

Economic Contribution of Recreational Fishing in the Murray Darling Basin

Department of Primary Industries

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ERNST & YOUNG



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8 August 2011

Mr Anthony Forster Fisheries Victoria Department of Primary Industries 1 Spring Street Melbourne VIC 3000

Reliance restricted

#### Economic contribution of recreational fishing in the Murray Darling Basin

Dear Anthony

In accordance with our proposal and engagement agreement, we are pleased to present you with the economic study of recreational fishing in the Murray Darling Basin (the Report).

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#### Basis of our work

We have performed research and analysis using information from the Department of Primary Industries, Ernst & Young's 2009 Study of the Recreational Fishing Sector in Victoria (prepared for VRFish) and other publicly available sources, which were available to us within the timeframe specified for preparation of the Report. We have not independently verified, or accept any responsibility or liability for independently verifying, any such information nor do we make any representation as to the accuracy or completeness of the information. We accept no liability for any loss or damage, which may result from your reliance on any research, analyses or information so supplied.

Please contact me on (03) 9655 2551 if you have any questions about the contents of this Report.

Yours sincerely

(Dr) David A Cochrane Partner Ernst & Young

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## Key findings

This study identifies the economic contribution of recreational fishing in the Murray Darling Basin (MDB) using the results of existing economic studies.

Key findings for 2010-11 include:

- Direct expenditure ranges between \$571 million and \$1,686 million, with a most likely estimate of \$1,352 million;
- Direct value added expenditure ranges between \$158 million and \$468 million, with a most likely estimate of \$375 million;
- Contribution to Gross Domestic Product (GDP) ranges between \$170 million and \$503 million, with a most likely estimate of \$403 million; and
- Contribution to employment ranges between 4,623 jobs and 13,660 jobs, with a most likely estimate of 10,950 jobs.<sup>1</sup>

Sensitivity results<sup>2</sup>



distribution of the range of outcomes in our economic modelling.

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<sup>&</sup>lt;sup>1</sup> Minimum and maximum results have been presented at the 5% and 95% confidence intervals respectively.

<sup>&</sup>lt;sup>2</sup> Sensitivity analyses were performed to test changes in critical assumptions. The analysis presents the

## 1. Introduction

#### 1.1 Recreational fishing in the Murray Darling Basin

The Murray Darling Basin (MDB) is Australia's largest river system, covering more than one million square kilometres of land in south-eastern Australia (around 14 per cent of Australia).<sup>3</sup> The Basin sits across New South Wales (NSW), Victoria, Queensland, South Australia and the Australian Capital Territory (ACT).

Recreational fishing<sup>4</sup> in the MDB comprises inland fishing activities across the Basin's rivers and waterways. While fishing methods vary, fishers generally use a range of natural live, dead or artificial baits, and a wide variety of lures. Fishers can also be land-based or boatbased.

Recreational fishers target a range of native and introduced (non-endemic) species. Strict bag and size limits apply to all recreational take of native fish.

Species typically targeted by recreational fishers in the MDB are listed below.

Table	1:	Species	targeted	bv	recreational	fishers i	n MDB
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Native species	Introduced species	
<ul> <li>Murray cod (listed as threatened)</li> <li>Golden perch</li> <li>Trout cod (listed as threatened)</li> <li>Macquarie perch (listed as threatened)</li> <li>River blackfish (listed as threatened)</li> <li>Freshwater crayfish, including yabbies and various spiny crayfish</li> </ul>	<ul> <li>Brown trout</li> <li>Rainbow trout</li> <li>Redfin</li> <li>European carp</li> </ul>	

#### 1.2 Purpose of study

This study estimates the economic contribution of recreational fishing in the MDB using the results of existing economic studies. The following three measures of economic activity have been identified:

- Direct expenditure which is measured as the value of total sales for recreational fishing in the MDB;
- Direct value added expenditure which is measured as the value of wages and profits directly generated from recreational fishing in the MDB; and
- Wider economic contribution which is measured as the wider effect of recreational fishing in the MDB on the economy in terms of its contribution to Gross Domestic Product<sup>5</sup> (GDP) and employment.

<sup>&</sup>lt;sup>3</sup> Murray Darling Basin Ministerial Council, Native Fish Strategy for the Murray-Darling Basin 2003-2012, 2003.

<sup>&</sup>lt;sup>4</sup> Recreational fishing has been defined as any fishing activity which is not undertaken for commercial purposes. There is a large variety in recreational fishing activities

<sup>&</sup>lt;sup>5</sup> For the purpose of this study, Gross Domestic Product is calculated as the sum of all value added expenditure in the national economy.

The linkages between these concepts and the methodology used to identify the economic contribution of recreational fishing are illustrated in Figure 1 below.





In order to identify a point estimate for the direct expenditure of recreational fishing in the MDB, we have adopted the equation below:

No. of recreational fishers in the MDB x expenditure per fishing trip (\$)x no. of fishing trips taken per fisher per year = Direct expenditure of recreational fishing in the MDB

The direct value added expenditure and economic contribution of recreational fishing have been calculated using standard economic approaches to measure these outputs. These approaches are discussed in Section 4 of the Report.

It is important to note this study represents an economic contribution study, not an economic impact study, or a cost benefit study. An economic contribution study is likened to an economic accounting exercise for a specific period that seeks to capture all of the market-related activity flows for the recreational fishing industry. In this context, economic contribution should be distinguished from economic impacts. Economic impacts are normally assessed where a specified change (or 'shock') to the status quo is quantified (e.g., a "with recreational fishing" scenario compared to a "without recreational fishing" scenario). An economic impact study also requires the consideration of a counter factual scenario (that is, what would people spend their money on in the absence of recreational fishing?).

#### 1.3 Limitations

Ernst & Young has not undertaken primary research for recreational fishing in the MDB. Instead, we have adopted a "benefits transfer" approach by applying the results of the Ernst & Young Economic Study of Recreational Fishing in Victoria (prepared for VRFish in 2009) and other publicly available information. Sensitivity analyses have been undertaken to identify the potential range of outcomes should key assumptions change. These analyses are presented in Section 4.5 of the Report.

In order to make the estimates more reliable, it is recommended a survey be undertaken specifically relating to recreational fishers in the MDB.

## 2. Economic studies of recreational fishing

This section of the Report details some of the studies that have been reviewed on the economic contribution of recreational fishing.

# 2.1 Ernst & Young economic study of recreational fishing in Victoria (2009)

Ernst & Young completed an economic study of recreational fishing to identify the net benefit and economic contribution of recreational fishing to Victoria in 2008-09. This drew on the outcomes of a recreational fishing survey completed for the study which determined the demographic and economic characteristics of Victorians who participate in recreational fishing. The survey received 1,037 responses, making the results significant for the Victorian population.

The results of the study reflect the value of recreational fishing completed in Victoria by Victorians during this period. The additional impact of recreational fishing in Victoria by non-Victorian tourists was not considered.

Key findings include:

- Around 721,000 Victorians participated in recreational fishing in 2008-09;
- ▶ The number of fishing trips taken in Victoria is around 12 per year per fisher;
- The average expenditure per trip per fisher is around \$250 inclusive of variable costs (such as accommodation, bait, fuel etc) and fixed costs (such as equipment and capital);
- The activity direct expenditure was \$2.3 billion in 2008-09 and estimated to increase to \$2.9 billion in 2028-29;
- ► The industry produced an estimated total Gross State Product (GSP) of \$825 million in 2008-09, representing 0.3% of the total Victorian GSP; and
- The recreational fishing industry contributed 5,200 jobs in Victoria in 2008-09 (including flow on jobs).

# 2.2 National recreational fishing survey - economic report (2005)

A national survey of recreational and indigenous fishing in Australia was conducted during 2000-01 by the Department of Agriculture, Fisheries and Forestry (DAFF). This was the first comprehensive national examination of the non-commercial components of Australian fisheries. The survey obtained estimates of the level of participation, fishing effort and catch by recreational and indigenous fishers, as well as economic activity associated with recreational fishing and the attitude of recreational and indigenous fishers at a national, state and regional level.

A survey report was produced in 2003<sup>6</sup>, which provided a detailed background to the survey and the methodology used to collect recreational fishing data and the process by which the data was expanded to the national population. The survey monitored fishing and fishing-related expenditure activities between May 2000 and April 2001, and generated a statistically robust set of expenditure and catch data.

<sup>&</sup>lt;sup>6</sup> See Henry, G and Lyle, J. (eds), *The National Recreational and Indigenous Fishing Survey*, FRDC Project no.99/158 (2003).

In 2005, the Economic Report<sup>7</sup> was published with outcomes based on the survey and expenditure data.

The national recreational fishing survey provides information on expenditure levels (see Table 2 below). These levels are lower than the 2009 Ernst & Young report. The reason these expenditure levels differ on a per trip and annual capital spend level is most likely due to a broader interpretation of travel and accommodation expenditure, the inclusion of boat maintenance and a broader inclusion of annual equipment expenditure applied in the Ernst and Young report.

The results in Table 2 below are from May 2000 to April 2001.

Jurisdiction	Recreational fishers (no)	Participation rate of recreational fishers (%)	Attributable expenditure (\$m)	Average fisher expenditure (\$)
NSW	998,501	17.1	554.204	555
VIC	549,803	12.7	396.27	721
QLD	785,045	24.7	319.57	407
SA	328,227	24.1	148.48	452
WA	479,425	28.5	338.38	706
TAS	124,590	29.3	51.83	416
NT	43,932	31.6	26.70	608
ACT	53,467	19.2	19.36	362
AUS	3.362.990	19.5	1.854.80	552

Table 2: Estimated number and expenditure for recreational fishers aged 5 years and older.

Source: National Recreational and Indigenous Fishing Survey, DAFF (2003)

# 2.3 Ernst & Young economic study of recreational fishing in Victoria, Murray Cod assessment (2010)

Ernst & Young completed an economic study to identify the economic contribution of recreational fishing for Murray Cod in Victoria in 2009-10. This study utilised the results of the 2009 Ernst & Young study.

Key findings include:

- ► The direct expenditure on recreational fishing for recreational fishers who specifically target Murray Cod was estimated to be \$166.7 million in 2009-10;
- The economic contribution to Gross State Product of recreational fishing for recreational fishers who specifically target Murray Cod was estimated to be \$59.0 million in 2009-10; and
- The economic contribution to employment (industry and flow on jobs) of recreational fishing for recreational fishers who specifically target Murray Cod was estimated to be 374 jobs.

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<sup>&</sup>lt;sup>7</sup> See Campbell, D and Murphy, J., *The 2000-01 National Recreational Fishing Survey: Economic Report*, FDRC Project no.99/158 (2005).

# 3. Participation in recreational fishing in the MDB

This section of the Report presents the number of recreational fishers in the MDB. This is used to estimate the direct expenditure of recreational fishing, as discussed in Section 4.

#### 3.1 Number of recreational fishers

In order to estimate the number of recreational fishers in the MDB, this study applies a participation rate to the MDB resident population.

#### 3.1.1 Population of MDB

The estimated population of the MDB for 2010 is outlined below. This estimate is based on 2006 census data, cited in the 2008 Australian Bureau of Statistics (ABS) Report "Water and the Murray Darling Basin – A Statistical Profile". This data was projected forward to 2010 using regional population growth rates for each jurisdiction.

Jurisdiction		Population	
	2006	2010	Change 2006-10 (%)
NSW	775,640	813,275	4.9
VIC	575,980	611,521	6.2
QLD	217,310	238,983	10.0
SA	112,300	117,440	4.6
ACT	323,330	346,992	7.3
MDB	2,004,560	2,128,212	6.2

#### Table 3: Population of Murray Darling Basin

Source: Water and the Murray Darling Basin – A Statistical Profile, Australian Bureau of Statistics (2008) and Regional Population Growth, Australia, Australian Bureau of Statistics (2011)

#### 3.1.2 Participation rate

The participation rate of the MDB resident population in recreational fishing has been estimated using relevant data from the National Recreational and Indigenous Fishing Survey Report. This survey estimates the proportion of the MDB resident population aged over five years who fished recreationally in the 12 months prior to May 2000 by Statistical Division across Australia.

In order to identify the most appropriate rates for use in this study, the Murray Darling Basin Authority (MDBA) identified the relevant Statistical Division's that are broadly aligned with the MDB region. The participation rates in Table 4 were constructed by deriving the participation rates of identified Statistical Divisions for each jurisdiction.

Table 4: Proportion of MDB resident population	n who are recreational fishers aged over 5
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Jurisdiction	Proportion of MDB resident population who are recreational fishers aged over 5 years old (%)
NSW	21
VIC	19
QLD	20
SA	31
ACT	18

#### 3.1.3 Number of recreational fishers aged 5 and over living in the MDB

Using each jurisdiction's participation rate and the relevant population estimate, the number of recreational fishers living in the MDB by jurisdiction has been estimated. As can be seen below, the number of recreational fishers in the MDB is around 430,000. Of these fishers, 39% live in NSW, 27% live in Victoria and the remainder are spread across ACT, Queensland and South Australia.

Jurisdiction	No. of recreational fishers aged over 5	Proportion of recreational fishers living in the MDB by jurisdiction (%)
NSW	168,661	39
VIC	115,448	27
QLD	48,395	11
SA	36,137	9
ACT	61,216	14
MDB	429,857	100

Table 5: Number of recre	ational fishers living	in the Murray	/ Darling Basin
	acional nonci o nving	, in the main a	Barning Basin

#### 3.1.4 Number of trips per fisher

In order to understand the level of activity generated by recreational fishing each year, the total number of annual fishing trips has been estimated. This estimate uses results from the 2009 Ernst & Young study which found that, on average, recreational fishers took around 12 trips per fisher per year. It is important to note that a limitation of this study is the application of Victorian specific results to the MDB. Given this limitation, we have applied sensitivity analyses to identify the impact on key results, should activity be higher or lower. The results of this analysis are included in Section 4.5.

It is also important to note that the current analysis assumes that exporting and importing activities are neutral (i.e. the number of fishing trips undertaken by MDB residents outside the MDB is the same number of trips undertaken by non-MDB residents within the MDB). While the number of fishing trips in the MDB may exceed the number attributable to recreational fishers living in the MDB alone, the current analysis did not find any data to support this hypothesis. For simplicity, therefore, we have adopted a conservative assumption. Further research may yield a different value.

-	•
Item	No.
Annual number of fishing trips per fisher	12
Total annual number of fishing trips	5,158,282

Table 6: Estimated annual fishing trips

# 4. Economic contribution of recreational fishing

This section of the Report presents the economic contribution of recreational fishing in the MDB. The following three measures of economic activity have been identified:

- ► Direct expenditure;
- ► Direct value added expenditure; and
- ► Wider economic contribution.

The linkages between these outcomes and the methodology used to identify the economic contribution are illustrated below.

#### Figure 2: Project methodology



In order to identify the point estimate for direct expenditure, we have adopted the following equation:

No. of recreational fishers in the MDB x expenditure per fishing trip (\$) x no. of fishing trips taken per fisher per year = Direct expenditure of recreational fishing in the MDB

It is important to note that the estimated expenditure level represents 2010-11 turnover and not all monies necessarily retained in the region. In addition, the direct value added expenditure and wider economic contribution of recreational fishing have been calculated using standard economic approaches to measure these outputs, as discussed below.

#### 4.1 Estimated expenditure per fisher

Expenditure per fisher has been estimated using results from the 2009 Ernst & Young study. This study found that, on average, recreational fishers in Victoria spent around \$250 per fishing trip in 2008-09. In order to estimate the 2010-11 values from the 2008-09 survey data, dollar values were escalated by the growth in the national Consumer Price Index (CPI) between 2008 and 2010. Based on this rate of growth, spend per trip becomes \$262.

Expenditure item	Cost per trip (\$)
Tackle and equipment	15.6
Bait	14.8
Food and accommodation	81.0
Fuel and transport	52.5
Boat hire	12.6
Fuel for boat	12.0
Any other areas of expense	61.8
Total (2008-09)	250.3
Total (2010-11)	262

#### Table 7: Per trip expenditure estimates

Source: Ernst & Young (2009)

As noted above, a limitation of this study is the application of Victorian results to the MDB. In this context, sensitivity analyses have been performed to identify the impact on key results, should expenditure levels be higher or lower than those found in the 2009 study. The results of this analysis are included in Section 4.5.

#### 4.2 Direct expenditure

The direct expenditure on recreational fishing within the MDB for 2010-11 is estimated to be around \$1.35 billion. This estimate is the product of expenditure per trip and the total number of trips per fisher per year.

The results of the expenditure analysis by jurisdiction are outlined below.

 Table 8: Direct expenditure of recreational fishing in Murray Darling Basin

Jurisdiction	Direct expenditure (\$m)
NSW	530
VIC	363
QLD	152
SA	114
ACT	192
MDB	1,352





#### 4.3 Direct value added expenditure

As part of the current analysis, direct expenditures have been converted into "value added" estimates to identify the direct value added expenditure of recreational fishing in the MDB. Put simply, direct value added expenditure provides a measure of the net contribution of the sector calculated as the value of all wages and profits. Value added estimates are used as a standard measure of economic contribution because they remove inadvertent double counting and provide a meaningful basis for comparison across industries.

The cost structure of the recreational fishing sector outlined below has been developed using IBIS World industry financial benchmark data for the industries that generate key inputs for the sector.

Figure 4: Cost structure of recreational fishing sector



Assuming that value add comprises 28% of direct expenditure, recreational fishing in the MDB has been estimated to generate around \$375 million in direct value add for the region.

Table 9: Direct value added expenditure

Item	Value add for recreational fishing (\$m)		
Profit	94		
Wages	281		
Total direct value added expenditure	375		

## 4.4 Wider economic contribution of recreational fishing in the MDB

To estimate the wider economic contribution of recreational fishing in the MDB to the Australian economy, an input-output (I-O) methodology has been used for calculating flowon impacts. This involves working backwards from the sale to final users to examine the various contributions to the creation of the final project, or product. This works through the supply (or value) chain for that product or service and identifies all of the trades that take place between contributing businesses.

For this study, expenditure per trip data was disaggregated into industry groups to identify the key industry inputs. We then applied direct value added expenditure to the relevant value add multipliers for industry groups to identify the wider economic contribution. The multipliers used for this analysis were developed by the Centre of Policy Studies (CoPS) from Monash University and are derived from their general equilibrium model.

Based on the analysis undertaken, forecast economic contribution outcomes have been produced for GDP and employment. The key findings of this analysis are presented below.

Industry	Value			
Contribution to GDP (\$m)	403			
Contribution to jobs (Australia) (no.)	10,950			

Table 10: Economic contribution

#### 4.5 Sensitivity analysis

To understand the impact to the economic contribution of recreational fishing should key assumptions change, sensitivity analyses have been performed. Specifically, 10,000 Monte Carlo simulations were performed where numerous assumptions were allowed to vary at once to observe their impact on key results.

Monte Carlo simulations apply randomly selected combinations of the assumptions to observe the impact on the key results. The selection of the alternative assumptions in the simulations are constrained by the minimum and maximum values (as presented in Table 11), with the sampling following a triangular distribution<sup>8</sup>.

Assumption	Minimum	Most likely	Maximum
No. of recreational fishers (Base: 429,857 fishers)	80% of base	100% of base	120% of base
Expenditure per fisher per trip (Base: \$250 per trip in 2008-09)	\$175	\$250	\$325
Trips per fisher per year (Base: 12 trips per fisher per year)	3 trips	12 trips	15 trips

Table	11:	Alternative	assumptions	adopted i	n Sensitivitv	analysis
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#### 4.5.1 Results - Monte Carlo Simulations

The distribution of the results from the Monte Carlo simulations is presented below. The minimum and maximum results have been presented at the 5% and 95% confidence intervals respectively.

Table	12:	Distribution	of	results
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	Minimum (p5)	Mean	Maximum (p95)	Most likely estimate
Direct expenditure (\$m)	571	1,126	1,686	1,350
Direct value add expenditure (\$m)	158	312	468	375
Contribution to GDP (\$m)	170	336	503	403
Contribution to employment (no. of jobs)	4,623	9,117	13,660	10,950

Figure 5: Monte Carlo simulation results for direct expenditure (2010-11)



#### Direct expenditure

<sup>8</sup> A triangular distribution consists of three point estimates. The minimum, most likely and maximum estimates. Department of Primary Industries

Figure 6: Monte Carlo simulation results for value added expenditure (2010-11)



Figure 7: Monte Carlo simulation results for contribution to GDP (2010-11)



Figure 8: Monte Carlo simulation results for contribution to employment (2010-11)



Contribution to employment

### 5. Conclusions and further research

This study has estimated the economic contribution of recreational fishing in the MDB using research and data included in existing studies. The impact of such an approach is that some of the estimates developed in these studies may not be appropriate when applied to the MDB. For instance, recreational fishing in the MDB may be less costly than in Victoria.

Given the lack of up-to-date data, further research could be undertaken to better understand the economic contribution of recreational fishing in the MDB by using appropriate surveying techniques.

Once the population, activity and expenditure profiles were constructed, estimates could be developed for the following:

- Direct economic contribution The size of the recreational fishing sector in the Murray Darling Basin in terms of its economic contribution; and
- Wider impacts The importance of recreational fishing as a source of expenditure in regional economies, including multiplier impacts.

Surveying could also provide data on the social impacts of recreational fishing (such as consumer surplus and willingness to pay), not just economic impacts, which could enable a wider benefit analysis of recreational fishing in the region to be completed.

## Appendix A Release notice

Ernst & Young was engaged on the instructions of the Department of Primary Industries ("Client") to undertake an economic study of recreational fishing in the Murray Darling Basin ("Project"), in accordance with the engagement agreement dated 15 June 2011 ("Engagement Agreement").

The results of Ernst & Young's work, including the assumptions and qualifications made in preparing the report, are set out in Ernst & Young's report dated 8 August 2011 ("**Report**"). You should read the Report in its entirety including the Engagement Agreement, disclaimers and attachments. A reference to the Report includes any part of the Report. No further work has been undertaken by Ernst & Young since the date of the Report to update it.

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