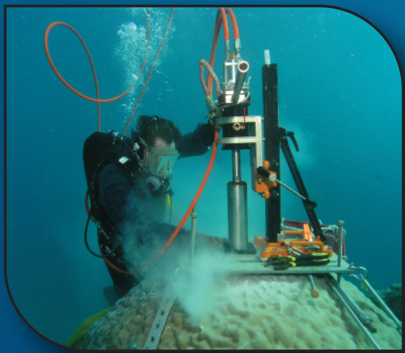
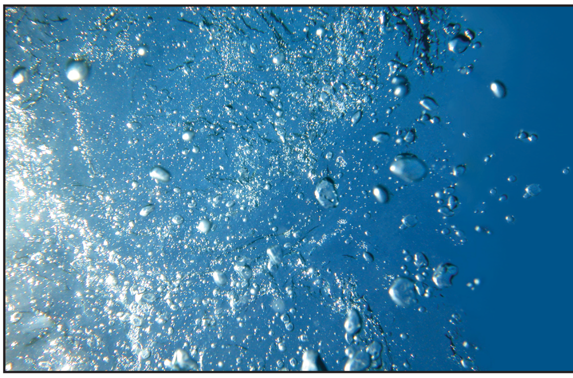


The AIMS Index of Marine Industry



November 2009
Amended October 2010

AIMS: Australia s tropical marine research agency.

Australian Government

Australian Institute of Marine Science

Preface

Australia lays claim to the third largest marine jurisdiction on the planet. It is one of the great marine nations of the world and is endowed with the potential to become an oceanic superpower. Yet its enormity belies its dynamic but finely-balanced and irreplaceable nature. It is in the national interest to understand and sustainably protect the precious resource surrounding us. But to use it wisely, we must endeavour to understand it fully.

Australia's marine industries are strong, and continue to grow. They include oil and gas exploration and extraction, tourism, fishing, boatbuilding, shipping, ports and numerous others. These industries contribute significantly to Gross Domestic Product (GDP), Gross State Product (GSP), employment, and infrastructure at a national, State/Territory and regional level.

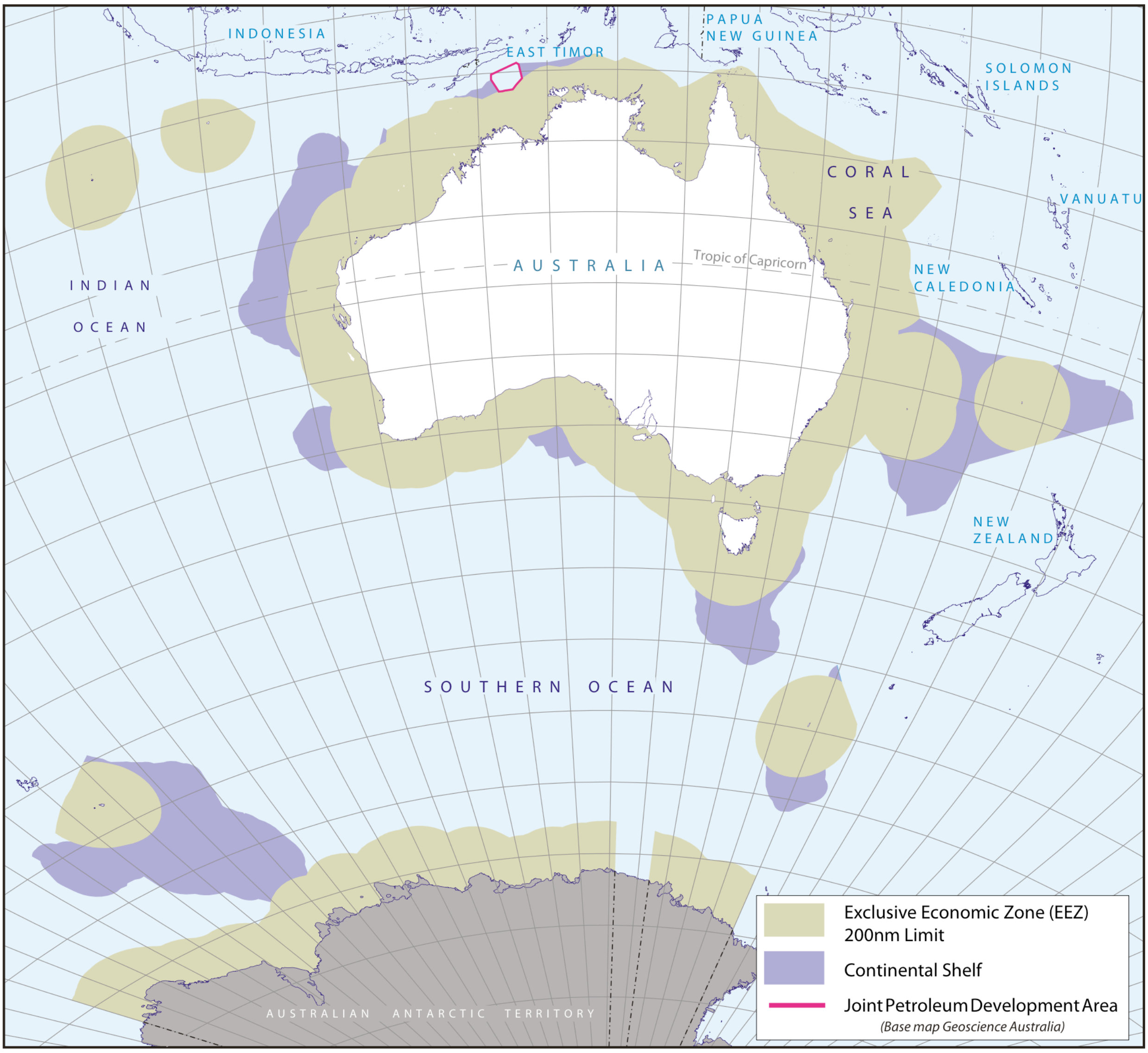
Commissioned by the Australian Institute of Marine Science (AIMS), and produced by Deloitte, this second edition of the AIMS Index of Marine Industry continues to build a picture about marine industries' contribution to national wealth. It brings together previously disparate and uncoordinated information resources and provides data upon which further development of Australia's marine industries and policy decisions may be based.

This year's AIMS Index shows continued and substantial growth in the marine sector – to the extent that marine-based industries now provide a similar contribution to that of the agriculture sector - the traditional cornerstone of our economy. Such growth is occurring at a time when the world is focussing on the impacts of climate change. Rising sea-levels, rising sea temperatures, ocean acidification and extreme weather have the potential to impact not only on the future of our marine industries, but the future of the planet itself.

This heightens the urgency for scientists to research, understand, and mitigate wherever possible, these damaging impacts. It reinforces the philosophy: if we are to use our marine environment wisely, we must understand it fully.

Marine science is more important today than at any other time in its history. It is central to the biggest issues now facing humanity: climate, climate change, environmental sustainability, economic growth; national security; energy security and food security.

The role of the Australian Institute of Marine Science is to study the oceans and coastal ecosystems of Australia, to provide the scientific rigour underpinning policy related to our marine domain. The AIMS Index of Marine Industry is a significant tool for the fight to protect the economic, social and environmental benefits bestowed by Australia's oceans and coastal environments.


INDONESIA
EAST TIMOR
PAPUA
NEW GUINEA
SOLOMON
ISLANDS
CORAL
SEA
VANUATU
NEW
CALEDONIA
AUSTRALIA
Tropic of Capricorn
INDIAN
OCEAN
NEW
ZEALAND
SOUTHERN OCEAN
AUSTRALIAN ANTARCTIC TERRITORY
Exclusive Economic Zone (EEZ)
200nm Limit
Continental Shelf
Joint Petroleum Development Area
(Base map Geoscience Australia)

The economic value of Australia’s marine industry

The value of marine industries

AIMS has commissioned this Index document as part of the Institute’s effort to bring together information about the economic value of the Australian marine industry sector and so demonstrate the importance of our marine territories to this nation. The Index provides all interested stakeholders with a snapshot of available data about activities related to Australia’s marine environment.

It is the second Index of Marine Industry to be released by AIMS, adding to the body of information which illustrates how the marine environment contributes to our economy and society. The information shows this benefit as a single category – the marine industry sector - which provides GDP, GSP, employment and infrastructure at a national, State/Territory and regional level.

The industry groupings and definitions used in this index were developed through discussion with representatives from a wide range of organisations involved with marine industries in Australia. They should be seen as an initial framework for considering the scope and scale of activities which are considered to be part of the ‘marine industry’.

The main purpose of this document is to highlight the extent of Australia’s marine industry, however it also serves to identify where information gaps exist in each sub-sector of the industry.

Approach to valuation

The main barrier to collecting the consistent and comparable data which would make it possible to estimate the economic value of Australia’s marine industry is that there is no single definition of which activities constitute this sector – that is, there is no agreed ‘marine industry’ grouping. For example, a number of industry sub-sectors included in the 1997 Marine Industry Development Strategy, which was developed by the Australian Marine Industries and Sciences Council, were excluded from the Marine Industry Action Agenda (developed later by the then Commonwealth Department of Industry, Science and Tourism).

This inconsistency has limited the identification of issues and trends affecting marine-related industries and activities. While a number of studies have estimated the value of marine-related activities at a local level (in particular work about the Great Barrier Reef Marine Park), this has not been done at a national level.

In its 2004 report to The National Oceans Office, *The Economic Contribution of Australia's Marine Industrie*s, the Allen Consulting Group used analysis of previous studies to provide a view of the economic impact of the marine industries. The goal of this index is to build on their work to develop a framework which more explicitly accounts for activities within major marine industry groupings and also highlights the data gaps which currently exist.

The approach in this paper to data sources and sub-sector definitions has been based on a particularly limited construction of ‘valuation’. In general, the focus is confined to quantifiable aspects of activities associated with the marine environment, and this necessarily means that economic transactions and industry groupings are emphasised. The approach is also limited to a focus on value flows rather than on value stocks. Alternative approaches, which would make it possible to think about valuing the social, environmental and other non-tangible dimensions of the marine environment, are not considered in this exercise. It is hoped that establishing a consistent definition for marine industries will enhance data collection about marine-related activities, and that this will contribute to valuation of these activities in the future.

The following table summarises the major and most recent available data about marine industry activities in Australia.

Table 1: Summary statistics for Australian marine industries, 2007-08

Marine resource activities and industries				
	Industry Value Added (2007-08 $m)	Value of Production (2007-08 $m)	Industry employment (2007-08)	Other
Fishing				
Marine-based aquaculture [1]	n/a	$782.0m	(84% of total)	
Commercial fishing (wild capture fisheries) [2]	n/a	$1362.7m	6107 employees (2006-07)	
Recreational fishing [3]	n/a	n/a (see note below)	n/a	$1910.0m (expenditure on related services & products)
Indigenous fishing [4]	n/a	n/a	In 2000-01, around 37000 indigenous people participated	2000-01 harvest: 1.89m fish, 0.84m crustaceans, 1.15m molluscs, 0.93m others

[1] ABARE, *Fisheries Statistics 2008*. Including aquaculture production of pearl oysters, edible oysters, marine shellfish, Southern Bluefin tuna, atlantic salmon and ocean trout, other marine fish (not barrmundi or silver perch), equivalent to 84% of total.
[2] ABARE, *Fisheries Statistics 2008*.
[3] *National Recreational and Indigenous Fishing Survey* 2001. Note that there is not agreement on whether recreational fishing should be included as a ‘marine resource’ activity or a ‘marine-related service’. It is believed that work is currently being undertaken to estimate the value of fish caught by recreational fishers. Expenditure on recreational fishing related services & product, is based on the 2001 survey, with values inflated to 2006-07 dollars.
[4] *National Recreational and Indigenous Fishing Survey* 2001.

Offshore oil & gas exploration and extraction				
Oil exploration [5]	n/a	$2541.1m		
Oil production [6]	n/a	$12 123.6m		
LPG [7]	n/a	$1182.0m*		

* Export revenue. Note that there are also substantial sales of these products within Australia, and assuming a similar price-volume ratio for domestic output as for exported output, there is in the order of $500m to $650m a year in output additional to export value.

Marine resource activities and industries				
	Industry Value Added (2007-08 $m)	Value of Production (2007-08 $m)	Industry employment (2007-08)	Other
Natural gas [8]	n/a	$5854.0m**		
Marine pipeline services	n/a	n/a	n/a	
Other resource extraction and use				
Desalination	n/a	n/a	n/a	Emerging industry
Carbon capture	n/a	n/a	n/a	Emerging industry
Bio-prospecting	n/a	n/a	n/a	Emerging industry
Seabed mining	n/a	n/a	n/a	Emerging industry
Tidal power	n/a	n/a	n/a	Emerging industry

Marine-related service activities and industries				
	Industry Value Added (2007-08 $m)	Value of Production (2007-08 $m)	Industry employment (2007-08)	
Boat/ship building, repair & maintenance services and infrastructure				
Shipbuilding & repair (civil and defence) [9]	$454.0m	$1889.9m*	8220 employees (2006-07)	
Boatbuilding & repair (incl recreational vessels) [10]	$679.0m	$1509.0m*	7300 employees (2006-07)	
Marinas and boating infrastructure	n/a	n/a	n/a	
Marine equipment retailing [11]	$264.2m	$2486.8m	4000 employees Wages & salaries $179.3m	

[5] ABS, *Mineral and Petroleum Exploration, Australia* 8412. Offshore exploration expenditure.
[6] APPEA Production Statistics, includes extraction from Bass, Gippsland, Bonaparte, Otway, Browse, Carnarvon basins.
[7] ABARE, *Australian Commodity Statistics, 2008*.
[8] ABARE, *Australian Commodity Statistics, 2008*.
[9] ABS, *Manufacturing Industry Australia 2006-07* cat. no. 8221.0
[10] ABS, *Manufacturing Industry Australia 2006-07* cat. no. 8221.0
[11] IBIS World *Marine Equipment Retailing in Australia* 2009

Marine tourism and recreational activities				
*Cultural & recreational activity ****	n/a	n/a	n/a	
Domestic consumption of tourism goods and services [12]	$15 970.4m	n/a	147 359 tourism-related employees	40% of domestic tourism

** Export revenue only; however, this represents almost all output of natural gas

Marine-related service activities and industries				
	Industry Value Added (2007-08 $m)	Value of Production (2007-08 $m)	Industry employment (2007-08)	
International consumption of tourism goods and services [13]	$2740.4m	n/a	24 590 tourism-related employees	19% of international tourism
Aquaria	n/a	n/a	n/a	
Water transport ****				
Water transport [14]	n/a		$537m (wages & salaries)	$2652m Income
Marine environment management				
Scientific research & development	n/a	n/a	n/a	
Establishment & operation of management programs	n/a	n/a	n/a	
Marine safety [15]	n/a	n/a	256 AMSA employees	2007-08 AMSA operating expenditure $109.9m

*** Including boating/sailing, snorkelling, scuba diving, charter & game fishing by locals

**** Note that in the initial estimate of the AIMS index, services to water transport was included in this category. From 2006, re-classifications of ANZSIC code mean that this information is no longer available.

[12] ABS *Tourism Satellite Account* cat.no. 5249. The percentage allocation of international and domestic tourism related economic activity is based on the calculation in the 1989 Report of the Review committee on Marine Industries, Science and Technology in Australia, *Oceans of Wealth?* This report used unpublished statistics from the then Bureau of Tourism Research to assess the proportion of visitor nights spent by non-business travellers in places (other than capital cities) where the main attraction is the sea. This share of nights was then used as a proxy for the share of total tourism that the marine tourism industry represents. These figures (19 percent for international and 40 percent for domestic) have subsequently been re-used in the Review Committee on Marine Industries and Sciences Council 1997 Report and the Allen Consulting Group's 2004 report to The National Oceans Office, *The Economic Contribution of Australia's Marine Industries*.

[13] ABS *Tourism Satellite Account* cat.no. 5249.

[14] ABS, *Australian Industry, 2007-08* cat.no.8155.0; ABS, Census data.

[15] AMSA, *Australian Marine Safety Authority Annual Report 2007-08*.

Based on the above information, it is possible to total the values for those industry sub-sectors where data is available, comparable, and reliable. This total value is not definitive, as there is likely to be some double counting of activity across categories, and for a number of categories there is no suitable data available. The aggregated data set out in Table 2 should be regarded as only an indicative value of marine industry activity in 2007-08.

Table 2: Total of measurable Industry Value of Production from marine-related activities in 2007-08

Marine resource activities and industries	
Fishing	
Marine-based aquaculture	$782.0m
Commercial fishing (wild capture fisheries)	$1362.7m
Offshore oil & gas exploration and extraction	
Oil exploration	$2541.1m
Oil production	$12 123.6m
LPG	$1182.0m
Natural gas	$5854.0m
Marine-related service activities and industries	
Boat/ship building, repair & maintenance services and infrastructure	
Shipbuilding & repair (civil and defence)	$1889.9m*
Boatbuilding & repair (incl recreational vessels)	$1509.0m*
Marine equipment retailing	$2486.8m
Marine tourism and recreational activities	
Domestic consumption of tourism goods and services	$15 970.4m **
International consumption of tourism goods and services	$2740.4m **
TOTAL	**$48 441.9 million**

* Inflated by 3.5% from 2006-07 dollar value

** Contribution to GDP

The above table suggests that, in 2007-08, the total measurable value of economic activity based in the marine environment in Australia was around $48.4 billion. By way of comparison, the gross value of all agricultural production in Australia in 2007-08 was $43.3 billion[16]. It should be noted that the above is not a complete figure – not only is economic data unavailable for many marine activities, but there are also non-economic values which are not captured by this approach.

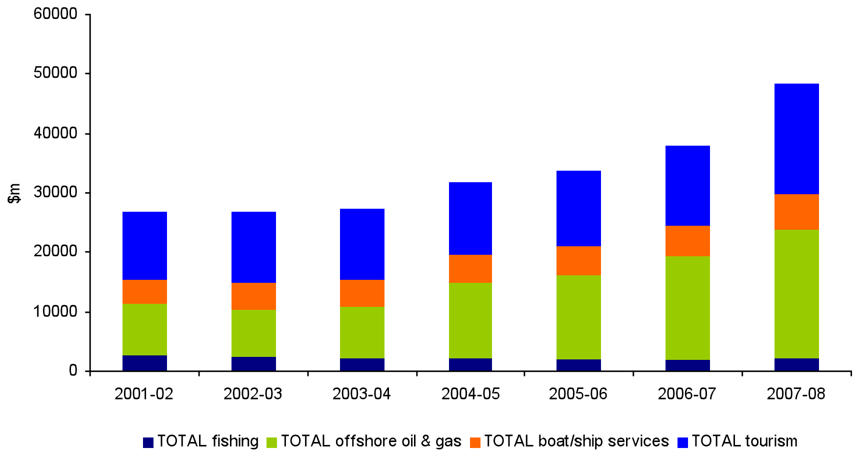
In order to form an idea of the sector's performance over time, the levels of activity for marine industry sub-sectors where reliable data on economic activity is collected annually is compared in Figure 1. From

[16] ABS, 7503.0,Value of Agricultural Commodities Produced, Australia, 2007-08

2001-02 to 2007-08, the marine industry value has increased by around 80 per cent, with a 27 per cent increase occurring between 2006-07 and 2007-08 alone. This recent spike in industry value has largely been driven by two sub-sectors of the marine industries:

- higher oil prices and a corresponding surge in offshore oil and gas exploration activity and output value, with the offshore oil and gas sector growing by $4.5 billion (26 per cent) for the year
- domestic consumption of marine tourism goods and services growing by $4.4 billion (37.6 per cent) for the year.

Figure 1: Comparison over time: measurable Industry Value of Production from selected marine-related activities



* NB Due to a change in industry classification, 2006-07 data for a number of subsectors in the boat/ship services grouping is not comparable to that from previous years.

Source: Deloitte Economics analysis of ABS, ABARE, APPEA, IBISworld data.

Table 3 provides the detailed data for each industry sub-sector's value over the 2001-02 to 2007-08 time period.

Table 3: Total of measurable Industry Value of Production from marine-related activities, 2001-02 to 2007-08

Marine resource activities and industries							
	Value of output ($m)						
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Fishing							
*Marine-based aquaculture**	730.9	617.0	614.7	532.6	624.6	666.2	782.0
Commercial fishing (wild capture fisheries)	2074.4	1890.5	1647.7	1597.0	1430.6	1429.3	1362.7
TOTAL fishing	*2805.3*	*2507.4*	*2262.4*	*2129.6*	*2055.2*	*2095.5*	*2144.7*

Offshore oil & gas exploration and extraction							
Oil exploration	719.6	922.4	791.2	829.8	937.8	1727.3	2541.1
*Oil production***	4441.0	3472.7	4898.5	7866.6	7570.3	9229.8	12 123.6
LPG	856.3	981.1	717.3	861.3	1037.1	1038.0	1182.0
Natural gas	2613.0	2607.0	2174.0	3199.0	4416.0	5220.0	5854.0
TOTAL offshore oil & gas	*8629.9*	*7983.2*	*8581.0*	*12 756.7*	*13 961.2*	*17 215.1*	*21 700.7*
Boat/ship building, repair & maintenance services and infrastructure							
Shipbuilding & repair (civil and defence)	1796.4	1839.0	1696.0	1721.0	1797.0	1859.9	1889.9
Boatbuilding & repair (incl recreational vessels)	818.0	1037.0	1108.0	1251.0	1488.0	1540.1	1509.0
Marine equipment retailing	1411.6	1632.8	1670.3	1709.6	1743.8	1804.8	2486.8
TOTAL boat/ship services	*4026.0*	*4508.8*	*4474.3*	*4681.6*	*5028.8*	*5204.8*	*5885.7*
Marine tourism and recreational activities							
Domestic consumption of tourism goods and services	9761.6	10 266.0	10 346.8	10 430.8	10 860.8	11 611.2	15 970.4
International consumption of tourism goods and services	1592.0	1602.8	1637.0	1625.8	1705.6	1882.3	2740.4
TOTAL tourism	*11 353.6*	*11 868.8*	*11 983.8*	*12 056.6*	*12 566.4*	*13 493.5*	*18 710.8*
TOTAL	**26 814.8**	**26 868.3**	**27 301.6**	**31 624.5**	**33 611.6**	**38 008.9**	**48 441.9**

* Export revenue only. See note Table 1

** Export revenue only. See note Table 2

*** Due to a change in industry classification, 2006-07 data for a these subsectors is not comparable to that from previous years.

Source: Deloitte Economics analysis of ABS, ABARE, APPEA, IBISworld data.

Marine industry sub-sectors

The following paragraphs outline briefly some of the key issues associated with each of these categories. For further information, see the earlier AIMS discussion paper, *Valuing the Australian marine industry: assessing the scope, scale and value of the Australian marine industry*.

Commercial fishing and aquaculture

Commercial fishing includes marine-based aquaculture and wild-catch from Commonwealth and State and Territory fisheries. This may mean that data is collected across jurisdictions. Marine-based aquaculture operations are those in coastal waters or in ponds requiring a sea water source – while there are some inland operations using salt water, these are not included in this definition.

Recreational fishing

Quantifying the economic value of recreational fishing is challenging because of the difficulties of collecting and comparing data about activities which occur in a relatively informal way and across a fragmented sector. In addition to any intrinsic environmental or heritage value, the fish caught by recreational fishers could be seen to represent an economic value; they are not, however, part of a market transaction, and determining how much they are worth therefore would requires alternative approaches to valuation.

Currently, the only data available about recreational fishing's economic impact is for expenditure on registration fees, ice, bait, fishing/boating/safety equipment, and travel costs. It also includes some activities which could be considered tourism or other services. Using this as the primary economic activity definition, recreational fishing would be considered marine-related service industry rather than as a marine resource industry. Based on stakeholder suggestions, however, it is thought that classifying this activity as a marine-resource based industry will be more useful in the future, as work is currently occurring to estimate the value of fish caught by recreational fishers.

Offshore oil and gas exploration, extraction and processing

The energy resources industries – including petroleum, LPG, and LNG – make up a significant portion of marine-based economic activity. In addition to the value arising from the domestic or export sale of resources extracted offshore, which is reliably reflected in production statistics, there is substantial activity generated through exploration and the development and ongoing maintenance of infrastructure (e.g. pipelines).

Other resource extraction

A number of other activities have been identified as emerging industries, with little current impact but the potential for an increasing contribution in the future.

Boat and ship building and maintenance equipment, services and infrastructure

The ANZSIC Manufacturing division includes marine equipment and supplies including activities such as the manufacture of winches, diving equipment, marine engines, acoustics equipment, sails and marine flooring. This is not currently separated out from general transport-related manufacturing, however it is believed that Austrade is undertaking a project to establish a common industry definitional vocabulary which will include 'marine equipment and supplies' as a discrete category. It is currently unclear whether data at the ANZSIC industry class level will be available for these activities in the future, as the ABS' Manufacturing Industry release may be reorganised.

Marine equipment retailing (ANZSIC 5245) is also in this category, although some activities such as retail of recreational and sporting equipment should be excluded, and counted among the recreational and leisure category.

In addition, this category includes activities in marinas and boating infrastructure. This sub-sector is highly diffuse, and there is no single source of consistent data. While a number of industry associations produce partial statistics, these are not considered reliable.

Marine tourism

Assessing the value of marine tourism is perhaps the most challenging part of valuing the marine industries. At the same time, the very substantial contribution of this sector to the economies of marine and coastal communities means that its importance should be recognised.

Identifying tourism activities differs from other industry categorisations, as these activities are defined by the classification of the consumer rather than, as is more typical, of the producer. The ABS develops its tourism satellite account based on internationally agreed standards for measuring tourism activity.[17] Internationally, approaches to defining the 'marine' components of tourism vary considerably. While there is consensus on approaches to the development of general tourism statistics, there does not yet appear to be a single framework for consistently identifying the portion of this attributable to marine tourism. While the tourism survey made it relatively straightforward to report tourism activity, the contributions in relation to marine tourism should be viewed as broad indicators of economic activity rather than precise estimates. The only existing methodology for this apportionment was developed in the 1989 report *Oceans of Wealth?* This report classified 19 percent of international and 40 percent of domestic tourism as marine tourism. It is recommended that further work, perhaps in the form of a survey, should be undertaken to determine an approximate measure for the proportion of Australian domestic tourism which is motivated by marine-related factors.

This grouping should also include marine-related cultural and recreational activity by local people who are not counted in typical 'tourism' datasets, including fishing; boating/sailing; snorkelling, scuba diving; charter and game fishing. There is currently no single dataset which identifies this activity. In addition, there is a degree of 'double counting' involved in relation to marine tourism and other marine sectors, given that nearly all of the broad (ANZSIC) industry groups are involved to a greater or lesser extent in tourism.

A recent example of where the economic impact of tourism in a specific region has been studied in depth is a recent Access Economics report for the Great Barrier Reef Marine Park Authority. This report found that tourism expenditure in the Great Barrier Reef Catchment Area totalled over $5.8 billion in 2006-07. The report also found that tourism accounted for 94 percent of the following total economic impacts of the Great Barrier Reef:

- direct and indirect national contribution of 53,800 Full Time Equivalent jobs.
- Australia-wide contribution to value added of just over $5.4 billion.

It is likely that for an accurate assessment of the economic impact of marine tourism to be compiled, similar detailed regional studies of major marine based tourism destinations would be required.

Water transport and Services to water transport

The challenge of capturing and appropriately attributing the value of all transport activity that, strictly speaking, occurs in Australia or Australian waters is considerable, given the frequently multinational nature of the transport operators. Therefore, in order to avoid double counting and to present a reliable base line level, this sector is restricted to include only the industry sub-sectors for which the ABS collects data.

Marine environment management

This grouping includes activities which provide management services for the marine environment, including scientific research and development and knowledge transfer, the establishment and operation of environmental management programs, and marine safety activities. In general, the major challenge to establishing the level of activity in this area is that it often occurs in a relatively diffuse way, spread across research institutes, universities, and the national, state, and even local levels of government.

[17] ABS, *Australian National Accounts: Tourism Satellite Account, 2006-07*, ABS cat.no. 5249.0

Sources

Access Economics, 2008, *Economic contribution of the GBRMP 2006-07*

Australian Bureau of Agricultural and Resource Economics

- *Fisheries Statistics 2008*
- *Australian Commodity Statistics*

Australian Bureau of Statistics

- 2006 Census data.
- *Australian Industry, 2007-08* ABS cat. no.8155.0
- *Australian National Accounts: Tourism Satellite Account*, ABS cat. no. 5249.0
- *Manufacturing Industry Australia 2006-07* ABS cat. no. 8221.0
- *Mineral and Petroleum Exploration, Australia* ABS cat. no.8412
- *Value of Agricultural Commodities Produced, Australia*, 2007-08, ABS cat.no 7503.0

Australian Institute of Marine Science, 2008, *Valuing the Australian marine industry: discussion paper.* produced in conjunction with Deloitte Touche Tohmatsu. Available on the AIMS website www.aims.gov.au.

Australian Marine Safety Authority, 2007, *Australian Marine Safety Authority Annual Report 2006-07*.

Australian Petroleum Production & Exploration Association, *Production Statistics*

Department of Agriculture, Fisheries and Forestry, 2003, *National Recreational and Indigenous Fishing Survey*

IBIS World, *Marine Equipment Retailing in Australia 2009*

Australian Government

AUSTRALIAN INSTITUTE OF MARINE SCIENCE

Townsville • Darwin • Perth
PMB No. 3, Townsville MC, QLD 4810
Tel: (07) 4753 4444 Fax: (07) 4772 5852

www.aims.gov.au