

Deloitte Access Economics

# Economic Contribution of the Great Barrier Reef

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# Glossary

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ABS	Australian Bureau of Statistics
DAE	Deloitte Access Economics
GBRMPA	Great Barrier Reef Marine Park Authority
NRM	Natural Resource Management Region
TRA	Tourism Research Australia

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# Executive Summary

The Great Barrier Reef is the world's largest coral reef ecosystem and one of the seven wonders of the natural world. The World Heritage Area is located off the coast of Queensland, covering an area of almost 350,000 square kilometres from around Bundaberg in the South to the northern tip of Queensland.

The study scope includes the catchment area of coastal Queensland that takes in a number of Local Government Areas including North Burnett and Gladstone in the south, Townsville and Charters Towers in the Central region and Cairns and the Tablelands in the north.

This economic contribution study measures the tourist, recreational, commercial fishing and scientific research and management activity within the Reef catchment and the World Heritage Area, and estimates the economic contribution of this activity to the Reef catchment, Queensland and Australia. The report outlines the geographical contribution for each of the NRM regions within the catchment. Throughout this report, NRM region refers to geographical areas not NRM management bodies.

Estimates of the economic contribution in this report are for the reference year 2011-12 (referred to as 2012) and are generally an update of previous studies conducted for 2006-07, 2005-06 and 2004-05.

The total Australia-wide value-added economic contribution generated in the Reef catchment in 2012 was \$5.7 billion with employment (as measured in full-time equivalent workers) of just below 69,000 (Table i). These estimates are based on both the direct and indirect contribution of the activities considered, where the indirect component is calculated using input-output multipliers. This Australia-wide value-added economic contribution is driven by just over \$7.0 billion in expenditure in the region.

**Table i: Economic contribution to Australia**

	<b>Direct expenditure (\$m)</b>	<b>Value-added (\$m)</b>	<b>Employment (FTE)</b>
Tourism	6,410.6	5,175.6	64,338
Recreation	332.4	243.9	2,785
Commercial Fishing	192.5	160.3	975
Scientific research & management	106.1	98.0	881
<b>Total</b>	<b>7,041.5</b>	<b>5,677.8</b>	<b>68,978</b>

Source: Deloitte Access Economics estimates

A high proportion of the value-added and employment generated emanates from tourism activity, with almost \$5.2 billion in value added and about 64,000 FTEs generated by the tourism sector.

Over 90% of the direct economic activity in the region comes from tourism, and this follows throughout the economy, with tourism accounting for 91% and 93% of the region's value-added and employment contributions to Australia respectively.

Recreation, which covers household recreational activity by those who live in the catchment area, contributed just over \$240 million in value-added and about 2,800 FTEs. Recreational activity covers both trip-related expenditure for fishing, boating, sailing and visiting islands and household expenditure on recreational equipment.

## Regional breakdown

The Wet tropics NRM region has the highest level of modelled economic activity, with almost \$2.7 billion in expenditure and \$1.2 billion in direct value added (see Table ii). Activity within the catchment area also contributes significantly to other regions of Australia with about \$1.3 billion in value added generated in the Rest of Queensland and Australia.

**Table ii: Total economic contribution by region, 2012**

	<b>Expenditure (\$m)</b>	<b>Value- added (\$m)</b>	<b>Employment (FTE)</b>
<b>Tourism, Recreational activity and Commercial fishing</b>			
<b>Direct</b>			
Torres Strait	2.9	1.2	18
Cape York	234.2	106.9	1,442
Wet Tropics	2,694.4	1,213.3	18,629
Burdekin	1,167.9	524.2	7,837
Mackay-Whitsundays	1,085.9	489.0	7,410
Fitzroy	1,147.2	515.7	7,785
Burnett-Mary	603.1	267.0	4,032
Scientific research & management	106.1	50.2	464
<b>Total direct</b>	<b>7,041.5</b>	<b>3,167.6</b>	<b>47,615</b>
<b>Indirect</b>			
Reef catchment		1,226.3	11,633
Rest of Qld		192.7	1,415
Rest of Australia		1,091.1	8,315
<b>Total Australia</b>		<b>5,677.8</b>	<b>68,978</b>

Source: Deloitte Access Economics estimates

## Comparison to previous estimates

Since the previous report based on 2006-07 data, the economic contribution is down slightly, by 1.8%, from \$5.76 billion in value-added (in 2012 dollars). This is driven by a slight reduction in tourist activity in the Reef catchment and also by changes in method. These changes in method are based on improved information in the activity in the catchment and are outlined in the Introduction.

## Deloitte Access Economics

# 1 Introduction

Deloitte Access Economics (DAE) has been engaged by the Great Barrier Reef Marine Park Authority (GBRMPA) to analyse the economic contribution of the activity that occurs within the Great Barrier Reef World Heritage Area.

The Great Barrier Reef (Reef) is the world's largest coral reef ecosystem and one of the seven wonders of the natural world. This World Heritage Area contributes significantly to the Queensland and the Australian economies through a number of commercial channels, which ultimately contribute to the national accounts. In addition, the Reef has considerable non-commercial value, providing significant intangible benefits to all visitors and locals through its natural beauty.

This report estimates the economic contribution in FY2012 to the Reef catchment area, Queensland and Australia. By nature of the analysis, the intangible benefits are ignored and only the tangible, monetary contributions to the national accounts are considered.

## Economic contribution study method

While the non-monetary benefits are an important part of the Reef's value, using a pure national accounting framework to measure the Reef's contribution means that the value established is based on market transactions between suppliers and consumers. Non-market or value judgements over the relative worth of the Reef are not part of the economic contribution metric. This approach is therefore less subjective and is also well understood and well-regarded by policy makers.

This report is the fourth in a series of economic contribution studies conducted for the Reef, and so its point of reference is largely the growth (or change) since the last report – being 2007. An outline of the method used for this report is provided in Appendix B.

## Contribution of activity in the Reef catchment

Broadly the scope of activity modelled here is similar to the previous analysis, these include:

- Tourism,
- Commercial fishing and aquaculture,
- Recreation, and
- Scientific research, Reef management.

### *Tourism*

The tourism contribution is based on information provided in the National Visitors Survey (NVS) and International Visitors Survey (IVS), with the addition of cruise-ship related tourism. The body of the report provides an account of the economic contribution based on the expenditure, as defined in the IVS and NVS, within the

Reef catchment area. Appendix A outlines the economic contribution of the tourism activity using the Tourism Satellite Account method.

### *Commercial Fishing and Aquaculture*

The information used to measure the economic contribution of commercial fishing and aquaculture has remained relatively unchanged. As with previous sections of the analysis the data has been granulated to smaller regional levels and mapped to the modelling regions. Some of the data and information used is based on years before the 2012 reference year.

### *Recreation*

The recreational activity method has changed from that employed in the last report. Where the previous report was heavily focused on recreational fishing this study has increased the scope of activity to include

- Visiting an island,
- Sailing,
- Boating, and
- Fishing.

The previous report was based on information outlined in the Fisheries Queensland State-wide Recreational Fishing Survey. A number of factors have caused a move away from using this information source including a lack of recent data and advice provided by Fisheries Queensland that the sample includes a high degree of avid anglers and as a result could overstate the economic activity. In addition a more recent survey of recreational use *Valuing local recreation in the Great Barrier Reef, Australia* John Rolfe et al. (2012) was made available for use in this report.

The study outlines:

- The proportion of the population that undertake the activities outlined above,
- The frequency, and
- The expenditure associated with trip.

These factors were taken into account when measuring the trip-related expenditure for households within the World Heritage Area. Australian Bureau of Statistics *Household Expenditure Survey 2009-10 (ABS cat. no. 6530.0)* was used to model the expenditure on recreational equipment.

### *Scientific Research and Reef Management*

*Scientific research and Reef management* is a new addition to the economic contribution study. It captures the economic contribution of a wide range of institutions including the Great Barrier Reef Marine Park Authority (GBRMPA), the Australian Institute of Marine Science and the scientific research stations on Heron Island and Lizard Island.

In line with the approach, the report is structured as follows:

- Chapter 2 gives a brief background of the Reef and outlines the key economic information for the catchment including the industry structure and occupations. The information is provided for the NRM regions.
- Chapters 3 - 6 provide an account of the economic contribution for each of the four industries: tourism, commercial fishing and aquaculture, recreation, and scientific research and Reef management.
- Chapter 7 summarizes the economic contribution of all industries.
- Appendix A outlines the tourist economic contribution using the Tourism Satellite Account method.
- Appendix B outlines the method and the limitations of the economic contribution modelling framework.

# 2 The Great Barrier Reef

The Great Barrier Reef is one of Australia's national treasures. It is the world's largest coral reef system and was world heritage listed by UNESCO in 1981.

As illustrated in Figure 2.1, the Reef catchment area was disaggregated into NRM regions.

**Figure 2.1: Great Barrier Reef Catchment NRM Regions**



Source: GBRMPA

## 2.1 Economic profile of the catchment – 2011

### Population and income

Table 2.1 presents key population, household and income statistics for each of the seven NRM regions within the catchment from the 2011 Census of Population and Housing.

In 2011, over 1.1 million people lived across the regions, with the Burnett Mary and the Wet Tropics regions home to the largest share of the population. The Mackay Whitsunday and the Fitzroy regions had the highest average individual income of about \$47,000 which is about \$6,000 higher than the state average.

**Table 2.1: Population, household and income snapshot, 2011**

<b>NRM</b>	<b>Persons</b>	<b>Average age</b>	<b>Dwellings</b>	<b>Average individual income</b>
Cape York	13,758	31	5,457	\$38,185
Wet Tropics	237,351	37	109,286	\$38,351
Torres Strait	7,489	28	2,329	\$33,707
Burdekin	222,116	35	95,310	\$42,698
Mackay Whitsunday	131,537	36	55,065	\$46,994
Fitzroy	227,830	35	99,170	\$46,943
Burnett Mary	301,052	41	142,143	\$32,065
Queensland	4,332,737	38	1,831,961	\$41,338

Source: 2011 Census of Population and Housing

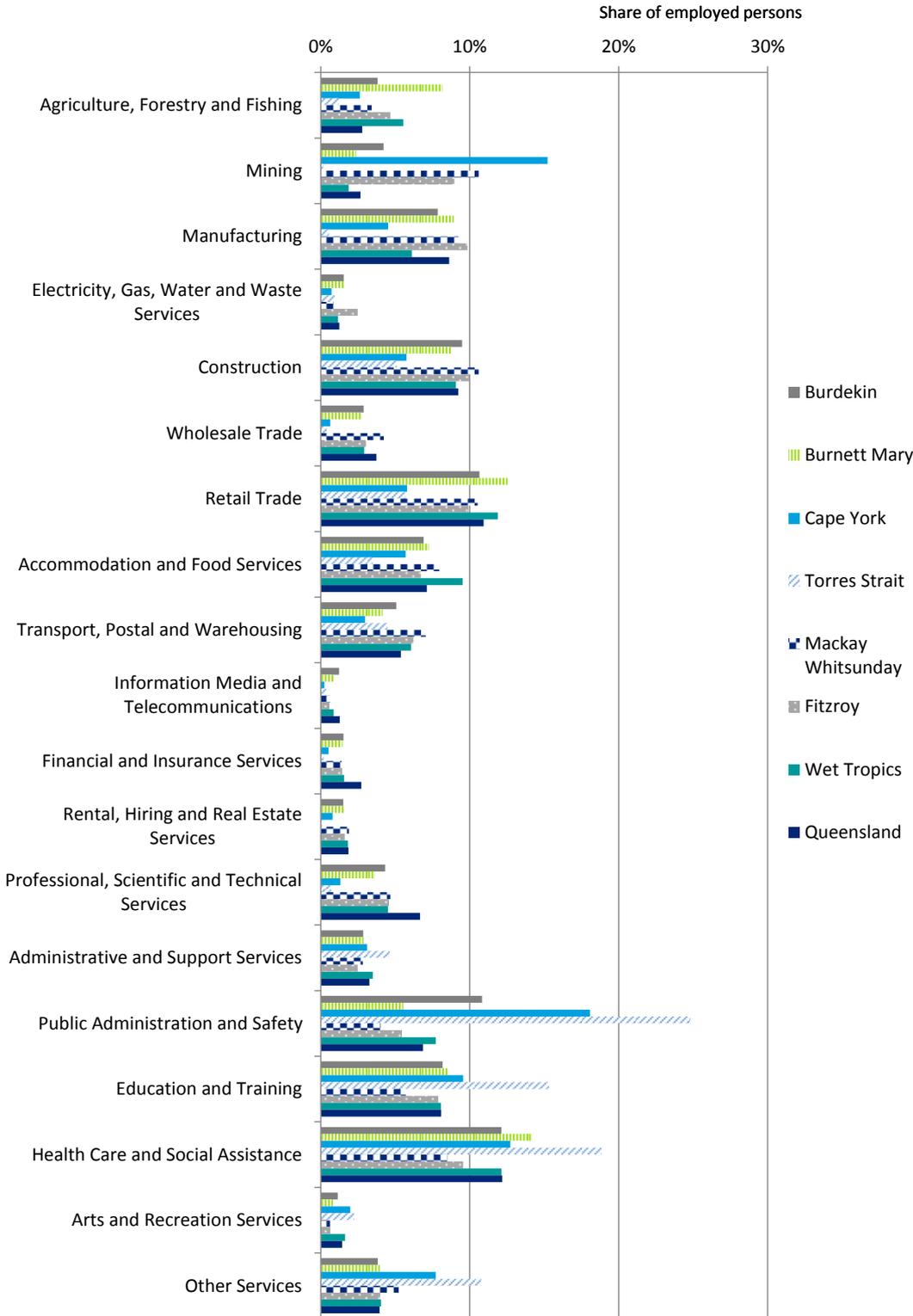
### Industry structure

The industry structure of the catchment in 2011, as indicated by employment by industry, was dominated by health care and social assistance, retail trade and construction (see Chart 2.1). The accommodation and food service industry was also dominant in the Wet Tropics region, which is unsurprising given these regions' tourism profile.

Since 2006, the industry structure of the catchment has undergone a number of adjustments, including:

- A reduction in the share of people employed in agriculture, forestry and fishing, consistent with changes in primary industry at the state and national level;
- A sizeable increase in mining's share of employment, particularly in the Burdekin and Fitzroy regions which include Gladstone and Isaac local government areas; and,
- A similar decrease in manufacturing employment as the state average.

Chart 2.1: Industry structure, 2011



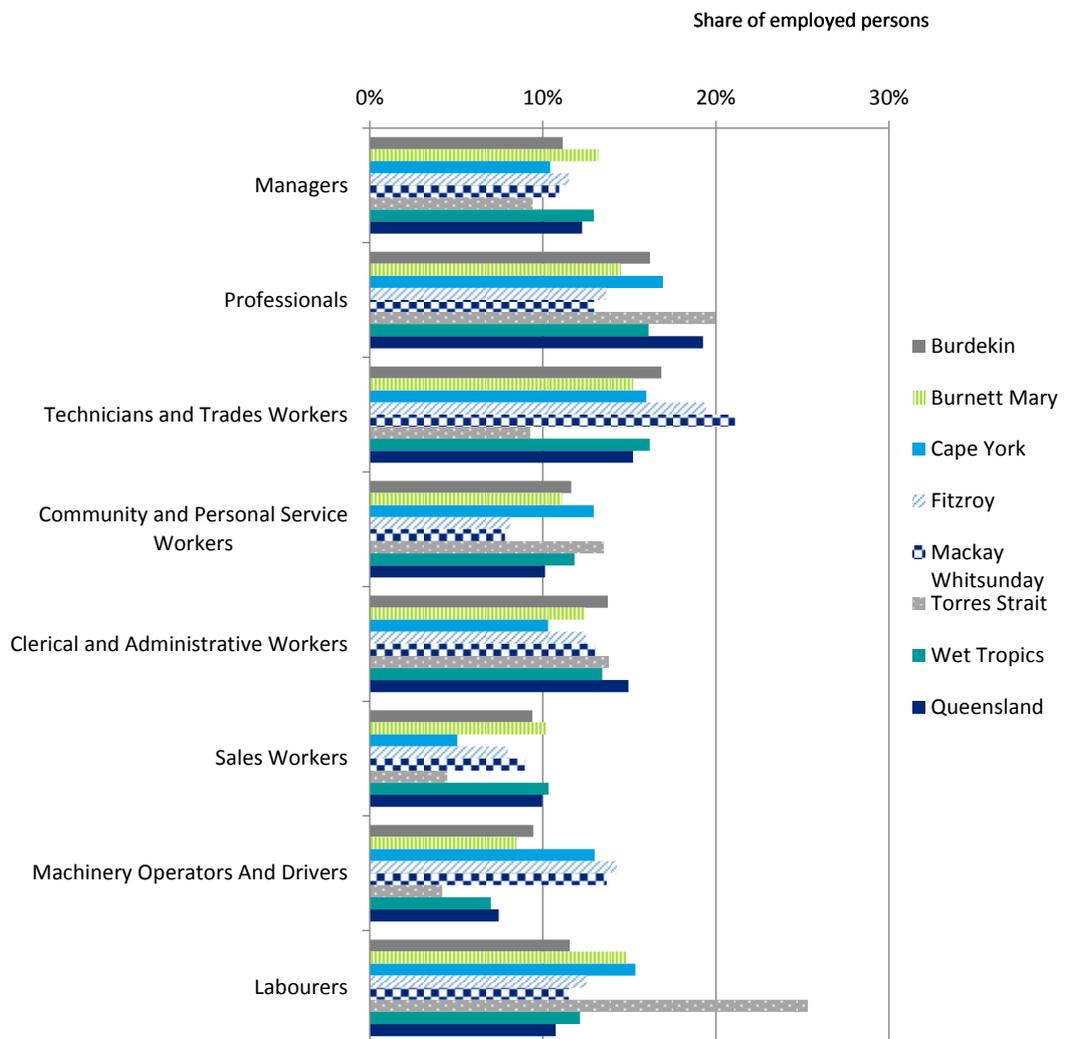
Source: ABS Census of Population and Housing 2011

## Occupation

In 2011, 13% of Queensland’s population had a Bachelor degree or higher; in comparison, the Wet Tropics and Burdekin NRM regions had the highest tertiary qualification rate of the catchment with 10%, while the Burnett Mary had the lowest with just 6% of the population holding a bachelor degree or above.

Consistent with this education profile, technicians and trade workers were the principal occupations in the catchment in 2011 (see Chart 2.2). Labourers make up a higher proportion of the labour force in the catchment than the whole of Queensland. This is consistent with the contribution made by the construction section in the region. In contrast, across Queensland, professionals represented the largest share of employees.

**Chart 2.2: Occupation, 2011**



Source: ABS Census of Population and Housing 2011

## 3 Tourism

Tourism is one of the dominant economic activities in the catchment, with the Reef itself a major domestic and international tourist attraction. Tourism activity (and the associated expenditure) in the catchment is analysed at three levels:

1. The activity and expenditure in the **entire Reef catchment**;
2. The activity and expenditure **across each of the NRM regions**; and
3. The activity and expenditure that is directly **attributable to Reef visitors**, which is a subset of the wider catchment tourism activity.

The tourism activity is based on information in the National Visitors Survey (NVS) and International Visitors Survey (IVS) – both of which are TRA publications – with the addition of cruise-ship related tourism.<sup>1</sup>

### 3.1 Tourism activity

Overall, the number of tourist days/nights spent in the Reef catchment and islands within the marine park has been broadly unchanged since 2007, with total visitor days/nights growing by only 4% to 42.8 million over the five years to end-June 2012 (Chart 3.1).<sup>2</sup>

The weak growth is largely due to the combination of a high exchange rate, the impact of the global financial crisis on incomes domestically and abroad, and the impact of natural disasters in Queensland and in key source countries such as New Zealand during the period.

International visitor nights declined by around 10% over the period, likely reflecting this market's acute sensitivity to the weak global economic conditions and the strong Australian dollar.

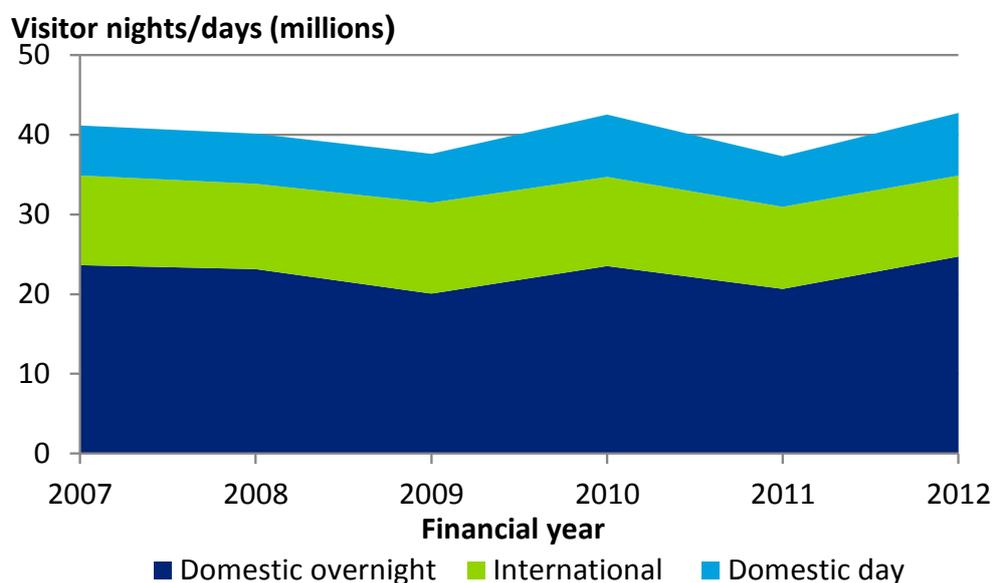
Countries that have traditionally been key source markets to the tropical north Queensland region – such as the United Kingdom and Japan – have dropped off significantly over the past decade. This weakness was offset by relative strength in domestic visitors – which, despite falling in 2009 and 2011, recovered to grow by 9% over the five year period. Domestic overnight visitors remain the key source of tourism for the catchment, accounting for over 57% of all visitor days/nights spent in the region.

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<sup>1</sup> The body of the report provides an account of the economic contribution based on the expenditure, as defined in the IVS and NVS, within the World Heritage Area. Appendix C outlines the economic contribution of the tourism activity using the Tourism Satellite Account method.

<sup>2</sup> International and Domestic overnight visits are measured in nights (i.e. 2 days and 1 night = 1), while Domestic day visits are measured in days (i.e. 1 day = 1). This is consistent with the method used in the last report to allow comparisons.

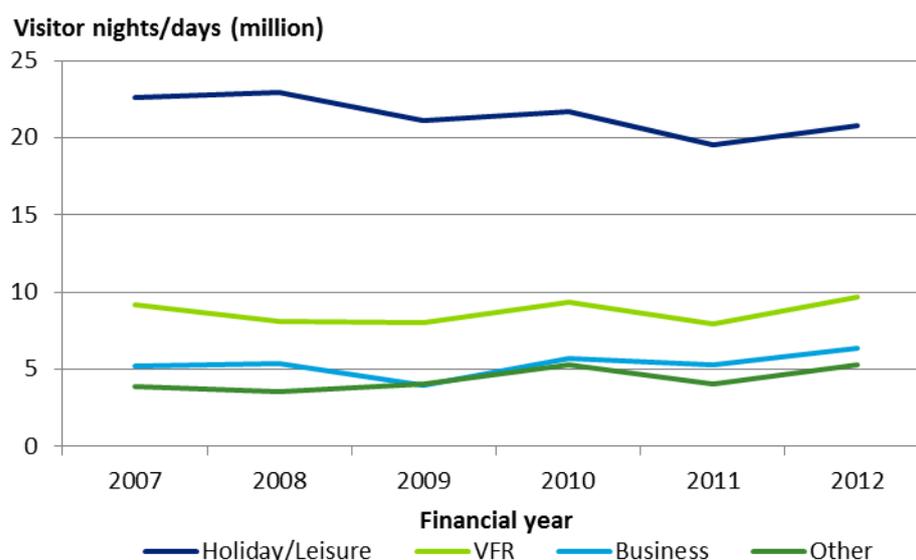
**Chart 3.1: Visitor nights/days to the Catchment, 2007-2012**



Source: TRA 2012, Deloitte Access Economics

Holiday/leisure travellers were the major source of weakness over the period, with visitation declining by 1.8 million days/nights (or -8%) over the five years to 2012 (Chart 3.2). Conversely, visiting friends and relatives grew slightly over the period, thanks to a strong rebound in 2012. Visitation for business and other reasons also grew, by 1.1 million days and 1.4 million nights respectively.

**Chart 3.2: Visitor nights/day in the catchment by main purpose of travel**



Source: TRA 2012, Deloitte Access Economics

Note: domestic overnight and international are measured in terms of number of nights, while domestic day is measured in terms of number of days.

As a result of the relative weakness in leisure travel, its share of tourism to the Reef catchment region fell by 6 percentage points over the period to 48%, while the share of business travellers has increased slightly.

These findings are consistent with the trend of Australians choosing to holiday overseas over the last decade. Outbound leisure travel has grown at double-digit rates over much of this period, largely at the expense of domestic leisure travel. However, this trend has been slowing and Deloitte Access Economics' tourism forecasts show it slowing further over coming years.

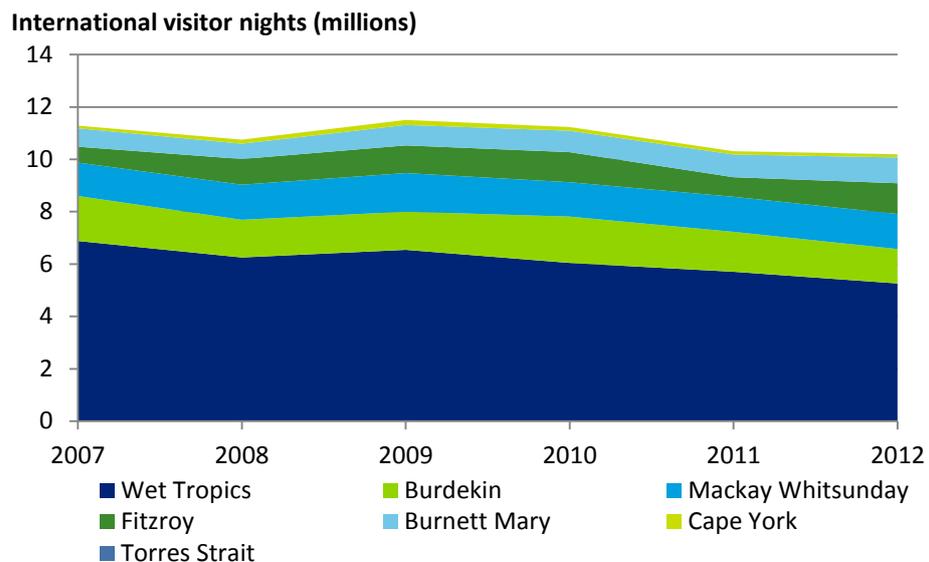
While for Australia international leisure travel has not declined overall, the profile of international leisure travellers has changed at the expense of holiday destinations such as the Great Barrier Reef Marine Park, with more international tourists visiting the capital cities.

### The NRM regions

Tourism activity over the last five years has varied significantly across natural resource management regions. International visitor nights has steadily declined by about 10% in the last five years.

In the last five years the Wet Tropics NRM has experienced a decline of about 6.9 million international visitor nights in 2007 to about 5.3 million in 2012 (Chart 3.3). Conversely, international visitor nights have increased in the Fitzroy NRM region from about 600,000 to about 1.2 million. The Mackay-Whitsundays region with about 1.6 million international visitor nights did experience some fluctuation over the modelling period.

**Chart 3.3: International visitor nights by NRM region**

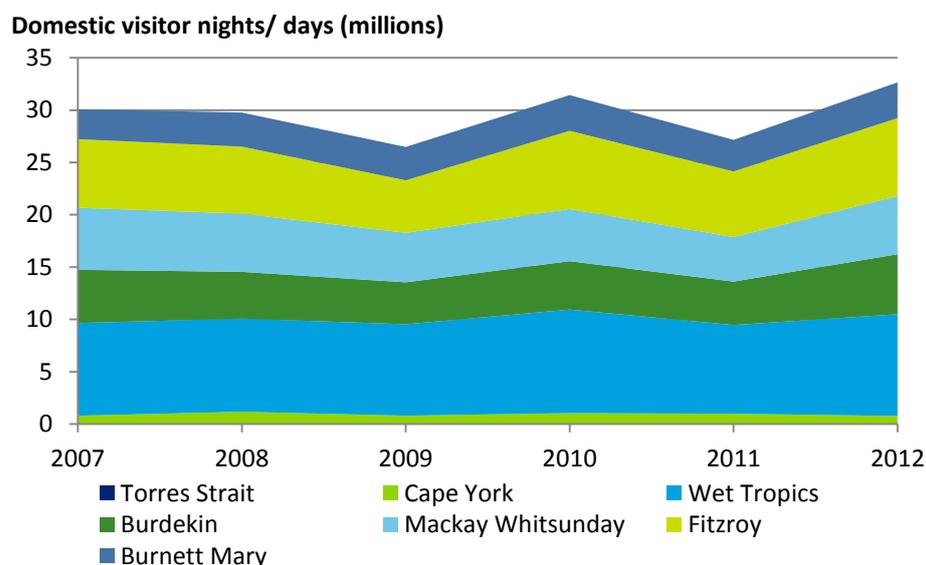


Source: TRA 2012, Deloitte Access Economics

While the number of domestic nights/ days has fluctuated considerably over the period, they have increased by about 9% from 2007 levels (see Chart 3.4). Many of the regions have reported similar increases over the modelling period, including a 10% increase in the number of nights/ days in the Wet Tropics. The largest

increase was reported in the Burnett Mary region with 19% growth, conversely the Mackay-Whitsundays reported a decline in domestic visitor nights/ days of 6% over the modelling period.

**Chart 3.4: Domestic visitor nights by NRM region**



There are also considerable differences in purpose of travel across NRM regions. As shown in Table 3.1 the Cape York, Wet Tropics, Mackay-Whitsunday and Burnett Mary NRMs are more dependent on holiday/leisure travellers than the catchment average but are less dependent on business travellers. In the Wet Tropics NRM region, 61.3% of total visitor nights (or days for domestic day visitors) were for holiday/leisure purposes compared to 48.7% for the whole of the catchment.

**Table 3.1: Reason for travel by NRM region, 2012 (total visitor nights/days)**

Reason for travel	Holiday/leisure	VFR	Business	Other	Purpose not asked
Torres Strait	0.0%	49.9%	50.1%	0.0%	0.0%
Cape York	79.0%	3.5%	6.8%	1.6%	9.0%
Wet Tropics	61.3%	17.0%	7.1%	13.3%	1.4%
Burdekin	29.0%	31.2%	17.8%	19.2%	2.7%
Mackay Whitsunday	51.6%	23.7%	14.4%	9.3%	0.9%
Fitzroy	31.9%	25.5%	30.4%	9.9%	2.2%
Burnett Mary	57.9%	23.6%	8.3%	9.4%	0.8%
<b>Total</b>	<b>48.7%</b>	<b>22.5%</b>	<b>14.8%</b>	<b>12.2%</b>	<b>1.8%</b>

Source: TRA 2012, Deloitte Access Economics

The strength in business visits to the region is also consistent with the experience for Australia more broadly, with corporate travel being the primary driver of growth in the sector, particularly on the domestic front.

The level of visitor nights in each natural resource management region was estimated by mapping the number of visitor nights in each SA2<sup>3</sup> regions to NRM regions. Table 3.2 shows the total number of tourist visitor nights in each NRM region.

The Wet Tropics NRM region accounts for the largest number of visitor nights, comprising 35% of total visitor nights. The Burdekin, Mackay Whitsunday and Fitzroy NRM regions also account for a relatively high number of visitor nights.

**Table 3.2: Visitor nights by NRM, ('000 2011-12)**

<b>NRM region</b>	<b>International</b>	<b>Domestic overnight</b>	<b>Domestic day</b>	<b>Total</b>
Torres Strait	3.7	3.0	-	6.7
Cape York	114.8	761.0	8.0	883.8
Wet Tropics	5,259.0	7,182.0	2,540.0	14,981.0
Burdekin	1,054.1	4,507.0	1,226.0	6,787.1
Mackay				
Whitsunday	1,600.1	4,643.0	915.0	7,158.1
Fitzroy	1,174.3	5,467.0	1,985.0	8,626.3
Burnett Mary	984.3	2,227.0	1,185.0	4,396.3
<b>Total</b>	<b>10,190.2</b>	<b>24,790.0</b>	<b>7,859.0</b>	<b>42,839.2</b>

Source: TRA 2012, Deloitte Access Economics.

## 3.2 Expenditure

The decline in visitor days between 2007 and 2011 led to a decline in total tourism expenditure in the catchment. Based on Tourism Research Australia's regional tourism profiles for 2010-11, tourism expenditure in the region has been estimated at \$5.1 billion, indicating a 23% drop in real expenditure over the four year period to end-June 2011.<sup>4</sup> This decline in expenditure is associated with a 9.5% decline in visitor nights to 37.5 million, indicating that not only were visitor numbers down, but those who continued to travel to the Great Barrier Reef were spending less on average than in 2006-07.

However, as noted above, year-on-year tourism numbers in the catchment fluctuated considerably and 2010-11 numbers were particularly low, affected by a number of natural disasters. Thus, analysing growth to end-June 2011 will likely overstate the trend decline in tourism expenditure. Tourist days rebounded by 14.4% in 2012, and expenditure likely followed suit.

To illustrate, an estimate of expenditure in the catchment in 2011-12 can be constructed using information contained on some of the regions in the National and International Visitor Surveys, combined with available data on visitors to

<sup>3</sup> The Statistical Area Level 2 (or SA2) region is a medium sized statistical area used by the Australian Bureau of Statistics

<sup>4</sup> Access Economics (2008) estimated that total tourism expenditure in the catchment in 2007 was \$6.7 billion in 2012 dollars. This was based on an aggregation of six tourism regions. If sub-regions within these regions that are not within the catchment area are excluded, the total expenditure estimate is \$6.6 billion.

Queensland more broadly. They suggest a more modest decline in regional tourism expenditure between 2007 and 2012, in the order of -4% (Table 3.3).

**Table 3.3: Tourism expenditure by visitor type**

Visitor type	2007 (\$m)	2012 (\$m)	% change
International	1,561	1,101.8	-29.4
Domestic overnight	4,180	4,342.2	3.9
Domestic day	908	931.5	2.6
<b>Total</b>	<b>6,648.9</b>	<b>6,375.5</b>	<b>-4.1</b>

Source: TRA regional profiles 2010-11, TRA 2012, Deloitte Access Economics.

Note: The 2006-07 figures from the previous report and 2010-11 figures were converted to \$2011-12 using the Consumer Price Index.

The estimated daily expenditure by visitor type is shown in Table 3.4. In addition to comprising the largest visitor group in terms of total visitor nights, domestic overnight visitors also have the highest estimated average nightly spend.

**Table 3.4: Breakdown of estimated tourism expenditure in 2012 by visitor type**

Visitor type	Visitor nights/days (million)	Estimated average expenditure per night/day (\$)	Total expenditure (million)
International	10.2	108.1	1,101.8
Domestic overnight	24.8	175.2	4,342.2
Domestic day	7.9	118.5	931.6
<b>Total</b>	<b>42.8</b>	<b>148.8</b>	<b>6,375.5</b>

Source: TRA NVS and IVS June 2012, Deloitte Access Economics.

Note: Results are expressed in \$2011-12.

Table 3.5 provides the estimated breakdown of expenditure<sup>5</sup> by specific types of tourists in the Reef catchment in 2012. Holiday and leisure travellers contribute a significant proportion of the expenditure accounting for almost \$3.7 billion.

**Table 3.5: Expenditure, by reason for travel and visitor type (\$ million) in 2012**

Reason for travel	International	Domestic overnight	Domestic day	Total
Holiday/leisure	718	2,402	542	3,663
Visiting friends and relatives	104	759	103	966
Business	88	923	118	1,129
Other	191	258	169	618
<b>Total</b>	<b>1,102</b>	<b>4,342</b>	<b>932</b>	<b>6,375</b>

Source: TRA International Visitor Survey June 2012, TRA National Visitor Survey June 2012.

Note: catchment wide expenditure was attributed to traveller purpose based on the proportion of nights attributable to each traveller multiplied by the rate of traveller daily expenditure in Queensland to average daily expenditure in Queensland for each group.

<sup>5</sup> The regional tourism profiles provided by TRA do not allow for a precise estimation of the proportion of total expenditure in the GBR catchment attributable to specific types of tourists. However, proportions for travellers in Queensland can be used as a proxy and applied to the region's expenditure estimates.

The Wet Tropics NRM region accounts for the largest proportion of expenditure, with about 40%. The Burdekin, Mackay Whitsunday and Fitzroy NRM regions also account for a relatively high proportion of expenditure.

**Table 3.6: Expenditure by NRM ('000 2011-12)**

NRM region	International	Domestic overnight	Domestic day	Total
Torres Strait	0.5	0.7	-	1.2
Cape York	16.6	167.8	0.7	185.1
Wet Tropics	761.1	1,583.3	231.3	2,575.7
Burdekin	92.8	820.2	130.7	1,043.7
Mackay Whitsunday	118.5	757.6	127.4	1,003.5
Fitzroy	61.1	719.5	276.4	1,057.0
Burnett Mary	51.2	293.1	165.0	509.3
<b>Total</b>	<b>1,101.8</b>	<b>4,342.2</b>	<b>931.5</b>	<b>6,375.5</b>

Source: TRA 2012, Deloitte Access Economics.

### Cruise tourism

While smaller than the general tourism sector, cruise tourism contributed \$35 million in expenditure in the Reef catchment in 2011-2012. About half of this was concentrated in the Wet Tropics region of the catchment, as outlined in Table 3.7.

**Table 3.7: Cruise tourism expenditure in 2012**

	Visit Days	Passenger days at port	Direct expenditure (\$m)			Total
			Passenger	Crew	Operator	
Cape York	1	97	0.02	0	0	0.02
Wet Tropics	72	80,057	15.6	0.9	2.3	18.8
Burdekin	10	3,555	0.7	0.2	0.6	1.5
Mackay Whitsunday	47	64,786	12.4	1	1.4	14.8
<b>Total</b>	<b>130</b>	<b>148,495</b>	<b>28.7</b>	<b>2.1</b>	<b>4.3</b>	<b>35.1</b>

Source: *Economic Impact Assessment of the Cruise Shipping Industry in Australia, 2011-12*, Cruise Down under August 2012

## 3.3 Tourism contribution

Tourism expenditure by NRM region is shown in Table 3.8. This was estimated by multiplying visitor nights by the average nightly expenditure of the three different types of tourist (international, domestic overnight and domestic day) in the modelling region that most closely corresponded to the NRM region.

The Wet Tropics NRM region accounted for just over 40% of total expenditure, which was higher than its proportion of visitor nights as expenditure per visitor night was higher on average in the Upper modelling region. However, the Fitzroy NRM region accounted for the greatest amount of domestic day expenditure as average day trip expenditure was highest in the Lower modelling region.

The IVS and NVS travellers contribute \$6,375.5 million of expenditure and with the cruise-related expenditure of \$35.1 million the total expenditure modelled is \$6,410.6 million.

**Table 3.8: Expenditure by NRM (\$m 2011-12)**

<b>NRM region</b>	<b>International</b>	<b>Domestic overnight</b>	<b>Domestic day</b>	<b>Cruise</b>	<b>Total</b>
Torres Strait	0.5	0.7	-	0	1.2
Cape York	16.6	167.8	0.7	0.0	185.1
Wet Tropics	761.1	1,583.3	231.3	18.8	2,594.5
Burdekin	92.8	820.2	130.7	1.5	1,045.2
Mackay					
Whitsunday	118.5	757.6	127.4	14.8	1,018.3
Fitzroy	61.1	719.5	276.4	0	1,057.0
Burnett Mary	51.2	293.1	165.0	0	509.3
<b>Total</b>	<b>1,101.8</b>	<b>4,342.2</b>	<b>931.5</b>	<b>35.1</b>	<b>6410.6</b>

Source: TRA 2012, Deloitte Access Economics.

This expenditure was then converted into estimated value added and employment, using the input output table methodology outlined in Appendix B. The \$6.4 billion in tourism expenditure in the NRM regions resulted in a total direct economic contribution of \$2.9 billion, as outlined in Table 3.9.

The indirect contribution of tourism was estimated to be \$2.3 billion which was split between the Great Barrier Reef Region, the rest of Queensland and the rest of Australia. This indirect contribution captures the value added associated with the purchase of intermediate inputs, like fuel or food and beverage by tourism operators.

Tourism related activity was estimated to contribute to the employment of 63,985 people on a FTE (full time equivalent) basis including 44,850 directly and almost 19,500 indirectly. At a regional level, tourism was estimated to contribute almost 55,600 FTE jobs in the catchment.

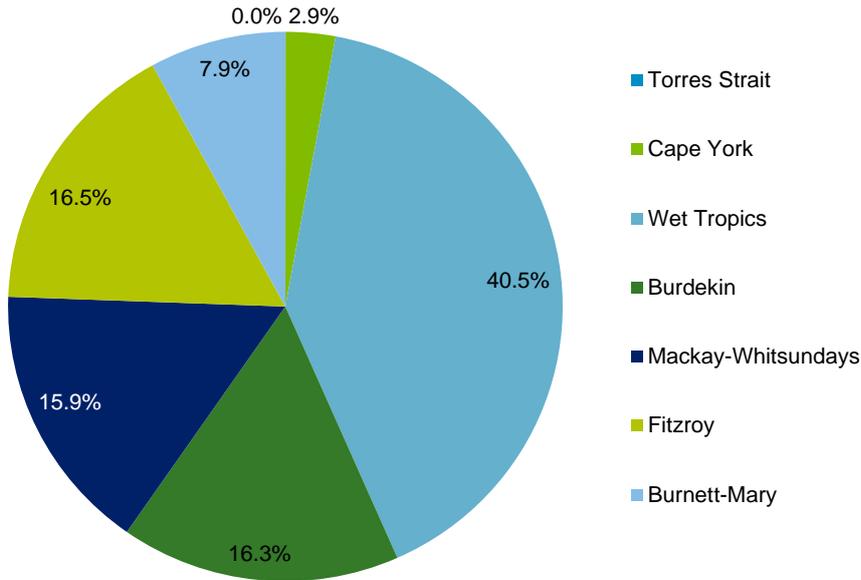
**Table 3.9: Tourism expenditure, value added and employment (\$m 2011-12)**

	<b>Expenditure</b>	<b>Value added</b>	<b>Employment</b>
Torres Strait	1.2	0.5	8
Cape York	185.1	83.7	1,295
Wet Tropics	2,594.5	1,173.4	18,152
Burdekin	1,045.2	472.7	7,312
Mackay Whitsunday	1,018.3	460.5	7,125
Fitzroy	1,057.0	478.0	7,395
Burnett Mary	509.3	230.3	3,563
<b>Total direct</b>	<b>6,410.6</b>	<b>2,899.2</b>	<b>44,851</b>
Indirect Catchment		1,127.6	10,751
Indirect Rest of Qld		172.0	1,266
Indirect Rest of Australia		976.7	7,470
<b>Australia</b>		<b>5,175.6</b>	<b>64,338</b>

Source: Deloitte Access Economics.

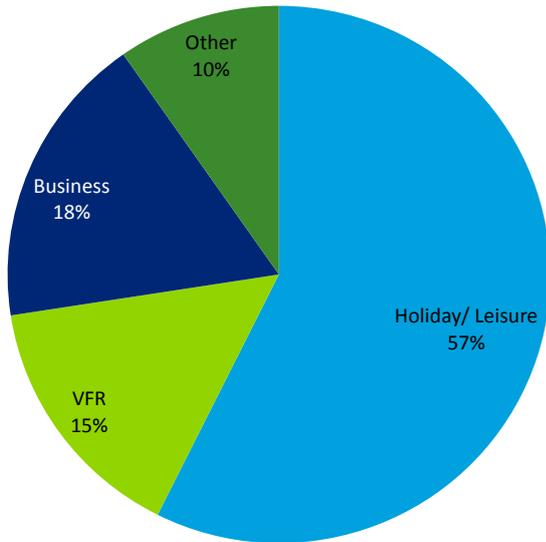
Reflecting the distribution of economic activity detailed above, the largest share of the overall contribution is derived from activity in the Wet Tropics NRM region (Chart 3.5) and the majority of the contribution is derived from Holiday/Leisure travellers (Chart 3.6).

**Chart 3.5: Share of tourism-related economic contribution to Australia, by NRM region**



Source: Tourism Research Australia, Deloitte Access Economics estimates

**Chart 3.6: Share of tourism-related economic contribution to Australia, by visitor type**



Source: Tourism Research Australia, Deloitte Access Economics estimates

### Cruise tourism

Included in the tourism contribution outlined above is the cruise-related expenditure of \$35 million. The cruise sector contributes \$28 million in total value added and just over 350 FTEs to the Australian economy.

**Table 3.10: Economic contribution of cruise ship tourism activity to Australia, 2012**

	Value-added (\$m)	Employment (FTE)
Direct	15.9	246
Indirect	12.5	107
<b>Total</b>	<b>28.4</b>	<b>353</b>

Source: Deloitte Access Economics estimates

### Tourism: Case Study 1: Cairns and the Whitsundays

Cairns and the Whitsunday Islands are highly reliant on visitor activity. In recent years there has been a significant decrease in visitor activity in the Whitsundays which has, among other things resulted, in the closure of several resorts.

Cairns has performed more strongly than the Whitsundays but has still suffered from a relatively weak international market, partly due to the decline in traditional source markets such as Japan and Europe and the impact of natural disasters such as Cyclone Yasi.

Table 3.11 and Table 3.12 show the change in visitor expenditure in Cairns and the Whitsundays between 2006-07 and 2011-12. While both experienced declines in expenditure, the decline in visitor expenditure was strongest in the Whitsundays where it fell by 24.4% compared to 11.55% in the Cairns region.<sup>6</sup> The results suggest a marked decline in visitor activity in the Whitsundays between 2006-07 and 2010-11.

**Table 3.11: Total tourism expenditure in Cairns by visitor type (\$2012 million)**

Visitor type	2007	2012	% change
International	1,129	658	-42%
Domestic overnight	1,097	1,303	19%
Domestic day	160	135	-16%
<b>Total</b>	<b>2,385</b>	<b>2,096</b>	<b>-12%</b>

Source: TRA Regional Tourism Profiles 2010-11, TRA NVS/IVS, Deloitte Access Economics.

**Table 3.12: Total tourism expenditure in the Whitsundays by visitor type (\$2012 million)**

Visitor type	2007	2012	% Change
International	137	93	-32%
Domestic overnight	822	623	-24%
Domestic day	79	30	-62%
<b>Total</b>	<b>1,038</b>	<b>746</b>	<b>-28%</b>

Source: TRA Regional Tourism Profiles 2010-11, Deloitte Access Economics.

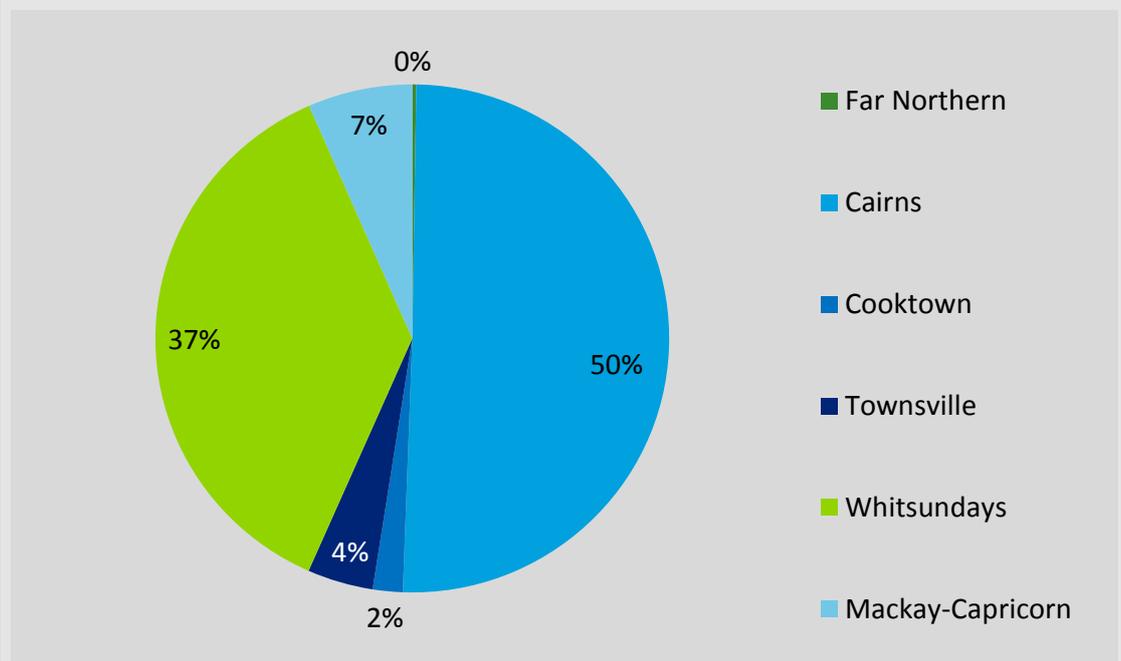
<sup>6</sup> In interpreting these results it should be noted that the decline in expenditure by domestic day visitors in the Whitsundays should be interpreted with caution given the relatively few domestic day visitors to the region.

### Tourism case Study 2: Reef-related activity

Although the Reef provides an impetus for travel to the broader catchment, not all visitors to the region actually visit the Reef. To estimate tourism activity specific to the Reef, information provided by GBRMPA on the total number of tourists on the Reef was used. These data are based on the logbooks that tourism operators provide when submitting their Environmental Management Charge returns.

In total, there were 1.92 million visitor days spent on the Reef in 2012 and most (87%) of these visits were to Cairns and the Whitsundays (Chart 3.7).

**Chart 3.7: Tourists visiting the Reef 2012**



Source: GBRMPA 2012

### Expenditure

Given the lack of information on Reef-specific expenditure of these tourists, broader TRA data on expenditures while visiting a reef – which includes the GBR and other reefs in Australia such as Ningaloo reef in Western Australia – were used.

The average daily expenditure of domestic overnight visitors to any reef in Australia over 2011 and 2012 was \$310 (TRA 2012). There is no information available on the expenditure of international visitors to Australian reefs, so this was estimated by assuming that the same expenditure ratio between the catchment and the Reef observed for domestic visitors applies to international visitors. This resulted in an estimated daily expenditure for international visitors of \$200.

### Reef-related activity – continued

The proportion of international visitors to the Reef was 52% on average, ranging from 60% in Cairns, Cooktown and Townsville to just 19% in the Mackay-Capricorn management area.

Using these data, total Reef related expenditure was estimated to be \$481 million in 2012. Further detail is provided in Table 3.13.

**Table 3.13: Estimated Reef-related tourism expenditure, 2012**

	Visitor days (‘000s)	International %	Domestic	Total expenditure
Far- Northern	4.8	60%	40%	1.2
Cairns	966.7	60%	40%	235.9
Cooktown	36.2	60%	40%	8.8
Townsville	79.5	60%	40%	19.4
Whitsundays	706.7	50%	50%	179.5
Mackay-Capricorn	126.4	19%	81%	36.5
<b>Total</b>	<b>1,920.2</b>			<b>481.4</b>

Source: Deloitte Access Economics

The Reef-related expenditure of about \$480 million contributed almost \$389 million to Australia’s value-added in 2012 and generated employment equivalent to over 4,800 full-time jobs.

**Table 3.14: Economic contribution of Reef-specific tourism activity to Australia, 2012**

	Value-added (\$m)	Employment (FTE)
Direct	218	3,368
Indirect	171	1,463
<b>Total</b>	<b>389</b>	<b>4,831</b>

Source: Deloitte Access Economics estimates

The analysis outlined above only includes that activity subject to the EMC. Information provided by GBRMPA estimates there is a further 2.3 million in passenger transfers to islands. Further analysis of these transfers could be included in subsequent studies where further information on their activity is forthcoming. Discussion on this is provided in the road map for future analysis in Chapter 7.

## 4 Commercial fishing and aquaculture

Commercial fishing and aquaculture are important industries for the Queensland and Australian economies. Commercial fishing refers to the catching of fish that have not been supported, while aquaculture refers to the catching of fish that have been farmed or supported with human intervention to enhance production.

Within each of these classifications, commercial fishing is often further disaggregated according to the types of species being caught, their final use and/ or the gear that is used to catch them.

The total value revenue from all commercial fishing (including aquaculture) in the World Heritage Area in 2010-11<sup>7</sup> is estimated to be around \$193 million (Table 4.1).

**Table 4.1: Gross value product of all commercial fishing 2010-11, \$m**

NRM Region	Line, net, pot and trawl	Harvest	Aquaculture	Total
Torres Strait				
Cape York	25.2	6.6	13.2	45.0
Wet Tropics	12.0	3.1	6.2	21.3
Burdekin	12.4	3.2	34.7	50.3
Mackay				
Whitsunday	16.4	4.3	8.0	28.7
Fitzroy	27.8	7.3	0.3	35.3
Burnett Mary	3.6	1.0	7.2	11.8
<b>Total</b>	<b>97.4</b>	<b>25.5</b>	<b>69.6</b>	<b>192.5</b>

Source: DAFF, 2012a; DAFF, 2012b; Queensland Government, various years

This estimate is based on the gross value product (GVP) of each of the fishing methods, which have each been estimated as described below:

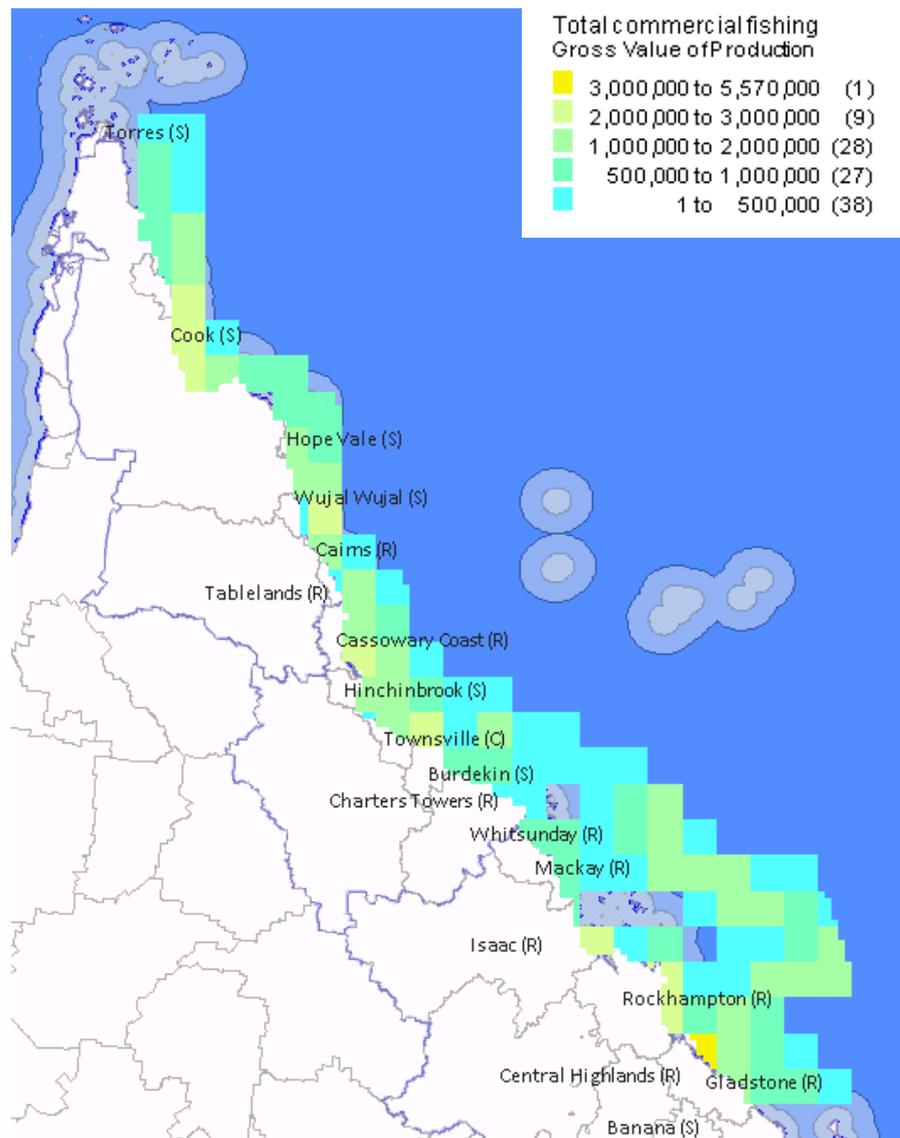
- For **line, net, pot and trawl fishing**, logbook data on commercial catch by grid reference for 2010-11 has been used, compiled by the Department of Agriculture, Forestry and Fishing.
- **Harvest data** has been aggregated from the gross value product of catches for each of Queensland's harvest fisheries, reported in their sustainability reports to government. These GVPs refer to various years. As such, where necessary, dollar figures have been scaled to reflect inflation.
- Finally, the gross value product of **aquaculture** in the catchment is sourced from the farm gate values reported in the 2011 Ross Lobegeiger Report to Farmers (agricultural production survey, prepared by Queensland Department of Employment, Economic Development and Innovation, yet to be published). As

<sup>7</sup> As this is the most recent data available, this is used as a proxy for 2011-12.

the report’s highest level of geographical disaggregation is by statistical division, the assignment of values to NRM regions is approximate.

Figure 4.1 shows the distribution of wild catch within the World Heritage Area. The figure shows that commercial fishing is spread evenly throughout the WHA with some pockets of concentration along the coast, including an area just to the north of Gladstone.

**Figure 4.1: GVP, for Wild catch by region distribution**



Source: DAFF, 2012a; DAFF, 2012b; Queensland Government

## 4.2 Economic contribution of commercial fishing and aquaculture

The \$193 million generated through commercial fishing and aquaculture in the Region in 2012 contributed \$160 million to Australia’s total value added and generated employment equivalent to 975 full-time jobs (Table 4.2). Again, most

(about 60%) of this value-added was generated in the catchment. The gross value of production by NRM region was then converted into value added and employment using multipliers derived from ABS Input-Output tables.

The direct economic contribution of commercial fishing (including aquaculture) was estimated to be \$92.5 million with the total economic contribution being \$160 million.

Commercial fishing and aquaculture were estimated to contribute to the employment of 975 individuals on a full-time equivalent basis, about 530 directly and 440 indirectly. In the catchment, commercial fishing was estimated to contribute to the employment of just over 700 individuals on a FTE basis.

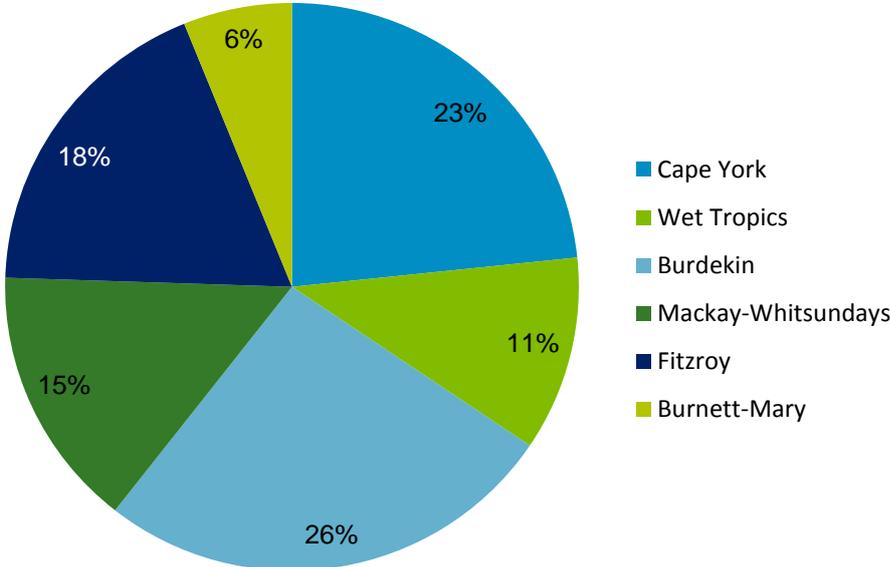
**Table 4.2: Economic contributions of commercial fishing and aquaculture, by region, 2012**

	<b>Expenditure</b>	<b>Value added</b>	<b>Employment</b>
Torres Strait	-	-	-
Cape York	45.0	21.6	125
Wet Tropics	21.3	10.3	59
Burdekin	50.3	24.2	139
Mackay Whitsunday	28.7	13.8	80
Fitzroy	35.3	17.0	98
Burnett Mary	11.8	5.7	33
<b>Total direct</b>	<b>192.5</b>	<b>92.5</b>	<b>533</b>
Indirect Catchment		30.3	171
Indirect Rest of Qld		4.4	29
Indirect Rest of Australia		33.2	242
<b>Australia</b>		<b>160.3</b>	<b>975</b>

Source: Deloitte Access Economics estimates

In contrast to tourism, the largest share of the contribution of commercial fishing and aquaculture was generated in the southern NRM regions (Chart 4.1).

**Chart 4.1: Share of economic contribution of commercial fishing to Australia by NRM region**



Source: Fisheries Queensland, Deloitte Access Economics estimates

## 5 Recreation

Recreational activities in the Reef catchment can be broadly classified into the following activities:

- fishing;
- boating;
- sailing; and
- visiting an island.

All of these activities stimulate economic activity through the trip-related expenditure they induce (on things such as travel to and from the activity and on personal items while on the trip), and also through expenditure on equipment used for the activities.

Activities are only classified as “recreation” when they are undertaken by locals. It could be the case that these same activities undertaken by visitors to the region are classified as “tourism”.

For this analysis, locals have been defined as households within the Reef catchment, other than those in the following LGAs, which were deemed as far enough away from the Reef to be classified as tourists:

- Central highlands;
- Banana;
- North Burnett;
- Cherbourg; and
- South Burnett.

Using this method, there were 1.04 million local residents in the catchment, across 462,653 households. Almost 87,000 people living in the regions above were defined as out-of scope for the recreational activity and were assumed to be included in tourists from other parts of Queensland.

The method used to measure recreational activity in this report has changed from the 2007 analysis, largely due to the availability of superior data. The 2007 analysis was based on information from Fisheries Queensland State-wide Recreational Fishing Survey and as a result, it focused heavily on recreational fishing. Moreover advice was provided by Fisheries Queensland that the survey used for the previous study including a high proportion of active fishers.

This current report draws on a more recent survey of recreation in the Reef (Rolfe et al. 2011), which has enabled a broader scope of recreational activities to be included in the analysis as described above.

Information contained in Rolfe et al (2011) was used to measure trip-related expenditure for households within the World Heritage Area, namely:

- the proportion of the population that undertake the activities outlined above;
- the frequency with which they undertake these activities; and
- the expenditure associated with each trip.

To measure the expenditure on recreational equipment, Australian Bureau of Statistics *Household Expenditure Survey 2009-10* (ABS cat. no. 6530.0) data were used.

## Recreational expenditure

Table 5.1 shows recreational expenditure by NRM region on equipment, fishing, boating, sailing and also visiting an island. Total expenditure was estimated to be \$332.4 million with the largest recreational expenditure occurring in the Burnett Mary NRM region, which includes the Fraser Coast and Gladstone.

A relatively large proportion of recreational expenditure (about 62%) consisted of purchases of recreational equipment such as the purchase, registration and insurance of boats, including parts and operations, fishing equipment, water sports equipment and repair.

**Table 5.1: Recreational expenditure in the catchment, 2011-12, \$m**

	Equipment	Fishing	Boating	Sailing	Visiting an Island	Total
Torres Strait	1.0	0.1	0.1	0.1	0.3	1.7
Cape York	2.4	0.8	0.3	0.2	0.5	4.2
Wet Tropics	48.6	13.0	4.6	3.1	9.2	78.5
Burdekin	42.4	12.2	4.3	2.9	10.7	72.4
Mackay	24.5	7.2	2.6	1.7	2.8	38.8
Whitsunday	34.8	10.1	3.6	2.4	4.0	54.8
Burnett Mary	53.9	14.2	5.0	3.3	5.6	82.0
Total	207.5	57.7	20.5	13.6	33.1	332.4

Source: Deloitte Access Economics estimates

Fishing generated the most economic activity, largely due to its popularity – with over 3.4 million fishing trips<sup>8</sup> estimated to have taken place in 2012 and almost one-third of the catchment's population undertaking the activity in the past two years.

At around \$40 on average, expenditure per trip per person is similar to boating and sailing, but these activities were not undertaken as broadly or as frequently. Visiting an island generates a higher unit expenditure (\$159 per person per trip), and also attracts a fairly high proportion of the local population, with around 30% having visited an island in the past two years. However, this activity is undertaken less frequently, with only around 300,000 trips made in 2012.

Not included in these numbers – but nonetheless an important contributor to economic activity is beach-going. Similar to the other activities, beach-going can reasonably be expected to stimulate economic activity through expenditure on things such as travel to the beach, food, drinks, sunscreen and other personal expenditures while at the beach. However, detailed, reliable data are not available for this activity, so its contribution has been excluded from the analysis.

<sup>8</sup> The fishing trips are estimated using information attained from the Rolf et al (2011) publication and supplementary unpublished data as provided by the Authors. This includes both the proportion of the population that has undertaken fishing and the frequency in which they have undertaken that activity.

## 5.1 Recreation economic contribution

The recreational expenditure was then converted into estimates of value added and employment with recreational activity in the GBRMPA estimated to result in total direct value added of \$126 million and a total value added of about \$244 million (Table 5.2).

Recreational activity and equipment purchases were estimated to contribute to the employment of 2,785 individuals on a full-time equivalent basis, 1,767 directly and 1,118 indirectly.

**Table 5.2: Economic contributions of recreation, by region, 2012**

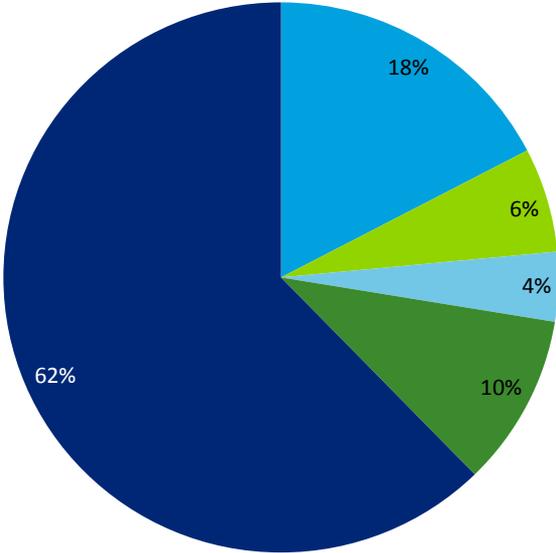
	<b>Expenditure</b>	<b>Value added</b>	<b>Employment</b>
Torres Strait	1.7	0.6	9
Cape York	4.2	1.6	22
Wet Tropics	78.5	29.7	417
Burdekin	72.4	27.4	385
Mackay Whitsunday	38.8	14.7	206
Fitzroy	54.8	20.7	292
Burnett Mary	82.0	31.0	436
<b>Total direct</b>	<b>332.4</b>	<b>125.7</b>	<b>1,767</b>
Indirect Catchment		34.0	397
Indirect Rest of Qld		13.8	101
Indirect Rest of Australia		70.3	519
<b>Australia</b>		<b>243.9</b>	<b>2,785</b>

Source: Deloitte Access Economics estimates

Compared to commercial fishing and tourism, slightly more of the economic contribution was generated outside of the catchment, at 34%, perhaps reflecting the fact that intermediate inputs in recreational equipment are sourced more broadly.

The vast majority of the contribution associated with recreational activity in the Reef was derived from expenditure on equipment, largely reflecting the purchase of boats and maintenance/repair of recreational equipment, (see Chart 5.1).

Chart 5.1: Recreational expenditure by type of activity, 2012



Fishing Boating Sailing Visiting an island Equipment

Source: Deloitte Access Economics estimates

## 6 Scientific research and Reef management

As a unique area hosting unparalleled biodiversity, the Great Barrier Reef serves to inspire and facilitate a wide range of scientific research. The value and economic contribution of research and management has not previously been estimated.

A number of research programs are conducted in the Great Barrier Reef Marine Park, ranging from small independent student projects to large, multi-agency collaborative programs with teams of world-leading scientists. However, there is little comprehensive data on Reef-specific research. Many of the institutions involved do not research the area exclusively, and do not separately report Reef-specific activity.

Despite this, it is clear that a significant amount of research activity revolves around the Reef. In 2010, research funding for Reef-related projects from ARC grants alone totalled over \$8 million (ARC, 2012). This funding supports a large body of research – the Australian Coral Reef Society listed over 230 publications for 2009 (Australian Coral Reef Society, 2010). Moreover, the 2012 International Coral Reef Symposium, held in Cairns, had over 2,000 attendees, with over 600 from Australia – an indicator of the importance of the Great Barrier Reef to international reef research.

Given limited data availability, the economic contribution of scientific research and management related to the Reef is based on the financials of the following organisations and institutions:

- Great Barrier Reef Marine Park Authority (GBRMPA);
- Australian Institute of Marine Science (AIMS);
- James Cook University (JCU) ARC Centre of Excellence in Coral Reef Studies;
- Herron Island Research Station (at the University of Queensland); and
- Lizard Island Research Station (operated by the Australian Museum).
- GBRMPA

Some of the information used to arrive at these estimates is confidential – such as the details used to allocate a portion of these organisations' financials to that associated with the Reef. As such, the estimates are reported in their aggregated form.

In 2012, \$106 million of revenue was generated by these organisations through the conduct of scientific research and management on the Reef and provided associated services.

### 6.1 Economic contribution

The estimated \$106 million of revenue generated through Reef-related scientific research resulted in total value added of \$98 million in Australia, with just over 880

FTE jobs generated. These jobs include the 464 FTEs directly employed by the organisations within scope and a further 420 flow-on.

The relatively high value added to expenditure ratio (of over 90%) is indicative of professional services activities.

**Table 6.1: Economic contributions of scientific research & management, 2012**

	<b>Expenditure</b>	<b>Value-added (\$m)</b>	<b>Employment (FTE)</b>
<b>Total direct</b>	106.1	50.2	464
<b>Indirect</b>			
Catchment		34.4	313
Rest of Qld		2.5	19
Rest of Australia		10.9	85
<b>Total Australia</b>		98.0	881

Source: Deloitte Access Economics estimates

## 7 Economic contribution – summary

The previous chapters outline the economic contribution of tourism, commercial fishing and aquaculture, recreation, and scientific research and Reef management. This chapter provides a summary of those results and also provides some discussion on how the analysis can be built upon for future economic contribution studies.

The Input-Output analysis has been constructed for three nested areas:

- The Reef catchment;
- Queensland; and
- Australia.

### 7.1 Summary of economic contributions

The total estimated economic contribution of activity in the Reef catchment to Australia is summarised in Table 7.1. Detail on each of the activities is provided in the sub-sections that follow.

**Table 7.1: Economic contributions of the Great Barrier Reef World Heritage Area to Australia, 2012**

	Direct expenditure (\$m)	Value-added (\$m)	Employment (FTE)
Tourism	6,410.6	5,175.6	64,338
Recreation	332.4	243.9	2,785
Commercial Fishing	192.5	160.3	975
Scientific research & management	106.1	98.0	881
<b>Total</b>	<b>7,041.5</b>	<b>5,677.8</b>	<b>68,978</b>

Source: Deloitte Access Economics estimates

Over 90% of the expenditure in the region comes from tourism, and this follows throughout the economy, with tourism accounting for 91% and 93% of the region's value-added and employment contributions to Australia respectively.

The Wet tropics NRM region has the highest level of modelled economic activity, with \$2.7 billion in expenditure and \$1.2 billion in direct value added (see Table 7.2). Activity within the catchment area also contributes significantly to other regions of Australia with about \$1.3 billion in value added generated in the Rest of Queensland and Australia.

**Table 7.2: Total Economic contribution by region, 2012**

	<b>Expenditure</b>	<b>Value-added (\$m)</b>	<b>Employment (FTE)</b>
<b>Tourism, Recreational activity and Commercial fishing</b>			
<b>Direct</b>			
Torres Strait	2.9	1.2	18
Cape York	234.2	106.9	1,442
Wet Tropics	2,694.4	1,213.3	18,629
Burdekin	1,167.9	524.2	7,837
Mackay-Whitsundays	1,085.9	489.0	7,410
Fitzroy	1,147.2	515.7	7,785
Burnett-Mary	603.1	267.0	4,032
Scientific research & management	106.1	50.2	464
<b>Total direct</b>	<b>7,041.5</b>	<b>3,167.6</b>	<b>47,615</b>
<b>Indirect</b>			
Reef catchment		1,226.3	11,633
Rest of Qld		192.7	1,415
Rest of Australia		1,091.1	8,315
<b>Total Australia</b>		<b>5,677.8</b>	<b>68,978</b>

Source: Deloitte Access Economics estimates

## 7.2 Roadmap for future work and data

The analysis provided in this report relies on inputs from a varied number of sources. For tourism and commercial fishing these inputs have remained the same as previous studies. For other areas of analysis like recreational activity the data inputs were changed to incorporate data that was better suited to the analysis.

Below is a discussion of how the data may be improved for future analysis. These improvements both relate to determining the overall size of the activity and how to improve the granularity of the analysis.

### *Tourism*

While the quality of the tourism data is generally good, there are some pockets of tourism activity where further information is needed, for example:

- Cruising yachts entering into Australia could be excluded from the scope of the TRA surveys. Where this is the case more information is needed on the level of activity of these yachts, including the number, the days at port, the visitors they carry and the level of expenditure while at port. There are a number of studies in the public domain including those by Deloitte Access Economics on the cruise sector in Australia- (*The Economic Contribution of the Cruise Sector to Australia*). These studies may provide an insight into how this analysis is undertaken and the data inputs used.
- Reef-related activity outlined above is based on EMC data, as a result it excludes the activity related to island transfers. The transfer activity was excluded because of the insufficient expenditure information on these travellers.

Where future analysis includes this activity, information on the nature of travel and expenditure would be ideal.

- Tourism Research Australia data does include island activity, but the current data does not provide for this to be granulated from the wider tourism activity. Moreover it could be the case that island visitors spend more than the average visitor to the Reef. Where this is the case, to model the island activity in the future it would be ideal to have both the visitor nights and expenditure for island visitors.

### *Commercial fishing*

Again the quality of commercial fishing and aquaculture data is generally good. The commercial fishing data is provided with a high degree of regional granularity which makes matching this activity to the NRM region relatively easy.

The aquaculture data on the other hand is provided at the statistical division level and apportioning it to the NRM regions relied on some assumptions being made. If future aquaculture data is provided with more regional granularity, the analysis would be based on fewer assumptions and the regional analysis would be improved.

### *Recreation*

As outlined above the inputs into the recreation analysis have undergone significant change. This came about because of the analysis undertaken by John Rolfe (et al) on the recreational activity by locals in the catchment. While this analysis was improved over previous use of recreational fishing surveys, there are a number of areas where the analysis could be improved including;

- Recreational equipment purchases is currently based on the ABS's Household Expenditure Survey. This uses Queensland state-wide expenditure information on boats and equipment. Improvements could be made if there was specific information for household expenditure for those households specifically located in the catchment.
- In addition more regional information on recreational activity would also improve the analysis. The current information used does provide some regional granularity but it does not specifically match the NRM boundaries. This information would include the rates of recreational activity, the frequency and the expenditure.
- The economic contribution of beach activity is not provided in the current analysis. While there was some information on the level of activity, there was no information on the expenditure associated with going to a beach.

### *Scientific research and Reef management*

The recent addition of scientific research and management currently covers only a limited number of organisations; these include AIMS, the ARC Centre of Excellence in Coral Reef Studies, the research activities on Heron and Lizard Islands and GBRMPA. While it is estimated that this covers the majority of scientific research and management economic activity on the Reef, improvements to estimating the overall magnitude of activity could be made, for example; adding One Tree Island and Orpheus Island, and other management agencies.

Moreover there is also a much broader range of organisations that may undertake Reef-related scientific research and management including the Commonwealth Department of Sustainability Environment Water Population and Communities (DSEWPaC), CSIRO, relevant Queensland Government agencies (including Queensland Fisheries), the Fisheries Research and Development Corporation and other Australian universities.

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## Appendix A: Tourism Satellite Account Method

This appendix provides an account of the economic contribution to Gross Domestic Product using the Tourism Satellite Accounting (TSA) framework. Unlike the expenditure based approach outlined above in the tourism section, the TSA framework provides for a wider scope of tourism-related consumption. Under the TSA framework expenditure by tourists before and after a trip can be taken into account as long as they relate to the trip. This may include buying of luggage or printing photos.

Moreover the TSA also include non-expenditure items imputed into the tourism consumption bundle. Imputed consumption, as defined in the TSA, includes:

- Services provided by one household to the visiting members of another household free of charge, including the value of goods such as food and purchased services provided by the host.
- Housing services provided by holiday homes.
- Imputed values of non-market services provided directly to visitors such as public museums, even though these may be provided free or at a price which is not economically significant.

The Australian Bureau of Statistics publishes the national TSA, where Tourism Research Australia publishes the state equivalent. The analysis below uses the Queensland-wide 2010-11 imputed tourism consumption to provide an indicative estimate of the tourism contribution using the TSA method.

Using the TSA method the contribution to GSP is \$7.26 billion in the year 2012. This is based on a modelled tourist consumption of just over \$8.0 billion, see Table A.1.

**Table A.1: Contribution to GSP TSA method (2011-2012)**

(\$m 2012)	International	Day	Overnight	Total
TRA expenditure	1,101.8	931.5	4,342.2	6,375.5
Tourist consumption	1,376.5	936.6	5,701.7	8,014.8
GVA	1,168.2	794.9	4,839.0	6,802.1
GSP	1,247.6	848.9	5,167.7	7,264.1

Source: Deloitte Access Economics

Overnight and international travellers are modelled to have significantly higher tourist consumption relative to their expenditure, at 25% and just over 30% respectively. Conversely tourist consumption for day travellers is modelled slightly higher to expenditure. This could be the case because they are less likely to receive imputed housing services from holiday homes or friends and relatives.

The contribution by traveller follows the same patterns as to the tourist expenditure outlined in the body of the report. Domestic overnight travellers account for about 70% of the GSP and international travellers about 17%.

It is worth noting that this analysis is based on a number of limitations and should be viewed as merely an indication of the economic contribution of tourist consumption in the World Heritage Area. These limitations include:

- The adjustment factors used to model tourist consumption from TRA expenditure information is based on Queensland state-wide averages
- As a result, where imputed use of housing by tourists in the World Heritage Area is lower than the rest of the state average the modelled tourist consumption as outlined above should be considered a high-side estimate.
- The adjustment factors used in the analysis are from the 2010-11 State Tourism Satellite Account.

# Appendix B: Methods and Limitations

The economic contribution study outlined above has quantified measures such as value added, output and employment associated with the use of the Reef catchment for the reference year of 2011-12. The economic contribution is a measure of the value of production by that use to the Australian economy.

## Value added

Value added is the most appropriate measure of an industry's/company's economic contribution to gross domestic product (GDP) at the national level, or gross state product (GSP) at the state level.

The value added of each industry in the value chain can be added without the risk of double counting across industries caused by including the value added by other industries earlier in the production chain. The value added in the supply chain is driven by the costs used in producing goods and services. These costs are intermediate inputs used in businesses.

## Measuring the economic contribution

There are several commonly used measures of economic activity, each of which describes a different aspect of an industry's economic contribution:

- **Value added** measures the value of output (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. 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). 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).
  - Tax on production less subsidy provided for production. This generally includes company taxes and taxes on employment. Note: given the returns to capital before tax (EBITDA) are calculated, company tax is not included or this would double count that tax.
  - Labour income is a subcomponent of value added. It represents the value of output generated by the entity's direct labour inputs, as measured by the income to labour.
- **Gross output** measures the total value of the goods and services supplied by the entity. This is a broader measure than value added because it is an addition to the value added generated by the entity. It also includes the value of

intermediate inputs used by the entity that flow from value added generated by other entities.

- **Employment** is a fundamentally different measure of activity to those above. It measures the number of workers that are employed. The Input-Output tables as provided by the ABS allow for the employment intensity to be measured by industry.

Figure B.1 shows the accounting framework used to evaluate economic activity, along with the components that make up gross output. Gross output is the sum of value added and the value of intermediate inputs. Value added can be calculated directly by summing the payments to the primary factors of production, labour (i.e. salaries) and capital (i.e. gross operating surplus (GOS), or profit), as well as production taxes less subsidies. The value of intermediate inputs can also be calculated directly by summing up expenses related to non-primary factor inputs.

**Figure B.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 economic entity directly transacting with the consumer. For example in the case of tourism activity, suppose a traveller purchases a meal at a restaurant, the direct economic contribution is the value added generated in the restaurant sector.

The **indirect** contribution is a measure of the demand for goods and services produced in other sectors as a result of demand generated by the direct consumer. Estimation of the indirect economic contribution is undertaken in an input-output (IO) framework using Australian Bureau of Statistics input-output tables which report the inputs and outputs of specific sectors of the economy. Continuing the example above, the indirect economic contribution generated when the restaurant buys supplies from wholesalers.

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

## Limitations of economic contribution studies

While describing the geographic origin of production inputs may be a guide to the linkages one sector has 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 significant unused capacity in the economy (such as unemployed labour) there is only a weak 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. Indeed, 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>9</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 input-output table modelling framework and there are some limitations to this modelling framework. The analysis assumes that goods and services provided to the sector is 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 the CGE model.

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<sup>9</sup> Productivity Commission (1999), *Australia's Gambling Industries*, Report No. 10, AusInfo, Canberra, (page 4.19).

## **Input-output analysis**

Input-output tables are required to account for the intermediate flows between sectors. These tables measure the direct economic activity of every sector 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 sector.

The input-output matrix used for Australia is derived from the Australian Bureau of Statistics 2007-08 Input-Output Tables. The industry classification used for input-output tables is based on ANZSIC, with 111 sectors in the modelling framework

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