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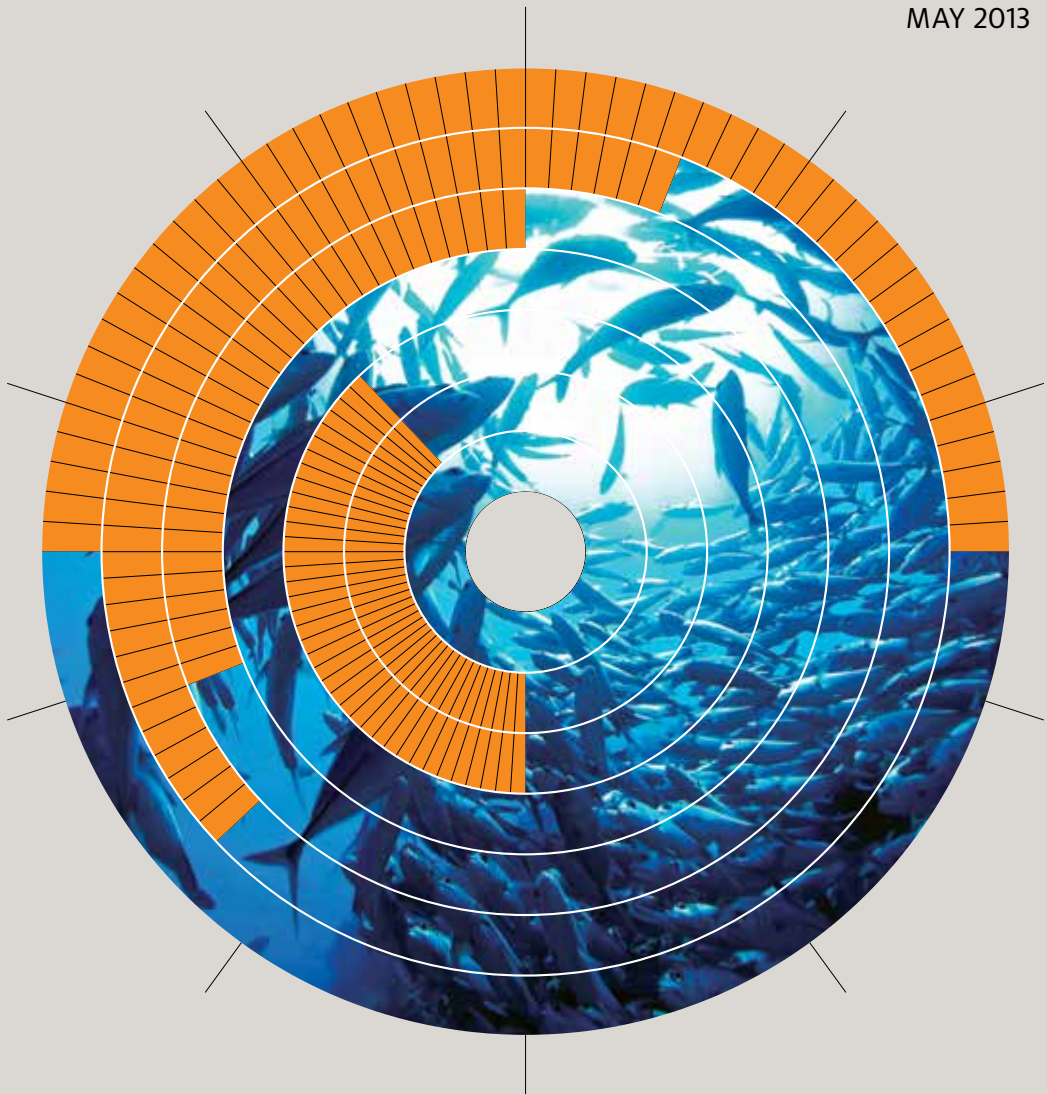
# Australian fisheries surveys report 2012

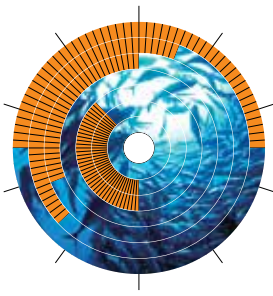
## Financial and economic performance of the Eastern Tuna and Billfish Fishery, the Commonwealth Trawl Sector and the Gillnet, Hook and Trap Sector

Daniel George and Robert New

Research by the Australian Bureau of Agricultural  
and Resource Economics and Sciences

MAY 2013





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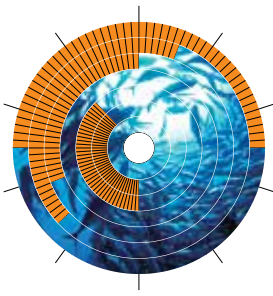
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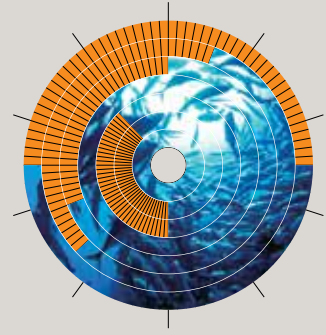
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# Executive summary

The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) undertakes regular surveys of key Commonwealth fisheries. The resulting data are used to assess the financial performance of operators in the fishery and the economic performance of the fishery as a whole. The financial performance information provides a context for trends in the surveyed fishery but may also include costs and revenues incurred from other fisheries. Net economic returns indicate how well the fishery is performing relative to the management objective of maximising economic yield. Net economic returns relate only to the fishery being considered. The 2012 survey collects data for the Eastern Tuna and Billfish Fishery (ETBF), and the Gillnet, Hook and Trap Sector (GHTS) and Commonwealth Trawl Sector (CTS) of the Southern and Eastern Scalefish and Shark Fishery.

Between 2009-10 and 2010-11 the profit at full equity increased for the average boat in the ETBF but it decreased in the CTS and GHTS. Net economic returns improved for all three fishery/sectors over the same period.

Profit at full equity for the average boat in the ETBF increased from -\$1616 in 2009-10 to \$45 509 in 2010-11 (Table 1).

**TABLE 1** Key financial performance results for the Eastern Tuna and Billfish Fishery boat-level average

Category	Unit	2009-10	2010-11
Total cash receipts	\$	875 697	1 051 488
Total cash costs	\$	884 668	1 029 706
Boat cash income	\$	-8 971	21 782
<i>less depreciation</i>			
Boat business profit	\$	-51 424	-11 164
<i>plus interest, leasing and rent</i>			
Profit at full equity	\$	-1 616	45 509

Net economic returns including management costs in the fishery improved from -\$4.5 million in 2009-10 to \$0.6 million in 2010-11 (2011-12 dollars). In 2011-12 preliminary net economic returns (including management costs) were estimated using non-survey based methods at almost \$3.0 million (Table 2).

**TABLE 2** Key economic performance results for the Eastern Tuna and Billfish Fishery total fishery

Category	Unit	2009-10	2010-11	2011-12 <sup>p</sup>
Fishing income	\$m	47.18	47.21	42.63
Operating costs	\$m	47.43	43.18	35.8
Fishery cash profit	\$m	-0.25	4.03	6.83
<i>less</i> owner and family labour, opportunity cost of capital and depreciation				
<i>plus</i> interest, leasing and management fees				
Net economic returns (excluding management costs)	\$m	-1.74	2.51	4.85
Net economic returns (including management costs)	\$m	-4.46	0.56	2.97

<sup>p</sup> Preliminary non-survey based estimates.

Profit at full equity for the average boat in the CTS decreased marginally from \$165 142 in 2009-10 to \$162 513 in 2010-11 (Table 3).

**TABLE 3** Key financial performance results for the Commonwealth Trawl Sector boat-level average

Category	Unit	Danish seine		Trawl		All boats	
		2009-10	2010-11	2009-10	2010-11	2009-10	2010-11
Total cash receipts	\$	727 413	713 328	1 226 734	1 189 720	1 060 294	1 040 848
Total cash costs	\$	629 594	620 726	1 097 118	1 063 291	941 277	924 989
Boat cash income	\$	97 819	92 603	129 616	126 430	119 017	115 859
<i>less</i> depreciation							
Boat business profit	\$	72 218	67 248	118 086	116 244	102 797	100 933
<i>plus</i> interest, leasing and rent							
Profit at full equity	\$	117 013	111 956	189 207	185 493	165 142	162 513

Net economic returns including management costs in the sector improved from \$2.5 million in 2009-10 to \$6.8 million in 2010-11 (2011-12 dollars). In 2011-12 preliminary net economic returns were estimated using non-survey based methods at \$5.5 million (Table 4).

**TABLE 4** Key economic performance results for the Commonwealth Trawl Sector total fishery

Category	Unit	2009–10	2010–11	2011–12 <sup>p</sup>
Fishing income	\$m	49.88	50.57	47.11
Operating costs	\$m	41.06	39.06	37.68
Fishery cash profit	\$m	8.82	11.51	9.43
<i>less</i> owner and family labour, opportunity cost of capital and depreciation				
<i>plus</i> interest, leasing and management fees				
Net economic returns (excluding management costs)	\$m	6.07	10.18	8.52
Net economic returns (including management costs)	\$m	2.5	6.82	5.51

<sup>p</sup> Preliminary non-survey based estimates.

Profit at full equity for the average boat in the GHTS decreased from \$91 518 in 2009–10 to \$86 054 in 2010–11 (Table 5).

**TABLE 5** Key financial performance results for the Gillnet, Hook and Trap Sector boat-level average

Category	Unit	Gillnet boats		All boats	
		2009–10	2010–11	2009–10	2010–11
Total cash receipts	\$	429 806	441 464	502 869	466 215
Total cash costs	\$	438 119	426 902	472 492	438 429
Boat cash income	\$	-8 313	14 562	30 377	27 786
<i>less</i> depreciation					
Boat business profit	\$	-23 577	-1 565	11 878	8 320
<i>plus</i> interest, leasing and rent					
Profit at full equity	\$	43 259	71 215	91 518	86 054

Net economic returns including management costs in the sector improved from -\$0.4 million in 2009–10 to -\$0.1 million in 2010–11 (2011–12 dollars). In 2011–12 preliminary net economic returns were estimated using non-survey based methods at around -\$0.2 million (Table 6).

**TABLE 6** Key economic performance results for the Gillnet, Hook and Trap Sector total fishery

Category	Unit	2009–10	2010–11	2011–12 <sup>p</sup>
Fishing income	\$m	23.39	21.86	18.23
Operating costs	\$m	21.8	20	16.6
Fishery cash profit	\$m	1.59	1.86	1.64
<i>less owner and family labour, opportunity cost of capital and depreciation</i>				
<i>plus interest, leasing and management fees</i>				
Net economic returns (excluding management costs)	\$m	1.9	2.26	2.19
Net economic returns (including management costs)	\$m	-0.40	-0.14	-0.18

<sup>p</sup> Preliminary non-survey based estimates.

These data are important for analysing the effects of management changes on the profitability of fisheries and the operators within them. Such analysis provides important input to future management decisions.

# Chapter 1

## Introduction

This report presents estimates of the financial and economic performance of the Commonwealth Eastern Tuna and Billfish Fishery and two sectors of the Southern and Eastern Scalefish and Shark Fishery. It provides survey based estimates for 2009–10 and 2010–11 as well as nonsurvey based estimates of economic performance for 2011–12.

A distinction is made throughout the report between financial performance and economic performance. Financial performance estimates are calculated for the average boat in a fishery and include all cash receipts and cash costs that have been earned and incurred within the survey period. These estimates reflect the average boat's profit and loss statement for all business activities, including in cases where they have operated in a number of fisheries. The indicator of economic performance presented in the report is net economic returns (NER), which is reported at the fishery level. The NER estimates differ from financial performance estimates because they relate only to the surveyed fishery and include other economic costs such as depreciation, the opportunity cost of capital and the opportunity cost of labour. For definitions of these costs, see Appendix A.

Each indicator provides different information. Financial performance information provides a context for trends in the surveyed fishery; for example, positive financial profits at the boat level may reveal how operators continue to operate in a fishery that has experienced negative economic returns. These estimates are more relevant for industry operators, who can compare their performance to that of the average boat.

Economic performance is most relevant for fishery managers and policymakers. This is because NER relates only to the specific fishery being managed. Moreover, by taking into account all cash receipts, cash costs and economic costs, NER indicates the economic return to society associated with harvesting the fishery resource. For this reason, NER is the key economic performance indicator referred to in the *Fisheries Management Act 1991*. According to the Act, the Australian Fisheries Management Authority (AFMA) is required to maximise NER to the Australian community through managing Commonwealth fisheries. Although estimates of NER do not reveal how a fishery has performed relative to maximum potential NER (maximum economic yield) in a given period, interpretation of NER trends and drivers can assist in assessing AFMA's performance against this objective. Such interpretation is also discussed in Appendix A.

In 2012 the fishery survey collected demographic indicators for the first time. A summary of the age of skippers, fishing experience and educational attainment provides a background to the fishery and are provided in this report. The median sale price for permanent transfer of quota for key species in each of the fisheries has also been provided. As this information continues to be collected in future surveys, ABARES will have greater capacity to draw on survey data to respond to emerging policy issues.

ABARES has undertaken surveys of key Commonwealth fisheries since the early 1980s and regularly since 1992. The historical time series of data that has been collected through these surveys allows a number of economic tools and indicators to be constructed to assess AFMA's performance against its economic objective. These include productivity indexes, profit decompositions, efficiency analyses and bioeconomic models. A list of earlier fisheries surveys reports is presented at the end of this report.

Data for the Eastern Tuna and Billfish Fishery (formerly the East Coast Tuna Fishery) are available for every year since the 1989–90 financial year. For the Gillnet, Hook and Trap Sector (previously the South East Non-Trawl and the Southern Shark fisheries) of the Southern and Eastern Scalefish and Shark Fishery (SESSF) data are available from 1988–89 and then for every year from 1990–91 until the present survey. For the Commonwealth Trawl Sector (formerly the South East Trawl Fishery) of the SESSF data have been collected sporadically since 1978–79 and then for every year from 1989–90 until the present survey.

## Chapter 2

# Eastern Tuna and Billfish Fishery

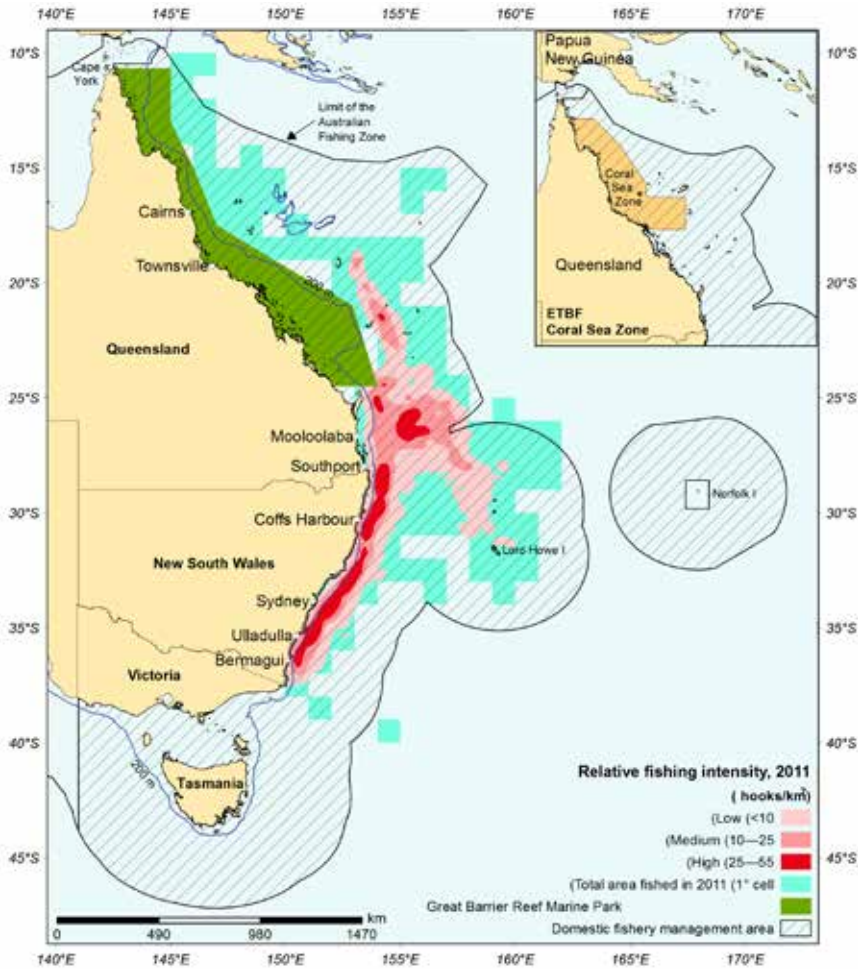
### The fishery

The Eastern Tuna and Billfish Fishery (ETBF) is a multispecies fishery that stretches from the tip of Cape York to the South Australian–Victorian border and includes the waters around Lord Howe Island and Norfolk Island (Map 1). The key ports for this fishery are Bermagui, Cairns, Coffs Harbour, Mooloolaba, Southport, Sydney and Ulladulla (Kirby et al. 2012). Commercial fishing occurs in longline and minor line sectors; the longline sector accounts for most of the fishery’s catch, effort and gross value of production (GVP).

The fishery targets some internationally shared stocks. Commonwealth management of the ETBF takes into account Australia’s obligations to the Western and Central Pacific Fisheries Commission, which is the regional fisheries management organisation through which internationally shared stocks are jointly managed with other countries.

In March 2011 the fishery moved to a system of a total allowable commercial catch (TACC) for key target species, with individual transferable quota entitling holders to a share of the TACC. This superseded transitional arrangements whereby the fishery was managed within a total allowable effort limit with transferable effort rights, which was in place for 18 months ending 28 February 2011 (Kirby et al. 2012). The system of TACC with individual transferable quotas (ITQs) is aimed at managing catch in the fishery while allowing operators to choose the most cost-effective way of operating their business. This allows operators greater flexibility in adapting their business to improve the profitability of their operations.

**MAP 1** Location and relative fishing intensity of the Eastern Tuna and Billfish Fishery, 2011



The main target species in the ETBF are yellowfin tuna, bigeye tuna, albacore, swordfish and striped marlin (Figure 1), which together accounted for around 94 per cent of GVP in 2010–11 (ABARES 2012). Further information on the fishery, including the biological status of key species, can be found in the *ABARES Fishery status reports 2011* (Kirby et al. 2012).

The median age of skippers surveyed in the fishery was 45 years in 2010–11. Skippers had a median of 14 years of experience in the ETBF and 18 years of fishing experience in total. Eighty per cent of respondents’ highest level of educational attainment was primary school or year 10, and the highest qualification was the completion of year 12.



## Timelines of the Eastern Tuna and Billfish Fishery, 1994-95 to 2011-12

FIGURE 1a Active management interventions in the Eastern Tuna and Billfish Fishery

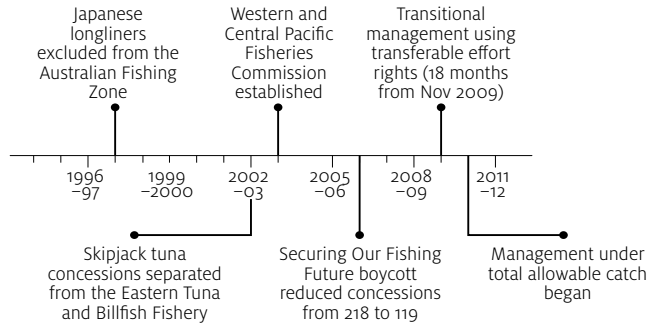


FIGURE 1b Landed catch of key species in the Eastern Tuna and Billfish Fishery

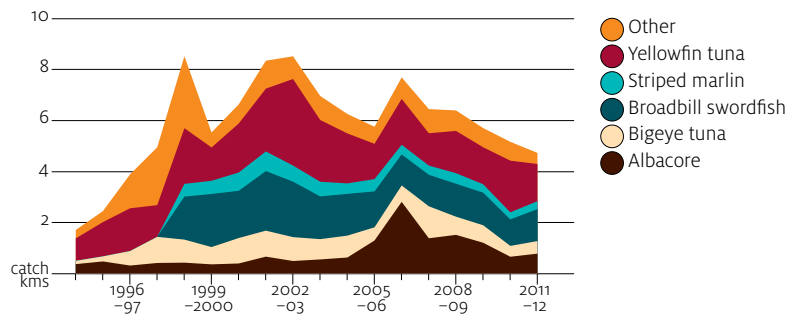


FIGURE 1c Real gross value of production in the Eastern Tuna and Billfish Fishery, in 2011-12 dollars

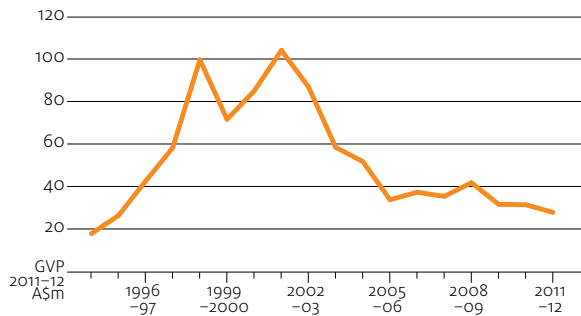
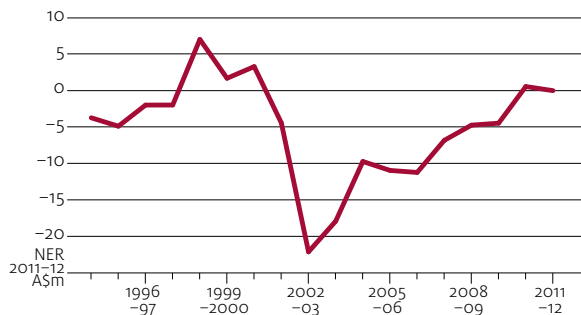


FIGURE 1d Real net economic return in the Eastern Tuna and Billfish Fishery, in 2011-12 dollars



## Financial performance

The survey population for a given year was defined as any boat that recorded more than 1 tonne of catch in the ETBF. The population was 54 in 2009–10 and 51 in 2010–11. The survey sample was 17 in 2009–10 and 14 in 2010–11, representing 40 per cent and 36 per cent of the catch, respectively.

The average financial performance of boats operating in the ETBF improved between 2009–10 and 2010–11. This is reflected in all measures of profitability (Table 7).

Total cash receipts rose by 20 per cent between 2009–10 and 2010–11. This was driven by a 21 per cent increase in seafood receipts per boat, partly as a result of relatively constant fishery receipts being shared between fewer boats.

Cash costs increased by 16 per cent, a lesser degree than the increase in cash receipts. Crew costs, freight and marketing, fuel and repairs and maintenance were the major cost categories in both years, representing 70 per cent of total costs in 2010–11. Fuel costs rose by 22 per cent, crew costs and freight and marketing expenses each increased by 19 per cent, and repairs and maintenance costs increased by 4 per cent.

Boat cash income increased to \$21 782 in 2010–11, from -\$8 971 in 2009–10. Depreciation fell by 22 per cent to \$32 945 in 2010–11, which contributed to boat business profit rising from -\$51 424 to -\$11 164. Profit at full equity, which represents boat business profit as though operators owned all of the capital in their business, increased to \$45 509 in 2010–11 from -\$1616 in 2009–10. This was as a result of increased boat business profit and an increase in the costs items of interest, leasing and rent, which are excluded from this profit measure.

**TABLE 7** Financial performance of boats operating in the Eastern Tuna and Billfish Fishery average per boat

Category	Unit	2009–10		2010–11	
Seafood receipts	\$	828 009	(12)	1 001 233	(10)
Non-fishing receipts	\$	47 688	(15)	50 255	(16)
Total cash receipts	\$	875 697	(11)	1 051 488	(10)
Administration	\$	14 380	(20)	19 030	(16)
Crew costs	\$	236 839	(15)	280 929	(14)
Freight and marketing expenses	\$	147 821	(9)	176 498	(9)
Fuel	\$	116 363	(10)	142 496	(10)
Insurance	\$	25 584	(22)	36 200	(31)
Interest paid	\$	16 382	(12)	12 237	(14)
Licence fees and levies	\$	28 613	(25)	29 090	(37)
Packaging	\$	54 066	(11)	63 197	(10)
Repairs and maintenance	\$	119 551	(9)	124 258	(9)
Other costs	\$	94 333	(370)	105 412	(142)
Total cash costs	\$	884 668	(12)	1 029 706	(15)
Boat cash income	\$	-8 971	(15)	21 782	(18)
<i>less</i> depreciation <b>a</b>	\$	42 453	(153)	32 945	(223)
Boat business profit	\$	-51 424	(24)	-11 164	(32)
<i>plus</i> interest, leasing and rent	\$	49 808	(119)	56 673	(101)
Profit at full equity	\$	-1 616	(7)	45 509	(9)
Capital (excl. quota and licence.)	\$	641 944	(6)	629 064	(7)
Capital (incl. quota and licence.)	\$	890 471	(629)	1 253 238	(80)
Rate of return to boat capital <b>b</b>	%	-0.25	(645)	7.23	(194)
Rate of return to full equity <b>c</b>	%	-0.18	(1322)	3.63	(38)
Population	no.	54	na	51	na
Sample	no.	17	na	14	na

**a** Depreciation adjusted for profit or loss on capital items sold. **b** Excluding value of quota and licences.

**c** Including value of quota and licences. **na** Not available.

Notes: Figures in parentheses are relative standard errors (RSEs). For any given standard error, an RSE will be higher for estimates closer to zero. A guide to interpreting RSEs is included in Appendix A.

## Economic performance

The economic performance of the fishery continued its improvement since 2006–07. In 2010–11, the fishery achieved positive net economic returns (NER) for the first time since 2000–01 (Figure 1).

**TABLE 8** Fishery cash profit and net economic returns in the Eastern Tuna and Billfish Fishery total fishery 2011–12 A\$ million

Category	2009–10		2010–11		2011–12 <sup>p</sup>
Fishing income	47.18	(12)	47.21	(13)	42.63
Operating costs	47.43	(9)	43.18	(14)	35.80
Fishery cash profit	-0.25	(934)	4.03	(75)	6.83
Owner and family labour	2.98	(24)	2.67	(27)	2.45
Opportunity cost of capital	1.10	(21)	0.99	(21)	0.91
Depreciation	1.85	(21)	1.63	(20)	1.44
<i>plus</i> interest, leasing and management fees	4.31	(14)	3.77	(22)	2.82
Net economic returns (excl. management costs)	-1.74	(137)	2.51	(137)	4.85
Management costs	2.72	na	1.95	na	1.88
Net economic returns (incl. management costs)	-4.46	na	0.56	na	2.97

<sup>p</sup> Preliminary non-survey based estimates. na Not available.

Notes: Longer time series are available in the attached data product. Figures in parentheses are relative standard errors (RSEs). RSEs are not available for 2011–12 results due to estimation method.

Between 2009–10 and 2010–11 improved economic performance in the fishery was driven primarily by reduced operating costs. Fishery income remained fairly constant; however, a reduction in the number of boats operating in the fishery may have driven the reduction in costs; the most efficient boats are likely to have remained in the fishery. The opportunity cost of capital and depreciation costs decreased between the two survey years, and management costs fell by 28 per cent. The reduction in overall costs resulted in NER (including management costs) becoming positive for the first time since 2000–01, increasing to \$564 000 in 2010–11, up from -\$4.5 million in 2009–10 (Table 8).

In 2011–12 NER is estimated to increase to \$3.0 million. Revenue and operating costs are both estimated to decline, with the decline in operating costs proportionately larger than the decline in revenue. The main driver for reduced operating costs is a fall in boat numbers, total effort, catch (which affects some key variable costs) and the estimated distance travelled by the ETBF fleet.

Following a build up in capital to 2000–01, the fishery has been catching lower volumes of fish (26 per cent decrease to 5169 tonnes in 2010–11) and fleet size has fallen (survey population fell by 61 per cent to 51 boats in 2010–11). Average real beach prices have fallen by 52 per cent to \$5.98 per kilogram in 2010–11 from \$11.76 per kilogram in 2000–01, corresponding with an appreciation of the Australian dollar against the yen and the US dollar (of 27 per cent and 83 per cent, respectively). The ETBF was targeted in the Securing Our Fishing Future structural adjustment package in 2006, which further contributed to the already declining fleet size (down from around 150 boats in 2002 (Kirby et al. 2012)).

The ETBF had some of the characteristics of an unmanaged, open access fishery in the past, with estimates suggesting that the fishery earned only very small or negative NER before 2008–09 (Kirby et al. 2012). However, despite external pressures such as rising fuel prices and the appreciation of the Australian dollar, NER in the fishery have consistently increased since its low in 2002–03 of -\$22.0 million.

Since transitioning to ITQs in March 2011, estimates for the value of quota for individual species have been difficult to ascertain. Anecdotally quota prices were highly volatile, with operators suggesting yellowfin tuna quota prices increased considerably throughout 2011 and albacore quota prices fell. The sale price for bigeye tuna quota during the 2011–12 season is estimated to be around \$10.00 a kilogram, for yellowfin tuna is estimated at \$11.00 a kilogram and for broadbill swordfish is estimated at \$6.50 a kilogram.

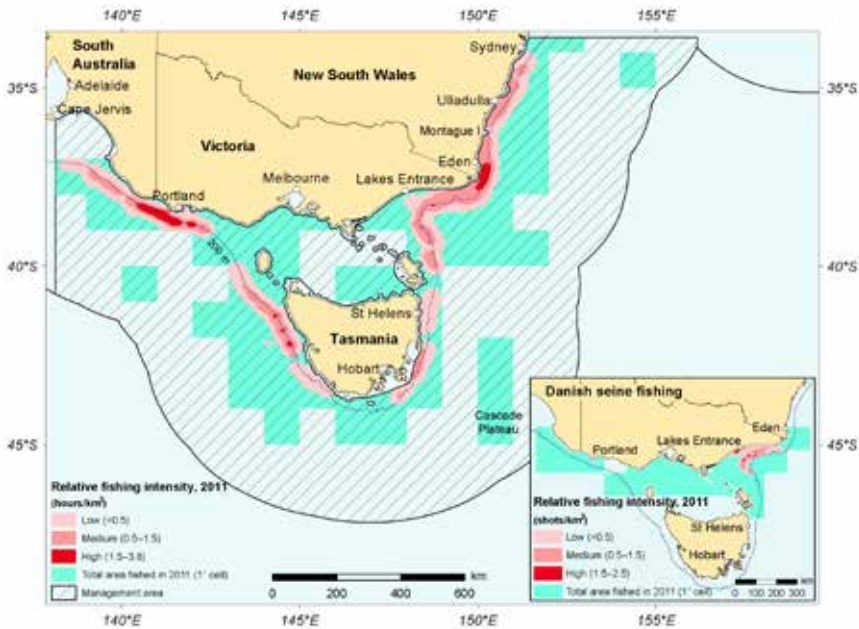
## Chapter 3

# Commonwealth Trawl Sector

### The sector

The Commonwealth Trawl Sector (CTS) is the highest value sector, in terms of gross value of production (GVP), of the Southern and Eastern Scalefish and Shark Fishery (SESSF). It stretches from Sydney southward around Tasmania to Cape Jervis in South Australia, where it abuts the Great Australian Bight Trawl Sector (Map 2). Key ports in the CTS are Ulladulla, Eden, Lakes Entrance, Hobart and Portland (Ward et al. 2012). Both Danish seine and trawl boats operate in this sector.

**MAP 2** Location and relative fishing intensity of the Commonwealth Trawl Sector, 2011



A management system of total allowable catch (TAC) limits with individual transferable quota was first introduced in the SESSF in 1998, and global TACs were extended to cover all 16 quota species and groups in 2001. In 2006, the Securing Our Fishing Future structural adjustment package resulted in the removal of half of the 118 concessions originally available in the sector (Figure 2).

The CTS is a major source of Australian fresh fish for the Sydney and Melbourne markets. Key target species include tiger flathead, blue grenadier, pink ling and silver warehou. These four species collectively accounted for 65 per cent of the sector's GVP in 2010–11 (Figure 2) (ABARES 2012).

The median age of skippers surveyed in the sector was 38 years in 2010–11. Skippers had a median of 19 years fishing experience and usually all of that was spent in the CTS. Just under half of respondents' highest level of educational attainment was beyond year 10, and almost one-quarter had a tertiary education.

## Financial performance

The survey population for a given year was defined as any boat that recorded more than 1 tonne of catch in the CTS, excluding factory trawlers (for which there were insufficient numbers to include in the survey). The population was 48 in 2009–10 and 2010–11. The sample was 12, representing 25 per cent of the population and 19 per cent of the catch in both survey years. The small sample size should be considered when drawing conclusions from these results. Financial performance estimates have been given for Danish seiners and trawlers separately alongside the combined average for the sector.

Some operators in the CTS are likely to have operated in other fisheries during the survey period. These have been included in their financial performance results. The performance of the CTS only is presented in the economic performance section. The financial performance of the average boat operating in the CTS changed little from 2009–10 to 2010–11. There was no considerable change in any of the revenue or cost categories presented in Table 9.

Profit at full equity for the average CTS boat was estimated at \$185 000 in 2010–11; a 2 per cent fall from 2009–10. This drove boat cash income and boat business profit to decline at a similar rate.

Total cash receipts declined by 3 per cent to \$1.2 million, reflecting a reduction in both seafood and non-fishing receipts. Total cash costs also declined by 3 per cent, to \$1.1 million. All cost categories measured changed by less than 5 per cent from 2009–10 to 2010–11. Crew costs accounted for the largest share of cash costs (31 per cent in 2010–11), followed by fuel (18 per cent), freight and marketing expenses (14 per cent) and repairs and maintenance costs (13 per cent).

In 2010–11, Danish seine and trawl operators spent a similar percentage of revenue on operating costs (87 per cent compared with 89 per cent); however, the structure of these costs varied. Danish seine operators spent a significantly greater proportion of their total costs on crew compared with trawl (49 per cent compared with 31 per cent). However, they spent significantly less on fuel (7 per cent compared with 17 per cent) and repairs and maintenance (3 per cent compared with 12 per cent). Despite these differences, profit at full equity as a percentage of total revenue was the same for both fishing methods (16 per cent).

## Timelines of the Commonwealth Trawl Sector, 1996–97 to 2011–12

FIGURE 2a Active management interventions in the Commonwealth Trawl Sector

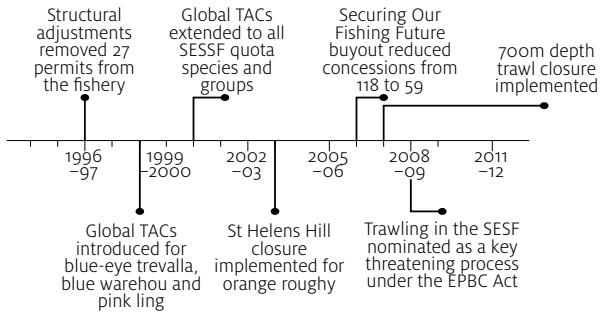


FIGURE 2b Landed catch of key species in the Commonwealth Trawl Sector

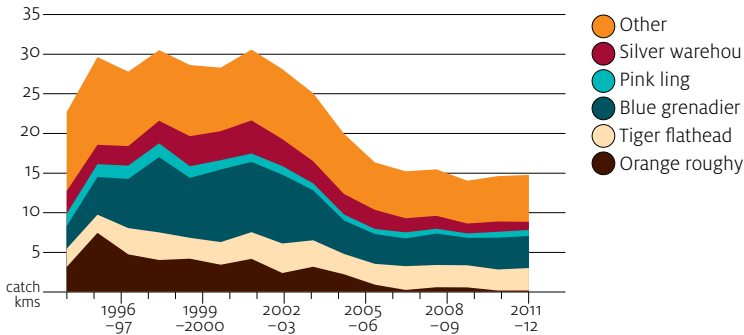


FIGURE 2c Real gross value of production in the Commonwealth Trawl Sector, in 2011–12 dollars

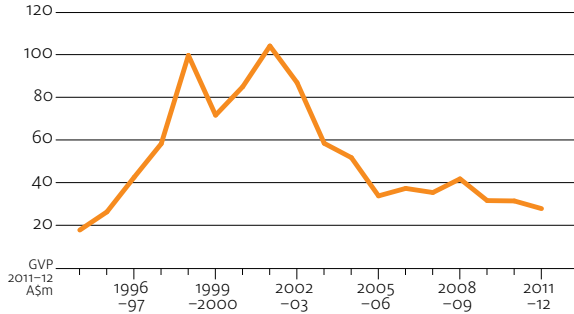


FIGURE 2d Real net economic return in the Commonwealth Trawl Sector, in 2011–12 dollars

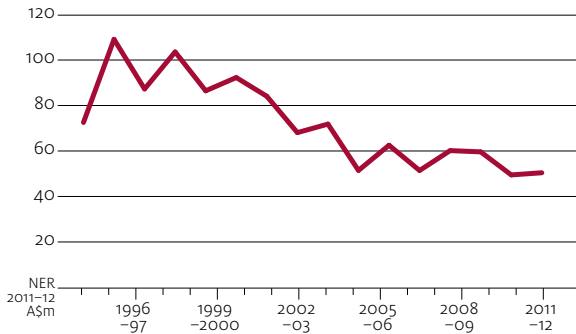




TABLE 9 Financial performance of boats operating in the Commonwealth Trawl Sector average per boat

Category	Unit	Danish seine			Trawl			All Boats		
		2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	
Seafood receipts	\$	704 593 <sup>(5)</sup>	689 900 <sup>(5)</sup>	1 125 087 <sup>(23)</sup>	1 093 762 <sup>(25)</sup>	984 922 <sup>(17)</sup>	967 555 <sup>(21)</sup>			
Non-fishing receipts	\$	22 820 <sup>(21)</sup>	23 429 <sup>(21)</sup>	101 647 <sup>(38)</sup>	95 958 <sup>(41)</sup>	75 371 <sup>(33)</sup>	73 293 <sup>(34)</sup>			
Total cash receipts	\$	727 413 <sup>(5)</sup>	713 328 <sup>(5)</sup>	1 226 734 <sup>(24)</sup>	1 189 720 <sup>(26)</sup>	1 060 294 <sup>(18)</sup>	1 040 848 <sup>(21)</sup>			
Administration	\$	10 358 <sup>(10)</sup>	10 159 <sup>(9)</sup>	17 365 <sup>(19)</sup>	17 373 <sup>(19)</sup>	15 030 <sup>(15)</sup>	15 119 <sup>(17)</sup>			
Crew costs	\$	307 139 <sup>(6)</sup>	304 765 <sup>(6)</sup>	335 947 <sup>(21)</sup>	328 402 <sup>(21)</sup>	326 344 <sup>(27)</sup>	321 015 <sup>(33)</sup>			
Freight and marketing expenses	\$	113 889 <sup>(9)</sup>	111 210 <sup>(9)</sup>	154 197 <sup>(40)</sup>	146 992 <sup>(43)</sup>	140 761 <sup>(21)</sup>	135 810 <sup>(23)</sup>			
Fuel	\$	49 436 <sup>(5)</sup>	48 592 <sup>(4)</sup>	202 286 <sup>(23)</sup>	196 338 <sup>(24)</sup>	151 336 <sup>(9)</sup>	150 167 <sup>(12)</sup>			
Insurance	\$	23 934 <sup>(4)</sup>	23 403 <sup>(5)</sup>	34 670 <sup>(12)</sup>	34 258 <sup>(12)</sup>	31 091 <sup>(43)</sup>	30 866 <sup>(49)</sup>			
Interest paid	\$	10 770 <sup>(31)</sup>	10 433 <sup>(29)</sup>	3 758 <sup>(85)</sup>	3 645 <sup>(87)</sup>	6 096 <sup>(28)</sup>	5 766 <sup>(27)</sup>			
Licence fees and levies	\$	22 081 <sup>(16)</sup>	21 027 <sup>(17)</sup>	59 935 <sup>(34)</sup>	57 326 <sup>(33)</sup>	50 426 <sup>(47)</sup>	49 012 <sup>(39)</sup>			
Packaging	\$	0 <sup>-</sup>	0 <sup>-</sup>	5 011 <sup>(47)</sup>	5 097 <sup>(45)</sup>	3 341 <sup>(31)</sup>	3 504 <sup>(22)</sup>			
Repairs and maintenance	\$	20 617 <sup>(15)</sup>	20 781 <sup>(15)</sup>	148 941 <sup>(34)</sup>	141 768 <sup>(34)</sup>	106 166 <sup>(17)</sup>	103 960 <sup>(19)</sup>			
Other costs	\$	37 344 <sup>(12)</sup>	36 081 <sup>(12)</sup>	73 425 <sup>(36)</sup>	72 111 <sup>(37)</sup>	58 289 <sup>(52)</sup>	57 822 <sup>(43)</sup>			
Total cash costs	\$	629 594 <sup>(5)</sup>	620 726 <sup>(5)</sup>	1 097 118 <sup>(23)</sup>	1 063 291 <sup>(24)</sup>	941 277 <sup>(27)</sup>	924 989 <sup>(21)</sup>			
Boat cash income	\$	97 819 <sup>(9)</sup>	92 603 <sup>(10)</sup>	129 616 <sup>(77)</sup>	126 430 <sup>(78)</sup>	119 017 <sup>(40)</sup>	115 859 <sup>(21)</sup>			
less depreciation <b>a</b>	\$	15 906 <sup>(17)</sup>	15 772 <sup>(16)</sup>	11 412 <sup>(82)</sup>	11 300 <sup>(94)</sup>	16 220 <sup>(59)</sup>	14 926 <sup>(48)</sup>			
Boat business profit	\$	72 218 <sup>(16)</sup>	67 248 <sup>(16)</sup>	118 086 <sup>(82)</sup>	116 244 <sup>(82)</sup>	102 797 <sup>(36)</sup>	100 933 <sup>(23)</sup>			
plus interest, leasing and rent	\$	44 796 <sup>(18)</sup>	44 708 <sup>(17)</sup>	71 121 <sup>(50)</sup>	69 250 <sup>(51)</sup>	62 346 <sup>(43)</sup>	61 581 <sup>(37)</sup>			
Profit at full equity	\$	117 013 <sup>(11)</sup>	111 956 <sup>(12)</sup>	189 207 <sup>(60)</sup>	185 493 <sup>(61)</sup>	165 142 <sup>(20)</sup>	162 513 <sup>(23)</sup>			
Capital (excl. quota and licence.)	\$	300 895 <sup>(8)</sup>	298 552 <sup>(8)</sup>	357 711 <sup>(30)</sup>	343 996 <sup>(32)</sup>	338 772 <sup>(22)</sup>	329 795 <sup>(23)</sup>			
Capital (incl. quota and licence.)	\$	2 613 200 <sup>(9)</sup>	2 574 215 <sup>(9)</sup>	2 122 128 <sup>(36)</sup>	2 057 833 <sup>(37)</sup>	2 285 819 <sup>(50)</sup>	2 219 202 <sup>(36)</sup>			
Rate of return to boat capital <b>b</b>	%	39 <sup>(14)</sup>	37 <sup>(14)</sup>	53 <sup>(90)</sup>	54 <sup>(98)</sup>	49 <sup>(48)</sup>	49 <sup>(34)</sup>			
Rate of return to full equity <b>c</b>	%	4 <sup>(18)</sup>	4 <sup>(15)</sup>	9 <sup>(68)</sup>	9 <sup>(71)</sup>	7 <sup>(34)</sup>	7 <sup>(48)</sup>			
Population	no.	16 <sup>na</sup>	15 <sup>na</sup>	32 <sup>na</sup>	33 <sup>na</sup>	48 <sup>na</sup>	48 <sup>na</sup>			
Sample	no.	9 <sup>na</sup>	9 <sup>na</sup>	6 <sup>na</sup>	6 <sup>na</sup>	12 <sup>na</sup>	12 <sup>na</sup>			

**a** Depreciation adjusted for profit or loss on capital items sold. **b** Excluding value of quota and licences. **c** Including value of quota and licences. **na** Not available.

Notes: Figures in parentheses are relative standard errors (RSEs). For any given standard error, an RSE will be higher for estimates closer to zero. A guide to interpreting RSEs is included in Appendix A

## Economic performance

Net economic returns (NER) including management costs increased by \$4.3 million to \$6.8 million in 2010–11, representing a 173 per cent increase from 2009–10. In 2011–12 NER are estimated to have decreased to \$5.5 million, as lower management costs partly offset declines in sector cash profit and interest, leasing and management fees.

**TABLE 10** Sector cash profit and net economic returns in the Commonwealth Trawl Sector total sector 2011–12 A\$ million

Category	2009–10		2010–11		2011–12 <sup>p</sup>
Fishing income	49.88	(17)	50.57	(21)	47.11
Operating costs	41.06	(17)	39.06	(19)	37.68
Sector cash profit	8.82	(40)	11.51	(36)	9.43
Owner and family labour	6.61	(22)	6.21	(24)	5.11
Opportunity cost of capital	0.84	(21)	0.72	(23)	0.71
Depreciation	0.82	(40)	0.95	(21)	1.01
<i>plus</i> interest, leasing and management fees	5.52	(22)	6.55	(22)	5.91
Net economic returns (excl. management costs)	6.07	(52)	10.18	(38)	8.52
Management costs	3.57	na	3.37	na	3
Net economic returns (incl. management costs)	2.5	na	6.82	na	5.51

<sup>p</sup> Preliminary non-survey based estimates. na Not available.

Notes: Longer time series are available in the attached data product. Figures in parentheses are relative standard errors (RSEs). RSEs are not available for 2011–12 results due to estimation method.

The increase in NER in 2010–11 was driven by a combination of higher sector cash profit and increased interest, leasing and management fees. A rise in fishing income and a decline in operating costs resulted in sector cash profit increasing by \$2.7 million to \$11.5 million. The marginal rise in fishing income reflected a 5 per cent increase in total catch volume, which offset lower average unit prices for the majority of target species in the sector.

NER in the CTS have been generally positive since 2004–05 (Figure 2). Combined with the reductions in boat numbers and associated increases in economic productivity (Skirtun & Vieira 2012) this suggests that the CTS has moved closer to maximum economic yield (MEY)—the economic target outlined in the Commonwealth Harvest Strategy Policy (DAFF 2007). This is consistent with the estimated current biomasses of at least three of the four most valuable species being close to the MEY biomass targets (Ward et al. 2012). This indicates that the economic status of the CTS is positive and has substantially improved since 2004–05.

Quota prices in the CTS were collected predominantly from Danish seine operators and as such may not be indicative of quota values in the sector as a whole. The species for which response rates were the greatest and thus had the most reliable data were tiger flathead and eastern school whiting. The median sale price of tiger flathead quota for permanent transfer was \$26.00 a kilogram in 2010–11, while eastern school whiting quota was \$3.00 a kilogram. In 2010–11 tiger flathead, blue-eye trevalla and pink ling tended to be higher priced quota species and ocean perch, silver warehou and eastern school whiting tended to be lower priced quota species.

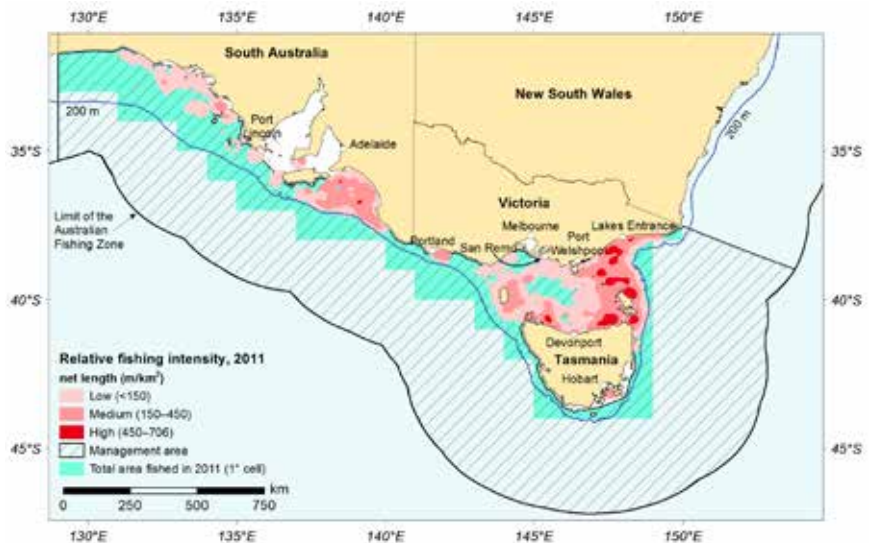
# Chapter 4

## Gillnet, Hook and Trap Sector

### The sector

The Gillnet, Hook and Trap Sector (GHTS) of the Southern and Eastern Scafish and Shark Fishery (SESSF) extends south from southern Queensland to the western border of South Australia, and includes waters to the south of Tasmania (Map 3). Key ports include Lakes Entrance, Port Lincoln, San Remo, Port Welshpool and Devonport (Woodhams & Vieira 2012). Gear types that can be used in the sector include gillnets, droplines, demersal longlines, automatic longlines and, to a lesser extent, traps. Most catch in the sector is caught by gillnet operators (84 per cent in 2010-11). Financial results for gillnet operators have been presented separately from those for the sector as a whole (Table 9).

**MAP 3** Location and relative gillnet fishing intensity of the Gillnet, Hook and Trap Sector, 2011



As part of the SESSE, the GHTS is managed using a system of output controls with individual transferable quota (ITQ). Quota was first introduced for blue-eye trevalla in 1998, and was then extended to all quota-managed species except some species of shark in 2001. ITQs for school and gummy shark were also introduced in 2001, and ITQs for elephantfish and sawshark were introduced in 2002. In 2006, as part of the Securing Our Fishing Future structural adjustment package, 26 gillnet boat statutory fishing rights, 63 scalefish hook boat statutory fishing rights and 17 shark boat statutory fishing rights were removed.

Gillnets are used to target shark species (mainly gummy shark), while all other methods are used primarily to target finfish species, with some targeting of shark species using line methods. The main target species in the sector include gummy shark, pink ling and blue-eye trevalla; school shark has historically been a target species but is now managed as a byproduct species. Together, these four species accounted for 91 per cent of the sector's gross value of production in 2010–11 (Figure 3) (ABARES 2012).

The median age of skippers surveyed in the sector was 42 years in 2010–11. Skippers had a median of 24 years of fishing experience and 17 of these were spent in the GHTS. Half of respondents had a higher educational attainment than year 10.

## Financial performance

The survey population for a given year was defined as any boat that recorded more than 1 tonne of catch in the GHTS in the survey period. The population was 68 in 2009–10 and 73 in 2010–11. The sample was 16 in both survey years, representing 22 per cent of the population in 2010–11 and 39 per cent of the catch. The small sample size should be considered when drawing conclusions from these results.

Some operators in the GHTS are likely to have operated in other fisheries during the survey period. These have been included in their financial performance results. The financial performance of the average boat operating in the GHTS deteriorated from 2009–10 to 2010–11 (Table 11). Total revenue declined in percentage terms, marginally more than total costs (7.3 per cent compared with 7.2 per cent), resulting in a slightly lower boat cash income. Depreciation rose marginally, resulting in a further decline in boat business profit, falling by \$3500 to \$8300 in 2010–11. This resulted in profit at full equity of \$86 000 in 2010–11, down 6 per cent from 2009–10.

Total cash receipts declined by \$37 000 to \$466 000 in 2010–11, reflecting an 8 per cent reduction in seafood receipts which was only partially offset by a 5 per cent increase in non-fishing receipts. Total cash costs declined by \$34 000, to \$438 000. Crew costs, which accounted for the largest share of cash costs (32 per cent in 2010–11), fell by 5 per cent and fuel costs (12 per cent) remained relatively constant, rising by less than 1 per cent. Repairs and maintenance (7 per cent) fell by 13 per cent.

In 2010–11 gillnet operators appear to have had relatively similar cost structures to other GHTS operators. Gillnet operators had 5 per cent lower total cash receipts and 3 per cent lower total cash costs than the average of all operators in the GHTS. This resulted in all profit categories for gillnet operators being lower than those for the sector as a whole.

## Timelines of the Gillnet, Hook and Trap Sector, 1998–99 to 2011–12

FIGURE 3a Active management interventions in the Gillnet, Hook and Trap Sector

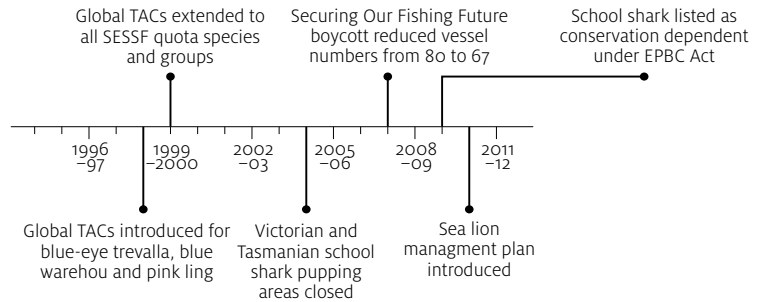


FIGURE 3b Landed catch of key species in the Gillnet, Hook and Trap Sector

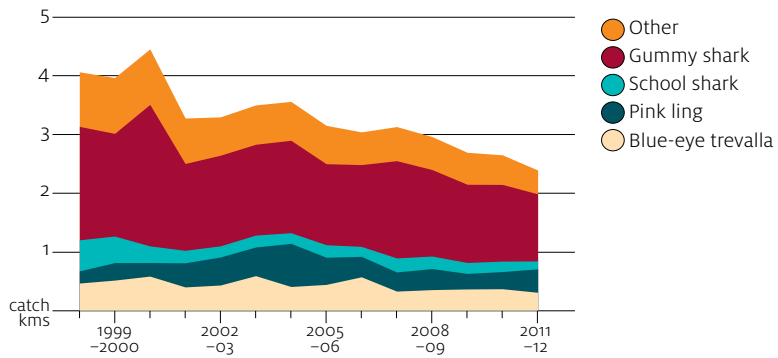


FIGURE 3c Real gross value of production in the Gillnet, Hook and Trap Sector, in 2011–12 dollars

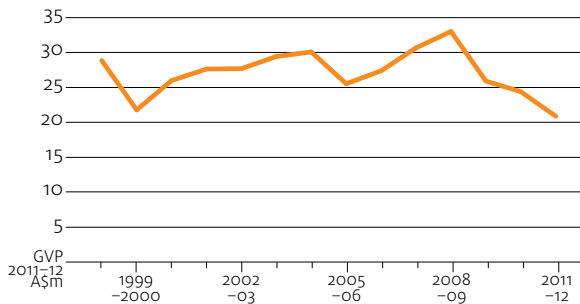
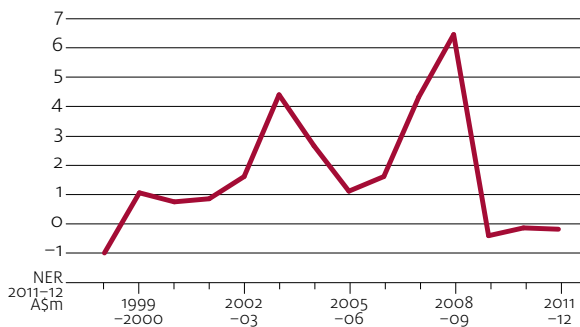


FIGURE 3d Real net economic return in the Gillnet, Hook and Trap Sector, in 2011–12 dollars



**TABLE 11** Financial performance of boats operating in the Gillnet, Hook and Trap Sector average per boat

Category	Unit	Gillnet boats				All boats			
		2009–10		2010–11		2009–10		2010–11	
Seafood receipts	\$	407 198	(10)	421 157	(8)	484 919	(16)	447 418	(13)
Non-fishing receipts	\$	22 608	(10)	20 307	(22)	17 950	(20)	18 797	(22)
Total cash receipts	\$	429 806	(9)	441 464	(7)	502 869	(16)	466 215	(13)
Administration	\$	20 724	(36)	19 147	(35)	13 265	(32)	15 251	(26)
Crew costs	\$	138 488	(18)	134 794	(19)	146 498	(41)	139 743	(37)
Freight and marketing expenses	\$	38 691	(42)	40 321	(47)	63 936	(17)	41 418	(13)
Fuel	\$	52 638	(16)	52 298	(18)	51 765	(18)	52 148	(15)
Insurance	\$	14 766	(19)	12 700	(22)	11 716	(47)	10 940	(35)
Interest paid	\$	2 689	(47)	2 880	(34)	7 431	(20)	10 249	(22)
Licence fees and levies	\$	27 455	(21)	31 622	(25)	19 819	(81)	26 181	(71)
Packaging	\$	70	(74)	14	(107)	452	(16)	343	(19)
Repairs and maintenance	\$	47 980	(12)	33 212	(23)	36 943	(15)	32 018	(12)
Other costs	\$	30 471	(10)	30 015	(10)	48 502	(95)	42 712	(107)
Total cash costs	\$	438 119	(350)	426 902	(286)	472 492	(22)	438 429	(16)
Boat cash income	\$	-8313	(19)	14 562	(17)	30 377	(14)	27 786	(11)
less depreciation <b>a</b>	\$	15 264	(14)	16 127	(13)	18 498	(456)	19 466	(350)
Boat business profit	\$	-23 577	(119)	-1 565	(2610)	11 878	(24)	8 320	(17)
plus interest leasing and rent	\$	66 836	(31)	72 780	(24)	79 640	(38)	77 734	(39)
Profit at full equity	\$	43 259	(75)	71 215	(63)	91 518	(14)	86 054	(12)
Capital (excl. quota and licence)	\$	347 622	(10)	335 351	(12)	352 891	(17)	350 440	(16)
Capital (incl. quota and licence)	\$	1 741 600	(11)	1 726 200	(16)	1 419 640	(48)	1 653 085	(43)
Rate of return to boat capital <b>b</b>	%	12	(76)	21	(55)	26	(57)	25	(118)
Rate of return to full equity <b>c</b>	%	2	(65)	4	(74)	6	(106)	5	(21)
Population	no.	44	na	45	na	68	na	73	na
Sample	no.	8	na	10	na	16	na	16	na

**a** Depreciation adjusted for profit or loss on capital items sold. **b** Excluding value of quota and licences. **c** Including value of quota and licences. **na** Not available.

Notes: Figures in parentheses are relative standard errors (RSEs). For any given standard error, an RSE will be higher for estimates closer to zero. A guide to interpreting RSEs is included in Appendix A.

## Economic performance

Fishing income and operating costs in the GHTS fell in all three of the years considered (Table 12). Net economic returns (NER) including management costs increased by around \$266 000 between 2009–10 and 2010–11 but remained negative at -\$137 033. This was due to fishing income decreasing at a lesser rate (7 per cent) than operating costs (8 per cent). This led to an increase in sector cash profit of 17 per cent. A decrease in the opportunity cost of capital and depreciation and little change in management costs resulted in an increase in NER in 2010–11.

In 2011–12 NER were estimated to fall only slightly to -\$182 000. Both fishing income and operating costs are estimated to fall by 17 per cent.

**TABLE 12** Sector cash profit and net economic returns in the Gillnet, Hook and Trap sector total sector 2011–12 A\$ million

Category	2009–10		2010–11		2011–12 <sup>p</sup>
Fishing income	23.39	(24)	21.86	(23)	18.23
Operating costs	21.8	(25)	20	(24)	16.6
Sector cash profit	1.59	(85)	1.86	(75)	1.64
Owner and family labour	3.05	(30)	3.06	(28)	3.06
Opportunity cost of capital	0.65	(18)	0.53	(18)	0.5
Depreciation	0.88	(18)	0.85	(18)	0.76
<i>plus</i> interest, leasing and management fees	4.9	(26)	4.84	(20)	4.87
Net economic returns (excl. management costs)	1.9	(86)	2.26	(73)	2.19
Management costs	2.31	na	2.39	na	2.37
Net economic returns (incl. management costs)	-0.40	na	-0.14	na	-0.18

<sup>p</sup> Preliminary non-survey based estimates. **na** Not available.

Notes: Longer time series are available in the attached data product. Figures in parentheses are relative standard errors (RSEs). RSEs are not available for 2011–12 results due to estimation method.

Between 2009–10 and 2010–11 there was very little change in total effort; however, there was a 1 per cent reduction in both catch and prices which reduced fishing income. This is likely to have put downward pressure on costs (especially crew costs, which are highly correlated with fishing income) resulting in lower operating costs in the sector. NER improved marginally in 2010–11 but remained negative. This trend continued in 2011–12 with total fishing effort and catch falling, resulting in lower fishing income and lower operating costs and NER remaining relatively unchanged compared with 2010–11.

It is estimated that NER became negative in 2009–10 for the first time since 1999–2000, and remained negative in 2010–11 and 2011–12. Gummy shark abundance, availability and price are the main driver of costs and revenues in the sector. In 2009–10 voluntary closures were implemented in the sector to protect Australian sea lion populations. At the beginning of 2010–11 sea lion closures became mandatory in the waters of South Australia (AFMA 2010) and were much larger than the voluntary closures previously in place. These closures, which excluded fishers from some areas previously fished for gummy shark, potentially reduced gummy shark availability and coincided with the period in which NER became negative. It is likely that the economic performance of the sector was constrained by these closures. Further analysis would be required to understand the full effects of these management changes on the sector's economic performance.

Management efforts to rebuild school shark stocks that are currently classified as overfished may also have affected recent economic performance in the GHTS. The total allowable catch (TAC) for school shark has progressively been reduced to historically low levels to promote rebuilding. Given that school shark is often caught as bycatch when targeting gummy shark, gummy shark catches may be constrained by lower school shark TACs.

The above issues demonstrate management efforts to address issues around bycatch and ecosystem impacts can have significant implications for the economic performance of fisheries. This further demonstrates the importance of using economic information to inform such management changes so that preferred management outcomes can be achieved at least cost for industry, and society more broadly.



# Appendix A

## Survey definitions

This appendix provides definitions of key financial performance variables, net economic returns (NER) and the ABARES method of calculating NER. Use of NER as an indicator of economic performance is then briefly discussed.

### Financial performance

The definitions of key variables used in the analysis of boat-level financial performance are provided below.

**Total cash receipts** represent returns from the sale of fish, from non-fishing activities, including charter operations, and from other sources (insurance claims and compensation, quota and/or endorsements leased out, government assistance and any other revenue) in the financial year.

For most operators, this information is readily available from their own records. However, different operators record their fishing income in different ways. In some cases, such as where fish are sold through a cooperative, some operators may only record payments received from the cooperative. These payments may be net of commissions and freight, as well as net of other purchases made through the cooperative.

In other cases, the cooperative or agency pays the crew directly for the catch; the owner's financial records might include only the revenues received after the crew's share has been deducted.

For these reasons, operators are asked to provide a breakdown of the total catch of their boat and an estimate of the total value of that catch. For consistency, marketing charges may need to be added back into fishing receipts for some boats to give a gross value. Where this is necessary, these selling costs are also added into the cost estimates to offset the new revenue figure. Receipts also include amounts received in the survey year for fish sold in previous years.

**Total cash costs** include payments made for both permanent and casual hired labour and payments for materials and services (including payments on capital items subject to leasing, rent, interest, licence fees and repairs and maintenance). Capital and household expenditures are excluded.

**Labour costs** are often the highest cash cost in the fishing operation. Labour costs include wages and an estimated value for owner/partner, family and unpaid labour. Labour costs cover the cost of labour involved in boat-related aspects of the fishing business, such as crew or onshore administration costs, but do not cover the cost of onshore labour involved in processing fisheries products.

On many boats, the costs of labour are reflected in the wages paid by boat owners and/or in the share of the catch they earn. However, in some cases, such as where owner–skippers are involved, or where family members work in the fishing operation, the payments made can be low or even nil, which will not always reflect the market value of the labour provided. To allow for this possible underestimation, all owner/partner and family labour costs are based on estimates collected at the interview of what it would cost to employ someone else to do the work.

**Boat cash income** is the difference between total cash receipts and total cash costs.

**Depreciation costs** have been estimated using the diminishing value method based on the current replacement cost and age of each item. The rates applied are the standard rates allowed by the Commissioner of Taxation. For items purchased or sold during the survey year, depreciation is assessed as if the transaction had taken place at the midpoint of the year. This method of calculating depreciation is also used in other ABARES industry surveys.

**Boat business profit** is boat cash income less depreciation.

**Profit at full equity** is boat profit, plus rent, interest and lease payments.

**Capital** is the value placed on the assets employed by the owning business of the surveyed boat. It includes the value of the boat, hull, engine and other onboard equipment (including gear). Estimates are also reported for the value of quotas and endorsements held by the surveyed boat. Estimates of the value of capital are based on the market value of capital and are usually obtained at interview, but in some cases quota and endorsement values are obtained from industry sources.

**Depreciated replacement value** is the depreciated capital value based on the current age and replacement values of the boat and gear. The value of quota and endorsements held is not included in the estimate.

**Rate of return to boat capital** is calculated as if the proprietors owned all fishing assets. This enables financial performance of sample boats to be compared regardless of proprietors' equity in the business. Rate of return to boat capital is calculated by expressing profit at full equity as a percentage of total capital (excluding quota and licence value).

**Rate of return to full equity** is calculated by expressing profit at full equity as a percentage of total capital (including quota and licence value).

## Net economic returns

Net economic returns are the long-run profits from a fishery after all costs have been met, including fuel, crew costs, repairs, the opportunity cost of family and owner labour, fishery management costs, depreciation and the opportunity cost of capital.

More specifically, a fishery's net economic return for a given time period can be defined as:

$$\text{NR} = \underbrace{\text{R}}_{\text{cash receipt}} - \underbrace{\text{CC} - \text{OWNFL} + \text{ILR}}_{\text{operating costs}} - \underbrace{\text{OppK} - \text{DEP}}_{\text{capital cost}} + \underbrace{\text{recMC} - \text{totM}}_{\text{management costs}}$$

Where:

- NR** = net returns
- R** = total cash receipts attributable to the fishery, excluding leasing income
- CC** = total cash costs attributable to the fishery, including recovered management costs
- OWNFL** = imputed cost of owner and family labour
- ILR** = interest and quota/permit leasing costs
- OppK** = opportunity cost of capital
- DEP** = depreciation
- recMC** = recovered management costs
- totMC** = total management costs.

Note that recovered management costs are those management costs paid by industry through management fees and are included in total cash costs (CC). These costs are removed (as indicated by '+ recMC') to prevent double counting given that these costs are a component of total management costs. Similarly, interest and quota/permit leasing costs are removed (indicated by '+ ILR') as these costs at the fishery level represent revenues that have been redistributed to external investors in the fishery.

The method of collecting data for each component and then calculating an estimate is outlined in the last section of this appendix.

## Survey-based estimation of net economic returns

### Fish sale receipts

Fish sale receipts are usually taken from fishers' financial accounts. Where a fisher operates in more than one fishery, they are asked to indicate what proportion of total fish sales is attributable to the fishery being surveyed. Any freight or marketing costs must also be deducted. This provides an estimate of net fishing receipts that incorporates only the 'beach price' that has been received for the catch; that is, the price received for fish at its first landing point.

Income received from leasing out quota and licences is not included as income in calculating net economic returns. This item represents a redistribution of profits among investors in the fishery. Also, the amount a fisher earns from leasing out quota and licences relates to the amount of profits the fishery is generating. Including leasing revenue would therefore result in double counting.

### Operating costs

Operating costs include day-to-day operational expenses incurred to harvest fish in the fishery. Cash costs (CC) are a component of operating costs that includes those cost items that are easily identified in fishers' accounts, such as fuel, repairs and gear replacement.

Labour costs are often specified in fishers' accounts as wages. However, in calculating net returns, an estimate of the opportunity cost of labour is needed. The opportunity cost of labour is the wage that could have been earned performing a similar role elsewhere. Where a market wage is paid, it is assumed to represent the opportunity cost of labour and is included in the cash costs component of operating costs. The opportunity cost of owner and family labour is not easily identifiable in fishers' accounts. Often owners and their families are involved in operating a boat, either as skippers and crew or onshore as accountants and shore managers. While some will be paid market value for their labour, some will not be paid at all and others paid very high amounts, often as 'director fees' or 'manager fees'. In these cases, ABARES survey officers ask survey respondents to estimate the market value of owner and family labour—that is, the amount that would need to be paid to employ a non-family member to fulfil the same position. This amount is entered as a component of operating costs (OWNFL).

Quota and licence leasing costs and interest expenses are included in cash costs. However, these costs must be removed from calculation of net returns for the same reason they are excluded from income (see 'Fish sale receipts' above).

### Capital costs

To calculate capital costs, an estimate of the value of capital is needed. ABARES survey officers ask fishers to provide information for all capital items associated with the fishing business (including hull, engine, onboard equipment, vehicles and sheds). Information collected for each item includes the year the capital item was manufactured and an estimate of what it would cost to replace that item with a new equivalent item. By accounting for previous depreciation and inflation, these data are used to estimate the total value of capital invested in the fishery for the survey year.

As mentioned, capital costs include the opportunity cost of capital (OppK) and depreciation (DEP). The opportunity cost of capital is the return that could have been earned if capital was invested elsewhere, rather than in the fishery. This cost is not identifiable in fishers' accounts.

A real interest rate that represents the long-term average rate of return that could be earned on an investment elsewhere is applied to the value of capital in the fishery. For fisheries surveys, ABARES uses a rate of 7 per cent per year.

Depreciation expense is the cost of capital becoming less valuable over time as a result of wear and tear and obsolescence. Depreciation expense is not consistently identifiable in fishers' accounts, so ABARES calculates the annual depreciation of boats based on the capital inventory list collected during the surveys (described above) and predetermined depreciation rates for each capital item type.

### Management costs

Management costs are incurred to ensure the fishery continues operating and are therefore costs associated with harvesting fish in the fishery. Management costs are made up of two components: recovered management costs and non-recovered management costs. Recovered management costs (recMC) are those costs recovered from fishers and appear in the accounts of fishers as payments of management fees or levies. Non-recovered management costs are those management costs not charged to fishers, but instead are covered by the managing body or government. Calculation of net economic returns requires deduction of total management costs, which is the sum of these two components.

Total cash costs (CC) includes an estimate of recovered management costs based on management levy expenses contained in fishers' accounts. As this estimate of recovered management costs is based only on a sample of the fishery, it may not be consistent with the actual value of management costs recovered from the entire fishery. AFMA is able to provide an estimate of total management costs for each fishery—that is, the sum of both recovered and non-recovered management costs. For these reasons, recovered management costs from fishers' accounts are ignored (as indicated by +recMC in the net returns equation). Then, total management costs (totM) as supplied by AFMA are used to estimate net economic returns.

## Net economic returns and economic performance

AFMA fishery managers require information on fisheries' performance against the objective of maximising net economic returns from use of fish stocks—an objective commonly referred to as MEY. If a fishery is operating at MEY, effort, catch and stocks are at levels where the difference between discounted revenues and costs, and therefore profits, are maximised. The term 'discounted' means that the difference in the value of a dollar earned today relative to a dollar in the future is accounted for.

## Appedix B

# Survey methods

### Collecting economic survey data

ABARES has undertaken economic surveys of selected Commonwealth fisheries since the early 1980s, and on a regular basis for particular fisheries since 1992. The current fisheries survey program involves surveying major Commonwealth fisheries every few years; or more frequently where the fishery is undergoing major changes and monitoring is particularly important. The aim is to develop a consistent time with scientific assessments of each fishery, is vital for assessing fisheries' economic performance.

Survey information is made publicly available so the performance of fisheries and the impact of management policies can be independently assessed.

### Sample design

ABARES surveys are designed and samples selected on the basis of information provided by AFMA. This information includes data on the volume of catch, fishing effort and boat characteristics.

Because it is not possible to survey all boats in a fishery, a representative sample of boats is selected. Where possible, boats are classified into subgroups based either on the fishing method used (longline, purse seine and trawl) or on the size of operations (typically, small, medium and large producers). A minimum number of representative boats from each subgroup are then targeted for the survey.

In practice, this sample is seldom fully realised. Non-response is relatively high across fishery surveys, reflecting the difficulty in contacting some operators and a reluctance of others to participate. This may bias the results; for example, if there is a significant difference between the profitability of respondents and non-respondents. Sample design and weighting systems have been developed that reduce the non-response effect, but care is still needed when interpreting survey information.

Between February and August, an ABARES officer visits the owner of each boat selected in the sample. The officer interviews the boat owner to obtain physical and financial details of the fishing business for the survey years. When necessary the skipper of the boat is also interviewed. Further information is subsequently obtained from accountants, selling agents and marketing organisations on the signed authority of the survey respondents.

The information obtained from various sources is reconciled to produce the most accurate description possible of the financial characteristics of each sample boat in the survey.

## Sample weighting

All population estimates presented in this report are calculated from the weighted survey data of sample boats. A weight is calculated for each boat in the sample based on how representative that boat is in the population. Sample weights are calculated such that the weights sum to the population of boats that the sample is representing, and the weighted sum of catch reported by the sample boats approximates as closely as possible the total catch for the fishery according to AFMA logbook data.

That is,

$$\sum w_i = P \text{ and } \sum w_i x_i = X$$

where:

$w_i$  is the weight for the  $i^{\text{th}}$  boat

$P$  is the number of boats in the population

$x_i$  is the catch for the  $i^{\text{th}}$  boat

$X$  is the total catch for the target population.

Technical details of the method of weighting used are given in Bardsley and Chambers (1984).

## Reliability of estimates

A relatively small number of boats out of the total number of boats in a particular fishery are surveyed. Estimates derived from these boats are likely to be different from those that would have been obtained if information had been collected from a census of all boats. How closely the survey results represent the population is influenced by the number of boats in the sample, the variability of boats in the population and, most importantly, the design of the survey and the estimation procedures used.

To give a guide to the reliability of the survey estimates, measures of sampling variation have been calculated. These measures, expressed as percentages of the survey estimates and termed relative standard errors, are given next to each estimate in parentheses. In general the smaller the relative standard error, the more reliable the estimate.

## Use of relative standard errors

Relative standard errors can be used to calculate 'confidence intervals' for the survey estimate. First, calculate the standard error by multiplying the relative standard error by the survey estimate and dividing by 100. For example, if average total cash receipts are estimated to be \$100 000 with a relative standard error of 6 per cent, the standard error for this estimate is \$6000.

There is roughly a two-in-three chance that the 'census value' (the value that would have been obtained if all boats in the target population had been surveyed) is within one standard error of the survey estimate. There is roughly a 19-in-20 chance that the census value is within two standard errors of the survey estimates. Thus, in this example, there is approximately a two-in-three chance that the census value is between \$94 000 and \$106 000, and approximately a 19-in-20 chance that the census value is between \$88 000 and \$112 000.

## Comparing estimates

When comparing estimates across groups or years, it is important to recognise that the differences are also subject to sampling error. As a rule of thumb, a conservative estimate of the standard error of the difference can be constructed by adding the squares of the estimated standard errors of the component estimates and then taking the square root of the result.

For example, suppose the estimates of total cash receipts were \$100 000 in one year and \$125 000 in the previous year—a difference of \$25 000—and the relative standard error is given as 6 per cent for each estimate. The standard error of the difference can be estimated as:

$$\sqrt{(0.06 \times \$100\,000)^2 + (0.06 \times \$125\,000)^2} = \$9605$$

The relative standard error of the difference is:

$$(\$9605/\$25\,000) \times 100 = 38\%$$

There may be changes in the population of a fishery from one year to the next. If these population changes are substantial, differences in estimates may be caused more by the changes in population than by changes in the variables themselves.

## Non-sampling errors

The values obtained in a survey may be affected by errors other than those directly related to the sampling procedure. For example, it may not be possible to obtain information from certain respondents, respondents may provide inaccurate information or respondents may differ from non-respondents for a particular variable being surveyed.

In conducting surveys, ABARES draws on a depth of experience. Survey staff are generally very experienced and undergo rigorous pre-survey training, aimed at minimising non-sampling errors. However, when drawing inferences from estimates derived from sample surveys, users should bear in mind that both sampling and non-sampling errors occur.



## Appendix C

# Non-survey based estimation of net economic returns

ABARES has developed a non-survey based method of estimating net economic returns for financial years where survey data are not yet available. It allows more timely estimation and reporting of net economic return estimates that can better inform both industry and government decision-making. This method is intended to complement collection of data and publication of results normally undertaken through the fisheries surveys.

### Method

The method used to calculate non-survey based estimates of net economic returns for a non-survey year (that is, a year for which no survey data are available) is similar to that used by Wood et al. (2008). Following this general method, regressions are estimated for each component of net economic return. Regression approaches use the most relevant variables for each fishery, given the unique fishing methods and other characteristics. In all cases, each component is estimated based on an assumed sample of the population and a set of corresponding assumed weights. This assumed sample represents those boats that are expected to be sampled for 2011–12 in the next survey.

Details of the estimation process unique to calculating 2011–12 estimates for the fisheries in this report are detailed below. Where relevant, summary statistics related to these estimations are also provided. In each case, a large number of variables were tested until a preferred functional form was found.

### Reliability of estimates

The estimates using this method are the subject of significant uncertainty. First, relationships estimated between surveyed values of receipts and costs and more readily available data relies on the historical sample of boats surveyed. Therefore, if boats are consistently not included in a sample, there is the potential that they may be underrepresented in the estimates.

There is also uncertainty surrounding the validity of historical relationships to hold in the most recent year. There is potential for a number of operating conditions in the fishery to change, resulting in changes in receipts and costs not foreseeable using this method.

Estimates should be used as an indication of the likely direction and magnitude of changes in net economic return. For each receipt and cost category, the coefficient of determination ( $R^2$ ) gives an indication of the extent to which the explanatory variables can explain variation in the dependent variable. Lower coefficients of determination suggest a greater level of uncertainty surrounding the estimates.

### Cash receipts

GVP has a close relationship with cash receipts, which is used to calculate net economic returns in a non-survey year. Preliminary estimates of GVP were made using average price data and boat-level catch data.

Variables tested for each fishery include:

- preliminary GVP
- time trend.

### Operating costs

Accurately calculating operating costs for a non-survey year depends on obtaining preliminary estimates of three key expenses: fuel, labour, and repairs and maintenance. These three cost items on average account for between 75 per cent and 80 per cent of an operator's total operating costs. In addition, preliminary estimates were made for other materials and other service costs; however, these estimates are generally less reliable because of the weak relationship between these cost categories and known variables.

### Fuel

Estimating fuel expenditure in a non-survey year requires information on fuel consumption and the price at which the fuel was purchased.

Variables tested for each fishery include:

- estimated travel distance (based on logbook and unloading position data)
- estimated fishing distance (for example, trawl distance)
- fuel price
- effort
- gear type.

### Labour

In most fisheries, the skipper and the crew are paid a share of the boat's fishing revenues. Therefore, a proxy for revenue is frequently the most informative available indicator of labour costs.

Variable tested for each fishery include:

- preliminary GVP
- effort.

The value of owner and family labour was estimated based on historical shares of owner and family participation in the industry.

## Repairs and maintenance

Boat operators generally address repairs and maintenance as needed. Significant repairs or major overhauls are unlikely to be done annually; therefore at the boat level, this expense item can be expected to vary considerably from year to year. This increases the uncertainty surrounding estimates of this cost category.

Variables tested for each fishery include:

- total catch volume
- effort
- estimated travel distance (based on logbook and unloading position data)
- catch composition.

## Other material costs

Other material costs are for items such as bait, ice, electricity and packing materials.

Variables tested for each fishery:

- total catch volume
- estimated travel distance (based on logbook and unloading position data)
- estimated fishing distance (for example, trawl distance).

Significant uncertainty surrounds these estimates for most fisheries because of the weak relationship between this cost category and known variables.

## Other service costs

Other service costs include items such as freight, marketing and packing charges, but exclude interest, leasing and management fees.

Variables tested for each fishery:

- preliminary GVP
- total catch volume
- effort
- time trend.

Significant uncertainty surrounds these estimates for most fisheries because of the weak relationship between this cost category and known variables.

## Interest, leasing and management fees

Interest and leasing fees represent a redistribution of profits to investors in the fishery. As such, they are not costs at the fishery level and are removed from calculation of net economic returns. They are estimated on a boat level based on historical values.

Management fees for the purpose of NER estimation are taken from AFMA (recovered and non-recovered) and include all the costs involved with managing the fishery, not just those recovered from industry. These are also removed from calculation of net economic returns so total management costs (recovered management fees and non-recovered management costs) can be deducted.

## Opportunity cost of capital and depreciation

Capital values, the opportunity cost of capital and depreciation expenses were estimated for each boat in the assumed sample for each fishery, assuming a depreciation rate equal to that in the most recent survey year and a capital upgrade rate (an assumed capital investment amount). All boat-level estimates were then weighted up to a total estimate for the fishery using weights calculated for individual boats in the 2011–12 assumed sample.

## Management costs

Total management costs (recovered and non-recovered) for 2011–12 were based on AFMA's budgeted estimates.

## Regression results

Relationships were estimated using survey and supplementary data up to and including 2010–11. The estimated relationships were used to extrapolate to 2011–12 given known or assumed values of the relevant explanatory variables for 2011–12. All monetary values are in 2011–12 dollars.

**TABLE 13** Eastern Tuna and Billfish Fishery revenue

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	-39 210 000	9 619 000	-4.08	0.00	***
GVP	1.24	0.05	27.24	0.00	***
Year	19 610	4 794	4.09	0.00	***
Boat dummy 1	-184 200	88 040	-2.09	0.04	*
Boat dummy 2	433 400	68 510	6.33	0.00	***
Boat dummy 3	404 700	68 960	5.87	0.00	***
Boat dummy 4	359 400	111 700	3.22	0.00	**
R <sup>2</sup>	0.82	-	-	-	-
F p-value	0.00	-	-	-	-

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 14** Eastern Tuna and Billfish Fishery fuel

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	558.10	96.58	5.78	0.00	***
Shots	0.0030	0.0009	3.31	0.00	**
Shot distance	0.0548	0.0301	1.82	0.07	.
Travel distance	0.0038	0.0018	2.12	0.04	*
Boat dummy 1	1 573.00	262.00	6.00	0.00	***
Boat dummy 2	1 101.00	337.50	3.26	0.00	**
R <sup>2</sup>	0.67	-	-	-	-
F p-value	0.00	-	-	-	-

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 15** Eastern Tuna and Billfish Fishery labour

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	65 210	9 098	7.17	0.00	***
GVP	0.29	0.01	21.18	0.00	***
Boat dummy 1	287 200	48 570	5.91	0.00	***
R <sup>2</sup>	0.66	–	–	–	–
F p-value	0.00	–	–	–	–

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 16** Eastern Tuna and Billfish Fishery repairs and maintenance

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	33 290	5 307	6.27	0.00	***
Catch volume	0.32	0.07	4.32	0.00	***
Travel distance	0.44	0.12	3.56	0.00	***
Boat dummy 1	136 700	23 490	5.82	0.00	***
Boat dummy 2	41 200	13 750	3.00	0.00	**
R <sup>2</sup>	0.48	–	–	–	–
F p-value	0.00	–	–	–	–

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 17** Eastern Tuna and Billfish Fishery other materials

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	-14 239	9 495	-1.50	0.13	^
Shot distance	20.89	1.65	12.63	0.00	***
Boat dummy 1	100 525	21 342	4.71	0.00	***
Boat dummy 2	88 169	21 505	4.10	0.00	***
Boat dummy 3	82 438	21 462	3.84	0.00	***
Boat dummy 4	128 131	29 513	4.34	0.00	***
R <sup>2</sup>	0.55	–	–	–	–
F p-value	0.00	–	–	–	–

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 18** Eastern Tuna and Billfish Fishery other services

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	-34 980 000	4 032 000	-8.68	0.00	***
Year	17 480	2 011	8.69	0.00	***
Catch volume	1.17	0.11	11.12	0.00	***
Boat dummy 1	138 000	32 750	4.21	0.00	***
Boat dummy 2	123 300	27 820	4.43	0.00	***
Boat dummy 3	180 600	46 760	3.86	0.00	***
Boat dummy 4	223 700	60 800	3.68	0.00	***
Boat dummy 5	98 890	35 640	2.77	0.01	**
Boat dummy 6	103 600	28 030	3.70	0.00	***
R <sup>2</sup>	0.66	-	-	-	-
F p-value	0.00	-	-	-	-

Note: Significance codes: 0, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 19** Commonwealth Trawl Sector revenue

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	-42 330	23 900	-1.77	0.08	***
GVP	1.19	0.04	27.32	0	***
Boat dummy	444 700	72 110	6.17	0	*
Trawl hours	188.5	17.6	10.71	0	***
R <sup>2</sup>	0.91	-	-	-	-
F p-value	0.00	-	-	-	-

Note: Significance codes: 0, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 20** Commonwealth Trawl Sector fuel

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	143.10	36.99	3.87	0.00	***
Travel distance	0.0154	0.0013	11.50	0.00	***
Boat dummy 1	1 530.00	156.40	9.79	0.00	***
Boat dummy 2	773.40	109.80	7.04	0.00	***
R <sup>2</sup>	0.85	-	-	-	-
F p-value	0.00	-	-	-	-

Note: Significance codes: 0, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 21** Commonwealth Trawl Sector labour

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	-18 920	14 420	-1.31	0.19	^
GVP	0.30	0.02167	13.887	0.00	***
Trawl hours	77.25	9.935	7.78	0.00	***
Method dummy	77 450	16 660	4.65	0.00	***
Boat dummy	394 900	88 430	4.47	0.00	***
R <sup>2</sup>	0.74	-	-	-	-
F p-value	0.00	-	-	-	-

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 22** Commonwealth Trawl Sector repairs and maintenance

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	28 380	7 709	3.68	0.00	***
GVP	0.11	0.01322	8.09	0.00	***
Method dummy	-40 140	9 571	-4.19	0.00	***
Species dummy	181 200	56 830	3.19	0.00	**
Boat dummy	769 600	59 740	12.88	0.00	***
Boat dummy	116 100	21 900	5.30	0.00	***
Boat dummy	393 600	58 410	6.74	0.00	***
R <sup>2</sup>	0.71	-	-	-	-
F p-value	0.00	-	-	-	-

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 23** Commonwealth Trawl Sector other material

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	2 915	2 760	1.06	0.29	^
Total catch	0.11	0.018	6.06	0.00	***
Catch size					
dummy	-20 420	5 735	-3.56	0.00	***
R <sup>2</sup>	0.39	-	-	-	-
F p-value	0.00	-	-	-	-

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 24** Commonwealth Trawl Sector other services

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	-17 500	11 170	-1.57	0.12	^
GVP	0.3356	0.02	15.60	0.00	***
Trawl hours	90.08	8.16	11.03	0.00	***
Boat dummy	145 600	32 450	4.49	0.00	***
R <sup>2</sup>	0.81	-	-	-	-
F p-value	0.00	-	-	-	-

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 25** Gillnet, Hook and Trap Sector revenue

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	65 860	8 790	7.49	0.00	***
GVP	1.06	0.03	40.87	0.00	***
Boat dummy 1	296 000	85 640	3.46	0.00	***
Boat dummy 2	212 100	36 560	5.80	0.00	***
R <sup>2</sup>	0.96	-	-	-	-
F p-value	0.00	-	-	-	-

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 26** Gillnet, Hook and Trap Sector labour

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	42 590	4 180	10.19	0.00	***
GVP	0.28	0.01	30.56	0.00	***
Boat dummy 1	202 100	32 030	6.31	0.00	***
Boat dummy 2	102 600	17 400	5.90	0.00	***
R <sup>2</sup>	0.86	-	-	-	-
F p-value	0.00	-	-	-	-

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.



**TABLE 27** Gillnet, Hook and Trap Sector repairs and maintenance

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	7 176	2 669	2.69	0.01	**
GVP	0.08	0.01	5.27	0.00	***
Gillnet shots	0.01	0.00	2.61	0.01	**
Auto-longline shots	0.05	0.01	3.74	0.00	***
Boat dummy 1	66 730	9 265	7.20	0.00	***
Boat dummy 2	58 330	14 120	4.13	0.00	***
R <sup>2</sup>	0.84	–	–	–	–
F p-value	0.00	–	–	–	–

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 28** Gillnet, Hook and Trap Sector other material

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	-3 997	1 582	-2.53	0.012382	*
Catch volume	0.50	0.03	19.88	0.00	***
Boat dummy 1	42 250	8 417	5.02	0.00	***
Boat dummy 2	-22 890	6 637	-3.45	0.00	***
R <sup>2</sup>	0.78	–	–	–	–
F p-value	0.00	–	–	–	–

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

**TABLE 29** Gillnet, Hook and Trap Sector other services

Category	Estimate	Std. error	t value	Pr(> t )	Significance
Intercept	-6 630 000	3 098 000	-2.14	0.03	*
GVP	0.47	0.01	33.17	0.00	***
Year	3 314	1 544	2.15	0.03	*
Boat dummy 1	-172 400	22 720	-7.59	0.00	***
Boat dummy 2	-243 800	29 650	-8.22	0.00	***
Boat dummy 3	-166 500	42 750	-3.90	0.00	***
R <sup>2</sup>	0.88	–	–	–	–
F p-value	0.00	–	–	–	–

Note: Significance codes: o, \*\*\* = 0.001, \*\* = 0.01, \* = 0.05, . = 0.1, ^ = 1.

## Appendix D

# Previous fisheries surveys reports

### **Northern Prawn Fishery**

#### **1980–81 to 1981–82**

BAE 1984, Northern Prawn Fishery Survey 1980–81 and 1981–92, Bureau of Agricultural Economics, Canberra.

#### **1986–87 to 1987–88**

Collins, D & Kloessing, K 1988, 'Financial performance in the Northern Prawn Fishery—latest survey by ABARE', Australian Fisheries, vol. 47, no. 12, pp. 38–44.

#### **1989–90 to 1990–91**

ABARE 1993, Fisheries Surveys Report 1992, Australian Bureau of Agricultural and Resource Economics, Canberra.

#### **1990–91 to 1991–92**

ABARE 1993, Fisheries Surveys Report 1993, Australian Bureau of Agricultural and Resource Economics, Canberra.

#### **1992–93 to 1993–94**

ABARE 1996, Australian Fisheries Surveys Report 1995, Australian Bureau of Agricultural and Resource Economics, Canberra.

#### **1994–95 to 1995–96**

Brown, D 1997, Australian Fisheries Surveys Report 1997, Australian Bureau of Agricultural and Resource Economics, Canberra.

#### **1996–97 to 1997–98**

ABARE 2000, Australian Fisheries Surveys Report 1999, Australian Bureau of Agricultural and Resource Economics, Canberra.

#### **1998–99 to 1999–2000**

ABARE 2002, Australian Fisheries Surveys Report 2001, Australian Bureau of Agricultural and Resource Economics, Canberra.

#### **2000–01 to 2001–02**

ABARE 2004, Australian Fisheries Surveys Report 2003, Australian Bureau of Agricultural and Resource Economics, Canberra.

**2002–03 to 2003–04**

ABARE 2006, Australian Fisheries Surveys Report 2005, Australian Bureau of Agricultural and Resource Economics, Canberra

**2004–05 to 2005–06**

ABARE 2007, Australian Fisheries Surveys Report 2007, Australian Bureau of Agricultural and Resource Economics, Canberra

**2006–07 to 2007–08**

ABARE 2007, Australian Fisheries Surveys Report 2007, Australian Bureau of Agricultural and Resource Economics, Canberra

**2008–09 to 2010–11**

ABARES 2012, Australian fisheries surveys report 2011, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra.

## **East Coast Prawn Fishery**

**1980–81 to 1982–83**

BAE 1985, 'BAE report on South-Eastern Prawn Fishery', Australian Fisheries, vol. 44, no. 1, pp. 36–7.

## **Eastern Tuna and Billfish Fishery**

(Formerly the East Coast Tuna Fishery)

**1989–90 to 1990–91**

ABARE 1993, Fisheries Surveys Report 1992, Australian Bureau of Agricultural and Resource Economics, Canberra.

**1991–92 to 1992–93**

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**1993–94 to 1994–95**

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**1997–98 to 1998–99**

ABARE 2001, Australian Fisheries Surveys Report 2000, Australian Bureau of Agricultural and Resource Economics, Canberra.

**1999–2000 to 2000–01**

ABARE 2003, Australian Fisheries Surveys Report 2002, Australian Bureau of Agricultural and Resource Economics, Canberra.

**2001–02 to 2002–03**

ABARE 2005, Australian Fisheries Surveys Report 2004, Australian Bureau of Agricultural and Resource Economics, Canberra.

**2003–04 to 2004–05**

ABARE 2007, Australian Fisheries Surveys Report 2006, Australian Bureau of Agricultural and Resource Economics, Canberra.

**2005–06 to 2006–07**

ABARE 2007, Australian Fisheries Surveys Report 2008, Australian Bureau of Agricultural and Resource Economics, Canberra.

**2007–08 to 2008–09**

ABARES 2010, Australian Fisheries Surveys Report 2010, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra.

## **Gillnet, Hook and Trap Sector**

(Formerly the South East Non-Trawl Fishery and the Southern Shark Fishery)

**1988–89**

Battaglione, T & Campbell, D 1991, 'Economic survey of the southern shark fishery', Australian Fisheries, vol. 50, no. 5, pp. 12–15.

**1990–91 to 1991–92**

ABARE 1993, Fisheries Surveys Report 1993, Australian Bureau of Agricultural and Resource Economics, Canberra.

**1992–93 to 1993–94**

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**1999–2000 to 2000–01**

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**2001–2002 to 2002–03**

ABARE 2005, Australian Fisheries Surveys Report 2004, Australian Bureau of Agricultural and Resource Economics, Canberra

**2003–04 to 2004–05**

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**2005–06 to 2006–07**

ABARE 2008, Australian Fisheries Surveys Report 2008, Australian Bureau of Agricultural and Resource Economics, Canberra.

**2007–08 to 2008–09**

ABARES 2010, Australian Fisheries Surveys Report 2010, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra.

## Southern Rock Lobster Fishery

### 1981–82 to 1982–83

BAE 1985, Southern Rock Lobster Fishery Survey, 1981–82 and 1982–83, Bureau of Agricultural Economics, Canberra.

## Bass Strait Central Zone Scallop Fishery

(Formerly the Bass Strait Scallop Fishery)

### 1995–96 to 1996–97

ABARE 1998, Australian Fisheries Surveys Report 1998, Australian Bureau of Agricultural and Resource Economics, Canberra.

### 1997–98 to 1998–99

ABARE 2001, Australian Fisheries Surveys Report 2000, Australian Bureau of Agricultural and Resource Economics, Canberra.

### 2008–09 to 2010–11

ABARES 2012, Australian fisheries surveys report 2011, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra.

## Commonwealth Trawl

(Formerly the South East Trawl Fishery)

### 1978–79 to 1980–81

BAE 1984, Southern Trawl Fishery Survey, 1978–79 and 1980–81, Bureau of Agricultural Economics, Canberra.

### 1985–86 to 1987–88

Geen, G, Brown, D & Pascoe, S 1989, 'ABARE survey of the South East Trawl Fishery', Australian Fisheries, vol. 48, no. 10, pp. 45–7.

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### 1990–91 to 1991–92

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## **Southern Bluefin Tuna Fishery**

**1980–81 to 1981–82**

BAE 1986, Southern Bluefin Tuna Survey, 1980–82, Bureau of Agricultural Economics, Canberra.

## **Southern Squid Jig Fishery**

**1997–98 to 1998–99**

ABARE 2001, Australian Fisheries Surveys Report 2000, Australian Bureau of Agricultural and Resource Economics, Canberra.

**1999–2000 to 2000–01**

ABARE 2003, Australian Fisheries Surveys Report 2002, Australian Bureau of Agricultural and Resource Economics, Canberra.

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**1989–90**

Battaglione, T, Reid, C & Collins, P 1992, 'An economic survey of the Torres Strait Prawn Fishery', Australian Fisheries, vol. 50, no. 7, pp. 28–31.

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ABARE 2002, Australian Fisheries Surveys Report 2001, Australian Bureau of Agricultural and Resource Economics, Canberra.

**2000–01 to 2001–02**

ABARE 2004, Australian Fisheries Surveys Report 2003, Australian Bureau of Agricultural and Resource Economics, Canberra.

**2002–03 to 2003–04**

ABARE 2006, Australian Fisheries Surveys Report 2005, Australian Bureau of Agricultural and Resource Economics, Canberra.

**2004–05 to 2005–06**

ABARE 2007, Australian Fisheries Surveys Report 2007, Australian Bureau of Agricultural and Resource Economics, Canberra.

**2006–07 to 2007–08**

ABARE 2009, Australian Fisheries Surveys Report 2009, Australian Bureau of Agricultural and Resource Economics, Canberra.

**Western Tuna and Billfish Fishery**

(Formerly the Southern and Western Tuna and Billfish Fishery)

**2001–02**

ABARE 2004, Australian Fisheries Surveys Report 2003, Australian Bureau of Agricultural and Resource Economics, Canberra.

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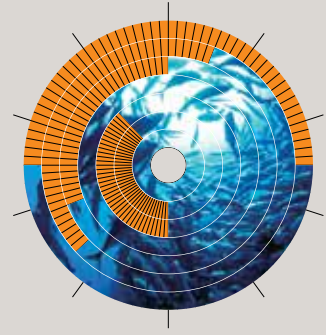
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