# The Economic Impact of Aquaculture on the South Australian State and Regional Economies, 2001/02

A report prepared for

Aquaculture Group
Primary Industries and Resources South Australia

Prepared by

EconSearch Pty Ltd

July 2003

EconSearch Pty Ltd
PO Box 746, Unley BC SA 5061
Tel: (08) 8357 9560
Fax: (08) 8357 2299
www.econsearch.com.au

# Contents

# Tables

# Figures



# Abbreviations

| | |
|---|---|
| ABARE | Australian Bureau of Agricultural and Resource Economics |
| AFMA | Australian Fisheries Management Authority |
| SA | South Australia |

# Executive Summary

The aim of this study was to estimate the economic impact of aquaculture activity in South Australia in 2001/02. The results reported here update and expand on those provided in previous studies (EconSearch 1997b, 1998, 1999, 2001, 2002a). This report provides estimates of economic impact for 2001/02 by aquaculture sector (tuna, oysters, abalone, Atlantic salmon, mussels, barramundi, yabbies/marron and other aquaculture) at the state and regional (Eyre Peninsula, Limestone Coast and balance of South Australia) levels.

The results of this study illustrate clearly the significance of aquaculture in South Australia in terms of business activity, household income and contribution to the state's growth and employment levels.

Previous studies have only included the first level of processing, marketing or handling of aquaculture production in the overall economic impact. However, for the purpose of this and future analyses, the following stages in the marketing chain are included in the quantifiable economic impact:

- the farm gate value of production;
- the net value of local (SA) processing;
- the net value of local retail and food service trade; and
- the value of local transport services at all stages of the marketing chain.

In addition, other facets of regional economic development associated with the aquaculture industry are qualitatively assessed.

The results of the analysis, at the state level, are summarised in Tables E.1 and E.2. For the state as a whole the industry in 2001/02 was estimated to have a farm gate value of $284 million with associated direct business turnover impacts in the processing, transport, retail and food service sectors of $42 million (Table E.1). In total, the value of aquaculture industry output was estimated at over $325 million. This activity generated business turnover (output) of $252 million in other South Australian industries.

In terms of employment, there were over 1,170 jobs generated directly in aquaculture, over 200 jobs generated directly in downstream activities (total aquaculture of 1,380 jobs) and almost 1,240 flow-on jobs generated in other sectors of the state's economy in 2001/02.

The aquaculture industry in aggregate is dominated by tuna farming (Table E.2). Tuna farming generated around 85 per cent of the industry's output and value added impacts and approximately 70 per cent of the industry's employment and household income impacts in 2001/02.

Table E.1 The direct and flow-on economic impact of aquaculture in South Australia, 2001/02

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Direct effects | | | | | | | | |
| Aquaculture production | 283.5 | 49% | 133.1 | 44% | 1,173 | 45% | 34.2 | 36% |
| Aquaculture downstream [a] | 42.1 | 7% | 14.9 | 5% | 207 | 8% | 8.3 | 9% |
| *Total Direct* | *325.6* | *56%* | *148.0* | *49%* | *1,380* | *53%* | *42.6* | *45%* |
| Flow-on effects | | | | | | | | |
| Tuna Fishing | 70.5 | 12% | 64.5 | 21% | 224 | 9% | 11.2 | 12% |
| Other Sectors | 181.4 | 31% | 91.4 | 30% | 1,013 | 39% | 40.7 | 43% |
| *Total Flow-on* | *251.9* | *44%* | *155.9* | *51%* | *1,237* | *47%* | *51.9* | *55%* |
| **Total** | **577.5** | **100%** | **303.8** | **100%** | **2,617** | **100%** | **94.4** | **100%** |

[a] Processing, transport, retail and food services.

Source: EconSearch analysis.

Table E.2 The total economic impact (direct and flow-on) of aquaculture in South Australia, by aquaculture sector, 2001/02

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Tuna farming | 490.8 | 85.0% | 260.1 | 85.6% | 1,806 | 69.0% | 69.8 | 73.9% |
| Oyster farming | 57.6 | 10.0% | 28.9 | 9.5% | 514 | 19.7% | 15.5 | 16.4% |
| Abalone farming | 5.6 | 1.0% | 3.0 | 1.0% | 64 | 2.4% | 1.7 | 1.8% |
| Marine finfish farming | 2.3 | 0.4% | 1.1 | 0.4% | 37 | 1.4% | 0.9 | 1.0% |
| Mussels farming | 1.6 | 0.3% | 0.9 | 0.3% | 31 | 1.2% | 0.7 | 0.8% |
| Barramundi farming | 8.7 | 1.5% | 4.4 | 1.4% | 74 | 2.8% | 2.6 | 2.8% |
| Yabby/Marron farming | 1.1 | 0.2% | 0.6 | 0.2% | 13 | 0.5% | 0.2 | 0.2% |
| Other aquaculture | 9.8 | 1.7% | 4.9 | 1.6% | 78 | 3.0% | 2.9 | 3.1% |
| **Total (SA)** | **577.5** | **100.0%** | **303.8** | **100.0%** | **2,617** | **100.0%** | **94.4** | **100.0%** |

Source: EconSearch analysis.

In regional areas, the impact of the aquaculture industry in 2001/02 was concentrated in the Eyre Peninsula region, reflecting the dominance of tuna farming in the total (Table E.3).

Table E.3 The total regional economic impact (direct and flow-on) of aquaculture in South Australia, 2001/02

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Eyre Peninsula | 471.6 | 97% | 252.5 | 97% | 2,199 | 92% | 70.1 | 93% |
| Limestone Coast | 6.0 | 1% | 3.2 | 1% | 83 | 3% | 2.4 | 3% |
| Balance of SA | 8.6 | 2% | 4.6 | 2% | 107 | 4% | 2.6 | 3% |
| **Total Regional Impact** | **486.2** | **100%** | **260.3** | **100%** | **2,389** | **100%** | **75.1** | **100%** |

Source: EconSearch analysis.

# 1. Introduction

The aim of this study was to estimate the economic impact of aquaculture activity in South Australia in 2001/02. The results reported here update and expand on those provided in previous studies (EconSearch 1997b, 1998, 1999, 2001 and 2002a). This report provides estimates of economic impact by aquaculture sector (tuna, oysters, abalone, Atlantic salmon, mussels, barramundi, yabbies/marron and other aquaculture) and assesses the impacts of these sectors at both the regional (Eyre Peninsula, Limestone Coast and the balance of SA) and state levels.

The report is structured as follows:

| | |
|---|---|
| Section 2: | The general approach to the study is outlined. |
| Section 3: | A summary of aquaculture production in South Australia. |
| Sections 4 to 7: | The economic impacts of each aquaculture sector are presented at the state and regional levels. |
| Section 8: | Other facets of regional economic development associated with aquaculture activity in SA are presented. |
| Section 9: | Summary of the results. |

# 2. Study Approach

## 2.1 Method of Analysis

The presence of a large industry or set of enterprises has considerable effects on the character of the local economy in which it is embedded. In the case of an aquaculture development, the enterprise, to support its own activities, makes purchases of spat or fingerlings, feedstuffs, other material inputs, labour, energy and services. Much of the expenditure goes to persons and companies situated in the local region.

The principle of this expenditure dependence is clearly defined. If aquaculture activity were to cease, there would be consequent reductions in the gross revenues of other sectors in the region. Conversely, if aquaculture activity were to increase, there would be increases in the gross revenues of other sectors. The extent of this type of economic impact can be measured through input-output modelling. This study applies input-output analytical procedures to measure the impact of aquaculture development on the South Australian state and regional economies. For a technical description of the input-output modelling procedure refer to EconSearch 1997a or Appendix 1 and for a glossary of input-output terminology refer to Appendix 2.

In terms of scope, previous studies (EconSearch 1997b, 1998, 1999, 2001 and 2002a) have only included the first level of processing, marketing or handling of aquaculture production in the overall economic impact.

Estimates of the economic impact of aquaculture presented in this report are consistent with ‘message’ and method in[1]:

- South Australian Aquaculture Council (2002), *Final Draft State Aquaculture Action Plan*;
- PIRSA’s *Food for the Future* value chain analysis 2001/02[2]; and
- the overview of PIRSA Aquaculture’s strategic direction for South Australian marine and land based aquaculture industries.

To this end, the following stages in the marketing chain have been included in the quantifiable economic impact:

- the farm gate value of production[3];
- the net value of local (SA) processing;
- the net value of local retail and food service trade; and
- the value of local transport services at all stages of the marketing chain.

In addition, other facets of regional economic development associated with the aquaculture industry were qualitatively assessed.

The table below illustrates the change in scope of the economic impact assessment.

1 As discussed at the State Aquaculture Plan Working Group meeting at the Hilton Hotel on 19 November 2002.
2 The relevant information was obtained from Jack Langberg and Rob Esvelt (PIRSA, pers. comm.).
3 For tuna this will include the net value of farm gate production and the gross value of tuna fishing.

Table 2.1 Change in scope of the economic impact assessment

| Stage in Market Chain | Scope of Impact Analysis In Previous Studies [a] | Scope of Impact Analysis in Current and Future Studies |
|---|---|---|
| Farm gate production | Yes | Yes |
| Processing | Yes | Yes |
| Retail | No | Yes |
| Food Service | No | Yes |
| Transport between stages | Part | Yes |
| Other aspects of the economic impact of aquaculture | | |
| Regional investment | Yes (tuna only) | Yes – qualitative only |
| Tourism | No | Yes – qualitative only |
| Education and training | No | Yes – qualitative only |

[a] EconSearch (1997b, 1998, 1999, 2001 and 2002a).

As with previous reports, estimates of direct and flow-on economic impact are presented in terms of the following indicators:

- output (business turnover);
- value added (contribution to gross state product);
- employment; and
- household income.

This report was prepared by Matthew Ferris and Julian Morison.

## 2.2 Data

Despite the growing importance of the aquaculture industry in South Australia, very little economic data is compiled on the industry. The main sources of collated statistical information are the production (quantity and value) data collected by SARDI Aquatic Sciences and the value chain analysis conducted by PIRSA (Scorecard team).

For the current study, EconSearch compiled representative cost structures and other key information for enterprises operating in individual sectors of the aquaculture and fishing industries for distribution amongst and validation by key industry contacts.

Responses were received for:

- tuna farming (Brian Jeffriess, Tuna Boat Owners Association of South Australia);
- oyster farming (Bruce Zippel, Chairman, SA Aquaculture Council and private oyster grower);
- Atlantic salmon (Doug Peel, South East Atlantic Salmon); and
- mussel farming (Andy Dyer, Port Lincoln Mussel Growers).

Between them these sectors accounted for approximately 97 per cent of the gross value of aquaculture production in SA in 2001/02. For the remaining sectors, representative cost structures were derived from those used in previous studies. The representative cost structures were applied to industry aggregate value of production figures (provided by SARDI Aquatic Sciences) to obtain estimates of aggregate expenditures on a regional and state basis.

Other information on the aquaculture industry in South Australia was derived from EconSearch (2002b) and, for the Limestone Coast region, from EconSearch (2002c).

Estimates of the net value of local (SA) processing margins, the net value of local retail and food service trade margins and the value of local transport margins at all stages of the marketing chain were derived for each aquaculture sector from PIRSA's Food for the Future value chain analysis (Scorecard), 2001/02 (Jack Langberg and Rob Esvelt, PIRSA, pers. comm.) and, for the tuna farming sector, from Brain Jeffriess (pers. comm.).

# 3. Aquaculture Production in South Australia

Estimates of farm-gate aquaculture production and value of production for South Australia in 2001/02, as published by SARDI Aquatic Sciences and the PIRSA Scorecard team, are summarised in Table 3.1.

Without a sound basis for determining the relative accuracy of the two data sets and in order to maintain a consistent time series of data between this and previous studies (EconSearch 1997b, 1998, 1999, 2001, 2002a), the estimates of economic impact presented in this report are based on SARDI Aquatic Sciences estimates of farm-gate aquaculture production.

However, the impact of downstream activities (i.e. processing, transport, retail and food services) was based on margins provided by the PIRSA Scorecard team (Jack Langberg and Rob Esvelt, PIRSA, pers. comm.) and Brain Jeffriess (pers. comm.).

Table 3.1 Estimates of farm-gate aquaculture production, South Australia, 2001/02

| | Value ($m) | | Production (t) | |
|---|---|---|---|---|
| | SARDI Aquatic Sciences | PIRSA Scorecard | SARDI Aquatic Sciences | PIRSA Scorecard |
| Tuna | 260.5 | 244.8 | 9,245 | 9,000 |
| Oysters [a] | 13.3 | 15.2 | 3,464 | 4,000 |
| Other Aquaculture | 8.9 | 16.9 | 839 | 1,960 |
| Total | 282.7 | 276.9 | 13,548 | 14,960 |

[a] Estimates of oyster value and production from SARDI Aquatic Sciences refer to adult oysters only (i.e. exclude spat) and are measured in thousands of dozens, whereas estimates of oyster production from the PIRSA Scorecard refer to adult oysters measured in tonnes.

Source: SARDI Aquatic Sciences and PIRSA (Jack Langberg, pers. comm.).

Table 3.2 provides tuna farm production and value of production data from SARDI Aquatic Sciences for the seven years, 1995/96 to 2001/02. The farm output values in 1995/96 were significantly affected by the tuna disaster at Port Lincoln in April 1996. Over the period 1996/97 to 2000/01, whole weight of tuna into farms and processed weight out of farms increased at an average rate of 22 per cent per annum while the farm gate value of tuna increased at an average rate of 31 per cent per annum. Between 2000/01 and 2001/02 there were only marginal changes in farm output and value.

Table 3.2 Farmed tuna production, South Australia, 1996/97 to 2001/02

| | Into Farms | Farm Output | |
|---|---|---|---|
| | Whole Weight | Processed Weight | Farm Gate Value |
| | ‘000kg | ‘000kg | $m |
| 1995/96 | 3,362 | 1,170 | 29.3 |
| 1996/97 | 2,498 | 4,069 | 91.5 |
| 1997/98 | 3,610 | 4,927 | 120.7 |
| 1998/99 | 4,991 | 6,805 | 166.7 |
| 1999/00 | 5,133 | 7,750 | 240.0 |
| 2000/01 | 5,282 | 9,051 | 263.8 |
| 2001/02 | 5,234 | 9,245 | 260.5 |

Source: SARDI Aquatic Sciences, ABARE (2002) and AFMA (pers. comm.).

Table 3.3 provides oyster production and value of production data from SARDI Aquatic Sciences for the period 1994/95 to 2001/02. The gross value of (adult oyster and spat) production has increased at an average rate of 21 per cent per annum over the five-year period 1996/97 to 2001/02.

Table 3.3 Oyster production, South Australia, 1994/95 to 2001/02 [a]

| | 1994/95 | 1995/96 | 1996/97 | 1997/98 | 1998/99 | 1999/00 | 2000/01 | 2001/02 |
|---|---|---|---|---|---|---|---|---|
| Production (adult only): | | | | | | | | |
| Weight (‘000 kg) | 855 | 976 | 1,359 | na | na | na | na | na |
| Number (‘000 doz.) | na | na | 1,336 | 1,298 | 1,441 | 2,516 | 2,936 | 3,464 |
| Value: | | | | | | | | |
| Adult oysters ($'000) | 3,535 | 3,950 | 5,205 | 4,908 | 5,489 | 9,389 | 11,011 | 13,303 |
| Spat ($'000) | na | na | 610 | 1,168 | 997 | 800 | 579 | 856 |
| Total ($'000) | 3,535 | 3,950 | 5,815 | 6,076 | 6,486 | 10,189 | 11,590 | 14,159 |

[a] All figures have been rounded to the nearest thousand. Individual figures provided in the columns may not sum to the 'Total' for this reason.

Source: SARDI Aquatic Sciences.

Table 3.4 provides other aquaculture production and value of production data from SARDI Aquatic Sciences for the eight years 1994/95 to 2001/02. Both production and value of production increased significantly over the seven-year period, 1994/95 to 2000/01, production by an average of 22 per cent per annum and gross value of production by 24 per cent per annum. However, between 2000/01 and 2001/02, production of other aquaculture products in SA decreased by 11 per cent and the gross value of other aquaculture production decreased by 16 per cent.

Table 3.4 Other aquaculture production, South Australia, 1994/95 to 2001/02 [a]

| | 1994/95 | | 1995/96 | | 1996/97 | | 1997/98 | | 1998/99 | | 1999/00 | | 2000/01 | | 2001/02 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Whole Weight ('000kg) | Value ($'000) | Whole Weight ('000kg) | Value ($'000) | Whole Weight ('000kg) | Value ($'000) | Whole Weight ('000kg) | Value ($'000) | Whole Weight ('000kg) | Value ($'000) | Whole Weight ('000kg) | Value ($'000) | Whole Weight ('000kg) | Value ($'000) | Whole Weight ('000kg) | Value ($'000) |
| Barramundi | na | na | na | na | 138 | 1,642 | 193 | 2,681 | 249 | 3,192 | 279 | 3,330 | 264 | 2,743 | 255 | 2,653 |
| Marron | 5 | 99 | 6 | 141 | 5 | 116 | 6 | 131 | 7 | 160 | 12 | 304 | 8 | 196 | 11 | 282 |
| Blue Mussels | na | na | na | na | na | na | na | na | 84 | 183 | 81 | 173 | 111 | 260 | 171 | 371 |
| Abalone | na | na | na | na | na | na | na | na | 21 | 856 | 40 | 2,000 | 53 | 2,677 | 34 | 1,901 |
| Yabbies | 9 | 86 | 17 | 175 | 10 | 111 | 11 | 115 | 27 | 231 | 16 | 156 | 17 | 172 | 8 | 95 |
| Rainbow Trout | 32 | 188 | 21 | 158 | 25 | 191 | 23 | 118 | 14 | 101 | 8 | 49 | 13 | 176 | 26 | 192 |
| Atlantic Salmon | na | na | na | na | na | na | na | na | na | na | na | na | na | na | 64 | 596 |
| Other | 296 | 2,629 | 323 | 3,158 | 280 | 2,012 | 379 | 3,041 | 412 | 3,259 | 337 | 2,828 | 480 | 4,322 | 270 | 2,779 |
| **Total** | **342** | **3,002** | **367** | **3,632** | **458** | **4,072** | **612** | **6,086** | **814** | **7,982** | **773** | **8,840** | **946** | **10,546** | **839** | **8,869** |

[a] All figures have been rounded to the nearest thousand. Individual figures provided in the columns may not sum to the 'Total' for this reason.

Source: SARDI Aquatic Sciences.

In aggregate, tuna is the largest single sector in the state's aquaculture industry, accounting for approximately 92 per cent of the state's gross value of aquaculture production in 2001/02. The state's total value of seafood production (landed) in 2001/02 was almost $492 million[4]. Of this, tuna farming contributed approximately 53 per cent.

[4] This was comprised of $208 million for the fishing industry, $261 million for tuna farming and $23 million for other aquaculture.

# 4. The Economic Impact of Aquaculture in South Australia, 2001/02

This section of the report provides estimates of the direct economic impact of aquaculture production, aquaculture processing, the transport of aquaculture products and the sale of aquaculture products to the retail and food service sectors in South Australia. Estimates of the flow-on effects generated by these activities through the purchase of materials, services and labour are also provided.

## 4.1 The Economic Impact of Tuna Farming in South Australia, 2001/02

Table 4.1 and Figures 4.1 to 4.4 provide estimates of the economic impact generated by the tuna farming industry in SA on a sector-by-sector basis for 2001/02. Impacts are measured in terms of output (business turnover), value added (gross state product), employment and household income. Note that these impacts include the fishing activity associated with the tuna transferred to tuna farms but exclude the impacts associated with the tuna direct marketed to Japan.

Table 4.1 The economic impact of tuna farming in South Australia, 2001/02

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Direct effects | | | | | | | | |
| Tuna farming [a] | 260.5 | 53% | 118.2 | 45% | 735 | 41% | 23.5 | 34% |
| Processing | 14.3 | 3% | 3.8 | 1% | 50 | 3% | 2.4 | 3% |
| Transport | 9.2 | 2% | 4.6 | 2% | 45 | 2% | 2.3 | 3% |
| Retail | 0.0 | 0% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| Food services | 0.0 | 0% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| *Total Direct* | *284.0* | *58%* | *126.6* | *49%* | *830* | *46%* | *28.2* | *40%* |
| Flow-on effects | | | | | | | | |
| Tuna fishing | 70.5 | 14% | 64.5 | 25% | 224 | 12% | 11.2 | 16% |
| Property and business serv. | 30.9 | 6% | 19.1 | 7% | 101 | 6% | 4.6 | 7% |
| Manufacturing | 28.4 | 6% | 7.6 | 3% | 99 | 5% | 4.7 | 7% |
| Trade | 17.5 | 4% | 8.5 | 3% | 189 | 10% | 5.5 | 8% |
| Other fishing [b] | 12.1 | 2% | 6.7 | 3% | 66 | 4% | 2.8 | 4% |
| Transport | 10.8 | 2% | 5.4 | 2% | 53 | 3% | 2.7 | 4% |
| Finance | 5.4 | 1% | 3.7 | 1% | 32 | 2% | 1.8 | 3% |
| Other Sectors | 31.2 | 6% | 18.0 | 7% | 213 | 12% | 8.3 | 12% |
| *Total Flow-on* | *206.8* | *42%* | *133.5* | *51%* | *976* | *54%* | *41.6* | *60%* |
| **Total** | **490.8** | **100%** | **260.1** | **100%** | **1,806** | **100%** | **69.8** | **100%** |
| Total/Direct | 1.73 | | 2.05 | | 2.18 | | 2.47 | |

[a] Note the double counting in the output impact, also includes the value of tuna fishing.

[b] Principally pilchard fishing.

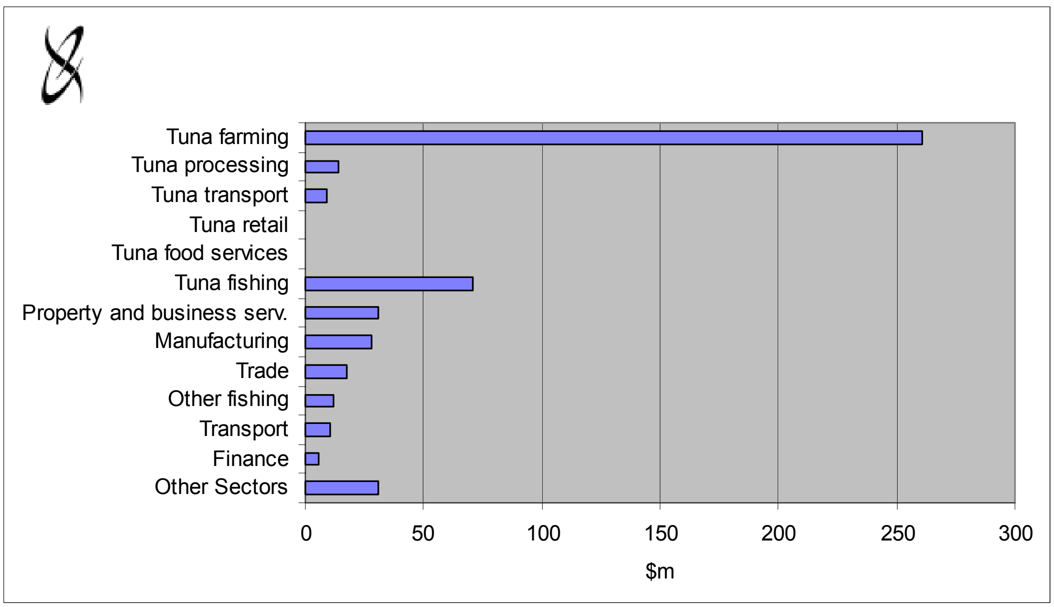
Source: EconSearch analysis.

***Business turnover impacts...***

There are substantial economic impacts from the tuna farming industry in South Australia. Direct business turnover (output) generated in South Australia by tuna farms summed to almost $261 million and in other sectors (processing and transport), almost $24 million, in 2001/02. Flow-ons to other sectors added another $207 million in business turnover. The sectors most affected were the tuna fishing (tuna capture[5]), other fishing (pilchards), manufacturing, trade, business and property services, transport, and finance sectors (Figure 4.1).

The bottom row of Table 4.1 gives the total impact/direct impact ratio for each economic indicator. For business turnover, the ratio of 1.73 indicates that for each dollar of sales generated by the tuna industry (farming and downstream) there is a total of $1.73 of business turnover generated by businesses throughout the state, $1 in the tuna industry (farming and downstream) and $0.73 in other sectors of the economy.

Figure 4.1 Tuna farming in South Australia, output impacts by sector, 2001/02




Source: EconSearch analysis.

***Value added effects...***

Value added is calculated as the value of output less the cost of goods and services used in producing the output. Value added is consistent with standard measures of economic activity, such as gross domestic product and gross state product. It provides an assessment of the net contribution to regional economic growth of a particular enterprise or activity[6].

---

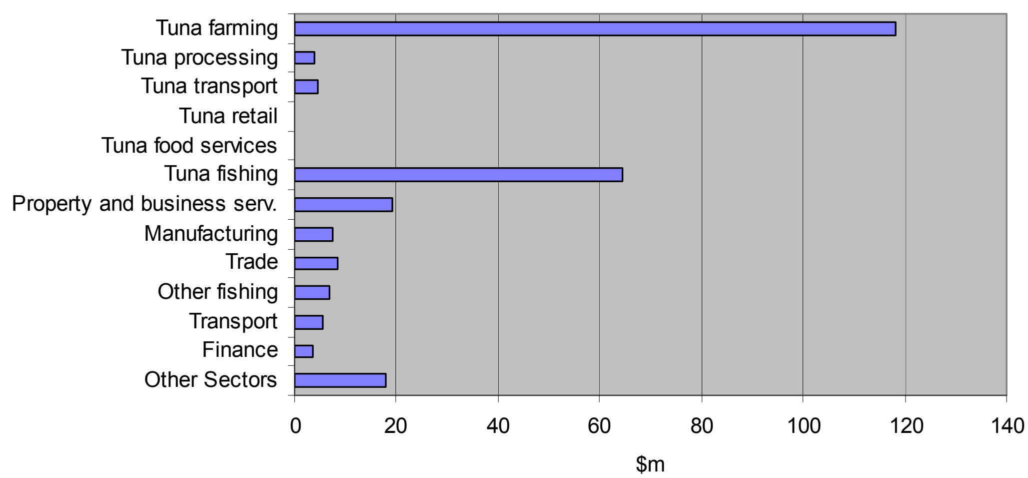
5 Note that the value of tuna fishing is also included in the direct impact of tuna farming.

6 The use of value added as a measure of economic impact overcomes the problem of double counting that arises from using business turnover for this purpose.

The direct value added generated in South Australia by the tuna industry was $127 million in 2001/02. Associated with this was flow-on value added in the other sectors of the state economy of almost $134 million (Table 4.1).

The flow-ons were greatest in the tuna fishing ($65m), property and business services ($19m), manufacturing ($8m), trade ($9m) and transport ($5m) sectors (Figure 4.2). The bottom row in Table 4.1 shows that for each one dollar of value added generated directly in the tuna industry there was an additional $1.05 ($2.05 total) in value added generated in other sectors of the state economy.

Figure 4.2 Tuna farming in South Australia, value added impacts by sector, 2001/02




Source: EconSearch analysis.

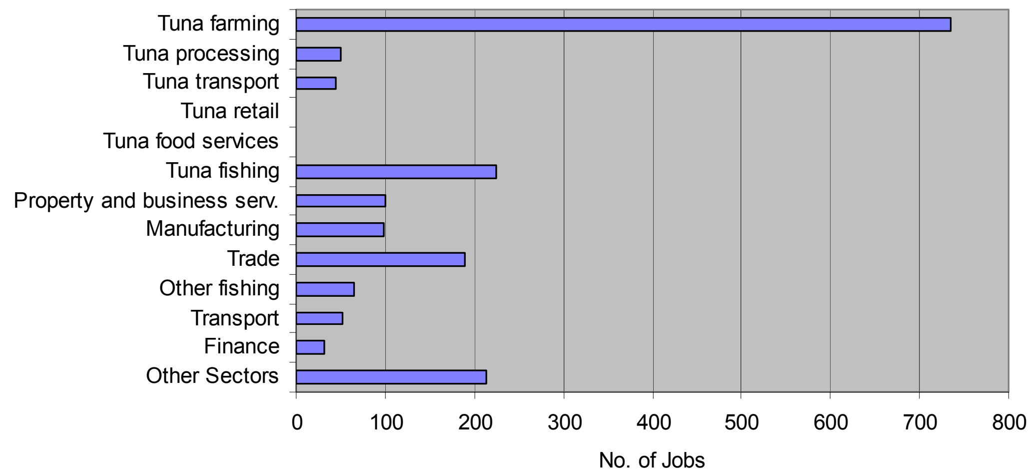
### *Employment and household income...*

A significant number of jobs were created as a result of the flow-on business activity associated with tuna farming, processing and transport. The tuna farms were responsible for the direct employment of approximately 735 people[7] and, through the associated processing and transport activities, another 95 people in 2001/02 (Table 4.1). Flow-on business activity was estimated to generate a further 980 jobs to give total employment of approximately 1,800 jobs in the state. The sectors of the economy with employment flow-ons from tuna farming, processing and transport include the tuna fishing (224 jobs), trade (189), manufacturing (99), property and business services (101), other fishing (66) and transport (53) sectors (Figure 4.3).

The bottom row in Table 4.1 shows that for each job generated directly in tuna farming, processing and transport there are an additional 1.18 jobs (2.18 jobs total) in the rest of the state.

[7] Full-time equivalent jobs.

Figure 4.3 Tuna farming in South Australia, employment impacts by sector, 2001/02

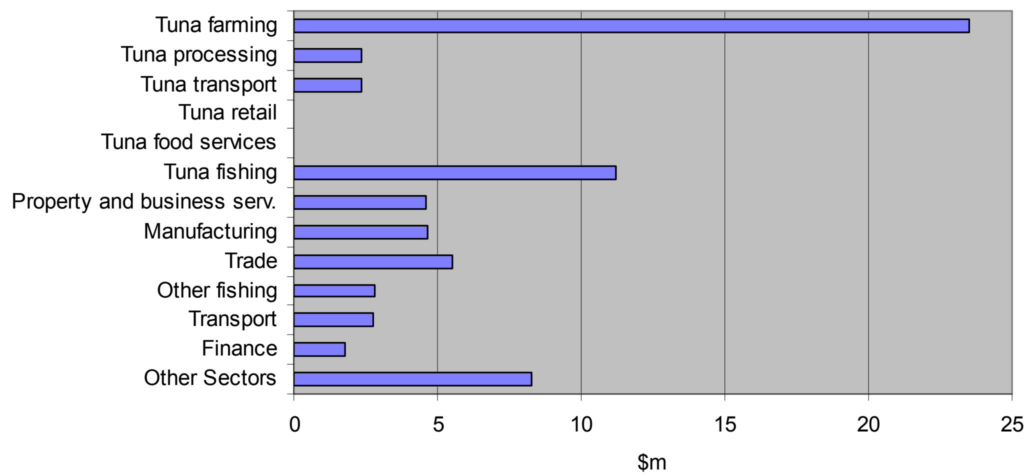



Source: EconSearch analysis.

It was estimated that personal income of $23.5 million was earned in the tuna farming industry in 2001/02, comprising both wages by employees and drawings by owner/operators. An additional $11.2 million was earned by licence holders and crew in the tuna fishing sector and a further $35.1 million by wage and salary earners in other sectors of the state economy (Figure 4.4).

For each $1.00 of household income generated directly by the tuna farms in 2001/02 there was an additional $1.47 ($2.47 total) generated in other sectors of the state economy.

Figure 4.4 Tuna farming in South Australia, household income impacts by sector, 2001/02




Source: EconSearch analysis.

## 4.2 The Economic Impact of Oyster Farming in South Australia, 2001/02

Table 4.2 provides estimates of the economic impact generated by oyster farming in South Australia on a sector-by-sector basis in 2001/02. As for tuna in the previous section, impacts are measured in terms of output (business turnover), value added (gross state product), employment and household income.

***Business turnover impacts...***

Direct business turnover (output) generated in SA by oyster farming enterprises summed to $14.2 million in 2001/02 while output generated in SA by associated downstream activities (processing, transport, retail and food service) summed to $13.4 million in 2001/02. Flow-ons to other sectors of the state economy added another $30.1 million in business turnover in 2001/02. The sectors most affected were the trade, manufacturing and property and business services sectors.

***Value added effects...***

As noted above, value added is calculated as the value of output less the cost of goods and services used in producing the output. In 2001/02, total oyster farming-related value added in South Australia was almost $29 million, $9.5 million generated by oyster farming directly, $4.6 million generated directly by downstream activities and almost $15 million generated in other sectors of the state economy. Although a growing industry, the oyster sector is still a relatively minor component of the state economy.

Table 4.2 The economic impact of oyster farming in South Australia, 2001/02 [a]

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Direct effects | | | | | | | | |
| Oyster farming [b] | 14.2 | 25% | 9.5 | 33% | 261 | 51% | 6.0 | 39% |
| Processing | 8.3 | 14% | 2.2 | 8% | 29 | 6% | 1.4 | 9% |
| Transport | 0.7 | 1% | 0.3 | 1% | 3 | 1% | 0.2 | 1% |
| Retail | 0.2 | 0% | 0.1 | 0% | 2 | 0% | 0.1 | 0% |
| Food services | 4.2 | 7% | 1.9 | 7% | 46 | 9% | 1.0 | 6% |
| *Total Direct* | *27.5* | *48%* | *14.1* | *49%* | *341* | *66%* | *8.6* | *56%* |
| Flow-on effects | | | | | | | | |
| Property and business serv | 7.4 | 13% | 4.5 | 15% | 25 | 5% | 1.2 | 8% |
| Manufacturing | 7.5 | 13% | 2.0 | 7% | 26 | 5% | 1.2 | 8% |
| Trade | 4.0 | 7% | 1.9 | 7% | 43 | 8% | 1.3 | 8% |
| Transport | 1.9 | 3% | 0.9 | 3% | 9 | 2% | 0.5 | 3% |
| Finance | 1.1 | 2% | 0.8 | 3% | 6 | 1% | 0.4 | 2% |
| Other Sectors | 8.1 | 14% | 4.7 | 16% | 63 | 12% | 2.3 | 15% |
| *Total Flow-on* | *30.1* | *52%* | *14.8* | *51%* | *173* | *34%* | *6.8* | *44%* |
| **Total Impact** | **57.6** | **100%** | **28.9** | **100%** | **514** | **100%** | **15.5** | **100%** |
| Total/Direct | 2.47 | | 2.38 | | 1.74 | | 2.02 | |

[a] Constitutes an upper estimate of the flow-on effects given the likelihood of some double counting of consumption induced effects in the retail and food services margins.

[b] Includes sales of spat.

Source: EconSearch analysis.

### *Employment and household income...*

In 2001/02, SA oyster farming was responsible for the direct employment of around 260 people[8] and downstream activities created employment for around 80 people. Flow-on business activity was estimated to generate a further 173 jobs. These jobs were concentrated in the trade (43), manufacturing (26) and business services (25) sectors.

Personal income of $6.0 million was earned in the oyster farming sector and $2.6 million in downstream activities. This comprised both wages by employees and estimated drawings by owner/operators. An additional $6.8 million was earned by wage earners in other businesses in the state as a result of oyster farming and downstream activities. The total household income impact was over $15 million.

## 4.3 The Economic Impact of Other Aquaculture in South Australia, 2001/02

The economic impacts of other aquaculture sectors in South Australia in 2001/02 (abalone, Atlantic salmon, mussels, barramundi, marron/yabbies and other aquaculture) are reported in Tables to 4.3 to 4.7, respectively.

[8] Full-time equivalent jobs.

These results are reported without comment, as the interpretation is identical to that for oysters and tuna farming described in the previous sections. Note that for most of the other aquaculture sectors, the impacts in terms of flow-on employment and household income are relatively low. As these sectors grow and sales increase, household income and flow-on employment impacts generated by recurrent expenditure are expected to increase as well.

Table 4.3 The economic impact of abalone farming in South Australia, 2001/02

| Sector | Output ($m) | | Value Added ($m) | | Employment (jobs) | | Household Income ($m) | |
|---|---|---|---|---|---|---|---|---|
| Direct effects | | | | | | | | |
| Abalone farming | 1.9 | 34% | 1.3 | 42% | 42 | 66% | 0.8 | 49% |
| Processing | 0.7 | 12% | 0.2 | 6% | 2 | 4% | 0.1 | 6% |
| Transport | 0.0 | 1% | 0.0 | 1% | 0 | 0% | 0.0 | 1% |
| Retail | 0.0 | 0% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| Food services | 0.0 | 0% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| *Total Direct* | *2.6* | *47%* | *1.5* | *49%* | *45* | *70%* | *1.0* | *56%* |
| Flow-on effects | | | | | | | | |
| Property and business serv | 0.7 | 12% | 0.4 | 14% | 2 | 3% | 0.1 | 5% |
| Manufacturing | 0.6 | 11% | 0.2 | 6% | 2 | 3% | 0.1 | 6% |
| Trade | 0.4 | 6% | 0.2 | 6% | 4 | 6% | 0.1 | 7% |
| Transport | 0.2 | 3% | 0.1 | 3% | 1 | 1% | 0.0 | 2% |
| Finance | 0.1 | 2% | 0.1 | 2% | 1 | 1% | 0.0 | 2% |
| Other Sectors | 1.1 | 19% | 0.6 | 21% | 10 | 15% | 0.4 | 22% |
| *Total Flow-on* | *3.0* | *53%* | *1.5* | *51%* | *19* | *30%* | *0.7* | *43%* |
| **Total** | **5.6** | **100%** | **3.0** | **100%** | **64** | **100%** | **1.7** | **100%** |
| Total/Direct | 2.13 | | 2.04 | | 1.43 | | 1.77 | |

Source: EconSearch analysis.

Table 4.4 The economic impact of Atlantic salmon farming in South Australia, 2001/02 [a]

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Direct effects | | | | | | | | |
| Atlantic Salmon farming | 0.6 | 26% | 0.3 | 24% | 27 | 73% | 0.5 | 59% |
| Processing | 0.2 | 9% | 0.1 | 5% | 1 | 2% | 0.0 | 4% |
| Transport | 0.0 | 1% | 0.0 | 1% | 0 | 0% | 0.0 | 0% |
| Retail | 0.0 | 2% | 0.0 | 2% | 0 | 1% | 0.0 | 2% |
| Food services | 0.1 | 5% | 0.1 | 5% | 1 | 3% | 0.0 | 3% |
| *Total Direct* | *1.0* | *42%* | *0.4* | *37%* | *30* | *80%* | *0.6* | *68%* |
| Flow-on effects | | | | | | | | |
| Property and business serv | 0.4 | 15% | 0.2 | 21% | 1 | 3% | 0.0 | 5% |
| Manufacturing | 0.3 | 14% | 0.1 | 8% | 1 | 3% | 0.1 | 6% |
| Trade | 0.2 | 9% | 0.1 | 9% | 2 | 6% | 0.1 | 7% |
| Transport | 0.1 | 3% | 0.0 | 4% | 0 | 1% | 0.0 | 2% |
| Finance | 0.0 | 2% | 0.0 | 3% | 0 | 1% | 0.0 | 2% |
| Other Sectors | 0.3 | 15% | 0.2 | 19% | 3 | 7% | 0.1 | 11% |
| *Total Flow-on* | *1.3* | *58%* | *0.7* | *63%* | *7* | *20%* | *0.3* | *32%* |
| **Total** | **2.3** | **100%** | **1.1** | **100%** | **37** | **100%** | **0.9** | **100%** |
| Total/Direct | 2.67 | | 3.15 | | 1.31 | | 1.54 | |

[a] Constitutes an upper estimate of the flow-on effects given the likelihood of some double counting of consumption induced effects in the retail and food services margins.

Source: EconSearch analysis.

Table 4.5 The economic impact of mussel farming in South Australia, 2001/02 [a]

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Direct effects | | | | | | | | |
| Mussel farming | 0.4 | 23% | 0.3 | 30% | 23 | 75% | 0.5 | 62% |
| Processing | 0.1 | 8% | 0.0 | 4% | 0 | 2% | 0.0 | 3% |
| Transport | 0.0 | 1% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| Retail | 0.0 | 2% | 0.0 | 1% | 0 | 1% | 0.0 | 1% |
| Food services | 0.1 | 4% | 0.0 | 4% | 1 | 3% | 0.0 | 2% |
| *Total Direct* | *0.6* | *37%* | *0.4* | *40%* | *25* | *81%* | *0.5* | *69%* |
| Flow-on effects | | | | | | | | |
| Property and business serv | 0.3 | 16% | 0.2 | 20% | 1 | 2% | 0.0 | 4% |
| Manufacturing | 0.2 | 14% | 0.1 | 7% | 1 | 3% | 0.0 | 5% |
| Trade | 0.1 | 9% | 0.1 | 8% | 2 | 5% | 0.0 | 6% |
| Transport | 0.1 | 4% | 0.0 | 3% | 0 | 1% | 0.0 | 2% |
| Finance | 0.0 | 2% | 0.0 | 3% | 0 | 1% | 0.0 | 2% |
| Other Sectors | 0.3 | 18% | 0.2 | 19% | 2 | 8% | 0.1 | 12% |
| *Total Flow-on* | *1.0* | *63%* | *0.5* | *60%* | *6* | *19%* | *0.2* | *31%* |
| **Total** | **1.6** | **100%** | **0.9** | **100%** | **31** | **100%** | **0.7** | **100%** |
| Total/Direct | 3.02 | | 2.75 | | 1.28 | | 1.50 | |

[a] Constitutes an upper estimate of the flow-on effects given the likelihood of some double counting of consumption induced effects in the retail and food services margins.

Source: EconSearch analysis.

Table 4.6 The economic impact of barramundi farming in South Australia, 2001/02 [a]

| Sector | Output ($m) | | Value Added ($m) | | Employment (jobs) | | Household Income ($m) | |
|---|---|---|---|---|---|---|---|---|
| Direct effects | | | | | | | | |
| Barramundi farming | 2.7 | 30% | 1.6 | 36% | 38 | 51% | 1.3 | 50% |
| Processing | 0.9 | 11% | 0.3 | 6% | 3 | 4% | 0.2 | 6% |
| Transport | 0.1 | 1% | 0.0 | 1% | 0 | 0% | 0.0 | 1% |
| Retail | 0.2 | 2% | 0.1 | 2% | 2 | 3% | 0.1 | 2% |
| Food services | 0.5 | 6% | 0.2 | 5% | 5 | 7% | 0.1 | 5% |
| *Total Direct* | *4.4* | *50%* | *2.2* | *50%* | *49* | *67%* | *1.7* | *63%* |
| Flow-on effects | | | | | | | | |
| Property and business serv | 1.1 | 13% | 0.7 | 16% | 4 | 5% | 0.2 | 6% |
| Manufacturing | 1.1 | 12% | 0.3 | 7% | 4 | 5% | 0.2 | 7% |
| Trade | 0.7 | 8% | 0.3 | 7% | 7 | 10% | 0.2 | 8% |
| Transport | 0.3 | 3% | 0.1 | 3% | 1 | 2% | 0.1 | 3% |
| Finance | 0.2 | 2% | 0.1 | 3% | 1 | 1% | 0.1 | 2% |
| Other Sectors | 1.1 | 13% | 0.6 | 14% | 8 | 11% | 0.3 | 11% |
| *Total Flow-on* | *4.4* | *50%* | *2.2* | *50%* | *25* | *33%* | *1.0* | *37%* |
| **Total** | **8.7** | **100%** | **4.4** | **100%** | **74** | **100%** | **2.6** | **100%** |
| Total/Direct | 2.27 | | 2.23 | | 1.69 | | 1.71 | |

[a] Constitutes an upper estimate of the flow-on effects given the likelihood of some double counting of consumption induced effects in the retail and food services margins.

Source: EconSearch analysis.

Table 4.7 The economic impact of yabbies/marron farming in South Australia, 2001/02 [a]

| Sector | Output ($m) | | Value Added ($m) | | Employment (jobs) | | Household Income ($m) | |
|---|---|---|---|---|---|---|---|---|
| Direct effects | | | | | | | | |
| Yabbie/marron farming | 0.4 | 35% | 0.3 | 46% | 9 | 69% | 0.0 | 24% |
| Processing | 0.1 | 12% | 0.0 | 6% | 0 | 4% | 0.0 | 11% |
| Transport | 0.0 | 1% | 0.0 | 1% | 0 | 0% | 0.0 | 1% |
| Retail | 0.0 | 3% | 0.0 | 2% | 0 | 2% | 0.0 | 4% |
| Food services | 0.1 | 7% | 0.0 | 6% | 1 | 6% | 0.0 | 9% |
| *Total Direct* | *0.6* | *58%* | *0.3* | *61%* | *11* | *81%* | *0.1* | *49%* |
| Flow-on effects | | | | | | | | |
| Property and business serv | 0.1 | 11% | 0.1 | 12% | 0 | 3% | 0.0 | 10% |
| Manufacturing | 0.1 | 11% | 0.0 | 5% | 0 | 3% | 0.0 | 9% |
| Trade | 0.1 | 6% | 0.0 | 5% | 1 | 5% | 0.0 | 10% |
| Transport | 0.0 | 3% | 0.0 | 3% | 0 | 1% | 0.0 | 4% |
| Finance | 0.0 | 2% | 0.0 | 2% | 0 | 1% | 0.0 | 3% |
| Other Sectors | 0.1 | 11% | 0.1 | 11% | 1 | 6% | 0.0 | 14% |
| *Total Flow-on* | *0.5* | *42%* | *0.2* | *39%* | *3* | *19%* | *0.1* | *50%* |
| **Total** | **1.1** | **100%** | **0.6** | **100%** | **13** | **100%** | **0.2** | **100%** |
| Total/Direct | 1.95 | | 1.80 | | 1.34 | | 2.46 | |

[a] Constitutes an upper estimate of the flow-on effects given the likelihood of some double counting of consumption induced effects in the retail and food services margins.

Source: EconSearch analysis.

Table 4.8 The economic impact of other aquaculture in South Australia, 2001/02 [a]

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Direct effects | | | | | | | | |
| Other aquaculture | 3.0 | 30% | 1.8 | 36% | 38 | 49% | 1.5 | 50% |
| Processing | 1.1 | 11% | 0.3 | 6% | 4 | 5% | 0.2 | 6% |
| Transport | 0.1 | 1% | 0.0 | 1% | 0 | 0% | 0.0 | 1% |
| Retail | 0.2 | 2% | 0.1 | 2% | 2 | 3% | 0.1 | 2% |
| Food services | 0.6 | 6% | 0.3 | 5% | 6 | 8% | 0.1 | 5% |
| *Total Direct* | *4.9* | *50%* | *2.5* | *50%* | *51* | *65%* | *1.8* | *63%* |
| Flow-on effects | | | | | | | | |
| Property and business serv | 1.3 | 13% | 0.8 | 16% | 4 | 5% | 0.2 | 6% |
| Manufacturing | 1.2 | 12% | 0.3 | 7% | 4 | 5% | 0.2 | 7% |
| Trade | 0.7 | 8% | 0.4 | 7% | 8 | 10% | 0.2 | 8% |
| Transport | 0.3 | 3% | 0.2 | 3% | 1 | 2% | 0.1 | 3% |
| Finance | 0.2 | 2% | 0.1 | 3% | 1 | 1% | 0.1 | 2% |
| Other Sectors | 1.2 | 13% | 0.7 | 14% | 9 | 11% | 0.3 | 11% |
| *Total Flow-on* | *4.9* | *50%* | *2.5* | *50%* | *28* | *35%* | *1.1* | *37%* |
| **Total** | **9.8** | **100%** | **4.9** | **100%** | **78** | **100%** | **2.9** | **100%** |
| Total/Direct | 2.27 | | 2.23 | | 1.76 | | 1.71 | |

[a] Constitutes an upper estimate of the flow-on effects given the likelihood of some double counting of consumption induced effects in the retail and food services margins.

Source: EconSearch analysis.

# 5. The Economic Impact of Aquaculture in the Eyre Peninsula Region, 2001/02

## 5.1 The Economic Impact of Tuna Farming in the Eyre Peninsula Region, 2001/02

Estimates of the economic impact of tuna farming in the Eyre Peninsula region of South Australia in 2001/02 are reported in Table 5.1. The interpretation of these results is identical to the state-level impacts described in Section 4 of the report.

Table 5.1 The economic impact of tuna farming in the Eyre Peninsula Region, 2001/02

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Direct effects | | | | | | | | |
| Tuna farming [a] | 260.5 | 59% | 118.2 | 51% | 735 | 42% | 23.5 | 40% |
| Processing | 14.3 | 3% | 4.8 | 2% | 87 | 5% | 2.4 | 4% |
| Transport | 9.2 | 2% | 4.8 | 2% | 55 | 3% | 2.2 | 4% |
| Retail | 0.0 | 0% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| Food services | 0.0 | 0% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| *Total Direct* | *284.0* | *65%* | *127.8* | *55%* | *877* | *50%* | *28.1* | *48%* |
| Flow-on effects | | | | | | | | |
| Tuna fishing | 70.5 | 16% | 64.5 | 28% | 224 | 13% | 11.2 | 19% |
| Property and business serv. | 15.4 | 4% | 7.8 | 3% | 50 | 3% | 1.7 | 3% |
| Manufacturing | 6.5 | 1% | 2.2 | 1% | 39 | 2% | 1.1 | 2% |
| Trade | 17.4 | 4% | 8.7 | 4% | 262 | 15% | 5.2 | 9% |
| Other fishing [b] | 13.9 | 3% | 5.8 | 2% | 37 | 2% | 2.9 | 5% |
| Transport | 7.4 | 2% | 3.8 | 2% | 44 | 3% | 1.8 | 3% |
| Finance | 3.3 | 1% | 2.2 | 1% | 23 | 1% | 1.0 | 2% |
| Other Sectors | 20.3 | 5% | 11.3 | 5% | 195 | 11% | 5.9 | 10% |
| *Total Flow-on* | *154.8* | *35%* | *106.1* | *45%* | *874* | *50%* | *30.7* | *52%* |
| **Total** | **438.8** | **100%** | **233.9** | **100%** | **1,752** | **100%** | **58.8** | **100%** |
| Total/Direct | 1.54 | | 1.83 | | 2.00 | | 2.09 | |

[a] Note the double counting in the output impact, also includes the value of tuna fishing.

[b] Principally pilchard fishing.

Source: EconSearch analysis.

### *Business turnover impacts...*

Direct business turnover (output) generated locally by tuna farms summed to almost $261 million and in other sectors (processing and transport), almost $24 million, in 2001/02. Flow-ons to other sectors added another $155 million in business turnover. The sectors most affected were the tuna fishing (tuna capture[9]), other fishing (pilchards), manufacturing, trade, business and property services, transport, and finance sectors (Table 5.1).

[9] Note that the value of tuna fishing is also included in the direct impact of tuna farming.

The bottom row of Table 5.1 gives the total impact/direct impact ratio for each economic indicator. For business turnover, the ratio of 1.54 indicates that for each dollar of sales generated directly by tuna farming, processing and transport there is a total of $1.54 of business turnover generated by businesses throughout the Eyre Peninsula region, $1.00 in tuna farming, processing and transport and $0.54 in other sectors of the regional economy.

***Value added effects...***

Direct value added generated in the Eyre Peninsula region by tuna farming, processing and transport was almost $128 million in 2001/02. Flow-on value added generated in the other sectors of the regional economy was approximately $106 million in 2001/02. The flow-ons were greatest in the tuna fishing ($65m), property and business services ($8m), trade ($9m), transport ($4m) and other fishing ($6m) sectors.

The bottom row in Table 5.1 shows that for each dollar of value added generated directly in tuna farming, processing and transport there is an additional $0.83 ($1.83 total) generated in other sectors of the regional economy.

***Employment and household income...***

A significant number of jobs are created as a result of the flow-on business activity. The tuna farms were responsible for the direct employment of 735 people and associated processing and transport, approximately 140 people, in the Eyre Peninsula region in 2001/02. Flow-on business activity was estimated to have generated a further 870 jobs locally to give total employment of over 1,750 jobs in the region. The sectors of the local economy with employment flow-ons from tuna farming, processing and transport included the tuna fishing (224 jobs), trade (262), manufacturing (39), property and business services (50), transport (44) and other fishing (37) sectors.

The bottom row in Table 5.1 shows that for each job generated directly in tuna farming, processing and transport there was an additional 1.00 jobs (2.00 jobs total) in the rest of the region.

It was estimated that personal income of $23.5 million was earned directly in the tuna farming sector in 2001/02, comprising both wages by employees and drawings by owner/operators. An additional $11.2 million was earned by licence holders and crew in the tuna fishing sector and a further $24.1 million by wage and salary earners in other sectors of the regional economy.

For each $1.00 of household income generated directly by tuna farming, processing and transport in 2001/02 there was an additional $1.09 ($2.09 total) generated in other sectors of the Eyre Peninsula regional economy.

## 5.2 The Economic Impact of Oyster Farming in the Eyre Peninsula Region, 2001/02

Estimates of the economic impact of oyster farming in the Eyre Peninsula region in 2001/02 are reported in Table 5.2. The interpretation of these results is identical to the state-level impacts described in Section 4 of the report.

***Business turnover impacts...***

Direct business turnover (output) generated by oyster enterprises in the Eyre Peninsula region summed to $11.3 million in 2001/02 while output generated in the Eyre Peninsula region by associated downstream activities (processing, transport, retail and food service) summed to $2.4 million in 2001/02. Flow-ons to other sectors of the regional economy added another $8.0 million in business turnover in 2001/02. The sectors most affected were the trade, transport, manufacturing and property and business services sectors (Table 5.2).

Table 5.2 The economic impact of oyster farming in the Eyre Peninsula region, 2001/02 [a]

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Direct effects | | | | | | | | |
| Oyster farming [b] | 11.3 | 52% | 7.6 | 60% | 209 | 70% | 4.8 | 66% |
| Processing | 1.7 | 8% | 0.6 | 4% | 10 | 3% | 0.3 | 4% |
| Transport | 0.5 | 2% | 0.3 | 2% | 3 | 1% | 0.1 | 2% |
| Retail | 0.0 | 0% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| Food services | 0.2 | 1% | 0.1 | 1% | 3 | 1% | 0.0 | 1% |
| *Total Direct* | *13.7* | *63%* | *8.5* | *68%* | *225* | *75%* | *5.3* | *72%* |
| Flow-on effects | | | | | | | | |
| Property and business serv. | 1.7 | 8% | 0.9 | 7% | 5 | 2% | 0.2 | 2% |
| Manufacturing | 0.6 | 3% | 0.2 | 2% | 4 | 1% | 0.1 | 1% |
| Trade | 2.1 | 10% | 1.0 | 8% | 31 | 10% | 0.6 | 8% |
| Transport | 0.4 | 2% | 0.2 | 2% | 3 | 1% | 0.1 | 1% |
| Finance | 0.3 | 2% | 0.2 | 2% | 2 | 1% | 0.1 | 1% |
| Other Sectors | 2.8 | 13% | 1.5 | 12% | 30 | 10% | 1.0 | 13% |
| *Total Flow-on* | *8.0* | *37%* | *4.1* | *32%* | *75* | *25%* | *2.1* | *28%* |
| **Total** | **21.7** | **100%** | **12.6** | **100%** | **300** | **100%** | **7.3** | **100%** |
| Total/Direct | 1.60 | | 1.49 | | 1.35 | | 1.40 | |

[a] Constitutes an upper estimate of the flow-on effects given the likelihood of some double counting of consumption induced effects in the retail and food services margins.

[b] Includes sales of spat.

Source: EconSearch analysis.

***Value added effects...***

Total oyster farming-related value added in the Eyre Peninsula region was $12.6 million in 2001/02, $7.6 million generated by oyster farming directly, $0.9 million generated by downstream activities directly and $4.1 million generated in other sectors of the regional economy. Although a growing industry, the oyster sector is still a relatively minor component of the regional economy.

***Employment and household income...***

In 2001/02 in the Eyre Peninsula region, oyster farming was responsible for the direct employment of almost 210 people[10] and associated downstream activities created employment for an additional 16 people. Flow-on business activity was estimated to generate a further 75 jobs.

In 2001/02, personal income of $5.3 million was earned in oyster farming and downstream activities in the Eyre Peninsula region comprising both wages by employees and estimated drawings by owner/operators. An additional $2.1 million was earned by wage earners in other local businesses as a result of oyster industry operations. The total household income impact was over $7 million.

## 5.3 The Economic Impact of Other Aquaculture in the Eyre Peninsula Region, 2001/02

The economic impacts of other aquaculture sectors in the Eyre Peninsula region in 2001/02 (abalone, mussels and other aquaculture) are reported in aggregate in Table 5.3. These results are reported without comment, as the interpretation is identical to that for oysters and tuna farming described in the previous sections.

Note that for most of the other aquaculture sectors, the impacts in terms of flow-on employment and household income are relatively low. As these sectors grow and sales increase, household income and flow-on employment impacts generated by recurrent expenditure are expected to increase as well.

[10] Full-time equivalent jobs.

Table 5.3 The economic impact of other aquaculture [a] in the Eyre Peninsula region, 2001/02 [b]

| Sector | Output ($m) | | Value Added ($m) | | Employment (jobs) | | Household Income ($m) | |
|---|---|---|---|---|---|---|---|---|
| Direct effects | | | | | | | | |
| Other aquaculture | 4.9 | 44% | 3.1 | 51% | 96 | 65% | 2.6 | 64% |
| Processing | 1.7 | 16% | 0.6 | 10% | 11 | 7% | 0.3 | 7% |
| Transport | 0.1 | 1% | 0.1 | 1% | 1 | 0% | 0.0 | 1% |
| Retail | 0.0 | 0% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| Food services | 0.0 | 0% | 0.0 | 0% | 1 | 0% | 0.0 | 0% |
| *Total Direct* | *6.7* | *61%* | *3.7* | *63%* | *108* | *73%* | *2.9* | *72%* |
| Flow-on effects | | | | | | | | |
| Property and business serv. | 0.9 | 8% | 0.5 | 8% | 2 | 1% | 0.1 | 2% |
| Manufacturing | 0.3 | 3% | 0.1 | 2% | 2 | 1% | 0.1 | 1% |
| Trade | 1.1 | 10% | 0.6 | 9% | 17 | 11% | 0.3 | 8% |
| Transport | 0.2 | 2% | 0.1 | 2% | 1 | 1% | 0.1 | 1% |
| Finance | 0.2 | 1% | 0.1 | 2% | 1 | 1% | 0.0 | 1% |
| Other Sectors | 1.6 | 15% | 0.9 | 15% | 17 | 11% | 0.5 | 14% |
| *Total Flow-on* | *4.4* | *39%* | *2.2* | *37%* | *40* | *27%* | *1.1* | *28%* |
| **Total** | **11.1** | **100%** | **6.0** | **100%** | **148** | **100%** | **4.0** | **100%** |
| Total/Direct | 1.65 | | 1.61 | | 1.38 | | 1.39 | |

[a] Includes abalone farming, mussel farming and other aquaculture enterprises.

[b] Constitutes an upper estimate of the flow-on effects given the likelihood of some double counting of consumption induced effects in the retail and food services margins.

Source: EconSearch analysis.

# 6. The Economic Impact of Aquaculture in the Limestone Coast Region, 2001/02

Estimates of the economic impact of aquaculture in the Limestone Coast region in 2001/02 are reported in aggregate in Table 6.1. The interpretation of these results is identical to the state and regional level impacts described in Sections 4 and 5 of the report.

Note that for most of the aquaculture sectors in the Limestone Coast region (barramundi, Atlantic salmon, yabbies/marron and other aquaculture), the impacts in terms of flow-on employment and household income are relatively low. As these sectors grow and sales increase, household income and flow-on employment impacts generated by recurrent expenditure are expected to increase as well.

Table 6.1 The economic impact of aquaculture [a] in the Limestone Coast region, 2001/02 [b]

| Sector | Output ($m) | | Value Added ($m) | | Employment (jobs) | | Household Income ($m) | |
|---|---|---|---|---|---|---|---|---|
| Direct effects | | | | | | | | |
| Other aquaculture | 2.8 | 47% | 1.6 | 50% | 59 | 71% | 1.6 | 68% |
| Processing | 0.3 | 5% | 0.1 | 3% | 1 | 2% | 0.1 | 2% |
| Transport | 0.1 | 1% | 0.0 | 1% | 0 | 1% | 0.0 | 1% |
| Retail | 0.0 | 0% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| Food services | 0.0 | 0% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| *Total Direct* | *3.2* | *54%* | *1.8* | *54%* | *61* | *74%* | *1.7* | *71%* |
| Flow-on effects | | | | | | | | |
| Property and business serv. | 0.6 | 9% | 0.4 | 11% | 1 | 1% | 0.0 | 2% |
| Manufacturing | 0.5 | 8% | 0.2 | 5% | 2 | 2% | 0.1 | 4% |
| Trade | 0.7 | 12% | 0.3 | 11% | 9 | 11% | 0.2 | 10% |
| Transport | 0.1 | 2% | 0.1 | 2% | 1 | 1% | 0.0 | 1% |
| Finance | 0.1 | 2% | 0.1 | 2% | 1 | 1% | 0.0 | 2% |
| Other Sectors | 0.8 | 14% | 0.5 | 15% | 8 | 10% | 0.2 | 11% |
| *Total Flow-on* | *2.8* | *46%* | *1.5* | *46%* | *21* | *26%* | *0.7* | *29%* |
| **Total** | **6.0** | **100%** | **3.2** | **100%** | **83** | **100%** | **2.4** | **100%** |
| Total/Direct | 1.88 | | 1.86 | | 1.36 | | 1.41 | |

[a] Includes barramundi farming, Atlantic salmon farming, yabbies/marron farming and other aquaculture enterprises.

[b] Constitutes an upper estimate of the flow-on effects given the likelihood of some double counting of consumption induced effects in the retail and food services margins.

Source: EconSearch analysis.

### *Business turnover impacts...*

Direct business turnover (output) generated by aquaculture summed to $2.8 million and associated downstream activities, $0.4 million, in the Limestone Coast region in 2001/02. Flow-ons to other sectors of the regional economy generated another $2.8 million in business turnover in 2001/02. The sectors most affected were the manufacturing, trade and property and business services sectors (Table 6.1).

### *Value added effects...*

Total aquaculture-related value added in the Limestone Coast region was $3.2 million in 2001/02, $1.6 million generated by aquaculture directly, $0.1 million generated directly in associated downstream activities and $1.5 million generated in other sectors of the regional economy. In aggregate, the aquaculture sector is still a relatively minor component of the regional economy.

### *Employment and household income...*

Aquaculture and downstream activities were responsible for the direct employment of 61 people[11] in 2001/02 in the Limestone Coast region. Flow-on business activity was estimated to generate a further 21 jobs.

In 2001/02, personal income of $1.7 million was earned in aquaculture and downstream activities in the Limestone Coast region comprising both wages by employees and estimated drawings by owner/operators. An additional $0.7 million was earned by wage earners in other local businesses as a result of aquaculture industry operations.

[11] Full-time equivalent jobs.

# 7. The Economic Impact of Aquaculture in the Balance of South Australia, 2001/02

## 7.1 The Economic Impact of Oyster Farming in the Balance of SA, 2001/02

Estimates of the economic impact of oyster farming in the balance of SA in 2001/02 are reported in Table 7.1. The interpretation of these results is identical to the state and regional level impacts described in Sections 4 to 6 of the report.

Table 7.1 The economic impact of oyster farming in the balance of SA, 2001/02 [a]

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Direct effects | | | | | | | | |
| Oyster farming [b] | 2.8 | 49% | 1.9 | 59% | 52 | 71% | 1.2 | 66% |
| Processing | 0.4 | 7% | 0.1 | 3% | 1 | 2% | 0.1 | 3% |
| Transport | 0.1 | 2% | 0.1 | 2% | 1 | 1% | 0.0 | 2% |
| Retail | 0.0 | 0% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| Food services | 0.0 | 1% | 0.0 | 1% | 1 | 1% | 0.0 | 1% |
| *Total Direct* | *3.4* | *60%* | *2.1* | *65%* | *55* | *74%* | *1.3* | *72%* |
| Flow-on effects | | | | | | | | |
| Property and business serv. | 0.5 | 8% | 0.3 | 9% | 1 | 2% | 0.0 | 2% |
| Manufacturing | 0.4 | 7% | 0.1 | 4% | 1 | 2% | 0.1 | 3% |
| Trade | 0.5 | 9% | 0.3 | 8% | 8 | 11% | 0.2 | 9% |
| Transport | 0.1 | 2% | 0.1 | 2% | 1 | 1% | 0.0 | 2% |
| Finance | 0.1 | 2% | 0.1 | 2% | 1 | 1% | 0.0 | 1% |
| Other Sectors | 0.7 | 11% | 0.4 | 11% | 7 | 9% | 0.2 | 11% |
| *Total Flow-on* | *2.3* | *41%* | *1.1* | *35%* | *19* | *26%* | *0.5* | *28%* |
| **Total** | **5.8** | **100%** | **3.2** | **100%** | **74** | **100%** | **1.8** | **100%** |
| Total/Direct | 1.70 | | 1.56 | | 1.36 | | 1.41 | |

[a] Constitutes an upper estimate of the flow-on effects given the likelihood of some double counting of consumption induced effects in the retail and food services margins.

[b] Includes sales of spat.

Source: EconSearch analysis.

### *Business turnover impacts...*

Direct business turnover (output) generated by oyster farming in the balance of SA region summed to $2.8 million and downstream activities, $0.6 million, in 2001/02. Flow-ons to other sectors of the regional economy generated another $2.3 million in business turnover in 2001/02. The sectors most affected were the manufacturing, trade and property and business services sectors (Table 7.1).

***Value added effects...***

Total oyster farming-related value added in the balance of SA was $3.2 million in 2001/02, $1.9 million generated by oyster farming directly, $0.2 million generated directly in downstream activities and $1.1 million generated in other sectors of the regional economy. In aggregate, the oyster farming sector is still a relatively minor component of regional economy in the balance of SA.

***Employment and household income...***

In 2001/02 in the balance of SA, oyster farming and downstream activities were responsible for the direct employment of 55 people[12]. Flow-on business activity was estimated to generate a further 19 jobs.

In 2001/02, personal income of $1.3 million was earned in oyster farming and downstream activities in the balance of SA comprising both wages by employees and estimated drawings by owner/operators. An additional $0.5 million was earned by wage earners in other local businesses as a result of oyster industry operations. The total household income impact was almost $2 million.

## 7.2 The Economic Impact of Other Aquaculture in the Balance of SA, 2001/02

The economic impact of other aquaculture sectors in the balance of SA in 2001/02 (abalone, mussels, barramundi and yabbies/marron) is reported in aggregate in Table 7.2.

These results are reported without comment, as the interpretation is identical to that for oyster farming described in the previous section. Note that for most of the other aquaculture sectors, the impacts in terms of flow-on employment and household income are relatively low. As these sectors grow and sales increase, household income and flow-on employment impacts generated by recurrent expenditure are expected to increase as well.

[12] Full-time equivalent jobs.

Table 7.2 The economic impact of other aquaculture [a] in the balance of SA, 2001/02 [b]

| Sector | Output ($m) | | Value Added ($m) | | Employment (jobs) | | Household Income ($m) | |
|---|---|---|---|---|---|---|---|---|
| Direct effects | | | | | | | | |
| Other aquaculture | 1.2 | 41% | 0.6 | 47% | 22 | 66% | 0.5 | 57% |
| Processing | 0.4 | 14% | 0.1 | 8% | 1 | 4% | 0.1 | 7% |
| Transport | 0.0 | 1% | 0.0 | 1% | 0 | 0% | 0.0 | 1% |
| Retail | 0.0 | 0% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| Food services | 0.0 | 0% | 0.0 | 0% | 0 | 0% | 0.0 | 0% |
| *Total Direct* | *1.6* | *57%* | *0.8* | *56%* | *24* | *71%* | *0.5* | *66%* |
| Flow-on effects | | | | | | | | |
| Property and business serv. | 0.2 | 7% | 0.1 | 9% | 1 | 2% | 0.0 | 2% |
| Manufacturing | 0.3 | 10% | 0.1 | 5% | 1 | 3% | 0.0 | 5% |
| Trade | 0.3 | 9% | 0.1 | 9% | 4 | 12% | 0.1 | 10% |
| Transport | 0.1 | 5% | 0.1 | 5% | 1 | 2% | 0.0 | 4% |
| Finance | 0.0 | 1% | 0.0 | 2% | 0 | 1% | 0.0 | 1% |
| Other Sectors | 0.3 | 12% | 0.2 | 13% | 3 | 10% | 0.1 | 12% |
| *Total Flow-on* | *1.2* | *43%* | *0.6* | *43%* | *10* | *29%* | *0.3* | *34%* |
| **Total** | **2.9** | **100%** | **1.4** | **100%** | **34** | **100%** | **0.8** | **100%** |
| Total/Direct | 1.78 | | 1.78 | | 1.41 | | 1.52 | |

[a] Includes abalone farming, mussel farming, barramundi farming and yabbies/marron farming.

[b] Constitutes an upper estimate of the flow-on effects given the likelihood of some double counting of consumption induced effects in the retail and food services margins.

Source: EconSearch analysis.

# 8. Other Facets of Regional Economic Development Associated with Aquaculture Activity in South Australia

In addition to the quantifiable economic impacts outlined above there are a number of other facets of regional economic development associated with aquaculture activity in South Australia.

**Increasing the diversity and complexity of regional economies**

Many of the small regional towns in South Australia are characterised by a heavy reliance on one or a small number of major industries, combined with a set of other "fundamental" activities that provide basic services and infrastructure to those industries. They lack the diversity and complexity of larger economic units.

The aquaculture industry has developed rapidly in recent years. Through its relatively large requirement for labour and material inputs, the industry has shown the potential to increase the complexity and diversity of local economies. The demand for local labour, goods and services assists in offsetting the contraction of other local industry and may help avoid a range of other economic and social pressures associated with declining regional economies.

**Re-investment of profits in local enterprises**

In addition to the regional impacts generated by recurrent expenditures in the aquaculture sector, further economic impacts are generated by the investment of profits in new or under-resourced local ventures by aquaculture operators.

For example, the current profitability in the tuna farming sector underpins the very substantial local investment by tuna farmers in the local cannery, shipyard, marinas, property (e.g. hotels) and other industries (e.g. kingfish aquaculture and viticulture) (Brian Jeffries, pers. comm.)

**Tourism**

Tourism activities associated with the aquaculture sector (e.g. recreational fishing and farm tours) provide a further source of income and employment for regional economies with a well-developed aquaculture sector (e.g. the Eyre Peninsula region).

**Education and Research**

The aquaculture sector, particularly the tuna industry, is characterised by a high level of innovation. These innovative ideas have been directed towards value adding opportunities in the tuna industry itself (e.g. fresh fish direct marketed to Japan) and to the development of new aquaculture industries (e.g. kingfish farming).

The success of the tuna industry, in particular, has been a catalyst for the development of significant research (e.g. CRC for Sustainable Aquaculture of Finfish) and education resources (e.g. the Marine Science Centre at Port Lincoln) within South Australia.

# 9. Summary

The results of the economic impact analysis are summarised in Tables 9.1 to 9.5. For the state as a whole the industry in 2001/02 was estimated to have a farm gate value of $284 million with associated direct business turnover impacts in the processing, transport, retail and food service sectors of $42 million (Table 9.1). In total, the value of aquaculture industry output was estimated at over $325 million. This activity generated business turnover (output) of $252 million in other South Australian industries. In terms of employment, there were over 1,170 jobs generated directly in aquaculture, over 200 jobs generated directly in downstream activities (total aquaculture of 1,380 jobs) and almost 1,240 flow-on jobs generated in other sectors of the state's economy in 2001/02. Tuna farming dominates the South Australian aquaculture industry, in aggregate.

Table 9.1 The economic impact of aquaculture in South Australia, 2001/02

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Direct effects | | | | | | | | |
| Aquaculture production | 283.5 | 49% | 133.1 | 44% | 1,173 | 45% | 34.2 | 36% |
| Aquaculture downstream [a] | 42.1 | 7% | 14.9 | 5% | 207 | 8% | 8.3 | 9% |
| *Total Direct* | *325.6* | *56%* | *148.0* | *49%* | *1,380* | *53%* | *42.6* | *45%* |
| Flow-on effects | | | | | | | | |
| Tuna Fishing | 70.5 | 12% | 64.5 | 21% | 224 | 9% | 11.2 | 12% |
| Other Sectors | 181.4 | 31% | 91.4 | 30% | 1,013 | 39% | 40.7 | 43% |
| *Total Flow-on* | *251.9* | *44%* | *155.9* | *51%* | *1,237* | *47%* | *51.9* | *55%* |
| **Total** | **577.5** | **100%** | **303.8** | **100%** | **2,617** | **100%** | **94.4** | **100%** |

[a] Processing, transport, retail and food services.

Source: EconSearch analysis.

For the Eyre Peninsula region the industry in 2001/02 was estimated to have a farm gate value of $277 million with associated direct business turnover impacts in the processing, transport, retail and food service sectors of $28 million (Table 9.2). In total, the value of aquaculture industry output was estimated at over $304 million. This activity generated business turnover (output) of $167 million in other regional industries. In terms of employment, there were 1,040 jobs generated directly in aquaculture, over 170 jobs generated directly in downstream activities (total aquaculture of 1,211 jobs) and almost 990 flow-on jobs generated in other sectors of the region's economy in 2001/02. Tuna farming dominates the aquaculture industry in the Eyre Peninsula region.

Table 9.2 The economic impact of aquaculture in the Eyre Peninsula region, 2001/02

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Direct effects | | | | | | | | |
| Aquaculture production | 276.7 | 59% | 128.8 | 51% | 1,040 | 47% | 30.9 | 44% |
| Aquaculture downstream [a] | 27.7 | 6% | 11.2 | 4% | 171 | 8% | 5.3 | 8% |
| *Total Direct* | *304.4* | *65%* | *140.0* | *55%* | *1,211* | *55%* | *36.2* | *52%* |
| Flow-on effects | | | | | | | | |
| Tuna Fishing | *70.5* | 15% | *64.5* | 26% | *224* | 10% | *11.2* | 16% |
| Other Sectors | 96.6 | 20% | 48.0 | 19% | 765 | 35% | 22.7 | 32% |
| *Total Flow-on* | *167.1* | *35%* | *112.5* | *45%* | *989* | *45%* | *33.9* | *48%* |
| **Total** | **471.6** | **100%** | **252.5** | **100%** | **2,200** | **100%** | **70.1** | **100%** |

[a] Processing, transport, retail and food services.

Source: EconSearch analysis.

For the Limestone Coast region the industry in 2001/02 was estimated to have a farm gate value of $2.8 million with associated direct business turnover impacts in the processing, transport, retail and food service sectors of $0.4 million (Table 9.3). This activity generated business turnover (output) of $2.8 million in other regional industries. In terms of employment, there were 61 jobs generated directly in aquaculture and downstream activities and over 20 flow-on jobs generated in other sectors of the region's economy in 2001/02.

Table 9.3 The economic impact of aquaculture in the Limestone Coast region, 2001/02

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Direct effects | | | | | | | | |
| Aquaculture production | 2.8 | 47% | 1.6 | 50% | 59 | 71% | 1.6 | 68% |
| Aquaculture downstream [a] | 0.4 | 7% | 0.1 | 5% | 2 | 3% | 0.1 | 3% |
| *Total Direct* | *3.2* | *54%* | *1.8* | *54%* | *61* | *74%* | *1.7* | *71%* |
| Other Sectors (flow-on) | 2.8 | 46% | 1.5 | 46% | 21 | 26% | 0.7 | 29% |
| **Total** | **6.0** | **100%** | **3.2** | **100%** | **83** | **100%** | **2.4** | **100%** |

[a] Processing, transport, retail and food services.

Source: EconSearch analysis.

For the balance of SA region the industry in 2001/02 was estimated to have a farm gate value of $4.0 million with associated direct business turnover impacts in the processing, transport, retail and food service sectors of $1.0 million (Table 9.4). This activity generated business turnover (output) of $3.6 million in other regional industries. In terms of employment, there were almost 80 jobs generated directly in aquaculture and downstream activities and almost 30 flow-on jobs generated in other sectors of the region's economy in 2001/02.

Table 9.4 The economic impact of aquaculture in the balance of SA, 2001/02

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Direct effects | | | | | | | | |
| Aquaculture production | 4.0 | 46% | 2.5 | 55% | 74 | 69% | 1.7 | 64% |
| Aquaculture downstream [a] | 1.0 | 12% | 0.3 | 7% | 5 | 4% | 0.2 | 6% |
| *Total Direct* | *5.1* | *59%* | *2.9* | *62%* | *79* | *73%* | *1.8* | *70%* |
| Other Sectors (flow-on) | 3.6 | 41% | 1.7 | 38% | 28 | 27% | 0.8 | 30% |
| **Total** | **8.6** | **100%** | **4.6** | **100%** | **107** | **100%** | **2.6** | **100%** |

[a] Processing, transport, retail and food services.

Source: EconSearch analysis.

For the state as a whole the aquaculture industry is dominated by the tuna farming sector (Table 9.5). In 2001/02, it accounted for 85 per cent of total aquaculture industry related (direct and flow-on) output and value added and around 70 per cent of aquaculture related employment and household income.

Table 9.5 The total economic impact (direct and flow-on) of aquaculture in South Australia, by aquaculture sector, 2001/02

| Sector | Output | | Value Added | | Employment | | Household Income | |
|---|---|---|---|---|---|---|---|---|
| | ($m) | | ($m) | | (jobs) | | ($m) | |
| Tuna farming | 490.8 | 85.0% | 260.1 | 85.6% | 1,806 | 69.0% | 69.8 | 73.9% |
| Oyster farming | 57.6 | 10.0% | 28.9 | 9.5% | 514 | 19.7% | 15.5 | 16.4% |
| Abalone farming | 5.6 | 1.0% | 3.0 | 1.0% | 64 | 2.4% | 1.7 | 1.8% |
| Marine finfish farming | 2.3 | 0.4% | 1.1 | 0.4% | 37 | 1.4% | 0.9 | 1.0% |
| Mussels farming | 1.6 | 0.3% | 0.9 | 0.3% | 31 | 1.2% | 0.7 | 0.8% |
| Barramundi farming | 8.7 | 1.5% | 4.4 | 1.4% | 74 | 2.8% | 2.6 | 2.8% |
| Yabby/Marron farming | 1.1 | 0.2% | 0.6 | 0.2% | 13 | 0.5% | 0.2 | 0.2% |
| Other aquaculture | 9.8 | 1.7% | 4.9 | 1.6% | 78 | 3.0% | 2.9 | 3.1% |
| **Total (SA)** | **577.5** | **100.0%** | **303.8** | **100.0%** | **2,617** | **100.0%** | **94.4** | **100.0%** |

Source: EconSearch analysis.

# 10. References


ABARE 2002, *Australian Fisheries Statistics 2001,* Canberra.

Bayne, B.A. and West, G.R. 1991, *GRIT: Generation of Regional Input-Output Tables, User's Reference Manual, Version 2.0*, Department of Economics, University of Queensland.

EconSearch 1997a, *An Economic Impact Model for the Eyre Region of South Australia,* report to Aquaculture Group, Primary Industries South Australia.

EconSearch 1997b, *The Economic Impact of Aquaculture and Fishing Industry Activity on the Eyre Peninsula Region of South Australia,* report to Aquaculture Group, Primary Industries South Australia.

EconSearch 1998, *The Economic Impact of Aquaculture in the Eyre Peninsula Region and South Australia, 1996-97,* report to Aquaculture Group, Primary Industries and Resources South Australia.

EconSearch 1999, *The Economic Impact of Aquaculture in the Eyre Peninsula Region and South Australia, 1998-99,* report to Aquaculture Group, Primary Industries and Resources South Australia.

EconSearch 2001, *The Economic Impact of Aquaculture in the Eyre Peninsula Region and South Australia, 1999/00,* report to Aquaculture Group, Primary Industries and Resources South Australia.

EconSearch 2002a, *The Economic Impact of Aquaculture on the South Australian State and Regional Economies, 20000/01,* report to Aquaculture Group, Primary Industries and Resources South Australia.

EconSearch 2002b, *South Australian Aquaculture Market Analysis Project,* report to the Seafood Industry Development Board.

EconSearch 2002c, *Accent on Aquaculture in the Limestone Coast,* report to the South East Local Government Association.

Hewings, G.J.D. 1985*, Regional Input-Output Analysis*, Sage Publications, Beverly Hills.

Jensen, R.C., Mandeville, T.D. and Karunaratne, N.D. 1979, *Regional Economic Planning: Generation of Regional Input-Output Analysis*, Croom Helm, London.

Jensen, R.C. and West, G.R. 1986, *Input-Output for Practitioners: Theory and Applications*, Australian Regional Developments No. 1, AGPS, Canberra.

Midmore, P. and Harrison-Mayfield, L. 1996, *Rural Economic Modelling: an Input-Output Approach*, CAB International, Wallington, UK.

Powell, R.A., Jensen, R.C. and Gibson, A.L. 1985, *The Economic Impact of Irrigated Agriculture in N.S.W.*, Report to the N.S.W. Irrigators' Council Limited, Department of Agricultural Economics and Business Management, University of New England, Armidale.

South Australian Aquaculture Council 2002, *Final Draft State Aquaculture Action Plan*

West, G.R. 1993, *Input-Output Analysis for Practitioners: User's Guide, Version 7.1*, Department of Economics, University of Queensland, St Lucia.

**Disclaimer**

We have prepared the above report exclusively for the use and benefit of our client. Neither the firm or any employee of the firm undertakes responsibility in any way whatsoever to any person (other than to the above mentioned client) in respect of the report including any errors or omissions therein however caused.

# Appendix 1 Input-Output Methodology

### Overview of Input-Output Analysis

Input-output analysis provides a comprehensive economic framework that is extremely useful in the resource planning process. Broadly, there are two ways in which the input-output method can be used.

First, the input-output table provides a numerical picture of the size and shape of the economy and its essential features. The input-output transactions table can be used to describe some of the important features of an economy, the interrelationships between sectors, and the relative importance of the individual sectors.

Second, input-output analysis provides a standard approach for the estimation of the economic impact of a particular activity. The input-output model is used to calculate industry multipliers that can then be applied to various development scenarios.

### Linkages between sectors

The standard approach for the estimation of the regional economic impact of a particular activity, such as wine production, is to employ *input-output analysis*. The input-output model conceives the economy of the region as being divided up into a number of sectors, and this allows the analyst to trace expenditure flows.

To illustrate this, consider the example of a winery that, in the course of its operation, purchases goods and services from other sectors. These goods and services would include grapes, bottles, and corks and, of course, labour. The direct employment created is regarded in the model as an expenditure flow into the household sector, which is one of several non-industrial sectors recognised in the input-output model.

Upon receiving expenditure by the winery, the other sectors in the state economy engage in their own expenditures. For example, as a consequence of winning a contract for work with a winery, a bottle manufacturer buys materials from its suppliers and labour from its own employees. Suppliers and employees in turn engage in further expenditure, and so on. These *indirect effects*, as they are called, are part of the impact of the winery on the regional or state economy. They must be added to the *direct effects* (which are expenditures made in immediate support of the winery itself) in order to arrive at a measure of the total impact of the winery.

It may be thought that these indirect effects go on indefinitely, and that their amount adds up without limit, the presence of *leakages*, however, prevents this from occurring. In the context of the impact on a *regional or state* economy, an important leakage is expenditure on imports, that is, products or services that originate from *outside the region, state or country* (e.g. French oak barrels).

Thus some of the expenditure for imports to the region is lost to the local economy. Consequently, the indirect effects get smaller and smaller in successive expenditure rounds, due to this and other leakages. Hence the total expenditure created in the local economy is limited in amount, and so (in principle) it can be measured.

The performance of the input-output analysis calculations require a great deal of information. The analyst needs to know the magnitude of various expenditures and where they occur. Also needed is information on how the sectors that receiving this expenditure share *their* expenditures among the various sectors from whom they buy, and so on for the further expenditure rounds.

In applying the input-output model, the standard procedure is to determine the direct or first-round expenditures only. No attempt is made to pursue such inquiries on expenditure in subsequent rounds, not even (for example) to trace the effects in the local economy on household expenditures by winery employees on food, clothing, entertainment, and so on, as it is impracticable to measure these effects for an individual case, here the winery.

The input-output model is instead based on a set of assumptions about constant and uniform proportions of expenditure. If households in general in the local economy spend (say) 13.3 per cent of their income on food and non-alcoholic beverages, it is assumed that those working in wineries do likewise. Indeed, the effects of all expenditure rounds after the first are calculated by using such standard proportions (*multiplier* calculations).

### Multipliers

Multipliers are an indication of the strength of the linkages between a particular sector and the rest of the regional economy. As well, they can be used to estimate the impact of a change in that particular sector on the rest of the economy. As noted above, detailed explanations on calculating input-output multipliers (and the underlying assumptions) are provided in any regional economics or input-output analysis textbook (see for example Hewings (1985), Jensen and West (1986), Midmore and Harrison-Mayfield (1996), Powell et al. (1985), and West (1993)). Suffice to note that they are calculated through a routine set of mathematical operations based on coefficients derived from the input-output transactions table.

### Input-output transactions table

The structure and linkages of a local economy can be described with the aid of input-output analysis. Input-output analysis, as an accounting system of inter-industry transactions, is based on the notion that no industry exists in isolation.

This assumes, within any economy, each firm depends on the existence of other firms to purchase inputs from, or sell products to, for further processing. The firms also depend on final consumers of the product and labour inputs to production. An input-output transactions table is a convenient way to illustrate the purchases and sales of goods and services taking place in an economy at a given time.

Input-output tables provide a numerical picture of the size and shape of the economy and its essential features. Products produced in the economy are aggregated into a number of groups of industries and the transactions between them recorded in the transactions table. The rows and columns of the input-output table can be interpreted in the following way:

- The rows of the input-output table illustrate sales for intermediate usage (to other firms) and for final demand (consumers, exports, capital formation).

- The columns show the origin of the inputs and hence the purchases made at that time (labour, capital and intermediate inputs).

- Each item is shown as a purchase by one sector and a sale by another, thus constructing two sides of a double accounting schedule.

In summary, the input-output transactions table can be used to describe some of the important features of a regional economy, the interrelationships between sectors, and the relative importance of the individual sectors. The table is also used for the calculation of sector multipliers and the estimation of economic impacts arising from some change in the local economy.

# Appendix 2 Glossary of Input-Output Terminology

***Consumption-induced effects*** are additional output, employment and income resulting from re-spending by households that receive income from employment in direct and indirect activities. Consumption-induced effects are sometimes referred to as "induced effects".

***Direct effects*** are the initial round of output, employment and income generated by an economic activity.

***Employment*** is the number of working proprietors, managers, directors and other employees, in terms of the number of full-time equivalent jobs.

***Flow-on effects*** are the sum of the production-induced effects and the consumption-induced effects.

***Gross regional (or State) product*** is a measure of value added on a regional basis. It can be calculated using two methods. The income method calculates GRP as household income plus other value added. The expenditure method calculates GRP as household expenditure plus other final demand, that is, in total, gross regional expenditure, plus exports less imports.

***Household income*** is wages and salaries and other payments to labour including overtime payments and income tax, but excluding payroll tax.

***Input-output analysis*** is an accounting system of inter-industry transactions based on the notion that no industry exists in isolation.

***Input-output table*** is a transactions table that illustrates and quantifies the purchases and sales of goods and services taking place in an economy at a given point in time. It provides a numerical picture of the size and shape of the economy and its essential features. Each item is shown as a purchase by one sector and a sale by another, thus constructing two sides of a double accounting schedule.

***Multiplier*** is an index (ratio) indicating the overall change in the level of activity that results from an initial change in economic activity. They are an indication of the strength of the linkages between a particular sector and the rest of the regional economy. They can be used to estimate the impact of a change in that particular sector on the rest of the economy.

***Other Final Demand*** includes government expenditure, private and public sector investment (gross fixed capital formation) and change in stocks (inventories).

***Other Value Added*** includes gross operating surplus and all taxes, less subsidies.

***Output*** is gross revenue of goods and services produced by commercial organisations plus gross expenditure by government agencies.

***Production-induced effects*** are additional output, employment and income resulting from re-spending by firms that receive income from the sale of goods and services to firms undertaking, for example, agricultural activities. Production-induced effects are sometimes referred to as "indirect effects".

***Total impact*** is the sum of the direct effects and the flow-on effects.

***Type I multiplier*** is calculated as (direct effects + production induced effects)/direct effects.

***Type II multiplier*** is calculated as (direct effects + production induced effects + consumption induced effects)/direct effects.

***Value added*** is calculated as the value of output less the cost of goods and services (including imports) used in producing the output. It represents payments to the primary inputs of production (labour, capital and land). Value added is consistent with standard measures of economic activity, such as gross domestic, State or regional product and it provides an assessment of the net contribution to regional economic growth of a particular enterprise or activity.