

## **The economic contribution of South Australia's marine industries**

A report prepared for the Department of Primary Industries  
and Regions South Australia (PIRSA), as part of an initiative  
led by Marine Innovation Southern Australia (MISA)

November 2017

# About this report

This report has been prepared by Deloitte Access Economics for the South Australian Research and Development Institute (SARDI), the research division of the Department of Primary Industries and Regions South Australia (PIRSA), as part of an initiative led by Marine Innovation Southern Australia (MISA).

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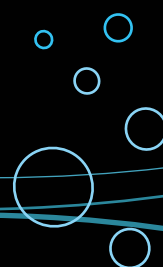
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# Glossary

Acronym	Full name
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABS	Australian Bureau of Statistics
AFMA	Australian Fisheries Management Authority
AIMS	Australian Institute of Marine Science
ANZSIC	Australian and New Zealand Standard Industrial Classification
ASC	Australian Submarine Corporation
AUD	Australian Dollar
CGE	Computerised General Equilibrium
DAE	Deloitte Access Economics
DAE-RIO-M	Deloitte Access Economics' Regional Input-Output Model
DAWR	Department of Agriculture and Water Resources
EBITDA	Earnings before interest tax depreciation and amortisation
EEZ	Exclusive Economic Zone
FRDC	Fisheries Research and Development Corporation
FTE	Full-time equivalent
GDP	Gross Domestic Product
GOS	Gross Operating Surplus
GRP	Gross Regional Product
GSP	Gross State Product
ILUA	Indigenous Land Use Agreement
IO	Input Output
MISA	Marine Innovation Southern Australia
nec	Not elsewhere classified by ABS
nm	Nautical mile
NSW	New South Wales
NVS	National Visitor Survey
PIRSA	Department of Primary Industries and Regions South Australia
SA	South Australia
SARDI	South Australian Research and Development Institute
TRA	Tourism Research Australia
TSA	Tourism Satellite Account
WA	Western Australia

# Executive Summary

## Introduction

Despite its recognised importance, there is presently no reliable estimate of the total contribution that the South Australian marine environment and marine industries make to the economy. This report has been prepared by Deloitte Access Economics for the South Australian Research and Development Institute (SARDI), the research division of the Department of Primary Industries and Regions South Australia (PIRSA), as part of an initiative led by Marine Innovation Southern Australia (MISA), specifically to address this information gap by assessing the economic contribution of South Australia's marine industries.

## Approach

This report follows a similar approach to that developed by the Australian Institute of Marine Science and Deloitte Access Economics in compiling the value of production and economic contribution of Australia's marine industries.<sup>1</sup>

This approach includes collating the most recent estimates of economic production (or, in some cases, expenditure<sup>2</sup>) across a range of industries. This list of industries was developed through discussion with representatives from MISA, and includes:

- Commercial fishing (wild catch fisheries)
- Recreational fishing
- Marine-based aquaculture
- Offshore oil and gas exploration
- Marine tourism
- Shipbuilding and boatbuilding
- Water transport (encompassing freight and passenger transport)
- Marine equipment retailing
- Marina operation.

Data on industry production and expenditure have been collected at a regional level, and assigned to four marine regions across South Australia – the West Coast, Spencer Gulf, Gulf St Vincent and Kangaroo Island, and the South East Coast. Data have been collected and presented up to 2015-16, the latest year for which updated estimates consistently exist across most, but not all, industries.<sup>3</sup>

Notably, the value of South Australia's marine environment extends beyond the contribution that these industries make to widely adopted economic metrics such as gross state product (GSP). The marine environment also has significant non-market value generated through its recreational uses, its contribution to important research, and its environmental importance. This report does not identify or quantify these non-market values.

### South Australian marine industry production

Before assessing the contribution of the marine industries to the economy, Deloitte Access Economics compiled data which estimates the value of production in each marine industry. This reflects an estimate of the income directly earned in each marine industry. In 2015-16, the total value of production of the South Australian marine industries was about \$2.3 billion.

**Table i: Value of production for South Australia's marine industries by industry and region, 2015-16 (\$ millions)**

Industry	West Coast (\$m)	Spencer Gulf (\$m)	Gulf St Vincent and Kangaroo Island (\$m)	South East Coast (\$m)	South Australia (\$m)
Commercial fishing	\$42.0	\$117.0	\$29.1	\$125.4	\$313.5
Recreational fishing (expenditure)	\$29.8	\$67.5	\$52.4	\$11.1	\$160.8
Marine-based aquaculture	\$17.9	\$182.4	\$6.7	-	\$206.9
Offshore oil and gas (expenditure)	\$47.5	-	-	-	\$47.5
Shipbuilding	-	-	\$595.0	-	\$595.0
Boatbuilding	-	\$5.7	\$30.4	\$4.1	\$40.3
Water transport	\$5.2	\$6.6	\$136.6	\$3.5	\$151.9
Domestic marine tourism	\$7.8	\$81.9	\$260.8	\$140.8	\$491.3
International marine tourism	\$2.0	\$20.7	\$65.9	\$35.5	\$124.1
Marine equipment retailing	-	\$16.3	\$56.9	\$15.7	\$88.9
Marina operation	-	\$11.8	\$33.0	\$14.2	\$59.0
<b>Total</b>	<b>\$152.4</b>	<b>\$509.8</b>	<b>\$1,266.7</b>	<b>\$350.2</b>	<b>\$2,279.2</b>

Source: Various, see body of report

Note: Total may not sum due to rounding

### Economic contribution of the South Australian marine industries

In addition to estimating the value of production in each marine industry, this report considers the economic contribution of the marine industries. This recognises that, for every dollar earned by the marine industries, activity is also stimulated elsewhere in the economy – termed ‘indirect’ effects. By describing both the value of production and economic contribution of the marine industries, this report provides a comprehensive estimate of the size and importance of the South Australian marine industries. It is important to note that the economic contribution figures should not be added to the value of production estimates; they represent related, but separate, concepts in estimating the value of the marine industries to South Australia.

The economic contribution of the marine industries is measured by the value added to the economy arising from marine industry activity. Value added (or value add) is a different concept to value of production. Rather than counting the total value of the goods or services produced in each industry (or total expenditure in the recreational fishing or offshore oil and gas sectors), it removes the value of intermediate inputs in the production process. As such, it represents the ‘value added’ by labour and capital inputs in a given industry arising from that production, rather than the total value of the good or service produced. Value added is commonly used to measure economic contribution because it avoids double-counting, as the product of one industry often becomes the input of another. The sum of value added across all entities in the South Australian economy equals gross regional product (GRP) at a regional level, or GSP at the state level – the most commonly cited metric of the size of an economy.

The total economic contribution of a given industry is measured by adding its direct and indirect economic contribution. The direct economic contribution reflects the economic activity (value added and employment) attributed to that industry, while the indirect economic contribution reflects the economic activity that flows-on from expenditure on intermediate inputs by that industry. Economic contribution is measured here in both value add and employment terms.

The marine industries in South Australia contributed around \$1.9 billion in value add to the economy in 2015-16, incorporating \$1,054.5 million in direct value added and \$869.4 million in indirect value added. This represented approximately 2 per cent of the South Australian GSP in 2015-16. This means that, for every dollar of value add generated within the marine industries in South Australia, almost another dollar is supported elsewhere in the economy.



**Table ii: Economic contribution of the marine industries in South Australia, 2015-16 (\$ millions)**

	Direct value added (\$m)	Indirect value added (\$m)	Total value added (\$m)
All marine industries	\$1,054.5	\$869.4	\$1,923.9

Source: Deloitte Access Economics

Note: Total may not sum due to rounding

South Australia's marine industries employed almost 15,000 people in 2015-16, including both direct and indirect employment. Employment is measured in full-time equivalent (FTE) terms. The indirect employment represents those FTEs associated with the flow-on effects of expenditure within each marine industry.

**Table iii: Total employment contribution of the marine industries in South Australia, 2015-16**

	Direct employment (FTE)	Indirect employment (FTE)	Total employment (FTE)
All marine industries	8,436	6,422	14,858

Source: Deloitte Access Economics

Note: Total may not sum due to rounding

### Economic contribution of marine industries in the Spencer Gulf

The marine industries in the Spencer Gulf, a key region in South Australia, contributed \$392.8 million to the regional economy, incorporating \$240.9 million in direct value added and \$151.9 million in indirect value added.

**Table iv: Total economic contribution of the marine industries in Spencer Gulf, 2015-16 (\$ millions)**

	Direct value added (\$m)	Indirect value added (\$m)	Total value added (\$m)
All marine industries	\$240.9	\$151.9	\$392.8

Source: Deloitte Access Economics

Note: Total may not sum due to rounding

The marine industries directly employed around 1,586 FTEs in 2015-16 in the Spencer Gulf, and a further 1,192 indirect FTEs.

**Table v: Total employment contribution of marine industries in Spencer Gulf, 2015-16**

	Direct employment (FTE)	Indirect employment (FTE)	Total employment (FTE)
All marine industries	1,586	1,192	2,778

Source: Deloitte Access Economics

Note: Total may not sum due to rounding

# Introduction

The focus of this study, is the observed economic contribution of marine industries in the decade up to 2015-16.

## 1.1 Background

South Australia has 5,000 kilometres of coastline, making up 8.5 per cent of Australia's total coastline. The 60,000 square kilometres of the South Australian marine estate<sup>4</sup> accounts for less than 1 per cent of Australia's marine jurisdiction; the third largest in the world<sup>5</sup>. Together with the natural resources and marine infrastructure within these areas, the coastline and marine waters are important drivers of economic activity in the state.

Currently, these man-made and natural assets contribute to some of South Australia's largest industries including tourism, shipbuilding, aquaculture and wild fisheries.

Despite its known importance, there is presently no reliable estimate of the contribution that the South Australian marine environment and marine industries make to the economy, through commonly used measures of economic output such as gross state product (GSP). This is largely because it can't be measured through the value of production of a single industry or activity. Rather, there are many industries that derive value and generate output.

This report has been prepared by Deloitte Access Economics for the South Australian Research and Development Institute (SARDI), the research division of the Department of Primary Industries and Regions South Australia (PIRSA), as part of an initiative led by Marine Innovation Southern Australia (MISA) to specifically address this information gap. The report estimates the contribution

of marine-based industries and activities to the South Australian economy.

The contribution comprises both the direct activity within the marine industries themselves, as well as the flow on benefits to other industries of the economy.

Clearly, the value of South Australia's marine environment extends beyond the contribution that these industries make to widely adopted economic metrics such as GSP. The marine environment also has significant non-market value generated through its recreational uses, its contribution to important research, and its environmental importance. This report does not identify or quantify these non-market values.

Although not the focus of this report, there is also significant potential upside for economic activity in South Australia's marine industries in the future. The Great Australian Bight is one of Australia's largest remaining frontier oil and gas exploration basins in Australia. There is also significant potential as new and innovative uses for ocean resources are discovered. This could be through future innovations in renewable energy (tidal, wave, geothermal), or discoveries in biotechnology. The focus of this study, however, is the observed economic contribution of marine industries in the decade up to 2015-16.

# South Australia



## 1.2 Approach to the valuation

As outlined above, industries associated with South Australia's marine environment contribute significant benefits to our economy and society. Despite this, there is not a consolidated 'marine industry' category that reports this contribution to gross domestic product (GDP), GSP, employment, or infrastructure at a national, state and regional level.

To overcome this information gap, this report follows a similar approach to that developed by the Australian Institute of Marine Science and Deloitte Access Economics in valuing Australia's marine industries.<sup>6</sup> This approach includes collating the most recent estimates of economic value of production (or, in some cases, expenditure<sup>7</sup>) across a range of industries. This list of industries was developed through discussion with Marine Innovation Southern Australia (MISA), and includes:

- Commercial fishing (wild catch fisheries)
- Recreational fishing
- Marine-based aquaculture
- Offshore oil and gas exploration
- Marine tourism
- Shipbuilding and boatbuilding
- Water transport (encompassing freight and passenger transport)
- Marine equipment retailing
- Marina operations.

There are further marine industries which are important or have significant potential in South Australia, but whose economic contribution is not able to be estimated based on available data. These include indigenous fishing, salt production, desalination, bioprospecting and other marine services.

All marine industries for which data were available have been quantified in Chapters 2 and 3. In Chapter 2, the industries are described qualitatively, and estimates of the value of production in each industry are presented. This estimate generally represents the total value of goods and services sold within that industry, except in the case of recreational fishing and offshore oil and gas exploration, for which total expenditure estimates are provided. All estimates are provided for the latest year possible, which for most industries is the 2015-16 financial year. Where previous year estimates are used (e.g. for Commonwealth fisheries, recreational fishing and marina operation), these values are adjusted to 2015-16 dollars.

The value of production is presented for all of South Australia, as well as the value produced in four key marine regions across the state: the West Coast, Spencer Gulf, Gulf St Vincent and Kangaroo Island, and the South East Coast. These regions are displayed in Figure 1.1, and further defined in Appendix A.

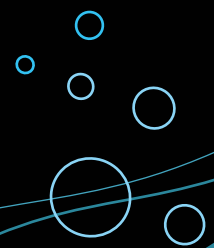
In Chapter 3, the Deloitte Access Economics Regional Input-Output Model, along with the Australian Bureau of Statistics' (ABS) input-output tables, are used to estimate the contribution of marine industries to the South Australian and regional Spencer Gulf economies. The economic contribution of Spencer Gulf was analysed because it is a major gateway to the state's energy, mining and agricultural resources, supports a wide range of marine industries, and is comprised of marine ecosystems and species that have global conservation significance.

The economic contribution of marine industries is measured by the value added to the economy arising from marine industry activity. Value added (or value add) is a different concept to value of production. Rather than counting the total value of the goods or services produced in each industry, it removes the value of intermediate inputs (e.g. fish feed or fuel for marine-based aquaculture) in the production process. As such, it represents the 'value added' to the economy arising from that production, rather than the total value of the good or service produced. Value added is commonly used to measure economic contribution because it avoids double-counting, as the product of one industry often becomes the input of another. Value added represents the contribution of an industry to Gross State Product (GSP). Further detail is contained in Chapter 3.

It is important to note that this report does not capture all the benefits generated by South Australia's marine industries and should be interpreted as a minimum estimate of value, given the exclusion of some industries for which data are unavailable. Rather, it represents only one way of measuring the industries' value, through its contribution to the economy. Other alternative approaches could include valuing the social, environmental or other non-tangible benefits of marine industries, activities and assets. However, this economic contribution approach has been taken in order to present and compare industries across South Australia.

# South Australia's marine industries

In 2015-16, the total value of  
production in South Australia's  
marine industries was \$2.3 billion.



## 2.1 Value in 2015-16 – South Australia

South Australia's marine economy was worth an estimated \$2.3 billion in 2015-16, as measured by the value of production (or expenditure<sup>8</sup>) in marine industries. The value of production produced in each industry, for all of South Australia and in four marine regions across the state, is shown in Table 2.1.

**Table 2.1: Value of marine industry production by industry and region, 2015-16 (\$ millions)**

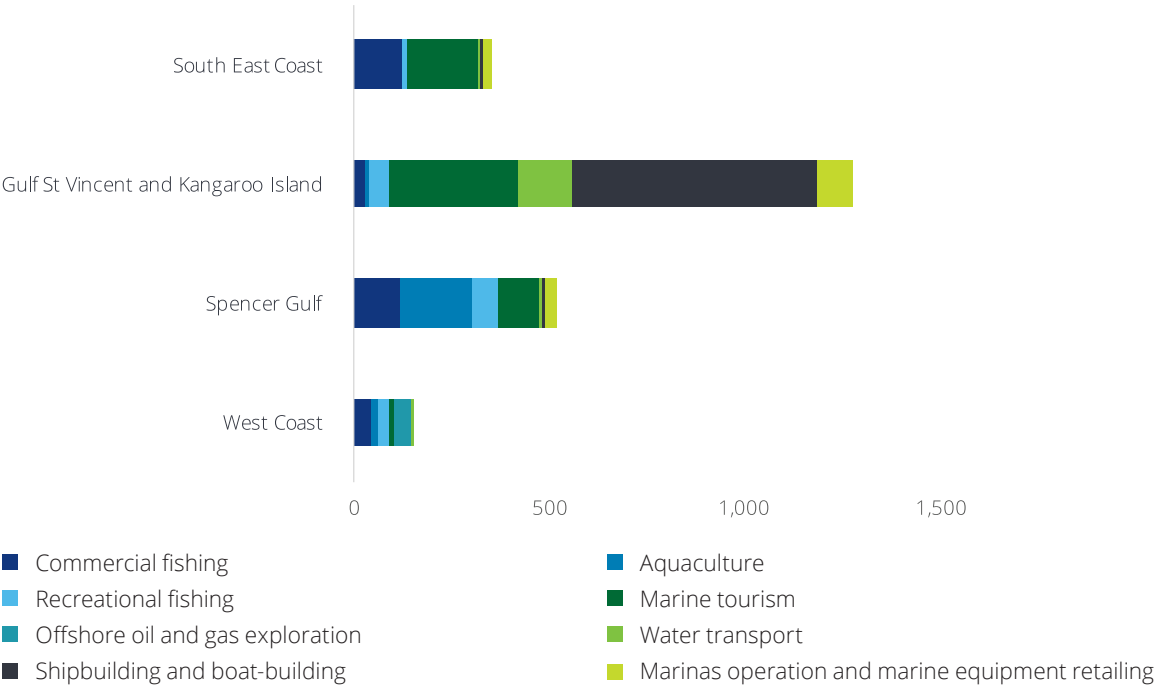
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Recreational fishing (expenditure)	\$29.8	\$67.5	\$52.4	\$11.1	\$160.8
Marine-based aquaculture	\$17.9	\$182.4	\$6.7	-	\$206.9
Offshore oil and gas (expenditure)	\$47.5	-	-	-	\$47.5
Shipbuilding	-	-	\$595.0	-	\$595.0
Boatbuilding	-	\$5.7	\$30.4	\$4.1	\$40.3
Water transport	\$5.2	\$6.6	\$136.6	\$3.5	\$151.9
Domestic marine tourism	\$7.8	\$81.9	\$260.8	\$140.8	\$491.3
International marine tourism	\$2.0	\$20.7	\$65.9	\$35.5	\$124.1
Marine equipment retailing	-	\$16.3	\$56.9	\$15.7	\$88.9
Marina operation	-	\$11.8	\$33.0	\$14.2	\$59.0
<b>Total</b>	<b>\$152.4</b>	<b>\$509.8</b>	<b>\$1,266.7</b>	<b>\$350.2</b>	<b>\$2,279.2</b>

Source: Various, see body of report

Note: Total may not sum due to rounding. Industries using previous year data and adjusted for inflation include Commonwealth fisheries (component of commercial fishing), recreational fishing and marina operation

Chart 2.1 displays these values in a visual format, illustrating the extent to which each region's primary marine activities differ.

**Chart 2.1: Value of marine industry production by marine industry groups and region, 2015-16, \$ millions**



Source: Various, see sections following

In Gulf St Vincent and Kangaroo Island, shipbuilding and water transport are the region's most important marine industries. Osborne, 21 kilometres north-west of Adelaide's city centre and located in the Gulf St Vincent and Kangaroo Island region, is the state's shipbuilding hub. Home to ASC's Naval and Submarine shipyards, shipbuilding comprises 45 per cent of the total value of marine production in the Gulf St Vincent and Kangaroo Island region. As South Australia's largest container port and water passenger terminal, Port Adelaide is also the dominant water transport hub in the state.

Waters off the South East Coast region are home to the state's most lucrative rock lobster stocks, with commercial fishing accounting for 35 per cent of the region's marine economy. Marine tourism is also popular along this stretch of coastline, with domestic tourism representing \$140.8 million (39 per cent) in production, and international tourism a further \$35.5 million (10 per cent).

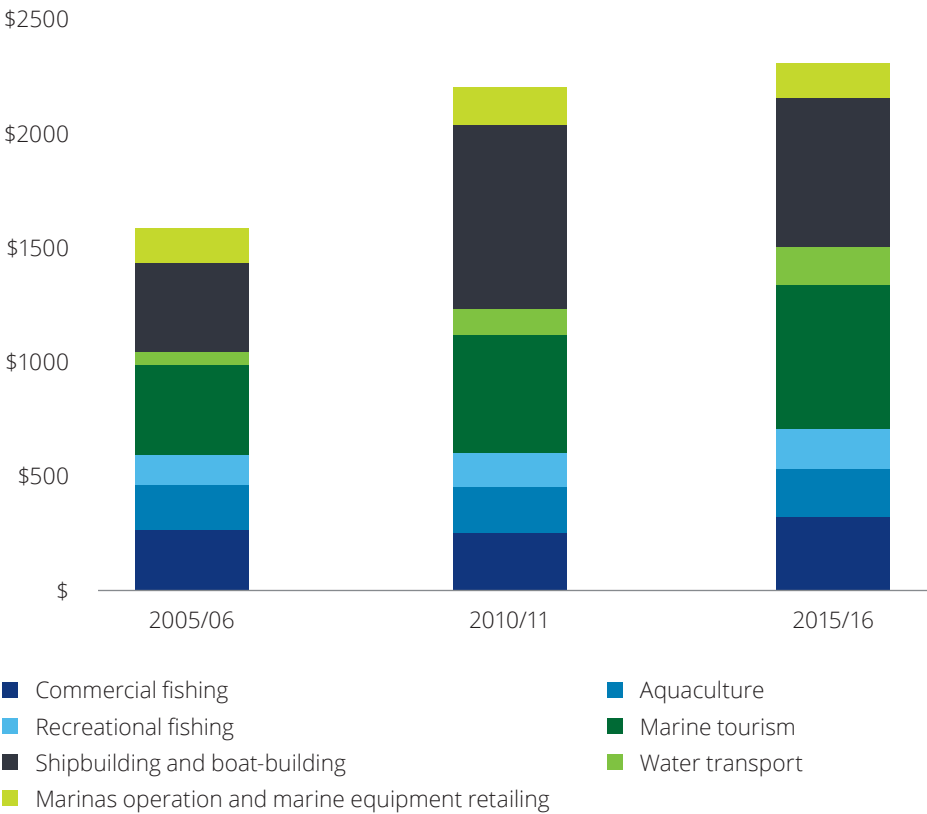
The Spencer Gulf region's primary marine activities are fishing and aquaculture. The Eyre Peninsula, which forms one side of the Gulf, is home to a large share of the state's aquaculture production. This industry accounts for 38 per cent of the Spencer Gulf's total marine production, while commercial fishing operations account for 26 per cent, with a large number of vessels berthing at Port Lincoln.

The West Coast region is adjacent to the majority of South Australia's offshore oil and gas exploration sites, which contributes around one-third of the region's total marine production (or, in this case, expenditure) by value. Although these offshore sites are located in Commonwealth waters, they are adjacent to South Australia's West Coast marine region in the Great Australian Bight.

2.2 Changes in value of production over time

Between 2005-06 and 2015-16, the value of production in South Australia's marine industries (excluding oil and gas) increased by 44 per cent in nominal terms, or by 13 per cent in real (inflation adjusted) terms.

Chart 2.2 Value of production for marine industries, 2005-06 to 2015-16 (\$ millions, nominal)



Source: Various, see body of report

The majority of this increase occurred between 2005-06 and 2010-11, with slower growth in the five years to 2015-16. This growing trend reflects the following:

- The South Australian shipbuilding industry grew considerably between 2005-06 and 2010-11, reflecting rising capital expenditure on Commonwealth Government Defence projects
- There was strong growth in South Australian marine tourism activity across the state, reflecting increased visitor numbers
- The South Australian water transport industry has grown for both passenger and freight services.

The figures presented in the time series do not contain estimates for offshore oil and gas exploration because of insufficient data for 2005-06 and 2010-11. This figure could not be consistently estimated over the ten year period from the available data sources.



**2.3 Marine industries: definitions, data issues and trends**

The following sections synthesise available data to quantify the size of each marine industry. These data are then used to assess the contribution of each sector to the South Australian economy in Chapter 3. This report follows a similar approach to the AIMS national marine industry index, though data sources varied depending on availability at a state and regional level.

**2.3.1 Commercial fisheries**

Fishing stocks are abundant in South Australian waters, and Commonwealth waters off the South Australian coast. Regulatory regimes exist to manage the sustainable fishing of these resources.

Commercial license holders are entitled to fish within specified regions, up to a certain quota or using particular equipment. In contrast to aquaculture stocks, which are farmed, commercial fisheries relate to the wild catch of seafood.

The total value of fish caught in waters off the South Australian coast was \$313.5 million in 2015-16. State-managed fisheries accounted for 85 per cent, while fish species caught in Commonwealth waters off the South Australian coast comprised 15 per cent. The value of production is equivalent to gross value of production (GVP) as commonly reported in fisheries statistics.

*Table 2.2 Total value of production from commercial fishing in South Australia, 2015-16 (\$ millions)*

Fishery	Total value of production (\$m)	Share of value
South Australian fisheries	\$265.7	85%
Commonwealth fisheries	\$47.8	15%
Total	\$313.5	100%

Source: SARDI and ABARES<sup>9</sup>  
Note: Total may not sum due to rounding

**South Australian fisheries**

South Australia has 12 commercial wild catch fisheries covering the state’s coastal waters (up to three nautical miles offshore and inclusive of the two gulfs), lakes and river systems. Two of South Australia’s fisheries, the Lake Eyre Basin Fishery and the River Fishery, relate to onshore waterways and therefore fall outside the scope of this report. In addition, the Charter Boat Fishery is considered under recreational fishing in Section 2.3.3. The exact location of each fishery can be found within the relevant Fisheries Management Regulations.<sup>10</sup>

The greatest share of South Australia’s fishing value is generated in the South East Coast region, largely due to the production/harvest of lucrative rock lobster. These shares are based on the location where the catch was taken, not where they were landed.

**Table 2.3 South Australian fisheries data, total value and volume of catch, 2015-16 (\$ millions)**

Region	Value of production		Catch volume	
	\$m	Share	Tonnes	Share
West Coast	\$35.6	13%	10,436	21%
Spencer Gulf	\$78.5	30%	30,516	60%
Gulf St Vincent and Kangaroo Island	\$26.9	10%	3,132	6%
South East Coast	\$124.7	47%	6,767	13%
<b>South Australia</b>	<b>\$265.7</b>	<b>100%</b>	<b>50,852</b>	<b>100%</b>

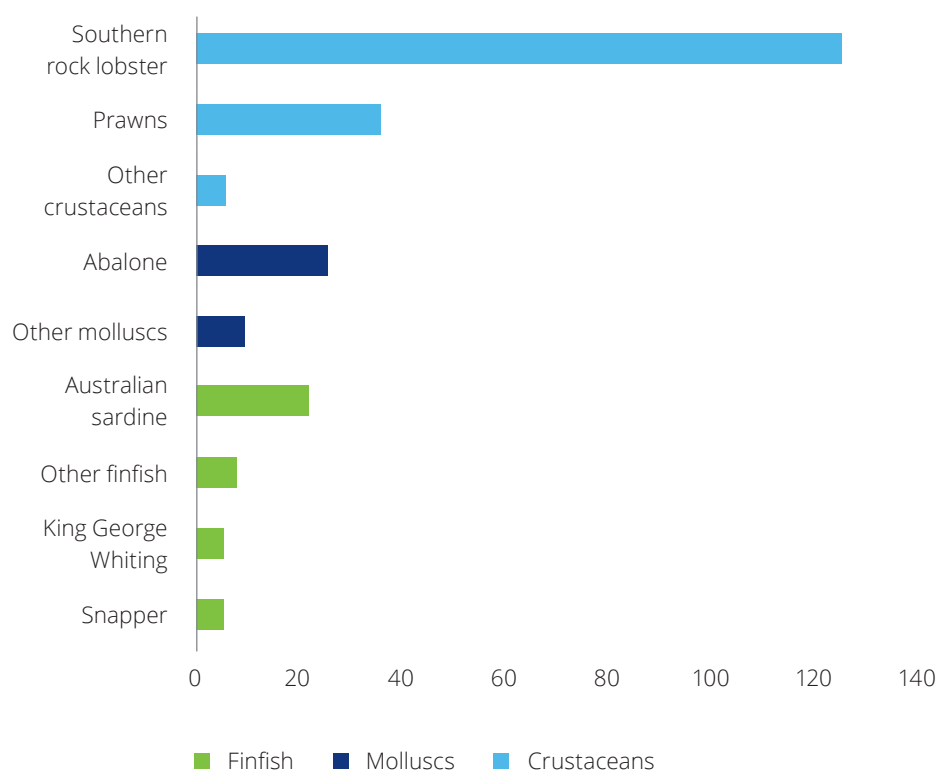
Source: SARDI<sup>11</sup>

Note: Total may not sum due to rounding

More than 50,000 tonnes of fish and seafood were commercially caught in the state's marine waters over 2015-16.

In 2015-16, southern rock lobster accounted for around half of the total value of wild caught seafood from South Australian waters.

**Chart 2.3: Value of catch in South Australia, 2015-16 (\$ millions)**



Source: SARDI<sup>12</sup>



Downstream from these commercial fisheries are operators who process, store, transport or deal seafood for a commercial purpose. Activities undertaken by fish processors include: scaling, gilling, gutting, filleting, freezing, chilling, repacking, or any other activity involved in preparing fish for sale, which will largely occur onshore. The value of these activities is included in the calculation of the indirect contribution of the commercial fisheries industry in Chapter 3.

**Commonwealth fisheries**

In addition to the South Australian fisheries, there also exist Commonwealth fisheries which operate in Commonwealth waters (beyond three nautical miles off the coast and excluding Spencer Gulf and Gulf St Vincent) and are managed by the Commonwealth body, the Australian Fisheries Management Authority (AFMA).

Table 2.4 shows an estimate of the value of production produced in these Commonwealth fisheries, which is landed at South Australian ports.

In 2014-15, the value of fish caught in Commonwealth waters and landed at South Australian ports was \$47.8 million (in 2015-16 terms). The majority of this value accrues to Port Lincoln in Spencer Gulf, or around 80 per cent of the total value. Port Lincoln is a major landing port for the Southern Bluefin Tuna Fishery, as well as the Southern and Eastern Scalefish and Shark Fishery.

*Table 2.4: Value of production from Commonwealth fisheries, 2014-15 (in 2015-16 terms, \$ millions)*

Region	Value of production (\$m)
West Coast	\$6.4
Spencer Gulf	\$38.5
Gulf St Vincent and Kangaroo Island	\$2.2
South East Coast	\$0.7
<b>South Australia</b>	<b>\$47.8</b>

Source: ABARES<sup>13</sup>  
 Note: Total may not sum due to rounding

### 2.3.2 Marine-based aquaculture

Marine-based aquaculture production in 2015-16 was \$206.9 million. The South Australian aquaculture industry produces seafood including southern bluefin tuna (farmed grow-out sector), Pacific oysters, yellowtail kingfish, greenlip abalone (including coastal land-based operations) and mussels. Some freshwater finfish, marron and yabbies are produced inland; however, these are not considered here to be part of the marine economy.

The majority of aquaculture activity occurs in the Eyre Peninsula, which spans across two marine regions (as defined in this report): the Spencer Gulf and West Coast. It is home to the majority of the state's aquaculture activities, which include subtidal and intertidal mollusc farming and sea-cage farming of southern bluefin tuna and yellowtail kingfish.

The majority of the Eyre Peninsula's activities fall within the Spencer Gulf region, which accounts for 88 per cent of the industry's total value of production (marine-based aquaculture only). However, some aquaculture, most notably oyster farming, occurs within the West Coast region.

Southern bluefin tuna accounts for around 50 per cent of the total aquaculture production by value, with 8,895 tonnes harvested in 2015-16. Further detail is shown in Table 2.5.

**Table 2.5 Value of marine-based aquaculture production by region and species, 2015-16 (\$ millions)**

Species	West Coast (\$m)	Spencer Gulf (\$m)	Gulf St Vincent and Kangaroo Island (\$m)	South East Coast (\$m)	Total (\$m)
Southern Bluefin Tuna	-	\$126.9	-	-	\$126.9
Marine Finfish	-	\$30.0	-	-	\$30.0
Oysters	\$16.7	\$13.9	\$0.4	-	\$30.9
Mussels	-	\$4.4	-	-	\$4.4
Abalone	\$1.3	\$7.2	\$6.3	-	\$14.7
<b>South Australia</b>	<b>\$17.9</b>	<b>\$182.4</b>	<b>\$6.7</b>	<b>\$0.0</b>	<b>\$206.9</b>

Source: Econsearch<sup>14</sup>

Note: value for oysters in 2015-16 excludes the value of spat and on-grown sales

### 2.3.3 Recreational fishing

Recreational fishing is one of Australia's most important leisure activities by participation, and may confer economic, social and health benefits. Recreational fishing in South Australia is a popular activity, with more than 277,000 South Australians considering themselves recreational fishers in South Australia's most recent recreational fishing survey conducted by PIRSA.<sup>15</sup>

Quantifying the economic value of recreational fishing is challenging due to the difficulties in collecting and comparing data about activities which occur in a relatively informal way, and across a fragmented industry.

Furthermore, fish caught and consumed by recreational fishers are free, to the extent that they are not part of a market transaction. As such, it is not possible to directly measure the value of production, as for some other industries including commercial fisheries. Determining the value of recreational fishing requires alternate approaches to valuation, and for this reason, these values are not directly comparable with those of the commercial fishing sector.

As an alternative, estimates of the total value of activity attributable to recreational marine fishing are typically expenditure-based. A study completed in 2003 observed that 3.36 million Australians engaged in recreational fishing, spending \$1.9 billion in 1999-2000. The National Recreational Fishing Survey was completed with the support of the Commonwealth and state governments. In South Australia, average expenditure per fisher was reported to be \$454 per year, which equates to \$668 in 2015-16 dollars. Items in the expenditure bundle included fishing gear, bait/berley, fees and licences, boat/trailer, dive gear, camping gear and clothing, travel and accommodation.<sup>16</sup>

In this study, any expenditure that wasn't attributable to fishing activities was excluded from these estimates. This is because recreational trips often include a number of activities, of which fishing is only one, and some items (such as boats) can be used for non-fishing activities. For example, only 50% of boat expenditure would be included in expenditure estimates if recreational fishing accounted for 50% of the boat's usage.

This Commonwealth study used multiple surveys to acquire data on recreational fishing, with the survey participants determined from an initial random sample from the general population (over 5,000 households in South Australia). The final methodology chosen was based on best-practice and also included a year-long fisher diary survey for eligible households to account for recall bias. Although some years old, the survey includes a South Australian estimate, accounts for recall bias and made all attempts to survey a representative sample.

A more recent study completed for VRFish estimated the per-trip spend for Victorian recreational fishers to be \$326. However, given this was a Victorian study, and the relatively smaller sample size (500 recreational fishers and 500 from the general population<sup>17</sup>), these estimates were deemed less appropriate for this report.

Therefore, based on the National Recreational Fishing Survey, it is estimated that recreational fishers who fish in marine waters spent \$160.8 million in 2015-16, based on the average expenditure above (i.e. \$668 per year), and the most recent survey showing 277,000 South Australians participated in recreational fishing. This figure was adjusted to account for the share of fishing activity which occurs inland (e.g. rivers, lakes).<sup>18</sup>

The Spencer Gulf is the most popular area for recreational fishers, attracting around 37 per cent of fishing effort (in days) in 2013-14. However, a greater number of the state's fishers are based in the Gulf St Vincent and Kangaroo Island region, likely due to the location of Adelaide within this region.

Table 2.6 shows the estimated total fishing expenditure in each of the four regions, based on the location of fishing effort.

**Table 2.6: Recreational fishing expenditure in South Australia, 2015-16, \$ millions**

Region	Expenditure (\$m)
West Coast	\$29.8
Spencer Gulf	\$67.5
Gulf St Vincent and Kangaroo Island	\$52.4
South East Coast	\$11.1
<b>South Australia</b>	<b>\$160.8</b>

Source: Fisheries Victoria<sup>19</sup> and FRDC<sup>20</sup>

Note: Total may not sum due to rounding

Charter boats are regulated as a commercial fishery in South Australia. However, the activity generated is best characterised as recreational fishing, rather than as commercial fishing. This is because the activity undertaken on charter boats is recreational fishing, rather than catching for commercial (business) purposes. Table 2.6 above already accounts for any activity undertaken on charter boats, as the expenditure relates to all recreational fishing activity in South Australia. However, the most recent statistics show that the value of production in the Charter Boat Fishery was \$3.6 million in 2014-15.<sup>21</sup>

**2.3.4 Offshore oil and gas exploration**

While there is currently no offshore oil and gas production in South Australia, substantial exploration activity has occurred in recent years. A significant proportion of oil reserves are considered to be located in the Great Australian Bight, off the coast of South Australia and southern Western Australia, in the Bight Basin. Further oil reserves are located in the Otway Basin, off the south east coast of South Australia and into Victoria.

The most recent round of exploration permits occurred in 2013. The table below shows the companies that hold the exploration permits which are currently active.

In late 2016, BP announced that it would not progress its exploration drilling program in the Great Australian Bight in offshore South Australia. This decision was attributed to BP's review and refresh of its upstream strategy earlier in 2016.<sup>24</sup> While previously BP held a 70 per cent share in EPPs 37-40 and Statoil 30 per cent, the companies signed a swap deal whereby Statoil now holds EPPs 39 and 40, and BP holds EPPs 37 and 38.<sup>25</sup>

Expenditure data for this report was sourced from the Work Program (dated 30 June 2017) of the National Offshore Petroleum Titles Administrator (NOPTA) and provided by the South Australian Department of Premier and Cabinet.

All of the \$47.5 million in offshore exploration activity occurred in the West Coast region (encompassing the Great Australian Bight). These offshore titles are located in Commonwealth waters, however they are adjacent to South Australia's marine regions.

*Table 2.7: Exploration permit for petroleum (EPP)*

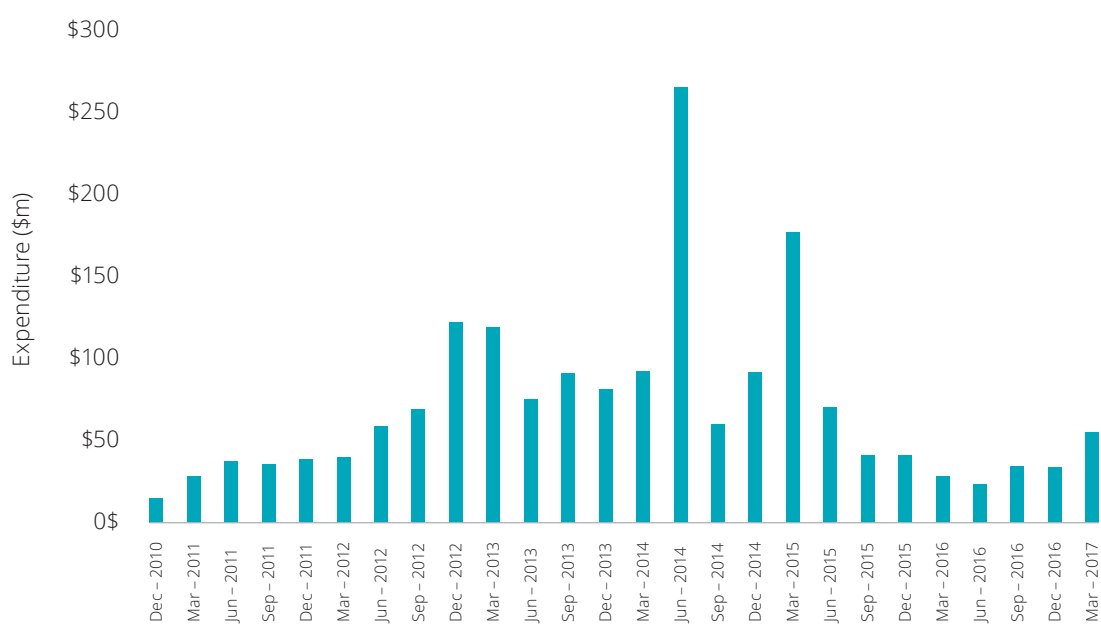
Permit	Holder
EPPs 37-38	BP
EPPs 39-40	Statoil
EPPs 41-42	Bight Petroleum
EPP 43	50% Murphy / 50% Santos
EPPs 44-45	Chevron

Source: Department of Premier and Cabinet<sup>22</sup> and Statoil<sup>23</sup>

Oil and gas exploration expenditure is highly variable, reflecting both the lifecycle of projects and commodity prices. Chart 2.4 displays all onshore and offshore petroleum expenditure in South Australia, and highlights that total petroleum exploration expenditure in 2015-16 was significantly below the average of the previous five years.

The Great Australian Bight is one of Australia's largest remaining frontier oil and gas exploration basins in Australia, and has the potential to generate significant economic activity in the future.

**Chart 2.4 Quarterly offshore and onshore petroleum exploration expenditure in South Australia, 2010-2017, \$ millions**



Source: ABS<sup>26</sup>

**Table 2.8: Offshore oil and gas exploration, guaranteed expenditure in South Australia, 2015-16 (\$ millions)**

Region	Value (\$m)
West Coast	\$47.5
Spencer Gulf	-
Gulf St Vincent and Kangaroo Island	-
South East Coast	-
<b>South Australia</b>	<b>\$47.5</b>

Source: Deloitte Access Economics analysis of NOPTA Work Program – 30 June 2017





### 2.3.5 Marine tourism

While the marine environment is an important driver of tourism in Australia, estimating and assessing the value of marine tourism represents a significant challenge. The ABS Tourism Satellite Accounts (TSA), which produce estimates of the size and contribution of Australia's tourism industry, do not separately assess marine tourism.

To overcome this limitation, Deloitte Access Economics assessed Tourism Research Australia's National Visitation Survey data to determine the significance of marine activities for tourists visiting South Australia. Marine activities<sup>27</sup> accounted for approximately 12 per cent of all activities undertaken by domestic tourists to South Australia.<sup>28</sup>

Applying this share to South Australia's total tourism production (which Tourism Research Australia estimates to be \$4.3 billion for domestic tourism and \$1.1 billion for international tourism) the estimated value of marine-related tourism production in South Australia is \$615.3 million.

Regional marine tourism output has been estimated by apportioning total SA marine tourism between the four marine regions, based on the total visitor expenditure of each region multiplied by each region's share of total visitor activities that are marine-based (sources listed under Table 2.9).

Using the methodology applied in the AIMS national marine industry index, marine-related tourism production in South Australia is estimated to be \$1.9 billion. However, this represents an upper bound to the value of the industry, as the approach taken in this report reflects data specific to South Australia. On the other hand, the approach used in the AIMS index related to Australia-wide data. Given the availability of state-specific information on specific marine activities undertaken by visitors to South Australia, the national approach (which assumes that, Australia-wide, marine tourism represents a fixed share of overall tourism) was deemed less suitable for this report.

**Table 2.9: Marine-related tourism production by region, 2015-16 (\$ millions)**

Region	Domestic marine tourism (\$m)	International marine tourism (\$m)	Total marine tourism (\$m)
West Coast	\$7.8	\$2.0	\$9.8
Spencer Gulf	\$81.9	\$20.7	\$102.6
Gulf St Vincent and Kangaroo Island	\$260.8	\$65.9	\$326.7
South East Coast	\$140.8	\$35.5	\$176.3
<b>South Australia</b>	<b>\$491.2</b>	<b>\$124.1</b>	<b>\$615.3</b>

Source: Deloitte Access Economics analysis of Tourism Research Australia data<sup>29</sup>

Note: Total may not sum due to rounding



### 2.3.6 Shipbuilding and boatbuilding

The shipbuilding and boatbuilding industries relate to the manufacturing and repair of marine vessels. Activities classified under the two industries differ based on the weight of the vessel manufactured or repaired. Shipbuilding covers watercraft with a displacement (weight) of 50 tonnes or more (including submarines), while boatbuilding refers to smaller vessels.

The key shipbuilding companies operating in South Australia include ASC and BAE Systems. The operations of these entities are included in the Gulf St Vincent and Kangaroo Island region, and both service Australian Government defence contracts.

Australia-wide, the value of production in the shipbuilding and boatbuilding industries in 2015-16 was \$2.2 billion and \$1.1 billion, respectively.<sup>30</sup> Based on South Australia's share of employment for each of these industries,<sup>31</sup> the estimated value of production in the South Australian shipbuilding industry is estimated to be \$595.0 million, and \$40.3 million in the boatbuilding industry. The value across each region is outlined in the table below.<sup>32</sup>

**Table 2.10: Value of marine-based aquaculture production by region and species, 2015-16 (\$ millions)**

Region	Boatbuilding (\$m)	Shipbuilding (\$m)
West Coast	-	-
Spencer Gulf	\$5.7	-
Gulf St Vincent and Kangaroo Island	\$30.4	\$595.0
South East Coast	\$4.1	-
<b>South Australia</b>	<b>\$40.3</b>	<b>\$595.0</b>

Source: ABS<sup>33</sup> and IBISWorld<sup>34</sup>

Note: Total may not sum due to rounding

Defined activities undertaken by shipbuilders include dry-dock operation, hull cleaning, ship repairing, ship wrecking, shipbuilding, submarine construction. For boatbuilders, defined activities include the construction of boats and their repair, and the manufacture of canoes, dinghies, inflatable boats, jet boats, motorboats (inboard and outboard), powerboats, sailboats and yachts. The manufacture of vessels from fibreglass is excluded from this category, as is the manufacture of surfboards and sailboards.

### 2.3.7 Water transport

Water transport involves the operation of vessels that transport freight, cargo and passengers between destinations via water. Overall, it is estimated the water transport industry produced \$151.9 million in value in 2015-16 in South Australia.

Importantly, this valuation represents the estimated value of water transport services, rather than the value of the cargo transported. These estimates exclude land-based port and water terminal operations and stevedoring services, which are classified separately.<sup>35</sup>

South Australia's largest container port and water passenger terminal, Port Adelaide, is the dominant water transport hub in the state. As such, the majority of the value of production in the industry is centred on Gulf St Vincent. However, other ports in South Australia also experience significant transport activity, particularly in terms of bulk goods.

#### Water passenger transport

Water passenger transport includes cruise services, passenger ferry services, vehicle ferry services, water taxi services and crewed boat hire. This may incorporate some inland services, however as water transport refers specifically to transport between destinations, sightseeing services are not included. The operation of passenger terminals, tugboats and towing vessels are excluded from this category.

Nationally, the water passenger transport industry produced \$1.2 billion of services in 2015-16.<sup>36</sup> The value of production in South Australia is estimated to be \$96.5 million. This figure was calculated using the share of employment in the industry that is South Australian based, excluding inland areas.<sup>37</sup>

#### Water freight transport

Water freight transport includes international sea freight, domestic sea freight, harbour freight services and ship freight management services. Similar to the operation of passenger terminals, this industry excludes the operation of freight terminals in ports and tugboat services.

While Port Adelaide is the major shipping hub in South Australia, other ports, particularly in Spencer Gulf, move significant volumes of bulk goods. Table 2.11 displays total imports and exports through South Australian ports in 2016.

**Table 2.11: Total imports and exports through South Australian ports, in volume ('000 tonnes) and value (\$ millions) terms, 2016**

Port	Export volume ('000 tonnes)	Export value (\$ m)	Import volume ('000 tonnes)	Import value (\$ m)
Ardrossan	-	-	-	-
Bonython	259	\$140.2	90	\$48.4
Klein Point	-	-	-	-
Port Adelaide	5,232	\$7,060.9	4,120	\$6,115.9
Port Augusta	-	-	-	-
Port Giles	474	\$136.2	-	-
Port Lincoln	2,162	\$729.8	142	\$60.5
Port Pirie	8	\$14.6	116	\$372.9
Port Stanvac	-	-	-	-
Port Thevenard	360	\$111.3	-	-
Wallaroo	475	\$121.6	-	-
Whyalla	8,878	\$428.4	191	\$4.1
Other South Australian ports	-	\$0.7	3	\$2.0
<b>Total</b>	<b>17,848</b>	<b>\$8,743</b>	<b>4,661</b>	<b>\$6,604</b>

Source: Department of Planning, Transport and Infrastructure

Note: Total may not sum due to rounding

Nationally, the water freight industry's value of production in 2015-16 was \$2.5 billion.<sup>38</sup> Based on South Australia's share of throughput,<sup>39</sup> it is estimated that \$55.4 million of value was generated in the water freight transport industry in South Australia.

#### Total water transport

Overall, it is estimated the water transport industry produced \$151.9 million in services in 2015-16 in South Australia, including both water passenger and water freight transport.

**Table 2.12: Value of production in the water transport industries, 2015-16 (\$ millions)**

Region	Passenger transport (\$m)	Freight transport (\$m)	Total water transport (\$m)
West Coast	-	\$5.2	\$5.2
Spencer Gulf	-	\$6.6	\$6.6
Gulf St Vincent and Kangaroo Island	\$93.0	\$43.5	\$136.6
South East Coast	\$3.5	-	\$3.5
<b>South Australia (marine)</b>	<b>\$96.5</b>	<b>\$55.4</b>	<b>\$151.9</b>

Source: IBISWorld<sup>40</sup>, ABS<sup>41</sup> and Ports Australia<sup>42</sup>

Note: Total may not sum due to rounding

#### 2.3.8 Marine equipment retailing

Marine equipment retailing relates to retailing new or used boats or boat accessories. Boat repairs are incorporated in the boatbuilding industry, described in Section 2.3.6.

Nationally, the value of production in the industry was \$1.4 billion in 2015-16.<sup>43</sup> Based on South Australia's share of employment for

this industry (excluding employment in inland areas),<sup>44</sup> the estimated value of production in the South Australian marine equipment retailing industry was \$88.9 million in 2015-16. This industry is concentrated in the Gulf St Vincent and Kangaroo Island region. Table 2.13 outlines the value of production for all four regions.

**Table 2.13: Value of production in the marine equipment retailing industry, 2015-16 (\$ millions)**

Region	Value (\$m)
West Coast	-
Spencer Gulf	\$16.3
Gulf St Vincent and Kangaroo Island	\$56.9
South East Coast	\$15.7
<b>South Australia (marine areas)</b>	<b>\$88.9</b>

Source: ABS<sup>45</sup> and IBISWorld<sup>46</sup>

Note: Total may not sum due to rounding

### 2.3.9 Marina operation

This industry relates to the operation of marinas for both pleasure and non-pleasure craft. The value of production in this industry is derived from a 2013 Marina Industries Association survey relating to the economic performance of marinas. In that report, it was estimated that the gross revenue earned by marina operators (a proxy for value of production) was \$62.4 million, or \$66.1 million in 2015-16 dollars.<sup>47</sup>

Based on the location of marinas in South Australia, and excluding those that are located inland,<sup>48</sup> it is estimated that marina operation in South Australia produced \$59.0 million in value in 2015-16 (based on 2012-13 figures and adjusted for inflation). It is assumed that each marina contributed an equal share of production.

**Table 2.14: Value of production in the marina operation industry, 2012-13 (adjusted for inflation to 2015-16 dollars) (\$ millions)**

Region	Value (\$m)
West Coast	-
Spencer Gulf	\$11.8
Gulf St Vincent and Kangaroo Island	\$33.0
South East Coast	\$14.2
<b>South Australia (marine areas)</b>	<b>\$59.0</b>

Source: Mahoney, Herbowicz and Voldeck,<sup>49</sup> and Marinas Guide<sup>50</sup>

Note: Total may not sum due to rounding

## 2.4 Other marine industries and activities

There are other marine related industries and activities which are important or have significant potential in South Australia, but for which the value of production or expenditure are not able to be estimated based on available data. These are described in the following sections.

### 2.4.1 Indigenous fishing

Fishing is an important part of the culture of some indigenous communities in South Australia. While there are no reliable estimates relating to the participation rate or value of catch for fishing in these communities, indigenous traditional fishing nevertheless represents an element of South Australia's marine activity.

The South Australian Government recognises traditional fishing as a distinct activity. An Indigenous Land Use Agreement (ILUA), which is an agreement between a native title group and others, can provide for an Aboriginal Traditional Fishing Management Plan.

### 2.4.2 Salt

Salt production commenced in the early 1800s, and South Australia subsequently became the largest salt producing state until the 1960s.<sup>51</sup> Since then, Western Australia has dominated the industry but South Australia retains a substantial share. In 2013, salt production in South Australia was 870,000 tonnes,<sup>52</sup> representing approximately 10 per cent of Australian salt production. In 2007, solar salt production in South Australia was worth over \$5.5 million.<sup>53</sup> All salt production in South Australia is produced by solar evaporation of seawater or saline lake water.<sup>54</sup>

IBISWorld projects the broader salt and mineral mining industry to perform well over the next five years. Demand from industrial producers (such as chemical manufacturers) is projected to increase, which is significant given South Australia's production of salt is largely for industrial uses. A depreciating Australian dollar, leading to favourable export conditions, may also assist the industry going forward.<sup>55</sup>

### 2.4.3 Desalination

There are several desalination plants in South Australia, three of which are owned and operated by SA Water: Hawker in the Flinders Ranges, Penneshaw on Kangaroo Island, and Lonsdale in Adelaide.<sup>56</sup>

The Hawker desalination plant processes groundwater, and is therefore not within the scope of this report.<sup>57</sup> In contrast, the town of Penneshaw on Kangaroo Island has no natural water resources and receives 100 per cent of its mains freshwater from the desalination of seawater.<sup>58</sup>

The largest desalination plant in South Australia is the Lonsdale plant in Adelaide. It is capable of producing 100 gigalitres of water per year, equivalent to half of Adelaide's demand for water. Under most circumstances, it does not provide this amount, and is typically 'mothballed' during times of high rainfall.<sup>59</sup>

Sundrop Farms have operated their own desalination plant in Port Augusta since 2010. Sundrop uses a seawater greenhouse model to grow tomatoes in which seawater is desalinated and used to alter the temperature of the greenhouse and to water the tomatoes, enabling year-round production. The desalination plant is owned by and exclusively services Sundrop rather than being used for mains water supply. In 2016, the company completed a 20 hectare expansion of its facilities which are also serviced by Sundrop's desalination plant.<sup>60</sup>

Arguably, the real value of South Australia's desalination plants is in the water security it provides the state, rather than the revenue generated by their operations. This contribution is difficult to quantify, but predictions of increasingly erratic rainfall patterns may make the presence of a sizable desalination capability more valuable over time.<sup>61</sup>

### 2.4.4 Marine algae (seaweed)

In terms of production volume, seaweeds are the largest aquaculture commodity in the world, with operations occurring in coastal land-based or at-sea facilities. In South Australia, there are a few species farmed on a relatively small scale. Growing demand for seaweed in Australia, in a range of products (including cosmetics, fertilisers and animal feeds) is being met by imports, which increased by 189 per cent between 1999 and 2008.<sup>62</sup>

Micro-algae has been cultivated and processed into beta-carotene, a food colouring, in Whyalla since 1986. The Whyalla plant is one of the world's leading producers of the chemical and indicative of the potential of seaweed in the state.<sup>63</sup> Also located in Whyalla is Muradel's pilot marine algae biofuels plant, which has been testing the viability of creating a crude oil substitute using algae.<sup>64</sup> The facility first opened in 2011 and has since attracted a sizable amount of investment into its operation.

Australian Kelp Products, a Chinese-owned company in Millicent, produces animal feed and fertilizer from the seaweed it harvests and has partnered with the Centre for Marine Bioproducts Development to explore the potential of its crop further.

Investigations into the future development of the seaweed industry are promising due to the uniqueness of South Australia's marine ecology.<sup>65</sup> With over 1,500 native species of algae, SARDI considers there to be undiscovered potential for marine prospecting and seaweed products.

### 2.4.5 Bioprospecting

Bioprospecting, also known as marine biotechnology, relates to research into the extraction of useful chemicals or compounds from organisms. According to SARDI, South Australia's unique ecology and biodiversity, as well as the presence of a vast stretch of the Great Southern Reef and the biological hotspots of the Gulf St Vincent and Spencer Gulf, mean that South Australia is a prime location for bioprospecting.

South Australia is home to the Centre for Marine Bioproducts Development at Flinders University. In 2016, the Centre signed a memorandum of understanding with Shandong Tianjiu Industrial Group, a \$220 million company, which included a \$1 million investment into the Centre's research.<sup>66</sup> The Centre also liaised with Qingdao Gather Great Ocean Algae Industry Group Company to secure a buyout of Australian Kelp Products and a seaweed collection licence, along with a planned \$21 million investment over the next three years to build a processing plant.<sup>67</sup>

#### 2.4.6 Other marine services

This sector includes marine research undertaken in South Australia, the enforcement of environmental management schemes, and marine safety operations. While it is difficult to estimate the economic contribution of marine research and other marine services in South Australia, these services generally complement the other industries identified in this report.

Marine research and fisheries, aquaculture and environmental management are intimately linked due to the research capabilities needed to assess fish stocks and monitor disease and mortality in aquatic populations. Marine research in South Australia is diffused across private industry, universities and government agencies. Research topics that are explored in South Australia include aquaculture production, fisheries stock assessment, algae production, genetics, environmental and ecosystem assessment, oceanography, biology and ecology. The main government body for marine research in South Australia is the South Australian Research and Development Institute (SARDI). Other key providers of marine related research in the state include the University of Adelaide and Flinders University.<sup>68</sup>

Currently, there are an estimated 60 full-time equivalent (FTE) research jobs in South Australia in the area of fishing and aquaculture. This represents a 25 per cent decrease from the 2009 figure of 80.<sup>69</sup> Note that these numbers should be recognised as a minimum as they do not represent the entirety of marine research (or all research providers) for marine industries in South Australia.

#### 2.4.7 Other natural marine resource assets

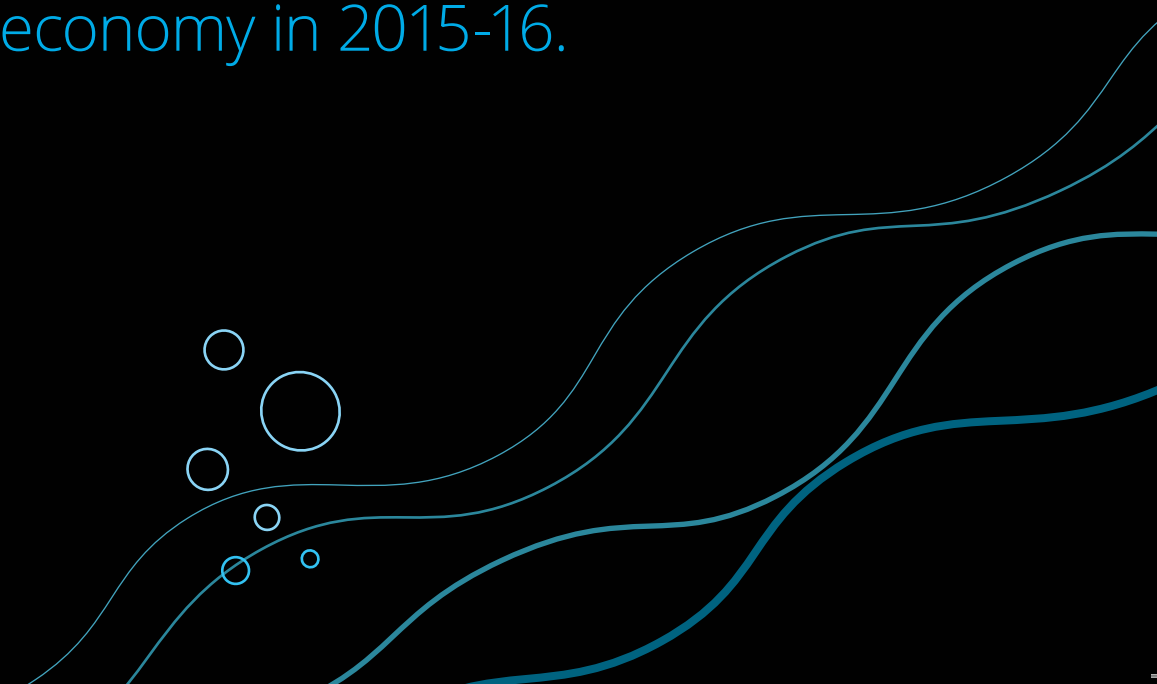
More value could be derived from discovery and conservation of natural assets that lie within the boundaries of the state. The term natural assets is used here to describe a resource that has a positive economic effect but is not harvested or depleted through its use.

An example of the value created from natural marine assets is the role that marine environments could play in carbon abatement. South Australia has over 10,000 km<sup>2</sup> of temperate seagrass fields. Research has shown that, although not captured in international accounting mechanisms, seagrasses are more effective at capturing and retaining carbon than tropical forests in terms of the rate of capture and the length of time that the carbon is stored.<sup>70</sup> Saltmarshes and mangroves, although less extensive in South Australia, can capture and retain carbon similarly.<sup>71</sup> The role of research will also be important for preserving this natural asset; a 2007 study found that South Australia has faced seagrass losses due to high levels of nutrients, suspended solids and dissolved organic carbon discharged to coastal waters, along with other effects.<sup>72</sup>

More recently, the establishment of South Australia's first native shellfish restoration reef will contribute to a healthier marine environment and improved recreational fishing, tourism and employment opportunities.<sup>73</sup> Establishment of these reefs focus on habitat restoration, with subsequent economic benefits to the state.

# **Economic contribution of the marine industry in South Australia**

The marine industry in South Australia makes a significant contribution to the economy. This chapter quantifies the contribution of the marine sector to the South Australian economy and the regional Spencer Gulf economy in 2015-16.



In addition to estimating the value of production in each marine industry, this report considers the economic contribution of the marine industries. This recognises that, for every dollar earned by the marine industries, activity is also stimulated elsewhere in the economy. It is important to note that these economic contribution figures (Chapter 3) should not be added to the value of production estimates (Chapter 2); they represent related, but separate, concepts.

### 3.1 Methodology

The following sections briefly outline the methodology adopted for this report. Further detail on the methodology can be found in Appendix C.

The economic contribution of the marine industries is measured by the value added to the economy arising from marine industry activity. Value added (or value add) is a different concept to value of production. Rather than counting the total value of the goods or services produced (or expenditure in the case of recreational fishing and offshore oil and gas exploration) in each industry, it removes the value of intermediate inputs (e.g. fish feed or fuel for marine-based aquaculture) in the production process. As such, it represents the 'value added' to the economy arising from that production, rather than the total value of the goods or services produced.

Value added is commonly used to measure economic contribution because it avoids double-counting, as the product of one industry often becomes the input of another. The sum of value added across all entities in the South Australian economy equals gross regional product (GRP) at a regional level, or gross state product (GSP) at the state level – the most commonly cited metric of the size of an economy.

#### 3.1.1 Direct and indirect contribution

The total contribution of the marine industries is comprised of their direct and indirect contribution to the economy.

The direct contribution includes the wages and profits earned directly within entities operating in each industry. These entities' wages and profits reflect their direct involvement in adding value to the South Australian and regional Spencer Gulf economy.

The indirect contribution reflects the flow-on economic effects associated with entities operating in the marine industries. When these businesses purchase inputs to create their goods or services, they are making contributions to other industries. For example, businesses in the fishing industry may purchase bait or pay for transportation services. The indirect contribution measures the flow-on effects of these purchases, as they represent wages and profits in other industries, which also add value to the economy.

The estimates of the direct and indirect economic contribution are based on input-output (IO) modelling techniques. The Australian Bureau of Statistics (ABS) produces IO tables which provide the value added for each industry of the Australian economy, as well as the linkages between industries. Deloitte Access Economics' Regional Input-Output Model (DAE-RIO-M) is used to estimate the direct and indirect value added and employment for each region.

The total economic contribution is measured by adding the direct and indirect economic contribution. The direct economic contribution reflects the economic activity within the industries directly, while the indirect economic contribution reflects the flow-on effects of the expenditure on intermediate inputs within those industries (also known as

'Type-1' effects). Economic contribution is measured here in both value add and employment terms.

Note that the expenditure of those who have received income from the industry (e.g. households receiving income from an aquaculture business) are not considered in this analysis. These effects (known as 'induced', or 'Type-2' effects) are sometimes included in other economic contribution studies, resulting in a higher overall economic contribution. As a standard approach, Deloitte Access Economics studies do not include Type-2 effects in our analysis.

In this report, a combination of survey data (where available) and ABS-derived statistics were used to calculate the expenditure of businesses within each marine industry. For some, including the commercial fishing industry<sup>74</sup> and recreational fishing industry<sup>75</sup>, survey data were available to calculate which industries benefit from the expenditure of commercial and recreational fishers. In all other industries excluding tourism, ABS IO tables were used to calculate the expenditure of each industry on others. Input-output tables provide information about the linkages between industries of the economy, and were used to calculate the proportion of each industry's total production value which is spent on each industry. Applying these proportions to total production provides the expenditure of each industry on other industries. The Deloitte Access Economics Regional Input-Output Model was then used to estimate the indirect contribution of each marine industry to the economy.

Economic contribution studies such as this estimate the contribution of a particular industry to the economy at a particular point in time – in this case, the 2015-16 financial year.



### 3.1.2 Regional analysis

This report presents the economic contribution for two regions: the Spencer Gulf and all of South Australia. The South Australian figures are inclusive of the Spencer Gulf region.

The South Australian figures reflect the direct and indirect activity occurring within the state. Any imports from other jurisdictions or foreign imports are excluded.

The Spencer Gulf region is defined earlier in this report. Importantly, the economic contribution figures presented reflect only the direct and indirect activity occurring within the Spencer Gulf region, based on the assumptions described in the preceding sections.

It is important to note that these economic contribution figures were calculated based on industry-wide value of production figures, rather than data available at the entity level. In addition, the offshore oil and gas exploration figures should be treated as indicative only, as the actual level of expenditure in any year was unavailable.

### 3.2 Contribution to the South Australian economy

#### 3.2.1 Value added to the South Australian economy

It is estimated that in 2015-16, the marine industry contributed around \$1 billion directly to the South Australian GSP. The contribution of individual marine industries to GSP is shown in Table 3.1.

**Table 3.1: Direct and indirect economic contribution of marine industries in South Australia, 2015-16, \$ millions**

Industry	Value of production (\$m)	Direct value added (\$m)	Indirect value added (\$m)	Total value added (\$m)
Commercial fishing	\$313.5	\$173.3	\$66.7	<b>\$240.0</b>
Recreational fishing	(expenditure) \$160.8	-	\$97.3	<b>\$97.3</b>
Marine-based aquaculture	\$206.9	\$115.1	\$46.5	<b>\$161.7</b>
Offshore oil and gas exploration	(expenditure) \$47.5	\$58.2	\$32.7	<b>\$90.8</b>
Shipbuilding	\$595.0	\$218.5	\$231.8	<b>\$450.4</b>
Boatbuilding	\$40.3	\$14.8	\$15.2	<b>\$30.0</b>
Water transport	\$151.9	\$66.5	\$54.6	<b>\$121.2</b>
Marine tourism (domestic)	\$491.3	\$256.7	\$255.9	<b>\$512.5</b>
Marine tourism (international)	\$124.1	\$70.7	\$70.5	<b>\$141.2</b>
Marine equipment retailing	\$88.9	\$51.4	\$25.4	<b>\$76.8</b>
Marina operation	\$59.0	\$29.2	\$20.9	<b>\$50.1</b>
<b>All marine industries</b>	<b>\$2,279.2</b>	<b>\$1,054.5</b>	<b>\$869.4</b>	<b>\$1,923.9</b>

Source: Deloitte Access Economics

Note: Total may not sum due to rounding

It is important to note that each industry was analysed separately. As such, the indirect value added results shown for each individual industry in Table 3.1 do not sum exactly to the total (in the bottom row of the table). This is because, to avoid double counting between industries, the total marine industry estimate excludes expenditure of one marine industry on another.

It is also noted that the estimates of indirect value added and employment are based on industry averages across Australia. As such, they do not take into account the specific expenditure profiles of South Australian businesses in marine industries – that is, what South Australian businesses purchase in the course of production. This information is generally elicited in surveys when assessing an individual industry. For this reason, the amounts shown in Table 3.1 may be under-

estimated (or over-estimated), in particular where South Australian industries are structured substantially differently than how they are structured nationally. For example, the South Australian marine-based aquaculture industry may be more reliant on intermediate inputs than the national aquaculture industry, and as such, has a greater expenditure on intermediate inputs per dollar of output – meaning the indirect (or flow on effects) in the sector may be greater (or smaller) than indicated.

In total, the marine industries in South Australia contributed almost \$2 billion to the economy, incorporating \$1,054.5 million in direct value added and \$869.4 million in indirect value added, as shown in Table 3.1. This represented around 2 per cent of the South Australian GSP in 2015-16.

### 3.2.2 Employment in South Australia

It is estimated that 8,471 people were directly employed in the marine industry in 2015-16 in full-time equivalent (FTE) terms. As with Table 3.1, the results are not additive due to double counting across supplying industries.

South Australia's marine industries employed almost 15,000 people in 2015-16, including both direct and indirect employment. The indirect employment represents those FTEs not employed in the marine industries, but whose employment is a function of the marine industries.

**Table 3.2: Direct and indirect economic employment contribution of marine industries in South Australia, 2015-16**

Industry	Direct employment (FTE)	Indirect employment (FTE)	Total employment (FTE)
Commercial fishing	1,032	630	1,662
Recreational fishing	-	929	929
Marine based aquaculture	552	363	915
Offshore oil and gas exploration	465	256	721
Shipbuilding	1,988	1,867	3,855
Boatbuilding	135	125	259
Water transport	308	369	677
Marine tourism (domestic)	2,502	1,595	4,096
Marine tourism (international)	567	361	928
Marine equipment retailing	781	185	966
Marina operation	142	161	303
<b>All marine industries<sup>76</sup></b>	<b>8,471</b>	<b>6,444</b>	<b>14,913</b>

Source: Deloitte Access Economics

Note: Total may not sum due to rounding

### 3.3 Contribution to the regional Spencer Gulf economy

#### 3.3.1 Value added to the regional Spencer Gulf economy

It is estimated that the marine industries contributed \$240.9 million directly to the regional Spencer Gulf economy in 2015-16. The direct and indirect value added of each marine industry, as well as its direct value of production in the Spencer Gulf region, is shown in Table 3.3.

The marine industries in Spencer Gulf contributed a total of \$392.8 million to the regional economy, incorporating \$240.9 million in direct value added and \$151.9 million in indirect value added.

**Table 3.3: Direct and indirect economic contribution of marine industries in the Spencer Gulf, 2015-16, \$ millions**

Industry	Value of production (\$m)	Direct value added (\$m)	Indirect value added (\$m)	Total value added (\$m)
Commercial fishing	\$117.0	\$64.7	\$23.8	<b>\$88.5</b>
Recreational fishing (expenditure)	\$67.5	-	\$39.8	<b>\$39.8</b>
Marine based aquaculture	\$182.4	\$101.4	\$40.4	<b>\$141.8</b>
Offshore oil and gas exploration	-	-	-	-
Shipbuilding	-	-	-	-
Boatbuilding	\$5.7	\$2.1	\$1.7	<b>\$3.8</b>
Water transport	\$6.6	\$2.9	\$2.2	<b>\$5.1</b>
Marine tourism (domestic)	\$81.9	\$42.8	\$42.7	<b>\$85.4</b>
Marine tourism (international)	\$20.7	\$11.8	\$11.7	<b>\$23.5</b>
Marine equipment retailing	\$16.3	\$9.4	\$4.2	<b>\$13.6</b>
Marina operation	\$11.8	\$5.8	\$3.9	<b>\$9.7</b>
<b>All marine industries<sup>77</sup></b>	<b>\$509.8</b>	<b>\$240.9</b>	<b>\$151.9</b>	<b>\$392.8</b>

Source: Deloitte Access Economics

Note: Total may not sum due to rounding

### 3.3.2 Employment in the Spencer Gulf region

It is estimated that 1,586 people were directly employed in marine industries in 2015-16 in full-time equivalent (FTE) terms in Spencer Gulf, as shown in Table 3.4

The marine industries supported around 2,778 FTEs in 2015-16 in Spencer Gulf, including both direct and indirect employment.

The multiplier (ratio of indirect to direct) for value add for the Spencer Gulf region is lower than it is for South Australia as a whole, while the employment, the multipliers for the Spencer Gulf region and the State are approximately equal.

As a smaller and less diverse economy than the whole of South Australia, the Spencer Gulf marine industries are likely to require more 'imported' inputs from industries outside of the defined region (including the rest of the state, interstate and overseas). Therefore, a smaller share of the upstream benefits accrue to businesses in the same region, than the share that accrues to businesses within the same state.

**Table 3.4: Direct and indirect employment contribution of marine industries in Spencer Gulf, 2015-16**

Industry	Direct employment (FTE)	Indirect employment (FTE)	Total employment (FTE)
Commercial fishing	385	228	613
Recreational fishing	-	382	382
Marine based aquaculture	486	317	803
Offshore oil and gas exploration	-	-	-
Shipbuilding	-	-	-
Boatbuilding	19	16	35
Water transport	13	15	28
Marine tourism (domestic)	417	266	683
Marine tourism (international)	95	60	155
Marine equipment retailing	143	31	174
Marina operation	28	30	59
<b>All marine industries<sup>78</sup></b>	<b>1,586</b>	<b>1,192</b>	<b>2,778</b>

Source: Deloitte Access Economics

Note: Total may not sum due to rounding

# Appendix A:

Regional concordance



Activity within industries was apportioned to the four marine regions based on the concordance table below.

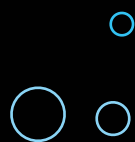
**Table A.1: Regional concordance**

Marine Region	Local Government Area	Marine Parks	Tourism regions	Port
Gulf St Vincent and Kangaroo Island	<ul style="list-style-type: none"> <li>Yorke Peninsula</li> <li>Wakefield</li> <li>Mallala</li> <li>Greater Adelaide Area</li> <li>Yankalilla</li> <li>Kangaroo Island.</li> </ul>	<ul style="list-style-type: none"> <li>Yorke Peninsula</li> <li>Fleurieu Peninsula</li> <li>Kangaroo Island.</li> </ul>	<ul style="list-style-type: none"> <li>Yorke Peninsula*</li> <li>Adelaide</li> <li>Kangaroo Island.</li> </ul>	<ul style="list-style-type: none"> <li>Port Adelaide</li> <li>Port Giles</li> <li>Klein Point</li> <li>Ardrossan</li> <li>Cape Jervis</li> <li>Penneshaw</li> <li>Kingscote.</li> </ul>
South East Coast	<ul style="list-style-type: none"> <li>Victor Harbor</li> <li>Alexandrina</li> <li>The Coorong</li> <li>Murray Bridge</li> <li>Kingston</li> <li>Robe</li> <li>Wattle Range</li> <li>Grant</li> <li>Mount Gambier.</li> </ul>	<ul style="list-style-type: none"> <li>Fleurieu Peninsula</li> <li>South East Region.</li> </ul>	<ul style="list-style-type: none"> <li>Fleurieu Peninsula</li> <li>Limestone Coast.</li> </ul>	
West Coast	<ul style="list-style-type: none"> <li>Ceduna</li> <li>Elliston</li> <li>Wudinna</li> <li>Streaky Bay.</li> </ul>	<ul style="list-style-type: none"> <li>Far West Coast Region</li> <li>Lower Eyre Peninsula.</li> </ul>	<ul style="list-style-type: none"> <li>Eyre Peninsula*.</li> </ul>	<ul style="list-style-type: none"> <li>Thevenard.</li> </ul>
Spencer Gulf	<ul style="list-style-type: none"> <li>Lower Eyre Peninsula</li> <li>Port Lincoln</li> <li>Tumby Bay</li> <li>Cleve</li> <li>Franklin Harbour</li> <li>Whyalla</li> <li>Port Augusta</li> <li>Mount Remarkable</li> <li>Port Pirie City and Dists</li> <li>Barunga West</li> <li>Copper Coast.</li> </ul>	<ul style="list-style-type: none"> <li>Lower Eyre Peninsula</li> <li>Yorke Peninsula Region</li> <li>Upper Spencer Gulf Region.</li> </ul>	<ul style="list-style-type: none"> <li>Flinders Ranges and Outback</li> <li>Eyre Peninsula*</li> <li>Yorke Peninsula*.</li> </ul>	<ul style="list-style-type: none"> <li>Port Lincoln</li> <li>Whyalla</li> <li>Port Bonython</li> <li>Port Pirie</li> <li>Wallaroo.</li> </ul>

\*Tourism activity in the Yorke and Eyre Peninsula Tourism regions were split across the Spencer Gulf and Gulf St Vincent and Kangaroo Island regions based on the population that was closer to each region.

# Appendix B:

South Australian and  
Commonwealth fisheries



The following table provides further detail on South Australia's commercial fisheries.

**Table B.1: South Australian fisheries, species and regions**

Fishery	Species	Description
Abalone Fisheries	<ul style="list-style-type: none"> <li>Greenlip abalone</li> <li>Blacklip abalone.</li> </ul>	<p>The commercial abalone fishery is divided into 3 zones spanning across South Australian waters:</p> <ul style="list-style-type: none"> <li>Western: West Coast region and part of Spencer Gulf region</li> <li>Central: Gulf St Vincent and Kangaroo Island and part of Spencer Gulf region</li> <li>Southern: South East Coast region.</li> </ul>
Blue Crab Fishery	<ul style="list-style-type: none"> <li>Blue crab.</li> </ul>	<p>The Blue Crab Fishery operates as a pot fishery in the <i>Spencer Gulf</i> and <i>Gulf St Vincent and Kangaroo Island</i> regions. Produce from these fisheries is sold primarily to the Sydney and Melbourne markets.</p>
Charter Boat Fishery	Various	<p>Charter boat fishing is a commercial platform for recreational fishing. Bag, boat, size and trip limits apply to the fish caught per chartered day.</p> <p>The Charter Boat Fishery is not included in the estimates of the value of production or economic contribution of the commercial fisheries sector. Activity within this sector is incorporated in the recreational fishing sector.</p>
Lakes and Coorong Fishery	<p>Native and exotic species are fished from the Lakes and Coorong fishery, including:</p> <ul style="list-style-type: none"> <li>Black bream</li> <li>Golden perch</li> <li>Pipi (Goolwa cockle)</li> <li>Yellow-eye mullet</li> <li>European carp</li> <li>Redfin.</li> </ul>	<p>The Lakes and Coorong Fishery falls within the <i>South East Coast</i> region.</p> <p>This fishery is a multi-method, multi-species fishery. Harvesting, commercial fishing operations, and mesh net operations all occur within this fishery zone.</p>
Marine Scalefish Fishery	<p>More than 60 types of marine scalefish can be fished under this fishery licence including King George whiting, snapper and garfish. Some non-scalefish species are also caught in this fishery</p>	<p>The Marine Scalefish Fishery covers all South Australian waters, covering gulfs, bays and estuaries (excluding the Coorong). For some species, an agreement with the Commonwealth Government (the Offshore Constitutional Settlement) extends the fishery area beyond South Australian waters, up to 200 nautical miles off the coast (i.e. within the Australian Exclusive Economic Zone).</p>
Miscellaneous Fishery	<ul style="list-style-type: none"> <li>Sea urchins</li> <li>Native oyster</li> <li>Scallop</li> <li>Giant crab</li> <li>Western Australian salmon</li> <li>Beachcast seagrass and macro-algae.</li> </ul>	<p>This fishery relates to species not included in other commercial fisheries and allows the use of multiple types of fishing gear.</p>
Prawn Fishery - Gulf St Vincent	<ul style="list-style-type: none"> <li>King prawns.</li> </ul>	<p>This fishery is located in the <i>Gulf St Vincent</i> and <i>Kangaroo Island</i> region with king prawns taken by trawlers.</p>
Prawn Fishery - Spencer Gulf and West Coast	<ul style="list-style-type: none"> <li>King prawns.</li> </ul>	<p>King prawns are taken in the <i>Spencer Gulf</i> and <i>West Coast</i> regions.</p>
Rock lobster Fishery– Southern Zone and Northern Zone	<ul style="list-style-type: none"> <li>Southern rock lobster.</li> </ul> <p>Other species are permitted to be harvested, landed and sold.</p>	<p>South Australian rock lobsters are captured in pots that are set overnight. These fisheries exist all along the coastline and fall within two zones:</p> <p>Northern zone- <i>West Coast, Spencer Gulf</i> and <i>Gulf St Vincent and Kangaroo Island</i> regions.</p> <p>Southern zone- <i>South East Coast</i> region.</p>
Sardine Fishery	<ul style="list-style-type: none"> <li>Australian sardine.</li> </ul>	<p>Australian sardines are permitted to be caught in all South Australian waters.</p>

Source: PIRSA<sup>79</sup>



Descriptions of the Commonwealth fisheries which are off the South Australian coast are outlined in the table below.

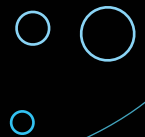
**Table B.2: Commonwealth fisheries, target species and description**

Fishery	Species	Description
Western Skipjack Tuna Fishery	<ul style="list-style-type: none"> <li>Skipjack tuna.</li> </ul>	Currently no boats hold permits to fish skipjack tuna in Australia.
Small Pelagic Fishery	<ul style="list-style-type: none"> <li>Australian sardine</li> <li>Blue mackerel</li> <li>Jack mackerel</li> <li>Redbait.</li> </ul>	The Small Pelagic Fishery covers the south eastern coast, extending from Queensland to the southern coast of Australia to a point just north of Perth. Although this fishery covers the coast line of South Australia, the major landing ports are Geelong (Victoria) and Iluka (NSW). Fishers targeting species in the Small Pelagic Fishery typically use midwater trawlers and purse seine gear.
Southern and Eastern Scalefish and Shark Fishery	<ul style="list-style-type: none"> <li>Blue grenadier</li> <li>Tiger flathead</li> <li>Silver warehou</li> <li>Gummy shark</li> <li>Pink ling.</li> </ul>	This multi-species, multi-method fishery covers almost half of Australia's Exclusive Economic Zone. It spans from just south of Fraser Island in Queensland, around the southern coast of Australia to Cape Leeuwin in southern WA. Major South Australian ports for landings, include Port Lincoln and Thevenard.
Southern Bluefin Tuna Fishery	<ul style="list-style-type: none"> <li>Southern bluefin tuna.</li> </ul>	The Southern Bluefin Tuna Fishery covers the entire sea around Australia up to the end of its Exclusive Economic Zone (200 nm). Commercial fishers mainly use purse seines to catch smaller fish, which are then transferred to permanent floating pontoons to be harvested once larger. Port Lincoln is the major port landing for the southern bluefin tuna industry in Australia.
Southern Squid Jig Fishery	<ul style="list-style-type: none"> <li>Gould's squid.</li> </ul>	The Southern Squid Jig Fishery covers waters off the coast of NSW, Victoria, Tasmania and South Australia, encompassing nearly half of Australia's Exclusive Economic Zone. Squid jigs operate at night in continental-shelf waters at depths of between 60 and 120 metres. South Australia does not have any major port landings for this fishery.
Western Tuna and Billfish Fishery	<ul style="list-style-type: none"> <li>Bigeye tuna</li> <li>Yellowfin tuna</li> <li>Broadbill swordfish</li> <li>Striped marlin.</li> </ul>	The Western Tuna and Billfish Fishery covers the coastline west of Cape York, Queensland, around Western Australia to the Victorian/ South Australia border. Fishing occurs in the Australian Fishing Zone, but also extends to the adjacent high seas. Longline and minor line fishing gear are used in this fishery. The major port landings for this fishery are in WA.

Source: AFMA<sup>80</sup>

# Appendix C:

Economic contribution  
modelling framework



Economic contribution studies are intended to quantify measures such as value added, exports, imports and employment associated with a given industry or firm, in a historical reference year. The economic contribution is a measure of the value of production by a firm or industry.

All direct, indirect and total contributions are reported as gross operating surplus (GOS), labour income, value add and employment, with these terms defined in Table C.1.

Table C.1: Definitions of economic contribution estimates

Industry	Value of production (\$m)
Gross operating surplus (GOS)	GOS represents the value of income generated by the entity's direct capital inputs, generally measured as the earnings before interest, tax, depreciation, and amortisation (EBITDA).
Labour income	Labour income is a subcomponent of value add. It represents the value of production generated by the entity's direct labour inputs, as measured by the income to labour.
Value add	Value add measures the value of production (i.e. goods and services) generated by the entity's factors of production (i.e. labour and capital) as measured in the income to those factors of production. The sum of value add across all entities in the economy equals gross domestic product (GDP). Given the relationship to GDP, the value add measure can be thought of as the increased contribution to welfare.
Employment (FTE)	Employment is a fundamentally different measure of activity to those above. It measures the number of workers (measured in full-time equivalent, FTE, terms) that are employed by the entity, rather than the value of the workers' product.
Direct economic contribution	The direct economic contribution is a representation of the flow from labour and capital committed in the economic activity.
Indirect economic contribution	The indirect contribution is a measure of the demand for goods and services produced in other industries as a result of demand generated by economic activity.
Total economic contribution	The total economic contribution to the economy is the sum of the direct and indirect economic contributions.

Source: Deloitte Access Economics

### Value added

The measures of economic activity provided by a contribution study are consistent with those provided by the Australian Bureau of Statistics. For example, value added is the contribution the industry makes to total factor income and gross domestic product (GDP) and gross state product (GSP).

There are a number of ways to measure GDP:

- **Expenditure approach** – measures the expenditure of households, on investment, government and net exports
- **Income approach** – measures the income in an economy by measuring the payments of wages and profits to workers and owners.

Below is a discussion measuring the value added by an industry or firm using the income approach.

### Measuring the economic contribution – income approach.

There are several commonly used measures of economic activity, each of which describes a different aspect of an industry's economic contribution. One measure is value added.

Value added measures the value of production (i.e. goods and services) generated by the entity's factors of production (i.e. labour and capital) as measured in the income to those factors of production. The sum of value added across all entities in the economy equals gross domestic product (GDP). Given the relationship to GDP, the value added measure can be thought of as the increased contribution to welfare.

Value added is the sum of:

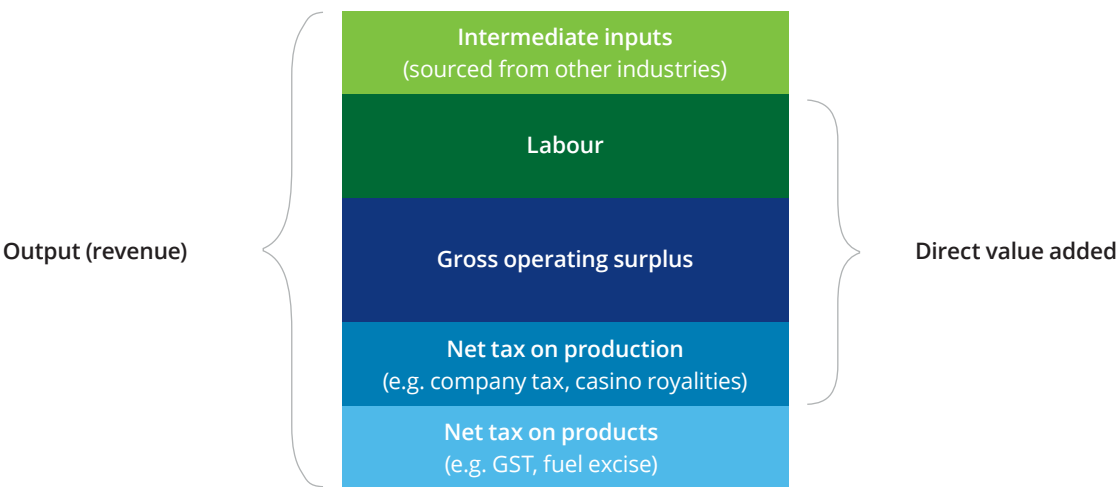
- Gross operating surplus (GOS), which represents the value of income generated by the entity's capital inputs, generally measured as the earnings before interest, tax, depreciation and amortisation (EBITDA)
- Tax on production less subsidy provided for production. Note: given the manner in which returns to capital before tax are calculated, company tax is not included or this would double-count that tax. In addition it excludes goods and services tax, which is a tax on consumption (i.e. levied on households)
- Labour income is a sub-component of value added. It represents the value of production generated by the entity's direct labour inputs, as measured by the income to labour.

Figure C.1 shows the accounting framework used to evaluate economic activity, along with the components that make up output. Output is the sum of value added and the value of intermediate inputs used by the firm. Net taxes on products are not included in value added but are included in GDP.

The value of intermediate inputs can also be calculated directly by summing up expenses related to non-primary factor inputs.

Contribution studies generally outline employment generated by a industry. Employment is a fundamentally different measure of activity to those above. It measures the number of workers that are employed by the entity, rather than the value of the workers' production.

Figure C.1: Economic activity accounting framework



Source: Deloitte Access Economics

**Direct and indirect contributions**

The direct economic contribution is a representation of the flow from labour and capital in the company.

The indirect contribution is a measure of the demand for goods and services produced in other industries as a result of demand generated by marine industries. Estimation of the indirect economic contribution is undertaken in an input-output (IO) framework using Australian Bureau of Statistics IO tables which report the inputs and outputs of specific industries of the economy.

The total economic contribution to the economy is the sum of the direct and indirect economic contributions.

Other measures, such as total revenue or total exports are useful measures of economic activity, but these measures alone cannot account for the contribution made to GDP. Such measures overstate the contribution to value added because they include activity by external firms supplying inputs. In addition, they do not discount the inputs supplied from outside Australia.

**Limitations of economic contribution studies**

While describing the geographic origin of production inputs may be a guide to a firm's linkages with the local economy, it should be recognised that these are the type of normal industry linkages that characterise all economic activities.

Unless there is unused capacity in the economy (such as unemployed labour) there may not be a strong relationship between a firm's economic contribution as measured by value added (or other static aggregates) and the welfare or living standard of the community. The use of labour and capital by demand created from the industry comes at an

opportunity cost as it may reduce the amount of resources available to spend on other economic activities. This is not to say that the economic contribution, including employment, is not important.

As stated by the Productivity Commission in the context of Australia's gambling industries:<sup>81</sup>

Value added trade and job creation arguments need to be considered in the context of the economy as a whole... income from trade uses real resources, which could have been employed to generate benefits elsewhere. These arguments do not mean that jobs, trade and activity are unimportant in an economy. To the contrary they are critical to people's well-being. However, any particular industry's contribution to these benefits is much smaller than might at first be thought, because substitute industries could produce similar, though not equal gains.

In a fundamental sense, economic contribution studies are simply historical accounting exercises. No 'what-if', or counterfactual inferences – such as 'what would happen to living standards if the firm disappeared?' – should be drawn from them.

The analysis – as discussed in the report – relies on a national IO table modelling framework and there are some limitations to this modelling framework. The analysis assumes that goods and services provided to the industry are produced by factors of production that are located completely within the state or region defined and that income flows do not leak to other states.

The IO framework and the derivation of the multipliers also assume that the relevant economic activity takes place within an unconstrained environment. That is, an increase in economic activity in one area of the economy does not increase prices and subsequently crowd

out economic activity in another area of the economy. As a result, the modelled total and indirect contribution can be regarded as an upper-bound estimate of the contribution made by the supply of intermediate inputs.

Similarly the IO framework does not account for further flow-on benefits as captured in a more dynamic modelling environment like a Computerised General Equilibrium (CGE) model.

#### **Input-output analysis**

Input-output (IO) tables are required to account for the intermediate flows between industries. These tables measure the direct economic activity of every industry in the economy at the national level. Importantly, these tables allow intermediate inputs to be further broken down by source. These detailed intermediate flows can be used to derive the total change in economic activity associated with a given direct change in activity for a given industry.

A widely used measure of the spill-over of activity from one industry to another is captured by the ratio of the total to direct change in economic activity. The resulting estimate is typically referred to as 'the multiplier'. A multiplier greater than one implies some indirect activity, with higher multipliers indicating relatively larger indirect and total activity flowing from a given level of direct activity.

The IO matrix used for Australia is derived from the ABS 2012-13 IO tables. The industry classification used for IO tables is based on the Australian and New Zealand Standard Industrial Classification (ANZSIC), with 114 sectors in the modelling framework.

# References

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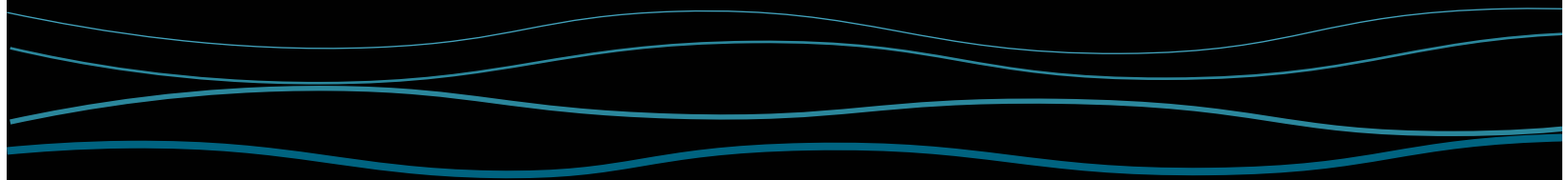


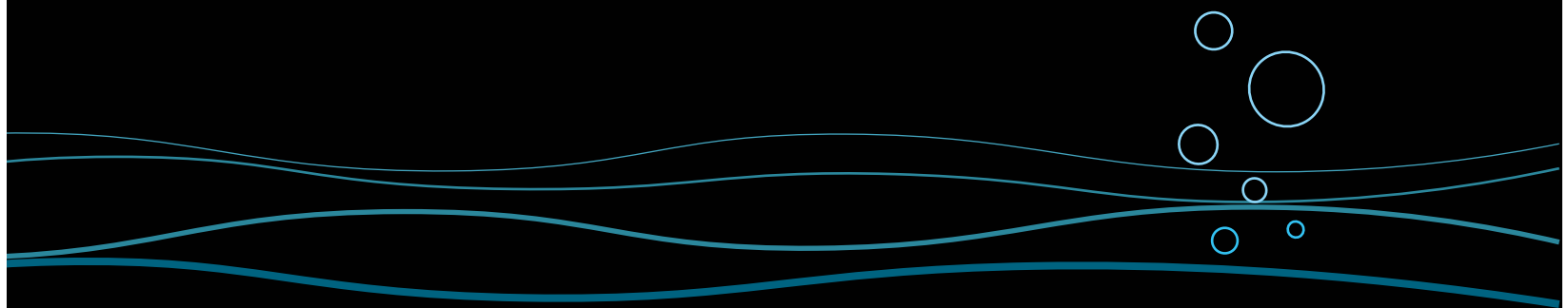
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