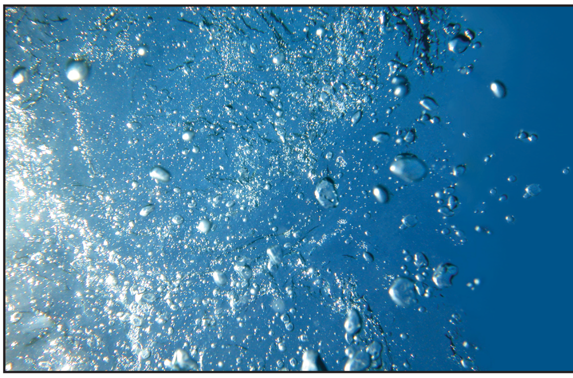
The AIMS Index of Marine Industry



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AIMS: Australia's tropical marine research agency.

Australian Government

Australian Institute of Marine Science

Preface

The AIMS Index of Marine Industry

Australia is a marine nation. In April 2008, the United Nations Convention on the Law of the Sea extended Australia's continental shelf by an additional 2.5 million km^2, giving this country the third largest marine jurisdiction in the world. With this huge extension of Australia's territory, the potential for new wealth from its resources has grown enormously, as has the responsibility to protect and sustainably use this valuable asset and to ensure this country's ongoing security.

The Australian Institute of Marine Science (AIMS) carries out research that underpins public policy concerning Australia's tropical marine domain. AIMS has identified marine industry as a growth sector that will be central in ensuring that this nation strengthens its foundations and makes the most of its advantages. Marine industry is already strong in this country's economy but will become stronger, particularly if its growth has a firm scientific basis and is carried out on ecologically sustainable principles. AIMS believes that discovering as much as we can about our ocean resources should be a priority so that any decisions about their protection and sustainable use will be in the national interest.

The Institute has commissioned Deloitte to quantify the value of Australia's marine industries. By drawing together this data, a picture is emerging for the first time of its high value to the nation. The AIMS Index of Marine Industry will be updated annually to provide ongoing data relevant to an area that is already of immense importance to Australia and will become more so.

There are challenges inherent in maximising the potential of our marine territory. Much of it remains unexplored and poorly understood, placing restrictions on informed decision-making. Robust legislative and regulatory requirements at both Commonwealth and State level govern how users interact with marine ecosystems. However, a basic understanding of the ocean's complex environmental settings and the drivers of pattern and change in its ecological communities is often lacking. Using resources without first understanding them is not sustainable.

The oceans and their rich biodiversity, including our coastal zone, will feel the effects of global climate change, one of the biggest issues facing the marine environment. Sea-level rise, increasing sea temperatures, acidification and extreme weather will have an impact on all biological systems, coastal areas and infrastructure such as marinas, harbours and off-shore platforms.

The projected impact of climate change on the marine environment and infrastructure is one major reason for increased scientific investigation of our marine resources. There are many others: new oil, gas and mineral resources; the need to protect biodiversity and the opportunity for new marine biotechnology industries; rapid population growth and environmental pressure on Australia's seaboard including the forecast shift of agriculture to the wetter north; the critical role of our oceans in influencing our climate; and as part of our national security. These are all issues of central importance to Australia's growth, safety, prosperity and well being.

The old barriers to maximising growth in this field, particularly the fragmented nature of marine industries and the spread of political and administrative responsibilities across all levels of government, are being replaced by a new resolve to create a co-ordinated, integrated approach. This first AIMS Index of Marine Industry is an important development in this process.

The economic value of Australia’s marine industry

The value of the marine industry sector

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 the marine environment.

Industries associated with Australia’s marine environment contribute significant benefits to our economy and society. Up to now, however, this benefit has not been considered in terms of a single category – the ‘marine industry’ – which contributes to Gross Domestic Product (GDP), Gross State Product (GSP), employment, and infrastructure at a national, State/Territory and regional level.

The following industry groupings and definitions were developed through discussion with representatives from a wide range of organisations involved with the 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’.

In addition to providing information on the scale of Australia’s marine industry, this document is also intended to highlight where information gaps exist in relation to each sub-sector of the marine 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 the AIMS 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 available data about marine industry activities in Australia.

Table 1: Summary statistics for Australian marine industries, 2006

Marine resource activities and industries				
	Industry Value Added (2006-07 $m)	Value of Output (2006-07 $m)	Industry employment (2006-07)	Other
Fishing				
Marine-based aquaculture [1]	n/a	$666.2m		
Commercial fishing (wild capture fisheries) [2]	n/a	$1429.3m	6107 employees	
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 37,000 indigenous people participated	2000-01 harvest: 1.89m fish, 0.84m crustaceans, 1.15m molluscs, 0.93m others
Offshore oil & gas exploration and extraction				
Oil exploration [5]	n/a	$1727.3m		
Oil production [6]	n/a	$9230.0m		
LPG [7]	n/a	$1038.0m *		

* 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.

[1] ABARE, *Fisheries Statistics 2007*. 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 2007*.
[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.
[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, 2007.*

Marine resource activities and industries				
	Industry Value Added (2006-07 $m)	Value of Output (2006-07 $m)	Industry employment (2006-07)	Other
Natural gas [8]	n/a	$5220.0m **		
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 (2006-07 $m)	Value of Output (2006-07 $m)	Industry employment	
Boat/ship building, repair & maintenance services and infrastructure				
Shipbuilding & repair (civil and defence) [9]	$713.0m	$1826.0m	8525 employees Wages & salaries $483m	
Boatbuilding & repair (incl recreational vessels) [10]	$490.0m	$1458.0m	8516 employees Wages & salaries $295m	
Marinas and boating infrastructure	n/a	n/a	n/a	
Marine equipment retailing [11]	$188.3m***	$1779.4m***	5605 employees*** Wages & salaries $155m	
Marine tourism and recreational activities				
*Cultural & recreational activity ****	n/a	n/a	n/a	
Domestic consumption of tourism goods and services [12]	n/a	$11,611.2m	143,980	40% of domestic tourism

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

*** 2005-06 figures

[8] ABARE, *Australian Commodity Statistics, 2007*.
[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* 2007
[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*.

Marine-related service activities and industries				
	Industry Value Added (2006-07 $m)	Value of Output (2006-07 $m)	Industry employment	
International consumption of tourism goods and services [13]	n/a	$1882.3m	23,341.2	19% of international tourism
Aquaria	n/a	n/a	n/a	
Water transport and services to water transport				
Water transport [14]	n/a		$490.0m (wages & salaries)	$2320.0m (income 2005-06)
Services to water transport [15]	n/a		$1520.0m (wages & salaries)	$6450.0m (income 2005-06)
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 [16]	n/a	n/a	237 AMSA employees	2006-07 AMSA operating expenditure $103.4

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

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 2006-07.

[13] ABS *Tourism Satellite Account* cat.no. 5249.
[14] ABS, *Australian Industry, 2005-06* cat.no.8155.0; ABS, Census data.
[15] ABS, *Australian Industry, 2005-06* cat.no.8155.0; ABS, Census data.
[16] AMSA, *Australian Marine Safety Authority Annual Report 2006-07*.

Table 2: Total measurable value from marine-related activities in 2006-07

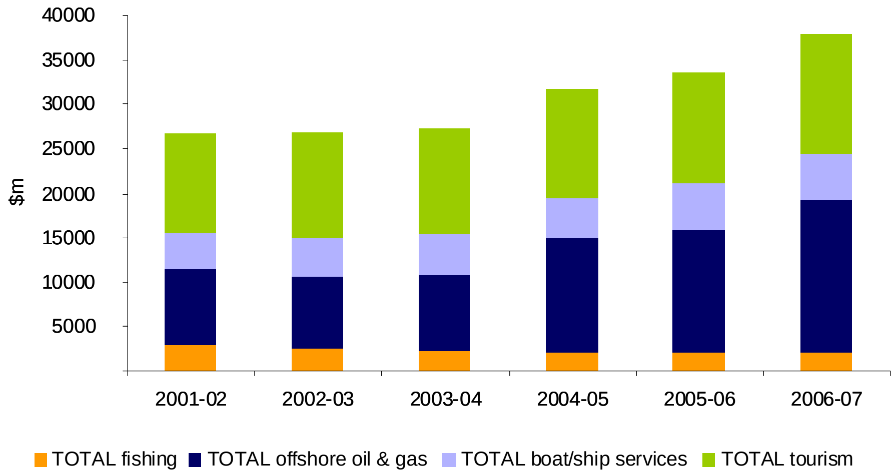
Marine resource activities and industries	
	Value of Output
Fishing	
Marine-based aquaculture	$666.2m
Commercial fishing (wild capture fisheries)	$1429.3m
Offshore oil & gas exploration and extraction	
Oil exploration	$1727.3m
Oil production	$9229.8m
LPG	$1038.0m *
Natural gas	$5220.0m **
Marine-related service activities and industries	
	Value of Output
Boat/ship building, repair & maintenance services and infrastructure	
Boatbuilding & repair (incl recreational vessels)	$1826.0m
Shipbuilding & repair (civil and defence)	$1458.0m
Marine equipment retailing	$1841.7m ***
Marine tourism and recreational activities	
Domestic consumption of tourism goods and services	$11,611.2m
International consumption of tourism goods and services	$1882.3m
TOTAL	**$38,008.9 million**

* Export revenue only. See note Table 1
** Export revenue only. See note Table 2
*** Inflated by 3.5% from 2005-06 dollar value

This suggests that, in 2006-07, the total measurable value of economic activity based in the marine environment in Australia was around $38 billion. It should be noted that this is not a complete figure – not only is economic data unavailable for many 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. During this period, marine industry value has increased by 42 per cent. This has largely been driven by higher oil prices and a corresponding surge in both exploration activity and output value.

Figure 1: Comparison over time: measurable value of 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 2006-07 time period.

Table 3: Total of measurable value from marine-related activities in 2006-07

Marine resource activities and industries						
	Value of output ($m)					
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Fishing						
*Marine-based aquaculture**	730.9	617.0	614.7	532.6	624.6	666.2
Commercial fishing (wild capture fisheries)	2074.4	1890.5	1647.7	1597.0	1430.6	1429.3
TOTAL fishing	*2805.3*	*2507.4*	*2262.4*	*2129.6*	*2055.2*	*2095.5*
Offshore oil & gas exploration and extraction						
Oil exploration	719.6	922.4	791.2	829.8	937.8	1727.3
Oil production	4441.0	3472.7	4898.5	7866.6	7570.3	9229.8
*LPG **	856.3	981.1	717.3	861.3	1037.1	1038.0
*Natural gas ***	2613.0	2607.0	2174.0	3199.0	4416.0	5220.0
TOTAL offshore oil & gas	*8629.9*	*7983.2*	*8581.0*	*12756.7*	*13961.2*	*17215.1*

Boat/ship building, repair & maintenance services and infrastructure						
Shipbuilding & repair (civil and defence)	1796.4	1839.0	1696.0	1721.0	1797.0	1826.0 ***
Boatbuilding & repair (incl recreational vessels)	818.0	1037.0	1108.0	1251.0	1488.0	1458.0 ***
Marine equipment retailing	1411.6	1632.8	1670.3	1709.6	1743.8	1804.8
TOTAL boat/ship services						*5204.8*
Marine tourism and recreational activities						
Domestic consumption of tourism goods and services	9761.6	10266.0	10346.8	10430.8	10860.8	11611.2
International consumption of tourism goods and services	1592.0	1602.8	1637.0	1625.8	1705.6	1882.3
TOTAL tourism	*11353.6*	*11868.8*	*11983.8*	*12056.6*	*12566.4*	*13493.5*
TOTAL	**26814.8**	**26868.3**	**27301.6**	**31624.5**	**33611.6**	**38008.9**

* 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.

Marine industry sub-sectors

The following paragraphs outline briefly some of the key issues associated with each of these categories.

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. 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,

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

given that nearly all of the broad (ANZSIC) industry groups are involved to a greater or lesser extent in tourism.

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.

Sources

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- *Australian Commodity Statistics*

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