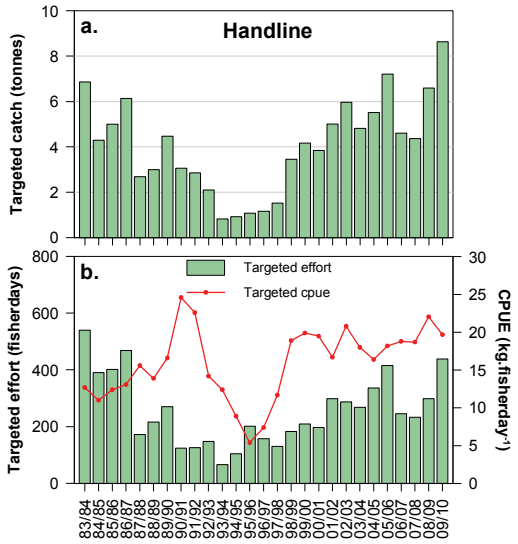

Figure 3.4 (a) Targeted handline catch of King George Whiting by rock lobster fishers; (b) Targeted handline effort and CPUE.

Table 3.2 Comparisons between performance indicators and limit reference points for King George Whiting by rock lobster fishers.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	**Yes**	**3rd highest**
	Greatest interannual change (±)	**Yes**	**Highest increase**
	Greatest 3-year trend (±)	**Yes**	**Highest increase**
B1. Targeted handline effort	3rd highest	**Yes**	**3rd highest**
	Greatest interannual change (±)	**Yes**	**Highest increase**
	Greatest 3-year trend (±)	**Yes**	**Highest increase**
C1. Targeted handline CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.2a Snapper (*Chrysophrys auratus*) – State-wide total

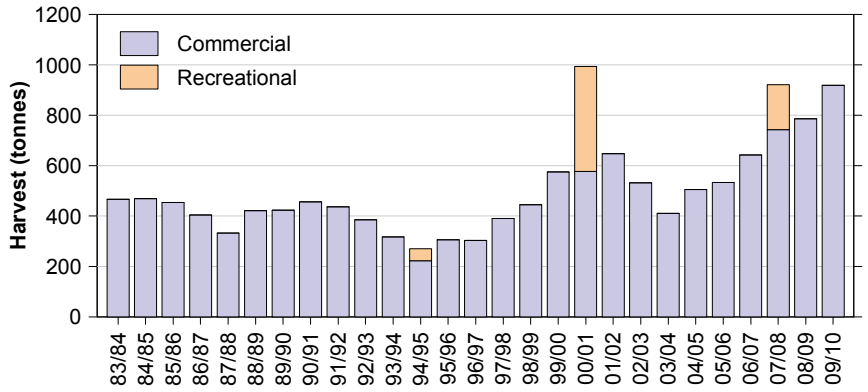

Figure 3.5 Total State-wide commercial and recreational catches of Snapper.

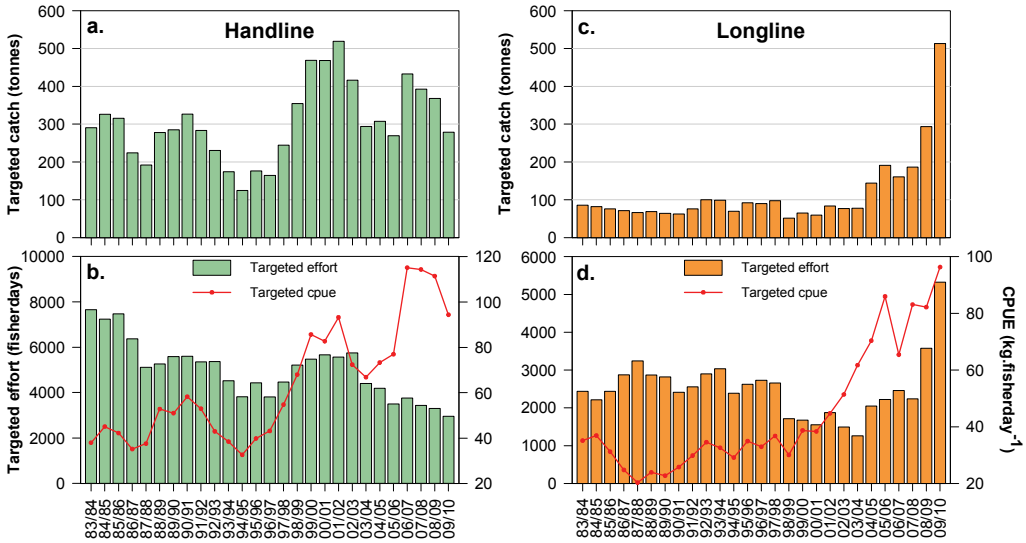

Figure 3.6 (a) Targeted handline catch of Snapper; (b) Targeted handline effort and CPUE; (c) Targeted longline catch; (d) Targeted longline effort and CPUE.

Table 3.3 Comparisons between performance indicators and limit reference points for Snapper.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	**Yes**	**Highest**
	Greatest interannual change (±)	**Yes**	**Highest increase**
	Greatest 5-year trend (±)	**Yes**	**Highest**
B1. Targeted handline effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	No	
B2. Targeted longline effort	3rd highest	**Yes**	**Highest**
	Greatest interannual change (±)	**Yes**	**Highest increase**
	Greatest 5-year trend (±)	**Yes**	**Highest increase**
C1. Targeted handline CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	No	
C2. Targeted longline CPUE	3rd lowest/3rd highest	**Yes**	**Highest**
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	No	

3.2b Snapper (*Chrysophrys auratus*) – rock lobster fishers

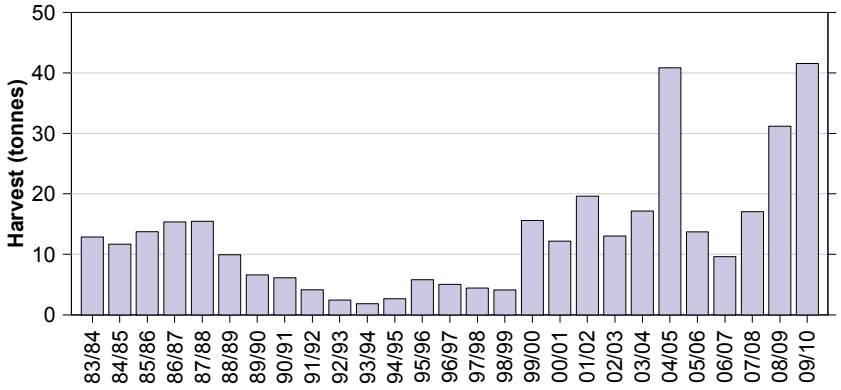

Figure 3.7 Total catch of Snapper by rock lobster fishers.

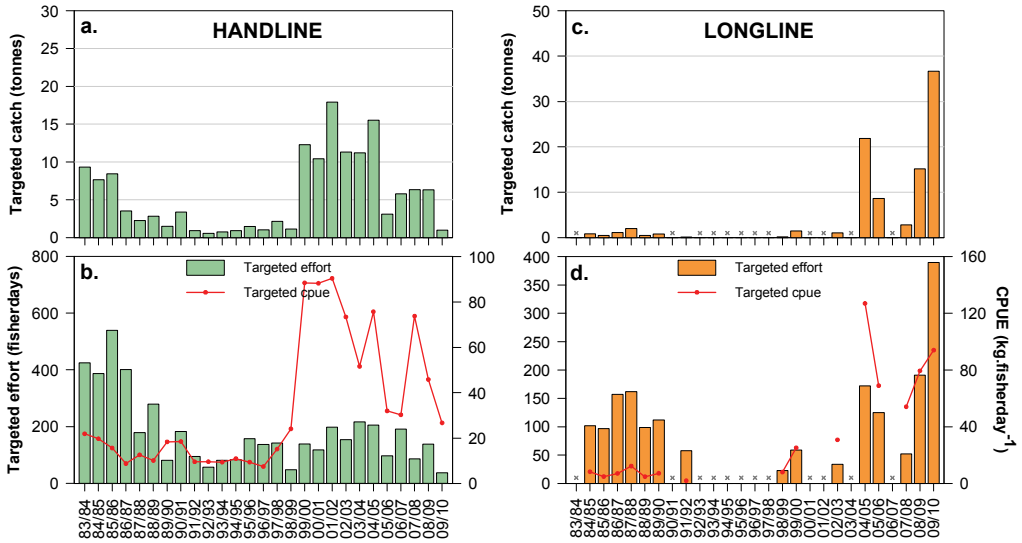

Figure 3.8 (a) Targeted handline catch of Snapper by rock lobster fishers; (b) Targeted handline effort and CPUE; (c) Targeted longline catch; (d) Targeted longline effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.4 Comparisons between performance indicators and limit reference points for Snapper by rock lobster fishers.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	**Yes**	**Highest**
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	**Yes**	**Highest**
B1. Targeted handline effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	No	
B2. Targeted longline effort	3rd highest	**Yes**	**Highest**
	Greatest interannual change (±)	**Yes**	**Highest increase**
	Greatest 5-year trend (±)	**Yes**	**Highest**
C1. Targeted handline CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	No	
C2. Targeted longline CPUE	3rd lowest/3rd highest	**Yes**	**2nd highest**
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	No	

3.3a Southern Calamary (*Sepioteuthis australis*) – State-wide total

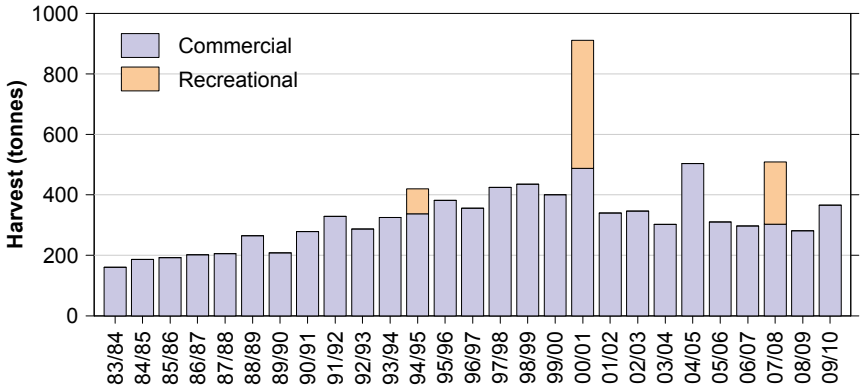

Figure 3.9 Total State-wide commercial and recreational catches of Southern Calamary.

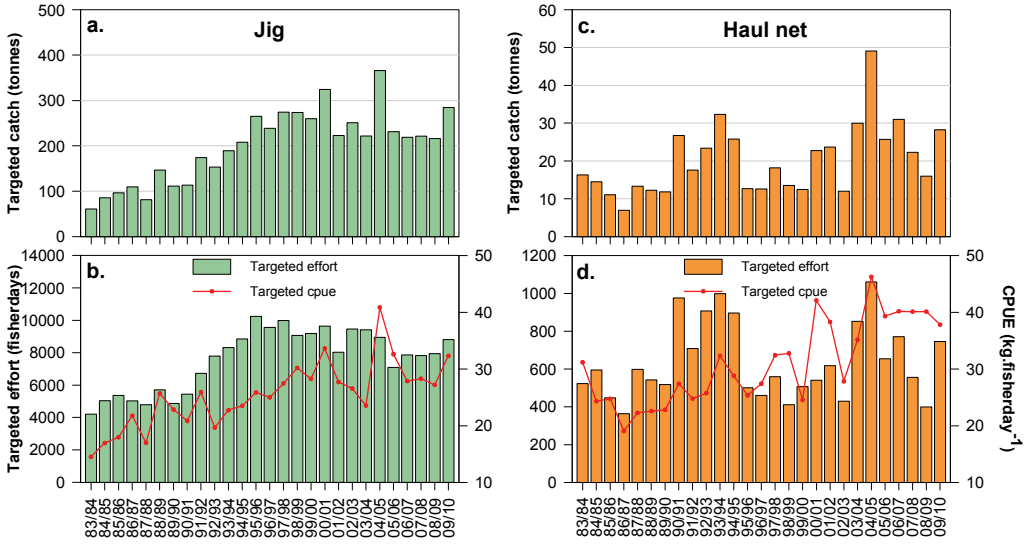

Figure 3.10 (a) Targeted jig catch of Southern Calamary; (b) Targeted jig effort and CPUE; (c) Targeted haul net catch; (d) Targeted haul net effort and CPUE.

Table 3.5 Comparisons between performance indicators and limit reference points for Southern Calamary.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted jig effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted haul net effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted jig CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C2. Targeted haul net CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.3b Southern Calamary (*Sepioteuthis australis*) – rock lobster fishers

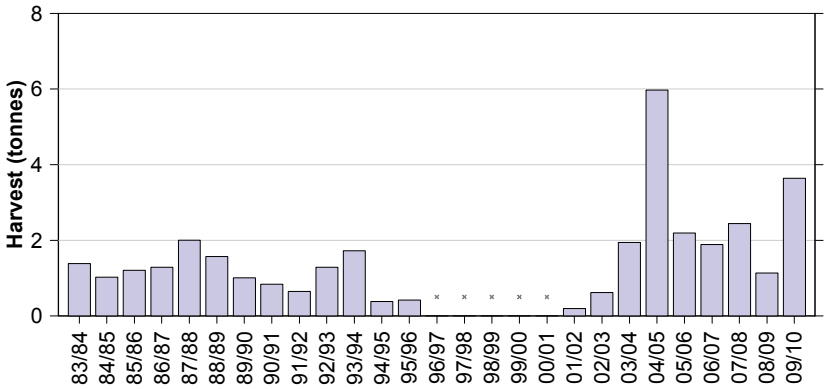

Figure 3.11 Total catch of Southern Calamary by rock lobster fishers. Grey crosses indicate confidential data (<5 fishers).

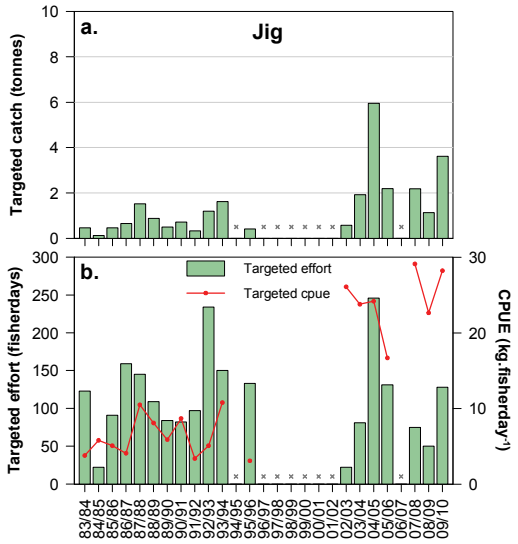

Figure 3.12 (a) Targeted jig catch of Southern Calamary by rock lobster fishers; (b) Targeted jig effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.6 Comparisons between performance indicators and limit reference points for Southern Calamary by rock lobster fishers.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	**Yes**	**2nd highest**
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted jig effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted jig CPUE	3rd lowest/3rd highest	**Yes**	**2nd highest**
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.4a Southern Garfish (*Hyporhamphus melanochir*) – State-wide total

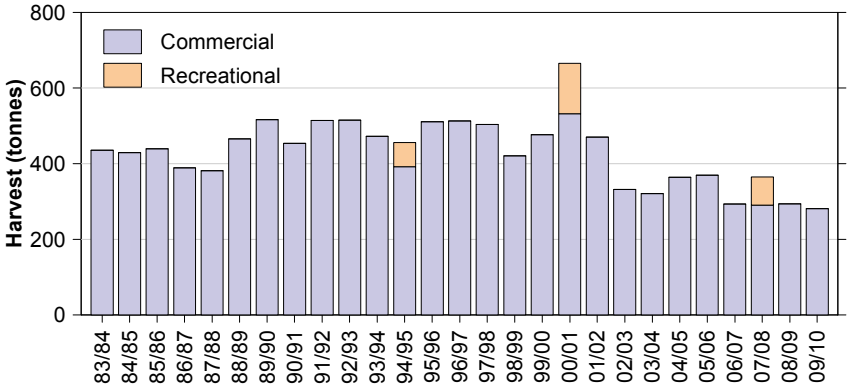

Figure 3.13 Total State-wide commercial and recreational catches of Southern Garfish.

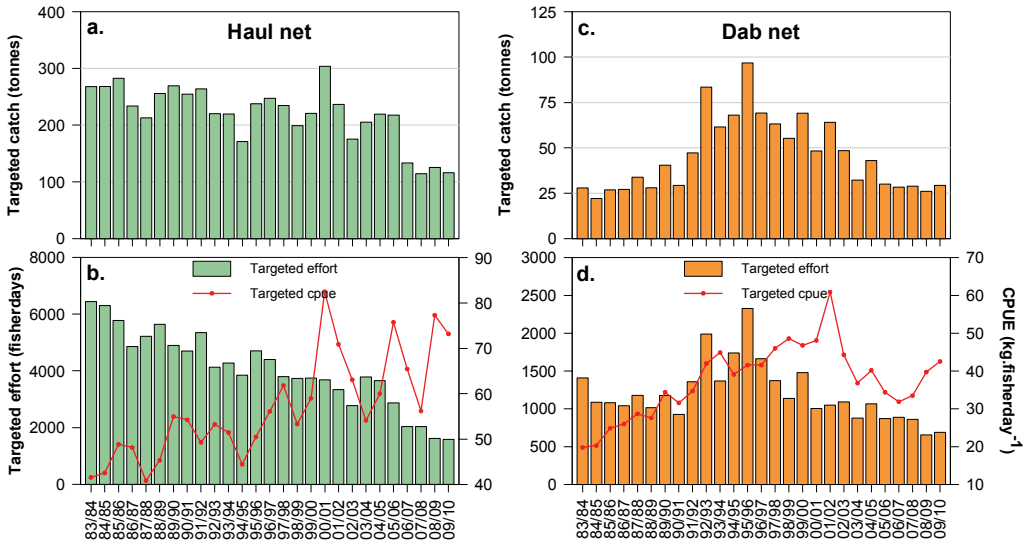

Figure 3.14 (a) Targeted haul net catch of Southern Garfish; (b) Targeted haul net effort and CPUE; (c) Targeted dab net catch; (d) Targeted dab net effort and CPUE.

Table 3.7 Comparisons between performance indicators and limit reference points for Southern Garfish.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	**Yes**	**Lowest**
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted haul net effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted dab net effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted haul net CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C2. Targeted dab net CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.4b Southern Garfish (*Hyporhamphus melanochir*) – rock lobster fishers

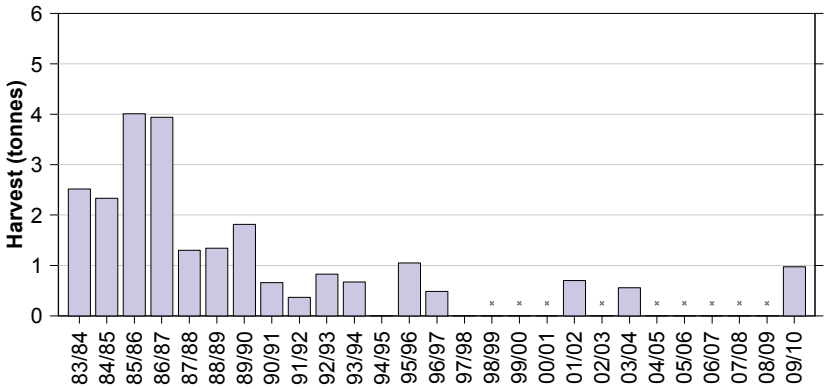

Figure 3.15 Total catch of Southern Garfish by rock lobster fishers. Grey crosses indicate confidential data (<5 fishers).

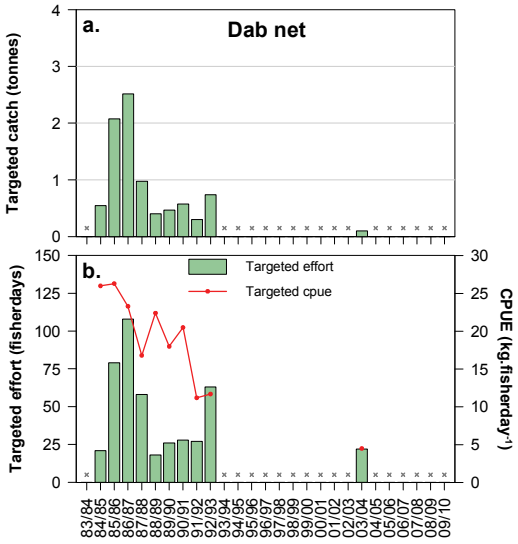

Figure 3.16 (a) Targeted dab net catch of Southern Garfish by rock lobster fishers; (b) Targeted dab net effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.8 Comparisons between performance indicators and limit reference points for Southern Garfish by rock lobster fishers. Crosses indicate that effort data were too sparse to be meaningful.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted dab net effort	3rd highest	x	Effort too low
	Greatest interannual change (±)	x	
	Greatest 3-year trend (±)	x	
C1. Targeted dab net CPUE	3rd lowest/3rd highest	x	
	Greatest interannual change (±)	x	
	Greatest 3-year trend (±)	x	

3.5 Yellowfin Whiting (*Sillago schomburgkii*)

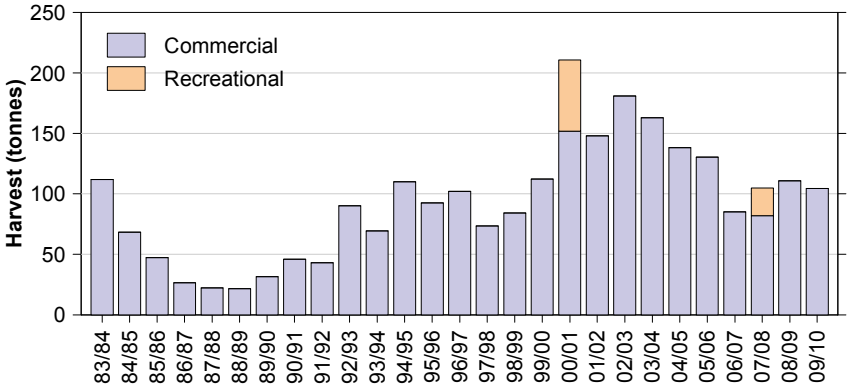

Figure 3.17 Total State-wide commercial and recreational catches of Yellowfin Whiting.

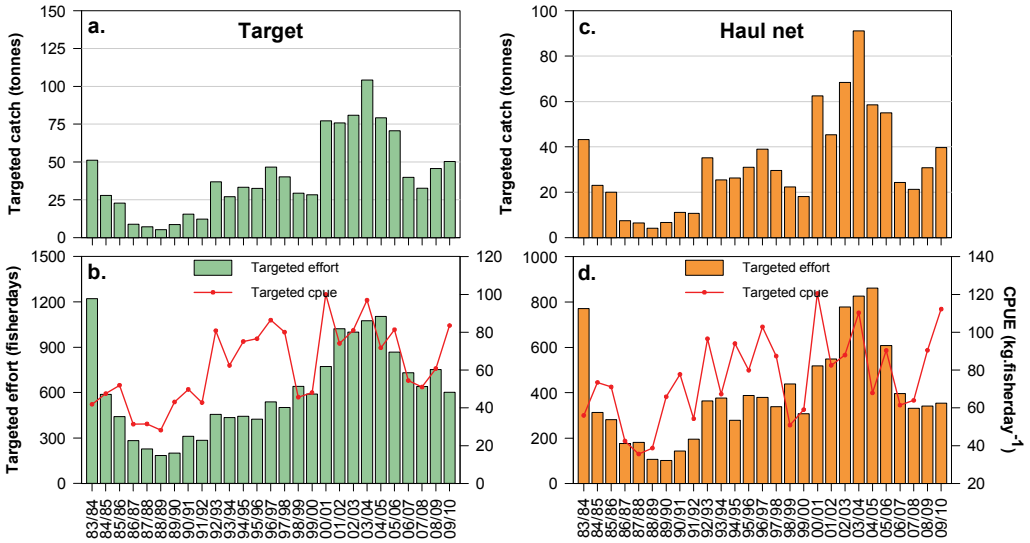

Figure 3.18. (a) Total targeted catch of Yellowfin Whiting; (b) Total targeted effort and CPUE; (c) Targeted haul net catch; (d) Targeted haul net effort and CPUE.

Table 3.9. Comparisons between performance indicators and limit reference points for Yellowfin Whiting.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted haul net effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C2. Targeted haul net CPUE	3rd lowest/3rd highest	**Yes**	**2nd highest**
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.6 Australian Salmon (*Arripis truttaceus*)

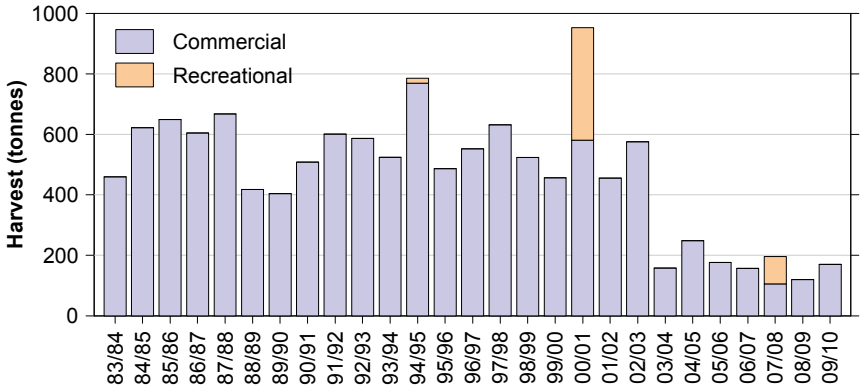

Figure 3.19 Total State-wide commercial and recreational catches of Australian Salmon.

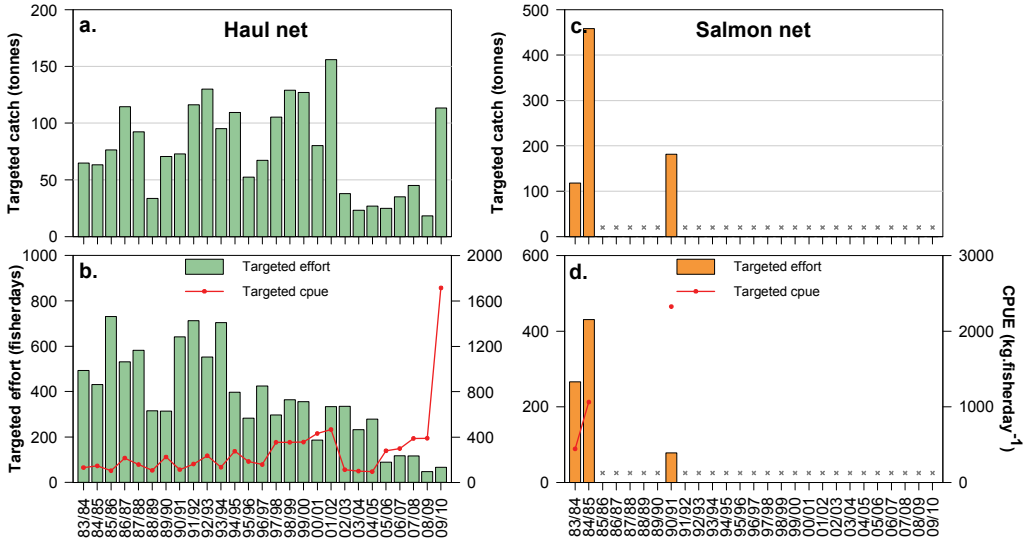

Figure 3.20 (a) Targeted haul net catch of Australian Salmon; (b) Targeted haul net effort and CPUE; (c) Targeted Australian Salmon catch; (d) Targeted Australian Salmon net effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.10 Comparisons between performance indicators and limit reference points for Australian Salmon. Crosses indicate that recent effort levels were too low to be meaningful.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted haul net effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted salmon net effort	3rd highest	x	Effort too low
	Greatest interannual change (±)	x	
	Greatest 3-year trend (±)	x	
C1. Targeted haul net CPUE	3rd lowest/3rd highest	**Yes**	**Highest**
	Greatest interannual change (±)	**Yes**	**Highest**
	Greatest 3-year trend (±)	**Yes**	**Highest**
C2. Targeted salmon net CPUE	3rd lowest/3rd highest	x	
	Greatest interannual change (±)	x	
	Greatest 3-year trend (±)	x	

3.7. Australian Herring (*Arripis georgianus*)

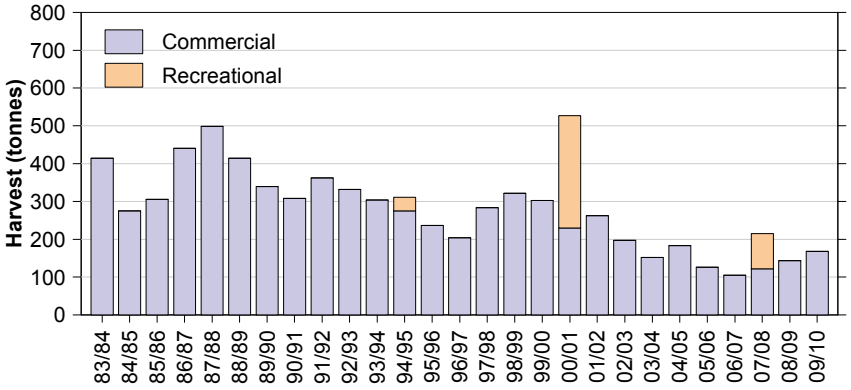

Figure 3.21 Total State-wide commercial and recreational catches of Australian Herring.

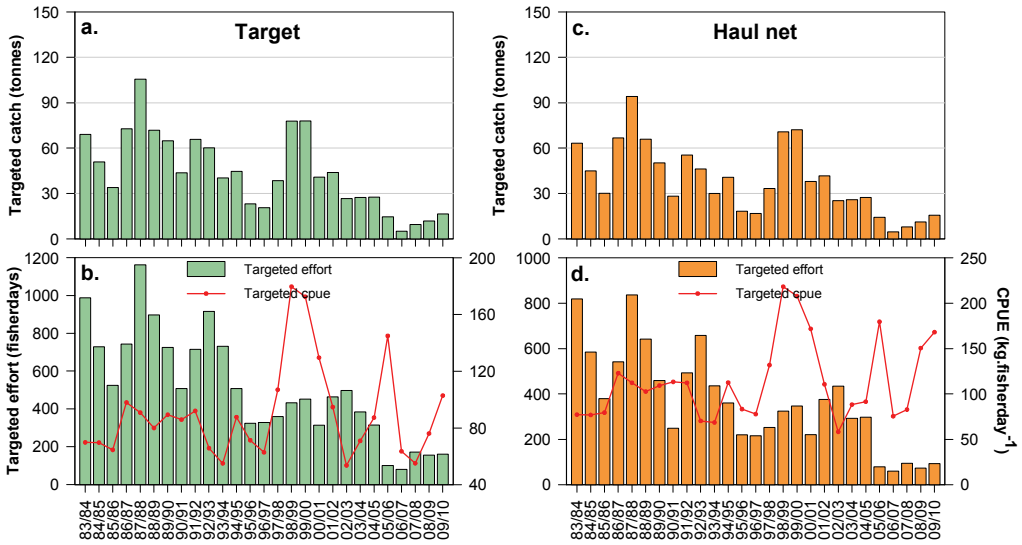

Figure 3.22 (a) Total targeted catch of Australian Herring; (b) Total targeted effort and CPUE; (c) Targeted haul net catch; (d) Targeted haul net effort and CPUE.

Table 3.11 Comparisons between performance indicators and limit reference points for Australian Herring.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted haul net effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C2. Targeted haul net CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.8. Mud Cockles (*Katelysia* spp.)

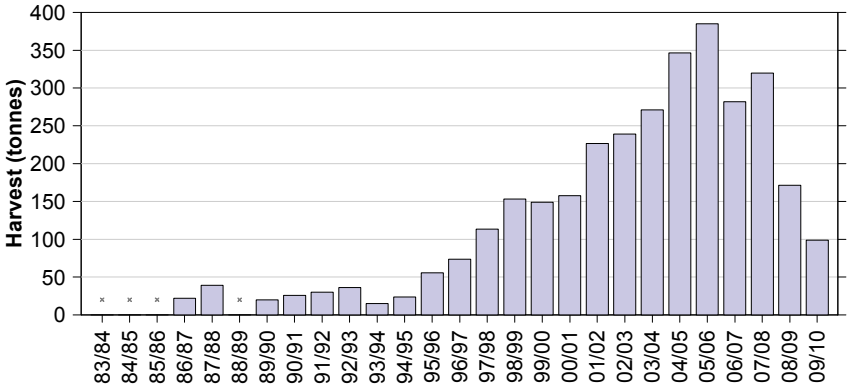

Figure 3.23 Total State-wide commercial catch of Mud Cockles. Grey crosses indicate confidential data (<5 fishers).

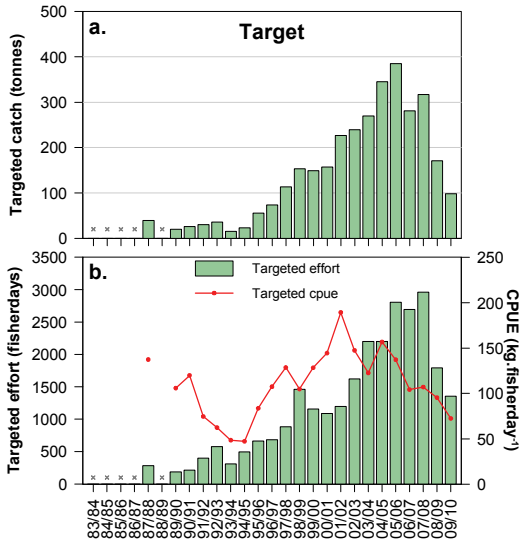

Figure 3.24 (a) Total Targeted catch of Mud Cockles; (b) Total targeted effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.12 Comparisons between performance indicators and limit reference points for Mud Cockles.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	**Yes**	**Greatest decrease**
B1. Targeted effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	**Yes**	**Greatest decrease**
C1. Targeted CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.9 Snook (*Sphyraena novaehollandiae*)

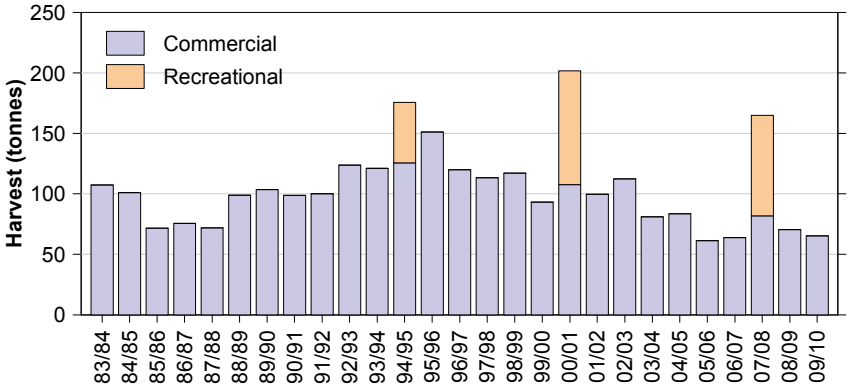

Figure 3.25 Total State-wide commercial and recreational catches of Snook.

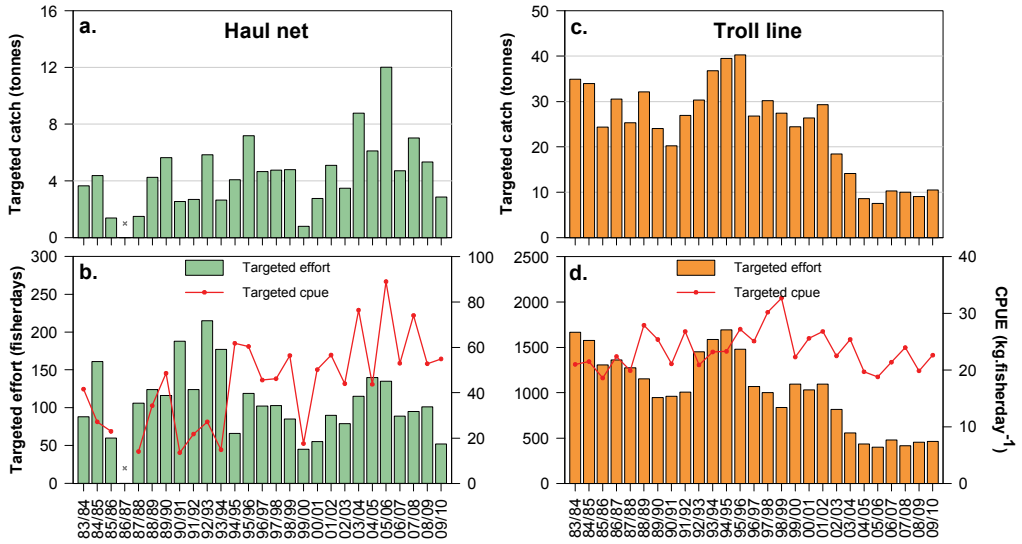

Figure 3.26 (a) Targeted haul net catch of Snook; (b) Targeted effort and CPUE; (c) Targeted troll line catch; (d) Targeted haul net effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.13 Comparisons between performance indicators and limit reference points for Snook.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	**Yes**	**3rd lowest**
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted haul net effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted troll line effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted haul net CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C2. Targeted troll line CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.10 Sand Crabs (*Ovalipes australiensis*)

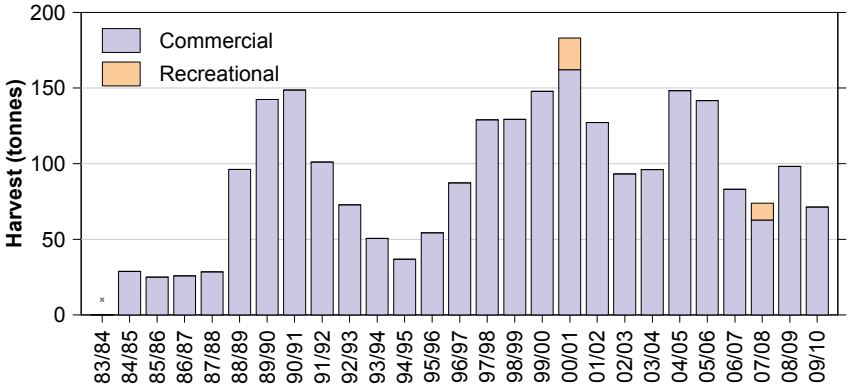

Figure 3.27 Total State-wide commercial and recreational catches of Sand Crabs. Grey cross indicates confidential data (<5 fishers).

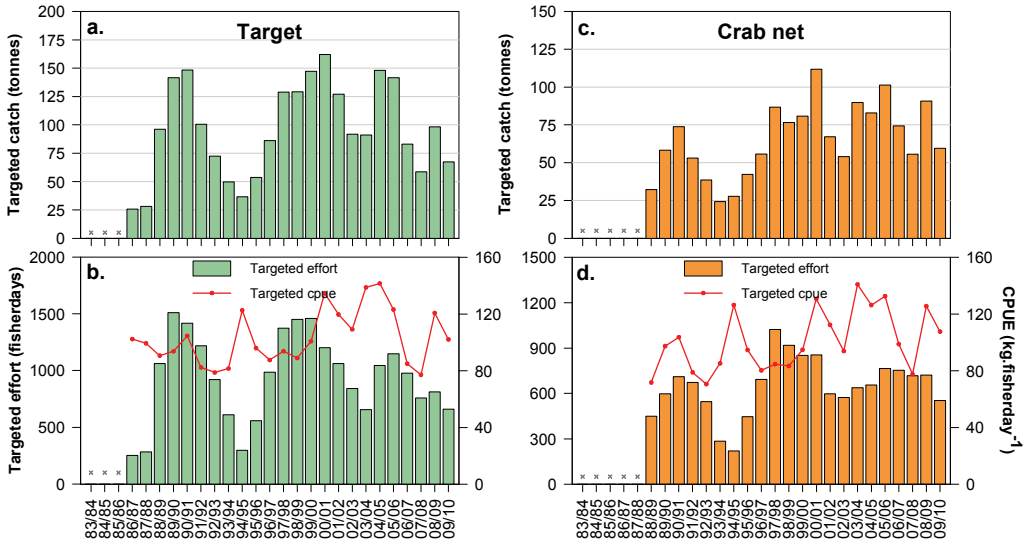

Figure 3.28 (a) Total targeted catch of Sand Crabs; (b) Total targeted effort and CPUE; (c) Targeted Sand Crab net catch; (d) Targeted Sand Crab net effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.14 Comparisons between performance indicators and limit reference points for Sand Crabs.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted crab net effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C2. Targeted crab net CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.11 Yelloweye Mullet (*Aldrichetta forsteri*)

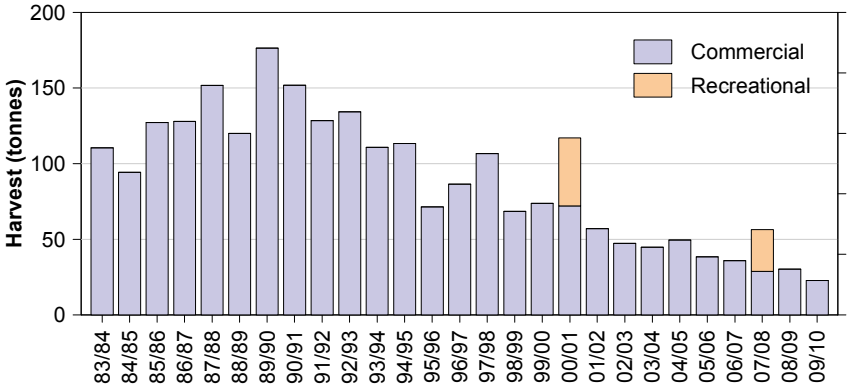

Figure 3.29 Total State-wide commercial and recreational catches of Yelloweye Mullet.

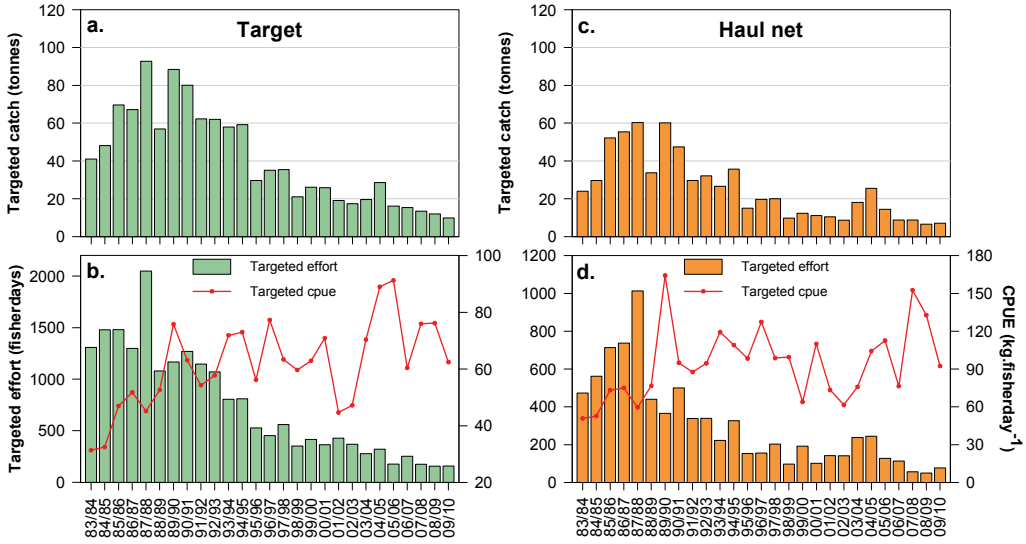

Figure 3.30 (a) Total targeted catch of Yelloweye Mullet; (b) Total targeted effort and CPUE; (c) Targeted haul net catch; (d) Targeted haul net effort and CPUE.

Table 3.15 Comparisons between performance indicators and limit reference points for Yelloweye Mullet.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	**Yes**	**Lowest**
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted haul net effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C2. Targeted haul net CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.12 Mulloway (*Argyrosomus japonicus*)

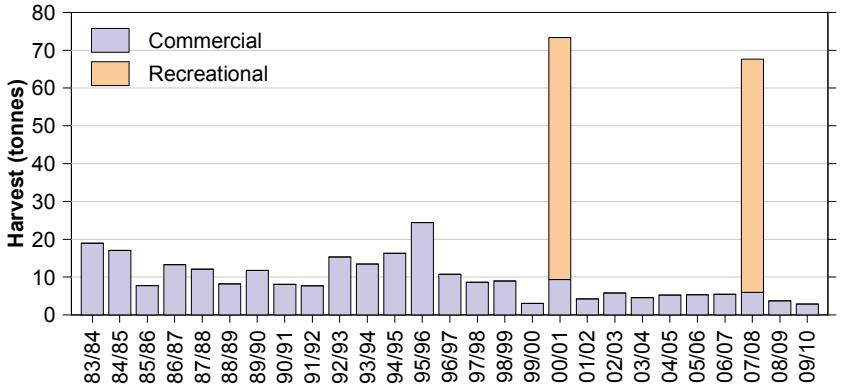

Figure 3.31 Total State-wide commercial and recreational catches of Mulloway.

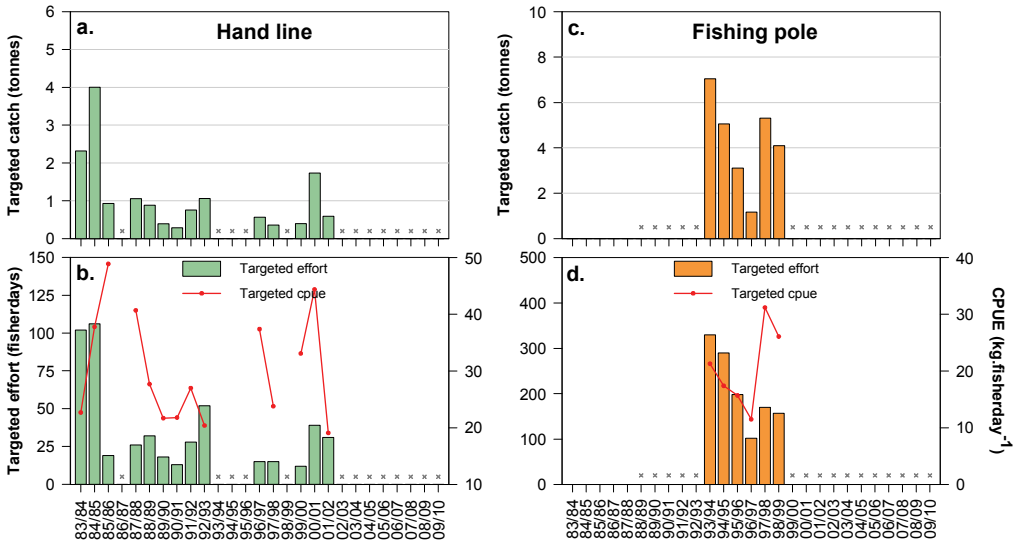

Figure 3.32 (a) Targeted handline catch of Mulloway; (b) Targeted handline effort and CPUE; (c) Targeted fishing pole catch; (d) Targeted fishing pole effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.16. Comparisons between performance indicators and limit reference points for Mulloway. Crosses indicate that recent effort levels were too low to be meaningful.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	**Yes**	**Lowest**
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted handline effort	3rd highest	x	Effort too low
	Greatest interannual change (±)	x	
	Greatest 3-year trend (±)	x	
B2. Targeted fishing pole effort	3rd highest	x	Effort too low
	Greatest interannual change (±)	x	
	Greatest 3-year trend (±)	x	
C1. Targeted handline CPUE	3rd lowest/3rd highest	x	
	Greatest interannual change (±)	x	
	Greatest 3-year trend (±)	x	
C2. Targeted fishing pole CPUE	3rd lowest/3rd highest	x	
	Greatest interannual change (±)	x	
	Greatest 3-year trend (±)	x	

3.13 Bronze Whaler (*Carcharhinus brachyurus*) and Dusky Whaler (*C. obscurus*)

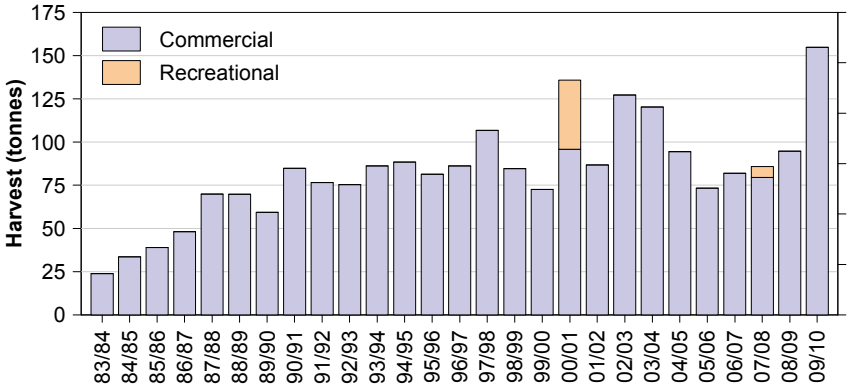

Figure 3.33 Total State-wide commercial and recreational catches of whaler sharks.

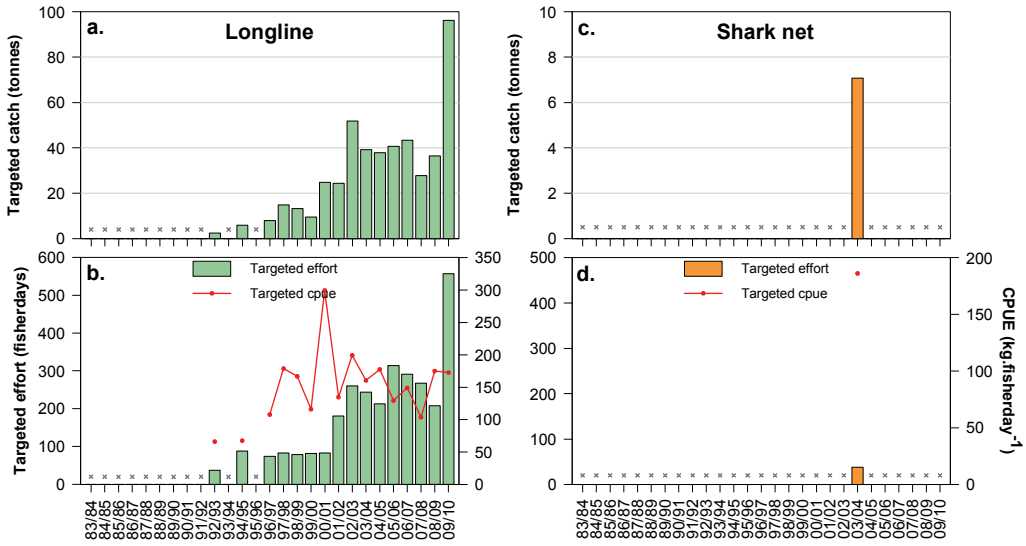

Figure 3.34 (a) Targeted longline catch of whaler sharks; (b) Targeted longline effort and CPUE; (c) Targeted shark net catch; (d) Targeted shark net effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.17. Comparisons between performance indicators and limit reference points for whaler sharks.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	**Yes**	**Highest**
	Greatest interannual change (±)	**Yes**	**Highest**
	Greatest 3-year trend (±)	**Yes**	**Highest**
B1. Targeted longline effort	3rd highest	**Yes**	**Highest**
	Greatest interannual change (±)	**Yes**	**Highest**
	Greatest 3-year trend (±)	**Yes**	**Highest**
B2. Targeted shark net effort	3rd highest	**Yes**	**2nd highest**
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	**Yes**	**Highest**
C1. Targeted longline CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C2. Targeted shark net CPUE	3rd lowest/3rd highest	**Yes**	**3rd highest**
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.14 Ocean Jackets (*Nelusetta ayraud*)

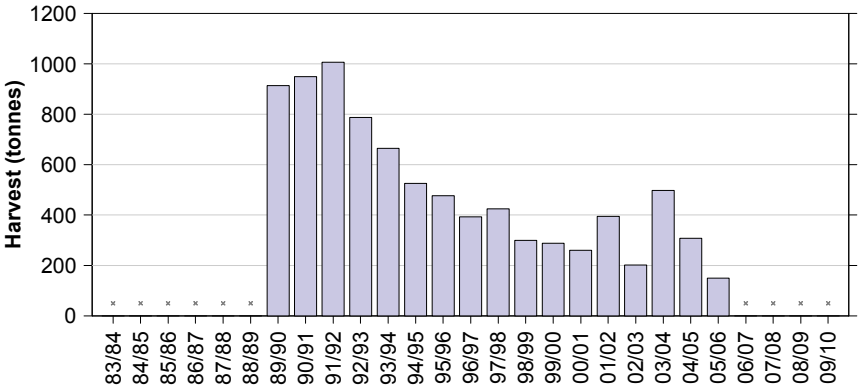

Figure 3.35 Total State-wide commercial catch of Ocean Jackets. Grey crosses indicate confidential data (<5 fishers).

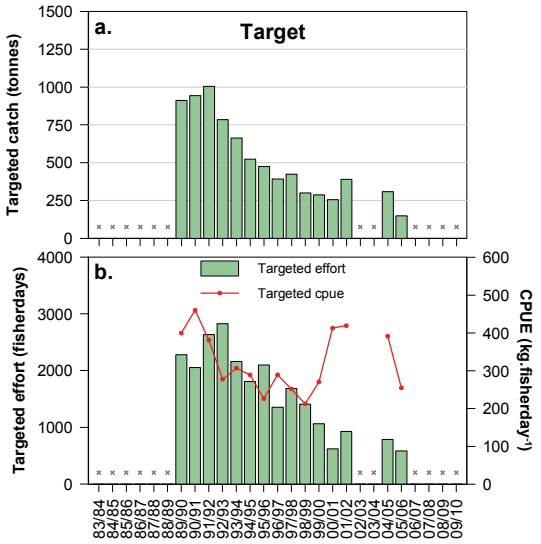

Figure 3.36 (a) Total targeted catch of Ocean Jackets; (b) Total targeted effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.18 Comparisons between performance indicators and limit reference points for Ocean Jackets.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted effort	3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted CPUE	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.15 Parrot Fish (*Notolabrus* spp.)

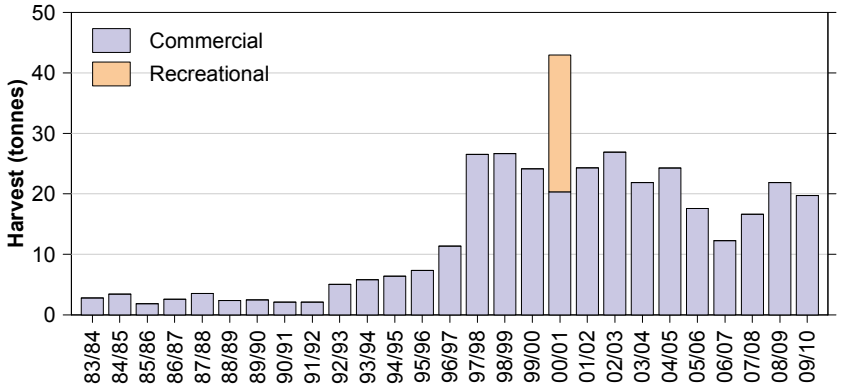

Figure 3.37 Total State-wide commercial and recreational catches of Parrot Fish.

Table 3.19 Comparisons between performance indicators and limit reference points for Parrot Fish.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.16 Western Striped Grunter (*Pelates octolineatus*)

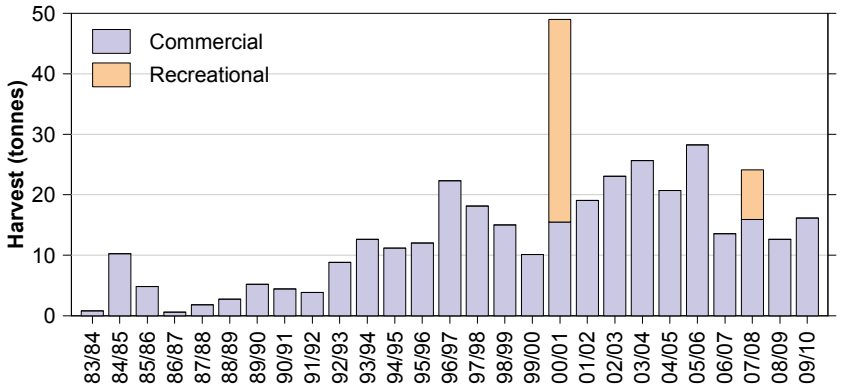

Figure 3.38 Total State-wide commercial and recreational catches of Western Striped Grunter.

Table 3.20 Comparisons between performance indicators and limit reference points for Western Striped Grunter.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.17 Silver Trevally (*Pseudocaranx georgianus*)

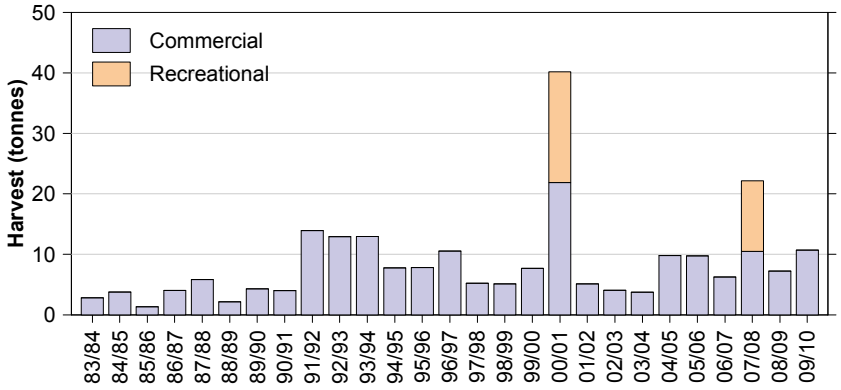

Figure 3.39 Total State-wide commercial and recreational catches of Silver Trevally.

Table 3.21 Comparisons between performance indicators and limit reference points for Silver Trevally.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.18 Leatherjackets (Family Monacanthidae)

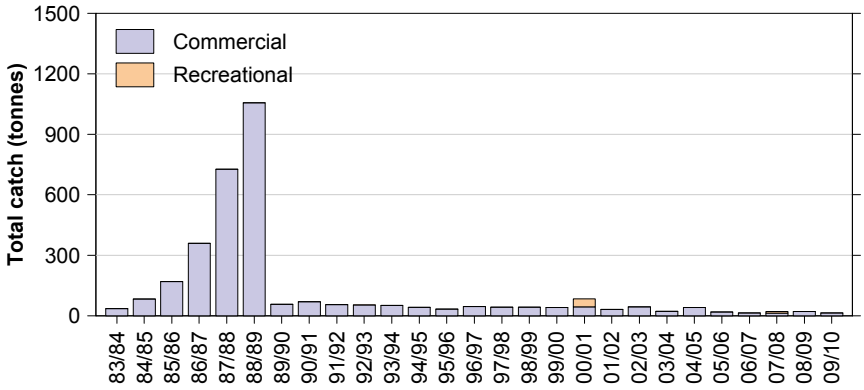

Figure 3.40 Total State-wide commercial and recreational catches of leatherjackets.

Table 3.22 Comparisons between performance indicators and limit reference points for leatherjackets.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	**Yes**	**3rd lowest**
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.19 Gummy Sharks (Family Triakidae)

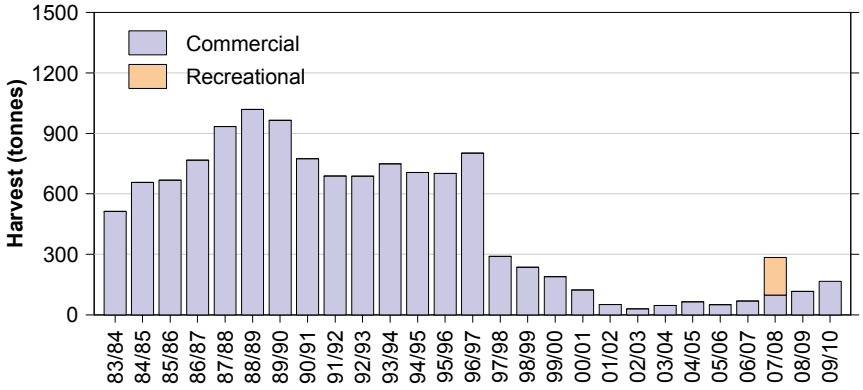

Figure 3.41 Total State-wide commercial catch of Gummy Sharks.

Table 3.23 Comparisons between performance indicators and limit reference points for Gummy Sharks.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.20 Rays and Skates (Class Elasmobranchii)

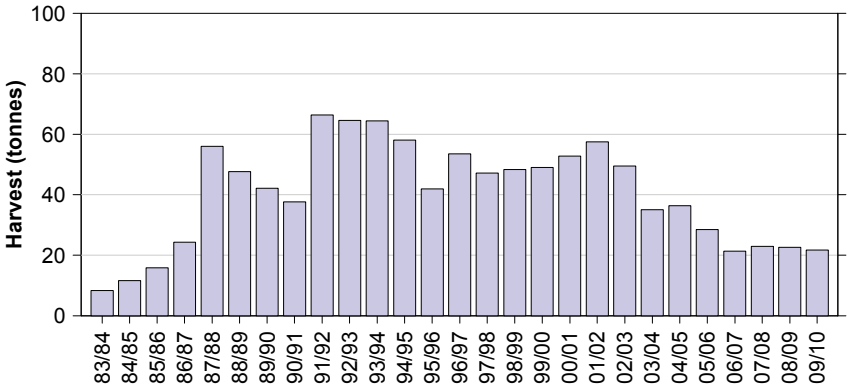

Figure 3.42 Total State-wide commercial catch of rays and skates.

Table 3.24 Comparisons between performance indicators and limit reference points for rays and skates.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.21 Cuttlefish (*Sepia apama*)

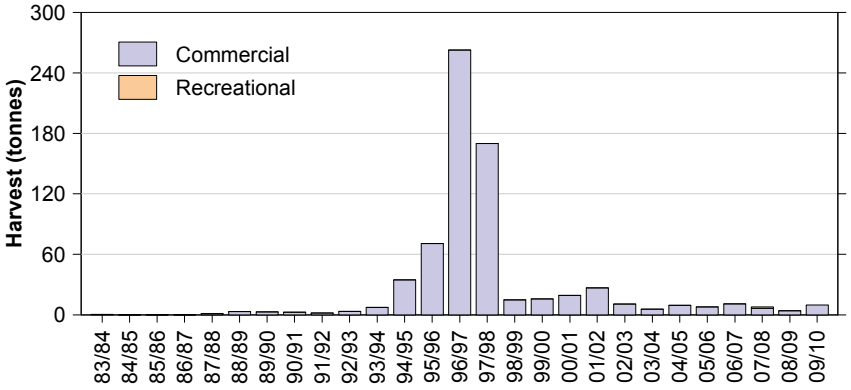

Figure 3.43 Total State-wide commercial catch of Cuttlefish.

Table 3.25 Comparisons between performance indicators and limit reference points for Cuttlefish.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3rd lowest/3rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

4.0 Discussion

In this report, the annual State-wide fishery statistics were presented for the 27-year period of 1983/84 to 2009/10 for 21 different taxa taken in the South Australian Marine Scalefish Fishery. The data from the commercial sector for 2009/10 were then compared against limit reference points calculated from the 27-year time period, or appropriate shorter periods, depending on the species. There were notable trends in the fishery statistics for some species and numerous breaches of limit reference points.

For three of the four Primary species there were several breaches of limit reference points. For King George Witing, by 2009/10 the declines in commercial catch and effort of the 2000s had stabilised whilst catch rates maintained the high levels of the past four years. For snapper, catches attained record levels in 2009/10, having increased annually since 2003/04. They reflect recent substantial increases in longline effort as well as high levels of longline and handline CPUE (Fowler et al. 2010). For Southern Calamary, the estimates of catch, effort and CPUE were at relatively high levels in 2009/10, although no limit reference points were triggered. In comparison, the lowest catch of Southern Garfish for the 27-year period was taken, reflecting the continually declining targeted effort on this species with both haul nets and dab nets. The trends in the fishery statistics from the rock lobster fishers for the primary species did not necessarily track the general trends described above. In fact, for each of King George Whiting, Snapper and Southern Garfish there were considerable increases in the catches taken by rock lobster fishers, which reflect increases in their targeted effort levels for these species. These increases in effort on MSF species may relate to the recent down-turn in the rock lobster fisheries, particularly that in the Southern Zone (Linnane et al. 2010).

In 2009/10, the Secondary species fell into three groups based on commercial fishery statistics. For the Bronze and Dusky Whalers there were record levels of longline effort that produced record catches. For Yellowfin Whiting and Sand Crabs there were moderate levels of catch and effort, with few limit reference points triggered. However, for Australian Salmon, Australian Herring, Snook, Yelloweye Mullet, Mulloway and Ocean Jackets low catches were recorded due to historically low levels of targeted fishing effort. Mud Cockles also fell into this category reflecting the significant restructure in the management of the fishery on this species (Gorman et al. 2010). Most of the Tertiary species fell into two categories. There were those taxa for which a moderate level of catch and effort were reported for 2009/10, including the Parrotfish, Western Striped Grunter, Silver Trevally, rays and skates and Gummy Sharks. Then there were those taxa for which there were historically low levels of catch, which included the leatherjackets and the Cuttlefish.

5.0 References

Fowler AJ (2005). The South Australian Marine Scalefish Fishery – Stock Status Report. Fishery Stock Status Report to PIRSA Fisheries. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, RD05/0025. SARDI Research Report Series No. 112. 19 pp.

Fowler AJ, Steer MA, McGarvey R, Feenstra JE (2007). The South Australian Marine Scalefish Fishery – Stock Status Report. Report to PIRSA. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, F2007/000565-2, SARDI Research Report Series No. 255. 28 pp.

Fowler AJ, McGarvey R, Steer MA, Feenstra JE (2008). The South Australian Marine Scalefish Fishery – Stock Status Report. Report to PIRSA. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, F2007/000565-3, SARDI Research Report Series No. 321. 29 pp.

Fowler AJ, McGarvey R, Steer MA, Feenstra JE (2009). The South Australian Marine Scalefish Fishery – Stock Status Report. Report to PIRSA. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, F2007/000565-4, SARDI Research Report Series No. 413. 29 pp.

Fowler AJ, McGarvey R, Feenstra JE and Jackson WB (2010). Snapper (*Chrysophrys auratus*) Fishery. Fishery Assessment Report to PIRSA. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, F2007/000523-2, SARDI Research Report series No. 473. Pp 109.

Gorman D, Mayfield S, Burch P, Ward TM (2010). Distribution, harvestable biomass and fisheries biology of *Katelysia* spp. in the South Australian commercial mud cockle fishery. SARDI Aquatic Sciences Publication No. F2010/000263-1. SARDI Research Report Series No. 442. 37pp.

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.

Linnane A, McGarvey R, Feenstra J and Hawthorne P (2010). Southern Zone Rock Lobster (*Jasus edwardsii*) Fishery 2008/09. Fishery assessment report to PIRSA. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, 95 pp. SARDI Publication Number F2007/000276-3. SARDI Research Report Series No. 476.

McGarvey R, Fowler AJ, Feenstra JE, Burch P, Jackson WB (2009). Southern Garfish (*Hyporhamphus melanochir*) fishery. Fishery assessment report to PIRSA. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, 82pp. SARDI Publication Number F2007/000720-2. SARDI Research Report Series No. 397.

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.

Steer MA, McGarvey R, Feenstra JE, Fowler AJ (2006). South Australian Marine Scalefish Fishery – Stock Status Report. Report to PIRSA. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, RD05/0025-2. 28 pp.