The Allen Consulting Group

The Economic Contribution of Australia's Marine Industries

1995-96 to 2002-03

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Report to The National Oceans Office

The Allen Consulting Group

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Summary

Australia's marine industries make a vital contribution to the Australian economy and society, both directly through production of goods and services and employment, and indirectly by stimulating production and employment in other sectors of the economy.

This study provides estimates of the economic contribution of marine industries in Australia, with data from 1995-96 to 2002-03. There is no statistical classification for marine industries, therefore the approach taken was to build the data required for the analysis in a 'bottom up' fashion. That is, the data sets have been built by identifying all the broad industry sectors that contain 'marine dependent' industries, identifying the marine dependent industries contained with the sectors, calculating the relevant contributions of these marine dependent industries and then aggregating this data up to the industry-wide level.

In 2002-03 the direct economic contribution of the marine industries included:

- approximately $26.7 billion in value added, which was around 3.6 per cent of total industry value added in the Australian economy;
- approximately 253 130 persons employed;
- $14.5 billion in exports; and
- $4.1 billion in tax paid to both Commonwealth and State governments.

In addition, activities of marine industries were associated with around $46 billion in value added in other sectors of the economy, and approximately 690 890 jobs.

Between 1995-96 and 2002-03 marine industry value added and employment growth was on par with the average across all industries, though export growth was higher than that national average, due to higher than average growth in offshore oil and gas exports.

The largest marine industries are marine tourism, which contributed 42.3 per cent of value added and 75.3 per cent of employment in 2002-03, and offshore oil and gas, which contributed 41.8 per cent of value added and the majority of marine industry exports. While offshore oil and gas industry is large in terms of value added, it is a relatively smaller employer.

During the period 1995-96 to 2002-03 marine industry value added grew by an average of 6.0 per cent per year. The fastest growing marine industry during this period was offshore oil and gas (8.4 per cent per year), driven by higher export prices and a weaker Australian dollar. International demand shocks to the tourism industry between 2000-01 and 2002-03 saw slower growth in marine tourism value added and employment, which was most acutely felt in tourist regions in Queensland and Western Australia. The shipping industry was the only marine industry to decline in value added terms during this period, falling by an average of 4 per cent per year.

Section 1

Introduction

This study aims to provide an up-to-date estimate of the economic contribution of marine-based industries to the Australian economy. This objective presents a challenge due to the lack of a current statistical approach in defining what a marine industry is and measuring its activities. This section provides an overview of the approach taken in this study. In the following sections of this report:

- section two provides estimates for the economic contribution of the marine industries at a national level, and for the states and territories;
- section three provide estimates of the individual contributions of the six marine industries to value added, employment and exports; and
- section four details the key challenges inherent in estimating the contribution of marine industries, and provides some suggestions for further work in this area.

In reading or using this report the following should be noted:

- This study uses the concept of "value added" to define the value of an industry "Value added" equates to the financial surplus generated by an industrial activity prior to the deduction of profit and wages. Value added is one of many measures that can be used to define the value of an activity. While the value added concept has many desirable attributes (outlined in section two), it does not necessarily signify the importance of an industry. Industries may have a relatively low value added but nevertheless be of significant importance as employers and as facilitators of economic activity domestically and internationally. Without such industries, Australia's standard of living would be significantly reduced.
- This study does not attempt to derive an economic value for the ocean environment or make any assumptions on the importance of the marine environment compared to marine industrial activity. While many studies have indicated that the marine environment, and the ecosystem services that it generates, can be worth many times the value of the industrial activities, these issues are not covered in this study.
- This study primarily uses Australian National Accounts data which is highly aggregated and does not differentiate between marine and non-marine activities. As a result, a number of assumptions (covered in detail below and in Appendix A) need to be made. As there is no widely accepted framework for extracting marine related activities from National Accounts data, derived estimates are subject to a degree of uncertainty relative to the amount of industry specific data and information available. For instance, this study calculates marine tourism industry value added with reference to the methods outlined by the Review Committee on Marine Industries and Science Council (1997). While this Committee's work is seen as the providing possibly the best model available for calculating marine tourism contributions, readers should be aware of the limitations of some of the approaches used within this study and treat the estimates derived accordingly.

Further detail on the study approach, underlying assumptions and methodology for the estimates in this study is provided in Appendix A, including details of the various sources used for the estimates. Alternative approaches to calculate "value" are discussed in section 4.

1.1 Study approach

In estimating the economic contribution of marine industries to the Australian economy it was necessary to consider:

- what constitutes a marine industry; and
- what activities would be considered as providing an economic contribution.

This section provides a discussion on this study's approach to these two issues.

Definition of marine industries

Official statistics do not account for the marine industries as a distinct category. Business activities in the Australian (and New Zealand) statistical systems follow international standards when defining an industry and these are set out in *The Australian and New Zealand Standard Industrial Classification (ANZSIC).*[1] These standards categorise every measured activity, therefore it is feasible to derive a useful estimate of the marine industries by examining the component parts of other industries and deciding if they are a marine activity or not, or the extent to which they are a marine activity.

When reviewing different industries it is sometimes difficult to define where an ocean–based activity stops onshore. Would, for example, land based processing of ocean resources be a marine industry? In some cases this will inevitably be a matter of judgement. Decisions have been made about inclusion or exclusion of an activity by considering the relative significance of the ocean–based resource. Is the ocean resource the main input? Is access to the ocean a significant factor in the activity? Following the approach of earlier publications,[2] major marine based activities addressed in this study are:

- marine tourism;
- offshore oil and gas;
- fisheries and seafood;
- shipping;
- shipbuilding; and
- port–based industries.

More details about these are provided in Appendix A and in section three.

[1] ABS (1292.0)

[2] The Australian Marine Industries and Sciences Council, 1997, *Marine Industry Development Strategy*, and The Allen Consulting Group, 2001, *The Economic Contribution of Australia's Marine Industries – 2001-02.*

Measurement of economic contribution

For each of the major marine-based activities this study has sought to identify a range of measures about economic significance, including:

- an assessment of economic activity;
- employment;
- taxation revenue; and
- export revenue.

While the measurement of employment, taxation revenue and exports are relatively straight forward, obtaining a measure of economic activity is more complex. There are a number of different measures which can account for industry impacts, including production, gross value of production, gross value of revenue, value, value added, turnover and volume.

This study focuses primarily on value added as a measure of the net economic contribution of marine industries.

Value added is defined by the Australian Bureau of Statistics (ABS) as *the value of output at basic prices minus the value of intermediate consumption at purchaser's prices*. In other words, it seeks to provide a measure of the net contribution of each industry calculated as the value of total sales (income) less the value of the inputs (costs) used in producing their products. This is akin to the net surplus generated by the industry, noting that this surplus includes payments to labour (wages) as well as to capital and entrepreneurship (profits).

Value added is used as a measure of economic contribution in this study because it:

- removes the danger of inadvertent double counting;
- provides a meaningful basis for comparison across industries; and
- simplifies analysis of regional impacts.

Value added may be distinguished from a number of other economic concepts and measures of contribution. The most important of these are 'output', 'turnover', and 'production', which are generally used to refer to the gross value of sales by an industry (although the precise definitions of these concepts vary). While these concepts are sometimes described as business 'income', and contrasted with expenditures, they are not appropriate measures of contribution. This is because they include the cost of producing the goods and services which are sold, and often do not relate closely to the real service provided. Retail margins, for example, give a better indication of the value of the service provided than retail turnover.

Direct and indirect economic contributions

Direct value added and employment estimates describe the direct economic contributions made by the major marine industries. A more complete picture of the contribution of Australia's marine industries, however, can be obtained by looking at the extent to which other activities are dependent upon it. This is often viewed as the indirect impact or flow on value. For example, an increase in demand in marine tourism can be expected to stimulate additional output and employment in other activities such as transport, manufacturing and other services. The additional marine tourism demand can be viewed as having caused the production of the other outputs and employment through backwards linkages.

The indirect estimates are derived by using value added and employment multipliers provided by the ABS. These multipliers are derived from 1996-97 input-output tables. A more detailed discussion of the use of value added and employment multipliers is provide in Appendix A.

Section 2

Overall contribution of marine industries

Industries in Australia related to the marine environment make a vital contribution to the nation's economy. Across Australia's marine regions these industries contribute directly, through value added in production and employment, and indirectly through stimulating production and employment in other sectors. Marine industries also export a significant proportion of their output and also contribute through the taxation system.

This section provides detail on the economic contribution of marine industries from 1995-96 to 2002-03, both at a national level and for each state and territory. Section three provides further detail on the trends in the individual industries with make up the marine industries.

2.1 National Overview

Direct contributions

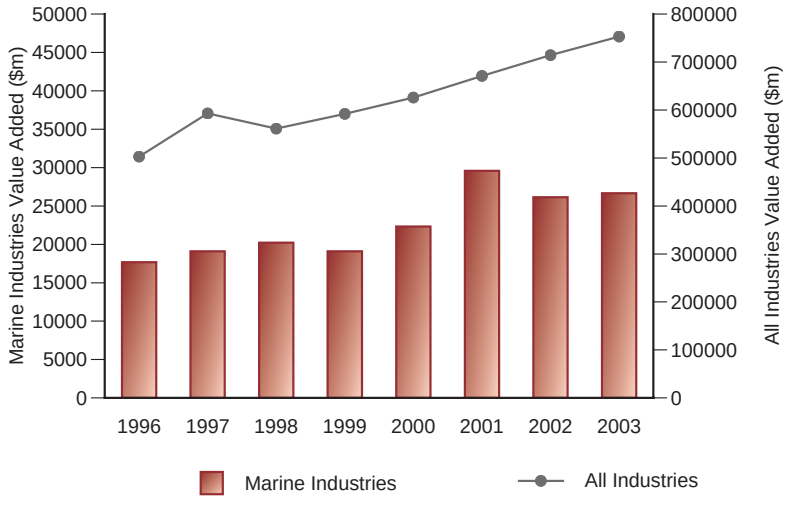
Value added

In 2002-03 marine industry value added was approximately $26.7 billion — 3.6 per cent of total Australian industry value added.

Figure 2.1 shows the trend in direct value added of marine industries from 1995-96 to 2002-03. During this period, marine industry value added grew by an average of 6.0 per cent a year, on par with average growth across all industries during the same period (5.9 per cent). Marine industry value added peaked during 2000-01 ($29.5 billion), primarily due to a peak in value added in the offshore oil and gas industry.

Figure 2.1

MARINE INDUSTRY VALUE ADDED AND ALL INDUSTRIES VALUE ADDED, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates

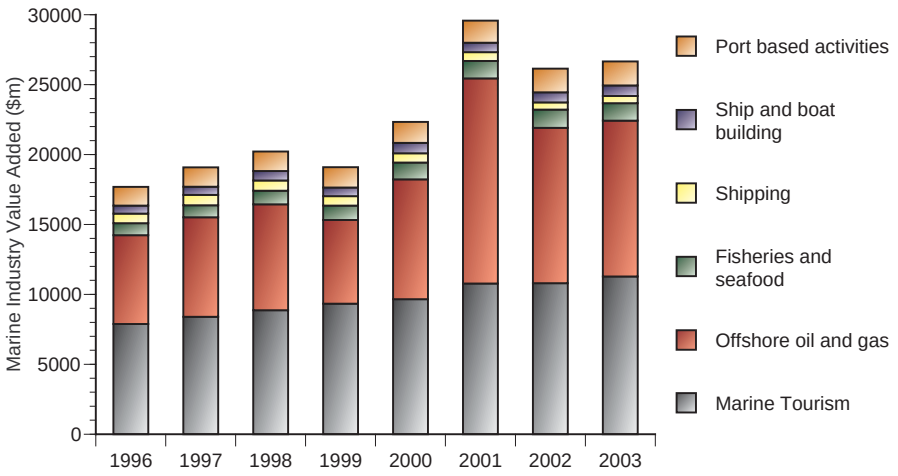
Given the estimate for marine industry value added is derived as a composite of the value added from a number of different industries, it is also interesting to analyse this composition, and how it has changed over time.

Figure 2.2 shows that in 2002-03 the largest marine industry, by value added was marine tourism, (42.3 per cent of total marine industry value added), followed closely by offshore oil and gas (41.8 per cent). During the period 1995-96 to 2002-03 the trend in marine industry value added was significantly influenced by the volatility in the offshore oil and gas industry. This volatility was primarily due to the industry's exposure to international commodity prices and exchange rate fluctuations. For example, the peak in marine industry value added in 2000-01 ($29.5 billion), was driven by strong growth in value added in the offshore oil and gas industry due to high export prices.

From 1995-96 to 2002-03 the relative importance of the offshore oil and gas industry within the marine industries increased — from 36 per cent of marine industry value added in 1995-96 to 42 per cent. Conversely, the relative importance of the shipping and ship and boat building industries declined.

Figure 2.2

MARINE INDUSTRIES DIRECT VALUE ADDED, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates

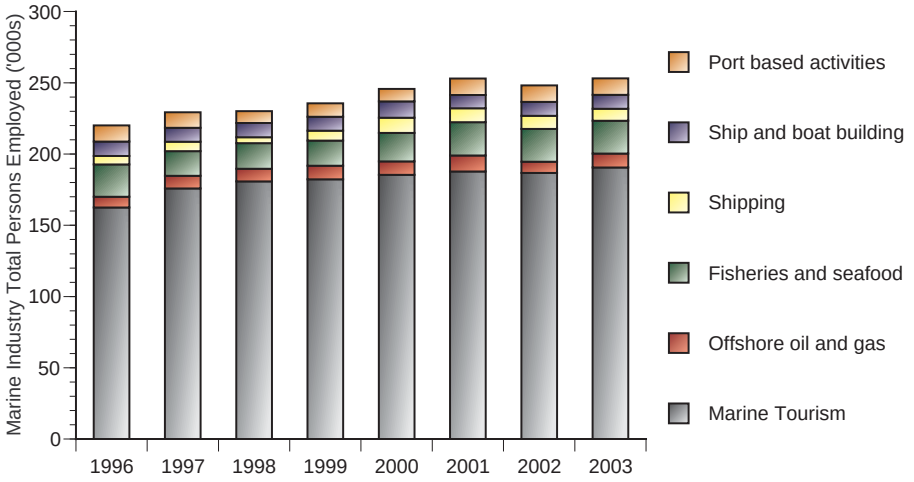
Employment

Marine industries employed approximately 253 130 persons in 2002-03, 3.5 per cent of total industry employment in Australia. During the period 1995-96 to 2002-03 the total number of employed persons in the marine industries grew at an average 2.0 per cent a year, which was higher than the average across all industries during the same period (1.4 per cent a year).

As shown in figure 2.3, marine tourism was the largest employer of all marine industries, employing approximately 190 620 persons in 2002-03 — 75.3 per cent of total employment in marine industries.

Figure 2.3

MARINE INDUSTRIES TOTAL EMPLOYED PERSONS, 1995-96 TO 2002-03



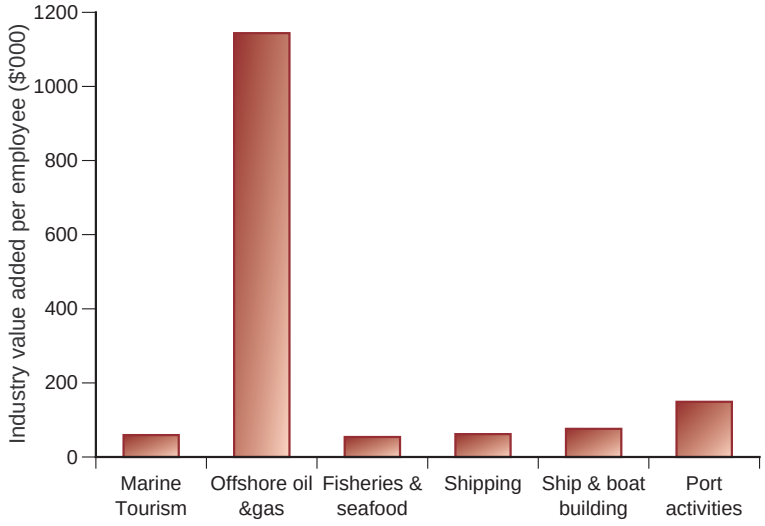
Source: Allen Consulting Group estimates

The nature of marine industries can be further understood by analysing industries on the basis of value added per employee. This provides an indication of the balance of capital and labour inputs into an industry, with the lower the value added per employees, the more labour intensive is the industry.

The fisheries and seafood industry was the most labour intensive marine industry, with the lowest level of value added per employee in 2002-03, as shown in figure 2.4. Offshore oil and gas had by far the highest level of value added per employee in 2002-03 of all marine industries, reflecting the capital intensive nature of the industry.

Figure 2.4

VALUE ADDED PER EMPLOYEE, 2002-03



Source: Allen Consulting Group estimates

Indirect contributions

An additional aspect of the economic contribution of marine industries is the value added from other industries in the economy necessary to produce a given amount of value added from marine industries. In the same way, the indirect employment estimates demonstrate the number of employed persons required from other industries in the economy in order to produce a given number of employed persons in marine industries. For example, indirect effects may include expenditure by commercial fishermen in local communities, capital equipment purchased by the offshore oil and gas industry, or jobs in manufacturing industries due to demand for goods from marine tourism.

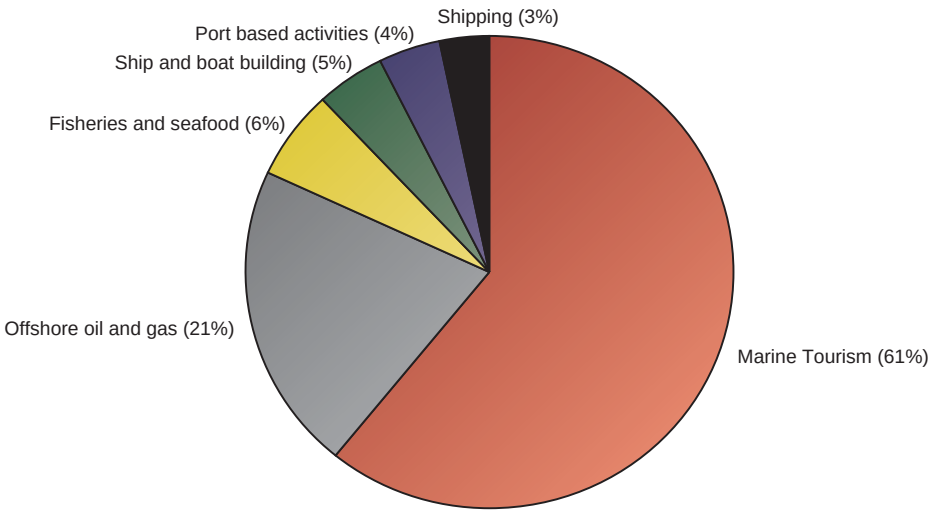
Care needs to be taken when interpreting these indirect estimates for value added and employment. The overall estimate for marine industries was compiled by taking the estimates for all marine industries. This methodology does not, however, allow for the fact that a proportion of this indirect effect will take place from one marine industry to another, rather than between marine industries and other sectors. Unfortunately the data on value added and employment multipliers do not allow for an estimate of this effect to be made.

Value added

It is estimated that economic activity in Australia's marine industries in 2002-03 was associated with around $46 billion in value added in other sectors or areas of the economy. As shown in figure 2.5, the majority of this indirect value added was from the marine tourism industry (60.8 per cent), likely due to the nature of the industry and its linkages with a range of other sectors. While a significant contributor of direct value added (41.8 per cent), offshore oil and gas provided a much smaller proportion of indirect value added (21.1 per cent).

Figure 2.5

COMPONENTS OF MARINE INDUSTRY INDIRECT VALUE ADDED, 2002-03



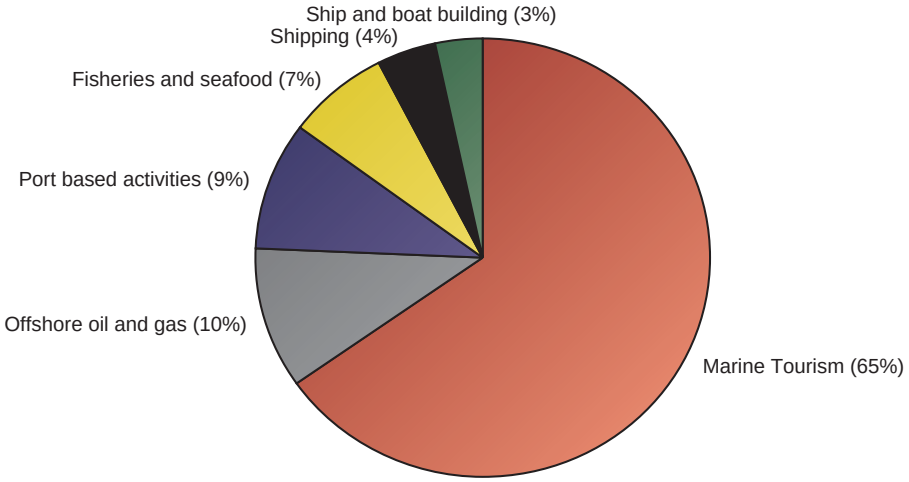
Source: Allen Consulting Group estimates

Employment

Economic activity in marine industries in 2002-03 was associated with an estimated 690 890 jobs in other sectors or areas of the economy. As with indirect value added, marine tourism made up the largest proportion of indirect employment (65 per cent).

Figure 2.6

COMPONENTS OF MARINE INDUSTRY INDIRECT EMPLOYMENT, 2002-03

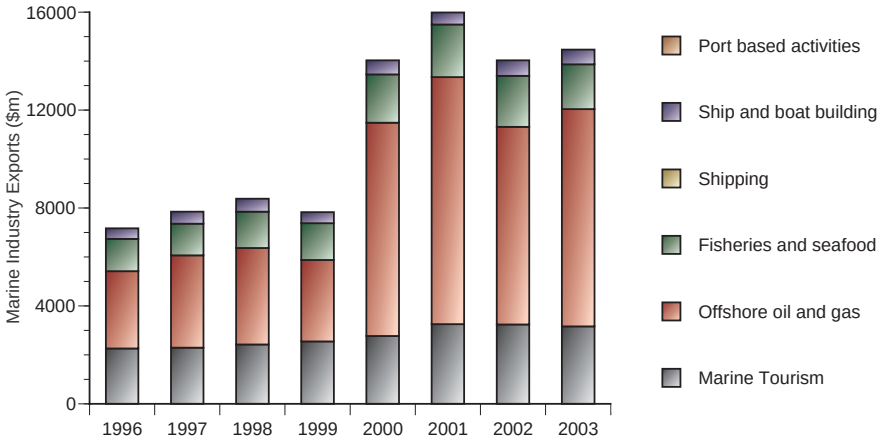


Source: Allen Consulting Group estimates

Exports

Figure 2.7

ALL MARINE INDUSTRIES – EXPORTS, 1995-96 TO 2002-03



Source: The Allen Consulting Group estimates.

The value of marine industry exports in 2002-03 was $14.5 billion. In the context of the Australian economy, the export of goods and services formed 19.7 per cent of industry value added in 2002-03. In the marine industry, exports played a much larger role, accounting for approximately 54.3 per cent of marine industry value added for the same year. This trend could be explained, in part, by the high representation of resource based industries in the marine industries, such as offshore oil and gas and fisheries, which are export oriented.

Figure 2.7 shows the trend in the value of exports for the marine industries between 1995-96 and 2002-03. By far the largest contributor to marine industry exports was offshore oil and gas, which accounted for 61.3 per cent ($8.9 billion) of total marine industry exports in 2002-03. Further, the relative importance of offshore oil and gas exports grew significantly from 1995-96 to 2002-03. The second largest exporting marine industry sector was marine tourism, which contributed 21.9 per cent ($3.2 billion) of marine industry exports.

The magnitudes of fisheries and seafood and shipbuilding remained relatively steady over the entire period, contributing 12.5 per cent ($1.8 billion) and 4.2 per cent ($0.6 billion) to exports of all marine industries respectively. There were no exports for shipping and port based activities.

Taxation revenue

Marine industries also affected the economy through the taxation revenues generated by their activity. It is estimated that Commonwealth and State and Territory Government revenue from marine industry activity in 2002-03 was $4.1 billion. Of this, the Commonwealth received approximately $2.5 billion and the States and Territories received the remaining $1.6 billion. The five types of revenue collectable from marine related activity were;

- Company tax, payable to the Commonwealth on profits made by all operators in the marine industry;
- Petroleum resource rent tax (PRRT), payable to the Commonwealth on the extraction of off-shore oil and gas outside three nautical miles from the shore, with the exception of Western Australia's North West Shelf;
- Goods and Services Tax (GST), collected by the Commonwealth on all industry value added less exports generated by the marine industry and received by the States and Territories;
- Royalties, payable to States and Territories on offshore oil and gas activity between the three nautical mile boundary and the low tide mark; and
- Payroll tax, payable to States and Territories for total persons employed in the marine industry.

Figure 2.8 shows the pattern of taxation revenues, as well as the distribution between the five revenue types. The GST is not part of the entire series, as it was introduced in 2000-01.

The contributions of the five revenue types to total taxation revenue in 2002-03 were;

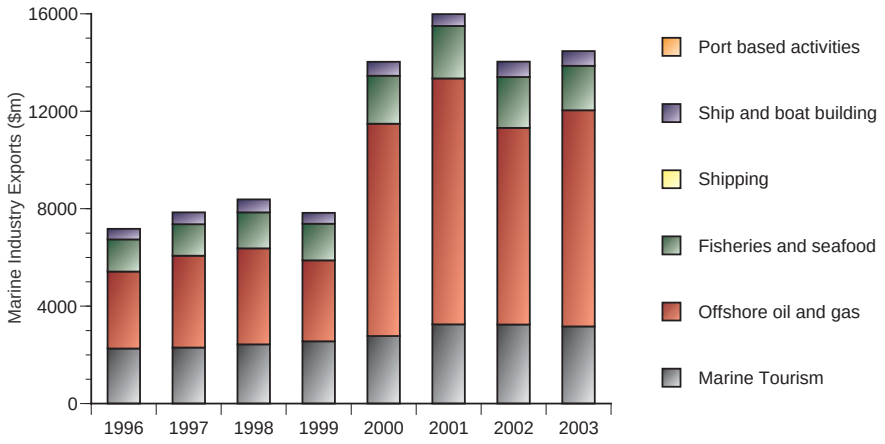
- 26 per cent ($1.0 billion) in company tax;
- 36 per cent ($1.5 billion) in PRRT;

- 16 per cent ($0.6 billion) in GST;
- 14 per cent ($0.6 billion) in Royalties; and
- 8 per cent ($0.3 billion) in Payroll tax.

The magnitudes of company and payroll tax and the GST remained relatively stable during the period. The PRRT and State and Territory royalties on oil and gas extraction were considerably more volatile, consistent with the volatile behaviour of value added and exports in the oil and gas sector during the same period.

Figure 2.8

TOTAL TAXATION REVENUE FROM ALL MARINE INDUSTRIES, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates, based on ABS, ATO and MYEFO data.

These estimates were based on calculations of the proportions of each tax associated with marine-related industries, as tax revenues were not disaggregated on the basis of ANZSIC classifications.

2.2 State Overview

The contribution of marine industries can also be considered on a regional basis. Given their reliance on the marine environment, marine industries are located in those regions that provide the appropriate environment for their activities. This section provides details of the activities of marine industries for each state and territory, with the exception of the Australian Capital Territory which has no marine industries.

The distribution of national marine employment and value added across the states and territories for 2002-03 is shown in Table 2.1. Victoria and New South Wales made the largest contributions to value added, due to the large contributions of offshore oil and gas in Victoria, and marine tourism in New South Wales.

Table 2.1

AUSTRALIA'S MARINE INDUSRIES: DIRECT VALUE ADDED AND EMPLOYMENT BY STATE - 2002-03

State	Direct Value Added ($m)	Total Persons Employed ('000s)
New South Wales	5 855	92.1
Victoria	7 332	45.7
Queensland	3 064	48.7
South Australia	1 489	23.3
Western Australia	4 707	14.3
Tasmania	608	10.0
Northern Territory	3 601	19.2
National Total	**26 655**	**253.1**

Source: Allen Consulting Group estimates.

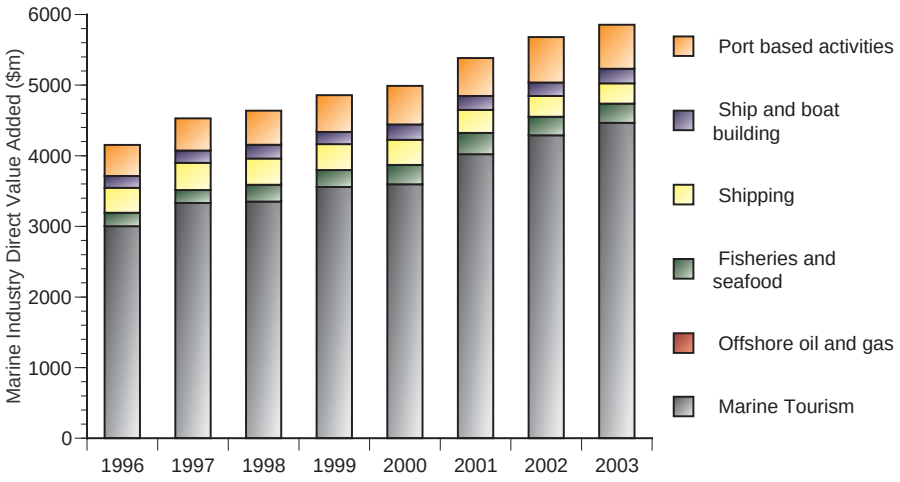
New South Wales

Direct Value Added

The marine industry in New South Wales is the second largest of all states and territories in Australia (by value added), contributing 22.0 per cent of national marine industry value added. Marine tourism is the largest marine industry in New South Wales, accounting for 76.3 per cent of state marine industry value added in 2002-03, likely to due to the established tourist regions along both the north and south coasts of the state.

Figure 2.9

DIRECT VALUE ADDED IN ALL MARINE INDUSTRIES – NEW SOUTH WALES, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates.

Figure 2.9 shows the trend in marine industry value added in New South Wales from 1995-96 to 2002-03. During this period:

- marine industry direct value added grew by an average of 5.0 per cent per year, slightly lower than the national growth in marine industry across the same period (6.0 per cent per year);
- the relative importance of marine tourism has grown, from 72.3 per cent of total marine industry value added in 1995-96 to 76.3 per cent in 2002-03; and

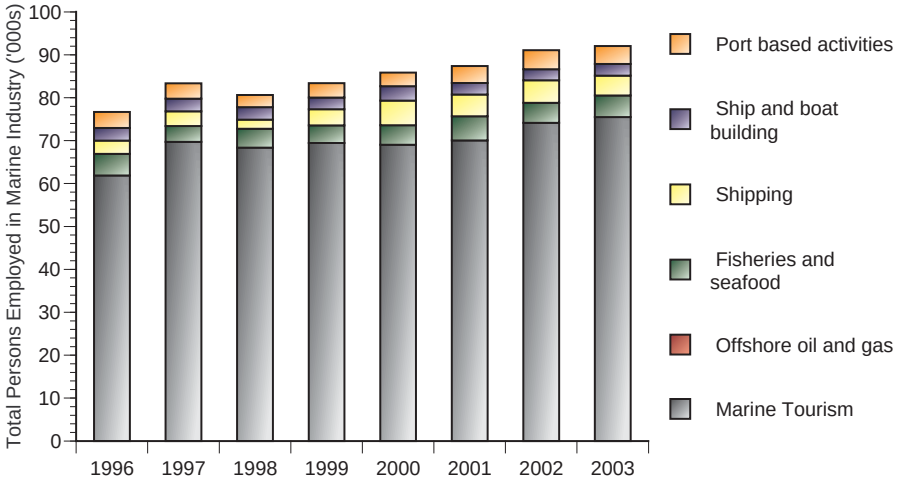
there was a decline in the relative importance of ship and boat building (from 4.0 per cent to 3.5 per cent) and shipping (8.6 per cent to 5.0 per cent).

Direct Employment

Marine industries in New South Wales employed 92 047 persons in 2002-03, 36.4 per cent of national marine industry employment. The vast majority of these positions were in marine tourism, which employed 75 488 persons in 2002-03, 82.0 per cent of total marine industry employment in New South Wales.

Figure 2.10

TOTAL PERSONS EMPLOYED IN ALL MARINE INDUSTRIES – NEW SOUTH WALES, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates

Figure 2.10 shows the trend in employment in New South Wales marine industries between 1995-96 and 2002-03. During this period employment grew by an average of 2.7 per cent per year, slightly higher than the national average (2.0 per cent per year). Of the total growth in employment in this period, 89 per cent of this growth was in marine tourism.

Victoria

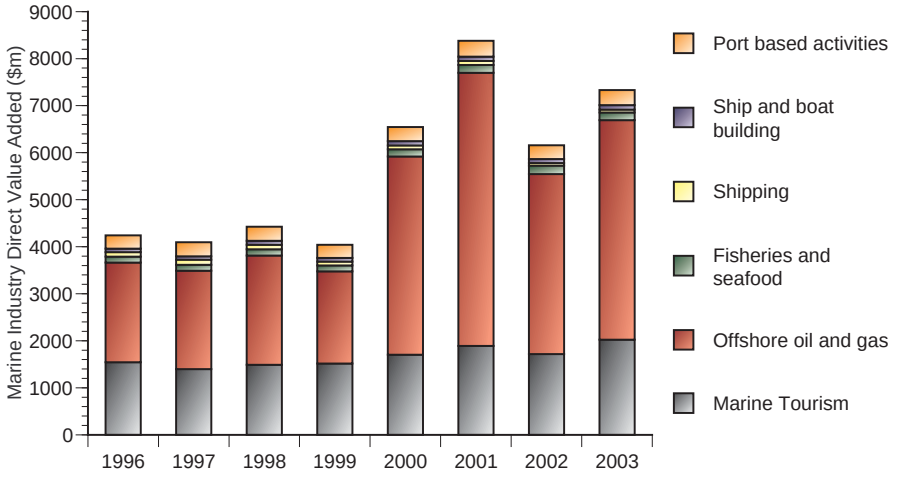
Direct Value Added

Victoria has the largest marine industry in Australia, contributing 27.5 per cent of national marine industry value added. The dominant marine industry in Victoria is offshore oil and gas, which accounted for 63.7 per cent of marine industry value added in the state in 2002-03.

Figure 2.11 shows the trend in marine industry value added in Victoria between 1995-96 and 2002-03. During this period marine industry direct value added grew by an average of 8.1 per cent per year, significantly higher than average growth in marine industries nationally (6.0 per cent per year). Of the individual industries, offshore oil and gas experienced the strongest growth in the period (12.0 per cent per year), while the shipping industry experienced a decline in value added (-5.9 per cent per year).

Figure 2.11

DIRECT VALUE ADDED IN ALL MARINE INDUSTRIES – VICTORIA, 1995-96 TO 2002-03

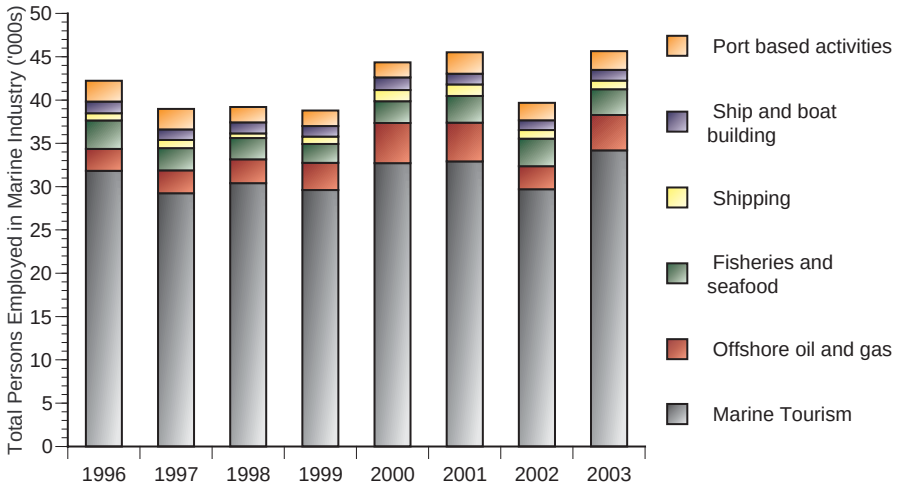


Source: Allen Consulting Group estimates.

Direct Employment

Figure 2.12

TOTAL PERSONS EMPLOYED IN ALL MARINE INDUSTRIES – VICTORIA, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates.

In 2002-03 marine industries in Victoria employed 45 646 persons, which was 18.0 per cent of national marine industry employment. While on the basis of value added offshore oil and gas was in the dominant marine industry in Victoria, it is a relatively small employer. Marine tourism is the dominant marine industry employer, with 34 195 persons employed in 2002-03 (74.9 per cent of total marine industry employment).

Figure 2.12 shows the trend in marine industry employment in Victoria between 1995-96 and 2002-03. During this period, employment in the marine industries was volatile, with only a marginal increase in employment over the period (1.1 per cent per year). This was the weakest employment growth of all states for this period, and was primarily due to lower in employment in fisheries (-1.5 per cent per year), ship and boat building (-1.3 per cent per year) and port based industries (-1.4 per cent per year).

Queensland

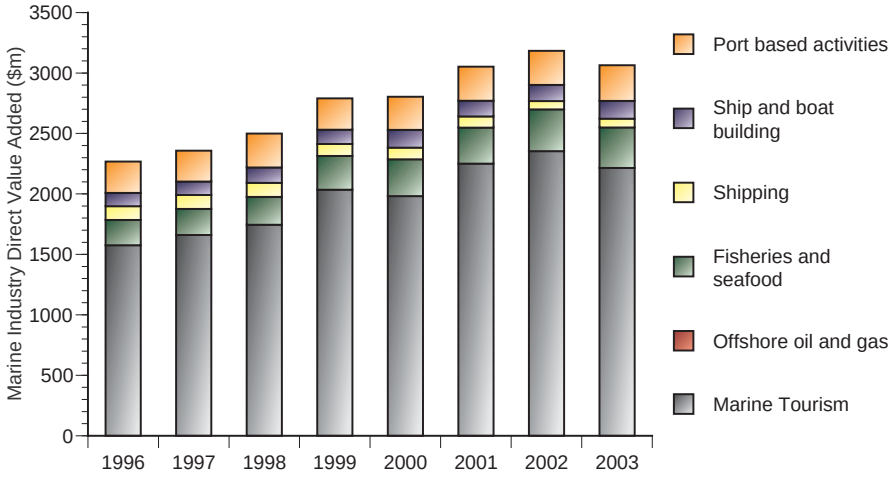
Direct Value Added

The marine industry in Queensland contributed $3.1 billion to national marine industry value added in 2002-03 — 11.5 per cent of national marine industry value added. Marine tourism accounted for 72.3 per cent of Queensland marine industry value added, to which the Great Barrier Reef marine tourist area and Gold Coast tourist areas likely make a significant contribution. Queensland also has a relatively large fisheries and seafood industry. Queensland fisheries and seafood industries contribute 26.9 per cent of national fisheries value added, the largest of any one state or territory.

Figure 2.13 shows the trend in marine industry value added in Queensland between 1995-96 and 2002-03. During this period value added grew by an average of 4.4 per cent per year, lower than the national average of 6.0 per cent per year over the same period. The fastest growing industry during this period was fisheries and seafood which grew by an average of 6.9 per cent per year, while value added for shipping declined by an average of 6.1 per cent per year.

Figure 2.13

DIRECT VALUE ADDED IN ALL MARINE INDUSTRIES – QUEENSLAND, 1995-96 TO 2002-03



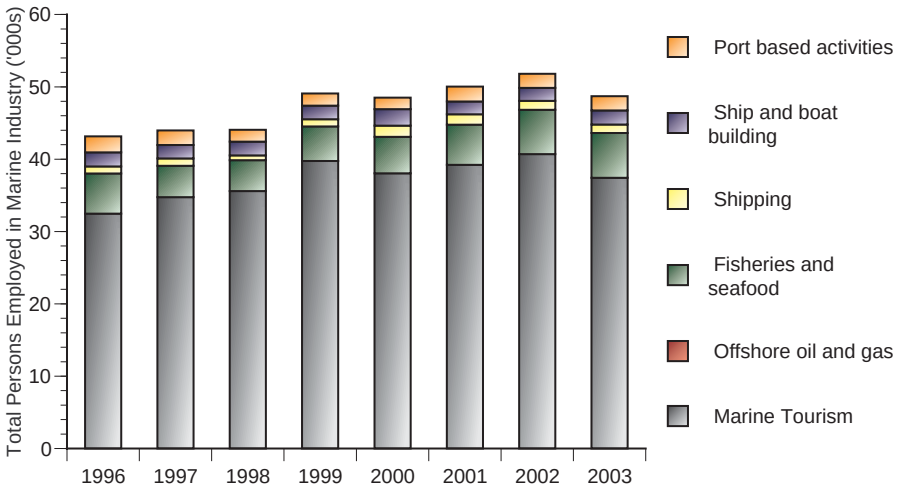
Source: Allen Consulting Group estimates.

Direct Employment

Marine industries in Queensland employed 48 711 persons in 2002-03, 19.2 per cent of national marine industry employment. The majority of this employment was in marine tourism, which accounted for 76.9 per cent of total marine industry employment in Queensland in 2002-03. The fisheries and seafood industry was the next largest employer (12.7 per cent). The fisheries and seafood industry in Queensland is the largest of any single state or territory, with 26.9 per cent of national fisheries and seafood employment occurring in Queensland (in 2002-03).

Figure 2.14

TOTAL PERSONS EMPLOYED IN ALL MARINE INDUSTRIES – QUEENSLAND, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates.

Figure 2.14 shows the trend of marine industry employment in Queensland between 1995-96 and 2002-03. During this period total persons employed in the marine industries grew by an average annual rate of 1.8 per cent, slightly lower than the national average (2.0 per cent per year). There was a fall in employment from 2001-02 to 2002-03, primarily due to an 8.0 per cent decline in marine tourism employment.

South Australia

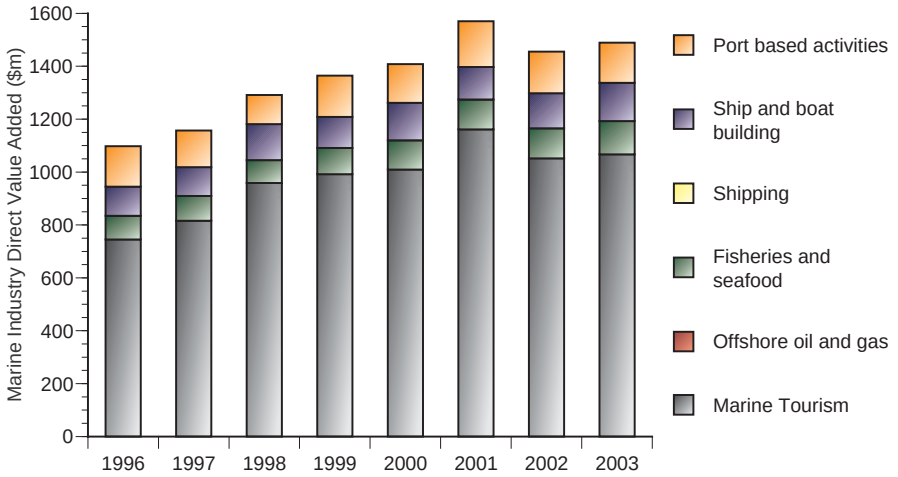
Direct Value Added

South Australian marine industries contributed $1.5 billion in valued added in 2002-03 — 5.6 per cent of national marine industry value added. The marine industry in South Australia is dominated by marine tourism, which accounted for 71.7 per cent of marine industry value added in South Australia in 2002-03.

Figure 2.15 shows the trend in marine industry value added in South Australia between 1995-96 and 2002-03. During this period marine industry direct value added grew by an average of 4.5 per cent per year, well above the national average for the same period (6.0 per cent). This high growth was driven primarily by 5.3 per cent growth per year in marine tourism value added across the period.

Figure 2.15

DIRECT VALUE ADDED IN ALL MARINE INDUSTRIES – SOUTH AUSTRALIA, 1995-96 TO 2002-03



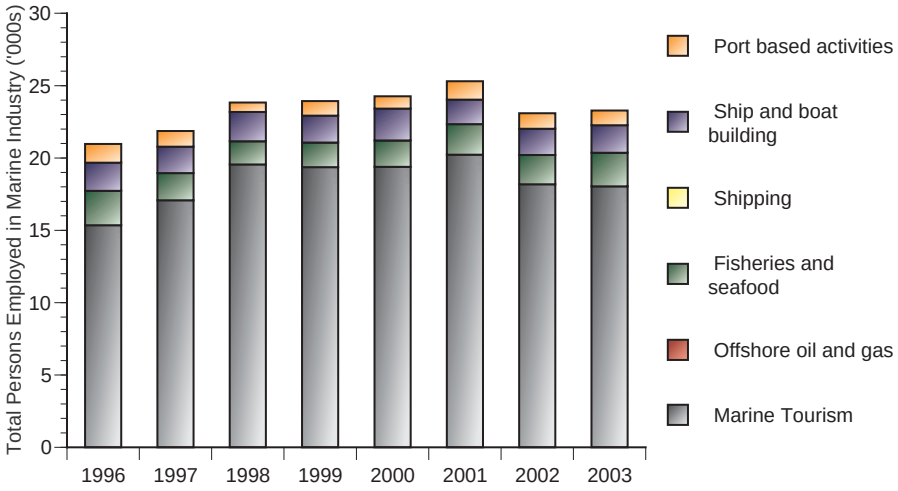
Source: The Allen Consulting Group estimates.

Direct Employment

Marine industries in South Australia employed 23 281 persons in 2002-03, 9.2 per cent of national marine industry employment. The largest employing industry was marine tourism, which accounted for 77.5 per cent of marine industry employment in South Australian in 2002-03.

Figure 2.16

TOTAL PERSONS EMPLOYED IN ALL MARINE INDUSTRIES – SOUTH AUSTRALIA, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates.

Figure 2.16 shows the trend in marine industry employment in South Australia between 1995-96 and 2002-03. During this period employment grew by 1.5 per cent per year, on par with national growth across this period (2.0 per cent per year). From 2001-02 to 2002-03 there was a fall in employment, primarily due to a fall in employment in marine tourism during this period (-10.8 per cent). This trend is consistent with that experienced in other states, and reflects the national trend of lower tourism employment in recent years.

Western Australia

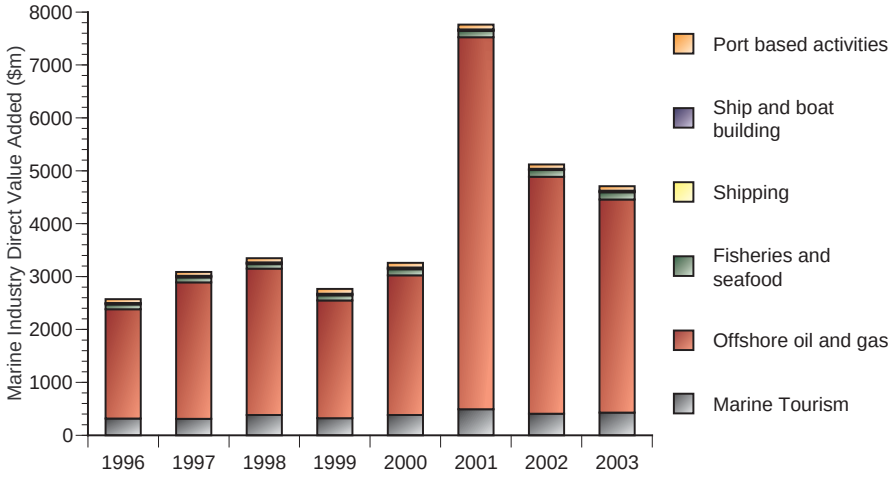
Direct Value Added

The marine industry in Western Australia contributed $4.7 billion (17.66 per cent) of national marine industry value added in 2002-03. The vast majority of this value added came from the offshore oil and gas industry (85.6 per cent of state marine industry value added). The remaining marine industries in Western Australia are relatively small, including marine tourism which contributed only 9.1 per cent of marine industry value added in the state, the smallest contribution of any state or territory.

Figure 2.17 shows the trend in marine industry value added in Western Australia between 1995-96 and 2002-03. During this period, there was strong growth in value added (9.0 per cent per year) — the highest growth of any state and territory during the period. This trend was primarily driven by 10.0 per cent average annual growth in value added in the offshore oil and gas industry.

Figure 2.17

DIRECT VALUE ADDED IN ALL MARINE INDUSTRIES – WESTERN AUSTRALIA, 1995-96 TO 2002-03



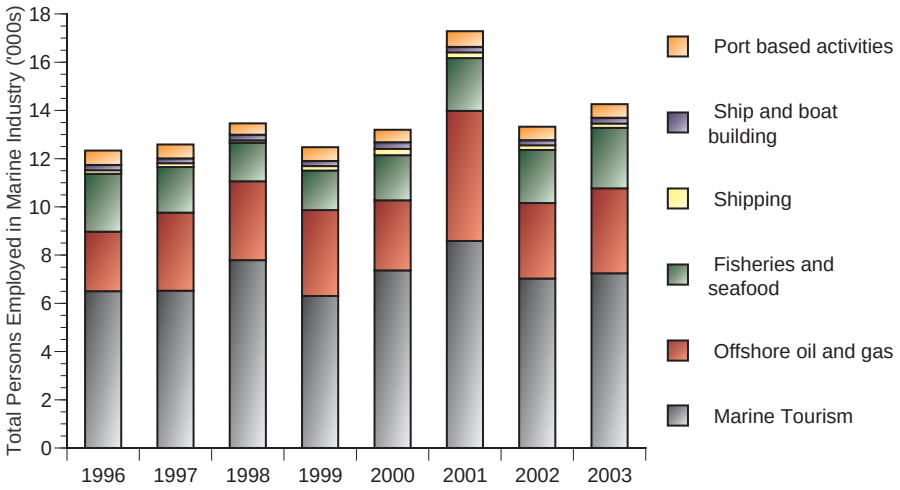
Source: Allen Consulting Group estimates.

Direct Employment

Marine industries in Western Australia employed approximately 14 262 persons in 2002-03 — 5.6 per cent of national marine industry employment, making it the second smallest level of employment amongst the states and territories. The majority of this employment was in marine tourism, which accounted for 50.8 per cent of employment, despite contributing only 9.1 per cent of value added (highlighting the labour intensive nature of tourism).

Figure 2.18

TOTAL PERSONS EMPLOYED IN ALL MARINE INDUSTRIES – WESTERN AUSTRALIA, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates.

Figure 2.18 shows the trend in employment in marine industries in Western Australia between 1995-96 and 2002-03. During this period employment grew by an average of 2.1 per cent per year. There was a peak in employment in 2000-01, primarily due to an 85.7 per cent increase in employment in the offshore oil and gas industry between 1999-00 and 2000-01 (driven by higher export prices, see section 3.2 for further explanation of this trend).

Tasmania

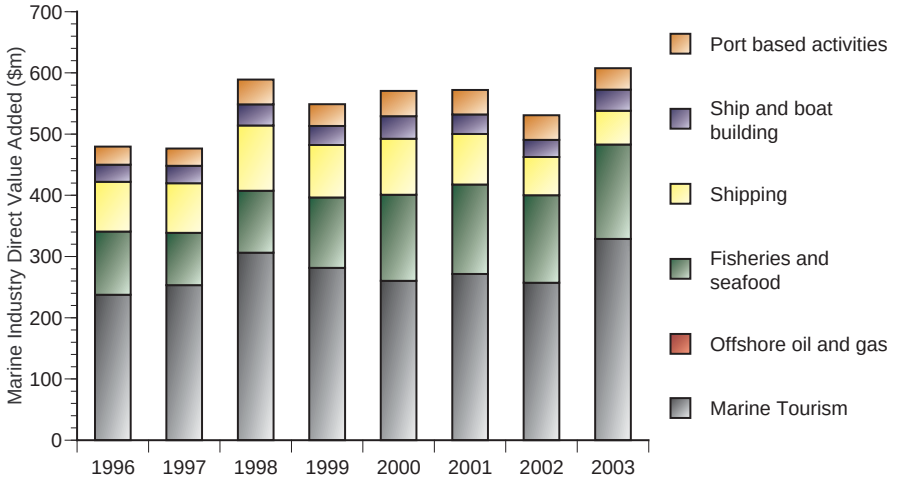
Direct Value Added

The marine industry in Tasmania is the smallest of any state and territory in Australia (with the exclusion of the ACT). In 2002-03 Tasmanian marine industry value added was $608.7 million, 2.3 per cent of national marine industry value added. The largest marine industry in Tasmania, by value added, is marine tourism, which accounted for 54.1 per cent of state marine industry value added in 2002-03. The Tasmanian fisheries and seafood industry is disproportionately large, accounting for 25.4 per cent of state value added. This is primarily due to the large aquaculture industry in Tasmania.

Figure 2.19 shows the trend in marine industry value added in Tasmania between 1995-96 and 2002-03. During this period, value added grew by 3.4 per cent per year, lower than the national average during the same period (6.0 per cent per year).

Figure 2.19

DIRECT VALUE ADDED IN ALL MARINE INDUSTRIES – TASMANIA, 1995-96 TO 2002-03



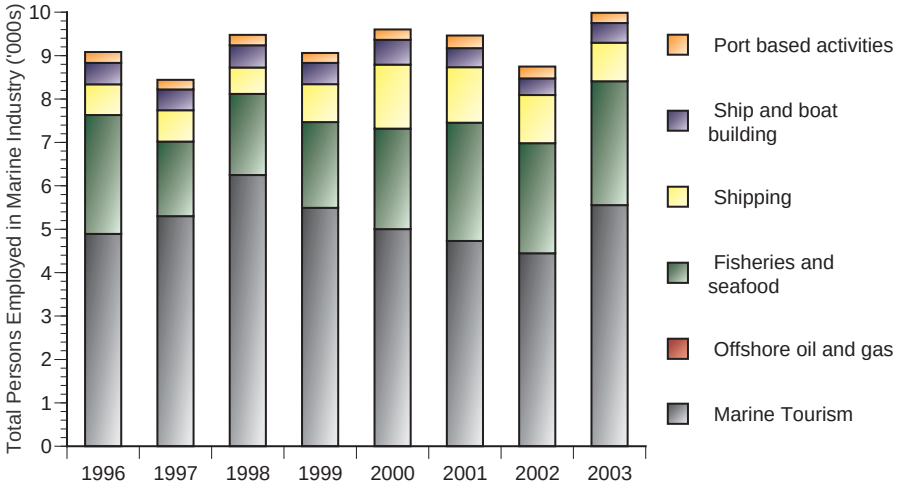
Source: Allen Consulting Group estimates.

Direct Employment

Marine industries in Tasmania employed 9 987 persons in 2002-03 — 4 per cent of national marine industry employment. Marine tourism was the largest employer in Tasmania in 2002-03, accounting for 55.6 per cent of total marine industry employment.

Figure 2.20

TOTAL PERSONS EMPLOYED IN ALL MARINE INDUSTRIES – TASMANIA, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates.

Figure 2.20 shows the trends in employment in marine industries in Tasmania between 1995-96 and 2002-03. During this period employment grew by an average of 1.4 per cent per year, lower than the national average across the same period (2.0 per cent per year). Employment across this period was volatile, with employment in marine tourism falling between 1998-99 and 2001-02, before recovering in 2002-03. There has also been volatility in employment in the fisheries and seafood industry.

Northern Territory

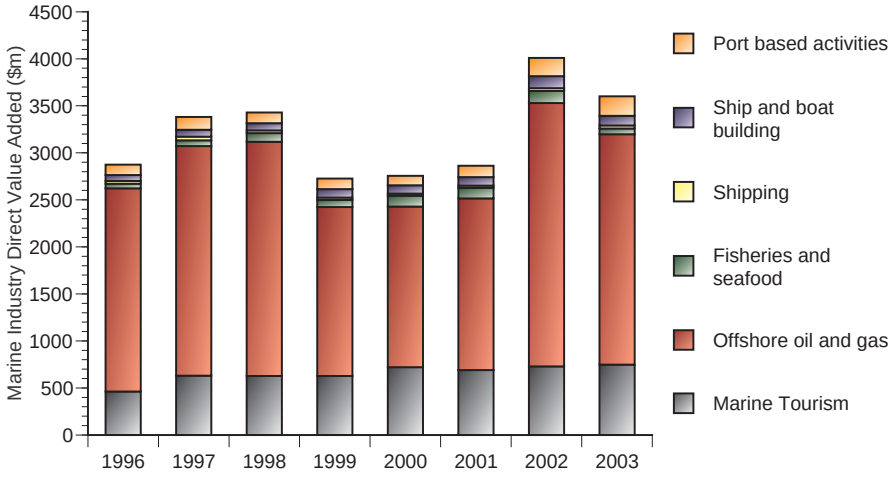
Direct Value Added

The marine industry in the Northern Territory is relatively small, with $3.6 bullion in value added in 2002-03 — 13.5 per cent of national marine industry value added. Offshore oil and gas is the dominant marine industry, accounting for 68.0 per cent of marine industry value added in the Northern Territory in 2002-03.

Figure 2.21 shows the trend in marine industry value added between 1995-96 and 2002-03. During this period, value added has been volatile, due to volatility in value added for offshore oil and gas. Across the period, value added grew by an average of 3.3 per cent per year, lower than the national growth across the period (6.0 per cent per year).

Figure 2.21

DIRECT VALUE ADDED IN ALL MARINE INDUSTRIES – NORTHERN TERRITORY, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates.

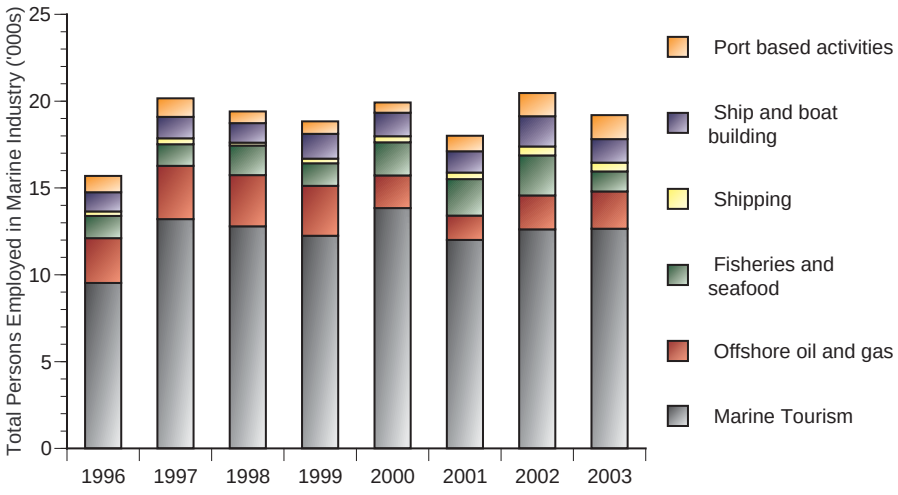
Direct Employment

Marine industries in the Northern Territory employed 19 200 persons in 2002-03, 7.3 per cent of national marine industry employment. Marine tourism is the largest employer of the marine industries, accounting for 65.9 per cent of total marine industry employment in the Northern Territory.

Figure 2.22 shows the trend in marine industry employment in the Northern Territory between 1995-96 and 2002-03. During this period employment was volatile, with considerable variability in employment from one year to the next. The variability was most pronounced in the offshore oil and gas industry, and marine tourism.

Figure 2.22

TOTAL PERSONS EMPLOYED IN ALL MARINE INDUSTRIES – NORTHERN TERRITORY, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates.

Section 3

Industry specific trends

3.1 Marine tourism

The marine tourism sector was the largest of the marine related industries in terms of direct value added and employment in 2002-03. In terms of contribution to exports, it was the second largest marine sector, after offshore oil and gas. The marine tourism sector is difficult to define, as it requires transactions to be classified by the status of the consumer, rather than the activity. Marine tourism is calculated as a proportion of overall tourism as published in the ABS' *Tourism Satellite Account*. While many ANZSIC industries form part of tourism activity, over 40 per cent of this sector comprises of:

- travel agency and tour operator services;
- taxi transport;
- air and water transport;
- accommodation;
- cafes, restaurants and food outlets;
- clubs, pubs, taverns and bars; and
- other retail trade.

Value added

Marine tourism in 2002-03 contributed:

- 42.3 per cent of marine industry direct value added ($11.3 billion);
- 60.8 per cent of indirect value added ($28.2 billion); and
- 44.6 per cent of turnover ($25.8 billion).

Figure 3.1 shows the trend in marine tourism value added between 1995-96 and 2002-03. During this period, industry direct value added grew by an average of 5.2 per cent per year — lower than the marine industry average across the period (6.0 per cent per year) and marginally lower than the average across all industries (5.9 per cent per year).

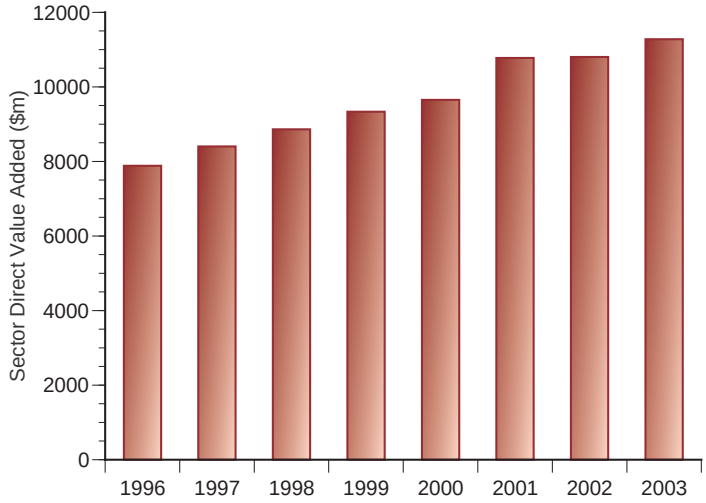
There was a large increase in marine tourism value added between 1999-00 and 2000-01 (11.6 per cent), primarily due to the introduction of the GST (which inflated prices), and the surge in demand due to the Sydney Olympic Games.[3] Since 2000-01 marine tourism value added has grown by only 2.3 per cent per year, due to a number of shocks to demand, including the September 11 terrorism attacks in 2001, the collapse of ANSETT in the same year, the Bali bombings in 2002 and the Severe Acute Respiratory Syndrome (SARS) in 2003.[4]

[3] Australian Bureau of Statistics, 2004, "Tourism Satellite Account, 2002–03", (Cat. No. 5249.0), p. 4.
[4] *op. cit.* , p. 4.

Slower growth in the period 2000-01 to 2002-03 saw the relative importance of marine tourism in the marine industries decline, on the basis of direct value added (from 44.5 per cent in 1995-96 to 42.3 per cent in 2002-03).

Figure 3.1

DIRECT VALUE ADDED IN MARINE TOURISM, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates.

Employment

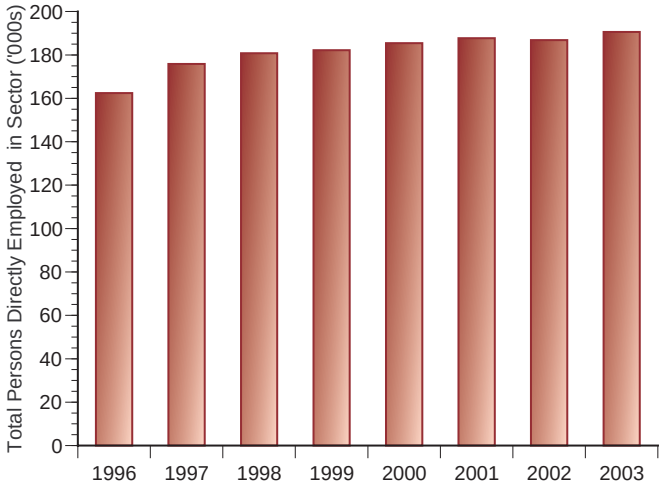
The marine tourism sector is relatively labour intensive compared to the other marine industries. In 2002-03 it contributed:

- 75.3 per cent of direct employment for marine industries (190 620 persons); and
- 65.3 per cent of indirect employment (450 960 persons).

Figure 3.2 shows the trend in employment in the marine tourism sector from 1995-96 to 2002-03. During this period, employment grew by an average of 2.3 per cent per year. Higher than average growth occurred between 1995-96 and 1996-97 (8.2 per cent), primarily due to strong growth in total employed persons in the Accommodation, Cafes and Restaurants and Air and Space and Water Transport Industries over the same period. Together, these industries comprised roughly 40 per cent of tourism employed persons.

Figure 3.2

TOTAL EMPLOYED PERSONS IN MARINE TOURISM, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates based on ABS data.

Exports

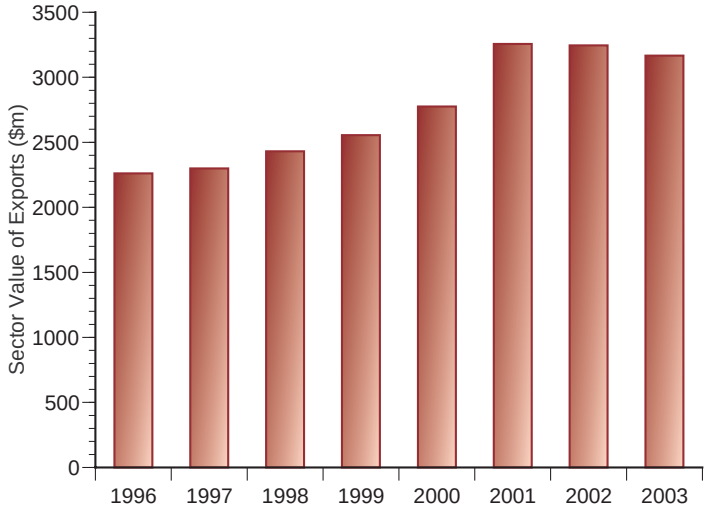
Marine tourism was the second largest exporting sector of the marine industries, contributing 21.9 per cent of the total value of exports from all marine industries in 2002-03. Figure 3.3 shows that exports of marine tourism grew at an average of 5.1 per cent per year from 1995-96 to 2002-03.

Despite strong growth in marine tourism exports since 1995-96, its relative importance in marine industries exports has declined (from 31.5 per cent of all marine industry exports in 1995-96) due to the increasing export shares of offshore oil and gas and fisheries over the same period.

The higher than average growth in the export of marine tourism in 2000-01 (17.3 per cent) and the negative growth in 2001-02 (-3.0 per cent) and 2002-03 (-2.4 per cent) were due to the same demand shocks that caused similar movements in direct value added during the same period.

Figure 3.3

EXPORTS OF MARINE TOURISM, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates based on ABS data.

3.2 Refining of petroleum from offshore sources

Offshore oil and gas is a major industry within the marine industries. As a capital intensive industry, it contributes significantly to marine industry value added and exports, though it is a relatively small employer.

The offshore oil and gas industry is comprised of:

- offshore oil and gas extraction;
- offshore petroleum refining; and
- exploration and services.

Between 1995-96 and 2002-03 the industry performed strongly relative to other marine industries, with higher than average growth in value added, exports and employment.

Value added

Offshore oil and gas was the second largest value added segment of the marine industries behind marine tourism in 2002-03, contributing:

- 41.8 per cent of direct value added of marine industries ($11.6 billion);
- 21.1 per cent of indirect value added ($9.8 billion); and
- 37.1 per cent of industry turnover ($21.5 billion).

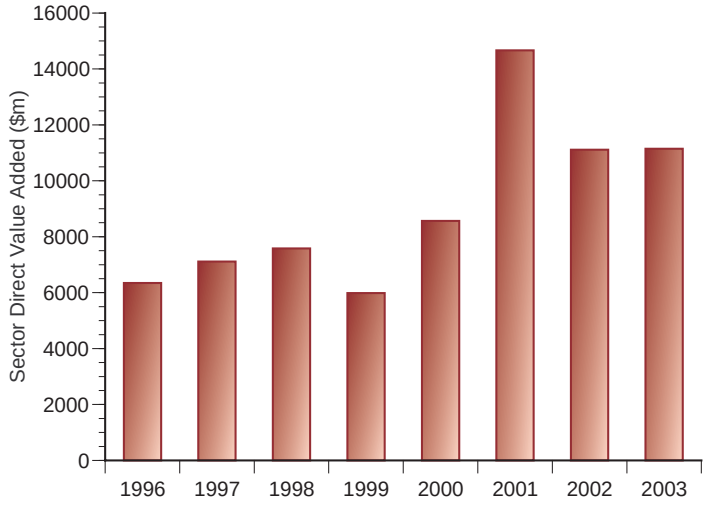
Figure 3.4 shows the trend in offshore oil and gas value added between 1995-96 and 2002-03. During this period offshore oil and gas value added grew by and average of 8.4 per cent per year. This was the highest growth of all marine industries — higher than average annual growth across marine industries (5.9 per cent) and that across all industries (6.0 per cent) during the same period.

Figure 3.4 also illustrates the volatility in offshore oil and gas between 1995-06 and 2002-03. There was a significant spike in value added in 2000-01, primarily driven by higher export prices and volumes — average oil and gas export unit prices increased by between 31 and 40 per cent during 2000-01.

Within the offshore oil and gas industry, oil and gas extraction contributed the greatest proportion of value added (90 per cent in 2002-03). Further, between 1995-96 and 2002-03 growth in value added for offshore oil and gas has been driven predominantly by growth in oil and gas extraction (9.2 per cent per year), compared with –1.1 per cent per year for petroleum refining and 6.2 per cent per year for exploration and services.

Figure 3.4

DIRECT VALUE ADDED IN OFFSHORE OIL AND, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates based on ABS data.

Employment

As a capital intensive industry, offshore oil and gas is a relatively small employer compared with other marine industries. In 2002-03 it contributed:

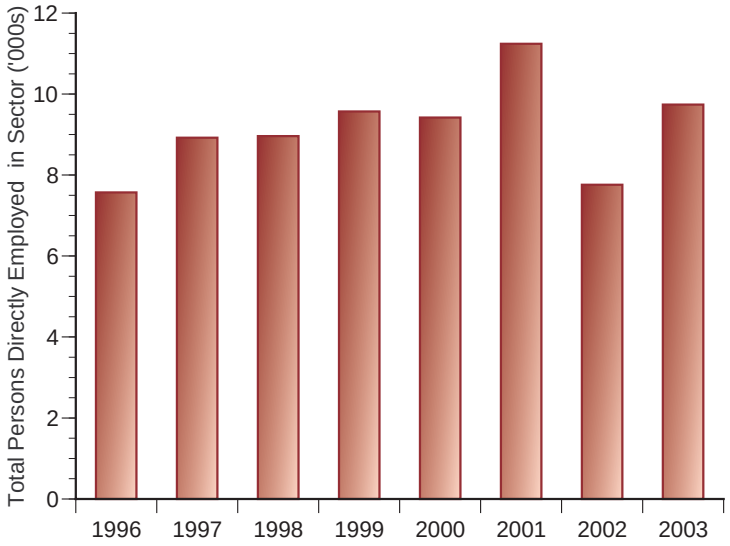
- 3.9 per cent of direct employment for marine industries (9 740 persons); and
- 10.4 per cent of indirect employment (71 890 persons).

While it only accounted for a small proportion of total employment, between 1995-96 and 2002-03 growth in employment for offshore oil and gas was marginally higher than the average across marine industries. During this period, employment in offshore oil and gas grew by and average of 3.7 per cent per year — higher than the average growth for marine industries (2.0 per cent per year), and the average across all industries (1.4 per cent per year).

As shown in figure 3.5, there was a peak in employment during 2000-01, the period where with industry took advantage of higher export prices to boost production.

Figure 3.5

TOTAL PERSONS EMPLOYED IN OFFSHORE OIL AND GAS, 1995-96 TO 2002-03



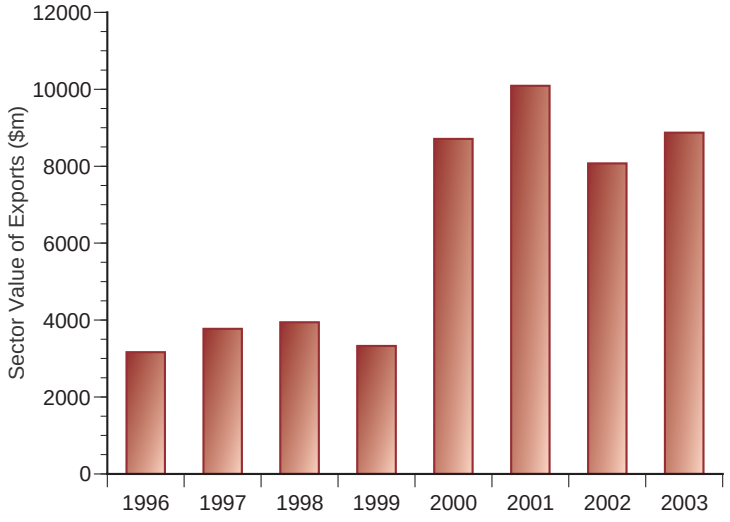
Source: Allen Consulting Group estimates based on ABS data

Exports

Offshore oil and gas is the largest exporting industry of all marine industries, contributing 61.0 per cent of the total value of exports from marine industries in 2002-03.[5]

Figure 3.6

EXPORTS OF OFFSHORE OIL AND GAS, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates based on ABS data

[5] Exports in the offshore oil and gas industry comprises of only oil and gas extraction

Figure 3.6 shows the trend in the value of offshore oil and gas exports between 1995-96 and 2002-03. During this period the value of exports grew strongly, though this trend has been volatile, with a sharp rise in the value exports from 1999-00 to 2000-01. As noted previously, high export prices, driven by a weaker Australian dollar, during this period resulted in higher export volumes and increased returns.

3.3 Fisheries and seafood

The fisheries and seafood industry, while often characterised as the archetypal marine industry, contributed a relatively small proportion of economic activity across the marine industries. The industry comprises of:

- marine fishing;
- aquaculture; and
- seafood processing.

Value added

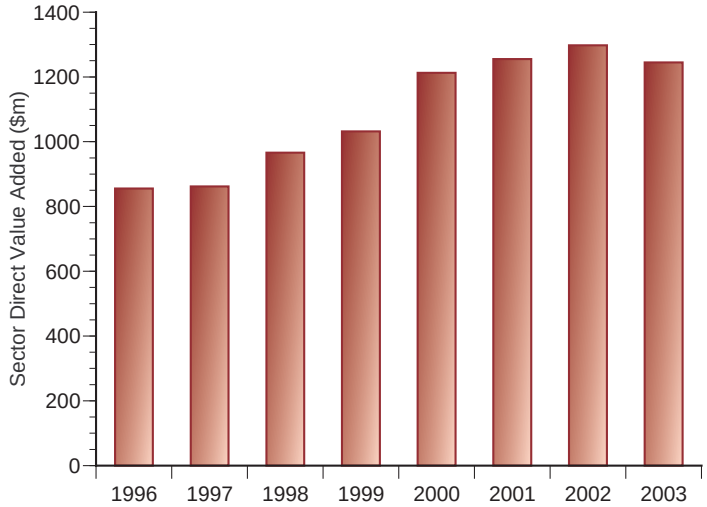
The fisheries and seafood industry is a relatively small contributor to total marine industry value added In 2002-03 fisheries and seafood contributed:

- 4.7 per cent of marine industry direct value added ($1.2 billion);
- 6.1 per cent of indirect value added ($2.8 billion); and
- 6.9 per cent of marine industry turnover ($4.0 billion).

Figure 3.7 shows the trend in fisheries and seafood value added between 1995-96 and 2002-03. During this period direct value added grew by an average of 5.5 per cent per year — lower than the marine industry average across the period (6.0 per cent per year) and marginally lower than the average across all industries (5.9 per cent per year).

Figure 3.7

DIRECT VALUE ADDED IN FISHERIES AND SEAFOOD, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates based on ABS and ABARE data.

Within the fisheries and seafood industry, the stronger growth in value added was in the marine fishing and aquaculture segments (5.6 per cent per year), with marginally lower growth in seafood processing (5.1 per cent per year).

Employment

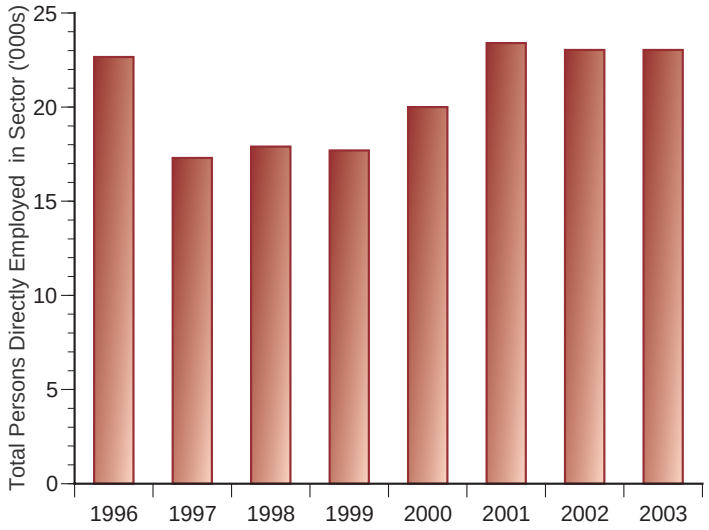
The fisheries and seafood industry is the most labour intensive of all marine industries, on the basis of value added per employee (as discussed in section two). In 2002-03 the industry employed 23 030 persons, 9.1 per cent of total employment in marine industries.

Figure 3.8 shows the trend in fisheries and seafood employment between 1995-96 and 2002-03. During this period, while there was growth in value added and turnover in fisheries and seafood, employment has increased only marginally (0.2 per cent per year). This was lower than the average across all marine industries (2.0 per cent per year).

Within the industry there was strong growth in employment in marine fishing (4.8 per cent per year), however, employment in aquaculture declined (-6.6 per cent per year). This was due to a significant drop in employment in aquaculture between 1995-96 and 1997-89, where employment in aquaculture more than halved.

Figure 3.8

TOTAL EMPLOYED PERSONS IN FISHERIES AND SEAFOOD, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates based on ABS and ABARE data

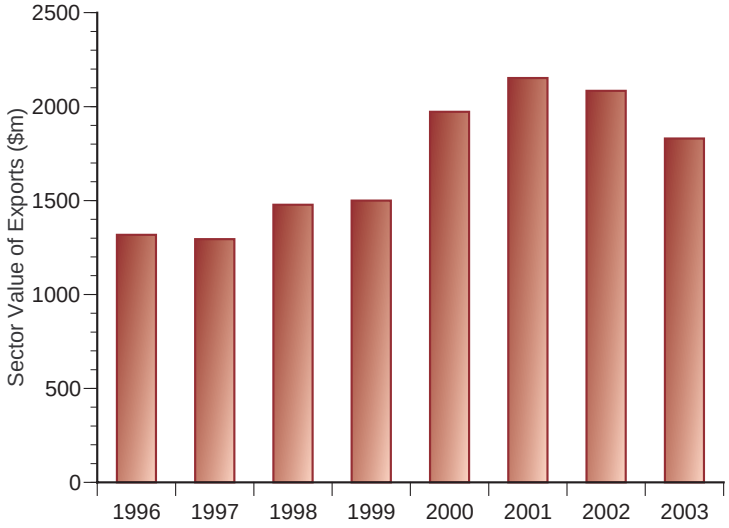
Exports

The fisheries and seafood industry was the third largest exporting marine industry, behind offshore oil and gas and marine tourism in 2002-03, accounting for almost 13 per cent of total marine industry exports.

As shown in figure 3.9, the value of exports from the fisheries and seafood industry grew by 4.8 per cent per year between 1995-96 and 2002-03. This was lower than the overall trend across all marine industries, which was heavily influenced by the strong growth in the value of offshore oil and gas exports.

Figure 3.9

EXPORTS OF FISHERIES AND SEAFOOD, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates based on ABS and ABARE data.

3.4 Shipping

The shipping industry was the smallest of the marine industries in 2002-03, both in terms of value added and total employed persons (direct and indirect). This sector is defined by the ABS as water transport.

As water transport was also a component of the marine tourism sector, an adjustment for double counting was made to the value added and the employment estimates.

Value Added

The shipping sector in 2002-03 contributed:

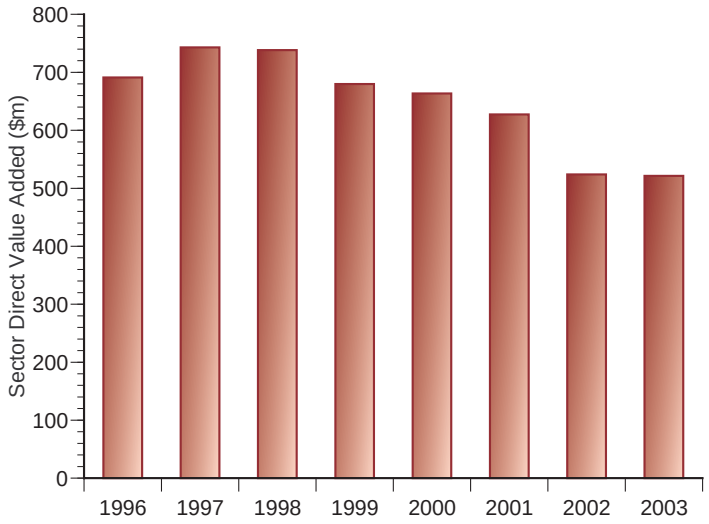
- 2.0 per cent of marine industry direct value added ($0.5 billion);
- 3.3 per cent of indirect value added ($1.5 billion); and
- 3.0 per cent of turnover ($1.7 billion).

Between 1995-96 and 2002-03 the shipping sector was the only marine industry to decline in value added terms, with an average annual rate of –3.7 per cent during the period (figure 3.10). The exception was between 1995-96 and 1996-97, when value added grew by 7.5 per cent.

This decline in value added lead to a fall in the relative importance of the shipping sector for the marine industries — from 3.9 per cent in 1995-96 to 2.0 per cent in 2002-03.

Figure 3.10

DIRECT VALUE ADDED IN SHIPPING, 1995-96 TO 2002-03



Source: The Allen Consulting Group estimates.

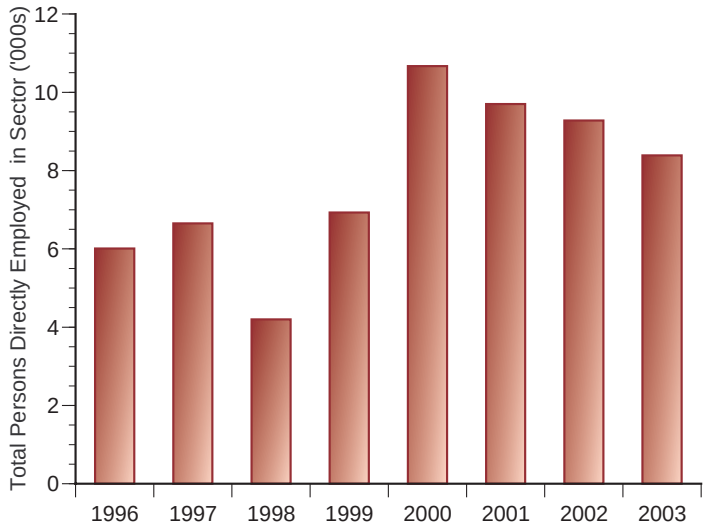
Employment

The shipping industry directly employed less than five per cent of total employed persons in the marine industries in 2002-03, making it the smallest employer, both directly and indirectly. In 2002-03 it contributed:

- 3.3 per cent of direct employment for marine industries (8 390 persons); and
- 3.4 per cent of indirect employment (23 310 persons).

Figure 3.11

TOTAL EMPLOYED PERSONS IN SHIPPING, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates, based on ABS data.

Figure 3.11 shows the volatile pattern of total persons employed in the shipping sector between 1995-96 and 2002-03. During this period employment in shipping grew by an average of 4.9 per cent per year, though employment during this period was highly volatile. The proportion of persons employed in shipping to total persons employed in the marine industries increased slightly from 3.0 per cent to 3.3 per cent over the same period.

3.5 Shipbuilding

The shipbuilding industry was the second smallest of the marine industries in terms of value added and total employed persons (direct and indirect) in 2002-03. Of the four marine industries that exported, it was the smallest. This sector comprises of:

- ship building; and
- boat building.

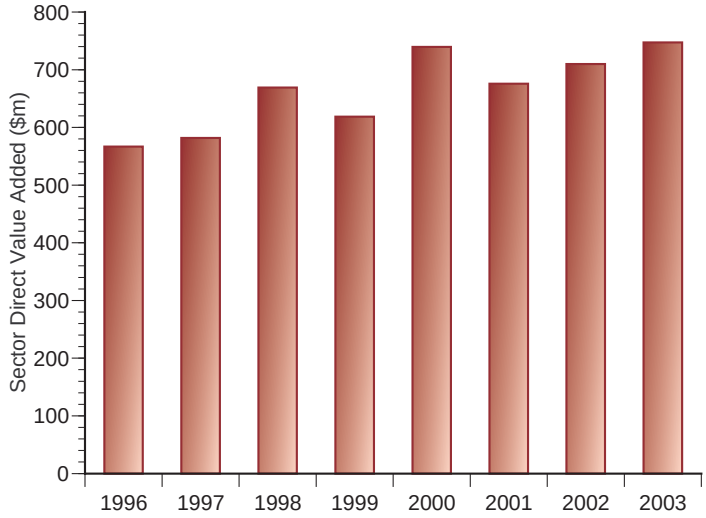
Value added

In 2002-03 the shipbuilding sector contributed:

- 2.8 per cent of marine industry direct value added ($0.7 billion);
- 4.6 per cent of indirect value added ($2.1 billion); and
- 3.6 per cent of turnover ($2.1 billion).

Figure 3.12

DIRECT VALUE ADDED IN SHIP AND BOAT BUILDING, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates, based on ABS data.

As shown in figure 3.12, industry direct value added in ship and boat building experienced volatile growth from 1995-96 to 2002-03. The average annual growth rate was 4.0 per cent — lower than the marine industry average (6.0 per cent) and the average across all industries (5.9 per cent) for the same period.

The relative importance of the shipbuilding sector declined from 3.2 per cent ($0.5 billion) of all marine industries in 1995-96 to 2.8 per cent in 2002-03. This decline was due to the contributions of other sectors increasing over the same period, namely offshore oil and gas, and fisheries.

Employment

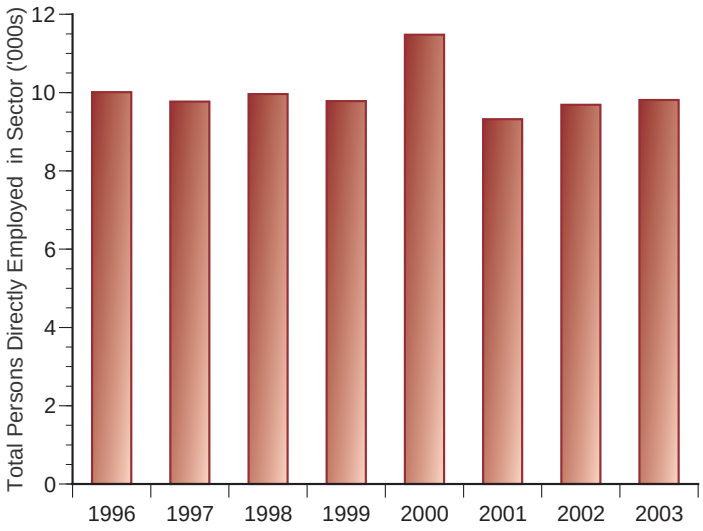
Of the marine industries, the shipbuilding sector is the second smallest direct employer (after shipping) and third smallest indirect employer (after shipping and port-based activity). In 2002-03 it contributed:

- 3.9 per cent of direct employment for marine industries (9 810 persons); and
- 9.5 per cent of indirect employment (65 270 persons).

Figure 3.13 shows that employment from 1995-96 to 2002-03 in the shipbuilding sector remained virtually unchanged, growing by an average of 0.2 per cent per year. Employment peaked in 1999-00 — the same year in which value added reached a high.

Figure 3.13

TOTAL EMPLOYED PERSONS IN SHIP AND BOAT BUILDING, 1995-96 TO 2002-03



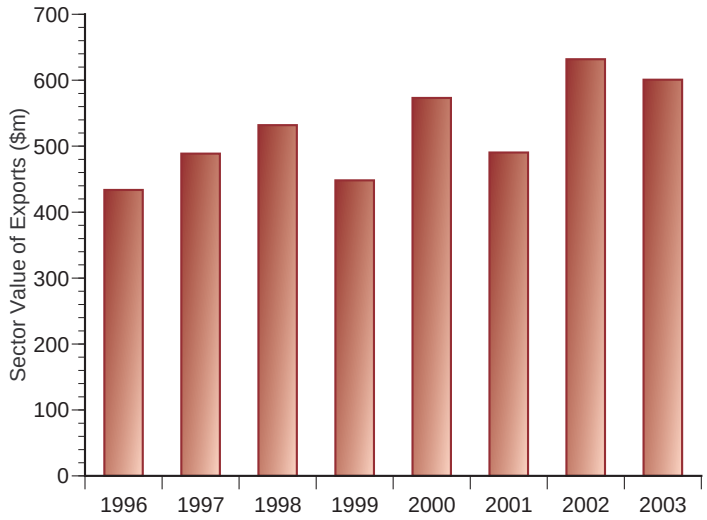
Source: Allen Consulting Group estimates, based on ABS data.

Exports

Of the four marine industry sectors that exported, shipbuilding was the smallest in 2002-03. The average annual growth rate of exports was 6.2 per cent from 1995-96 to 2002-03. This sector contributed 4.2 per cent ($0.6 billion) of the total value of exports from marine industries in 2002-03.

Figure 3.14

EXPORTS OF SHIP AND BOAT BUILDING, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates based on ABS data.

Shipbuilding exports exhibited strong growth between 1995-96 and 2002-03, but their contribution to the exports of all marine industries declined due to the increasing contribution of offshore oil and gas.

3.6 Port-based industries

Of all the marine industries, the port based industries are the most difficult to define and measure. Port based industries encompasses a range of activities, which can be characterised in the following groupings:

- stevedoring;
- water transport terminals;
- port operators; and
- other services to water transport.

While difficult to define, port industries are vital for the shipping industry, and as an industry has greater value added and employment than shipping.

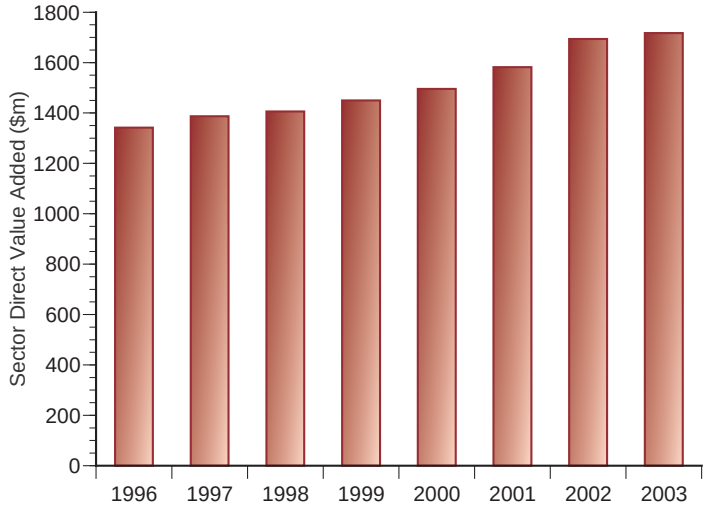
Value added

Port based industries were the third largest marine industry by value added in 2002-03, contributing:

- 6.4 per cent of marine industry value added ($1.7 billion);
- 4.1 per cent of marine industry indirect value added ($1.9 billion); and
- 4.9 per cent of turnover ($2.8 billion).

Figure 3.15

DIRECT VALUE ADDED IN PORT BASED ACTIVITY, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates based on ABS data

Between 1995-96 and 2002-03, port based industry value added grew steadily, by an average annual rate of 6 per cent per year — on par with the growth across all marine industries in the same period (5.9 per cent per year), as shown in figure 3.15.

Port based industries provided a relatively smaller contribution to indirect value added, indicating that the nature of the industry was more specialised and had fewer linkages with other sectors compared with other marine industries (particularly marine tourism).

Employment

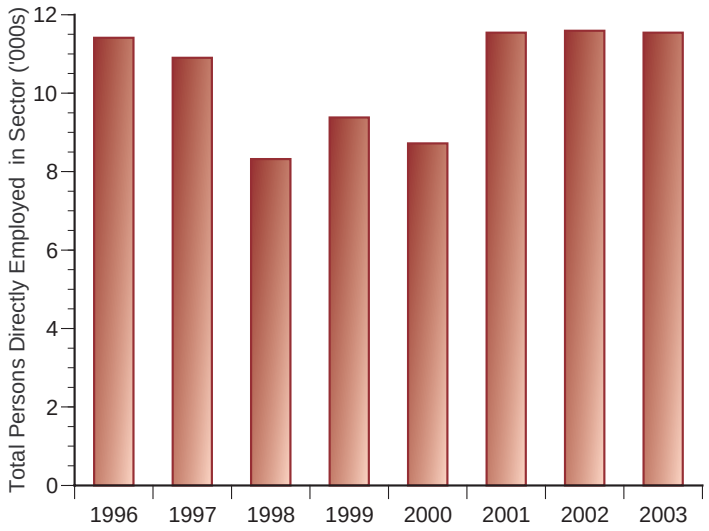
Port based industries are a relatively small employer in the marine industries. In 2002-03 they contributed:

- 4.6 per cent of marine industry direct employment (11 540 persons); and
- 4.2 per cent of marine industry indirect employment (28 930 persons).

Between 1995-96 and 2002-03, employment in port based industries grew annually by an average of 2.0 per cent per year, marginally higher than the average across all marine industries (1.4 per cent per year), as shown in figure 3.16. During this period, the period from 1997-98 and 2000-01 saw a decline in employment, which may, in part, be due to industrial problems in within the industry during that time.

Figure 3.16

TOTAL EMPLOYED PERSONS IN PORT BASED ACTIVITY, 1995-96 TO 2002-03



Source: Allen Consulting Group estimates based on ABS data

Section 4

Approaches to measuring the contribution of marine industries

4.1 The current approach

The approach taken in this study to measuring the economic contribution of marine industries is to compile data on those industries which have been categorised as a marine industry on the basis of their relationship with the marine environment — be that through the use of a marine resource (such a commercial fishing, offshore oil and gas), the provision of services through marine transportation (such as shipping and port based industries) or taking advantage the positive attributes of the marine environment (such as marine tourism).

The estimates provided in this study are based on a consistent conceptual framework, where data is collected and analysed on the basis of agreed assumptions and theory. In the absence of a statistically identified marine industry, as previously discussed, the approach taken was to build the data required for the analysis in a 'bottom up' fashion. That is, the data sets have been built by identifying all the broad industry sectors that contain 'marine dependent' industries, identifying the marine dependent industries contained with the sectors, calculating the relevant contributions of these marine dependent industries and then aggregating this data up to the industry-wide level. However, this approach has certain limitations.

Limitations of the approach contained within this study

While the current approach provides useful and realistic data on the economic contribution of the marine industries, there are some important limitations:

- in some industries where there is a marine and non-marine component (such as for tourism and oil and gas), it is necessary to adjust the data to report only the marine component. As there is no widely accepted framework to direct this disaggregation, any estimates are therefore subject to the choice of assumptions adopted;
- some activities are included in more than one industry, and therefore care must be taken to avoid double counting. This is the case for shipping and marine tourism, where passenger water transport could be double counted. The lack of disaggregated data for some industries means that it is difficult to completely rule out the risk of double counting;
- for several of the industries measured, quality data at the disaggregated level is only available for one or two years. For example, the ABS data on port based industries is experimental and released on only a semi-regular basis;
- difficulties in obtaining consistent time series data across a number of different sources make it necessary to extrapolate data for some years; and

- estimates of indirect value added and employment also risk double counting. This is because a proportion of the measured indirect effect will be between marine industries, rather than between the marine industries and other sectors in the economy, (for example, estimates for indirect employment for marine tourism may include jobs stimulated in the shipping and fisheries industries, and vice versa).

These limitations highlight the fact that while the currently available data provides a sound basis on which a snapshot of the economic contribution of marine industries can be developed, there are areas where the depth and consistency of data can be improved.

4.2 Alternative approaches

For the on-going measurement of the economic contribution of marine industries a more co-ordinated approach is necessary, which will enable improved collection of data, and importantly, provide consistent time series data.

Research on the measurement of ocean and coastal economies in the US highlighted four key characteristics of best practice in this area.

- *Comparability across industries and space* — the data should be consistent from the national to the local level and across all states.
- *Comparability across time* — the data should be sufficiently consistent over time, so that changes can be observed and measured with the same data at all points.
- *Theoretical and accounting consistency* — the data should reflect standard economic theory describing the measurement of economic activity. It should not permit double counting of economic activity, meaning all measures can be summed across industries and geography.
- *Able to be replicated* — the assembly of data should be done using a methodology that can be replicated by other researchers and that can form the basis of continued generation of data series into the future in order to establish long term time series measures.[6]

On the basis of this criteria, this section discusses three options for the future measurement of the economic contribution of Australia's marine industries.

Development of a marine industries satellite account

One option which would addressed the above criteria is to set up a satellite account for marine industries. This is an approach undertaken by the ABS for both tourism and non-profit institutions (see box 4.1 for details on the tourism satellite account).

Satellite accounts are useful for those industries, or groups of industries, which are not recognised as a group or category in their own right in the current ANZIC industry classifications. For example, while offshore oil and gas activities are recorded in economic statistics under mining classifications, they are not recorded under the classification of marine industries.

[6] Colgan, C.S. 2003, *Measurement of the Ocean and Costal Economy: Theory and Methods*

Box 4.1

AUSTRALIAN TOURISM SATELLITE ACCOUNT

The tourism satellite account highlights tourism within the national accounting framework. Implicitly, tourism is included in the core national account. The product purchased by visitors, and produced by suppliers, are all part of the economic activity measured in the national accounts. While all the products that are produced and consumed in meeting tourism demand are embedded in the core accounts, they are not readily apparent because 'tourism' is not identified as a conventional industry or product in international statistical standards.

The tourism satellite account provides a means by which the economic status of tourism can be drawn out and analysed separately within the structure of the main accounts. One of the major features of a satellite account is that it is set within the context of the whole economy, so that tourism's contribution to major national account

Source: ABS 5249.0

The development of a satellite account would address several, if not all, of the measurement problems detailed in the previous section. A satellite account would:

- provide a consistent framework of measures over time;
- address issues of double counting which are inherent in the 'bottom up' approach; and
- allow for consistent comparisons of marine industries with other sectors in the economy.

A satellite account, while providing benefits in the long term, would require considerable planning and effort to establish. In order to gain legitimacy it would need to be administered by the ABS, and would also need to be aligned to established international standards. In the case of tourism, the satellite account was build upon established standards for tourism statistics developed by an Inter-Secretariat Working Group on Tourism Statistics, with representatives from a number of international organisations (including the OECD, WTO, and UN). There is no similar international standard for marine industries. For a satellite account to be established, work would need to be done with organisations overseas to develop these standards.

Once this was established, the next challenge would be to set in place data collection techniques to ensure that the correct data was obtained. It is likely that this could be done on the basis of existing ABS (and ABARE) data. This process would take several years to implement, given the various sources involved and the possibility that survey questions may need to be added or altered. Therefore, while this approach does appear to be a good opportunity to develop robust measure of marine industries in the long term it would require significant development time and effort.

Industry survey approach

A second possible approach would be to undertake a survey of the marine industry on a regular basis. This would involve identifying industry participants and asking them to estimate the activities of their businesses, including production, cost of inputs, employment and exports. While this approach does appear attractive in that is goes straight to the industry sources and obtains original data, it does have some major drawbacks:

- asking business directly to estimate measures such as value added leads to problems of inconsistent interpretation and assumptions;
- a high response rate would be necessary to ensure that the sample was statistically significant across all marine industries. This is often difficult to achieve;
- measurement of tourism, a key marine industry, would not be possible using just a survey of industry, as tourism activities are based on the characteristics of the consumer. This aspect adds considerable complexity to any survey of marine industries; and
- it would be difficult to develop a time series with this approach unless there was complete consistency between surveys, and it could assured that the sample for each year was statistically significant.

Therefore, while an industry survey does appear to have some advantages in that it can be targeted on marine industry, the task itself would difficult and is not guaranteed to provide meaningful, robust results over a long time series.

General Equilibrium Modelling

The third possible approach would be to derive data for marine industries from a General Equilibrium (GE) Model. Using a GE model, an economy–wide assessment of the various marine industries could be conducted within a single robust and analytical framework, including:

- gross domestic product (GDP);
- prices;
- international competitiveness (changes in exports);
- employment;
- individual industry impacts; and
- government budgets.

The advantages of GE Modelling are that it can provide data which is:

- *dynamic* — the impact of change can be measured on all of the above indicators for specific periods;
- *regionally disaggregated* — GE models typically have rich regional data which provides for analysis at a highly disaggregated level by region; and
- *credible* — most GE models are fully documented in the public domain and subject to intense scrutiny within the global community of modelling academics and professionals

GE modelling is especially useful for determining the indirect impacts of industries on other sectors of the economy. This approach would help to overcome the previous limitation identified, related to risks of double counting in indirect estimates. Many current GE Models, such as the MONASH model, are equipped to provide estimates for marine industries.

While GE modelling can provide a wealth of data on industries and regions to a high level of disaggregation, there are some important drawbacks to this approach in estimating the contribution of marine industries over time. These types of models are not necessarily designed for this purpose. This leads to difficulties when trying to compare modelling results over time, where different models may have been used, or the assumptions of the existing models have changed. Further, it can be inappropriate to compare data results from models with other forms of data (such as ABS data).

Therefore, while a modelling approach does provide advantages in having a consistent framework which is theoretically based, it does fall down in the areas of comparability across time and between industries.

Accounting for other marine activities and values

The focus of the previous options has been on estimating the share of economic activity attributable to Australian marine industries. An alternative approach, which could build on the previous options, could be to develop a further dimension of measures that account for the amenity and service value derived from the physical attributes of the ocean environment.

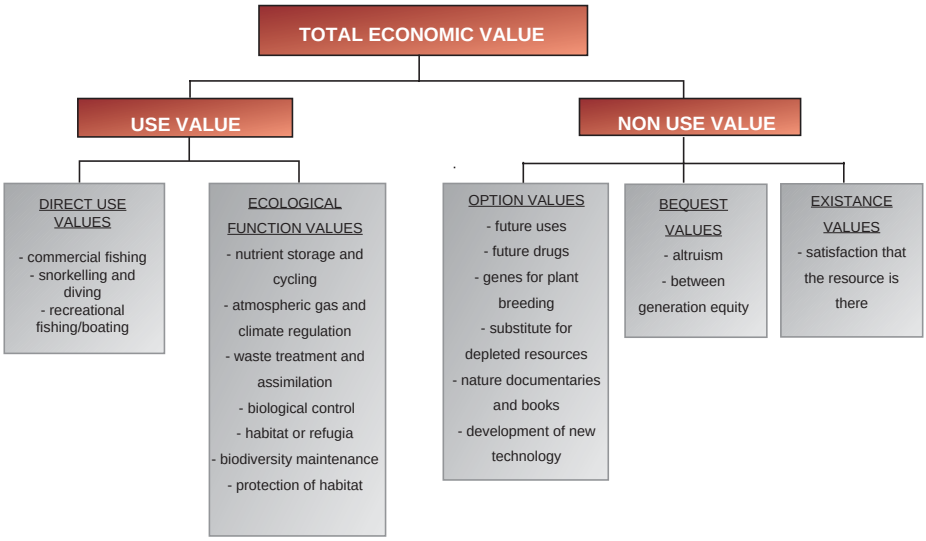
An inherent feature of marine industries is their reliance, to varying degrees, on the natural resources associated with the ocean environment. The amenity and service values derived from these resources are usually not directly priced in markets, and yet are often the foundation of economic activity and values. Healthy coastal environments, for example, underpin many tourism industries and the economic health of coastal communities. Importantly, these values associated with oceans depend largely on the quality of the marine environment, and have strong public good dimensions.

The concept often used in this area is that of total economic value, which includes both use and non-use values, as shown in figure 4.1. As represented in this figure:

- *use values* include direct use values (those that arise from the use of environmental resources) and ecological function values (the value of the ecological services and functions provided by an environmental resource); whereas
- *non use values* comprise of option values (relating to the benefit of maintaining the right to use resources), bequest values (for the benefit of future generations) and existence values (the benefit to the community of knowing that certain things exist).

Figure 4.1

COMPONENTS OF TOTAL ECONOMIC VALUE: USE AND NON USE VALUES



Source: Hassell and Associates, 2001, *Discussion Paper: Non-market economic values and the South-East Region Marine.* Prepared for the National Oceans Office.

Conventional methodologies for measuring the contribution, or value, of marine resources will tend to focus on those factors that are easy to quantify in dollars terms, on the premise that the purpose of economic activity is to increase the well-being of individuals in society. These methodologies do not typically account for other aspects of value from a resource, particularly non use values (where markets are difficult to identify).

Given that there are likely significant benefits from marine resources outside of those direct use values, a robust assessment of these values and their linkages into economic activity and Australian well-being could make a substantial contribution to informing sound oceans policy. Such an assessment would also help combat the tendency to discount important values that are not normally measured by the market. Understanding how an impact on the marine environment can translate to those economic indicators would be a value tool in developing oceans policy.

A key challenge in undertaking this approach is the difficulties in measuring and account for these values. There are a number of different techniques for putting a value on these non financial flows.

- *Market-based techniques* — which attempt to measure the value of environmental resources by incorporating environmental change into existing market-based measurements. These include measuring how environmental change leads to changes in production levels, costs, prices or leads to earnings foregone.
- *Surrogate market techniques* — which are similar to market-based techniques in that they attempt to use models based on economic principles. For example, the wage differential method, which values differences in environmental quality or risk in terms of the wages differential.

- *Survey techniques* — which attempt to estimate the value of environmental resources through establishing a hypothetical market of an environmental good or service and using a survey to determine society's willingness to pay for that good or service along the demand curve. Specific techniques in this area include the contingent valuation method, contingent ranking and choice modelling.[7]

While market based techniques are useful in that they can be linked to economic indicators, they are not the best technique for ecosystem function values and non use values, where survey techniques are better. Survey techniques are, however, at risk of survey biases. Given the hypothetical nature of the scenarios being put forward to those surveyed it is difficult to ensure that validity of the responses provided (for example, where respondent believe that the questioning is hypothetical they may not take the time to consider their preference carefully, or might change their response if the hypothetical became reality).

Incorporating these measures into a framework with standard economic measures (such as value added and employment), does present some challenges of comparability and weighting of importance. It may be that it is most useful to consider these non economic values in their own right, rather than attempting to combine them with other measures.

The appropriate approach

The preceding discussion highlights the inherent advantages and disadvantages in the options of measuring marine industries. An important differentiating factor in these options is the time taken in development. For instance, while a satellite account approach is probably the most robust measure, it is a longer term option given the time it would take to establish. Conversely, undertaking a modelling approach would provide some shorter term benefits, but this is not a viable option for the development of a consistent time series. Importantly, the incorporation of data on non-economic factors is an approach that can be taken with both modelling and a satellite account approach.

Importantly, the appropriateness of the different approaches does differ depending the use of the information. For instance, accounting methods are excellent for providing historical data and trends, and therefore are useful for regular reporting of industries over time. For planning purposes, where decision making is often undertaken in conditions of uncertainty and complexity, a modelling approach is more useful, coupled with the measures of non financial flows, as it can provide an insight into future impacts in a region.

[7] Hassell and Associates, 2001, *Discussion Paper: Non-market economic values and the South-East Region Marine*. Prepared for the National Oceans Office.

Appendix A

Data and assumptions

This Appendix provides details on the data and assumptions used to derive the estimates in the preceding sections. It also provides the tabulated data from which the figures where derived.

A.1 Direct estimates

This study derives direct estimates of the economic contribution of marine industries for:

- value added;
- employment; and
- exports.

In order to obtain an estimate for marine industries as a whole, estimates were derived for the six industries which make up the marine industries. Tables A.1, A.2 and A.3 provide these estimates.

Table A.1

DIRECT VALUE ADDED FOR MARINE INDUSTRIES, 1995-96 TO 2002-03, ($M)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	7,881.83	8,401.14	8,861.14	9,331.88	9,652.93	10,776.04	10,803.37	11,275.99
Offshore oil and gas	6,347.86	7,110.54	7,580.47	5,982.44	8,567.21	14,666.37	11,110.33	11,148.29
Fisheries and seafood	855.51	861.75	966.35	1,031.63	1,212.37	1,254.95	1,297.54	1,244.74
Shipping	691.18	742.99	738.39	679.68	663.47	627.24	523.97	521.24
Ship and boat building	566.88	581.73	669.13	618.58	739.45	675.80	709.82	747.35
Port based activities	1,341.73	1,387.23	1,406.21	1,449.63	1,495.65	1,582.23	1,693.90	1,717.43
Marine Industry Total	17,684.99	19,085.38	20,221.69	19,093.83	22,331.08	29,582.63	26,138.91	26,655.04

Source: Allen Consulting Group estimates based on ABS data

Table A.2

DIRECT EMPLOYEMENT FOR MARINE INDUSTRIES, 1995-96 TO 2002-03, TOTAL EMPLOYED PERSONS ('000)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	162.45	175.83	180.76	182.22	185.42	187.75	186.81	190.62
Offshore oil and gas	7.57	8.92	8.96	9.57	9.42	11.24	7.76	9.74
Fisheries and seafood	22.66	17.30	17.90	17.70	20.00	23.40	23.03	23.03
Shipping	6.01	6.65	4.20	6.93	10.67	9.70	9.28	8.39
Ship and boat building	10.01	9.77	9.96	9.78	11.48	9.32	9.69	9.81
Port based activities	11.41	10.90	8.32	9.38	8.72	11.54	11.59	11.54
Marine Industry Total	220.12	229.36	230.09	235.58	245.71	252.97	248.16	253.13

Source: Allen Consulting Group estimates based on ABS data

Table A.3

EXPORTS FOR MARINE INDUSTRIES, 1995-96 TO 2002-03, ($M)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	2,260.93	2,298.85	2,430.48	2,554.55	2,775.90	3,256.60	3,245.39	3,166.54
Offshore oil and gas	3,162.00	3,771.00	3,941.00	3,327.00	8,710.80	10,091.19	8,074.17	8,873.02
Fisheries and seafood	1,317.71	1,294.69	1,477.96	,499.69	1,972.60	2,151.90	2,083.93	1,829.91
Shipping	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ship and boat building	433.72	488.67	531.79	448.17	573.23	490.49	631.84	600.84
Port based activities	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Marine Industry Total	7,174.37	7,853.21	8,381.23	7,829.41	14,032.53	15,990.17	14,035.34	14,470.32

Source: Allen Consulting Group estimates based on ABS data

Table 4.2

TAXATION PAID BY MARINE INDUSTRIES, 1995-96 TO 2002-03

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Company tax	584.86	603.86	759.00	718.91	1,032.55	1,159.31	991.04	1,034.70
Petroleum resource rent tax	703.93	1,161.83	805.25	368.58	1,075.47	1,581.79	1,289.75	1,467.53
GST	n.a.	n.a.	n.a.	n.a.	n.a.	626.04	592.19	649.75
Royalties	176.21	254.93	286.76	216.40	439.11	563.95	554.36	572.69
Payroll tax	233.43	250.24	264.74	276.27	292.04	308.58	314.64	329.14
Total marine industry	1,698.42	2,270.86	2,115.75	1,580.16	2,839.17	4,239.67	3,741.98	4,053.81

Source: Allen Consulting Group estimates based on ABS data

A.2 State estimates

New South Wales

Table A.4

DIRECT VALUE ADDED FOR MARINE INDUSTRIES, NEW SOUTH WALES, 1995-96 TO 2002-03, ($M)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	3,001.75	3,330.72	3,351.94	3,556.63	3,595.14	4,020.75	4,288.03	4,465.47
Offshore oil and gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fisheries and seafood	190.08	183.73	237.09	240.20	274.89	301.77	263.37	271.93
Shipping	354.86	384.04	372.07	368.17	355.80	326.31	294.86	287.92
Ship and boat building	167.33	176.22	195.06	171.61	216.45	196.76	190.83	205.85
Port based activities	438.02	455.36	482.84	520.36	546.25	537.68	643.74	623.70
Marine Industry Total	4,152.04	4,530.07	4,638.99	4,856.96	4,988.53	5,383.26	5,680.82	5,854.87

Source: Allen Consulting Group estimates based on ABS data

Table A.5

DIRECT EMPLOYEMENT FOR MARINE INDUSTRIES, NEW SOUTH WALES, 1995-96 TO 2002-03, TOTAL EMPLOYED PERSONS ('000)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	61.87	69.71	68.38	69.45	69.06	70.05	74.15	75.49
Offshore oil and gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fisheries and seafood	5.04	3.69	4.39	4.12	4.53	5.63	4.67	5.03
Shipping	3.09	3.44	2.12	3.75	5.72	5.05	5.22	4.63
Ship and boat building	2.95	2.96	2.90	2.71	3.36	2.71	2.60	2.70
Port based activities	3.73	3.58	2.86	3.37	3.19	3.92	4.41	4.19
Marine Industry Total	76.67	83.37	80.64	83.40	85.86	87.37	91.06	92.05

Source: Allen Consulting Group estimates based on ABS data

Victoria

Table A.6

DIRECT VALUE ADDED FOR MARINE INDUSTRIES, VICTORIA, 1995-96 TO 2002-03, ($M)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	1,544.17	1,397.42	1,490.61	1,516.55	1,702.88	1,889.65	1,717.16	2,022.79
Offshore oil and gas	2,120.09	2,091.92	2,322.14	1,959.39	4,217.17	5,809.25	3,829.36	4,670.70
Fisheries and seafood	124.19	127.91	132.60	127.36	152.42	166.22	178.50	160.36
Shipping	95.32	106.03	96.54	82.31	81.03	85.76	56.53	62.19
Ship and boat building	76.83	72.66	84.88	77.33	93.16	90.17	82.19	94.32
Port based activities	281.08	300.33	299.27	277.93	297.20	337.58	294.82	321.83
Marine Industry Total	4,241.68	4,096.27	4,426.04	4,040.88	6,543.87	8,378.63	6,158.57	7,332.19

Source: Allen Consulting Group estimates based on ABS data

Table A.7

DIRECT EMPLOYEMENT FOR MARINE INDUSTRIES, VICTORIA, 1995-96 TO 2002-03, TOTAL EMPLOYED PERSONS ('000)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	31.83	29.25	30.41	29.61	32.71	32.92	29.69	34.19
Offshore oil and gas	2.53	2.63	2.74	3.14	4.64	4.45	2.67	4.08
Fisheries and seafood	3.29	2.57	2.46	2.19	2.51	3.10	3.17	2.97
Shipping	0.83	0.95	0.55	0.84	1.30	1.33	1.00	1.00
Ship and boat building	1.36	1.22	1.26	1.22	1.45	1.24	1.12	1.24
Port based activities	2.39	2.36	1.77	1.80	1.73	2.46	2.02	2.16
Marine Industry Total	42.22	38.97	39.19	38.79	44.34	45.51	39.68	45.65

Source: Allen Consulting Group estimates based on ABS data

Queensland

Table A.8

DIRECT VALUE ADDED FOR MARINE INDUSTRIES, QUEENSLAND, 1995-96 TO 2002-03, ($M)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	1,575.42	1,660.80	1,744.46	2,035.37	1,981.18	2,250.79	2,353.24	2,214.52
Offshore oil and gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fisheries and seafood	209.20	214.96	230.56	278.41	304.65	297.89	345.34	334.35
Shipping	113.78	115.94	116.17	99.29	96.45	92.37	69.66	73.29
Ship and boat building	109.36	110.47	127.92	117.72	146.76	128.79	132.66	147.17
Port based activities	260.30	254.78	279.42	260.09	274.45	282.10	281.86	294.24
Marine Industry Total	2,268.05	2,356.95	2,498.54	2,790.88	2,803.49	3,051.93	3,182.75	3,063.57

Source: Allen Consulting Group estimates based on ABS data

Table A.9

DIRECT EMPLOYEMENT FOR MARINE INDUSTRIES, QUEENSLAND, 1995-96 TO 2002-03, TOTAL EMPLOYED PERSONS ('000)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	32.47	34.76	35.59	39.74	38.06	39.22	40.69	37.44
Offshore oil and gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fisheries and seafood	5.54	4.32	4.27	4.78	5.03	5.55	6.13	6.19
Shipping	0.99	1.04	0.66	1.01	1.55	1.43	1.23	1.18
Ship and boat building	1.93	1.85	1.90	1.86	2.28	1.78	1.81	1.93
Port based activities	2.21	2.00	1.65	1.68	1.60	2.06	1.93	1.98
Marine Industry Total	43.15	43.97	44.07	49.08	48.51	50.03	51.79	48.71

Source: Allen Consulting Group estimates based on ABS data

South Australia

Table A.10

DIRECT VALUE ADDED FOR MARINE INDUSTRIES, SOUTH AUSTRALIA, 1995-96 TO 2002-03, ($M)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	745.01	816.11	958.50	991.61	1,009.25	1,161.11	1,051.80	1,066.99
Offshore oil and gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fisheries and seafood	89.47	93.32	86.55	99.61	110.57	113.04	113.57	125.72
Shipping	0.14	0.13	0.10	0.13	0.11	0.12	0.08	0.08
Ship and boat building	110.17	108.62	135.93	116.89	141.91	122.95	132.77	144.35
Port based activities	152.71	138.65	110.20	156.39	146.18	173.20	157.21	151.98
Marine Industry Total	1,097.50	1,156.84	1,291.27	1,364.62	1,408.02	1,570.43	1,455.43	1,489.12

Source: Allen Consulting Group estimates based on ABS data

Table A.11

DIRECT EMPLOYEMENT FOR MARINE INDUSTRIES, SOUTH AUSTRALIA, 1995-96 TO 2002-03, TOTAL EMPLOYED PERSONS ('000)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	15.36	17.08	19.55	19.36	19.39	20.23	18.19	18.04
Offshore oil and gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fisheries and seafood	2.37	1.87	1.60	1.71	1.82	2.11	2.02	2.33
Shipping	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ship and boat building	1.95	1.82	2.02	1.85	2.20	1.70	1.81	1.89
Port based activities	1.30	1.09	0.65	1.01	0.85	1.26	1.08	1.02
Marine Industry Total	20.97	21.87	23.83	23.93	24.27	25.30	23.09	23.28

Source: Allen Consulting Group estimates based on ABS data

Western Australia

Table A.12

DIRECT VALUE ADDED FOR MARINE INDUSTRIES, WESTERN AUSTRALIA, 1995-96 TO 2002-03, ($M)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	315.68	311.65	382.00	322.95	383.53	492.90	406.38	428.70
Offshore oil and gas	2,066.49	2,577.80	2,767.41	2,227.26	2,640.92	7,031.18	4,481.78	4,029.08
Fisheries and seafood	90.76	94.28	86.37	95.35	113.60	117.44	124.31	135.55
Shipping	16.44	17.86	17.73	18.01	16.66	15.71	10.81	11.20
Ship and boat building	12.35	11.83	15.27	13.64	17.14	16.04	15.48	18.26
Port based activities	70.40	73.46	79.83	88.32	88.75	89.82	81.89	84.16
Marine Industry Total	2,572.12	3,086.87	3,348.61	2,765.54	3,260.61	7,763.10	5,120.66	4,706.94

Source: Allen Consulting Group estimates based on ABS data

Table A.13

DIRECT EMPLOYEMENT FOR MARINE INDUSTRIES, WESTERN AUSTRALIA, 1995-96 TO 2002-03, TOTAL EMPLOYED PERSONS ('000)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	6.51	6.52	7.79	6.31	7.37	8.59	7.03	7.25
Offshore oil and gas	2.47	3.24	3.27	3.56	2.90	5.39	3.13	3.52
Fisheries and seafood	2.40	1.89	1.60	1.64	1.87	2.19	2.21	2.51
Shipping	0.14	0.16	0.10	0.18	0.27	0.24	0.19	0.18
Ship and boat building	0.22	0.20	0.23	0.22	0.27	0.22	0.21	0.24
Port based activities	0.60	0.58	0.47	0.57	0.52	0.66	0.56	0.57
Marine Industry Total	12.34	12.59	13.46	12.48	13.20	17.29	13.33	14.26

Source: Allen Consulting Group estimates based on ABS data

Tasmania

Table A.14

DIRECT VALUE ADDED FOR MARINE INDUSTRIES, TASMANIA, 1995-96 TO 2002-03, ($M)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	237.42	253.28	306.33	281.34	260.40	271.44	257.13	328.70
Offshore oil and gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fisheries and seafood	103.33	85.54	100.97	115.10	140.42	146.17	142.90	154.22
Shipping	81.25	80.97	106.75	85.84	91.56	82.52	62.63	55.07
Ship and boat building	28.07	28.42	34.39	30.96	36.95	31.95	28.01	34.72
Port based activities	29.45	28.19	40.68	35.62	41.27	39.93	40.15	35.03
Marine Industry Total	479.51	476.40	589.12	548.86	570.60	572.02	530.81	607.74

Source: Allen Consulting Group estimates based on ABS data

Table A.15

DIRECT EMPLOYEMENT FOR MARINE INDUSTRIES, TASMANIA, 1995-96 TO 2002-03, TOTAL EMPLOYED PERSONS ('000)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	4.89	5.30	6.25	5.49	5.00	4.73	4.45	5.56
Offshore oil and gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fisheries and seafood	2.74	1.72	1.87	1.97	2.32	2.73	2.54	2.85
Shipping	0.71	0.72	0.61	0.88	1.47	1.28	1.11	0.89
Ship and boat building	0.50	0.48	0.51	0.49	0.57	0.44	0.38	0.46
Port based activities	0.25	0.22	0.24	0.23	0.24	0.29	0.27	0.24
Marine Industry Total	9.08	8.44	9.48	9.06	9.61	9.46	8.75	9.99

Source: Allen Consulting Group estimates based on ABS data

Northern Territory

Table A.16

DIRECT VALUE ADDED FOR MARINE INDUSTRIES, NORTHERN VICTORIA, 1995-96 TO 2002-03, ($M)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	462.39	631.16	627.31	627.43	720.55	689.41	729.63	748.82
Offshore oil and gas	2,161.27	2,440.82	2,490.93	1,795.78	1,709.12	1,825.94	2,799.18	2,448.52
Fisheries and seafood	48.49	62.00	92.20	75.60	115.81	112.42	129.56	62.62
Shipping	29.39	38.03	29.02	25.93	21.86	24.45	29.40	31.50
Ship and boat building	62.78	73.50	75.67	90.42	87.07	89.13	127.88	102.68
Port based activities	109.77	136.46	113.98	110.92	101.55	121.92	194.22	206.49
Marine Industry Total	2,874.08	3,381.97	3,429.11	2,726.08	2,755.96	2,863.27	4,009.87	3,600.61

Source: Allen Consulting Group estimates based on ABS data

Table A.17

DIRECT EMPLOYEMENT FOR MARINE INDUSTRIES, NORTHERN TERRITORY, 1995-96 TO 2002-03, TOTAL EMPLOYED PERSONS ('000)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	9.53	13.21	12.80	12.25	13.84	12.01	12.62	12.66
Offshore oil and gas	2.58	3.06	2.94	2.87	1.88	1.40	1.95	2.14
Fisheries and seafood	1.28	1.24	1.71	1.30	1.91	2.10	2.30	1.16
Shipping	0.26	0.34	0.16	0.26	0.35	0.38	0.52	0.51
Ship and boat building	1.11	1.23	1.13	1.43	1.35	1.23	1.75	1.35
Port based activities	0.93	1.07	0.67	0.72	0.59	0.89	1.33	1.39
Marine Industry Total	15.69	20.16	19.41	18.83	19.93	18.01	20.47	19.20

Source: Allen Consulting Group estimates based on ABS data

A.3 Sources and methodology for direct estimates

In developing estimates for value added, employment and exports for each of the six industries that make up the marine industries, it was necessary to use a number of different sources and, where there were data limitations, make some assumptions. The sources and methodology used to derive these estimates for each industry are discussed in this section.

Marine tourism

Out of all the marine sectors covered in this study, marine tourism is the most challenging to define. Fortunately, the ABS attempted this exercise in its 2002-03 survey titled Australian National Accounts: Tourism Satellite Account.

In preparing this tourism survey, the ABS noted that nearly all of the broad (ANZSIC) industry groups are involved to a greater or lesser extent in providing products directly to visitors. Moreover, "tourism is not an industry in the traditional sense because industries are classified in accordance with the goods and services they produce, whereas tourism depends on the status of the customer".

The estimates in relation to value added and employment are based on this survey. In order to obtain values for 2000-01, data from was grown by the average growth rate for tourism-related industry codes (weighted by value added), which included accommodation, cafes and restaurants (ANZSIC division H) and air and space transport (ANZSIC subdivision 64).

On the basis of tourism spending estimates in the tourism survey, domestic and international tourism were estimated as 78 per cent and 22 per cent of total tourism respectively. Using the methodology outlined by the Review Committee on Marine Industries and Sciences Council (1997), domestic and international marine tourism were then estimated as 40 per cent and 19 per cent of domestic and international tourism respectively.

While the tourism survey made it relatively straightforward to measure tourism activity, the reported contributions in relation to marine tourism should be viewed as broad indicators of economic activity rather than precise estimates.

In addition, there is a degree of 'double counting' involved in relation to marine tourism and other marine sectors, given that nearly all of the broad (ANZSIC) industry groups are involved to a greater or lesser extent in tourism. However, the double counting in relation to marine tourism and shipping was broadly accounted for, and is explained in greater detail under the notes on estimates for the shipping sector.

Table A.18

DATA SOURCES FOR MARINES TOURISM ESTIMATES

Estimates	Sources
Direct value added	ABS Cat. No. 5249.0 "Tourism Satellite Account", 2002-03; ABS Cat. No. 5206.0 "National Income, Expenditure and Product", June Quarter 2003; and ABS Cat. No. 5204.0 "Australian National Accounts", 2002-03.
Direct employment	ABS Cat. No. 5249.0 "Tourism Satellite Account", 2002-03; and ABS Cat. No. 6291.0.55.001 "Labour Force, Australia" February 2004.
Exports	ABS Cat. No. 5249.0 "Tourism Satellite Account", 2002-03; ABS Cat. No. 5206.0 "National Income, Expenditure and Product", June Quarter 2003; and ABS Cat. No. 5204.0 "Australian National Accounts", 2002-03.

Offshore oil and gas

Offshore oil and gas is comprised of:

- oil and gas extraction;
- petroleum refining; and
- exploration and services.

Table A.5 details the data sources used for the estimates of offshore oil and gas. A key challenge in deriving these estimates was ensuring that only activities for offshore were included. This was done by using an estimate of the proportion of oil and gas production which was offshore from the Australian Government Department of Industry, Tourism and Resources. This proportion was applied to estimate for oil and gas extraction and petroleum refining. Similarly, estimates for exploration and services where derived for only the proportion that applied to offshore oil and gas activity.

Table A.19

DATA SOURCES FOR OFFSHORE OIL AND GAS ESTIMATES

Estimates	Sources
Direct value added	
• Oil and gas extraction	ABS 8414.0 'Australian Mining Industry', 1995-96, 1996-97, 1998-99 and ABS 8415.0 'Mining Operations' 1999-00 and 2000-01. Estimates of offshore activity provided by The Australian Government Department of Industry, Tourism and Resources (DITR).
• Petroleum refining	ABS Cat. No. 8221.0 "Manufacturing Industry", 1996-97, 1997-98, 1998-99, 1999-2000, 2000-01. Estimates for offshore activity provided by DITR
• Exploration and services	ABS 8414.0 'Australian Mining Industry', 1995-96, 1996-97, 1998-99 and ABS 8415.0 'Mining Operations' 1999-00 and 2000-01. Estimates for offshore activity provided by DITR
Direct employment	
• Oil and gas extraction	ABS Cat. No. 6291.0.55.001 "Labour Force, Australia" February 2004.
• Petroleum refining	ABS Cat. No. 8221.0 "Manufacturing Industry", 1996-97, 1997-98, 1998-99, 1999-2000, 2000-01, and ABS Cat. No. 6291.0.55.001 "Labour Force, Australia" February 2004.
• Exploration and services	ABS Cat. No. 6291.0.55.001 "Labour Force, Australia" February 2004.
Exports	
• Oil and gas extraction	ABS 8414.0 'Australian Mining Industry', 1995-96, 1996-97, 1998-99 and ABS 8415.0 'Mining Operations' 1999-00 and 2000-01. Estimates of offshore activity provided by DITR.

Fisheries and Seafood

Estimates for the fisheries and seafood industry were derived using a combination of ABARE fisheries statistics and ABS data, as detailed in table A.6. Estimates for aquaculture were derived by adjusting for those activities which are not marine based.

Table A.20

DATA SOURCES FOR OFFSHORE FISHERIES AND SEAFOOD ESTIMATES

Estimates	Sources
Direct value added	
• marine fishing	ABARE Fisheries Statistics, 2000 and 2003
• aquaculture	ABARE Fisheries Statistics, 2000 and 2003
• seafood processing	ABS Cat. No. 8221.0 "Manufacturing Industry", 1996-97, 1997-98, 1998-99, 1999-2000, 2000-01
Direct employment	
• marine fishing	ABARE *Australian Commodity Statistics 2003*
• aquaculture	ABARE *Australian Commodity Statistics 2003*
• seafood processing	ABS Cat. No. 8221.0 "Manufacturing Industry", 1996-97, 1997-98, 1998-99, 1999-2000, 2000-01, ABS Cat. No. 6291.0.55.001 "Labour Force, Australia" February 2004.
Exports	
• marine fishing	ABARE Fisheries Statistics, 2000 and 2003
• aquaculture	ABARE Fisheries Statistics, 2000 and 2003

Shipping

Shipping was measured under ANZSIC subdivision 63, water transport, (which is divided into international sea transport, coastal water transport and inland water transport) with the proportion of value added and employment relating to inland water transport excluded.

However, water transport is also important to the marine tourism sector, so that sector's value added and employment estimates needed to be excised from the shipping estimates to account for this. Advice from the ABS suggested that the proportion of water transport attributable to marine tourism related activity amounted to one per cent of all marine tourism. This has been deducted from estimates of direct value added and employment.

Table A.21

DATA SOURCES FOR SHIPPING ESTIMATES

Estimates	Sources
Direct value added	ABS Cat. No. 5206.0 "National Income, Expenditure and Product", June Quarter 2003.
Direct employment	ABS Cat. No. 6291.0.55.001 "Labour Force, Australia" February 2004.
Exports	n.a.

Ship and boat building

Estimates of ship and boat building were compiled using manufacturing statistics. Where this data was not available, estimates were extended using the "Manufacture of Machinery and Equipment" upper level aggregate.

Table A.22

DATA SOURCES FOR SHIP AND BOAT BUILDING ESTIMATES

Estimates	Sources
Direct value added	ABS Cat. No. 8221.0 "Manufacturing Industry", 1996-97, 1997-98, 1998-99, 1999-2000, 2000-01; and ABS Cat. No. 5204.0 "Australian National Accounts", 2002-03.
Direct employment	ABS Cat. No. 8221.0 "Manufacturing Industry", 1996-97, 1997-98, 1998-99, 1999-2000, 2000-01; and ABS Cat. No. 6291.0.55.001 "Labour Force, Australia" February 2004.
Exports	ABS Cat. No. 5422.0 "International Merchandise Trade", March Quarter 2003; ABS Cat. No. 5204.0 "Australian National Accounts", 2002-03.

Port based industries

The ABS does not have an industry classification for port-based industries. They do, however, publish experimental estimates for total operating income data:

- stevedoring;
- water transport terminals;
- port operators; and
- other services to water transport.

Data on these industries was supplemented with data on services to water transport.

Table A.23

DATA SOURCES FOR PORT BASED INDUSTRIES ESTIMATES

Estimates	Sources
Direct value added	ABS 8155.0 'Australian Industry' 1998-99 and 2000-01, ABS Cat. No. 5206.0 "National Income, Expenditure and Product", June Quarter 2003.
Direct employment	ABS Cat. No. 6291.0.55.001 "Labour Force, Australia" February 2004.
Exports	n.a.

Taxation revenue

Company Tax

Company tax paid by the marine industries was calculated as a proportion of total company tax paid. Total company tax paid was scaled down using the direct value added of the marine industries as a proportion of total industry value added.

Petroleum Resource Rent Tax and Royalties

The PRRT paid to the Commonwealth Government, and the royalties paid to the State and Territory governments by the marine industries were estimated in a similar fashion.

Total PRRT and royalty payments were split into oil and gas related payments. These two series were then scaled by fixed factors to remove non-marine related oil and gas extraction. It was estimated that marine oil extraction made up 95.7 per cent of total oil extraction, and marine gas extraction made up 79.3 per cent of total gas extraction.

Payroll tax

Estimates of payroll tax paid by the marine industries was calculated in a similar fashion to estimates of company tax. Payroll tax paid for all industries by State and Territory was scaled down by the total persons employed in the marine industries as a proportion of total persons employed in all industries.

Table A.24

DATA SOURCES FOR TAXATION REVENUE ESTIMATES

Estimates	Sources
Company Tax	ATO "Taxation Statistics 2000-01: A summary of taxation, superannuation and industry benchmark statistics 2000–01 and 2001–02"; and Treasury "Mid-Year Economic and Fiscal Outlook", 2001-02 and 2002-03.
Petroleum Resource Rent Tax	Department of the Parliamentary Library, Research Note no. 29, 2000-01 "Crude Oil Excise and Royalties"; and Treasury "Mid-Year Economic and Fiscal Outlook", 2001-02 and 2002-03.
Royalties	Department of the Parliamentary Library, Research Note no. 29, 2000-01 "Crude Oil Excise and Royalties"; and ABS Cat. No. 5204.0 "Australian National Accounts", 2002-03.
Payroll tax	ABS Cat. No. 5506.0 "Taxation Revenue", 1997-98 and 2002-03; and ABS Cat. No. 6291.0.55.001 "Labour Force, Australia" February 2004.
GST	ABS Cat. No. 5506.0 "Taxation Revenue", 1997-98 and 2002-03; and ABS Cat. No. 5204.0 "Australian National Accounts", 2002-03.

A.4 Indirect estimates

The indirect value added estimates demonstrate the amount of value added required from other industries in the economy in order to produce a given amount of value added from marine industries. In the same way, the indirect employment estimates demonstrate the number of employed persons required from other industries in the economy in order to produce a given number of employed persons in marine industries.

The estimates are derived by using value added and employment multipliers provided by the ABS. These multipliers are derived from 1996-97 input-output tables.[8]

The ABS notes a number of limitations associated with using multipliers.

- Multipliers describe average effects, not marginal effects, and thus do not take account of economies of scale, unused capacity or technological change. Generally, average effects are expected to be higher than the marginal effects.
- The input-output tables underlying multiplier analysis only take account of one form of interdependence, namely the sales and purchase links between industries. Other interdependence such as collective competition for factors of production, changes in commodity prices which induce producers and consumers to alter the mix of their purchases and other constraints which operate on the economy as a whole are not generally taken into account.
- The combination of the assumptions used and the excluded interdependence means that input-output multipliers are higher than would realistically be the case. In other words, they tend to overstate the potential impact of final demand stimulus. The overstatement is potentially more serious when large changes in demand and production are considered.
- The most appropriate interpretation of multipliers is that they provide a relative measure (to be compared with other industries) of the interdependence between one industry and the rest of the economy which arises solely from purchases and sales of industry output based on estimates of transactions occurring over a (recent) historical period. Progressive departure from these conditions would progressively reduce the precision of multipliers as predictive devices."[9]

Tables A.11 and A.12 provide the estimates for indirect value added and indirect employment for marine industries between 1995-96 and 2002-03.

[8] These are the most recently available set of input-output multipliers. The time of writing the ABS was in the process of deriving new multiplier table which are expected to be released in July 2004.

[9] ABS (5246.0) p24.

Table A.25

INDIRECT VALUE ADDED FOR MARINE INDUSTRIES, 1995-96 TO 2002-03, ($MILLION)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	19,691.97	20,989.41	22,138.68	23,314.76	24,116.88	26,922.87	26,991.13	28,171.94
Offshore oil and gas	5,560.72	6,228.83	6,640.49	5,240.61	7,504.88	12,847.74	9,732.65	9,765.90
Fisheries and seafood	1,942.86	1,957.04	2,194.57	2,342.82	2,753.29	2,849.98	2,946.70	2,826.81
Shipping	2,014.79	2,165.81	2,152.40	1,981.27	1,934.02	1,828.40	1,527.36	1,519.41
Ship and boat building	1,611.64	1,653.84	1,902.32	1,758.61	2,102.26	1,921.30	2,018.01	2,124.72
Port based activities	1,479.93	1,530.11	1,551.05	1,598.94	1,649.70	1,745.20	1,868.37	1,894.33
Marine Industry Total	32,301.91	34,525.05	36,579.52	36,237.02	40,061.02	48,115.49	45,084.22	46,303.10

Source: Allen Consulting Group estimates based on ABS data

Table A.26

INDIRECT EMPLOYMENT FOR MARINE INDUSTRIES, 1995-96 TO 2002-03, TOTAL EMPLOYED PERSONS ('000)

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Marine Tourism	384.33	415.98	427.65	431.09	438.66	444.19	441.94	450.96
Offshore oil and gas	55.88	65.85	66.10	70.64	69.48	82.96	57.24	71.89
Fisheries and seafood	49.72	37.96	39.27	38.83	43.88	51.34	50.53	50.53
Shipping	16.70	18.48	11.67	19.25	29.65	26.97	25.80	23.31
Ship and boat building	66.59	64.97	66.26	65.07	76.35	62.03	64.45	65.27
Port based activities	28.60	27.31	20.84	23.50	21.86	28.93	29.06	28.93
Marine Industry Total	601.84	630.53	631.78	648.39	679.89	696.41	669.03	690.89

Source: Allen Consulting Group estimates based on ABS data

Table 4.3

INPUT-OUTPUT MULTIPLIERS - MARINE INDUSTRIES 1996-97

	Output	Employment
Marine tourism	2.50	2.37
Offshore oil and gas	0.88	7.38
Fisheries and seafood	2.27	2.19
Shipping	2.92	2.78
Ship and boat building	2.84	6.65
Port based industries	1.10	2.51

Source: ABS , *Input-Output Table Australia, 1996-97,* Cat. No. 5209.0, Canberra.