

**The South Australian Marine Scalefish Fishery
Stock Status Report**

Report to PIRSA

AJ Fowler, R McGarvey, MA Steer, JE Feenstra,

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South Australian Research and Development Institute

SARDI Aquatic Sciences

PO Box 120

Henley Beach 5022

Telephone: (08) 8207 5400

Facsimile: (08) 8207 5406

<http://www.sardi.sa.gov.au>

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Author(s): AJ Fowler, R McGarvey, MA Steer, JE Feenstra

Reviewers: Dr Shane Roberts and Dr Adrian Linnane

Approved by: Dr Tim Ward



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1.0 Introduction

This is the fourth annual stock status report produced for the Marine Scalefish fishery of South Australia. The annual production of the stock status report is prescribed in the Management Plan in order to provide an overview of the current status of the more significant species 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, combining their values to the commercial, recreational and community sectors (Noell et al. 2006). The species considered in this report are the same as those considered in the last two stock status reports (Steer et al. 2006, Fowler et al. 2007).

The status of the stocks of the different species or taxonomic groups was based only on the commercial catch and effort data, which were assessed by development of fishery performance indicators and limit reference points. 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 for previous reports, the Marine Scalefish Fishery Management Committee (MSFMC) considered that they needed to be revised. This was done, and then at a meeting of the MSFMC that was held on 17th February 2006, the new performance indicators and reference points were adopted (Minutes of meeting No. 98 of MSFMC). The new fishery indicators are: total commercial catch; targeted effort; and targeted CPUE. Furthermore, the new limit reference points that relate to these indicators and that were used to process the data presented in this report were:

- the 3rd highest and 3rd lowest values over the reference period;
- 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
	Garfish	Full	haulnet, dabnet
	Calamary	Full	haulnet, jig
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	
	Silver trevally	Minor	n.a.
	Leatherjackets	Minor	n.a.
	Gummy sharks	Minor	n.a.
	Rays and skates	Minor	n.a.

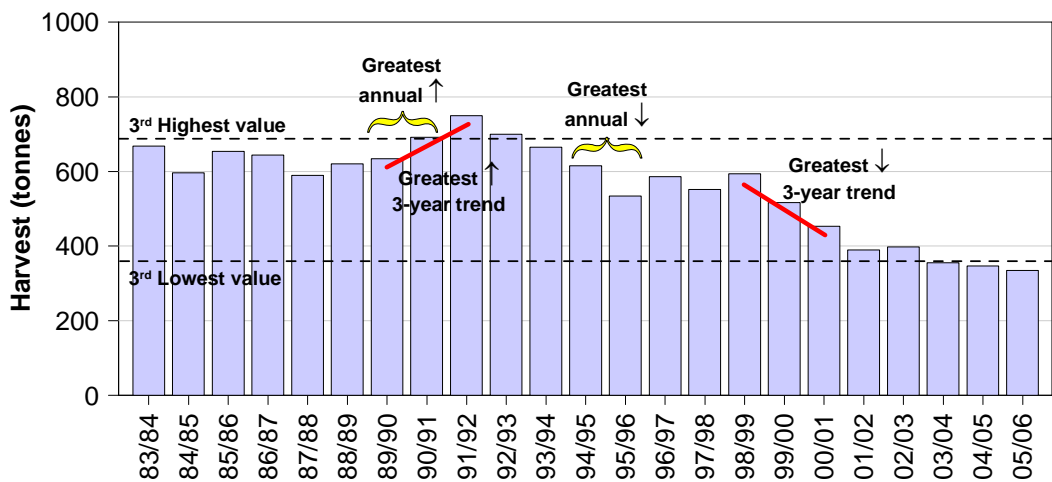


Figure 1.1. A schematic illustration of the prescribed limit reference points indicating: the 3rd highest and 3rd lowest values over the reference period; the greatest inter-annual variation (+ and -); and the greatest rates of change (trend) over a three-year period (+ and -) (five-year period used 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. Furthermore, two estimates of annual recreational catch are also reported, one from the recreational boat ramp creel survey that was done between 1994-96 (McGlennon and Kinloch 1997) and the second from the National Recreational and Indigenous Fishing Survey that collected data from May 2000 until April 2001 (Henry and Lyle 2003).

Data only from the commercial sector were used in the comparisons between 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 2007/08. The appropriate limit reference points were then derived from these different time-series of data. The estimates of indicators for 2007/08 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 showing 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 2007/08. 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 most informative for each individual species and are the same as those considered in the previous stock status reports (Fowler 2005, Steer et al. 2006, Fowler et al. 2007) (Table 1.1). The estimates of performance indicators for 2007/08 were compared against limit reference points calculated for the 25-year period of 1983/84 to 2007/08. 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 sub-sets of data. These data and the results of the comparisons between indicators and reference points were presented separately. The separate analysis of catch and effort data from rock lobster fishers for the primary Marine Scalefish species satisfies 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 data were not considered from the whole 25-year time-series, depending on when each 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 1989/90 to 2007/08, whilst for mud cockles it was 1985/86 to 2007/08.

For the species for which only a minor level of reporting was done, which were mostly Tertiary species, the only fishery performance indicator that was 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 were only 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 two stock status reports (Steer et al. 2006, Fowler et al. 2007);
- 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

In 2007/08, there were at least two limit reference points breached for three of the four Primary species, the number and nature of which were indicative of different trends for the different species. Two breaches for King George whiting related to a general decline in commercial catch since 1992, which is associated with a general increasing trend of CPUE. For snapper there were six breaches of reference points; one related to recent increases in total catch that attained a record level in 2007/08, whilst the others related to simultaneous increases in both handline and longline CPUE. For southern sea garfish, the lowest ever catch, very low haul net effort and a significant drop in haul net CPUE were recorded in 2007/08. For southern calamary, the catch and effort data in 2007/08 did not differ markedly from those from previous years and so there were no breaches of reference points. For some Primary species in 2007/08, there were several breaches of reference points for the catch and effort data from the rock lobster fishers. For snapper, there were declining trends in the catch and CPUE from rock lobster fishers, whilst their calamary catch was the 2nd highest yet recorded, with jig CPUE at its highest level. In several recent years, their dab net effort for garfish has been minimal.

For some Secondary species, there were notable trends in the catch and effort data. For Yellowfin whiting, catch, effort and CPUE have declined over several years but not sufficiently to breach any reference points. For Australian salmon, catch has continued to decline, although in 2007/08 haul net CPUE attained its 3rd highest recorded level. For Australian herring, commercial catch and targeted effort have declined since 1998/99, whilst targeted CPUE has been highly variable, declining dramatically in recent years. In 2007/08, mud cockle catch was the 3rd highest recorded value, despite declining from the record catch taken in 2005/06. For snook, there were no notable results except that in 2007/08 haul net CPUE was the 3rd highest value. For sand crabs, three reference points were breached in 2007/08; there was a significant declining trend in total catch that was associated with the lowest targeted CPUE, and the greatest declining trend in crab net CPUE. For yelloweye mullet, the lowest catch ever was recorded in 2007/08, but this was associated with the 2nd highest targeted haul net CPUE. For whaler sharks, there were five reference points breached, which related to high but nevertheless declining longline effort, but the 3rd lowest longline CPUE. For ocean jackets the lowest commercial catch was recorded.

For the seven Tertiary species or species groups, there were no results for 2007/08 that varied dramatically from those in previous years. For western striped grunter there has been a considerable decline in catch over the past three years, whilst for leatherjackets, the lowest ever catch was recorded that is consistent with a long-term declining trend.

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

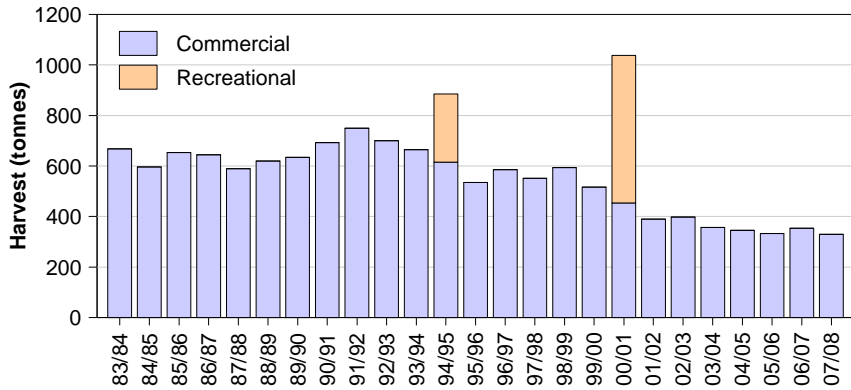


Figure 3.1 Total State-wide commercial and recreational catches of King George whiting.

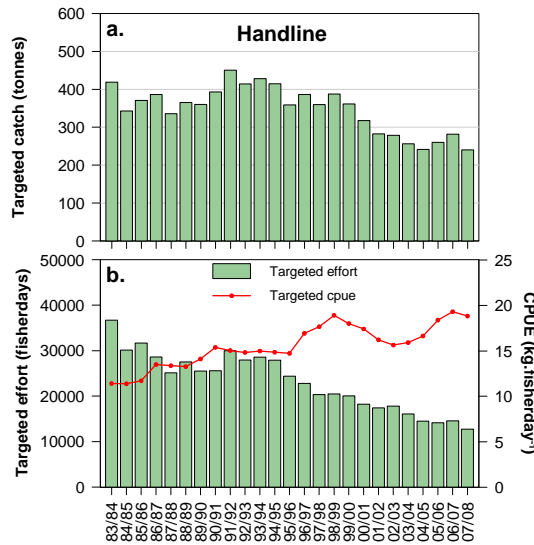


Figure 3.2 (a) Targeted handline catch of King George whiting; (b) Targeted handline effort and CPUE.

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	3 rd lowest/3 rd highest	Yes	Lowest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted handline effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted handline CPUE	3 rd lowest/3 rd highest	Yes	3 rd highest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

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

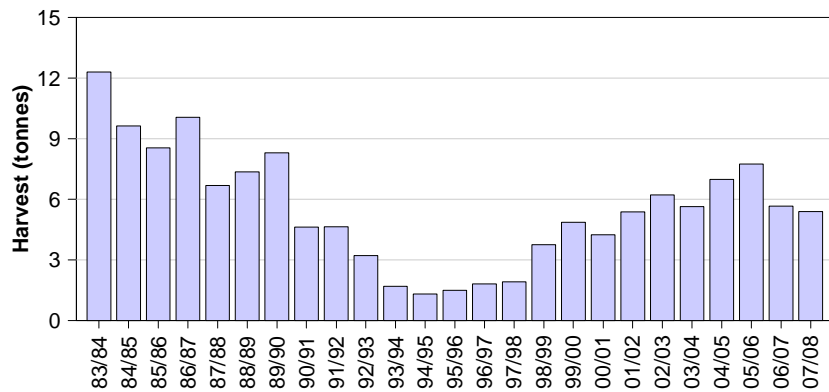


Figure 3.3 Total catch of King George whiting by rock lobster fishers.

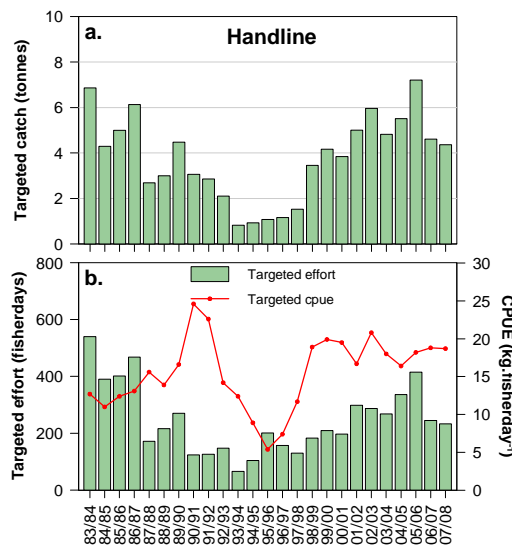


Figure 3.4 (a) Targeted handline catch of King George whiting by rock lobster fishers; (b) Targeted handline effort and CPUE.

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	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted handline effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted handline CPUE	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

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

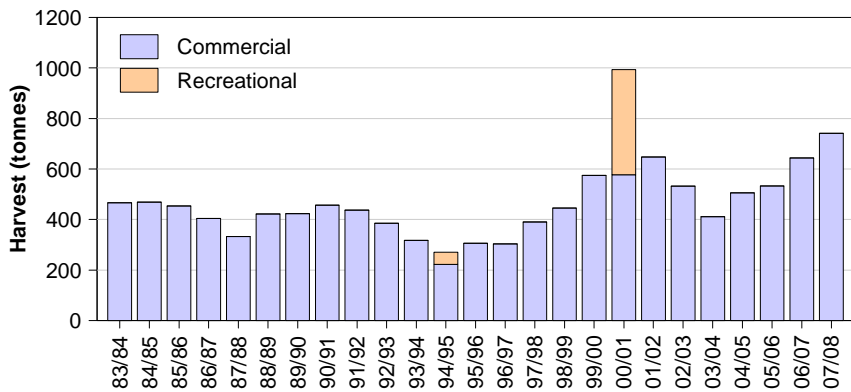


Figure 3.5 Total State-wide commercial and recreational catches of snapper.

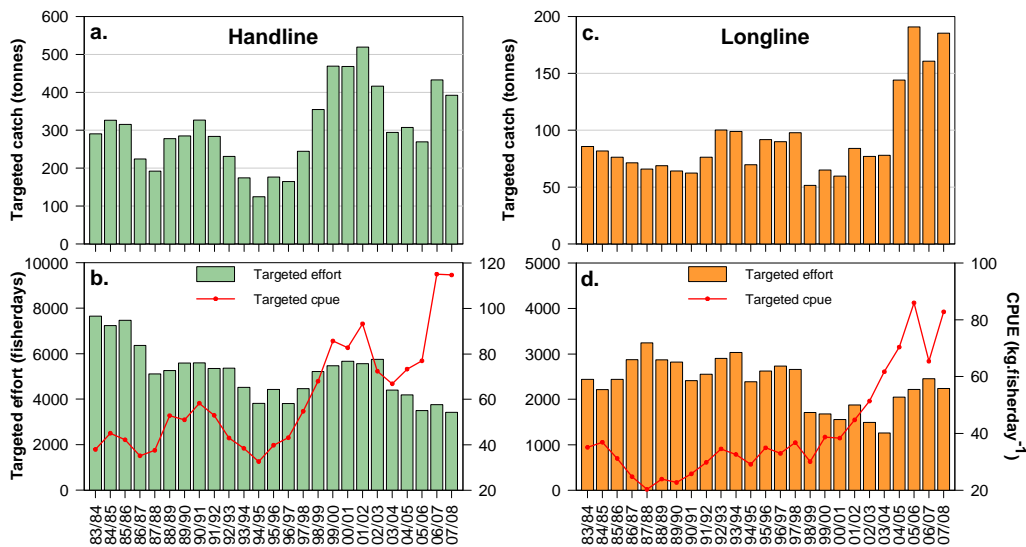


Figure 3.6 (a) Targeted handline catch of snapper; (b) Targeted handline effort and CPUE; (c) Targeted longline catch; (d) Targeted longline effort and CPUE.

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

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3 rd lowest/3 rd highest	Yes	Highest
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	Yes	↑ 79.9 t.yr ⁻¹
B1. Targeted handline effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	No	
B2. Targeted longline effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	No	
C1. Targeted handline CPUE	3 rd lowest/3 rd highest	Yes	2 nd highest
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	Yes	↑ 13.8 kg.f ² day ⁻¹ .yr ⁻¹
C2. Targeted longline CPUE	3 rd lowest/3 rd highest	Yes	2 nd highest
	Greatest interannual change (±)	Yes	↑ 26.6%
	Greatest 5-year trend (±)	No	

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

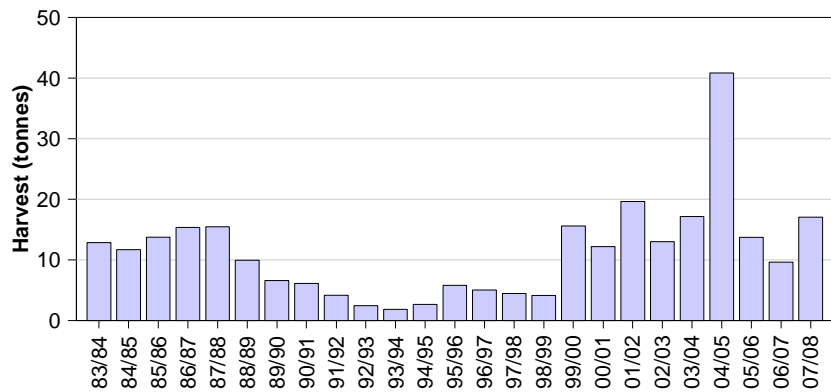


Figure 3.7 Total catch of snapper by rock lobster fishers.

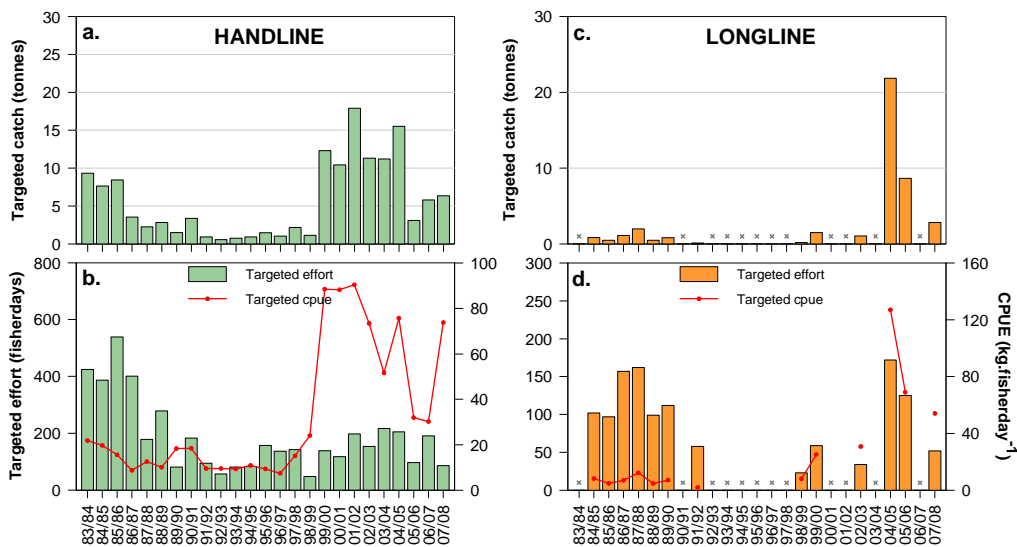


Figure 3.8 (a) Targeted handline catch of snapper by rock lobster fishers; (b) Targeted handline effort and CPUE; (c) Targeted longline catch; (d) Targeted longline effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.4 Comparisons between performance indicators and limit reference points for snapper by rock lobster fishers. Crosses indicate that relevant data are confidential.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	Yes	↓ 3.2 t.yr ⁻¹
B1. Targeted handline effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	No	
B2. Targeted longline effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	No	
C1. Targeted handline CPUE	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	No	
C2. Targeted longline CPUE	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 5-year trend (±)	Yes	↓ 8.3 kg.f ² day ⁻¹ .yr ⁻¹

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

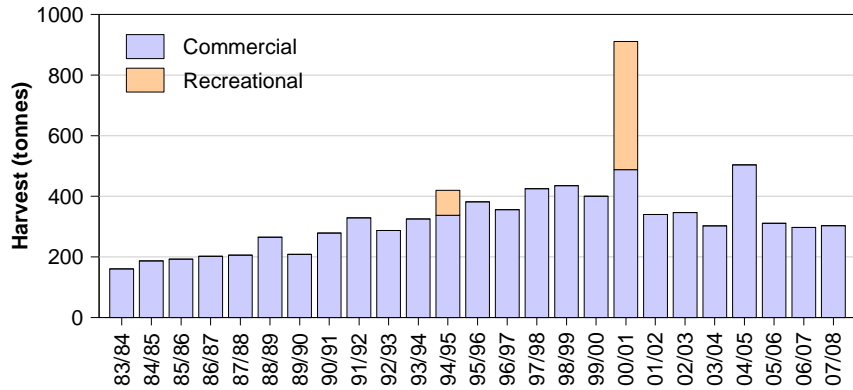


Figure 3.9 Total State-wide commercial and recreational catches of southern calamary.

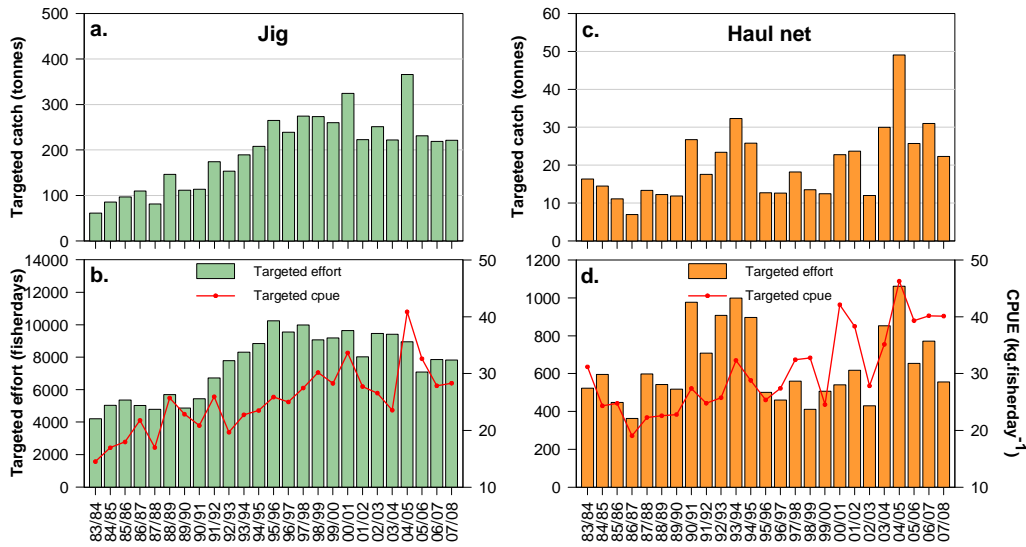


Figure 3.10 (a) Targeted jig catch of southern calamary; (b) Targeted jig effort and CPUE; (c) Targeted haul net catch; (d) Targeted haul net effort and CPUE.

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	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted jig effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted haul net effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted jig CPUE	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C2. Targeted haul net CPUE	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

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

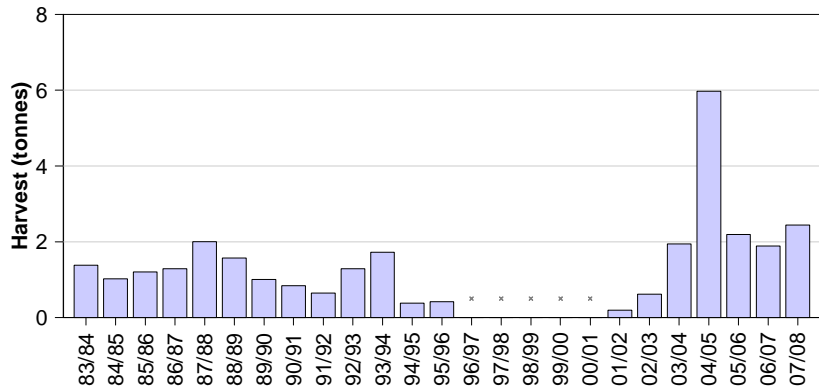


Figure 3.11 Total catch of southern calamary by rock lobster fishers. Grey crosses indicate confidential data (<5 fishers).

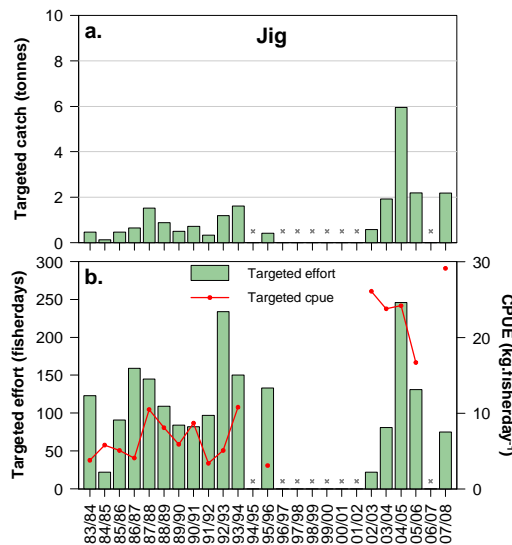


Figure 3.12 (a) Targeted jig catch of southern calamary by rock lobster fishers; (b) Targeted jig effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.6 Comparisons between performance indicators and limit reference points for southern calamary by rock lobster fishers. Crosses indicate that relevant data are confidential.

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

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

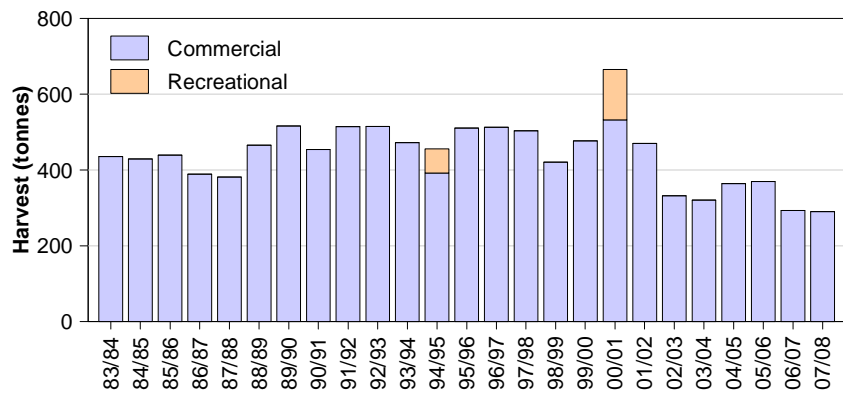


Figure 3.13 Total State-wide commercial and recreational catches of garfish.

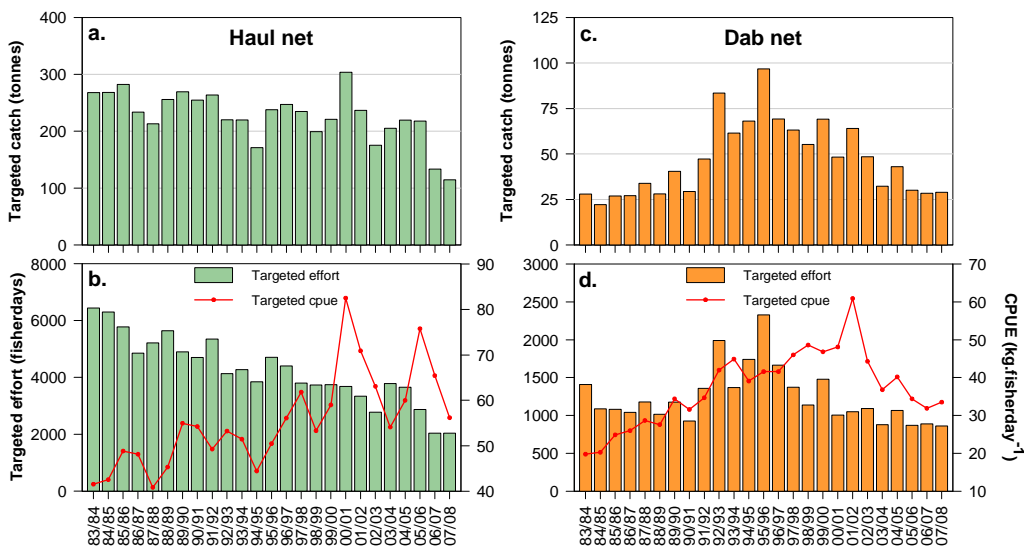


Figure 3.14 (a) Targeted haul net catch of garfish; (b) Targeted haul net effort and CPUE; (c) Targeted dab net catch; (d) Targeted dab net effort and CPUE.

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

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3 rd lowest/3 rd highest	Yes	Lowest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted haul net effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted dab net effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted haul net CPUE	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	Yes	↓ 9.8 kg.f ³ day ⁻¹ .yr ⁻¹
C2. Targeted dab net CPUE	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

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

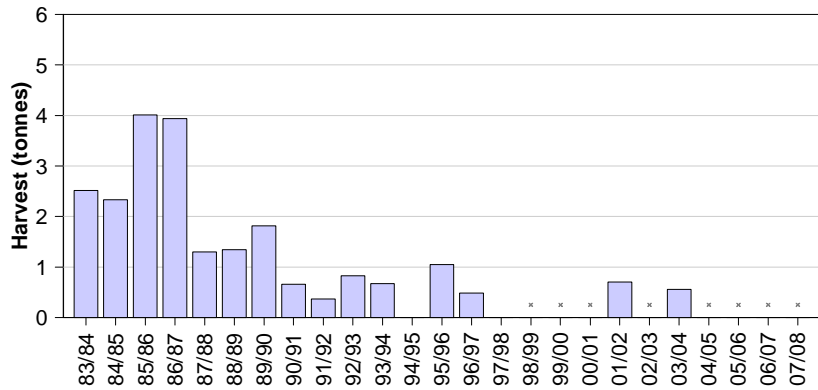


Figure 3.15 Total catch of garfish by rock lobster fishers. Grey crosses indicate confidential data (<5 fishers).

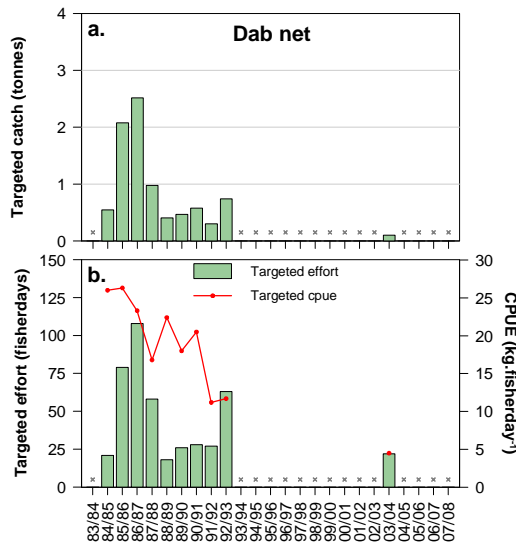


Figure 3.16 (a) Targeted dab net catch of garfish by rock lobster fishers; (b) Targeted dab net effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.8 Comparisons between performance indicators and limit reference points for garfish by rock lobster fishers. Crosses indicate that that relevant data are confidential.

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

3.5 Yellowfin whiting (*Sillago schomburgkii*)

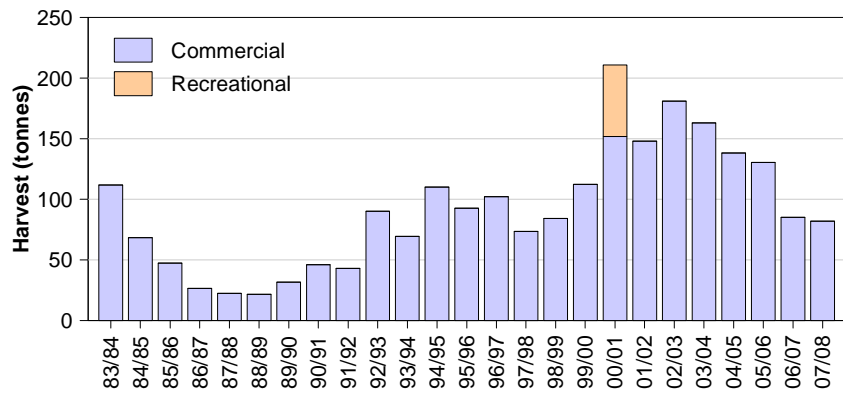


Figure 3.17 Total State-wide commercial and recreational catches of Yellowfin whiting.

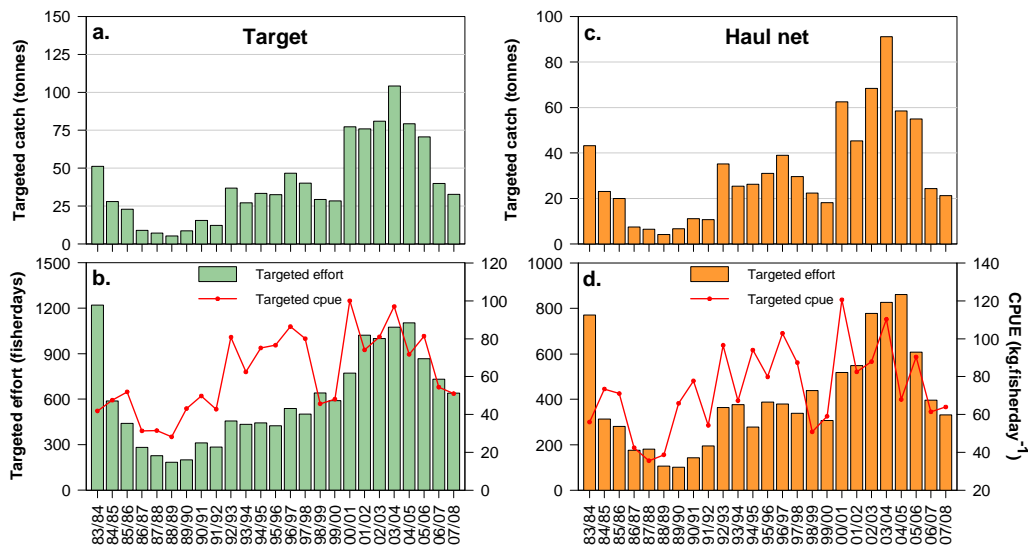


Figure 3.18. (a) Total targeted catch of Yellowfin whiting; (b) Total targeted effort and CPUE; (c) Targeted haul net catch; (d) Targeted haul net effort and CPUE.

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	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted haul net effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted CPUE	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C2. Targeted haul net CPUE	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.6 Australian salmon (*Arripis truttaceus*)

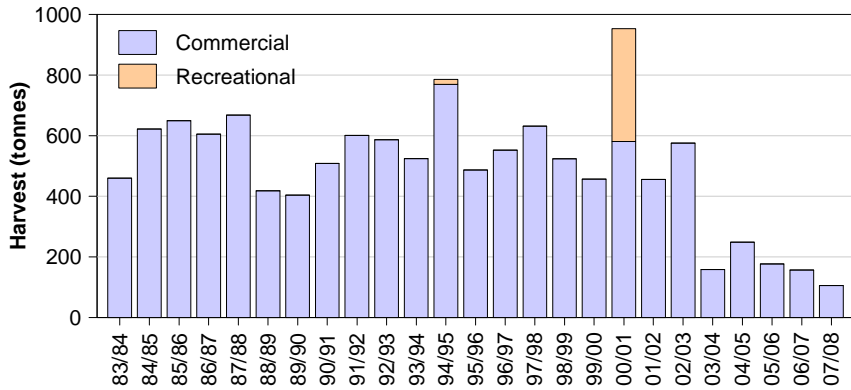


Figure 3.19 Total State-wide commercial and recreational catches of Australian salmon.

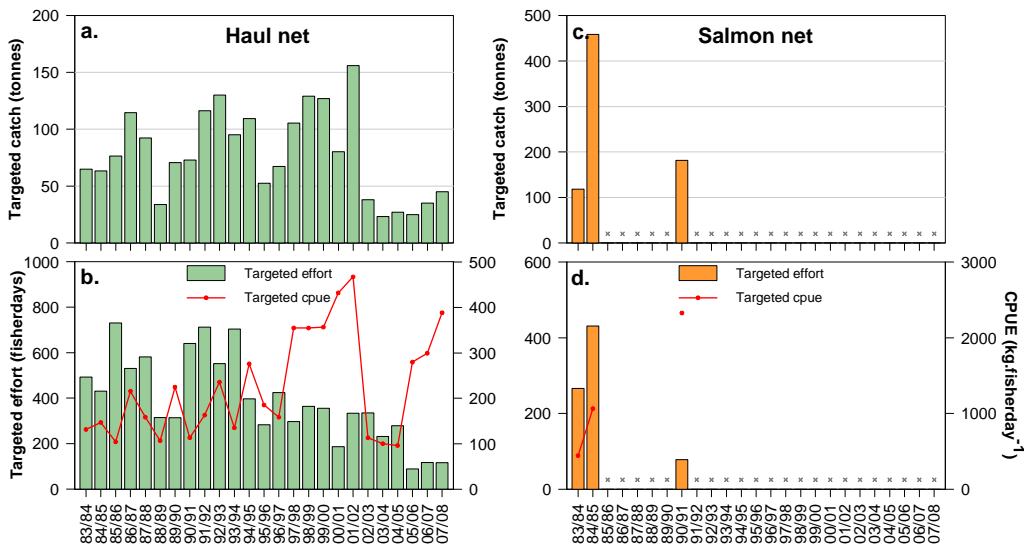


Figure 3.20 (a) Targeted haul net catch of Australian salmon; (b) Targeted haul net effort and CPUE; (c) Targeted salmon net catch; (d) Targeted salmon net effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.10 Comparisons between performance indicators and limit reference points for Australian salmon. Crosses indicate zero effort in recent years, thus comparisons are meaningless.

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

3.7. Australian herring (*Arripis georgianus*)

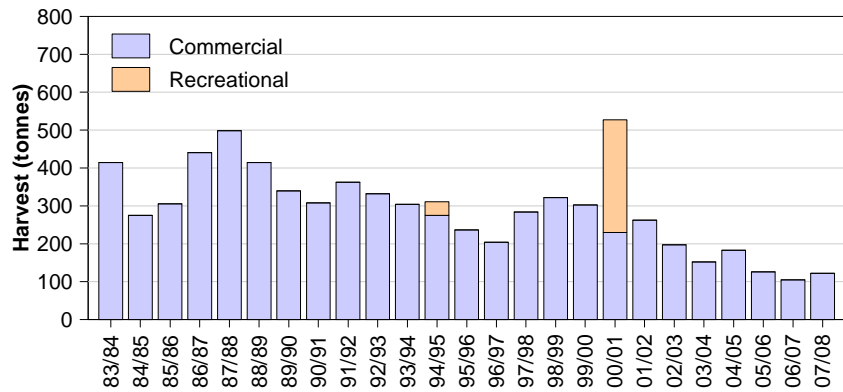


Figure 3.21 Total State-wide commercial and recreational catches of Australian herring.

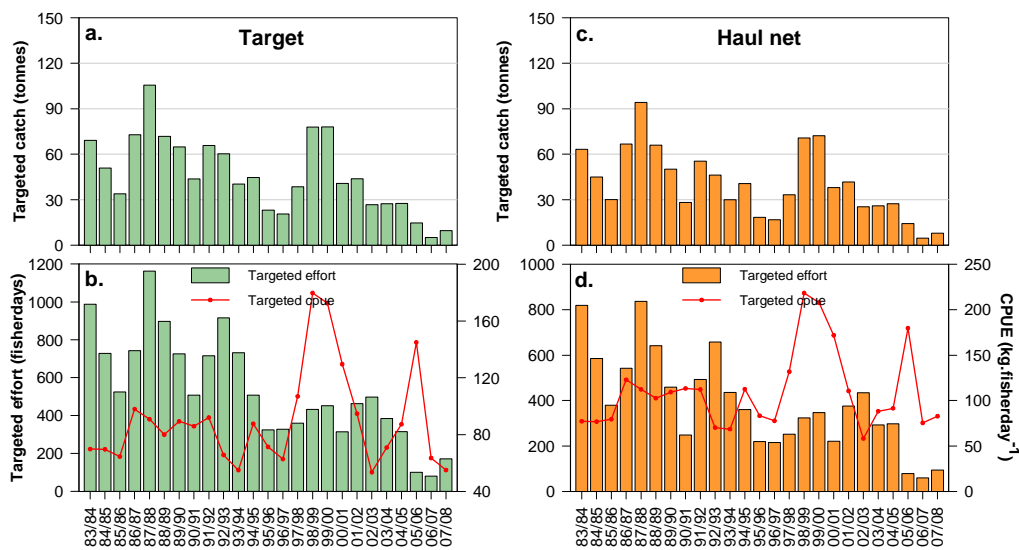


Figure 3.22 (a) Total targeted catch of Australian herring; (b) Total targeted effort and CPUE; (c) Targeted haul net catch; (d) Targeted haul net effort and CPUE.

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	3 rd lowest/3 rd highest	Yes	2 nd lowest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted haul net effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted CPUE	3 rd lowest/3 rd highest	Yes	3 rd lowest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	Yes	↓44.9 kg.f ⁻¹ .day ⁻¹ .yr ⁻¹
C2. Targeted haul net CPUE	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.8. Mud cockles (*Katelysia* spp.)

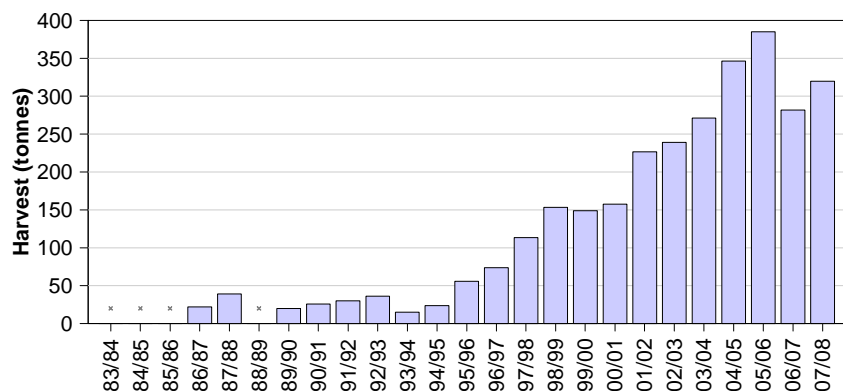


Figure 3.23 Total State-wide commercial catch of mud cockles. Grey crosses indicate confidential data (<5 fishers).

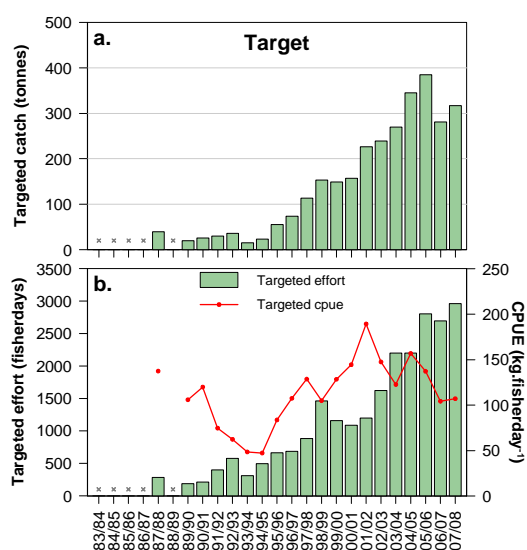


Figure 3.24 (a) Total Targeted catch of mud cockles; (b) Total targeted effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

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	3 rd lowest/3 rd highest	Yes	3 rd highest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	Yes	↓ 32.7 t.yr ⁻¹
B1. Targeted effort	3 rd highest	Yes	Highest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted CPUE	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.9 Snook (*Sphyraena novaehollandiae*)

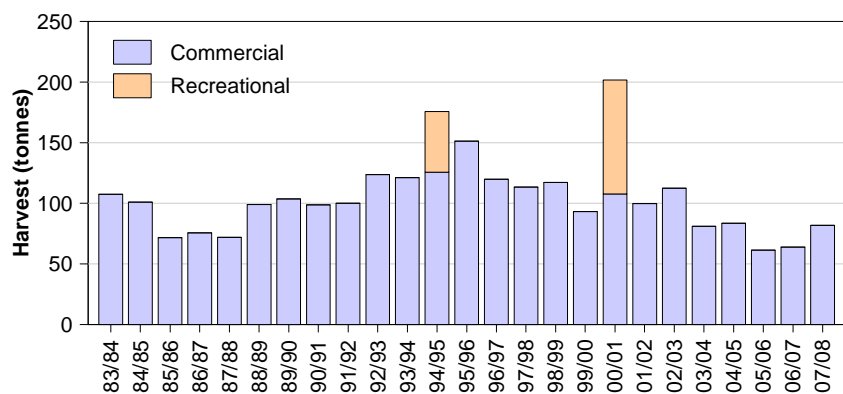


Figure 3.25 Total State-wide commercial and recreational catches of snook.

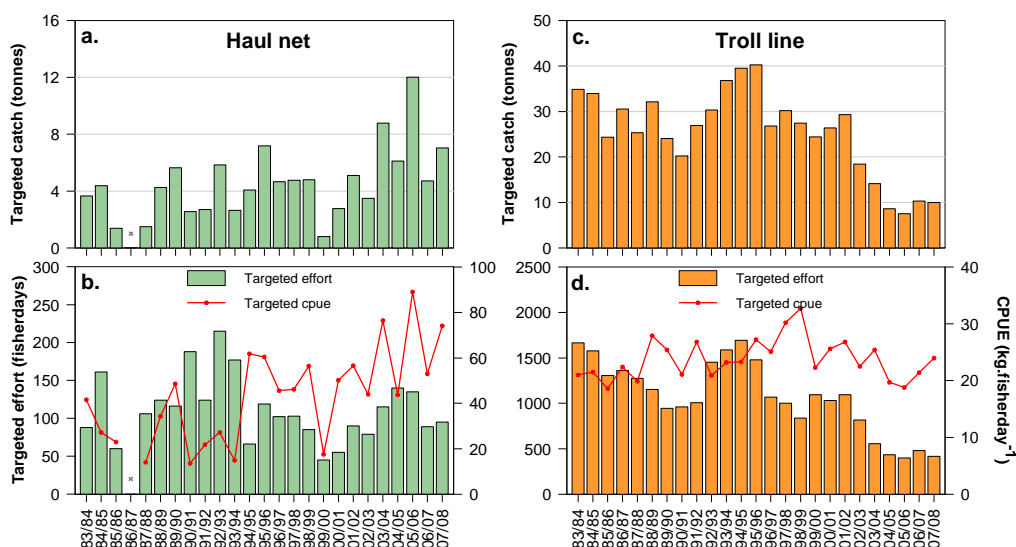


Figure 3.26 (a) Targeted haul net catch of snook; (b) Targeted effort and CPUE; (c) Targeted troll line catch; (d) Targeted troll line effort and CPUE.

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

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

3.10 Sand crabs (*Ovalipes australiensis*)

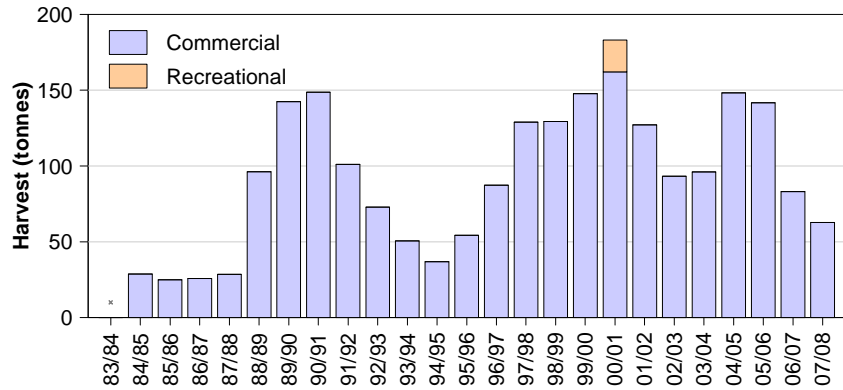


Figure 3.27 Total State-wide commercial and recreational catches of sand crabs. Grey cross indicates confidential data (<5 fishers).

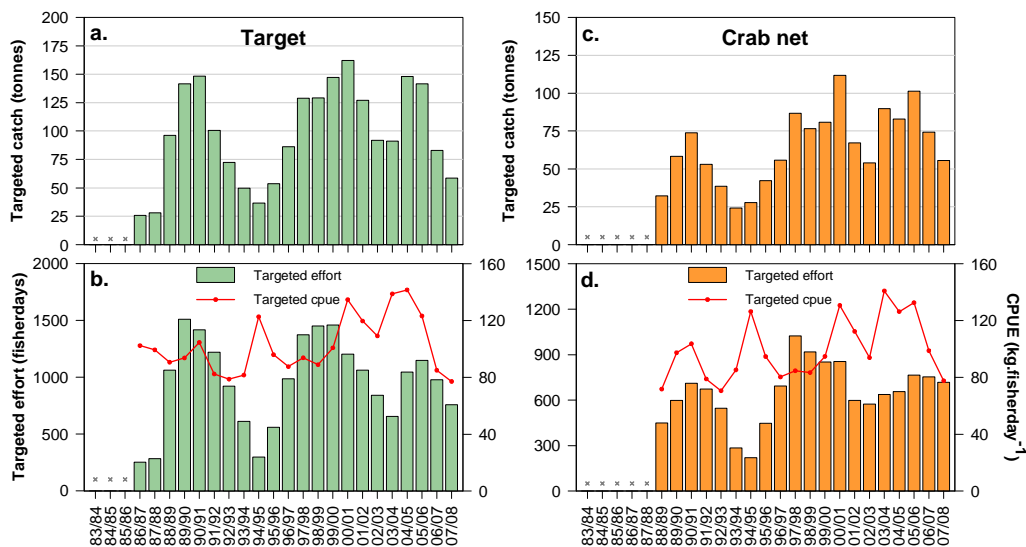


Figure 3.28 (a) Total targeted catch of sand crabs; (b) Total targeted effort and CPUE; (c) Targeted crab net catch; (d) Targeted crab net effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

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	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	Yes	↓ 39.5 t.yr ⁻¹
B1. Targeted effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted crab net effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted CPUE	3 rd lowest/3 rd highest	Yes	Lowest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C2. Targeted crab net CPUE	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	Yes	↓ 27.5 kg.f ³ day ⁻¹ .yr ⁻¹

3.11 Yelloweye mullet (*Aldrichetta forsteri*)

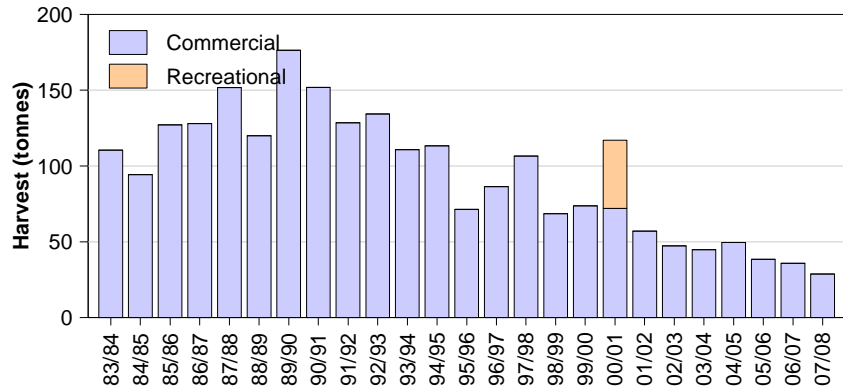


Figure 3.29 Total State-wide commercial and recreational catches of Yelloweye mullet.

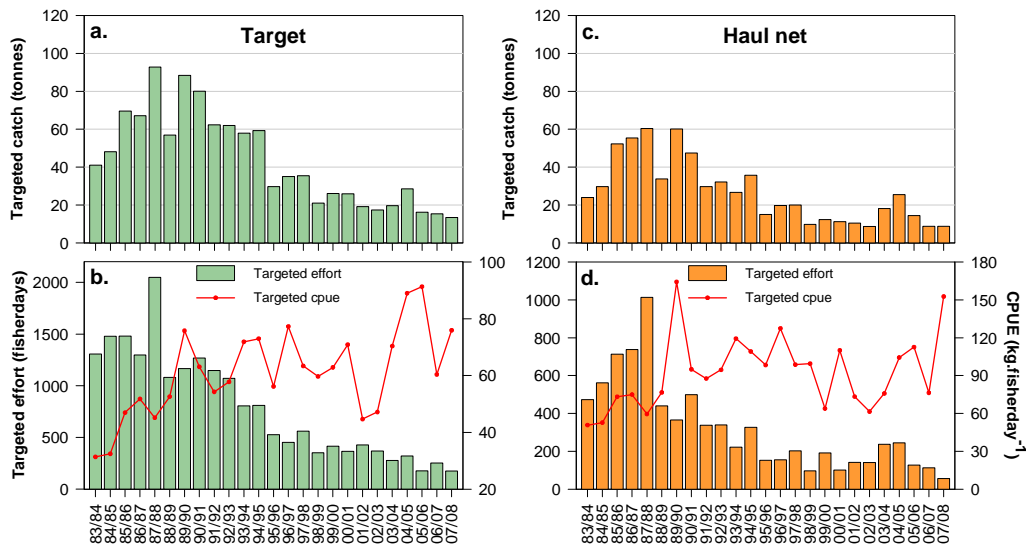


Figure 3.30 (a) Total targeted catch of Yelloweye mullet; (b) Total targeted effort and CPUE; (c) Targeted haul net catch; (d) Targeted haul net effort and CPUE.

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	3 rd lowest/3 rd highest	Yes	lowest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B2. Targeted haul net effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted CPUE	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C2. Targeted haul net CPUE	3 rd lowest/3 rd highest	Yes	2 nd highest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.12 Mulloway (*Argyrosomus japonicus*)

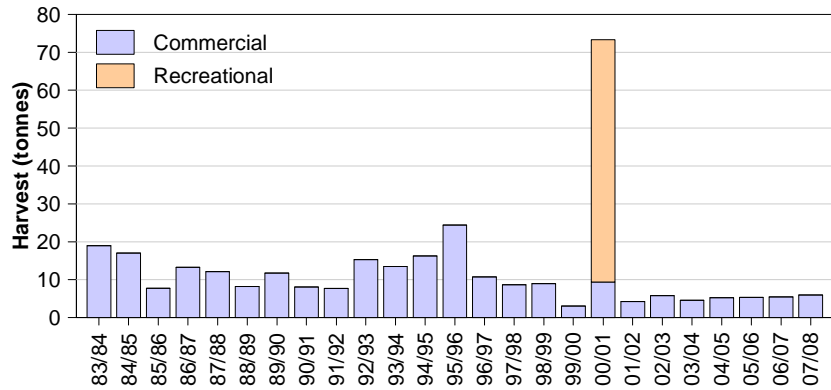


Figure 3.31 Total State-wide commercial and recreational catches of mulloway.

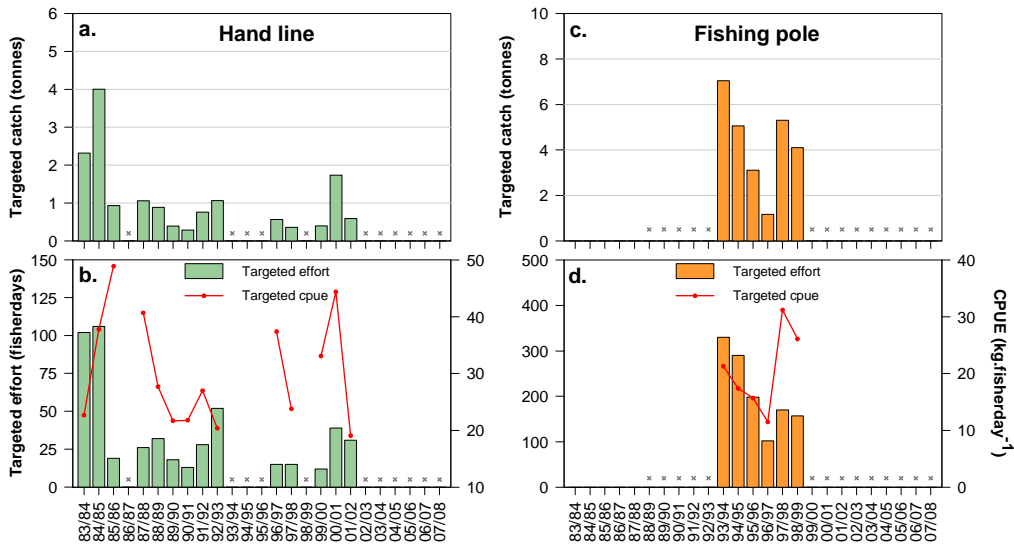


Figure 3.32 (a) Targeted handline catch of mulloway; (b) Targeted handline effort and CPUE; (c) Targeted fishing pole catch; (d) Targeted fishing pole effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.16. Comparisons between performance indicators and limit reference points for mulloway. Crosses indicate that relevant data are confidential.

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

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

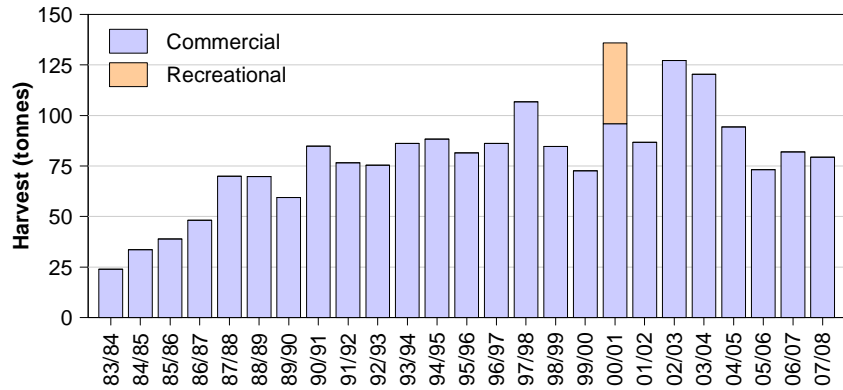


Figure 3.33 Total State-wide commercial and recreational catches of whaler sharks.

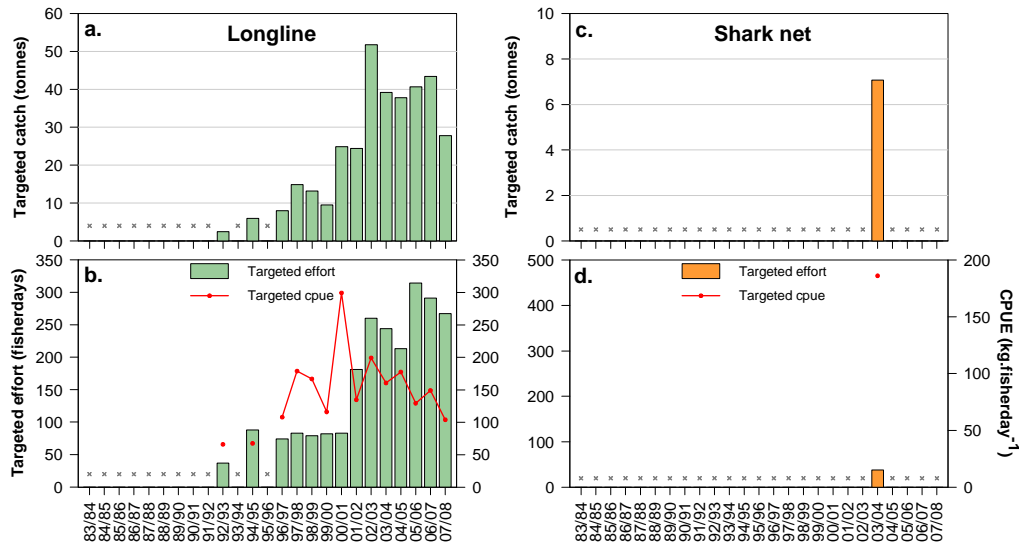


Figure 3.34 (a) Targeted longline catch of whaler sharks; (b) Targeted longline effort and CPUE; (c) Targeted shark net catch; (d) Targeted shark net effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.17. Comparisons between performance indicators and limit reference points for whaler sharks. Crosses indicate that relevant data are confidential.

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
B1. Targeted longline effort	3 rd highest	Yes	3 rd highest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	Yes	↓ 23.5 fisherdays.yr ⁻¹
B2. Targeted shark net effort	3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C1. Targeted longline CPUE	3 rd lowest/3 rd highest	Yes	3 rd lowest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	
C2. Targeted shark net CPUE	3 rd lowest/3 rd highest	Yes	2 nd highest
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	Yes	↑ 60.4 kg.f ⁻¹ day ⁻¹ .yr ⁻¹

3.14 Ocean jackets (*Nelusetta ayraud*)

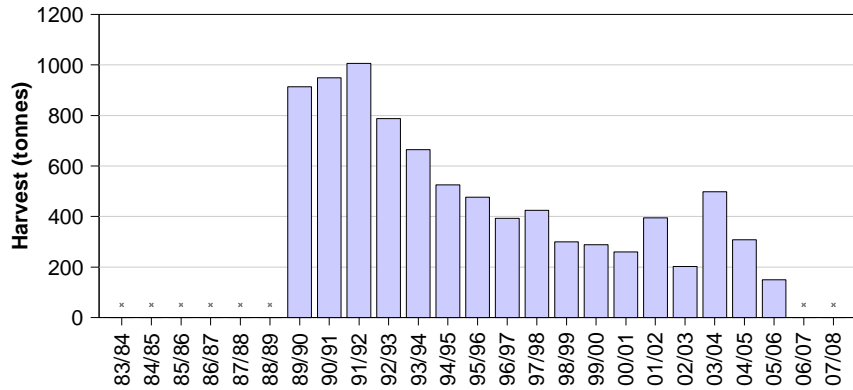


Figure 3.35 Total State-wide commercial catch of ocean jackets. Grey crosses indicate confidential data (<5 fishers).

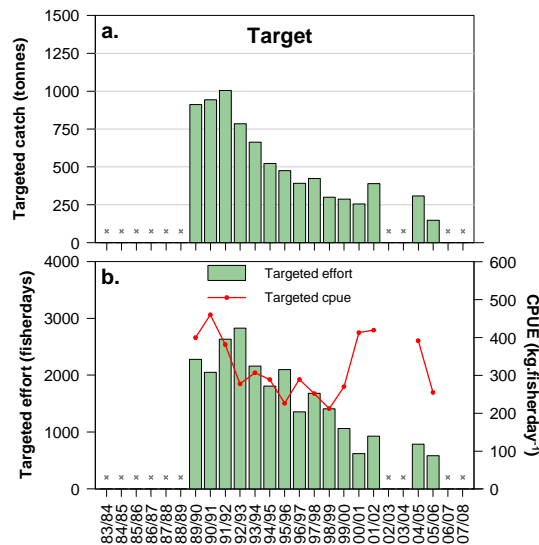


Figure 3.36 (a) Total targeted catch of ocean jackets; (b) Total targeted effort and CPUE. Grey crosses indicate confidential data (<5 fishers).

Table 3.18 Comparisons between performance indicators and limit reference points for ocean jackets. Crosses indicate that relevant data are confidential.

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

3.15 Parrot fish (*Notolabrus* spp.)

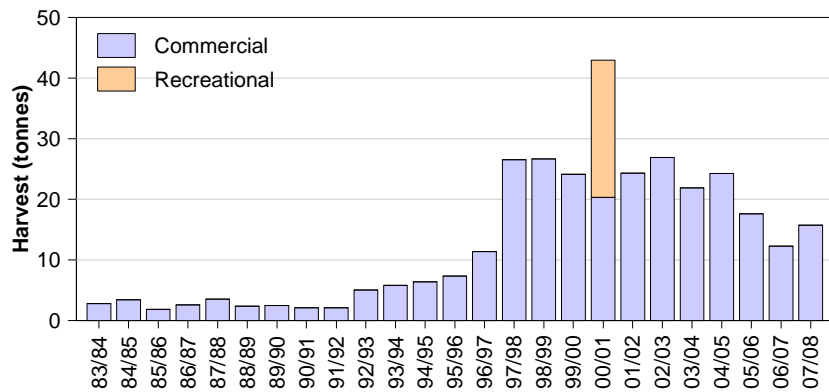


Figure 3.37 Total State-wide commercial and recreational catches of parrot fish.

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	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.16 Western striped grunter (*Pelates octolineatus*)

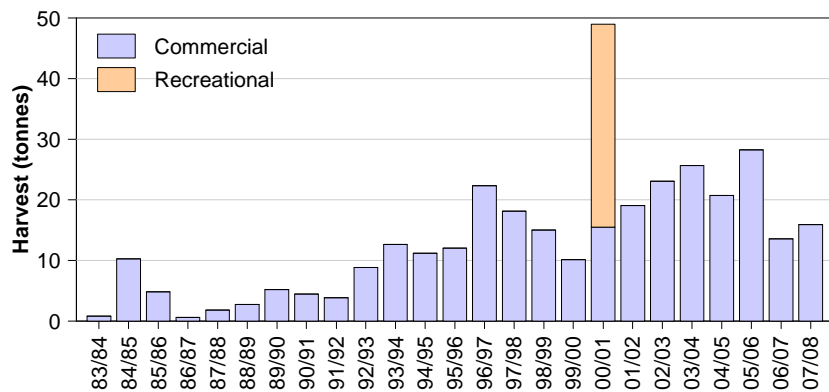


Figure 3.38 Total State-wide commercial and recreational catches of western striped grunter.

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	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	Yes	↓ 6.2 t.yr ⁻¹

3.17 Silver trevally (*Pseudocaranx georgianus*)

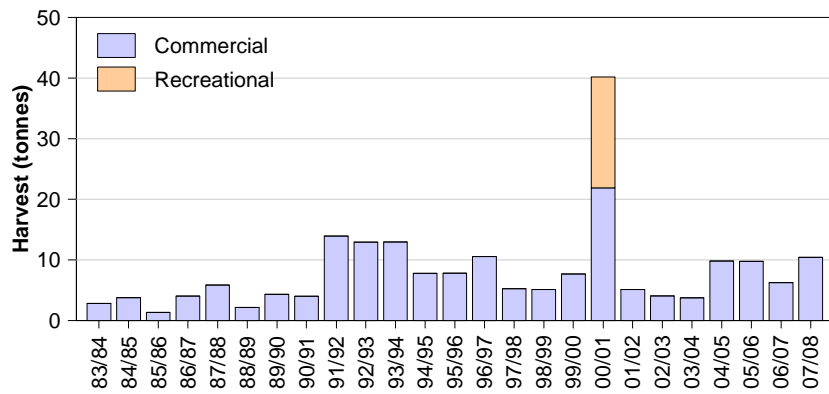


Figure 3.39 Total State-wide commercial and recreational catches of silver trevally.

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	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.18 Leatherjackets (Family Monacanthidae)

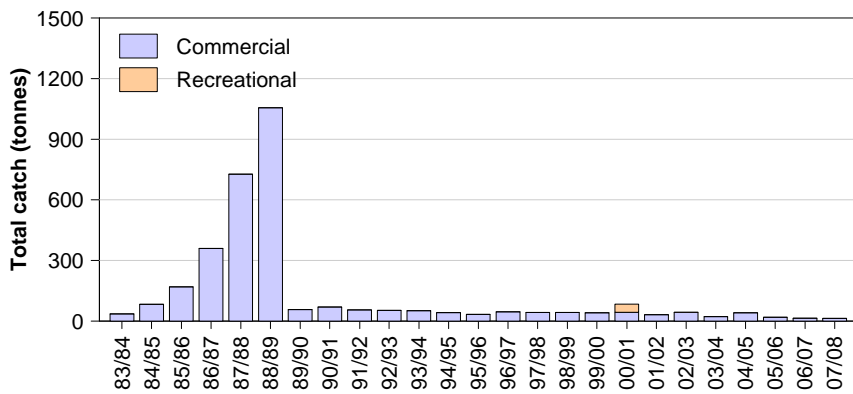


Figure 3.40 Total State-wide commercial and recreational catches of leatherjackets.

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

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

3.19 Gummy sharks (Family Triakidae)

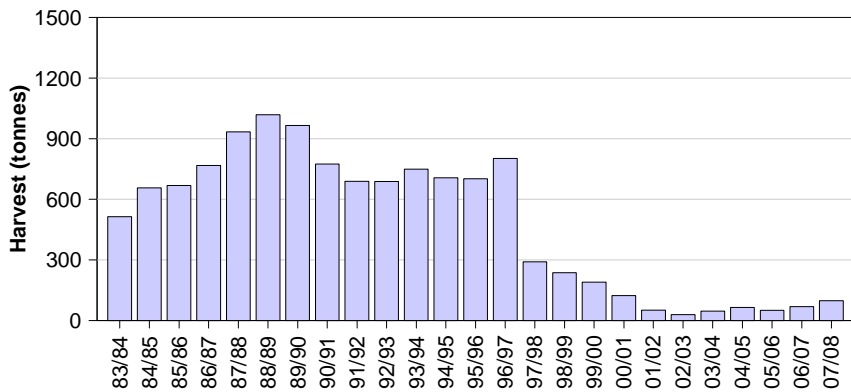


Figure 3.41 Total State-wide commercial catch of gummy sharks.

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	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.20 Rays and Skates (Class Elasmobranchii)

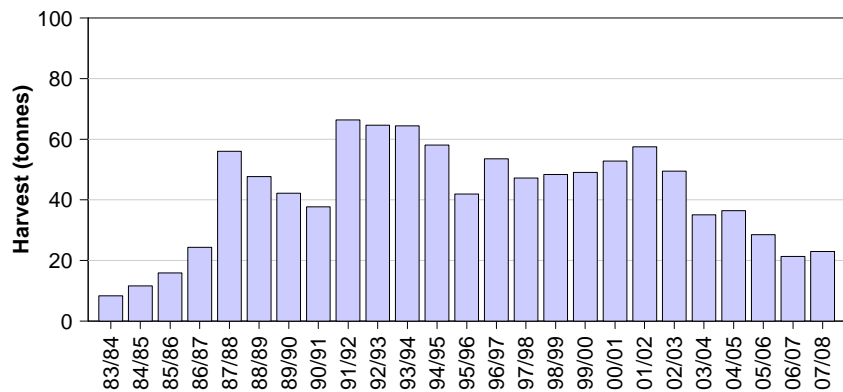


Figure 3.42 Total State-wide commercial catch of rays and skates.

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	3 rd lowest/3 rd highest	No	
	Greatest interannual change (±)	No	
	Greatest 3-year trend (±)	No	

3.21 Cuttlefish (*Sepia apama*)

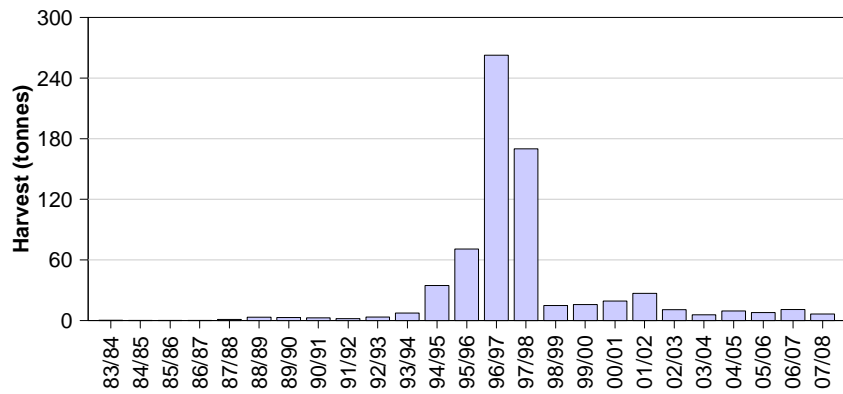


Figure 3.43 Total State-wide commercial catch of cuttlefish.

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

Performance Indicator	Limit Reference Point	Breached?	Details
A. Total commercial catch	3 rd lowest/3 rd 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 25-year period of 1983/84 to 2007/08 for 21 different taxa taken in the South Australian Marine Scalefish fishery. The data from the commercial sector for 2007/08 were then compared against limit reference points calculated from the data for this 25-year time period, or appropriate shorter reference periods, depending on the species. There were numerous breaches of limit reference points identified.

For three of the four Primary species there were several breaches of limit reference points. For King George whiting, commercial catch has declined over numerous years, whilst catch rates in recent years have been at their highest ever recorded levels (Fowler et al. 2008). For snapper, there were numerous breaches of limit reference points relating to high catches and catch rates that are indicative of a high biomass (Fowler et al. 2007). In 2007/08, the lowest catch of southern sea garfish for the 25-year period was taken, reflecting both a substantial decline in haul net effort and a falling catch rate. For southern calamary, the catch, effort and CPUE have decreased to more typical levels after the record catch and catch rates of 2004/05.

Some Secondary species also showed decreasing catch rates. Two of these species that are also targeted by the haul net sector are yellowfin whiting and the Australian herring. As such, the catch rates of these species have continued to decline despite the reduction in haul net fishing effort that resulted from the restructure of the net sector that took place in 2005. The other species that have demonstrated declining catch rates over the past few years are the whaler sharks and sand crabs. Alternatively, mud cockles have recovered marginally from the substantial drops in catch and catch rates that were recorded in 2006/07.

There were two breaches of limit reference points for the Tertiary species. For the western striped grunter there has been a considerable drop in catch over the past two years from the peak catch made in 2005/06. Furthermore, the catch of leatherjackets has also dropped to its lowest ever level. These changes may also relate to the restructure of the net sector that occurred in 2005.

5.0 References

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