MARSDEN JACOB ASSOCIATES

A Marsden Jacob Report

NATIONWIDE IMPACTS OF OUTDOOR RECREATION

Key estimates and recommendations

A COMPUTABLE GENERAL EQUILIBRIUM-BASED ANALYSIS

REPORT PREPARED FOR SKILLSIQ

SKILLSIQ
CAPABLE PEOPLE MAKE CLEVER BUSINESS

Prepared for SkillsIQ

June 2018

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About Us

Established in 1996, Marsden Jacob Associates has grown to be Australia's leading dedicated natural resource economics, policy and strategy advisory. We employ talented economists and policy advisors who specialise in solving practical, real world problems relating to water, energy, environment, natural resources, agriculture, earth resources, public policy and transport. We work with a wide range of cross-disciplinary partner firms to deliver best project outcomes for our clients.

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Outdoor recreation in Australia

FOUR HEADLINE NUMBERS

$11 BILLION

Estimated contribution of outdoor recreation to Australia's economy

16,000-30,000 FTE

Full-time equivalent jobs attributable to outdoor recreation

1%

Estimated contribution of outdoor recreation to Australia's economy

$20 BILLION

Estimated total expenditure on outdoor recreation

Foreword

Nature-based outdoor activities form a major part of the Australian lifestyle. Australia's nature-based outdoor activities community covers a diverse range of participants and organisations—both young and old, public and private, for-profit and not-for-profit, community- and business-oriented, voluntary and professional.

The benefits of participation in outdoor activities are far-reaching and significant. However, up until now, these benefits have been largely unknown. The size and scale of the outdoor recreation sector has long been underestimated as there is very little quantifiable national data available.

SkillsIQ engaged Marsden Jacob Associates to conduct a national research project highlighting the contribution of nature-based outdoor activities in Australia. A quantitative evaluation was conducted to establish a picture of this sector, covering both participation across activities and also the economics of the sector in relation to employment, expenditure, and Gross Domestic Product (GDP). **The national estimates presented in this report are based on Computable General Equilibrium (CGE) modelling, an economic approach to estimate the impact which accounts for changes in spending or policy on an economy, as well as remove 'leakages' (i.e. outflows, exits) from the economy.** This national report is released as part of a wider study which involved estimating the economic contribution of the nature-based outdoor recreation sector for individual States and Territories. State and Territory reports are available on SkillsIQ's website at https://www.skillsiq.com.au/ResourcesResearchandSubmissions/Naturebasedeconomics.

Please note that a different methodology was applied to estimate the individual State and Territory figures (i.e. Input-output modelling) and therefore State/Territory figures cannot be compared to, or consolidated with, the national figures published in this report. Further information regarding methodologies applied is available in the appendices of each report.

The body of evidence presented in this report is important for showcasing the significance of the outdoor recreation sector for Australia. The sector's current and future growth potential is substantial and therefore it has never been more important to ensure it is supported with a skilled workforce capable of continuing to achieve growth and wider economic contributions.

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Highlights

This report shows that the Australian outdoor recreation sector is an important part of the Australian economy in its own right. The report estimates show that in 2018 the sector:

- accounted for $11 billion in Gross Domestic Product (GDP). This is equivalent to approximately 1% of Australia's total GDP in 2018. By comparison, Australia's agriculture sector accounts for around 2.2% of GDP, and transport 4.5% of GDP.
- employed between 16,000-30,000 people. This represents between 0.2% and 0.3% of all employment in the Australian economy. By comparison, the utilities sector employs around 1.2% of Australia's workforce, and the education sector 7.6%.
- employed in excess of 1% of the workforces in both Victoria and New South Wales.

The headline findings in this report reinforce the findings in the series of individual State and Territory reports which estimate the economic contribution of nature-based outdoor activities in each location.

1. Introduction

This report presents the findings of an independent study by Marsden Jacob Associates (Marsden Jacob) and Cadence Economics (Cadence) of the contribution of the nature-based outdoor recreation sector to the Australian economy.

1.1 Why this report was commissioned

Between 2015 and 2018 Marsden Jacob prepared eight reports estimating the economic contribution of the nature-based outdoor recreation sector to each State and Territory. Using estimated expenditures and an Input-Output (I-O) framework, we examined the economic value added and employment supported as a result of:

- consumer spending on outdoor recreation goods and services
- investment in outdoor recreation facilities and buildings by the private and public sectors
- government support for the sector, mainly in the form of State and Territory Parks departments carrying out various functions.

While these reports provided initial insights into the importance of the outdoor sector, I-O modelling has known limitations **(Appendix 1**). SkillsIQ recognised that a more robust assessment was required for national level analyses.

Marsden Jacob and Cadence Economics were engaged to estimate the economic contribution of the sector using a Computable General Equilibrium (CGE) framework, which is recognised as the more comprehensive approach for estimating economy-wide impacts. CGE modelling is introduced in **Appendix 1**, and Cadence's CGE modelling approach is discussed in **Appendix 2**.

This report provides estimates of the macroeconomic impacts from expenditure and investment in the outdoor recreation sector for Australia as a whole, and for each State and Territory individually. This report has been written for readers not familiar with the technical aspects of macroeconomic modelling. Detailed assumptions and technical features are provided in appendices to the report (**Appendices 1** and **2**).

We report three key gross measures of economic contribution in this report. Each provides a different measure of gross economic contribution. Importantly, they cannot be added together. The measures are stand-alone measures of economic contribution:

- **Output** is the value of the initial (direct) stimulus that is relevant to each industry. It is expenditure by governments, businesses and individuals involved in nature-based outdoor activity.
- **Gross value added (GVA) / Gross domestic product (GDP) / Gross state product (GSP).** GVA is a subset of gross economic output. GVA includes local business profits and wages paid, and therefore represents economic returns on local capital and labour resources. It measures the true contribution of nature-based outdoor activity to the economy because it backs out leakage from the economy. GSP is the sum of GVA from all industries. GSP is the State counterpart of the Australian GDP. GDP is the market value of goods and services produced by labour and capital in Australia, regardless of nationality. Current dollar GSP components are compensation of employees, taxes on production and imports, and gross operating surplus.
- **Employment** is the number of full-time equivalent (FTE) jobs generated and/or supported in the creation of local gross economic output and GVA / GSP / GDP. In this report, we record total FTE (direct plus indirect FTE) impacts.

1.2 What is in the report and where to find it

This report is structured as follows:

- Section 2 provides CGE estimates of the outdoor recreation sector on GDP and output, employment and wages at a national economy level. Summary impacts for each State and Territory are reported in this section, while detailed estimates for each jurisdiction are provided in **Appendix 1**.
- Section 3 outlines the key features of the Cadence Economics CGE model used to develop the estimates, and outlines the inputs used in the CGE model. Key assumptions are also explained in this section. As noted above, a broader explanation of the CGE framework is provided in **Appendix 2**.

2. Headline results

The outdoor recreation sector is a significant contributor to economic growth in Australia and supports substantial employment

2.1 Labour mobility assumptions

A key assumption made in our modelling of the economic contribution of Australia's outdoor activity sector is around labour mobility. Labour mobility describes how easily people can move employment around an economy and between different sectors in the economy.

Australian labour flow mobility dynamics are complex (see for example Buchanan et al., 2011). Broadly, however, labour mobility for unskilled jobs can be high, because there are few requirements and barriers to shifting employment. For jobs with formal requirements and a high degree of specialisation (occupations like doctors and pilots) labour mobility is lower because it is harder to shift into these sectors.

In this evaluation we have modelled two assumptions around how outdoor recreation labour responds to higher wages:

- Under the **high labour mobility case** we assume a high rate of response will see a relatively high number of workers shift into the outdoor sector as wages increase. Specifically, we assume labour supply increases by 3% for a 10% increase in wages.
- Under the **low labour mobility case** we assume relatively few workers will shift sectors following a wage increase assuming a low rate of response. Specifically, we assume labour supply increases by 1.5% for every 10% increase in wages.

In this section we present results reflecting both high and low rates of response. We do this because labour mobility is a key uncertainty. Evaluating at different levels of responsiveness allows us to show how sensitive results are to this key assumption. We expect the real impact to lie somewhere between the low and high response scenarios. Further detail on this aspect of the modelling is provided in **Appendices 1** and **2**.

2.2 Base data

Expenditure data used in this analysis is based on estimates presented in the State and Territory reports on the economic contribution of nature-based outdoor activity (see **Appendix 3, Table 7**). As noted in section 1.1, outdoor recreation expenditure included in this evaluation covers:

- consumer spending on outdoor recreation goods and services
- investment in outdoor recreation facilities and buildings by the private and public sectors
- government support for the sector, mainly in the form of State and Territory Parks departments carrying out various functions.

2.3 The outdoor recreation economy makes a significant contribution to output and national GDP

Using the base expenditure data in **Appendix 3**, the Cadence CGE modelling estimates that the net increase in annual economic output from the economic activity of the outdoor recreation sector is between $15 and $20 billion.

Across Australia, economic activity in the outdoor sector in 2018 contributed to around $7.7 billion in output in the recreation sector directly (**Table 1**). It also stimulated increased economic output across several inter-related service sectors (**Table 1**). Recreational services, trade (tourism) and transport all benefit from economic outdoor recreation.

Conversely, manufacturing exhibits lower output with primary industries little affected or worse off. This is because these industries don't benefit as much directly from outdoor recreation and workers and businesses are drawn relatively more towards outdoor recreation.

The impacts in Table 1 represent the contribution of the outdoor recreation sector as compared to a hypothetical counterfactual where the sector did not exist. While most individual industries and the economy as a whole would contract in the counterfactual should the sector not exist, some sectors would find opportunity in (for example) the reduced demand for labour and other business inputs.

Table 1: Impact on economic output in 2018

	Low labour market response ($million)	High labour market response ($million)
Agriculture	—$851	—$741
Coal	—$937	—$848
Oil	—$725	—$658
Gas	—$118	—$100
Other Mining	—$506	—$435
Manufacturing	—$4,540	—$3,676
Electricity	$43	$88
Water and Waste	$77	$90
Construction	$1,114	$1,155
Trade	$9,682	$9,682
Transport	$1,928	$1,928
Communications	$486	$547
Finance and Insurance	$512	$693
Other Business services	$1,379	$1,776
Recreation	$7,711	$7,711
Other Services and Government	$820	$1,148
Total excluding direct investment in Outdoor Recreation	$23,752.00	$24,818.00

In terms of contribution to national GDP (**Table 2**), we estimate across Australia the outdoor recreation sector accounts for between $10 and $11 billion in national GDP. This is slightly less than 1% of total GDP. By comparison, in 2016 agriculture accounted for around 2.2% of GDP, and transport 4.5%.[1] These comparisons underscore the importance of the outdoor recreation sector to Australia's economy as a sector in its own right.

Table 2: Impacts on national Gross Domestic Product (GDP) in 2018

	Impact on GDP ($ million)	Change on baseline (%)
Low labour market responsiveness	$9,748	0.8%
High labour market responsiveness	$10,963	0.9%

Source: Cadence Economics analysis

2.4 The outdoor recreation economy makes a significant contribution to employment and wages

Based on Cadence estimates, Australia's outdoor recreation sector contributes some 16,000 - 30,000 net full-time equivalent (FTE) jobs across the economy, depending on the assumption regarding labour market responsiveness.

This represents between 0.2% and 0.3% of all employment in the Australian economy. By comparison, the utilities sector employs around 1.2% of Australia's workforce, and the education sector 7.6%.[2]

Table 3: Impacts on activity in 2018 (GDP)

	Impact on employment (FTE)	Change on baseline (%)
Low labour market responsiveness	16,609	0.2%
High labour market responsiveness	30,286	0.3%

Source: Cadence Economics analysis

2.5 Australia's outdoor recreation economy makes significant contributions to most State and Territory economies

The outdoor recreation economy contributes more than 1% of GSP in Australia's two largest State economies – New South Wales and Victoria. This represents State product of around $4.5 to $5 billion for New South Wales and $3 to $3.5 billion for Victoria.

The impacts across the jurisdictions reflect in part the relative investment in outdoor recreation by each State and Territory. The two largest States tend to benefit more from overall expenditure on outdoor recreation. Smaller States and Territories tend not to benefit as much. This may reflect Sydney and Melbourne's positions as the major gateways for tourism, which represents a significant amount of the expenditure for the sector. It may also reflect that around 56% of Australia's population live in these States.

The larger States also benefit from relatively greater stimulus to employment from outdoor recreation sector spending (**Table 5**).

Table 4: Impact of the outdoor recreation economy on Gross State Product (GSP) in 2018

	Low labour market responsiveness ($ million) (%)	High labour market responsiveness ($ million) (%)
NSW	$4,600 1.1%	$5,000 1.2%
Vic	$3,000 1.0%	$3,400 1.1%
Qld	$800 0.4%	$900 0.4%
SA	$400 0.5%	$500 0.5%
WA	$600 0.4%	$800 0.5%
Tas	$200 0.6%	$200 0.7%
NT	.. –0.1%	.. 0.0%
ACT	$100 0.5%	$100 0.5%
Australia	**$9,800 0.8%**	**$11,000 0.9%**

Rounded to nearest $100m

Table 5: Impact of the outdoor recreation economy on State and Territory employment in 2018

	Low labour market responsiveness (FTE) (%)	High labour market responsiveness (FTE) (%)
NSW	5,500 0.2%	10,000 0.3%
Vic	5,800 0.2%	10,500 0.4%
Qld	2,600 0.1%	4,800 0.2%
SA	800 0.1%	1,400 0.2%
WA	1,300 0.1%	2,400 0.2%
Tas	300 0.1%	500 0.3%
NT	100 0.1%	200 0.2%
ACT	200 0.1%	400 0.2%
Australia	**16,600 0.2%**	**30,300 0.3%**

Rounded to nearest 100

Appendix 1 Input-output and Computable General Equilibrium (CGE) modelling

Our earlier State/Territory-based reports used input-output estimates to measure the contribution of nature-based outdoor activities to the economy. While this approach is considered reasonable for indicative first-cut approximations, input–output models have a number of limitations that mean they may overstate the economic contribution of economic activity, including the following (SGS Economics 2014; VAGO 2007):

- **The input–output approach assumes that relationships between industries are static**. That is, productivity improvements are not factored in and historical relationships are assumed to hold. Businesses are not able to adjust to changes in prices to change the way they produce things.
- **The input–output approach uses total production estimates.** Consequently, the relationships are average. However, if we think about where increases in spending might occur, we expect the spender to look for the best value option (or a marginal option). Using an average approach does not allow for using any underutilised capacity at the industry level or for the better use of existing machinery, as production expands from its existing base.
- **All of the expenditure is assumed to be new economic activities in each local government area.** That is, input-output models assume that labour and equipment are, in effect, unemployed and with no constraints on their availability. This means that crowding out or industry substitution effects (including from saving) are assumed to be negligible. This means that there is sufficient slack in the local economy to service these stimuli without transferring significant resources from other uses. If that is not the case, then there is a tendency for input–output models to overstate economic value.

The input-output approach is further constrained by:

- the relevance of the most recent national input–output table, which was based on the structure of the economy in earlier years
- the high level of discretion that can be applied when disaggregating national tables to a State and regional industry level where those local levels of data are not available.

These issues mean that input–output modelling generally overstates the gross and net economic impact of industry sectors. Changes in spending in an industry, for example, are unlikely to generate the same impact as suggested by the application of input–output multipliers. Ignoring these effects can cause input–output-based estimates to overestimate the overall impact on the economy.

The economic contribution calculations in this analysis are done using a Computable General Equilibrium (CGE) model developed by Cadence Economics. Use of a CGE framework is a far more robust approach to estimating economy-wide economic impacts because it accounts for the various 'feedback' loops throughout the economy from an initial economic shock. In particular, the CGE framework applies constraints on the rate of growth in the labour force, which means sectors of the economy will compete for labour following an increase in demand. This serves to moderate the estimates of 'flow-on' impacts from expenditure in a particular sector. In contrast, input-output models place no constraint on the ability of the economy to supply labour. This means that following a demand shock, such as an increase in expenditure, labour is added to the economy to meet that demand with no change in the prevailing cost of labour. This is highly unrealistic and does not reflect how the economy accommodates demand shocks in practice.

Background to CGE

In the context of considering policy issues with widespread economic consequences, CGE modelling represents the standard approach adopted by central agencies within government. The main reason given for adopting CGE modelling is the ability of such models to account for resource constraints, particularly in the labour market, which is a critical issue when considering the economic impacts in Australia.

Australia has a long history of using applied CGE modelling to inform public policy dating back to the Industries Assistance Commission's use of the ORANI model in the debate around tariff protection in the early 1980s.

In broad terms the linkages represented in the CGE model are as follows: households are both consumers of products and providers of labour resources for which they receive income. Their demand for products across different sectors modelled is met by either local production or imports. Local firms can also sell both locally and overseas. Firms use various inputs as well as household labour in the production of goods and services. These include 'capital' which is expanded through investment in buildings, plant and equipment; in land; or in some cases, in natural resources. The owners of these other inputs also receive income. Sectors and inputs are taxed, and the government(s) will also spend on goods and services or investment goods. Finally, not all incomes are spent on goods and services, and this saving goes towards investment.[3]

In CGE models, markets are modelled to adjust until they clear by reaching a new equilibrium. The adjustment process includes flows of resources between sectors and adjustments to relative prices. In some markets (for example the labour market), reactions to price (wages) changes may be less responsive (inelastic). The current analysis includes the facility to examine this last effect.

The CGE model evaluates the effect of a 'shock' to the economy; effectively the model solves to obtain the new equilibrium after the shock. To examine the contribution of the nature-based outdoor economy, the sector was initially represented as having an increase in spending in the outdoor sector (the 'shock'), with flow on impacts for other sectors as the adjustment process works through the entire economy.

Appendix 2 Background to Cadence CGE

The estimates in this report are based on the Cadence Economics General Equilibrium Model (CEGEM).

A2.1 About CEGEM

CEGEM is an applied Computable General Equilibrium (CGE) model. CEGEM is a multi-commodity, multi-region, dynamic model of the world economy. Like all economic models, CEGEM is based on a range of assumptions, parameters and data that constitute an approximation to the working structure of an economy. Its construction has drawn on the key features of other economic models such as the global economic framework underpinning models such as GTAP (Global Trade Analysis Project) and GTEM (Global Trade and Environmental Model), with State and regional modelling frameworks such as Monash-MMRF (Multi-regional Forecasting Model) and TERM (The Enormous Regional Model).

Labour, capital, land and a natural resource comprise the four factors of production. On a year-by-year basis, capital and labour are mobile between sectors, while land is mobile across agriculture. The natural resource is specific to mining and is not mobile.

A representative household in each region owns all factors of production. This representative household receives all factor payments, tax revenue and interregional transfers. The household also determines the allocation of income between household consumption, government consumption and savings.

Capital in each region of the model accumulates by investment less depreciation in each period. Capital is mobile internationally in CEGEM where global investment equals global savings. Global savings are made available to invest across regions. Rates of return can differ to reflect region-specific differences in risk premiums.

The model assumes labour markets operate in a model where employment and wages adjust in each year so that, for example, in the case of an increase in the demand for labour, the real wage rate increases in proportion to the increase in employment from its base-case forecast level.

The model determines regional supplies and demands of commodities through optimising the behaviour of agents in perfectly competitive markets using constant returns to scale technologies. Under these assumptions, prices are set to cover costs and firms earn zero pure profits, with all returns paid to primary factors. This implies that changes in output prices are determined by changes in input prices of materials and primary factors.

The advantage of a global model such as CEGEM is that it accounts for bilateral trade flows of all commodities between regions. Goods are imperfect substitutes, implemented through the Armington assumption. The model does not require the regional current account to be in balance as the capital account can adjust to maintain balance of payments equilibrium.

A2.2 Base data

The starting point for the base data in CEGEM is the global database produced by the Global Trade Analysis Project (GTAP). This database is comprised of 140 country and regional groups and 57 production sectors. The Australian component of this database was supplied by the Productivity Commission, and is based on Australian input-output tables produced by the Australian Bureau of Statistics (ABS). For the purposes of this exercise, the database has been aggregated to the sectors shown in **Table 6**.

CEGEM is a model with customised regional detail. It models each region as an economy in its own right, with region-specific prices, region-specific consumers, region-specific industries, and so on. For this exercise, the regions included in the model are New South Wales, Victoria, Queensland, Western Australia, South Australia, Tasmania, Northern Territory, Australian Capital Territory (ACT) and Rest of the World.

Table 6: Sectors and Regions represented in CEGEM

Number	Sector	Number	Region
1	Agriculture	1	New South Wales
2	Coal	2	Victoria
3	Oil	3	Queensland
4	Gas	4	Western Australia
5	Other Minerals	5	South Australia
6	Processed Foods	6	Tasmania
7	Manufacturing	7	Northern Territory
8	Electricity	8	ACT
9	Water	9	Rest of World
10	Construction		
11	Trade		
12	Transport		
13	Communications		
14	Financial Services		
15	Other Business Services		
16	Recreational Services		
17	Government Services		

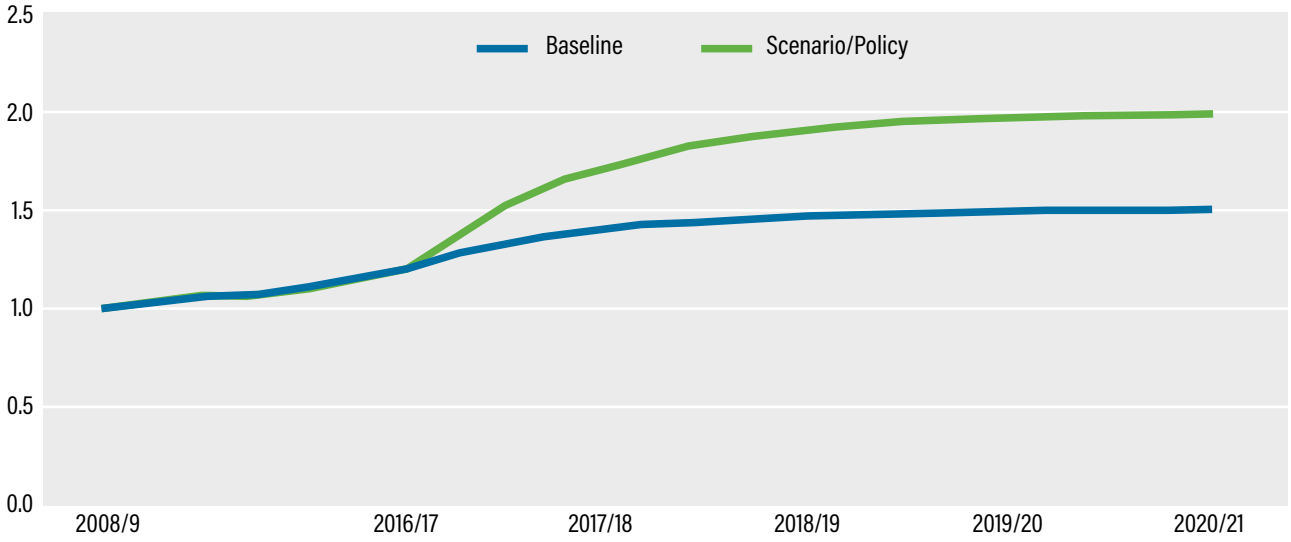
A2.3 Dynamics

CEGEM is a recursive dynamic model that solves year-on-year over a specified timeframe. The model is then used to project the relationship between variables under different scenarios, or states, over a predefined period. This is illustrated in **Figure 1.** This shows the baseline scenario, which forms the starting point for the analysis. The model is solved year-by-year from 2016/17 to a predetermined end year (in this case 2020/21).

The variable represented on the vertical axis of **Figure 1** (real GDP, for example, and similarly for various other economic indicators) has been converted to an index (= 1.0 in 2016/17) projected to increase by 2020/21.

Set against the baseline scenario is a policy scenario (the future path for the economy with all else held equal, but with (say) the specifications of a taxation reform or an industry intervention imposed). This scenario represents the outlook for the economy with a different policy imposed compared with the baseline. That results in a new projection of the path of the variable over the simulation time period. The impacts of the policy change are the deviation (in levels, that is, GDP Policy – GDP Baseline) between the policy and baseline scenarios for that variable at time T. It is important to note that the differences between the baseline and policy scenarios are tracked over the entire timeframe of the simulation.

Figure 1: Illustrative dynamic scenarios using CEGEM



Appendix 3 Inputs and assumptions

Outdoor recreation provides a range of benefits to Australians. In addition to those related to improved health outcomes and pure enjoyment from the activities, the outdoor sector is a significant part of the economy. Taking this sector and considering the linkages across the economy allows us to estimate its contribution.

A3.1 Inputs

The inputs to the CGE model represent the shock. We used the analysis contained in our earlier companion reports as the basis for the shock.

Our companion reports on outdoor recreation across the States and Territories provide estimates of the level of spending by different sectors of the economy: private consumers, business investment in outdoor facilities, and government expenditure on providing new outdoor infrastructure and ongoing payments for outdoor services and maintaining the infrastructure.

This current analysis takes these expenditures as representative of the overall size of the outdoor economy. To find out how spending in the outdoor recreation sector affects the overall economy, we looked at the effects of our estimates of private and public investment in outdoor recreation facilities. These figures are new investments and not replacements or upkeep of existing facilities.

The inputs or shocks reflect private investment and consumption and government investment by States and Territories in one year and are shown in ***Table 7***. For this analysis, we have included investment of the order of $1,180 million and consumer spending of $20,130 million in an economy of around $1.5 trillion.

Table 7: Inputs

Jurisdiction	Investment into outdoor recreation facilities ($ million)	Consumption expenditure ($ million)
NSW	$95.64	$7,055
Vic	$101.76	$6,938
Qld	$338.02	$3,176
SA	$117.54	$614
WA	$344.44	$1,579
Tas	$37.47	$281
NT	$136.62	$343
ACT	$8.52	$146
Total	**$1,180**	**$20,132**

Source: Marsden Jacob analysis

Note: Public consumption was not included as it was considered to predominantly represent upkeep of existing infrastructure.

A3.2 Assumptions

The modelling covers two broad scenarios. The first is the contribution of the total outdoor recreation sector to Australia as a whole. The second is the contribution to each State and Territory of the outdoor recreation sector in that State or Territory. This second element of the analysis is reported in **Appendix 4**.

It is important to point out that the first is not just the sum of the second, due to the crowding in and out of States outside the one being measured.

The impacts on the trade, transport and recreational services sectors are provided by the combined non tourism and tourism consumption estimates derived by Marsden Jacob previously. The investment shock shown in ***Table 7*** is derived from the combined public and private investment numbers derived by Marsden Jacob.

The public consumption number has not been included – as noted above this includes expenditure on maintenance of existing government facilities, which will be captured within the model. To add this estimate would risk double counting.

The modelling undertaken assumes that funding the investment does not compete with other sectors for capital. This is a standard approach when doing contribution analyses in CGE models in general but is particularly appropriate given much investment in the outdoor recreation sector is genuinely sector-specific.

In addition, funding for all investment (private and public) is met by global savings. This means there is no change in tax rates associated with public spending (nor crowding out of other public projects).

As noted in section 2.1, the labour market is one sector where there may be some variation in its responsiveness to shocks. For this reason, two estimates of the responsiveness of the labour supply (its elasticity) have been used. The low estimate expects the labour supply to increase by 1.5% for a 10% increase in wages, while the high one expects the labour supply to increase by 3% for a 10% increase in wages. These numbers are consistent with recent work by the Federal Treasury. Previous analysis has indicated that competition between the production sectors for labour is one of the key avenues of crowding out in the model. One area where this is very evident is the manufacturing sector.

Appendix 4 Separate State and Territory impacts

In addition to the impacts of outdoor recreation across the country, we looked at each State and Territory's individual impact. These show the effect in each State and Territory as if there were not any outdoor recreation investments in the rest of Australia.

Separate estimates were generated for each State and Territory based on the private consumption and investment and public investment in outdoor recreation. These estimates differ from those reported in the main body of the report as they reflect the impact of each State and Territory's outdoor recreation sector as a standalone analysis.

The tables show the impact on GSP and employment in each jurisdiction using the more responsive labour market analysis.

In terms of output, there is a similar pattern of impacts in each jurisdiction with recreation, trade and transport benefiting and manufacturing output mainly negatively affected.

Table 8: Impacts on output from outdoor recreation in each state and territory ($, millions)

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT
Agriculture	-$148	-$238	-$66	-$34	-$74	-$14	-$14	$0
Coal	-$204	-$4	-$259	$0	-$2	$0	$0	$0
Oil	-$24	-$213	-$17	-$8	-$49	-$1	-$55	$0
Gas	-$12	-$87	-$22	-$19	-$4	$0	-$1	$0
Other Mining	-$36	-$119	-$60	-$12	-$75	-$6	-$39	$0
Manufacturing	-$374	-$2,167	-$240	-$193	-$163	-$2	-$7	-$4
Electricity	$67	-$25	-$24	$0	$10	-$2	$1	$1
Water and Waste	$28	$21	$3	-$1	-$5	$0	$0	$1
Construction	-$21	$94	$228	$75	$167	$17	$31	$3
Trade	$1,758	$4,705	$1,559	$356	$947	$149	$115	$93
Transport	$1,059	$447	$161	$51	$126	$26	$46	$11
Communications	$139	$87	$38	$15	$27	$7	$4	$3
Finance and Insurance	$25	$79	$6	$10	$10	$4	$0	$2
Other Business Services	$320	$573	$220	$53	$116	$13	$17	-$31
Recreation	**$4,237**	**$1,786**	**$645**	**$206**	**$505**	**$106**	**$183**	**$42**
Other Services and Government	$582.86	$285	-$41	$21	-$6	$23	$12	$33

In terms of each jurisdiction, most experienced greater GSP and employment while other jurisdictions tended to be partly offsetting.

Table 9: New South Wales

	GDP (% change)	Employment (% change)
NSW	**1.1%**	**0.3%**
Vic	0.0%	0.0%
Qld	-0.1%	0.0%
SA	0.0%	0.0%
WA	-0.2%	-0.1%
Tas	0.0%	0.0%
NT	-0.4%	-0.1%
ACT	0.2%	0.1%

Table 10: Victoria

	GDP (% change)	Employment (% change)
NSW	0.0%	0.0%
Vic	**1.1%**	**0.4%**
Qld	-0.1%	0.0%
SA	0.1%	0.0%
WA	-0.2%	-0.1%
Tas	0.1%	0.1%
NT	-0.3%	-0.1%
ACT	-0.1%	-0.1%

Table 11: Queensland

	GDP (% change)	Employment (% change)
NSW	0.0%	0.0%
Vic	0.0%	0.0%
Qld	**0.5%**	**0.2%**
SA	0.0%	0.0%
WA	0.0%	0.0%
Tas	0.0%	0.0%
NT	-0.1%	0.0%
ACT	0.1%	0.0%

Table 12: South Australia

	GDP (% change)	Employment (% change)
NSW	0.0%	0.0%
Vic	0.0%	0.0%
Qld	0.0%	0.0%
SA	**0.4%**	**0.1%**
WA	0.0%	0.0%
Tas	0.0%	0.0%
NT	0.0%	0.0%
ACT	0.0%	0.0%

Table 13: Western Australia

	GDP (% change)	Employment (% change)
NSW	0.0%	0.0%
Vic	0.0%	0.0%
Qld	0.0%	0.0%
SA	0.0%	0.0%
WA	**0.5%**	**0.2%**
Tas	0.0%	0.0%
NT	0.0%	0.0%
ACT	0.1%	0.0%

Table 14: Tasmania

	GDP (% change)	Employment (% change)
NSW	0.0%	0.0%
Vic	0.0%	0.0%
Qld	0.0%	0.0%
SA	0.0%	0.0%
WA	0.0%	0.0%
Tas	**0.7%**	**0.3%**
NT	0.0%	0.0%
ACT	0.0%	0.0%

Table 15: Northern Territory

	GDP (% change)	Employment (% change)
NSW	0.0%	0.0%
Vic	0.0%	0.0%
Qld	0.0%	0.0%
SA	0.0%	0.0%
WA	0.0%	0.0%
Tas	0.0%	0.0%
NT	**0.8%**	**0.4%**
ACT	0.0%	0.0%

Table 16: Australian Capital Territory

	GDP (% change)	Employment (% change)
NSW	0.0%	0.0%
Vic	0.0%	0.0%
Qld	0.0%	0.0%
SA	0.0%	0.0%
WA	0.0%	0.0%
Tas	0.0%	0.0%
NT	0.0%	0.0%
ACT	**0.3%**	**0.1%**

Footnotes

1 https://www.ibisworld.com.au/media/2016/08/10/australias-growth-industries/

2 https://www.ibisworld.com.au/media/2016/08/10/australias-growth-industries/

3 There are a number of introductory texts on CGEs. For example, see the introductory chapters of Burfisher, M (2011) Introduction to Computable General Equilibrium Models, Cambridge, which is used for teaching CGE using the Global Trade Analysis Project (GTAP) model.

Acronyms and abbreviations

CGE Computable general equilibrium. An economic approach to estimate the impact of changes in spending or policy on an economy after removing leakages.

IO Input-output. A measure of the average inputs associated with outputs in the economy.

FTE Full-time equivalent. Reports employment effects in terms of full-time jobs.