

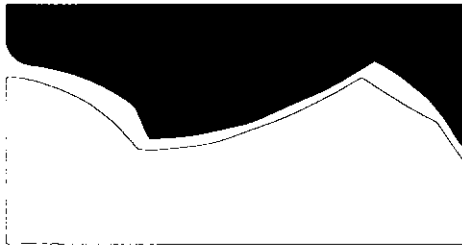
# FISHERIES

SURVEYS REPORT



**E**  
ABARE

1993



# FISHERIES

SURVEYS REPORT

*1993*

Physical and financial  
performance of  
Australian fisheries  
1990-91 to 1992-93

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# Foreword

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This report contains detailed estimates of the physical and financial performance of operators in the fisheries surveyed by ABARE in 1993. The report was produced by the Fisheries Economics and Surveys Sections of ABARE.

In this issue, information is included on the northern prawn and south east fisheries for the financial years 1990-91, 1991-92 and 1992-93 and for the southern shark fishery for the financial years

1990-91 and 1991-92. The estimates are presented, as far as possible, in a consistent format to facilitate comparisons within and between industries.

BRIAN FISHER  
*Executive Director, ABARE*

December 1993

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# Acknowledgments

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## Industry

ABARE relies heavily on the voluntary cooperation of fishing operators and their accountants for providing data for its fisheries surveys. Without this assistance the surveys would not be possible. The assistance of industry representatives in providing advice is also greatly appreciated.

## Management and research agencies

The Australian Fisheries Management Authority provided the logbook information necessary to select a sample and provide relevant population statistics. In particular, Mark Simpson, Vinnie Nguyen, Steve Bolton and Trish Stone provided valuable assistance. The Australian Fisheries Management Authority was supportive of the data collection and offered invaluable advice.

The Marine Science Laboratory, Victorian Department of Conservation and Environment provided catch information used for weighting the southern shark fishery survey data and producing the map of catch value. Lauren Brown and Terry Walker, in particular, provided valuable assistance.

## Funding

The 1992-93 data collection on the northern prawn, south east and southern shark fisheries was funded by the Fisheries Resources Research Fund.

## ABARE staff

The production of the survey information presented in this report was a cooperative effort between the Fisheries Economics Section, the Surveys Section and the Statistical and Mathematical Research Section of ABARE. The report was compiled by Tony Battaglione, Sean Pascoe and Michael Stephens of the Fisheries Economics Section and Laurie Cannon and Don Barker of the Surveys Section. The analyses were undertaken by Michael Stephens (northern prawn fishery), Sean Pascoe (south east fishery) and Tony Battaglione (southern shark fishery) of the Fisheries Economics Section. The maps were produced by Jane Wright of the Statistical and Mathematical Research Section.

Sample selection and sample weighting were performed with the assistance of Milly Lubulwa and John Grivas of the Statistical and Mathematical Research Section. Data were collected, entered and edited by Peter Beath, Ian Milthorpe, Ron Godenzi, Peter Hibberson, Damo Nambiar, Paul Phillips, Don Barker and Laurie Cannon of the Surveys Section, and Michael Stephens, Trevor Dann, Andrew Lancaster, Peter Collins and Patrick Power of the Fisheries Economics Section. The survey questionnaire was designed by Laurie Cannon, Paul Phillips, Don Barker, Damo Nambiar, Michael Stephens and Sean Pascoe.

Programming and computer systems support was provided by Carol Keil and Ken Colbert of the Information Technology Section.

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# Summary

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In 1993, ABARE conducted economic surveys of three major Commonwealth fisheries — the northern prawn fishery, the south east fishery and the southern shark fishery.

In the surveys, information was collected on the costs and receipts from commercial operators in each of these fisheries for the 1991-92 financial year. For the southern shark fishery, information relating to the 1990-91 financial year was also collected. Information relating to the 1990-91 financial year for the northern prawn and south east fisheries was collected in a similar survey conducted in 1992. Projections were made for the costs and receipts in 1992-93 for the northern prawn and south east fisheries based on changes in catch, prices and effort levels.

## Northern prawn fishery

In the northern prawn fishery, variability in environmental conditions and consequent variability in prawn stocks resulted in fluctuations in financial performance in recent years. The relatively poor banana prawn season in the first half of 1992 resulted in fishing receipts declining in 1991-92 compared with the previous year. As a result, total cash receipts for northern prawn fishery boats fell, on average, by about 12 per cent between 1990-91 and 1991-92. For the fleet as a whole, average effort per boat in the fishery declined by around 20 per cent between 1990-91 and 1991-92.

Improved prices for prawns on the Japanese market and higher banana prawn catches are expected to have resulted in higher fishing receipts in 1992-93. Higher

crew and fuel costs as a result of the increased catch and effort are estimated to have resulted in higher average total cash costs in 1992-93. Overall, average boat cash income and boat profit are estimated to have increased in 1992-93.

## South east fishery

In the south east fishery, catches are allocated to operators through individual transferable quotas. Reductions in the total allowable catch (and hence individual catches) for several key species in 1991-92 were largely offset by increases in price. As a result, average cash receipts fell only marginally between 1990-91 and 1991-92. Lower fuel prices and interest rates, coupled with a fall in the amount of time spent fishing, resulted in lower total cash costs in 1991-92 than in the previous year. As a consequence, average boat profits were estimated to have doubled between 1990-91 and 1991-92.

Further declines in allowable catches for orange roughy, gemfish and redfish in 1992-93 are expected to have resulted in lower fishing receipts for inshore and offshore boats. Poor whiting prices due to weak demand on the Japanese market are likely to have resulted in lower fishing receipts for danish seiners in 1992-93 than in 1991-92.

Increases in the quantity of orange roughy quota leased in 1992-93 is expected to have resulted in a substantial reduction in boat cash income for offshore boats. As a result, boat profit is estimated to have been 43 per cent lower on average in 1992-93 than in 1991-92 but still higher than in 1990-91.



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## Southern shark fishery

The southern shark fishery is managed under a limited entry scheme with restrictions on the length of gillnet each operator can deploy. In 1988, operators were allocated a certain number of units related to the number of nets they could use. There are three categories of unit holders in the fishery — operators with ten net units, operators with six net units and operators with five or less net units.

In 1991, reductions in the number of nets that could be used in association with the number of units held were introduced. These reductions have had varying effects on the financial performance of the different boat groups within the fishery.

For the fleet as a whole, shark catches fell by around 2 per cent between 1990-91 and 1991-92. Operators with less than six net units showed a 30 per cent fall in catches, while operators with six net units increased

catches by around 6 per cent. For operators with ten net units, catches remained fairly constant. Effort for all groups also fell because of the reduction in quantity of net per operator.

Total cash receipts rose, on average, by 19 per cent between 1990-91 and 1991-92. The increase in total receipts reflected in part an increase in shark prices, but also increases in receipts from other fishing operations such as rock lobster and scallops. Reductions in fuel prices and lower interest rates contributed to lower costs. As a result of the higher revenues and lower costs, average boat profits more than doubled between 1990-91 and 1991-92.

For many boats with less than six net units, profits from lobster and other non-shark activities made up most of the fishing receipts. Profitability was generally lower for boats that did not have endorsements to operate in other fisheries.

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# ABARE fisheries surveys

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ABARE has conducted economic surveys of selected Australian fisheries on an ad hoc basis since the early 1980s. In 1992, ABARE commenced a new program of surveys designed to assess the financial and economic performance of a number of key Commonwealth fisheries. In particular, the surveys are intended to track changes over time in the economic performance of fisheries undergoing changes in management. The information collected in the surveys can be used by industry and managers in assessing the effectiveness of various management policies in improving the economic performance of these fisheries.

In 1993, surveys were undertaken on:

- the northern prawn fishery
- the south east fishery
- the southern shark fishery.

The northern prawn and south east fishery are both undergoing substantial restructuring, and were previously surveyed in 1992. That survey covered the 1989-90 and 1990-91 financial years. The 1993 survey covered the 1991-92 financial year. The southern shark fishery was previously surveyed by ABARE in 1990, covering the 1988-89 financial year. Following significant management changes in 1991, it was considered appropriate to survey the fishery again in 1993. This survey covered the 1990-91 and 1991-92 financial years.

A sample of boats was selected based on logbook and boat registry information collected from all licensed fishing operations in Commonwealth fisheries, and supplied by the Australian Fisheries Management Authority. This information was used to select a representative sample

of boats in each fishery stratified by type of operation, boat size and catch.

Between March and June 1993, the owner of each sample boat selected was visited by an ABARE officer. The officer interviewed the boat owner to obtain physical and financial details of the fishing business for the survey years. In a number of instances, the skipper of the boat was also interviewed. Further information was subsequently obtained from accountants, selling agents and marketing organisations, on the signed authority of the respondents. For the northern prawn and south east fisheries, recent market information and input price indexes were used to estimate expected receipts and costs for 1992-93.

Considerable effort has been made to reconcile the information obtained from the various sources and to produce the most accurate description possible of the physical and financial characteristics of each sample boat in the survey. The data presented in this report constitute only a small proportion of the total amount of detailed data collected.

## The survey estimates

These surveys provide a broad range of information on the physical characteristics and financial performance of boats that operated in these fisheries. The information gained is summarised in this report.

Survey estimates for 1990-91 have changed from those reported in the *Fisheries Survey Report 1992* as a result of the incorporation of new information. Projections for 1991-92 reported in the 1992

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report have been replaced by estimates from the latest survey. The 1990-91 and 1991-92 estimates presented in this report are not expected to change as all the data from sampled operators, their accountants and marketing agents relating to these years have now been fully reconciled.

The 1992-93 figures are preliminary estimates. Recent market and catch information and input price indexes were used to estimate expected receipts and costs for 1992-93. These estimates may be changed in the future as more information becomes available.

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# Definitions of items and reliability of estimates

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The following are definitions and explanations of the main boat characteristics and financial items reported.

## Boat characteristics

Physical information was taken from both the logbook information and the survey interviews. The information is presented for both the sample and the population.

**Boat size** is expressed in management units for the northern prawn and south east fishery boats. These units are the sum of underdeck volume in cubic metres and engine power in kilowatts. For the southern shark fishery, management units have not been historically based on boat size, so boat size is not reported for this fishery.

**Effort** is measured in hours for the northern prawn and south east fishery boats. For northern prawn boats this includes both search time and trawl time. For south east fishery boats, only trawl time is included. For the southern shark boats, effort is expressed in thousands of kilometre net lifts. This is the number of nets multiplied by the length of each net and the number of times the nets were in the water.

**Catch** is expressed in kilograms. The catch information reported in the boat characteristic tables applies only to the fishery surveyed. For example, the catch for the northern prawn boats excludes catch taken in Torres Strait or other prawn fisheries for which the boat may be endorsed. The south east fishery catch excludes catch recorded as taken in state waters. The southern shark catch excludes

any catch taken in other fisheries, such as the south east fishery or the rock lobster fisheries. However, these other catches are included for the purpose of estimating boat fishing receipts.

## Financial items

The boat **capital** value shown is the total gross value of capital items, including the value of the hull, engine and other on-board capital, but excluding the value of the licence. Boat operators were asked to provide estimates of the capital invested in boats and fishing gear. The boats are treated as if wholly owned by the proprietors. This procedure is adopted so that the financial performance of all sample boats can be compared, regardless of the proprietors' equity in the business.

Estimates of boat value including licence were also collected from boat operators but are not used as high variability in individual assessments made these estimates of doubtful reliability.

**Total cash receipts** are the cash inflows to the boat during the financial year from the sale of fish, non-fishing receipts (which include non-fishing use of the boat, such as charter operations) and other sources (insurance claims and compensation, government assistance and any other revenue).

Receipts shown from the sale of fish are prior to any deductions made by marketing authorities for freight and selling charges. Where appropriate these charges are included in costs. Receipts include amounts received in the survey year for fish harvested and delivered in previous years.

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**Total cash costs** include the payments made for both permanent and casual hired labour and for materials and services (including payments on capital items subject to leasing, rent, interest, licence fees and, for the northern prawn fishery, aerial spotting). Labour costs also include an imputed payment to owner operators at rates comparable with their employed counterparts in the fishery. Capital and household expenditures are excluded.

**Boat cash income** is defined as the difference between total cash receipts and total cash costs. Boat cash income is one measure of the boat owner's capacity to continue operating in a fishery in the short term — that is, over a period during which the fishing boat does not need to be replaced. Operators can withstand a negative return on investment and depreciation over such a period as long as they receive sufficient return to meet all of the cash costs incurred.

**Depreciation** figures were obtained from the financial accounts of survey respondents. Depreciation is a non-cash cost representing the cost of wear and tear on capital items during the survey year.

**Boat profit** is defined as boat cash income less depreciation.

**Profit at full equity** is measured as boat profit, plus rent, interest and finance lease payments. It is the return produced by the resources used in the fishing business, and is the profit from fishing that would accrue to the owners if they owned 100 per cent of the assets employed in the business.

To stay in a fishery over the longer term, operators need to meet all costs including depreciation of capital plus a return on the original investment equivalent to that which could have been earned elsewhere. Profit at full equity therefore provides a measure of the capacity of operators to stay in the fishery in the longer term.

**Rates of return** (to boat capital) are computed by expressing profit at full equity as a percentage of total capital (excluding licence value).

## Target populations

Population information for the surveyed fisheries was obtained from logbooks and boat registry data supplied by the Australian Fisheries Management Authority. Fishery management plans are usually based on a calendar year so the fleet structure may change in the middle of the financial year. As a result the target populations included only those boats that operated in the fishery in both the first and second halves of the financial year.

In the northern prawn fishery, buyback programs and a compulsory surrender of units resulted in fewer boats in the second half of the financial year for each of the survey years covered in this report. Boats that fished only in the first half of the financial year were excluded from the target population.

In the south east fishery, the introduction of individual transferable quotas to the trawl and danish seine sectors in 1992 also resulted in a change in the fleet composition during 1991-92. As some boats only operated part time in the south east fishery, only boats holding quota that caught more than 10 tonnes and fished in both the first and second halves of the year were included in the target population.

In the southern shark fishery, only boats with a Commonwealth shark gillnet endorsement that caught shark (any quantity) were included in the target population for the fishery.

## Sample weighting

Because the sample sizes for each sector of a fishery are not necessarily proportional to the actual population sizes of the sectors, the estimates presented in this report are all calculated by appropriately weighting the data collected from each sample boat. The sample weights are derived by comparing the total numbers of boats in the target populations, and total catches from the annual logbook data collected by the

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Australian Fisheries Management Authority and the Victorian Marine Science Laboratories, with the corresponding numbers and catch details of the boats in the various survey samples.

Different sample weights are used in the estimates for the different years, because of differences in population numbers and outputs, as well as in sample numbers and outputs, between years. Technical details of the method of weighting used are given in Bardsley and Chambers (1984).

## Sampling errors

Only a small proportion of the total number of boats in a particular fishery are sampled to produce the survey estimates. The differences between these estimates and the estimates that would have been obtained if information had been collected from all boats (the population or census values) are called sampling errors. The more boats there are in the sample, the smaller the sampling error is likely to be. So, for example, boat group estimates are likely to have greater sampling errors than fisherywide estimates.

As a guide to the reliability of the survey estimates, estimates of 'standard errors' have been calculated. These estimated errors, 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. Note, however, that because relative standard errors are expressed as percentages of the estimates, numerically small estimates tend to have large relative standard errors.

### Example of use of relative standard errors

To obtain the standard error from the relative standard error, multiply the relative standard error by the survey estimate and divide 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 a survey estimate is within one standard error of the value which would have been obtained if all boats in the target population had been surveyed (the census value). There is a nineteen in twenty chance that a survey estimate is within two standard errors of this census value.

Thus, in the above example, there is an approximately two in three chance that the census value is between \$94 000 and \$106 000, and an approximately nineteen in twenty chance that the census value lies between \$88 000 and \$112 000.

## Comparing estimates

Greater caution should be exercised when calculating estimates of change derived from the survey estimates than when using the estimates themselves.

When comparing estimates between years or between different industries it is important to recognise that the differences are also subject to sampling error. As a rough rule of thumb, a conservative estimate (that is, an overestimate) of the standard error of the difference can be constructed by adding the squares of the estimated standard errors (note: not of the relative standard errors) of the component estimates, and then taking the square root of the result.

For example, suppose that total cash receipts were \$100 000 in one year and \$125 000 in the next — a difference of \$25 000 — and that the relative standard errors are given as 6 per cent and 8 per cent respectively. The standard error of the difference can be estimated as:

$$\sqrt{[(0.06 \times \$100\,000)^2 + (0.08 \times \$125\,000)^2]} \\ = \$11\,662.$$

Hence, the *relative* standard error of the difference is:

$$(\$11\,662 / \$25\,000) \times 100 = 47 \text{ per cent.}$$

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When comparing estimates for change from year to year it should be noted that there may be changes in the industry populations from one year to the next. As mentioned in the discussion of target populations above, the fisheries surveyed have been subjected to considerable change in composition between years.

There may also be differences in data quality between the two estimates being compared: final estimates are more reliable than preliminary estimates because the final data have been cross-checked against a greater number of external data sources, lowering the probability of non-sampling errors (see below).

## Non-sampling errors

The values obtained in a survey are affected by errors other than those relating directly to the sampling procedure. For example, it might not be possible to contact certain boat owners; the respondent may provide inaccurate information; non-respondents may differ from respondents in a variable being surveyed; and mistakes may occur in the editing and processing of data.

ABARE's experience in conducting surveys has resulted in procedures designed to minimise non-sampling errors. However, when drawing inferences from estimates derived from sample surveys, users of survey data should bear in mind that non-sampling as well as sampling errors can occur.

## Mapping fishing performance

The northern prawn, south east and southern shark fishery operators all complete logbook information which

includes the latitude, longitude, fish species, date and catch weight for their fishing operations. Maps depicting the value of catch per unit sea area in 1991-92 were produced using this logbook information and market prices for each fish species.

A grid measuring fifteen minutes by fifteen minutes was used. In each grid area, the catch weight (if any) of each species was multiplied by the average price received for that species in the 1991-92 financial year to give the total value of fishing catch for each area.

By interpolation, contours were drawn for discrete values of fishing catch per unit area. The contour intervals are indicated on the maps by the five different colours. The intervals were chosen so that each includes approximately 20 per cent of the grid areas where fish were caught.

Fish were not caught in all grid areas. Interpolation is more accurate where there is a greater number of areas where fish were caught. The high value regions are therefore the most accurately mapped, since in these regions there are few if any unproductive grid areas. In areas where the fishing is sparse, such as areas near the outer boundary of the management region, the information provided by the maps should be taken to be indicative only of the total for that region.

The value of fish caught in each area changes through the year and from one year to the next. Seasonal effects such as water temperature and ocean currents influence the migration paths of various fish species. Because only catch information for 1991-92 as a whole was used, the maps do not reveal seasonal variation.

# Survey results for the northern prawn fishery

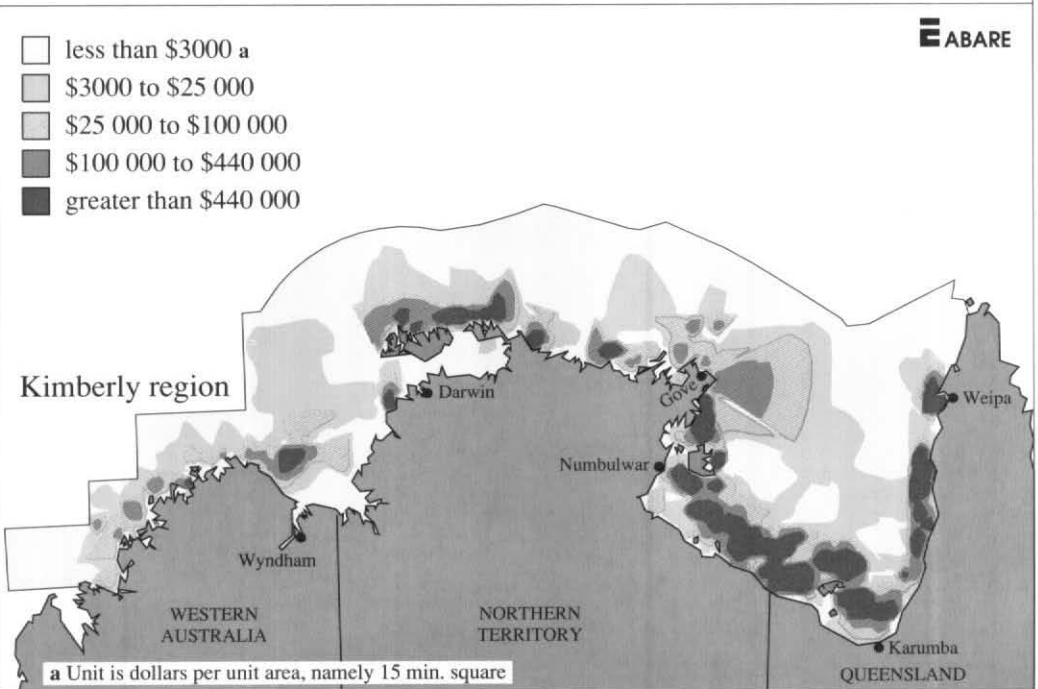
The northern prawn fishery is located in Commonwealth waters in the Australian fishing zone between Cape Londonderry and Cape York (figure A). It covers about 1 million square kilometres of water, making it one of Australia's largest fisheries, by area. It is also one of Australia's highest valued fisheries, with production in 1992-93 estimated to be worth over \$98 million from a total catch of around 8000 tonnes (ABARE 1993a). Over 90 per cent of the catch from the northern prawn fishery is exported, the principal market being Japan.

There is a large variety in the size of boats that operate in the fishery. Boat sizes range from below 200 units to over 600 units. A unit of capacity in the current

management plan is the sum of the hull volume (in cubic metres) and engine size (in kilowatts). Some of the smaller boats are also endorsed to fish in the Torres Strait (Commonwealth) and Queensland east coast (state) prawn fisheries.

There are four major types of prawns caught in the fishery — tiger, banana, endeavour and king prawns. The average annual prawn catch in the fishery over the past ten years has been about 9000 tonnes. Over this period, banana prawns accounted for about 46 per cent of the catch but only 22 per cent of the fishing effort. In contrast, tiger prawns accounted for 41 per cent of the catch but 71 per cent of the effort. The tiger prawn catch is made up of brown

**A** Value of catches in the northern prawn fishery, 1991-92





# 1 Boat characteristics, northern prawn fishery: population and sample <sup>a</sup> Average per boat

	Unit	Smaller than 375 units		375-475 units		Larger than 475 units		All boats	
		Sample	Population	Sample	Population	Sample	Population	Sample	Population
<b>1990-91</b>									
Number of boats	no.	18	70	20	48	31	51	69	169
Size	A units <sup>b</sup>	300 (7)	307	420 (1)	422	590 (1)	562	420 (2)	416
Hours fished	hr	1 880 (3)	1 799	2 340 (3)	2 408	2 330 (3)	2 403	2 150 (2)	2 153
Catch									
- banana	kg	16 050 (13)	16 054	44 280 (5)	43 978	66 240 (4)	64 116	39 140 (3)	38 336
- tiger	kg	15 470 (8)	15 626	18 310 (5)	18 630	18 400 (6)	19 699	17 160 (4)	17 696
- endeavour	kg	760 (8)	3 597	4 010 (8)	4 086	4 050 (6)	4 163	3 920 (4)	3 905
- king	kg	360 (32)	361	680 (13)	580	450 (16)	565	480 (12)	484
Total <sup>c</sup>	kg	35 640 (0)	35 638	67 280 (0)	67 274	89 140 (0)	88 543	60 700 (0)	60 422
<b>1991-92</b>									
Number of boats	no.	11	68	17	45	30	47	58	160
Size	A units <sup>b</sup>	309 (8)	309	421 (1)	424	589 (1)	567	423 (3)	418
Hours fished	hr	1 464 (4)	1 452	1 794 (2)	1 905	1 969 (2)	1 946	1 705 (2)	1 725
Catch									
- banana	kg	6 174 (15)	5 967	17 436 (11)	18 291	24 233 (7)	24 496	14 647 (6)	14 876
- tiger	kg	19 695 (12)	19 797	26 107 (4)	24 352	28 332 (3)	28 443	24 035 (5)	23 618
- endeavour	kg	5 470 (10)	5 501	5 341 (4)	6 324	7 113 (4)	6 633	5 916 (4)	6 065
- king	kg	57 (41)	132	484 (14)	400	382 (9)	487	272 (9)	312
Total	kg	31 396 (0)	31 396	49 368 (0)	49 368	60 059 (0)	60 059	44 870 (0)	44 870
<b>1992-93 <sup>p</sup></b>									
Number of boats	no.	9	45	18	39	25	41	52	125
Size	A units <sup>b</sup>	283 (10)	302	422 (1)	425	535 (1)	529	409 (3)	415
Hours fished	hr	1 873 (8)	1 886	1 851 (3)	1 917	2 012 (2)	1 974	1 912 (3)	1 924
Catch									
- banana	kg	11 785 (16)	10 106	37 295 (6)	38 159	44 554 (6)	45 777	30 492 (4)	30 559
- tiger	kg	18 140 (13)	19 305	18 995 (5)	17 883	21 306 (4)	20 498	19 445 (5)	19 253
- endeavour	kg	5 629 (15)	6 165	4 724 (8)	4 985	5 446 (4)	5 119	5 287 (6)	5 454
- king	kg	181 (40)	159	258 (14)	243	401 (9)	315	277 (11)	236
Total	kg	35 734 (0)	35 734	61 271 (0)	61 271	71 708 (0)	71 708	55 501 (0)	55 501

<sup>a</sup> Figures in parentheses are relative standard errors. <sup>b</sup> Units of boat size are explained in the main text. <sup>c</sup> Relative standard errors in sample catch figures are zero because catch is the basis for weighting. <sup>p</sup> Preliminary.

and grooved tiger prawns in roughly equal proportions. Endeavour prawns and king prawns accounted for most of the remainder of the annual catch. These were generally bycatch from tiger prawn fishing activities, although some targeting occurred.

The prawn season begins in April with operators targeting banana prawns almost exclusively. At this stage of the season, banana prawns aggregate into dense schools which are easily located, making the prawns very vulnerable to capture. Once the banana prawn catch rates fall, operators target the more valuable tiger prawns.

Banana prawn catches vary considerably from year to year, with recruitment to the fishery (that is, the quantity of juvenile prawns becoming vulnerable to fishing) correlated with monsoonal rainfall. As a general rule, the higher the rainfall the greater the number of prawns that enter the fishery in that season. The length of the banana prawn season is generally related to the number of banana prawns that enter the fishery — the greater the number of prawns, the longer the period before operators begin to target tiger prawns.

Management policies in Australia's northern prawn fishery were first introduced in the early 1970s, and have undergone many changes. The current management scheme incorporates various regulations that have been implemented over the years, and includes: seasonal closures, daylight trawling bans, boat replacement rules, gear restrictions and a buyback scheme. In 1993, a compulsory pro-rata surrender of class A units was imposed to reduce the number of boats operating in the fishery.

## Physical characteristics

For the purpose of the survey the fleet was, before sampling, categorised into three groups of similar sized boats (based on

class A units). A sample of boats from each group was then chosen for inclusion in the survey. The three groups were:

- smaller than 375 class A units,
- between 375 and 475 class A units and
- larger than 475 class A units.

The physical characteristics of boats in the northern prawn fishery over the survey period are presented in table 1. From table 1, the characteristics of the sample boats and the population can be compared.

Based on logbook data, the number of fishing vessels in the fleet was reduced by around 22 per cent between 1991-92 and 1992-93. The primary reason for this was the compulsory surrender of a proportion of class A units held by operators across the fishery in April 1993. This is likely to result in improved economic performance for most remaining vessels. The longevity of the benefits that such a fleet reduction may confer will, however, depend on the form of management that is imposed in the future.

Variable climatic conditions in the Gulf of Carpentaria affect both catches and operator behaviour in the northern prawn fishery. Low monsoonal rainfalls prior to the 1992 banana prawn season resulted in lower than average catches of banana prawns in 1991-92. In contrast, high monsoonal rainfalls resulted in higher banana prawn catches in 1992-93 than in the previous year. However, banana prawn catches were not as high as the near record level in 1990-91.

The fluctuation in catch between years was evident for all boat groups. For example, the large boats averaged a catch of around 89 tonnes in 1990-91; 60 tonnes in 1991-92 and 72 tonnes in 1992-93. The significant fluctuations in prawn catches over the survey period were generally reflected in the average level of effort per boat. There was a fall in average nominal effort for the fishery as a whole from 1990-91 to 1991-92 of 20 per cent, followed by a rise of around 12 per cent in 1992-93. The small boat group showed the largest

## 2 Financial performance of northern prawn fishery boats <sup>a</sup> Average per boat

	Unit	Smaller than 375 units			375-475 units		
		1990-91	1991-92	1992-93 <sup>p</sup>	1990-91	1991-92	1992-93 <sup>p</sup>
<b>Receipts</b>							
Prawn receipts	\$	434 293 (9)	412 420 (10)	476 500 (15)	705 411 (4)	604 300 (6)	786 300 (5)
Other fishing receipts	\$	3 577 (35)	22 790 (50)	9 600 (67)	1 044 (44)	15 840 (58)	15 700 (50)
Non-fishing receipts	\$	5 256 (53)	2 470 (59)	3 600 (62)	10 252 (53)	11 500 (27)	11 600 (23)
Total cash receipts	\$	443 126 (9)	437 680 (10)	489 800 (15)	716 707 (4)	631 650 (5)	813 700 (5)
<b>Costs</b>							
Administration	\$	14 598 (39)	16 150 (47)	19 800 (50)	45 632 (27)	47 960 (24)	53 800 (21)
Crew costs	\$	117 438 (11)	113 700 (12)	130 300 (16)	177 637 (4)	161 890 (6)	203 900 (6)
Freight and marketing	\$	4 078 (55)	8 090 (26)	6 600 (40)	19 118 (13)	27 660 (16)	30 000 (14)
Fuel	\$	83 854 (9)	77 230 (9)	104 100 (13)	134 909 (4)	117 900 (7)	128 100 (5)
Insurance	\$	13 045 (9)	16 070 (10)	13 800 (9)	22 648 (4)	23 360 (7)	22 500 (6)
Interest paid	\$	28 457 (27)	32 920 (27)	30 500 (28)	48 612 (25)	31 440 (20)	30 500 (17)
Leasing	\$	2 295 (30)	8 800 (74)	12 000 (69)	1 815 (31)	2 420 (27)	2 900 (23)
Licence fees and levies	\$	11 107 (6)	17 880 (8)	18 400 (9)	21 427 (7)	28 910 (12)	29 900 (11)
Packaging	\$	6 179 (21)	3 600 (37)	5 900 (28)	12 001 (11)	11 620 (16)	14 300 (15)
Repairs and maintenance	\$	59 764 (8)	107 040 (16)	121 600 (18)	115 783 (7)	95 730 (8)	114 600 (6)
Other costs	\$	22 393 (23)	19 990 (17)	18 700 (21)	19 231 (16)	21 490 (14)	17 500 (22)
Total cash costs	\$	363 208 (7)	421 460 (9)	481 600 (11)	618 814 (4)	570 380 (4)	648 000 (4)
<b>Boat cash income</b>	\$	79 918 (20)	16 210 (ns)	8 200 (ns)	97 893 (30)	61 270 (36)	165 700 (15)
less depreciation <sup>b</sup>	\$	29 008 (19)	20 490 (35)	24 600 (41)	65 705 (22)	29 830 (14)	35 100 (13)
<b>Boat profit</b>	\$	50 910 (29)	-4 280 (ns)	-16 400 (ns)	32 188 (ns)	31 440 (69)	130 500 (18)
plus interest, leasing and rent	\$	31 402 (26)	41 990 (23)	42 900 (23)	52 817 (24)	34 320 (19)	33 800 (16)
<b>Profit at full equity</b>	\$	82 312 (21)	37 710 (44)	26 500 (ns)	85 005 (35)	65 760 (39)	164 400 (16)
<b>Capital</b>	\$	306 926 (17)	389 500 (9)	343 700 (10)	560 793 (14)	670 960 (11)	735 100 (10)
<b>Rate of return</b>	%	26.8 (27)	9.7 (43)	7.7 (ns)	15.2 (41)	9.8 (37)	22.4 (15)

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	Unit	Larger than 475 units			All boats		
		1990-91	1991-92	1992-93 p	1990-91	1991-92	1992-93 p
<b>Receipts</b>							
Prawn receipts	\$	931 677 (2)	750 910 (2)	829 700 (2)	660 718 (3)	565 820 (4)	689 000 (4)
Other fishing receipts	\$	9 511 (24)	9 790 (46)	12 400 (44)	4 636 (19)	17 020 (33)	12 400 (31)
Non-fishing receipts	\$	4 112 (66)	19 820 (24)	22 200 (27)	6 335 (33)	10 100 (17)	12 200 (19)
Total cash receipts	\$	945 300 (2)	780 510 (3)	864 200 (3)	671 689 (3)	592 940 (4)	713 600 (4)
<b>Costs</b>							
Administration	\$	93 846 (16)	36 040 (19)	33 200 (24)	47 211 (13)	30 940 (16)	34 800 (16)
Crew costs	\$	223 974 (3)	190 690 (3)	213 200 (3)	166 542 (4)	149 870 (4)	180 400 (5)
Freight and marketing	\$	15 865 (14)	20 430 (14)	22 600 (14)	11 897 (11)	17 220 (10)	19 100 (10)
Fuel	\$	143 866 (3)	160 800 (3)	182 000 (3)	116 396 (3)	113 220 (4)	137 100 (4)
Insurance	\$	26 363 (4)	28 160 (2)	28 100 (2)	19 775 (3)	21 670 (4)	21 200 (3)
Interest paid	\$	18 519 (38)	19 590 (27)	10 900 (30)	31 215 (17)	28 590 (16)	24 100 (15)
Leasing	\$	36 793 (24)	33 220 (24)	44 100 (23)	12 508 (21)	14 180 (25)	19 700 (23)
Licence fees and levies	\$	30 589 (2)	39 460 (5)	40 300 (5)	19 891 (3)	27 320 (5)	29 200 (5)
Packaging	\$	23 608 (5)	19 070 (6)	23 400 (6)	13 066 (6)	10 400 (8)	14 300 (7)
Repairs and maintenance	\$	139 157 (5)	136 930 (5)	157 000 (4)	99 535 (4)	112 640 (7)	131 000 (7)
Other costs	\$	12 038 (13)	17 870 (15)	16 500 (21)	18 386 (13)	19 790 (9)	17 600 (12)
Total cash costs	\$	764 619 (3)	702 260 (2)	771 200 (2)	556 422 (3)	545 830 (3)	628 500 (3)
<b>Boat cash income</b>	\$	180 681 (11)	78 250 (21)	93 000 (22)	115 267 (11)	47 110 (25)	85 100 (18)
less depreciation b	\$	38 317 (9)	38 470 (9)	36 500 (11)	42 250 (11)	28 400 (12)	31 800 (13)
<b>Boat profit</b>	\$	142 364 (14)	39 780 (40)	56 500 (34)	73 017 (19)	18 710 (64)	53 400 (31)
plus interest, leasing and rent	\$	55 593 (18)	53 020 (16)	55 100 (18)	44 758 (13)	43 070 (12)	44 100 (12)
<b>Profit at full equity</b>	\$	197 957 (11)	92 800 (18)	111 600 (16)	117 775 (11)	61 780 (18)	97 400 (16)
<b>Capital</b>	\$	864 893 (4)	751 300 (4)	719 200 (4)	546 615 (6)	574 940 (5)	589 000 (5)
<b>Rate of return</b>	%	22.9 (13)	12.4 (18)	15.5 (17)	21.5 (13)	10.7 (18)	16.5 (16)

a Figures in parentheses are relative standard errors. b Depreciation adjusted for profit or loss on capital items sold. p Preliminary. ns Not supplied.

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increase in effort: on average, effort was around 30 per cent higher in 1992-93 than in 1991-92. Large and medium boats, on average, increased their effort by only 1 per cent over the same period.

## Catch value and location

The value of catches per unit area in the northern prawn fishery during 1991-92 is shown in figure A. The catches and prices received by operators for the major commercial species caught in the northern prawn fishery were used to construct this map. There is a large variation in prices for each prawn species according to size, and the size of prawns depends on the time of year in which they are caught. In calculating the value of catch for 1991-92, therefore, average monthly prices (rather than annual prices) were used.

In 1991-92, the northern prawn fishery experienced lower than average catches of banana prawns, while tiger prawn catches were higher than average. The high values (dark blue) in the region east of Numbulwar through to north of Karumba reflect the high catches of tiger prawns during this period. Tiger prawns receive the highest average price of the four types of prawns in the fishery.

## Financial performance

The principal measures of the financial performance of boats in the northern prawn fishery obtained from the survey are given in table 2.

A major influence on the financial performance of boats in the northern prawn fishery over the survey period is the fluctuating catch levels caused by varying seasonal conditions. In addition, operators in the fishery have also experienced fluctuating prices for prawns on the Japanese market during the surveyed years. High production from farmed prawns in South East Asia contributed to downward pressure on prices for prawns

on the Japanese market in 1991-92. However, recent falls in the value of the Australian dollar against the yen and higher prices received for prawns on the Japanese market in 1992-93 resulted in increased prices received by operators.

## Receipts

On average, total cash receipts of northern prawn fishery boats fell by 12 per cent in 1991-92, due largely to lower banana prawn catches. In 1991-92 the large boat sector of the fleet was the most affected, with a fall in average receipts of around 17 per cent compared with an average decrease in receipts of 12 per cent for medium sized boats.

In contrast, total cash receipts on average fell only marginally for the small boats in 1991-92. While prawn receipts declined for these boats, this was partly offset by an increase in other fishing receipts from around \$3600 per boat in 1990-91 to \$22 800 per boat in 1991-92. This reflects the greater proportion of bycatch retained by operators.

Estimates of average boat receipts in 1992-93 were based on changes in catch and prices between 1991-92 and 1992-93. Following an increase in banana prawn catches in the 1993 season, total cash receipts of northern prawn fishery boats are estimated to have increased by about 20 per cent in 1992-93. The lower catches of tiger prawns in 1992-93 were more than offset by higher prices received for prawns on the Japanese market and the higher banana prawn catches during this period.

## Costs

On average, total cash costs fell by 2 per cent between 1990-91 and 1991-92 to around \$546 000. However, the changes in total cash costs were not uniform across the fishery. In 1991-92, total cash costs fell by around 8 per cent for vessels in both the large and medium boat sector, while for small boats they rose by 16 per cent. The increase in total cash costs for the small

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boats was caused largely by an increase in repairs and maintenance costs, which rose, on average by 79 per cent in 1991-92. Insurance and interest costs also rose for the small boats, increasing on average by 23 per cent and 16 per cent respectively in 1991-92.

Crew costs, which form the largest single component of boat costs, accounted for 27 per cent of total cash costs of northern prawn fishery boats in 1991-92. Crew in the northern prawn fishery are generally paid a proportion of fishing receipts. Crew costs for the large and medium boats declined in 1991-92 by 15 per cent and 9 per cent respectively, largely because of the fall in fishing receipts. For the large boats, administration costs also fell by almost 62 per cent in 1991-92, contributing to the overall fall in total cash costs for large boats during this period.

Costs in 1992-93 were estimated using a series of cost indexes, as well as on the basis of changes in catch and effort. The cost indexes were determined by ABARE from a survey of suppliers of goods and services to the rural sector (ABARE 1993b). Changes in catch and effort are derived from logbook information, and affect crew payments, marketing costs and fuel costs. Based on these indexes and changes in catch and effort, average total cash costs per boat are estimated to have increased by about 15 per cent in 1992-93.

Payments to crew were estimated to have increased by 20 per cent on average in 1992-93 compared with the previous year as a result of the higher receipts. Fuel costs

were estimated to have increased by around 21 per cent over the same period as a result of an increase in the number of hours fished and higher fuel prices (ABARE 1993b).

### **Boat cash income and profit**

The effect of catch fluctuations on operators' incomes is evident in the estimates of financial performance. In the short term, when the fishing boat does not need to be replaced, boat cash income provides one measure of the boat's capacity to continue operating in the industry. Average boat cash income in the fishery dropped from around \$115 000 in 1990-91 to \$47 000 in 1991-92, before increasing to an estimated \$85 000 in 1992-93.

Average boat profit (which allows for depreciation of capital) declined from \$73 000 in 1990-91 to less than \$19 000 in 1991-92. In 1991-92, medium sized boats had an average profit of \$31 000, while large boats averaged profits of \$40 000. On average, the small boats recorded an operating loss of \$4000 in 1991-92.

Return to full equity provides a means to measure the financial performance of the different sectors of the fishery. This provides a measure of the return which would have been earned by the business unit had the boat been fully owned by the operator. For the fishery as a whole the average rate of return to capital at full equity in 1991-92 was around 11 per cent — still below the 1990-91 average of nearly 22 per cent, and less than the estimated average of almost 17 per cent in 1992-93.

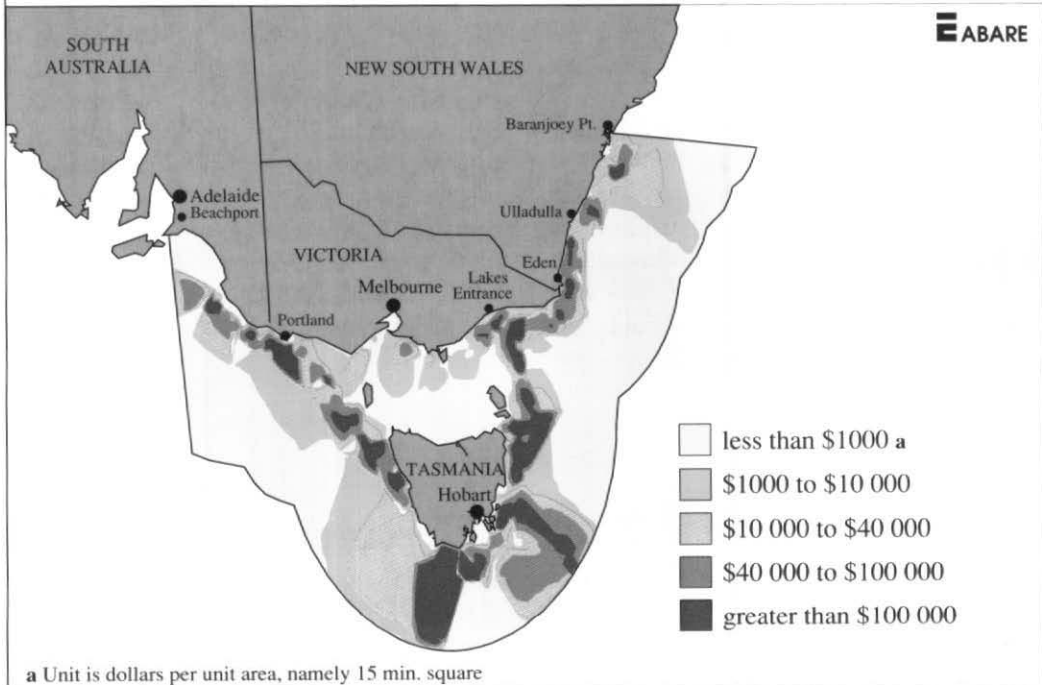
# Survey results for the south east fishery

The south east fishery is located in the Commonwealth waters of the Australian fishing zone from Barenjoey Point, just north of Sydney, to Beachport, South Australia (figure B). Gross value of production in 1992-93 was estimated to be about \$61 million (ABARE 1993a).

Over 100 species are caught in the south east fishery. However, a relatively small number of species dominate the commercial catch. Almost half the gross value of production in 1992-93 was derived from orange roughy (ABARE 1993a). In recent years, orange roughy has contributed as much as 68 per cent of the total value of catch (ABARE 1991).

The south east fishery can be considered as three separate subfisheries, according to vessel type. The inshore trawl boats generally operate on the continental shelf and upper continental slope to depths of around 500 metres. Most of the inshore fleet operates off the south coast of New South Wales. They target a range of species, most of which are destined for the domestic fresh fish market. The danish seiner fleet operates in the shallower waters, mostly off Lakes Entrance, and targets predominantly whiting and flathead. The deep water fleet operates predominantly out of Tasmanian and Victorian ports, on the continental slope (mainly in depths of 100-600 metres),

**B** Value of catches in the south east fishery, 1991-92



with orange roughy the main target species. Most of the orange roughy catch from these offshore boats is processed into fillets and exported. While there is some overlap in the species caught by these three groups, it is generally minor.

Individual transferable quotas (ITQs) were introduced into the south east fishery in 1989. Initially, only one species — gemfish — was managed in this way. ITQs were introduced for a further fifteen species at the beginning of 1992. Under an individual transferable quota system, operators are restricted in how much of a given species they may catch, determined by their quota holdings. This quota is defined as a share of the total allowable catch of each quota species. Operators may lease quota to adjust their operations in order to maximise their profits.

Understanding the new system, problems in quota allocation and the lack of a developed quota market may have caused some difficulties for a number of operators in the fishery. Reductions in the total allowable catch of several key species have also reduced the earning potential of a number of operators.

## Physical characteristics

The danish seiner boats are generally small (13–20 metres in length), low powered vessels. The otter trawl fleet, which comprises the other two sectors, is much more diverse and includes boats from 13 to 40 metres in length.

The physical characteristics of boats in the south east fishery over the survey period are presented in table 3. Based on logbook data for the population, the average boat size (measured in units representing both hull size and engine power) remained fairly stable over the survey period. For offshore boats, the main operational change was a 51 per cent increase in hours fished between 1990-91 and 1991-92, followed by a further 6 per cent increase in 1992-93. Despite this

increase in effort, average catches by offshore boats fell by about 24 per cent from 1990-91 to 1991-92, and by a further 24 per cent in 1992-93. This primarily reflected the reduction in the total allowable catch of orange roughy.

Average catches by danish seiners fell by around 12 per cent from 1990-91 to 1991-92 despite an increase in hours fished of around 3 per cent. Average danish seiner catches fell by a further 13 per cent in 1992-93. Average hours fished declined by about 17 per cent between 1991-92 and 1992-93.

For inshore boats, there was a marginal increase between 1990-91 and 1991-92 in average hours fished and a 15 per cent reduction in average catch. Average catch declined by a further 17 per cent in 1992-93. Average effort also declined in 1992-93 in response to the lower allowable catches.

An indication of the representativeness of the sample can also be gained from the standard errors given in table 3. The estimated values of average units, hours fished and catch from the sample were generally within two standard errors of the population means. As a result, the sample estimates of these variables are not significantly different from the true population means. The only exception to this was the estimate of units held by inshore boats in 1992-93. This was significantly smaller than the true population mean. As a result, costs that may be associated with boat size may be underestimated for the inshore fleet in 1992-93.

## Catch value and location

The value of catches in the south east fishery during 1991-92 are given in figure B. Catches and average prices for the major commercial species in the south east fishery in 1991-92 were used to construct this map.

The dominant species in the south east fishery in terms of catch is orange roughy. The majority of the areas with a high fishing catch value located on the east and



### 3 Boat characteristics, south east fishery: population and sample

	Inshore boats		Offshore boats		Danish seiners		Fishery average (all boats)	
	Sample estimate	Population	Sample estimate	Population	Sample estimate	Population	Sample estimate	Population
<b>1990-91</b>								
Number of boats	17	55	14	39	11	22	42	116
Units	150 (5)	144	270 (8)	304	70 (4)	69	170 (5)	184
Hours fished	990 (7)	840	310 (14)	299	500 (11)	505	670 (6)	595
Catch (kg)	213 110 (0)	213 114	873 390 (0)	873 391	115 420 (0)	115 421	416 580 (0)	416 576
<b>1991-92</b>								
Number of boats	14	54	8	33	12	18	34	105
Units	120 (10)	138	340 (19)	306	70 (4)	68	180 (13)	176
Hours fished	960 (6)	850	550 (19)	452	500 (7)	520	750 (6)	668
Catch (kg)	181 760 (0)	181 760	666 390 (0)	666 394	101 620 (0)	101 616	307 011 (0)	320 335
<b>1992-93</b>								
Number of boats	13	54	8	33	10	18	31	105
Units	110 (10)	145	370 (20)	314	70 (5)	69	180 (13)	178
Hours fished	710 (14)	697	400 (27)	480	410 (12)	429	560 (11)	583
Catch (kg)	150 030 (0)	150 034	509 460 (0)	509 455	88 570 (0)	88 573	252 460 (0)	252 459

a Figures in parantheses are relative standard errors.

north west coast of Tasmania and south west coast of Victoria are probably an indication of the high catch of orange roughy in these areas. The total recorded catch of orange roughy declined by about 40 per cent in 1991-92 due to a reduction in the total allowable catch. However, the price received for orange roughy increased substantially over the same period, offsetting the declining catch to a large degree.

Tiger flathead and school whiting account for much of the high catch value areas around south east Victoria. The low value of fish caught in Bass Strait is due to the low trawl species production in this area (Tilzey, Zann-Schuster, Klaer and Williams 1990).

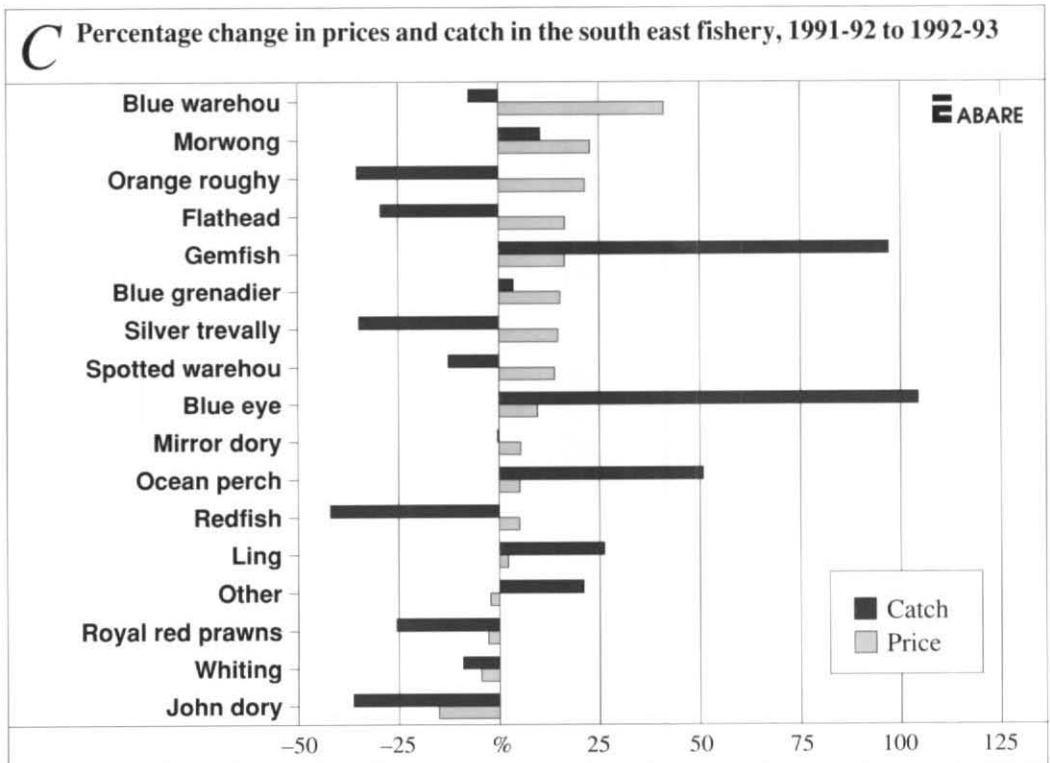
## Financial performance

The major measures of financial performance in the south east fishery obtained from the survey are given in table 4.

## Receipts

Total cash receipts for boats in the south east fishery averaged \$733 000 in 1991-92, down marginally from the average boat cash income in 1990-91. However, average total cash receipts fell by around 4 per cent to \$472 000 for inshore boats and by around 3 per cent to \$231 000 for danish seiners over the same period. Total cash receipts for offshore boats increased by about 6 per cent on average between 1990-91 and 1991-92 to about \$1 434 000. Higher prices received for orange roughy in 1991-92 offset the decline in individual boat catches associated with the decline in total allowable catch.

Estimates of average boat receipts in 1992-93 were largely based on changes in catch and prices between 1991-92 and 1992-93 (figure C). Catch information for the two years was obtained from logbooks. Changes in price were based on Sydney and Melbourne market information, as well as information provided by a number of cooperatives and processors. From



## 4 Financial performance of south east fishery boats <sup>a</sup> Average per boat

	Unit	Inshore trawlers			Offshore trawlers		
		1990-91	1991-92	1992-93 p	1990-91	1991-92	1992-93 p
<b>Receipts</b>							
Fishing receipts	\$	460 052 (13)	436 160 (16)	431 200 (15)	1 294 238 (14)	1 369 220 (20)	1 226 600 (18)
Non-fishing receipts	\$	30 898 (16)	35 450 (27)	29 500 (31)	63 143 (16)	64 850 (27)	84 700 (28)
Total cash receipts	\$	490 950 (13)	471 610 (15)	460 700 (15)	1 357 382 (13)	1 434 070 (19)	1 311 300 (17)
<b>Costs</b>							
Administration	\$	10 210 (16)	10 850 (28)	10 400 (23)	39 676 (27)	13 900 (23)	13 700 (25)
Crew costs	\$	105 240 (11)	101 330 (17)	100 000 (16)	330 236 (10)	305 190 (20)	272 600 (17)
Food	\$	6 779 (16)	6 800 (14)	6 000 (16)	10 879 (19)	15 690 (14)	16 100 (14)
Freight and marketing	\$	60 660 (28)	99 820 (19)	94 800 (20)	113 106 (23)	75 030 (29)	71 400 (26)
Fuel	\$	78 827 (11)	62 030 (18)	47 700 (19)	183 726 (11)	179 820 (24)	238 800 (26)
Insurance	\$	15 616 (15)	13 490 (24)	11 300 (23)	22 605 (11)	33 530 (31)	37 700 (30)
Interest paid	\$	23 063 (38)	21 720 (43)	15 500 (42)	59 606 (38)	32 310 (46)	24 500 (52)
Leasing	\$	26 191 (65)	3 940 (78)	13 100 (64)	5 945 (57)	29 380 (57)	149 000 (61)
Licence fees and levies	\$	10 317 (12)	10 740 (18)	9 100 (15)	22 110 (8)	13 620 (14)	12 000 (13)
Repairs and maintenance	\$	78 062 (18)	51 500 (18)	50 000 (19)	188 176 (14)	179 800 (20)	200 800 (18)
Other costs	\$	21 258 (25)	13 050 (7)	13 700 (8)	65 701 (31)	14 170 (19)	13 800 (20)
Total cash costs	\$	436 222 (11)	395 280 (15)	371 400 (15)	1 041 766 (9)	892 440 (14)	1 050 400 (8)
<b>Boat cash income</b>	\$	54 727 (55)	76 330 (32)	89 300 (19)	315 615 (35)	541 620 (29)	260 900 (64)
less depreciation b	\$	42 149 (27)	48 430 (29)	39 400 (30)	96 042 (33)	42 390 (48)	35 900 (52)
<b>Boat profit</b>	\$	12 579 (ns)	27 890 (91)	49 900 (35)	219 573 (57)	499 230 (35)	225 000 (81)
plus interest, leasing and rent	\$	49 254 (36)	26 880 (33)	29 800 (31)	66 456 (36)	61 700 (37)	173 500 (54)
<b>Profit at full equity</b>	\$	61 832 (41)	54 780 (37)	79 700 (23)	286 029 (40)	560 930 (28)	398 500 (31)
<b>Capital</b>	\$	401 049 (17)	363 880 (21)	320 600 (19)	1 821 581 (13)	1 351 580 (18)	1 340 300 (17)
<b>Rate of return</b>	%	15.4 (38)	15.1 (39)	24.9 (25)	15.7 (35)	41.5 (18)	29.7 (21)

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	Unit	Danish seiners			All boats		
		1990-91	1991-92	1992-93 p	1990-91	1991-92	1992-93 p
<b>Receipts</b>							
Fishing receipts	\$	236 268 (7)	224 040 (6)	182 600 (7)	698 082 (9)	693 050 (14)	638 600 (12)
Non-fishing receipts	\$	1 738 (40)	6 550 (33)	5 500 (44)	36 209 (12)	39 740 (19)	42 700 (21)
Total cash receipts	\$	238 005 (7)	230 590 (6)	188 100 (7)	734 291 (9)	732 790 (13)	681 300 (12)
<b>Costs</b>							
Administration	\$	2 379 (10)	3 370 (14)	3 300 (18)	18 632 (20)	10 530 (17)	10 200 (16)
Crew costs	\$	48 318 (8)	54 230 (5)	45 900 (6)	170 093 (8)	157 330 (13)	145 000 (12)
Food	\$	3 034 (12)	3 460 (6)	3 400 (7)	7 447 (11)	9 020 (10)	8 700 (10)
Freight and marketing	\$	73 865 (8)	57 040 (9)	48 000 (11)	80 798 (15)	84 700 (14)	79 400 (14)
Fuel	\$	11 585 (6)	13 760 (15)	9 300 (7)	101 343 (8)	90 780 (17)	101 200 (20)
Insurance	\$	5 498 (8)	6 660 (8)	6 000 (8)	16 047 (9)	18 620 (20)	18 700 (20)
Interest paid	\$	11 743 (29)	11 020 (23)	6 600 (34)	33 202 (26)	23 220 (29)	16 800 (31)
Leasing	\$	364 (48)	650 (47)	200 (55)	14 486 (56)	11 370 (48)	53 600 (54)
Licence fees and levies	\$	3 358 (4)	2 170 (15)	1 800 (15)	12 962 (7)	10 180 (12)	8 800 (10)
Repairs and maintenance	\$	12 947 (17)	23 030 (17)	19 600 (11)	102 736 (11)	86 940 (14)	92 200 (13)
Other costs	\$	13 345 (6)	8 900 (12)	7 300 (9)	34 700 (21)	12 690 (8)	12 600 (8)
Total cash costs	\$	186 436 (5)	184 280 (7)	151 400 (5)	592 446 (6)	515 370 (10)	547 100 (7)
<b>Boat cash income</b>	\$	51 570 (22)	46 300 (20)	36 700 (26)	141 845 (28)	217 420 (24)	134 200 (40)
less depreciation <b>b</b>	\$	8 635 (17)	8 770 (12)	8 400 (14)	53 913 (22)	39 740 (25)	33 000 (26)
<b>Boat profit</b>	\$	42 935 (26)	37 530 (24)	28 300 (32)	87 932 (51)	177 680 (31)	101 300 (57)
plus interest, leasing and rent	\$	12 107 (28)	11 670 (22)	6 800 (33)	47 992 (24)	35 220 (24)	71 000 (42)
<b>Profit at full equity</b>	\$	55 041 (18)	49 210 (17)	35 100 (25)	135 924 (30)	212 900 (23)	172 300 (23)
<b>Capital</b>	\$	210 644 (15)	167 050 (8)	156 800 (10)	842 551 (10)	640 570 (13)	613 000 (13)
<b>Rate of return</b>	%	26.1 (26)	29.5 (14)	22.4 (21)	16.1 (26)	33.2 (17)	28.1 (17)

a Figures in parentheses are relative standard errors. b Depreciation adjusted for profit or loss on capital items sold. p Preliminary. na Not applicable.

figure C the average price received for over half of the species increased between 1991-92 and 1992-93. In particular, the average prices in 1992-93 for the two main species caught by offshore boats (orange roughy and blue grenadier) were 15-20 per cent higher than in 1991-92. Recorded catches for most species fell in 1992-93. While catches of some quota species increased by more than 20 per cent in 1992-93, these contributed less than 10 per cent of the total catch of quota species. The landed catch of other (non-quota) species increased by about 20 per cent in 1992-93.

On average, total cash receipts for south east fishery boats are estimated to have fallen by around 7 per cent in 1992-93 to around \$681 000. While prices for most species increased, the decline in catch of high volume species resulted in lower estimated fishing receipts.

Total cash receipts for danish seiners are estimated to have declined by 18 per cent, on average, in 1992-93 to about \$188 000. This was caused by a fall in both the price and catch of whiting. Whiting made up about half of the danish seiner catch in 1992-93. Most whiting caught by danish seiners in the fishery is exported to Japan. The continuing recession in Japan resulted in the export demand for whiting being fairly weak. Recorded catches of flathead, the other main species caught by danish seiners, also decreased in 1992-93. While the average price for flathead increased in 1992-93, this was not sufficient to offset the reduced catch.

For inshore boats, average total cash receipts declined by 2 per cent in 1992-93 to about \$461 000. Increased prices for most of the inshore species offset the decline in recorded catch. Gemfish landings increased in 1992-93 despite a lowering of the total allowable catch to zero in 1993 for eastern gemfish. Increased catches of gemfish and a number of other quota species were recorded in state waters (where quota restrictions do not apply) in 1992-93. This further offset the effects of the

decline in total allowable catches for some species.

The average total cash receipts for offshore boats was estimated to have fallen by 9 per cent to about \$1 311 000 in 1992-93. While the prices of orange roughy and blue grenadier increased by between 15 and 20 per cent in 1992-93, the catch of orange roughy declined by 35 per cent as a result of a reduction in the total allowable catch. The recorded catch of blue grenadier increased by about 4 per cent. These two species make up 75 per cent of the total catch of offshore boats.

### Costs

On average, total cash costs for the south east fishery fell by 13 per cent to about \$515 000 in 1991-92. The largest component of this decrease came from the amount spent on boat repairs and maintenance, which fell, on average, by 15 per cent. Average fuel costs also declined by 10 per cent in 1991-92 as a result of lower fuel prices (ABARE 1993b). Payments to crew declined by 8 per cent on average between 1990-91 and 1991-92. Interest payments declined by 30 per cent on average in 1991-92, largely the result of lower interest rates.

Costs in 1992-93 were estimated using a series of cost indexes, as well as on the basis of changes in catch and effort. Changes in catch and effort, derived from logbook information, affect crew payments, marketing costs and fuel costs. The cost indexes were determined by ABARE from a survey of suppliers of goods and services to the rural sector (ABARE 1993b). Based on these indexes and changes in catch and effort, average total cash costs in 1992-93 were estimated to have increased by about 6 per cent to \$547 000.

Although the average boat repairs and maintenance costs decreased for the fleet as a whole in 1991-92, the average cost for danish seiners increased by 78 per cent. In contrast, the average boat repairs and maintenance costs for inshore boats declined by about 34 per cent in 1991-92. In

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1992-93, average boat repairs and maintenance costs for the fleet as a whole are estimated to have increased by about 6 per cent.

For the offshore boats, the average fuel cost declined by 2 per cent between 1991-92 and 1990-91, but is estimated to have increased by about 33 per cent in 1992-93. This increase is based on an increase in the number of hours fished and the price of fuel (ABARE 1993b). Average fuel costs in 1991-92 for inshore boats decreased by about 21 per cent, but for danish seiners, fuel costs increased by 19 per cent. In 1992-93, average fuel costs are estimated to have fallen by a further 23 per cent for inshore boats and by 32 per cent for danish seiners as a consequence of the reduced number of hours fished. On average, fuel costs were estimated to account for around 18 per cent of total cash costs per boat in both 1991-92 and 1992-93.

Crew costs were estimated to have declined by around 8 per cent on average in 1992-93 compared with the previous year. This follows a similar decline between 1990-91 and 1991-92. Payments to crew were estimated to have fallen in 1992-93 by 15 per cent on average for danish seiners and by 11 per cent for offshore boats. Crew costs remained largely unchanged for inshore boats. Crew costs were estimated to account for around 27 per cent of total cash costs on average in 1992-93.

Average freight and marketing charges were similar in all three years. However, freight and marketing charges increased, on average, by 65 per cent for inshore boats in 1991-92. This is despite a reduction in average catch by these boats. This increase may be due to a greater proportion of catch going to the major markets in 1991-92 than in 1990-91. However, as freight charges also depend on the distance to the market, the changes in the composition of the sample between the two years may also have resulted in the apparent increase in costs. For other costs, the location of the home port of the sample boats is less likely to be

important. For the other two sectors, average freight and marketing charges decreased over the survey period as a result of the lower average catches. Freight and marketing charges are estimated to have accounted for about 15 per cent, on average, of the total cash costs in 1991-92 and 1992-93.

Leasing costs are estimated to have increased substantially between 1991-92 and 1992-93 as a result of quota leasing. Individual transferable quotas were introduced into the fishery for most major species in 1992. There was little quota leasing activity in the first six months of the program, resulting in relatively small leasing costs in the 1991-92 financial year.

Quota leasing activity increased substantially in the second half of 1992, particularly in the offshore fleet as a number of operators leased orange roughy quota to cover their expected catches. As a result, average leasing costs for offshore boats are estimated to have increased by over 400 per cent to \$149 000 in 1992-93.

Inshore boats undertook quota leasing activity to a lesser extent. Average leasing costs as a result of quota leasing are estimated to have increased by about 230 per cent to about \$13 000 in 1992-93. Little quota leasing activity occurred in the danish seiner sector of the fleet. These operators pooled their individual quota allocations and fished under a cooperative arrangement.

### **Boat cash income and profit**

The financial performance of the fleet can be measured by boat cash income and the boat profit. These provide an indication of the ability of the operator to remain in the fishery in the short term. The economic performance of the fishery can be measured by the profit at full equity. This is estimated by adding leasing costs, interest charges and rent payments back into the boat profit. While these costs affect the financial position of the individual operator in the fishery, from a broader

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perspective they represent profits that are redistributed to other investors in the fishery. Profit at full equity also provides a measure of the return which would have been earned by the business unit had the boat and other capital (including quota) been fully owned by the operator and, as such, allows a comparison of the economic performance of all boats in the fishery.

Despite declining catches, average boat cash income increased by 53 per cent between 1990-91 and 1991-92 to about \$217 000. This increase in boat cash income came from reduced costs, as receipts fell marginally between the two years. In particular, the reduction in repairs and maintenance costs may have been a short term measure to offset the declining revenue. Average expenditure on repairs and maintenance in 1991-92 may have been lower than that required to keep the boat operational in the longer term. This is particularly the case in the inshore sector, where average repairs and maintenance costs were estimated to have declined by about 34 per cent in 1991-92. Average boat cash incomes increased by 39 per cent in 1991-92 in the inshore sector to about \$76 000.

In the offshore fleet, higher orange roughly prices and consequently higher fishing receipts was the main cause of an increase in average boat cash income. Boat cash income increased, on average, by about 72 per cent in 1991-92 to about \$542 000. Danish seiners experienced a 10 per cent decline in boat cash income, on average, in 1991-92 as a result of a decline in fishing receipts. Danish seiner boat cash incomes averaged about \$46 000 in 1991-92.

Average boat cash income in 1992-93 is expected to have declined on average by 38 per cent to about \$134 000. This decline was driven largely by the decline in boat cash income of the offshore boats, which is estimated to have fallen on average by about 52 per cent in 1992-93 to about \$261 000. This fall is largely the result of the increased leasing costs incurred by many

offshore boats in 1992-93. Average boat cash income for danish seiners is estimated to have fallen by about 21 per cent in 1992-93 to about \$37 000. The average boat cash income of inshore boats is estimated to have increased by 17 per cent in 1992-93 to about \$89 000.

For owner operators, the boat cash income would have been higher than indicated in table 4. As a large number of boats use an employed skipper, an allowance for owner operator's labour has been built into the estimated crew costs. This allows all boats to be treated in a similar manner with respect to skipper and crew.

Average boat profit in the fishery doubled between 1990-91 and 1991-92. Higher boat cash incomes and lower average depreciation costs resulted in average boat profits increasing to about \$178 000 in 1991-92. In 1992-93, average boat profit is estimated to have declined by 43 per cent to about \$101 000, largely as a result of the increased leasing costs. Average boat profits for offshore boats is estimated to have declined by about 55 per cent in 1992-93 to \$225 000. For danish seiners, average boat profit is estimated to have decreased by 25 per cent in 1992-93 to about \$28 000. For inshore boats, average boat profit is estimated to have increased by around 80 per cent in 1992-93 to almost \$50 000.

For boats that are fully owned and do not need to lease quota, profits may still have declined in 1992-93. Average profit at full equity for the fleet as a whole is estimated to have fallen by 19 per cent on average in 1992-93 to about \$172 000. For offshore boats, profit at full equity is estimated to have declined by 29 per cent to about \$399 000 as a result of the lower fishing receipts. Profits at full equity for danish seiners is estimated to have declined by 29 per cent on average in 1992-93 to about \$35 000. For inshore boats, average profits at full equity are estimated to have

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increased by about 45 per cent in 1992-93 to nearly \$80 000.

Despite the falls in full equity profit in 1992-93, the rate of return to boat capital was estimated to be about 28 per cent on average. This is down from the average rate of return in 1991-92 (33 per cent), but greater than the average rate of return in 1990-91 (16 per cent). As the capital values used to estimate the rate of return excludes the value of the quota, these figures do not reflect the return on the full asset holding. They also do not include the capital value of boats that may have been taken out of the fishery as a result of amalgamating quota but which remain unsold. As a result, they may present a more favourable view of the

returns to investment in the fishery than is actually being realised. They do, however, provide an indication of the relative changes in economic performances of the various sectors of the fleet.

While the estimated rate of return to capital in the offshore fleet in 1992-93 is higher than for the other two sectors, the large quota leasing costs incurred by many of these boats means that much of these profits are being transferred to quota holders who are not actively fishing. On average, quota holders who leased quota to offshore boats were earning larger returns than those operators actively harvesting the resource.



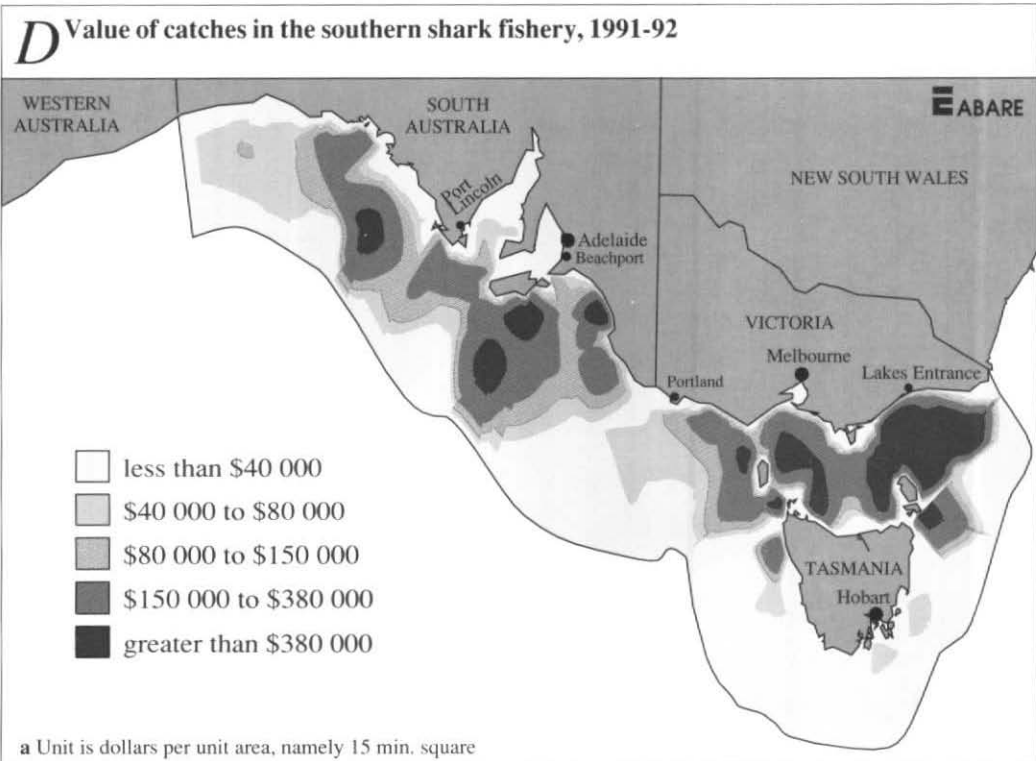
# Survey results for the southern shark fishery

The southern shark fishery is located in state and Commonwealth waters off south eastern Australia (figure D). In 1992-93, production was estimated to be worth almost \$16 million from a total catch of around 3250 tonnes (carcass weight) (ABARE 1993a).

The fishery is based primarily on catches of gummy and school sharks, although several other species, including common saw sharks, southern saw sharks, and elephant fish account for about 15 per cent of the total catch. Both gillnets and longlines are used in the southern shark fishery, but most of the catch is taken using gillnets.

Victoria is the main market for shark caught in the southern shark fishery and most of the shark caught by boats working out of Victorian ports is marketed through the Melbourne fish market. In contrast, in Tasmania and South Australia shark caught are often sent to local processors.

Responsibility for the management of the southern shark fishery is shared by the Commonwealth government and the state governments of Victoria, Tasmania and South Australia. State jurisdiction extends up to 3 nautical miles from the coastline and the Commonwealth government is responsible for the area from the 3 mile limit to the 200 mile limit of the Australian



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fishing zone. The southern shark fishery has come under a number of different management strategies since its inception. Management of the fishery has included closed seasons, minimum lengths, maximum lengths, minimum gillnet mesh size, limiting areas of fishing and limited entry and effort controls.

Under the Commonwealth management plan introduced in April 1988, gillnet endorsements based on units of fishing capacity were issued to fishermen with a history of operating in the southern shark fishery. A unit of fishing capacity was originally defined as a monofilament gillnet 600 metres in length and 20 meshes deep, where a mesh was defined as the single square in the net that was not less than 15 centimetres wide. Depending on their catch history, Commonwealth endorsed fishermen were issued with either a category A endorsement for six units of net, or a category B endorsement for 5 or less units of net.

A total of 1234 net units were issued to 241 boats to operate in the gillnet fishery. During the first two years of the management plan, fishermen could amalgamate two category A endorsements on to one boat, but at a cost of the forfeiture of two units of net to the management authority which were subsequently withdrawn from the fishery. Amalgamation of two A class licences thus resulted in the increase from six to ten units of net to form the endorsement category termed 'A10'. However, the 'B' category licences were not transferable outside the immediate family.

In April 1991 interim net reductions for southern shark fishermen were implemented which reduced the total amount of net in the fishery by about 33 per cent. Initially, operators who were originally entitled to use 10 nets were reduced to 7 nets, operators originally entitled to 6 nets were reduced to 4 nets, and operators who were originally entitled to 3, 4 or 5 nets were limited to 3 nets. As a result of

concerns about inequitable reductions in net numbers between operators, a unit of net was redefined in April 1993 to be equal to 420 metres in length and original entitlements regarding net numbers were reinstated.

In September 1993 new catch restrictions were introduced to protect pregnant school sharks during their period of high vulnerability as they migrate eastwards toward their traditional nursery grounds. Operators fishing in Commonwealth and state waters are limited to a bycatch of school and gummy sharks during the restriction periods. The bycatch limit restricts operators to taking, carrying and landing no more than five carcasses of school and gummy sharks (combined) for gillnetting and hook fishing, or 50 kilograms for all other methods. The restrictions apply to waters west of the South Australian-Victorian border during November and to waters east of that border during December.

## Physical characteristics

For the purpose of the survey, the population was defined as boats endorsed for the southern shark fishery that caught shark within the survey years. Therefore, boats that possess endorsements for the fishery but did not fish for shark were excluded from the survey population.

The fleet was divided into three sectors on the basis of the number of units allocated under the current management plan — boats with 10 units, 6 units and 5 or less units. As mentioned previously, the units refer to the amount of gillnet a boat may use, where each unit is equivalent to 420 metres. For example, a boat with 10 units may fish with no more than 4.2 kilometres of net in the water at any one time. A sample of boats from each sector was chosen for inclusion in the survey.

The physical characteristics of boats in each sector of the fishery over the survey period are presented in table 5. Based on

## 5 Boat characteristics, southern shark fishery: population and sample <sup>a</sup> Average per boat

	Unit	5 or less units		6 units		10 units		All boats	
		Sample	Population	Sample	Population	Sample	Population	Sample	Population
<b>1990-91</b>									
Number of boats	no.	19	49	9	25	13	40	41	114
Effort	kml	130 (18)	138	360 (22)	311	1 020 (12)	918	490 (9)	450
Catch									
- gummy	kg	5 870 (21)	5 272	13 150 (25)	12 568	23 740 (14)	22 224	13 730 (11)	12 820
- school	kg	1 740 (26)	2 455	3 090 (32)	4 396	19 830 (23)	19 258	8 380 (19)	8 777
- other	kg	1 030 (39)	906	2 680 (35)	1 954	3 940 (20)	6 031	2 410 (16)	2 934
Total	kg	8 640 (0)	8 633	18 920 (0)	18 918	47 510 (0)	47 513	24 520 (0)	24 531
<b>1991-92 <sup>p</sup></b>									
Number of boats	no.	20	47	10	25	14	40	44	112
Effort	kml	90 (19)	92	170 (16)	237	820 (16)	708	370 (13)	345
Catch									
- gummy	kg	3 600 (20)	3 618	14 320 (29)	12 647	24 910 (11)	21 681	13 600 (10)	12 084
- school	kg	2 060 (30)	2 030	3 110 (32)	5 487	16 640 (22)	16 091	7 500 (18)	7 824
- other	kg	420 (32)	431	2 670 (37)	1 967	5 780 (29)	9 556	2 840 (22)	4 033
Total	kg	6 080 (0)	6 079	20 100 (0)	20 101	47 330 (0)	47 328	23 940 (0)	23 941

<sup>a</sup> Figures in parentheses are relative standard errors. <sup>p</sup> Preliminary.

## 6 Financial performance of southern shark fishery boats <sup>a</sup> Average per boat

Unit	5 or less units		6 units		10 units		All boats	
	1990-91	1991-92	1990-91	1991-92	1990-91	1991-92	1990-91	1991-92
<b>Receipts</b>								
Shark receipts	\$ 43 204 (14)	44 730 (18)	83 377 (22)	110 690 (19)	222 405 (11)	253 710 (8)	114 891 (9)	134 090 (7)
Lobsters receipts	\$ 68 646 (21)	72 820 (22)	38 887 (40)	33 810 (51)	7 004 (82)	17 140 (61)	40 491 (18)	44 220 (19)
Scallops receipts	\$ 4 491 (69)	5 100 (71)	12 722 (60)	11 660 (58)	0 (0)	0 (0)	4 720 (45)	4 740 (45)
Other fishing receipts	\$ 19 520 (34)	25 010 (27)	12 512 (45)	9 130 (40)	21 670 (64)	18 670 (55)	18 737 (31)	19 200 (24)
Non-fishing receipts	\$ 3 184 (20)	8 000 (30)	2 618 (24)	2 240 (33)	11 729 (42)	40 500 (49)	6 058 (29)	18 320 (39)
Total cash receipts	\$ 139 045 (8)	155 670 (9)	150 115 (6)	167 520 (11)	262 807 (10)	330 020 (9)	184 898 (6)	220 580 (6)
<b>Costs</b>								
Administration	\$ 2 597 (12)	2 770 (11)	3 227 (19)	3 090 (18)	5 122 (15)	5 770 (22)	3 621 (9)	3 910 (12)
Bait	\$ 4 423 (20)	3 480 (20)	3 505 (50)	2 750 (58)	0 (0)	170 (80)	2 670 (20)	2 130 (22)
Crew costs	\$ 47 329 (9)	54 430 (11)	43 068 (9)	51 240 (15)	93 923 (13)	114 200 (8)	62 743 (8)	75 060 (6)
Food	\$ 3 095 (19)	3 470 (17)	3 850 (20)	4 020 (17)	4 694 (18)	4 830 (19)	3 822 (11)	4 080 (11)
Freight and marketing	\$ 3 779 (46)	2 670 (43)	9 405 (40)	10 600 (36)	11 901 (50)	11 500 (47)	7 862 (30)	7 590 (28)
Fuel	\$ 14 628 (11)	12 840 (10)	15 116 (14)	13 130 (15)	25 416 (12)	25 720 (11)	18 521 (7)	17 500 (7)
Insurance	\$ 2 798 (18)	3 750 (19)	4 448 (8)	3 720 (14)	6 912 (9)	8 760 (15)	4 604 (7)	5 530 (10)
Interest paid	\$ 6 945 (23)	9 010 (19)	8 052 (30)	7 120 (30)	24 788 (26)	19 890 (30)	13 448 (18)	12 470 (18)
Licence fees and levies	\$ 6 585 (8)	6 720 (8)	7 537 (9)	7 790 (16)	7 521 (12)	8 530 (9)	7 122 (6)	7 610 (6)
Repairs and maintenance	\$ 19 431 (9)	24 810 (11)	15 397 (15)	14 270 (16)	33 234 (15)	46 830 (25)	23 390 (8)	30 320 (14)
Other costs	\$ 6 183 (13)	6 750 (12)	7 099 (27)	6 550 (26)	7 609 (18)	8 300 (16)	6 884 (10)	7 260 (9)
Total cash costs	\$ 117 793 (7)	130 690 (8)	120 704 (6)	124 280 (10)	221 119 (9)	254 480 (6)	154 686 (5)	173 470 (4)
<b>Boat cash income</b>	\$ 21 252 (16)	24 970 (17)	29 411 (24)	43 240 (21)	41 688 (30)	75 540 (24)	30 212 (16)	47 110 (15)
less depreciation <sup>b</sup>	\$ 10 349 (19)	10 190 (18)	6 653 (30)	5 010 (28)	19 301 (22)	7 860 (ns)	12 679 (14)	8 200 (42)
<b>Boat profit</b>	\$ 10 903 (31)	14 780 (31)	22 757 (38)	38 230 (25)	22 387 (59)	67 680 (23)	17 532 (30)	38 910 (16)
plus interest, leasing and rent	\$ 7 579 (21)	9 700 (17)	10 583 (31)	9 670 (31)	27 948 (24)	22 810 (26)	15 384 (17)	14 380 (16)
<b>Profit at full equity</b>	\$ 18 482 (18)	24 490 (18)	33 340 (18)	47 910 (17)	50 335 (22)	90 490 (22)	32 917 (13)	53 290 (14)
<b>Capital</b>	\$ 149 400 (10)	159 100 (10)	184 740 (10)	162 950 (11)	244 200 (11)	246 070 (12)	190 410 (6)	191 020 (7)
<b>Rate of return</b>	% 12.4 (21)	15.4 (21)	18 (26)	29.4 (21)	20.6 (22)	36.8 (20)	17.3 (14)	27.9 (14)

<sup>a</sup> Figures in parentheses are relative standard errors. <sup>b</sup> Depreciation adjusted for profit or loss on capital items sold.

## 7 Financial performance of specialist shark operators in the southern shark fishery <sup>a</sup> Average per boat

Unit	1990-91		1991-92			
	All boats	5 or less units	6 units	10 units	All boats	
<b>Receipts</b>						
Shark receipts	\$ 201 461 (7)	85 110 (22)	148 090 (19)	281 760 (6)	199 380 (6)	
Lobsters receipts	\$ 0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	
Scallops receipts	\$ 518 (78)	980 (77)	0 (0)	0 (0)	240 (77)	
Other fishing receipts	\$ 3 676 (27)	330 (77)	12 130 (51)	2 690 (43)	4 550 (37)	
Non-fishing receipts	\$ 9 754 (38)	12 010 (65)	2 520 (47)	51 660 (49)	29 310 (44)	
Total cash receipts	\$ 215 410 (7)	98 410 (15)	162 740 (18)	336 110 (11)	233 490 (9)	
<b>Costs</b>						
Administration	\$ 4 817 (11)	2 230 (11)	2 860 (26)	4 600 (26)	3 570 (18)	
Bait	\$ 362 (80)	1 180 (76)	0 (0)	0 (0)	290 (76)	
Crew costs	\$ 75 572 (11)	27 630 (23)	45 160 (21)	104 990 (10)	70 710 (8)	
Food	\$ 4 366 (15)	2 950 (26)	4 470 (20)	5 020 (22)	4 370 (14)	
Freight and marketing	\$ 5 787 (41)	1 570 (65)	15 020 (41)	7 810 (54)	8 160 (32)	
Fuel	\$ 20 951 (9)	7 000 (18)	10 570 (23)	26 150 (14)	17 470 (11)	
Insurance	\$ 5 411 (7)	2 600 (45)	3 170 (23)	9 460 (17)	6 170 (14)	
Interest paid	\$ 19 361 (25)	7 680 (45)	5 290 (46)	20 650 (39)	13 520 (31)	
Licence fees and levies	\$ 7 338 (9)	5 200 (7)	7 240 (23)	9 450 (8)	7 850 (8)	
Repairs and maintenance	\$ 30 103 (12)	18 390 (18)	15 510 (23)	54 620 (28)	35 700 (22)	
Other costs	\$ 7 301 (15)	6 160 (13)	5 160 (31)	6 430 (20)	6 040 (13)	
Total cash costs	\$ 181 368 (5)	82 570 (17)	114 460 (15)	249 180 (8)	173 830 (6)	
<b>Boat cash income</b>	\$ 34 042 (27)	15 840 (26)	48 280 (31)	86 930 (26)	59 650 (20)	
less depreciation <sup>b</sup>	\$ 15 606 (20)	7 050 (33)	3 130 (29)	19 220 (27)	12 100 (22)	
<b>Boat profit</b>	\$ 18 436 (52)	8 800 (60)	45 150 (34)	67 710 (31)	47 550 (23)	
plus interest, leasing and rent	\$ 21 539 (23)	8 100 (42)	6 440 (47)	22 880 (35)	15 030 (28)	
<b>Profit at full equity</b>	\$ 39 975 (19)	16 900 (28)	51 600 (27)	90 590 (30)	62 590 (23)	
<b>Capital</b>	\$ 192 559 (11)	141 290 (23)	127 160 (14)	284 000 (10)	208 750 (8)	
<b>Rate of return</b>	% 20.8 (18)	12 (35)	40.6 (28)	31.9 (25)	30 (20)	

<sup>a</sup> Figures in parentheses are relative standard errors. Shark specialists are those operators for whom shark catches make up greater than 80 per cent of gross fishing receipts. <sup>b</sup> Depreciation adjusted for profit or loss on capital items sold.

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logbook data for the population, the number of active vessels in the fleet was reduced by around 2 per cent from 114 boats in 1990-91 to 112 in 1991-92.

For the fishery as a whole, shark catches remained fairly constant between 1990-91 and 1991-92, falling by less than 3 per cent. However, trends in catches across the fishery varied. Average shark catches of operators with 10 units of net remained fairly constant between 1990-91 and 1991-92. Operators with 6 units increased catches of shark by around 6 per cent, on average, between the two years. However, average shark catches of the operators with 5 or less units fell by around 30 per cent between 1990-91 and 1991-92.

This fall in catch for the operators with 5 or less units of net can be partly attributed to the net restrictions. With only 2 kilometres of net or less, shark fishing was only undertaken at times when catch rates were expected to be high. As a result, the net reductions resulted in less effort by these fishermen and consequent lower catches.

Operators with 10 units and operators with 6 units have also reduced their effort applied to the fishery. However, the extra units of net possessed by these groups may have meant that these groups were better able to respond to the net reductions and maintain their catch levels than the operators with 5 or less units of net.

## Catch value and location

The value of catches in the southern shark fishery during 1991-92 are given in figure D. The major commercial species caught in the southern shark fishery are school and gummy shark. A number of other shark species are also caught. Catches from logbooks and average prices received by fishermen for these species in 1991-92 were used to construct this map.

From the map, most of the high value catch is taken in Bass Strait. Other high value areas occur off Kangaroo Island and

on the edge of the Great Australian Bight. Areas of lower valued catch are off south eastern Tasmania, western Victoria and western South Australia.

Most of the value of catch in Bass Strait is from gummy shark, while most of the value of catch off South Australia is from school shark. School shark generally inhabit waters off the continental shelf and upper continental slope to depths up to 500 metres. Gummy shark prefer shallower waters, and are most commonly found in waters less than 80 metres deep. A number of other shark species are caught in deeper waters and used for producing shark liver oil.

## Financial performance

The major measures of the financial performance of boats in the southern shark fishery obtained from the survey are given in table 6. It should be noted that these estimates include activities in other fisheries as well as the southern shark fishery. A major influence on the financial performance of boats in the southern shark fishery over the survey period is income from fishing operations in other fisheries. A summary of the major measures of financial performance for shark specialist operators are presented in table 7.

## Receipts

On average, total cash receipts for all fishery operations of southern shark fishery operators rose an estimated 19 per cent in 1991-92 from the previous year. This increase came partly from an increase in shark receipts (17 per cent) but also from an increase in receipts from other fishing operations (receipts from lobster increased by around 9 per cent). Many southern shark fishery operators hold endorsements in other fisheries. Shark fishing is a part time or seasonal activity for many operators who also fish for rock lobster, scallops, scale fish, or other species. The degree of involvement and dependence on

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the shark fishery varies both within and between sectors.

The 10 unit sector of the fleet showed the largest increase, with average receipts estimated to have risen by around 26 per cent (shark receipts increased on average by around 14 per cent, while rock lobster receipts more than doubled). Operators with 6 units of net experienced an average increase in receipts of around 12 per cent in line with increased catches and higher prices. Receipts for operators with 5 or less units were also estimated to have increased by around 12 per cent.

For specialist shark operators, total cash receipts increased, on average, by around 8 per cent in 1991-92 as compared with the previous year, mainly due to increases in non-fishing income (such as charter fees).

In 1991-92, on average, shark fishing provided a smaller proportion of fishing income to the operators with 5 or less units than to the other sectors of the fleet — 29 per cent compared with 66 per cent for the operators with 6 units and 77 per cent for the operators with 10 units of net. For the boats with 5 or less units of net, receipts from the rock lobster fisheries provided just under 50 per cent of their fishing income in 1991-92. For operators with 6 units of net, rock lobster provided 20 per cent of their fishing income, and only 5 per cent for the operators with 10 units of net.

On average, therefore, operators with 5 or less units of net are more dependent on other fisheries (in particular the rock lobster fishery) to maintain their incomes than the other two groups. However, for operators without endorsements in other fisheries, it is likely that those operators with 5 or less units will be most affected by changes in conditions in the shark fishery.

### **Costs**

On average, total cash costs for the whole fishery rose by an estimated 12 per cent per vessel in 1991-92 compared with 1990-91. Total cash costs rose by around 15 per cent for operators with 10 units of net, 11 per

cent for operators with 5 or less units of net and 3 per cent for operators with 6 units of net. For shark specialist operators, total cash costs fell by around 4 per cent in 1991-92 compared with 1990-91. This was largely due to lower labour costs, reduced fuel bills and lower interest payments.

Crew costs are the major cash cost for shark operators and are calculated as a proportion of boat revenue. From 1990-91 to 1991-92, average crew costs rose by around 20 per cent to \$75 000. The increase in these costs occurred because they are directly related to boat catch and price. For shark specialist boats, average labour costs decreased by around 6 per cent from 1990-91 to 1991-92, following lower shark catches.

Average interest payments fell by over 6 per cent in 1991-92 to \$12 500. In 1991-92, interest costs for operators with 10 units of net averaged nearly \$20 000, more than double that of operators with 6 units of net and operators with 5 or less units of net (\$7000 and \$9000 respectively). This reflects the higher level of borrowing undertaken by these operators as a result of amalgamation of endorsements and associated upgrading of vessels.

Fuel costs accounted for around 10 per cent of total cash costs in 1991-92. On average, fuel costs fell by around 5 per cent between 1990-91 and 1991-92. Shark specialist boats showed a much larger fall in fuel costs of around 17 per cent. This reflects the reduced effort in the fishery between 1990-91 and 1991-92.

### **Boat cash income and profit**

Boat cash income is one measure of the boat's capacity to continue operating in the industry in the short term. In the short term, during which the fishing boat does not need to be replaced, fishermen can withstand a negative return on investment as long as they receive sufficient return to meet all of the cash costs incurred. Average boat cash income for operators rose by around 56 per cent to \$47 000 in 1991-92. For

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operators with 10 units of net, boat cash income rose by 81 per cent to \$75 500, while for operators with 6 units of net, boat cash incomes rose by 47 per cent to \$43 000, and for operators with 5 or less units of net boat cash incomes increased by 17 per cent to \$25 000.

Boat profit (which allows for depreciation of capital) provides a measure of return to the business unit. Average profit increased from \$17 500 in 1990-91 to nearly \$39 000 in 1991-92. In 1991-92, operators with 10 units of net had an average boat profit of almost \$68 000, while operators with 6 units of net and operators with 5 or less units of net averaged profits of around \$38 000 and \$15 000 respectively.

For shark specialist boats, the average boat profit increased from \$18 500 in 1990-91 to around \$47 500 in 1991-92. In 1991-92, specialist shark operators with 6 and 10 units of net had boat profits slightly higher than their respective groups for the fishery as a whole, but specialist shark operators with 5 or less units of net had far lower boat profits (under \$9000). For owner operators, boat cash income and boat profits would be higher than the above estimates because there is an imputed owner operator allowance equivalent to that of a paid skipper included in the cash costs.

Return to full equity provides a measure of the return which would have been earned by the business unit had the boat been fully owned by the operator and, as

such, allows a comparison of the economic performance of all boats in the fishery. It should be noted that the rates of return reported in this study do not reflect the full asset holdings of the operators in the fishery, because the value of the licence are not included in the capital used to calculate the rates. If the value of the licence was included, the rates of return to full equity would be lower than estimated.

For the fishery as a whole, the average rate of return in 1991-92 was nearly 28 per cent, compared with the 1990-91 average of around 17 per cent. Operators with 10 units of net recorded the highest rate of return to boat capital in 1991-92, averaging almost 37 per cent, up from under 21 per cent in 1990-91. Operators with 6 units of net had an average rate of return to boat capital of 29 per cent in 1991-92 compared with a rate of 18 per cent in 1990-91. The rate of return to boat capital for operators with 5 or less units of net rose from 12 per cent in 1990-91 to an estimated 15 per cent in 1991-92.

The financial performance of the operators with less than 6 units of net is, on average, more sensitive to conditions in other fisheries (particularly the rock lobster fisheries) than the other operators. For shark specialist boats, rates of return to operators with 10, 6, and 5 less units of net were on average 32 per cent, around 41 per cent and 12 per cent respectively in 1991-92.



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# References

- ABARE 1991, *Australian Fisheries Statistics 1991*, Canberra.
- \_\_\_\_\_ 1993a, *Australian Fisheries Statistics 1993*, Canberra.
- \_\_\_\_\_ 1993b, *Indexes of Prices Received and Paid by Farmers, March Quarter 1993*, May, Canberra.
- \_\_\_\_\_ 1993c, *Fisheries Surveys Report 1992*, Canberra.
- BAE (Bureau of Agricultural Economics, now ABARE) 1984a, *Northern Prawn Fishery Survey, 1980-81 and 1981-82*, Canberra.
- \_\_\_\_\_ 1984b, *Southern Trawl Fishery Survey, 1978-79 and 1980-81*, Canberra.
- \_\_\_\_\_ 1985a, 'BAE report on South-eastern prawn fishery', *Australian Fisheries*, vol. 44, no. 1, pp. 36-7.
- \_\_\_\_\_ 1985b, *Southern Rock Lobster Fishery Survey, 1981-82 and 1982-83*, Canberra.
- \_\_\_\_\_ 1986, *Southern Bluefin Tuna Survey, 1980-82*, Canberra.
- Bardsley, P. and Chambers, R.L. 1984, 'Multipurpose estimation from unbalanced samples', *Journal of the Royal Statistical Society, Series C (Applied Statistics)*, vol. 33, pp. 290-9.
- Battaglione, T. and Campbell, D. 1991, 'Economic survey of the southern shark fishery', *Australian Fisheries*, vol. 50, no. 5, pp. 12-15.
- Battaglione, T., Reid, C. and Collins, P. 1992, 'An economic survey of the Torres Strait prawn fishery', *Australian Fisheries*, vol. 51, no. 7, pp. 28-31.
- Collins, D. and Kloessing, K. 1988, 'Financial performance in the northern prawn fishery — latest survey by ABARE', *Australian Fisheries*, vol. 47, no. 12, pp. 38-44.
- Commonwealth of Australia 1989, *New Directions for Commonwealth Fisheries Management in the 1990's: A Government Policy Statement*, AGPS, Canberra.
- Geen, G., Brown, D. and Pascoe, S. 1989, 'ABARE survey of the south east trawl fishery', *Australian Fisheries*, vol. 48, no. 10, pp. 45-7.
- Tilzey, R.D.J., Zann-Schuster, M., Klaer, N.L. and Williams, M.J. 1990, *The South East Trawl Fishery: Biological Synopses and Catch Distributions for Seven Major Commercial Fish Species*, Bureau of Rural Resources Bulletin, no. 6, Canberra.

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# Previous ABARE fisheries surveys

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## **Northern prawn fishery**

<i>Years covered</i>	<i>Reference</i>
1980-81 to 1981-82	BAE (1984a)
1986-87 to 1987-88	Collins and Kloessing (1988)
1989-90 to 1991-92	ABARE (1993c)

## **East coast prawn fishery**

<i>Years covered</i>	<i>Reference</i>
1980-81 to 1982-83	BAE (1985a)

## **East coast tuna fishery**

<i>Years covered</i>	<i>Reference</i>
1989-90 to 1990-91	ABARE (1993c)

## **Southern rock lobster fishery**

<i>Years covered</i>	<i>Reference</i>
1981-82 to 1982-83	BAE (1985b)

## **South east fishery**

<i>Years covered</i>	<i>Reference</i>
1978-79 to 1980-81	BAE (1984b)
1985-86 to 1987-88	Geen, Brown and Pascoe (1989)
1989-90 to 1991-92	ABARE (1993c)

## **Southern bluefin tuna fishery**

<i>Years covered</i>	<i>Reference</i>
1980-81 to 1981-82	BAE (1986)

## **Southern shark fishery**

<i>Year covered</i>	<i>Reference</i>
1988-89	Battaglione and Campbell (1991)

## **Torres Strait prawn fishery**

<i>Year covered</i>	<i>Reference</i>
1989-90	Battaglione, Reid and Collins (1992)

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# Other ABARE survey data services

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## ***Agriculture and Resources Quarterly***

Each issue contains summary estimates and forecasts for fisheries products.

## ***Farm Surveys Report***

Each year ABARE surveys the physical and financial performance of the main cropping, livestock and dairy industries in Australia. Estimates, on an 'average per farm' basis, are provided for farm costs, receipts, income, profit, rates of return, capital, assets and debt and for farm area, production and labour use.

*Contact:* Denise Flamia, ABARE publications officer, on (06) 272 2211.

## **ASPIRE**

This computer package provides time series data from 1977-78 to 1991-92 on a wide range of physical and financial characteristics of farms covered in ABARE's annual surveys.

ASPIRE also provides graphical presentations of ABARE survey data. The package allows up to six variables to be compared simultaneously. Three ASPIRE packages are available:

- Australian agricultural and grazing industries survey (AAGIS)
- Australian dairy industry survey (ADIS)
- AAGIS and ADIS combined

*Contact:* Vince O'Donnell, ABARE Surveys Section, on (06) 272 2255.

## **Mapping services**

ABARE has the appropriate software, computing equipment and staff trained in mapping surveyed industry characteristics.

ABARE is also anticipating being able to cross-tabulate survey data with information on other variables such as climate and topography which will allow more sophisticated assessment of a range of factors affecting Australia.

*Contact:* Dr Ray Hinde, Statistical and Mathematical Research Section, on (06) 272 2218.

## **Customised data services**

### **Tabulations**

ABARE can provide special tabulations to meet specific requirements such as estimates for subpopulations, cross-tabulation of variables and quartiles.

*Contact:* John Tucker, ABARE Surveys Section, on (06) 272 2277.

### **Collections**

ABARE's survey system can be used for:

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- advice on surveys and questionnaire design.

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### **Statistical consultancy**

ABARE can provide expert advice on:

- designing and selecting a sample
- data analysis
- graphical presentation of results
- time series analysis
- data modelling and simulation
- statistical software evaluation

*Contact:* Dr Ray Hinde, Statistical and Mathematical Research Section, on (06) 272 2218.



# FISHERIES

Each year ABARE surveys the physical and financial performance of a number of key Commonwealth fisheries.

In this report, information is included on the northern prawn and south east fisheries for the financial years 1990-91 to 1992-93 and the southern shark fishery for the financial years 1990-91 and 1991-92.

Estimates are provided on an 'average per vessel' basis, and include fishing costs, receipts, profit and rates of return.

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