A socio—economic evaluation of the commercial fishing industry in the Ballina, Clarence and Coffs Harbour regions.

John Harrison – Principal Investigator





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A socio—economic evaluation of the commercial fishing industry in the Ballina, Clarence and Coffs Harbour regions

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CONTENTS

Non Technical Summary	4
Acknowledgements	6
Background	6
Need	6
Objectives	7
Methods	7
1. Background research	7
2. Stakeholder Consultation	7
3. Socio-Economic Assessment	8
4. Impact Assessment	8
5. Reporting	8
Results/Discussion	8
Benefits and adoption	8
Planned outcomes	9
Conclusion	9
Attachment one	10
Questionnaire	10
Attachment two	13
A Socio-Economic Evaluation of the Commercial Fishing Industry by Simon McVerry	13

NON TECHNICAL SUMMARY

The commercial fishing industry is constantly under pressure from a number of fronts in relation to continued access to resources, involvement in the supply of sustainable seafood for Australians and, a perception that the industry is here for today but not tomorrow.

These issues have and will continue to be problematic for the industry unless we can address them through an ongoing series of studies that clearly emphasise the benefits that the industry provides to the local economies along the coast where they operate from. This report is a repeat of the 1995 study on the Clarence River but it has been broadened to include the Ballina and Coffs Harbour regions.

This report provides a picture of the value and flow-on benefits that the commercial fishing sector delivers to the mid and north coast of NSW. The report looks at the social and economic benefits from the commercial fishing industry activities along the coast line of the areas focused on.

Within the report 7 fisheries are covered – lobster, estuary general, estuary prawn trawl, ocean haul, ocean trawl, ocean trap and line and eastern tuna and billfish. In addition there are various sections discussing the regulations, the environment, catch processing and conclusions from the study data. In addition the various factors affecting the fishing industry, the supply of seafood, a comparison to the 1995 study, employment and the flow-on value that the industry delivers to the local areas.

The weight and value of product caught and processed by the industry show its continued operation is vitally important, both economically and socially, for the local and regional economies in which it operates. These benefits are quantified in the economic modelling conducted as part of this report which identified the following total (sum of the direct and indirect) flow-on impacts arising from the operation of the industry:

- Ballina
 - Output of \$16.9 million
 - Income generated \$2.9 million
 - 75 Employment positions generated
- Clarence
 - Output of \$92.0 million
 - Income generated \$15.4 million
 - o 431 Employment positions generated
- Coffs Harbour
 - Output of \$46.0 million
 - Income generated 8.4 million
 - o 221 Employment positions generated
- Northern NSW
 - Output of \$216.0 million
 - Income generated \$36.1 million
 - 933 Employment positions generated

The commercial fishing industry continues to make a significant contribution in terms of output, income and employment.

- Two-thirds of the money generated by the operation of the industry is spent in the local and regional economies.
- The great majority of employment opportunities associated with the industry are filled from the local communities in which the industry operates.
- The industry in Northern NSW provides about one-third of the product (fish) landed in the whole of NSW.

ACKNOWLEDGEMENTS

The Professional Fishermen's Association Inc (PFA) would like to thank Phil Hilliard, Ballina Fishermen's Cooperative, Sam La Spada, Coffs Harbour Fishermen's Cooperative, Kerry Essex, Clarence River Fishermen's Cooperative and NSW Fisheries for the provision of data to the Project Consultants. We also appreciate the time and support from Dr Kate Brooks for her expert comment and advice during this project.

Last but not least the PFA would also like to acknowledge and thank the Fishers who completed the survey questionnaire which provided feedback and data for the project.

BACKGROUND

In the mid 1990s the Clarence River Fishermen's Cooperative commissioned a socioeconomic study for the Clarence River only. This proved to be an invaluable tool and has been used numerous times since to support the commercial fishing industry on the River.

In 2008 the Clarence Professional Fishermen's Association, which was a division of the Clarence River Fishermen's Cooperative, was considering options for the future of the CPFA. With a decreasing membership of the CRFC the CPFA needed to either expand the geographic coverage of its functions and role or increase membership fees. The former was decided on.

With the establishment of the Professional Fishermen's Association being considered in the late part of 2008 and the early part of 2009 it was seen as appropriate that a second study be undertaken but with a wider geographic focus. The PFA was formally established in July 2009. Preliminary discussions were held with Ballina and Coffs Harbour Fishermen's Cooperatives to ascertain their willingness to participate and contribute to the proposed study. Both agreed, as did the Clarence River Fishermen's Cooperative, to each contribute \$4,000 cash to the project. The PFA committed \$2,000 cash.

The study was seen as a crucial element in the need for a strong data set for the various issues facing the industry e.g. a potential for increased recreational fishing havens, state and commonwealth marine planning processes and the pressure facing the industry from various poor perceptions that are evident within the wider general public arena.

NEED

The need to know the impacts and benefits to society from commercial fishing industry activities is essential. A like study commissioned by the CRFC in 1995 has been of immense value. Repeating and improving this now in the climate that faces the industry will provide a first benchmark for the Coffs Harbour and Ballina regions whilst allowing for comparative analysis in the Clarence region with the 1995 report.

With the inclusion of Coffs Harbour and Ballina in the study we have been able to assess on a regional basis the benefits that the industry has on the Mid North and North Coast of NSW. With challenges facing the viability of fishing cooperatives this evaluation will assist the cooperatives and the PFA in promoting the role, worth and importance of commercial fishing in their respective regions.

OBJECTIVES

- 1. Provide an historical account of the development of the commercial fishing industry in the three regions.
- 2. Describe the geographical characteristics, the human alterations, the fisheries habitats and the fish communities in the regions.
- 3. Provide a detailed account of the operations of the commercial fisheries including the harvesting and processing sectors and the commercial catch in the regions.
- 4. Assess the economic impact of the commercial fishing industry and describe the output, income generation, employment and flow-on benefits as a result of the operation of the industry in both the local and regional economies.
- 5. Examine the socio-economic benefits as a result of the presence and operation of the commercial fishing industry in the regions for the local community and economy.
- 6. Evaluate the three regions contribution to seafood security at the local, regional and State level.
- 7. Examine and comment on the capacity and effectiveness of the economic impacts and benefits of the fishing industry to the local and regional economies for the purpose of informing management of the industry.

METHODS

The PFA commissioned a Consultant (Native Foresters - Simon McVerry author of the 1995 report and Jane Davissen) to undertake the study with the following methodologies.

The proposed methodology to undertake the study would be as follows:

Background research

Review of relevant documents relating to information about the fisheries, for example:

Historical development of fisheries in the three regions

Geographical characteristics of the regions;

Fisheries habitat and communities of each region;

Existing operations including harvesting and processing;

Previous studies or assessments on the fisheries including social, economic and environmental assessments;

Census information for the regions;

Government agency reports, policies and plans including Federal, State (DPI) and Local (Council); and

Other relevant documents.

Stakeholder Consultation

Meeting with stakeholders, such as relevant members of each fishing cooperative for the three regions to discuss and survey current operations of the fisheries. This would also include meeting with relevant members involved in the harvesting and processing sectors. These meetings would also involve a discussion to ground-truth any of the findings of the desktop (background) research undertaken and to determine on-ground impacts associated with the declaration of marine protected areas.

A voluntary survey would be distributed to the commercial fishers in the region in order to determine baseline data for the socio-economic assessment. See attachment 1 for a copy of the survey.

Socio-Economic Assessment

Undertake an assessment of the social and economic significance of the commercial fishing industries in the Clarence River, Ballina and Coffs Harbour regions. This would include using an appropriate economic modelling technique to allow the quantification of the economic significance of this industry in terms of output, income generation, employment and flow-on effects.

Impact Assessment

Determine how government policy has affected the production of the three fisheries. Using baseline statistics of fish catch numbers from prior to the introduction of the marine protected area and comparing these to reported fish catch numbers following introduction of the marine protected areas. This information will then be analysed against a range of possible implicating factors i.e. seasonal variation, fishing effort etc to determine impacts on fisheries production.

Reporting

Prepare a report that details the findings of the study and compares the existing findings for the Clarence River and provides data for both the Ballina and Coffs Harbour fisheries.

RESULTS / DISCUSSION

Clearly the results and outcomes of this study will prove to be a tool of immense value to the fishing industry on the north coast. The resultant economic output, the employment benefits and the income generated is vital to the overall economies of the three study regions as well as the larger north coast province.

Economic modelling was undertaken independently by Lawrence Consulting. They were commissioned to undertake an assessment of the economic impact of the commercial fishing industry in the Northern New South Wales region (specifically, the major catchment areas of Ballina, Lower Clarence and Coffs Harbour) for the financial years of 2007/2008 and 2008/2009

The report has also been reviewed by Dr Kate Brooks Manager for the FRDC Social Science Research Coordination Program and David Galeano Senior Economist Australian Fisheries Management Authority.

BENEFITS AND ADOPTION

This report and its findings will allow the industry (Cooperatives, PFA, NSW SIC, Local Councils etc) to promulgate the results to the broader community and to support the industry in various forums when commercial fishing is discussed.

In the present climate of increasing pressure from marine planning and other arenas where the commercial sector is being threatened this report will allow the industry to defend its position on access and importantly clearly show the economic and social value of the industry. The report will be invaluable when dealing with local councils, state and federal departments and agencies and other groups or stakeholders.

It will provide a backbone to the argument to support continuing access to resources; it

will further reinforce the need for better management of the environment that carries fish (wetlands, mangroves, estuaries, sea grass beds, etc); the report will provide information to focus the debate on rehabilitation of these areas and; it will provide data and information on the need for government support for redevelopment and improvements to infrastructure that is vital to the ongoing viability of the on-shore facilities that process and transport the product to various markets.

PLANNED OUTCOMES

The outcome of the project is the report by consultant Native Foresters. Refer to Attachment two.

CONCLUSION

It is recommended that this study be replicated every five years. It is also recommended that its geographic base be expanded to include the major centres along the NSW coast line including, but not limited to, the following:

- Tweed Heads
- Ballina
- Evans Head
- Clarence
- Coffs Harbour
- Forster Tuncurry
- Port Stephens/ Great Lakes
- Newcastle
- Central Coast
- Hawkesbury

Further areas may need to be considered and depending on resources the future studies could be expanded to cover the entire commercial fishing industry in NSW. However this will need to be assessed when the timing of the next report/study is being considered.

The report by the consultants, Native Foresters, will be distributed to the NSW Fishing Cooperatives Association, NSW Seafood Industry Council, NSW Master Seafood Merchants, Sydney Fish Market, Ocean Watch, the Shire Councils in the study province, various NSW Departments and Agencies, appropriate Commonwealth Departments and Agencies and other stakeholders who may have an interest in its findings.

ATTACHMENT ONE

QUESTIONNAIRE

Confidential Questionnaire - Ballina

Nov 2009

Confidential Questionnaire

Commercial Fishers in Ballina

November 2009

- 1. What type of fishery do you operate in? (Tick all relevant boxes)
 - Estuary general Estuary prawn trawl Lobster Ocean haul Ocean trawl Ocean trap and line Spanner Crab Other

	,			

2. What type of Boat/s do you operate? (Please fill in table)

	Trawler	Power boat	Powered punt	Unpowered punt	Other
Engine horsepower					
Hull length (m)					
Approximate value of boat/s (\$)					
Approximate value of fishing gear (\$)					

3. How many crew / staff (including family members) do you employ throughout the year? (please fill in table)

Crew member	Full time	Part time	Season (months)	Average annual income (\$)	Age (20-25, 25-30, 35-40, 45-50, 50-55, 55-60, 60-65)	No. of people supported by crew member
1						
2						
3						
4						
5						

Nov 2009

4. Skipper details:

Age tick)	(please	25 - 30 50 - 55	30 - 35 55 - 60	35 - 40 60 - 65	40 -45 65 - 70	45 - 50 > 70	
Howr	nany years	have you worked	in this fishery?				
How r	How many people do you support (family / dependents) from your fishing income?						
How r	How many of those dependents are at school?						
Do you or your dependents belong to any local clubs (sporting, school, community, etc) or organisations? Please list.							

5. Fishing income and expenditure

What are you average annual operating and maintenance costs for 2008 – 2009 and where are they spent? (please fill in table below)

Type of expenditure (\$)	Co-operative (paid direct)	Ballina region	Northern NSW	Outside region
Co-operative deductions				
Fishing equipment				
Safety equipment				
Insurance				
Registrations				
Permits / Licences				
Boat & mechanical repairs				
Vehicle expenses				
Hardware				
Fuel				
Other				

What was your approximate annual gross income from fishing and fish related activities (after deckhands are paid) for last three years?

2006 2007	\$
2007 - 2008	\$
2008 - 2009	\$

What percentage of your household income is derived from fishing and fish related activities?

%

Household expenditure 6.

Please fill in table below showing your average (weekly, quarterly, yearly and one off) expenditure for each of the following items listed and indicate where that money is spent.

Type of expenditure	Ballina region	Northern	Outside
		NSW	region
Weekly Expenditure			
Food			
Clubs/ Pubs/ entertainment			
Dining out/ take away			
Fuel			
Children's activities			
Sport/ sporting clubs			
Rent			
Other			
Quarterly expenditure			
Medical bills			
Phone			
Electricity			
Rates			
Bank/accountants fees			
Vehicle maintenance			
Other			
Yearly expenditure			
Education			
Tradesmen			
Holidays			
Mortgage			
Clothes			
Insurance			
Other			
One off expenses			
New vehicle			
Household appliances			
Furniture			
Other			

7. How do you feel about the future of commercial fishing industry in this region? Neutral

Positive Comments:

Negative

8. Do you plan to continue working in the fishing industry for the next five years?

Y/N?		ě.	•	
Comments:				

ATTACHMENT TWO

A Socio-Economic Evaluation of the Commercial Fishing Industry in the Ballina, Lower Clarence and Coffs Harbour Regions

Simon McVerry







Australian Government

Fisheries Research and Development Corporation

Project Number 2009/054

A Socio-Economic Evaluation of the Commercial Fishing Industry in the Ballina, Lower Clarence and Coffs Harbour Regions

Simon McVerry, B.App.Sci (Fisheries management) Native Foresters

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This report has been compiled on the basis of existing literature, information, and a targeted survey, with some information supplied by Industry and Investment NSW, the relevant Professional Fishermen's Co-Operatives on behalf of the client, and the Professional Fishermen's Association. Native Foresters does not undertake responsibility arising in any way to any persons in respect of the data, errors, or omissions arising, through mis-interpretation of information, negligence or otherwise, however caused.

Native Foresters is an independent consulting company undertaking projects in Natural Resource Management.

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Jane Davissen for her assistance in preparing this report.

ABSTRACT

A socio economic evaluation of the commercial fishing industries in the Ballina, Lower Clarence and Coffs Harbour areas was completed on behalf of the Professional Fishermen's Association in Northern NSW. The commercial fishing industry in this region has been undergoing a period of change, with resulting pressures on its effective operation and viability. This report aims to assess the importance of maintaining a viable commercial fishing industry in Northern NSW.

An assessment of the regional economy and the regulatory environment in which the industry operates was undertaken. Economic modelling was performed on output data from the harvesting and handling, processing & retail sectors, supplied from the local Professional Fishermen's Co-operatives and NSW Fisheries (Industry & Investment). The modelling utilised the input/output technique to determine direct, indirect and consumption induced impacts of the operation of the harvesting and processing sectors of the commercial fishing industry. Fishermen in the region were also surveyed to determine a profile of fishers in relating to their age, operations, income, and expenditure.

A description of the marine and estuarine environments upon which the commercial fishing industry is dependent was provided. Estuaries are an important driver of fisheries productivity in Northern NSW and have undergone substantial modifications associated with changing land use resulting in negative implications for ecosystem health. The marine zone in Northern NSW remains in good condition mainly due to its large area and dynamic nature.

Assessment of the main fisheries operating in Northern NSW over the last ten years has found that the Ocean Prawn Trawl Fishery catch weights have decreased while fishing effort has decreased in the last 5 years. The Estuary General Fishery catch weights have shown a reduction directly relative to the decrease in fishing effort. The Ocean Haul Fishery has shown fluctuating catch weights whilst effort levels have been steady. The Estuary Prawn Trawl Fishery has shown small fluctuations in catch weights with steady effort levels. The Ocean Trap and Line Fishery has shown stable catch weights with a decreasing effort over the same period. A assessment of fish stocks in NSW indicated most fisheries are probably sustainable but that there should be no expansion of catches.

The economic modelling results demonstrated that the industry provides quantifiable economic benefits to the Northern NSW region in the form of output, income, employment and value added (gross regional product). The combined harvesting and processing sectors of the industry in Northern NSW provided total flow-on effects of \$216 million derived from output, \$36.1 million in income, 933 employment positions and \$75.5 million in value added. Two-thirds of the money generated by the operation of the industry is spent in the local and regional economies.

The Lower Clarence area which is home to the majority of fishers in Northern NSW area has a fairly high level of socioeconomic disadvantage, therefore the employment and income generated by the industry, though relatively small, remains important in the local economy. The long term connection of fishermen and their families to their local area suggests that they make up an important part of the local community and contribute to the social fabric of the towns they live in.

Commercial operators have faced diminishing returns from the operation of their businesses with increased input costs particularly from the rising cost of fuel coupled with competition from cheap imported fisheries product and diminished export returns. There has been an incremental increase in regulation designed to reduce fishing effort and limit pressure on the resource resulting in a reduction in the operational efficiency of commercial operators. The introduction of Marine Protected Areas by the State and Commonwealth government has impacted the industry with two MPA's within the study area and a new larger MPA under consideration by the Federal Government. There is a new round of fisheries management initiatives to be undertaken in the industry in the next two years which will further impact the operation of the industry through the implementation of a structural adjustment scheme.

In a future where the sustainability and security of food resources will become so important, it is vital that the commercial fishing industry and the relevant regulatory authorities work together to ensure the long term economic viability of the industry, the sustainable use of the resource, the protection and rehabilitation of fisheries habitats, and the ongoing provision of seafood supply for the community.

Contents

1.0	INTRODUCTION	1
	1.1 Scope	1
	1.2 Aims and Objectives	1
	1.3 Study Area	1
2.0	METHODOLOGY	4
	2.1 Background Research	4
	2.2Data sources	5
	2.3 Fisher Surveys	5
	2.4Economic Modelling	6
3.0	BACKGROUND	7
	3.1 Ballina	7
	3.2 Lower Clarence	7
	3.3Coffs Harbour.	8
	3.4 Commercial Fishing Fleet and Equipment	9
4.0	REGIONAL ECONOMY	10
	4.1 Ballina	10
	4.2 Clarence Valley	11
	4.3Coffs Harbour	11
5.0	REGULATION	12
	5.1 Commonwealth Regulation	13
	5.2 State Regulation	13
	5.3Local government	14
	5.4 Industry groups	14
	5.4.1 Fisheries Research and Development Corporation	14
	5.4.2 Seafood Industry Advisory Council	15
	5.4.3 Professional Fishermen's Association	15
	5.4.4 Local Cooperatives	15
6.0	NORTHERN NSW REGIONAL ENVIRONMENT	16
	6.1 Marine Environment	16
	6.1.1 Oceanography	16
	6.1.2 Primary Productivity	16
	6.1.3 Rocky habitats	17
	6.1.4 Soft sediment habitats	17
	6.1.5 Alterations to habitats	18
	6.2 Estuarine Environment	18
	6.2.1 Physical processes	18
	6.2.2 Water quality	19
	6.2.3 Estuarine fisheries habitats	20
	6.3 Climate Change	21
7.0	THE COMMERCIAL FISHING INDUSTRY IN NORTHERN NSW	22
	7.1 Lobster Fishery	22
	7.2 Estuary General Fishery	23
	7.3 Estuary Prawn Trawl Fishery	24
	7.4Ocean Hauling Fishery	25
	7.5Ocean Prawn Trawl Fishery	26
	7.6 Ocean Trap and Line Fishery	27
	7.7Commonwealth Tuna Fishery	27
• -	7.8 Fishing Effort and Harvesting Levels in Northern NSW	28
8.0	THE COMMERCIAL CATCH – PROCESSING SECTOR	30
	8.1 Ballina	31
	8.2Lower Clarence	32
	8.3 Cotts Harbour.	33

9.0 ECONO	MIC IMPACTS OF THE COMMERCIAL FISHING INDUSTRY	34
9.1 Reg	ional Economic Impact Analysis	
9.2 Eco	nomic Impacts	
9.2.1	Ballina	
9.2.2	Lower Clarence	
9.2.3	Coffs Harbour	
9.2.4	Northern NSW	
9.3 Inco	me and Employment	
9.4 Tota	I Flow-on Economic Impact	
9.4.1	Operating expenditure and capital investment	
9.4.2	Household and other expenditure	
9.5 Con	parison of industry in Lower Clarence 1995 to 2010	
10.0SOCIAL	IMPACTS	44
10.1 Pr	ofile of commercial fishers	
10.2 So	pcio-Economic Index	
10.3 Fi	shers Perspective	
10.4 Co	ontribution of the industry to tourist amenity	
10.5 Se	eafood Supply	
11.0FACTOF	RS AFFECTING THE COMMERCIAL FISHERIES IN THE REGION	51
11.1 Pr	ofitability of the Industry	
11.2 lm	ports and Exports	
11.3 M	arine Protected Areas and Government Buyouts	
11.4 G	overnment Regulation and Management	
11.5 Er	nployment and Skills Base	
11.6 Pe	erception of Industry	
11.7 Er	vironmental Factors	
11.7.1	Habitat loss	
11.7.2	Fishing pressure	
12.0CONCLU	JSIONS	57
REFERENCE	ES	61
APPENDIX A	A – NSW Fisheries Region / Zone Maps	1
APPENDIX E	B – NSW Fisheries Data	1
APPENDIX C	C – Economic Modeling Report	4

List of Maps

Map 1: Location map for Study Area – Ballina, Lower Clarence and Coffs Harbour Fisheries	2
Map 2: Areas for Further Assessment in the East Marine Region	14
Map 3: Clarence Area for Further Assessment	54

List of Tables

Table 1: Study Area and corresponding NSW Fisheries Regions / Zones	3
Table 2: Profile of Survey Respondents compared to Actual Fisher Profile	6
Table 3: Habitat usage of important commercial fish species during lifecycle	21
Table 4: Economic impact of commercial fishing industry – Ballina Co-operative – 2007/2008	35
Table 5: Economic impact of commercial fishing industry – Lower Clarence Co-operative – 2007/2008	36
Table 6: Economic impact of commercial fishing industry – Coffs Harbour Co-operative – 2007/2008	
Table 7: Economic impact of commercial fishing industry – Northern NSW Co-operative – 2007/2008	

Table 8: Number, employment status and wage of crew in Northern NSW	39
Table 9: Number of people employed in fishing industry 2008/2009	39
Table 10: Range of incomes of commercial fishers in Northern NSW	40
Table 11: Average annual operating costs for commercial fishers in Northern NSW	41
Table 12: Description of the types and value of boats in study area	41
Table 13: Expenditure in Northern NSW region	42
Table 14: Age and gender of commercial fishers in the Ballina, Clarence Valley and Coffs Harbour areas	44
Table 15: Education level of commercial fishers in Ballina, Clarence Valley and Coffs Harbour	45
Table 16: Percentage of fishers belonging to clubs within Northern NSW	46
Table 17: SEIFA Index ratings for Ballina, Clarence Valley and Coffs Harbour areas	47
Table 18: Fishers opinions on future of commercial fishing industry	48

List of Figures

Figure 1: Regulatory Bodies and Processes within Australia	12
Figure 2: Estuarine Foodweb Cycle	20
Figure 3: Estuary General total weights per region from 1998 – 2008	23
Figure 4: Estuary Prawn Trawl total weights from 1998 – 2008 for Clarence River and all other NSW regions	24
Figure 5: Weight of product landed in zones 1, 2, 3, and all other NSW zones for Ocean Haul Fishery 1998 – 2008	25
Figure 6: Weight of product landed in zones 1, 2, 3, and all other NSW zones for Ocean Prawn Trawl Fishery 1998-2008	
Figure 7: Weight of product landed in zones 1, 2, 3, and all other NSW zones for Ocean Trap & Line Fishery 1998-2008	27
Figure 8: Fishing effort in Northern NSW for each fishery, 1998 – 2008	28
Figure 9: Gross weights landed for each fishery in Northern NSW, 1998 – 2008	29
Figure 10: Schematic representation of the commercial fishing industry production system	30
Figure 11: Gross Value of each Fishery in Ballina area, 1998 – 2008	31
Figure 12: Gross Value of each Fishery in Clarence area, 1998 – 2008	32
Figure 13: Gross value of each Fishery in Coffs Harbour area, 1998 – 2008	33
Figure 14: Weight of product supplied from study area vs total weight of product supplied other zones in NSW, 1998 - 2008	50
Figure 15: Number of fishing businesses reporting catch in Northern NSW, 1998-2008	51
Figure 16: Exports and Imports of seafood into Australia 1993-2008	52

INTRODUCTION

1.1 SCOPE

This report provides a socio-economic evaluation of the Ballina, Lower Clarence and Coffs Harbour commercial fisheries which operate in the marine and estuarine areas of Northern NSW. It has been prepared for the Professional Fishermen's Association (PFA) which represents the interests of professional fishers in the region.

The commercial fishing industry in the study region and across NSW has been undergoing a period of change with resulting pressures on its effective operation and viability. This report seeks to provide a thorough account of industry operations, quantifying economic and social impacts and determining the factors relevant to the industries ongoing operation. It may be used by industry stakeholders and fisheries managers when determining strategies for the effective management of the industry.

1.2 AIMS AND OBJECTIVES

The aim of this report is to identify and evaluate the economic and ensuing social benefits of the commercial fishing industry within the respective local economies of Ballina, Lower Clarence and Coffs Harbour, and in the wider region of Northern NSW, in order to determine both a qualitative and quantitative value for the fishery and its associated activities. The objectives of this report are as follows:

- 8. Provide an historical account of the development of the commercial fishing industry in the three regions.
- 9. Describe the geographical characteristics, the human alterations, the fisheries habitats and the fish communities in the regions.
- 10. Provide a detailed account of the operations of the commercial fisheries including the harvesting and processing sectors and the commercial catch in the regions.
- 11. Assess the economic impact of the commercial fishing industry and describe the output, income generation, employment and flow-on benefits as a result of the operation of the industry in both the local and regional economies.
- 12. Examine the socio-economic benefits as a result of the presence and operation of the commercial fishing industry in the regions for the local community and economy.
- 13. Evaluate the three regions contribution to seafood security at the local, regional and State level.
- 14. Examine and comment on the capacity and effectiveness of the economic impacts and benefits of the fishing industry to the local and regional economies for the purpose of informing management of the industry.

1.3 STUDY AREA

The PFA requested that the report titled "A Socio-economic Evaluation of the Clarence River Commercial Fishery" prepared by Simon McVerry and dated 1995, be expanded to include a study of the Ballina, Lower Clarence and Coffs Harbour fisheries. The locality of the three regions of the study area is shown on **Map 1** below.



Map 1: Location map for Study Area - Ballina, Lower Clarence and Coffs Harbour Fisheries

SOURCE: Northern Rivers Catchment Management Authority

The Fishermen's Co-operatives of each region were involved and provided data for analysis. The Department of Primary Industries – Industry and Investment NSW (I & I) herein referred to as NSW Fisheries also provided data for analysis. The NSW Fisheries data is split into reporting areas known as "Regions" for Estuarine areas and "Zones" for Marine areas. **Table 1** below details the definition of each Region / Zone and the corresponding study area.

				-	
NSW FISHERIES				STUDY AREA CO-	OTHER CO-OPS IN
MARINE	ESTUARINE	LATITUDE	GEOGRAPHICAL LOCATION	UP .	directly assessed)
Zone 1	Region 1	28 – 29°S	Tweed Heads to south of Ballina	Ballina	Brunswick Heads,
Zone 2	Region 2	29 – 30°S	North of Evans Head to south of Wooli	Lower Clarence	Evans Heads
Zone 3	Region 3	30 – 31°S	Corindi Beach to south of Smoky Head	Coffs Harbour	Macleay

Table 1: Study Area and corresponding NSW Fisheries Regions / Zones

Throughout this report the study area is foremost, however when using NSW Fisheries data, it is assumed that the trends presented are representative of the trends in the corresponding study area. NSW Fisheries data also detailed combined data for Northern NSW, and it is generally assumed throughout this report that Northern NSW trends are indicative for the study area as a whole. It should be noted that Northern NSW, for the purposes of this report, is defined as regions/zones 1 -3, which is from Latitude 28°S to Latitude 30°S. It encompasses the Local Government Areas of Ballina Shire, Bellingen Shire, Byron Shire, Clarence Valley, Coffs Harbour City, Kempsey Shire, Kyogle, Lismore City, Nambucca Shire, Richmond Valley and Tweed Shire.

Appendix A includes detailed maps showing the Regions / Zones used by NSW Fisheries.

METHODOLOGY

The methods used to achieve the outlined aims and objectives of this report included the following:

- 1. Background Research a desk top survey and review of all relevant data and reports relevant to the formulation of the report, including the following information:
 - o Historical development of fisheries in the three regions;
 - Geographical characteristics of the regions;
 - Fisheries habitat and communities of each region;
 - Existing operations including harvesting and processing;
 - Previous studies or assessments on the fisheries including social, economic and environmental assessments and surveys;
 - Census information for the regions;
 - Government agency reports, policies and plans including Federal, State (NSW Fisheries) and Local (Council); and
 - \circ Other relevant documents.
- 2. Stakeholder Survey Commercial fishers within the study area were surveyed on their operations, income, expenditure, demographic and opinions regarding their industry.
- 3. Data Analysis Gathering and analysing relevant data from the following:
 - Ballina, Clarence River and Coffs Harbour Professional Fishermen's Co-operatives (referred to herein as the Co-ops) provided information about their operations, including annual reports, financial data (income, expenditure, assets, etc), employment rates, product landed at each port, etc for the years 2006 to 2009. This information was used to determine baseline data for the economic modelling process.
 - Industry and Investment NSW (NSW Fisheries) provided relevant data on the study area from financial years 1997/98 to 2007/08. This information was used to formulate the Figures on weight, value of product and the number of fishing businesses and for baseline data for the economic modelling of the Northern NSW region.
 - The Australian Bureau of Statistics (ABS) census data from 2006 census. This information was used to develop tables and figures on demographics of fishers within the study area.
- 4. Economic Modelling Using Input / Output analysis to quantify the total economic impacts arising from the operation of the fishery in the local and regional economies of the study area.
- 5. Socio Economic Impact Assessment.

1.4 BACKGROUND RESEARCH

A comprehensive review of the literature, pertaining to socio-economic evaluations of both the commercial fishing industry and the regional economy was undertaken, as was an examination of similar studies completed in Australia. The use of data from a variety of sources was valuable for cross checking figures and minimising any potential errors when discussing the operations and implications of the commercial fishing industry in Northern NSW.

It should be noted that the data collected for this study is taken from a number of different year periods. The Co-ops were able to provide catch and income data from 2008/09, however due to gaps in NSW Fisheries data (as highlighted by staff) for the 2008/09 period it was determined to use the 2007/08 figures with Co-ops figures taken from this same period to ensure consistency of information across these two primary sources of information. Therefore NSW Fisheries data from 1997/98 to 2007/08 was used to indicate trends in catch data. The 2007/08 figures from both the Co-ops and NSW Fisheries was used in the economic modelling.

For the commercial fishers survey it was determined that there was a greater possibility of getting accurate information from fishers for their most recent operating period and hence the 2008/09 year was used.

ABS census data is from the 2006 census as this was the latest data set available. The ABS data is generally used to assess the demographic of the industry in the study area. It is considered that the demographics shown by ABS data in 2006 will still be indicative of the industry in the 2007/08 financial year. ABS data is used in preference to survey results due to limitations in the survey results.

1.5 DATA SOURCES

The information used in this report has been derived from both primary and secondary sources. The Co-ops based in Ballina, Lower Clarence and Coffs Harbour have provided data for the formulation of this report including:

- Annual reports and financial statements.
- Total value of output from harvesting operations.
- Number of operating fishers.
- Total value of output of handling, processing and retail sectors.
- Employment numbers in Co-op operations.
- Income generated by the handling, processing and retail sectors.

The figures from the 2007/08 fishing season were used to calculate the economic impacts of the industry and are considered to be generally representative of the average yearly production of the fishery in recent times.

NSW Fisheries provided Commercial Fisheries Statistics from 1997/98 to 2007/08 including data on:

- the number of fishing businesses reporting in each area,
- estimated gross value of product (GVP), and
- weight of product landed and reported effort in fisher months.

The data provided by NSW Fisheries has been used to generate the Figures in the report and is included in Appendix B.

The nature of fishing operations can mean that some operators regularly move between areas dependent on fishing conditions and will unload product at ports other than their home port. For this reason catch that is taken from a combination of different zones within Zones 1, 2 and 3 is recorded by NSW Fisheries as "mixed ocean zones". Total values for the Northern NSW area combine fisheries Zones 1, 2 and 3 with the mixed ocean zones. Product which does not pass through the Co-ops system, but passes through licensed fish receivers will also be recorded in Northern NSW total figures from NSW Fisheries. The values presented for GVP are derived from the average monthly species prices paid at the Sydney Fish Market. Thus there will be some difference between the valuation of product between the Co-ops and the price at the Sydney Fish Market, with the latter generally being slightly higher.

1.6 FISHER SURVEYS

A survey of commercial fishers in the Ballina, Lower Clarence and Coffs Harbour regions was undertaken in order to provide an analytical dataset providing information on:

- the methods of fishing used,
- types of boats operated,
- crew members employed,
- fishing income and expenditure,
- the number of people supported by that fishing income,
- how that income is distributed in the local and regional economy, and
- fisher's opinions on the future of the commercial fishery industry in the region.

The survey was developed from an earlier survey that was part of the report titled "A Socio-economic Evaluation of the Clarence River Commercial Fishery" conducted by the author in 1995. The survey was based on the original survey, in order to provide some comparison of results between the 1995 and 2009 surveys. The survey was refined with the input of the PFA in order to fulfil the objectives of this report. Surveys were both mailed and emailed to all fishers in the study area and included a cover letter explaining the objectives of the report and the purpose of the survey. This was followed up by two reminder messages which were sent out by the PFA. A timeframe of one month was stipulated for responses to the survey but this was extended in an attempt to receive more responses. The survey used the self completion method which gave respondents time to consider their answers and consult records. The disadvantage of this method was the potential for non-response of participants, and potential sampling bias towards fishers who chose to complete the survey.

A total of 203 questionnaires were distributed which covered all fishers who are registered with the PFA and are operating in the Ballina, Lower Clarence and Coffs Harbour regions. Of these, 34 were returned, representing 17 percent of the total population of fishers surveyed. Using the data from the survey a profile of respondents is available, which can be compared with the actual survey population profile, as shown in **Table 2**.

Table 2: Profile of Survey Respondents compared to Actual Fisher Profile in the Study Area
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RESPONDENTS PROFILE	ACTUAL FISHER PROFILE
Distribution across study area	Actual distribution (from Co-op numbers)
• 6% from Ballina Co-op;	 15% from Ballina Co-op
• 73% from Lower Clarence Co-op; and	62% from Lower Clarence Co-op
• 21% from Coffs Harbour Co-op.	23% from Coffs Harbour Co-op
Age profile of respondents	Actual age profile of fishers (ABS data from 2006)
• 0% between 10-19	• 4% between 10-19
• 3% between 20-29	• 12% between 20-29
• 15% between 30-39	• 22% between 30-39
• 30% between 40-49	• 33% between 40-49
• 36% between 50-59	• 20% between 50-59
• 12% between 60-69	• 7% between 60-69
• 3% over 70	• 2% over 70
Percentage working in each Fishery Type	Actual % working in each Fishery Type (NSW Fisheries 2009)
Estuary General – 67%	Estuary General – 48%
Estuary Prawn Trawl – 52%	 Estuary Prawn Trawl – 16%
• Lobster – 6%	• Lobster – 14%
• Ocean Haul – 21%	Ocean Haul – 8%
Ocean Prawn Trawl – 30%	Ocean Prawn Trawl – 20%
Ocean Trap and Line – 21%	Ocean Trap and Line – 32%

This profiling of the respondents shows a slight skew towards fishers from the Clarence region, older fishers, and the Estuary, Ocean Haul & Ocean Prawn Trawl fisheries types. This means that the averages provided should be interpreted with caution and when combined with the relatively low response levels achieved by the survey should be considered as a limitation on data supplied in Chapters 9.0 and 10.

1.7 ECONOMIC MODELLING

This report utilises input-output modelling conducted by Laurence Consulting to examine economic activity generated by the operation of the commercial fishing industry within the Ballina, Lower Clarence and Coffs Harbour economies and the Northern NSW economy. This analysis utilised separate input-output tables developed for each of the regions examined. The activities of the commercial fishing industry are divided into the harvesting sector and the combined handling, processing and retail sector and are modelled within their relevant industry sectors. The full report titled "*Economic Impact of the Commercial Fishing Industry in Northern New South Wales*" dated February 2010 and prepared by Laurence Consulting is contained in **Appendix C**. It is important to note the various limitations and qualifiers related to input-output analysis which are described in the full report by Laurence Consulting.

BACKGROUND

Commercial fishery in Northern NSW is one of a number of traditional primary industries that have played an important role in the economic development of the area. Commercial fishing is undertaken in the offshore marine areas and in the estuarine areas in Northern NSW with business activity centred at regional Co-ops. The commercial fisheries examined in this report are based in three areas:

- 1. The Richmond District Fishermen's Co-op is based in Ballina and operates in both river and offshore fisheries.
- 2. The Clarence River Fishermen's Co-op operates two depots with Maclean primarily processing catch from the river fishery and Iluka processing catch from the offshore fishery.
- 3. The Coffs Harbour Fishermen's Co-op is based in Coffs Harbour and primarily operates in the offshore fishery.

1.8 BALLINA

It is thought that Ballina takes its name from the local aboriginal word meaning "place of many oysters" which points to the fact that the Richmond River, which enters the sea at Ballina, has always been a productive hunting ground for fishers. In the late 1800's and early 1900's timber-getting constituted the main form of economic activity in the Ballina area though this was soon taken over by agriculture and a limited amount of grazing. With the arrival of more settlers in the mid-19th century fishing increased with the provision of fish to local markets and the introduction of steamships and ice making facilities allowing sale of catch to be transported to Sydney, with increasing catches up to the 1920's. This period was followed by a decline in catches during the 1930's and early 1940's, with a large gap in the database for the period covering the Second World War. Before 1945, the sale and distribution of fisheries products was conducted by individual agents sometimes resulting in problems arising from variations in price and demand. As a result the government moved to encourage the formation of regional Co-ops and regulated the Sydney Fish Market. The establishment of the Richmond District Fishermen's Co-op was in 1945. After peaks in fish catches during the 1950's there was a period of relatively steady catches during the 1960's and 1970's (West, 1993).

The Estuary General Fishery was historically active in the Ballina area although the impact of fish kills associated with climatic events has negatively impacted this fishery. Prawn trawling in the offshore waters from Ballina began in the late 1950's with the full utilisation of the offshore grounds in the 1970's resulting in increased catches by the demersal fishing fleet. Developments in trawl gear during the late 1970's saw the majority of boats in Northern NSW convert to triple gear, and the ground gear of prawn trawl nets were modified by the inclusion of longer droppers, to lessen catches of incidental species (NSW DPI, 2004b). At its peak the offshore fleet at Ballina consisted of 37 vessels though this has declined in recent years to 8 trawlers and 12 trap and line boats. The Ocean Hauling Fishery has operated in the Ballina area for many years and continues to make good landings of product during the winter and spring months from beaches in the area. The Ocean Trap and Line and Lobster fisheries continue to be active out of the Ballina Port. Commercial fishing operations in Ballina are based out of the Council wharf on the riverfront, while the product processing takes place at the Co-op facilities on River Street, Ballina.

1.9 Lower Clarence

Long before the arrival of Europeans in the area, local Bundjalung people were fishing the waters of the 'big river' for oysters and fish, as evidenced by the large middens found along the river banks and coastline. The first settlers to the area found a bountiful river surrounded by dense subtropical forests and swamps flowing out to the coastline. Fish were easy to come by and made up an important food source for the early settlers who set about developing forestry and farming in the area. Grafton was established in the 1850's with the river being a principal source of transport. The introduction of sheep grazing to the area occurred in the late 1850's and sugar cane farming was carried out as early as 1868 (Anon, 1980a).

A small commercial fishery had its beginnings in 1862 when fish were caught to supply workers and their families employed in the construction of the river entrance works. This major project was designed to provide safe navigation for

the coastal steamers that traded upriver. Commercial fishermen were supplying fish to the local market by the 1870's, particularly seasonal fishing for mullet, which was an important local industry supplying the Grafton market (Anon, 1880). The fishing industry began in earnest in 1884 when shipments of fish were sent to Sydney twice a week, weather permitting. The fish, mainly whiting, bream, flat tailed mullet and flathead were packed in ice in large insulated boxes. The boxes were then reused to bring ice on the return trip (Anon, 1994).

Fisheries inspectors had been appointed to the region by 1884 with an inspector in 1888 reporting that 150 baskets of fish were being shipped each week with five tonnes of ice required. Attempts were made to can fish on the Clarence in the late 1880's however it did not prove profitable. The industry received a boost in 1901 when ice became available locally with the establishment of an ice and butter making factory at Maclean. Before the turn of the century boats were rowed by fishermen who used hand-hauled cotton nets to catch fish. The motor launches which became available in the 1900's allowed fishermen to travel further afield resulting in increased catches. By 1908 production had increased to 27,333 baskets (each basket represented approximately 35kg), although catches did vary annually dependent on weather conditions (Anon, 1994).

The Clarence River Fishermen's Co-operative was formed in 1945 at Grafton, from where fish could be transported by rail following the decline of the coastal shipping trade. The Co-op moved to its present site in Maclean in 1949 where facilities were gradually expanded. Commercial fishing activity in the Clarence River occurs in the Estuary General and Estuary Trawl Fisheries. Increasing offshore fishing activity necessitated the development of another depot downstream, which was built at Iluka in 1970. Offshore activity was primarily driven by the development of the Ocean Prawn Trawl Fishery which continued to expand in the 1960's and 1970's. In its early days the fishery was exclusively for prawns but gradually there was market acceptance of secondary species such as octopus, cuttlefish, squid and bugs. At present there are approximately 30 trawlers operating out of the Yamba and Iluka ports, as well as a smaller number of Ocean Trap and Line and Lobster Fishers. Ocean Hauling was one of the earliest fisheries to be utilised on the beaches in the Clarence district and continues to be an important fishery in the area.

1.10 COFFS HARBOUR

The Coffs Harbour area has always been a productive and fertile hunting ground for the Gumbainggir people. European settlers followed with the town of Coffs Harbour gazetted in the 1880's. Fishing activity was undertaken in the region and by the 1930's there was a recognised commercial industry operating with a fishermen's shed located near the base of the town jetty. The Fishermen's Co-op Society commenced operation in 1947. At that time Macksville, Sawtell and Coffs Harbour were all included in this Co-op which attempted to address some of the concerns relating to transport, marketing and price control for fisheries product.

With the growth in the local industry it was decided to establish a standalone Coffs Harbour Co-op and a new premises comprising of a reinforced concrete receiving depot at Coffs Harbour Jetty was opened in 1950. Prior to the 1970's there were no slipway facilities thus requiring boats to be lifted onto the jetty for regular maintenance and repairs. Wave action in the harbour also posed a serious threat to small vessels during stormy weather with 25 boats being destroyed between 1952 and 1971 (Yeates, 1993). This resulted in a decision by the Public Works Department to build a boat harbour to provide for the needs of the fishing industry. At this time a new Co-op building with refrigeration was constructed as part of the boat harbour and this remains the site of current Co-op operations. With completion of the boat harbour the fishing fleet at Coffs Harbour expanded from 23 trawlers in 1971, to 51 licensed fishing boats in 1979 (Yeates, 1993). This number has gradually reduced to the present time with 30 commercial fishing boats operating out of the port. Coffs Harbour has an active Estuary General Fishery although most activity occurs offshore. The Ocean Prawn Trawl Fishery works out of Coffs Harbour and there are a number of Ocean Trap and Line, Lobster and Ocean Haul fishers operating. In addition there is a seasonal Longline Tuna Fishery that operates from the port.

1.11 COMMERCIAL FISHING FLEET AND EQUIPMENT

Although some aspects of fishing methods, vessels and gear have not changed much since 1965, the fishing industry in Northern NSW has embraced new technology. Vessel manufacture has advanced from producing mainly timber hulls to hulls of steel, aluminium or fibreglass. Despite these advances the majority of the Ocean Prawn Trawl Fleet vessels are of timber construction and are generally more than 30 years old. Navigation, communication and fish location have been revolutionised by the advent of increasingly sophisticated electronic sonar and navigation systems which, along with further developments and refinements in fishing gear, have resulting in increased harvesting efficiency and a corresponding increase in fishing effort (West, 1993).

In 1993 NSW Fisheries instigated a Fisheries Working Group on Ecological Sustainable Development which identified three major issues in relation to by-catch. As a result of this work, By-catch Reduction Devices (BRD's) have been implemented by fishermen to reduce the impacts to fish species and the fisheries. Recent research effort has been focused on excluding by-catch from prawn trawl gear, by modifying the cod-end to incorporate BRD's, which are now compulsory on all ocean and estuary prawn trawl nets.

Recent years have seen limited investment in the industry in terms of new boats and fishing gear. While some operators continue to improve and refine equipment there is a significant proportion of the fishing fleet that is showing the effects of many years of hard work in the marine environment.

REGIONAL ECONOMY

The Ballina, Coffs Harbour and Lower Clarence areas fall into the broader defined Northern NSW region. The Northern NSW region encompasses the Local Government areas of Ballina, Bellingen, Byron, Clarence Valley, Coffs Harbour, Kempsey, Kyogle, Lismore, Nambucca, Richmond and Tweed. The estimated population of Northern NSW was 421, 515 in 2008(ABS, 2010), which represents 6 percent of the total population of NSW. The area has one of the highest population growth rates for any region in NSW, with the majority of growth occurring in the coastal areas and resulting from immigration from outside the area. There are five main centres servicing the study region, these being Tweed Heads, Lismore, Ballina, Grafton and Coffs Harbour.

The Northern NSW region is characterised by its rich natural resources which have allowed for its traditional economic structure based on agriculture, forestry and fisheries. In recent times the regional economy has seen substantial social and economic change due to the effects of population shifts, global competition and industry restructuring (RIEP, 2006). This has resulted in significant structural changes within the local and regional economies with population increases and changes to the community demographic resulting in a movement away from its traditional primary industry base to a more service based economy. The tourism, retail, health and community services sectors are the region's main growth sectors followed by government, administration and construction. The primary industry sector including fisheries continues to have declining employment levels, however the Northern NSW employment levels in primary industries are significantly above the NSW average.

Unemployment levels in Northern NSW continue to be an area of concern with a smaller percentage of the community participating in the workforce compared to the NSW average. Current unemployment levels are still almost double the State average, despite good rates of job creation in recent years. Median household income levels are significantly lower than State averages, with 60% of households earning less than \$700 per week compared to the NSW average of 39%.

As seen in national trends, there is an increasing decline in the manual trades and skill development programs such as apprenticeships, which are not keeping pace with demand in the region. Current and future statistics show an older than average population with lower educational rates than the NSW average, as well as a lack of depth in base qualifications, a large benefit-dependent sector and an exodus of the region's youth (RIEP, 2006).

Commercial fishing activity in Northern NSW, centred along the coastal areas, has active commercial fishermen working offshore areas out of Tweed Heads, Brunswick Heads, Ballina, Evans Head, Yamba, Iluka and Coffs Harbour. There are productive estuarine fisheries operating in Northern NSW with the largest in Maclean on the Clarence River and smaller operations in the Richmond and Nambucca rivers as well as other estuary systems on the coast.

The continued existence of a working primary industries sector is one of important opportunities present in the Northern NSW economy. A refocusing on the potential that exists in the sector and a focus on skills based training which could enable young people to work in the agricultural, forestry and fishing industries is an important step in halting the decline in these sectors. Research and innovation as well as a long term approach to resource sustainability can enable the continued productivity of primary industries in the area and provide the vital provision of locally produced food product, employment and raw materials. While there is a trend towards focusing on tourism and population growth driven service sectors a long term approach to managing the region's economy would consider and seek to incorporate and encourage the regions primary industries. The following section provides a brief snapshot of the economic profile for the local government areas of Ballina, Clarence Valley and Coffs Harbour.

1.12 BALLINA

The Ballina LGA encompasses an area of 484 km² with a current population of 41,677 in 2008 with average annual growth of 1.2% over the last five years. Ballina is the main economic hub for the Shire which has a growing economy undergoing considerable change stemming from population growth. Property and business services are the largest industries in terms of businesses in Ballina Shire, followed by agriculture, forestry and fisheries. Gross Regional Product (GRP) has increased at a rate of 7.5% since 2006 to approximately 1.3 billion dollars in 2007/08. The estimated number of employed persons was 17,870 in 2008 with an unemployment rate of 4.6%. Average individual weekly income for the area was \$529.92; average family income was \$1,161.66. The average age of residents was 41.5 years in 2006 with the average increasing by 1.5 years between 2001-2006 (Ballina Shire Council, 2008).

1.13 CLARENCE VALLEY

Clarence Valley comprises an area of 10,440km² and extends from the temperate mountain areas of the Great Dividing Range through the lowland areas to the coast. The major regional town is Grafton, with the smaller towns of Yamba, Maclean and Iluka significant for the fishing industry. The population in the Clarence Valley in 2008 was 51,007 persons with an average annual increase of 0.8% over the last five years. The area can be divided into three sub-regions:

- 1. Clarence Central has an economic structure high in commerce and information based sectors and low in resources with key industry sectors including retail, trade, health and education, government and personal services.
- 2. Clarence Country has an economic structure high in resources and low in commerce, information, finance and household services, with key industries including primary industries (sugar and forestry) and manufacturing stemming from these primary industries.
- 3. Clarence Coast (referred to in this report as the Lower Clarence) has an economic structure high in resources and household sectors and low in information and finance services. Key industries in the area include commercial fishing, tourism and property and business services.

GRP for the Clarence Valley was approximately 1.7 billion dollars in 2007/08. The estimated number of employed persons was 20,320 in 2008 with an unemployment rate of 8.5%. Average individual weekly income for the area was \$446.33 which is below the regional and State averages. (Clarence Valley Council, 2006)

1.14 COFFS HARBOUR

The Coffs Harbour LGA encompasses an area of approximately 960 km² covering the coastal area and moving inland to extend up into the Great Dividing Range. The main economic hub is the expanding town of Coffs Harbour. Population for the area is 70,371 people in 2008 representing an annual increase of 1.9% which is the largest for the three study areas. There are 27,805 employed people in the area with an unemployment rate of 7.3%. GRP for the area in 2007/2008 was about 2.3 billion dollars which is an increase of 8.1% from the following year. Economic growth in the area has been focused on tourism, property and labour markets along with building approvals. (Coffs Harbour Council, 2009)

REGULATION

The management and regulation of the commercial fishing industry in NSW is undertaken by a number of government agencies. This section outlines the regulatory framework and identifies the various stakeholders who input into that structure. **Figure 1** shows the relationship between Commonwealth, State and Local level organisations.

The NSW Government has control of commercial fisheries in coastal waters to the 3 nautical mile limit while Commonwealth laws apply to those waters out to the limit of the Australian Fishing Zone (AFZ) (200nm). Offshore Constitutional Settlement (OCS) arrangements were established in the mid 1980's to allow management of those fisheries that cross State and Commonwealth jurisdictions.

Figure 1: Regulatory Bodies and Processes within Australia



Figure 1: Regulatory Bodies and Processes within Australia

1.15 COMMONWEALTH REGULATION

The Department of Agriculture, Fisheries and Forestry (DAFF) is responsible for the Commonwealth managed fisheries and develops and implements policies and programs to assist the fisheries to be competitive, profitable and sustainable. DAFF supports Australia's domestic fisheries through research, quarantine, fish health and food safety programs, market access and trade negotiations, business and policy development and management assistance.

DAFF works closely with the Australian Fisheries Management Authority (AFMA) in relation to fisheries management on issues including jurisdictional boundaries, Joint Authorities operations, legislation reviews and supporting fisheries Committees. The AFMA is responsible for the day-to-day management of Commonwealth fisheries which is undertaken under the Fisheries Management Act 1991 which establishes the Australian Fishing Zone (AFZ) and details the essential objectives used by the AFMA to manage and protect Australian's valuable fishery resources.

Under the Fisheries Management Act 1991 and Fisheries Administration Act 1991 the AFMA has an obligation to develop plans and implement policy to manage fisheries in the AFZ. These Acts also set out the legislative basis for statutory fishing rights, licences, and permits.

The implementation of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) allows the Australian Government to assess the environmental performance of fisheries and promote ecologically sustainable management. The Sustainable Fisheries Section (SFS) of the Department of the Environment, Water, Heritage and the Arts (DEWHA) is responsible for the assessment of fisheries managed under Commonwealth legislation and State export fisheries in accordance with the Act. The SFS's primary role is to evaluate the environmental performance of fisheries.

The Australian Government manages a number of Marine Protected Areas (MPA's) that are Commonwealth reserves under the EPBC Act and is currently undertaking a major review in Eastern Australia with the aim of developing a MPA's network. **Map 2** shows the area that is under review as part of this process. The main fishery subject to Commonwealth control in Northern NSW is the Tuna fishery which operates seasonally in Commonwealth offshore waters.

1.16 STATE REGULATION

In New South Wales the following departments are involved with management of the State's fisheries:

- Industry and Investment NSW (NSW Fisheries NSW Department of Primary Industries)
- NSW Marine Park Authority
- NSW Department of Environment, Climate Change and Water (formerly Department of Environment and Conservation)

State controlled fisheries in NSW are regulated and managed by Industry and Investment (I & I) formerly NSW Fisheries. NSW Fisheries manages all aspects of licensing, transferring, shares, endorsements and components of fishing businesses and eligible fishers. NSW Fisheries also undertakes scientific research to inform all its fisheries resource management strategies. Each fishery has a number of management tools in the form of rules and conditions. These can be in the form of input controls that restrict the areas that can be fished, the equipment that can be used, the size of the boat, the timing or season during which the fishing can occur or output controls in the form of quota systems which seek to control the number or weight of product harvested. These laws along with all fishing closures and marine parks are used by NSW Fisheries to regulate, manage and protect fisheries resources in the State.

The NSW Marine Parks Authority selects areas for protection as MPA's and manages them with the objective of balancing marine conservation needs with recreational and commercial interests.



Map 2: Areas for Further Assessment in the East Marine Region

SOURCE:DEWHA http://www.environment.gov.au/coasts/mbp/east/index.html

1.17 LOCAL GOVERNMENT

The local Councils of the study area are responsible for the land use planning and natural resource management of the catchments that affect the fisheries within the study area. These Councils work with relevant State government authorities to ensure aquatic habitats are conserved and rehabilitated in future land use planning decisions. Local Councils do not have any direct jurisdiction over the management of fisheries and fishing businesses.

1.18 **INDUSTRY GROUPS**

1.18.1 Fisheries Research and Development Corporation

The Fisheries Research and Development Corporation (FRDC) is responsible for planning, investing in, and managing fisheries research, development and extension within Australia. The FRDC was founded in 1991 under the Primary Industries and Energy Research and Development (PIERD) Act 1989. It is a statutory corporation and it is responsible to the Commonwealth Minister for Agriculture Fisheries and Forestry. The FRDC's mission is "to increase economic, environmental and social benefits for the fishing industry and the people of Australia, through planned investment in research and development, in an ecologically sustainable framework." (FRDC 2009)

Stakeholders of the FRDC include the Australian Government and the three sectors of the fishing industry: commercial (wild catch and aquaculture), recreational and indigenous. It is also guided by State and Territory governments, other funding bodies, research providers, community and interest groups.

1.18.2 Seafood Industry Advisory Council

The Seafood Industry Advisory Council (SIAC) provides strategic level advice on matters relating to the future commercial viability and environmental sustainability of the NSW seafood industry, including wild harvest fisheries and aquaculture.

Council members include representatives from the following stakeholders:

- commercial fishery management advisory committees,
- aquaculture industry,
- fishing Co-ops,
- wholesale sector,
- retail sector,
- indigenous interest groups, and
- conservation interest groups.

The membership of the Council has been structured to provide expert whole-of-chain representation for the NSW commercial seafood and aquaculture industries.

1.18.3 Professional Fishermen's Association

The Professional Fishermen's Association (PFA) is the peak Industry group in Northern NSW representing fishermen and their interests, maintaining professional fishers' rights, and encouraging members to be proactive in management of fish resources. The PFA voices industry's concern on various issues and decisions concerning the health and management of the fisheries in Northern NSW and its catchment, and the impacts of such decisions and activities on fish habitat, water quality and ultimately fish stocks. The PFA also provides services including:

- Policy formulation in collaboration with fishers
- Updates to fishers on latest research and development findings
- Psychological, emotional, financial and social issues support
- Assistance to access government exceptional circumstance programs
- Media representation, advice and assistance
- Representing the industry at all levels of Government

1.18.4 Local Cooperatives

Local fishing Co-ops were established in NSW to assist activities of individual fishers and provide a centralised handling and processing of catch landed at local docks. The Co-ops operate on a membership based industry structure managing product (fish) landings and processing facilities, retail outlets, ship chandlery, commercial boat harbours and fuel outlets. The Co-ops core business is the handling, distribution, processing, marketing, wholesaling and retailing of member's product. Deregulation of seafood marketing in 1999 has resulted in the Co-ops competing with other Registered Fish Receivers for the product from individual fishers. The Co-ops therefore provide subsidised services to ensure the continued support of members to guarantee supply to their own organisation and safeguard their investment in the industry.

NORTHERN NSW REGIONAL ENVIRONMENT

1.19 MARINE ENVIRONMENT

The marine environment of Northern NSW is recognised as an important area both for its ecologically diverse nature and the productivity of its marine habitats. For the purposes of this report the Northern NSW marine environment is considered to extend from Smoky Cape north to the Queensland border and from the coastline out to the 4000m depth contour which equates to approximately 80nm offshore. This area incorporates NSW Fisheries Reporting Zones 1, 2 and 3, and the offshore areas controlled by the Commonwealth government. It encompasses the coastline and offshore waters in which the Lobster, Ocean Haul, Ocean Prawn Trawl and Ocean Trap and Line fisheries operate

1.19.1 Oceanography

Water temperatures in the region are considered to be subtropical, with temperatures ranging from around 17 to 27 degrees C, with a trend for cooler waters in the south. This latitudinal trend in temperatures may greatly influence the distribution of some marine organisms such as corals, which for many species only appear as far south as the Solitary Islands (Harriot et al, 1994). Water temperature can influence the survival of small invertebrates as well as influencing feeding, reproduction and growth rates of fish (Bell et al, 1991). The clear blue waters of the East Australian Current (EAC) can impinge on to the continental shelf in the region causing counter currents, eddies and bringing warm waters which allow the survival of a range of tropical fish species. The EAC meanders along the edge of the continental shelf in a southerly direction before separating from the coast and heading towards the northern tip of New Zealand. This separation point is variable but can be as far north as Cape Byron or as far south as Ulladulla. The action of the EAC is generally stronger in summer and eases during winter (Ridgeway & Godfrey, 1997).

Coastal upwelling associated with strong EAC activity occasionally brings deeper, nutrient rich cold water to the surface in areas between Ballina and Evans Head. It mostly occurs between August and December with clockwise eddies over the continental shelf and northerly winds which tend to push surface waters offshore. Ocean currents in the Northern NSW area have an important influence on the seasonal distribution of some migratory fish species such as tuna and marlin (Rochford, 1975).

A northward flowing counter current is frequently found inshore of the EAC. This inshore northward movement can be further affected by the oblique action of the predominant south swells. This is responsible for the net northward longshore transport of sediment along the coast (Rule, Jordan & McIlgorm, 2007). From autumn through to spring the predominant swell direction is from the south-east, creating a moderate to strong north flowing current which results in decreased water temperatures. During the summer months the predominant wind direction is from the north to north-east with reversals in current direction and impacts from cyclones (Highley, 1982). The impact on the coast is to generate a year round moderate energy wave climate, though it is one that, at any time of the year, can be exposed to high wave periods. The impacts of offshore weather and wave activity have a direct affect on commercial fishermen. It is estimated that there can be up to 150 nights per year where fishing activity is unable to occur due to rough conditions offshore although this figure is dependent on vessel size and capability.

1.19.2 Primary Productivity

In general the marine areas of east coast Australia are fairly low in nutrients. When there is sufficient nutrient and available light, phytoplankton's bloom which may be critically important for larval recruitment of both benthic and pelagic species within the region (Hayes et al, 2005). The major processes that supply nutrient to the marine areas are coastal upwelling (Section 6.1.1) and river discharge during the periodic high flow events. Despite the high nutrient occurrence in the Richmond and Clarence River plumes, their primary productivity is limited by the high suspended sediment concentrations. However at the edges of the plumes where light penetration increases, increased concentrations of phytoplanktons are often found (Davies, 2005). Rivers also discharge relatively small amounts of freshwater and nutrients to the marine zone on the ebb tide of every tidal cycle (Rule, Jordan & McIlgorm. 2007). Northern NSW exhibits a predominantly sub-tropical maritime climate characterised by an annual rainfall exceeding 1400mm. Approximately 60

percent of rainfall occurs between December and April. Summers are usually warm to hot in contrast to winters which are drier and mild (NSW CLO, 1983).

Glaister (1978) examined the production of school prawn (*Metapenaeus macleayi*) in relation to river discharge, and found that production was increased during peak flow times of the Clarence River. This is confirmed through anecdotal evidence provided by commercial fishers in the area. The productivity of commercial fisheries in the marine areas is seen to be directly influenced by the level of primary productivity in offshore areas resulting from coastal upwelling and river discharge. In some areas there are important interactions between the estuarine and marine areas of the coast with movement of different species between the two and interdependence between species in terms of feeding behaviour.

1.19.3 Rocky habitats

The geology of the Northern NSW marine environment is influenced by its variable bedrock and the dynamic influence of the waves that impact upon it. These act to shape the geological characteristics of the coastal and offshore areas. The continental shelf is closer to the coastline from Ballina to Byron Bay resulting in increased exposure to wave processes while the shelf gets wider around the Clarence Coast area. The Coffs Harbour area is characterised by hard metamorphic slates which crop out over a large area of the seabed forming reefs and the numerous offshore islands that occur in the area. Sandstone outcropping forms the reefs around Evans Head and from Woody Head to Shelley Beach Head near the Clarence River. Bedrock outcrops resulting from volcanic activity occur from Ballina to Lennox Head and from Kingscliff to Fingal Head (Rule, Jordan & Mcllgorm, 2007). These rocky areas form the large number of rocky and coral reef habitats which can be divided into intertidal and sub tidal areas.

The intertidal areas generally occur near shore or in the shallow areas surrounding offshore reefs or islands and are shaped by the influence of waves, tides and the type on substrate of which they are found. The sub tidal reef areas are generally found offshore and are fairly extensive throughout the Northern NSW area. Macroalgae and invertebrates contribute to the physical structure of these areas which contain a mix of tropical, subtropical and temperate benthic assemblages reflecting latitudinal gradients of water temperatures and ocean currents (Zann, 2000). Rock and coral reef areas are a key element in the productivity of marine fisheries providing habitat and feeding areas for a wide variety of commercially important species. It is these rocky outcrops and reef areas and the areas surrounding them which provide the basis for operations for the Lobster and Ocean Trap and Line Fisheries.

1.19.4 Soft sediment habitats

The constant weathering of the bedrock geology determines the size and characteristics of the marine seabeds which make up the majority of the marine area of Northern NSW. Overall the continental shelf area is dominated by coarse sediments (sand) with smaller areas of finer sediment off the major river systems such as the Richmond and Clarence Rivers. A study of the Clarence River identified a seaward fining of sand grain size in the nearshore zone, a blanket of fine grained muddy sands off the mouth of the river extending to the south, and a belt of coarser sands moving offshore (Rule, Jordan & McIlgorm 2007). The existence of two major river systems and a number of smaller coastal rivers has an important impact on the marine area with the export of nutrients and suspended sediments elevated during flood events with sediment loads settling to the seafloor in the vicinity adjacent to the river mouths (Walsh and Roy, 1983). Changes in sediment type in combination with depth can result in considerable differences in macrofaunal community composition (Bax and Williams, 2001). In general there has been very little local research work conducted on soft sediment habitats and their relationship with the various species that live in them.

The soft sediment areas found in the marine environment can be divided into three zones: the Nearshore Zone, Shoreface Zone and the Inner Plain Zone.

The Nearshore Zone consists of sand bars, troughs and rip channels adjacent to the shoreline along sandy beaches (Short, 2003). It typically extends offshore for 50 - 500m into depths of around 5-6m and generally is made up of 1-3 parallel bar systems separated by troughs and cut by rip channels. The Nearshore Zone is very dynamic in response to the impacts of wave energy and represents the area where sediments accumulate under breaking wave conditions. The

beach and nearshore zone of the coastline forms part of this area and provides habitat for a large number of invertebrates such as worms, crabs, yabbies and other shellfish which are a major food source for important fish species such as flathead, flounder and whiting. This area provides the working area for the Ocean Haul Fishery with the primary species taken being pilchards, sea mullet, Australian salmon, blue mackerel and yellowfin bream.

The Shoreface Zone is a concave-upward to linear zone adjacent to the shoreline, extending to depths up to 30m where the gradient flattens out onto the inner plain (Rule, Jordan & McIlgorm 2007). The rocky headlands found throughout the area will often act to accumulate sand with the shoreface in these areas often extending to depths of 40-45m.

The Inner Plain Zone is a relatively flat, convex-upward zone occurring between 25-70m depth on the inner continental shelf (Rule, Jordan & McIlgorm 2007). The Ocean Prawn Trawl Fishery operates both within the Shoreface and Inner Plain Zones depending on seasonal considerations.

1.19.5 Alterations to habitats

The marine environment is a fairly dynamic zone and is potentially less prone to human alterations than the estuary areas of Northern NSW. Water quality in the marine zone is generally considered to be good though high rainfall events can lead to high sediment and nutrient discharges in ocean areas adjacent to estuaries. It is thought that this deposition can lead to increased sedimentation of nearshore rocky reefs which can lead to changes in benthic community structures and in turn to changes in the productivity of these important fisheries habitats. Sewage outfalls are located at Skennars Head which releases tertiary treated effluent into the lower intertidal zone and a deep sea release operates out of Coffs Harbour. Potential effects of these sewage outfalls are an increase in nutrient loads and sedimentation which can result in changes to faunal assemblages and an increase in algal species.

Offshore waters carry a fair amount of large shipping traffic (8-10 ships per day in 1994). The possibility of accidents occurring remains present either from collisions at sea or the effects of heavy weather. The major oil spill which occurred in a shipping accident in 2009 off Moreton Island is an example that led to major impacts on the coastal environment and fisheries resources. It is important that adequate response planning is in place to deal with such incidents.

Marine debris from passing shipping and from commercial and recreational fishermen is another source of environmental pollution which impacts negatively on the marine ecosystem. Education and the enforcement of laws to prevent disposal of rubbish at sea are important in addressing this issue.

1.20 ESTUARINE ENVIRONMENT

Estuaries represent the important interface between the land and the sea. They occur from the marine zone inland to the furthest extent of tidal influence. The seagrass, mangrove, saltmarsh, mud flat and sand bar habitats found in estuarine systems provide important feeding, spawning and nursery grounds for the many species of invertebrates, fish and birds that inhabit them. They are subject to a number of interrelating physical, water quality, ecological and human processes that determine their ongoing health and productivity. A healthy estuarine ecosystem increases the capacity of fish communities to regenerate from the impacts of fish harvesting thus enabling the sustainable harvest of the resource. The productivity of the offshore fishery is influenced in part by the capacity of the estuarine system to contribute to total fish production. The Estuary General and Estuary Trawl Fisheries both operate within the Estuary Zone.

1.20.1 Physical processes

Both the Richmond and Clarence River estuaries have been formed through the deposition of sediment from catchment runoff over millions of years and represent the outflow of major river systems. The current estuarine landscape evolved during the infilling of an estuarine embayment since sea levels reached their current level c.7000 years ago. Acid sulphate soil environments formed in mangrove back swamp areas, which eventually filled in to become freshwater wetlands
(ABER, 2006). Before the advent of training walls in the 19th century the estuary mouths were shifting in response to scouring associated with flood events with associated shoaling determined by freshwater flows and tidal range.

Modification of the river mouths through the construction of training walls to allow safe shipping movement has acted to create a consistent tidal range within the estuary which results in a number of flow on effects, including:

- the promotion of mangrove and saltmarsh colonisation,
- increased tidal induced drainage across the floodplain,
- increased tidal flushing and export of nutrients,
- increased larval and fish exchange between the estuary and ocean, and
- increased nutrient inputs from the ocean during dry periods (ABER, 2006).

Rainfall is highest in the upper reaches of the catchment and varies with topography. Periodic flooding of the lower catchment occurs after heavy rainfall events and is an integral part of the river and estuarine ecosystems.

1.20.2 Water quality

Catchment disturbance has had a major impact on water quality in many Northern NSW estuaries with considerable modification associated with land clearing, agriculture, grazing and urban development. These changes have resulted in substantial increases in sediment and pollution loads entering the waterways with subsequent impacts on water quality. Alterations to the lower floodplain have come in the form of structural flood mitigation works, resulting in major modifications to the hydrology and wetland systems of estuaries. The construction and operation of floodgates on many creeks and drains in the region has caused previously saline areas to become fresh with the resultant death of mangroves (West, 1993). Most flood gated areas are very poor fish habitats, not only due to the lack of access (Pollard & Hannan, 1993), but also due to the poor water quality conditions (Scribner, 1993). The lowering of the water table has had serious consequences at some particular sites where it has caused the release of acid water through the weathering of exposed pyritic soils (Walker, 1963). Acid Sulfate Soils (ASS) runoff impacts on the estuarine environment include low p H, high concentrations of toxic dissolved iron and aluminium, formation of monosulphic black ooze in drains and low dissolved oxygen (ABER, 2006).

Prolonged inundation of low lying pastures and wetlands during flood events causes the decay of grassland vegetation and accumulated organic matter, thereby depleting the water of oxygen (ABER, 2006). The extensive drainage works that have been conducted in the coastal floodplains then act to quickly transport this deoxygenated water into the estuary resulting in major impacts on water quality. Poor water quality associated with ASS and low oxygenation levels within the estuary have had serious consequences following flood events particularly in the Richmond River where a number of major fish kill events have occurred resulting in periodic halts to commercial fishing activities in the estuary. The increase in urban land areas mostly in the coastal zone has had an impact on water quality particularly in the dry season when catchment inputs wane. High faecal coliform levels, urban storm water runoff and increased sedimentation associated with building developments are all negative impacts on estuarine water quality.

Any decline in the area of aquatic macrophytes in Northern NSW estuaries is likely to impact either directly or indirectly on fish communities and the subsequent catches of the commercial fishery. There are a number of important measures which can address these threats to estuarine ecosystems. The reinstatement of a more natural floodplain ecosystem associated with the removal of canal and drainage systems in marginal agricultural lands would be a good step towards improving water quality in the estuary. Adequate riparian buffers along the river and estuarine waterways will act to filter out contaminants from the system. A total catchment management approach is seen as the best way to protect the important estuarine ecosystems.

1.20.3 Estuarine fisheries habitats

Estuarine habitat areas include the seagrass, mangrove, saltmarsh and bare sediment areas. Seagrass beds provide essential food and shelter to a diverse range of fish, plant and crustacean species and contribute considerably to the productivity of an area through nutrient cycling and the detrital food chain (Lynch et al, 1993). Submerged macrophyte beds, particularly those seagrass areas around the mouth of the estuary, are very important shallow water habitats for many species of fish (Hanekom & Baird, 1984), and are areas of recruitment for juveniles of several fish species of commercial importance. Mangroves constitute an important part of the total fisheries habitat, contributing large amounts of organic matter to the estuarine food chain and providing food and shelter to many species of fish, crustacea, birds and other animals. One hectare of mangrove forest contributes about six tonnes of organic material to the ecosystem each year (Lynch & Burchmore, 1992). Saltmarsh vegetation occurs at the interface of the aquatic and terrestrial vegetation communities and, as such, forms an important buffer zone while making up an important component of the total fisheries habitat. Saltmarshes are the area of fisheries habitat most often affected by human activities such as grazing and reclamation (Lynch et al, 1993). The bare sediment benthic zones represent the bottom of the food chain in an estuary and play an important nutrient cycling role which assists pelagic productivity. **Figure 2** demonstrates the foodweb cycle that drives estuarine productivity.



Figure 2: Estuarine Foodweb Cycle (Source ABER, 2006)

Studies of estuarine fish within Northern NSW found that the distribution of fish communities was shown to be most influenced by the distance from the river mouth, but that additional factors such as sediment characteristics, water chemistry, tidal strength and habitat complexity also play a role (West, 1993). Fish moving into the estuarine areas in response to feeding and/or habitat requirements are comprised mainly of juveniles and sub-adults of species also common in inshore coastal environments. **Table 3** shows the estuarine habitat usage of various fish species of commercial importance and their interrelationship with coastal and oceanic environments.

SPECIES	HABITAT USAGE (J = juvenile, A = adult, S = spawning)										
	ESTUARY						COASTAL / OCEANIC				
	Mangrove	Seagrass	Shoals	Channel	Freshwater	Inshore	Offshore	Reef			
Dusky flathead	J	S, J, A	S, J, A	A		S					
Sand whiting	J	J	J, A	J, A		S					
Tailor		J, A	J, A	J, A		S, J, A					
Yellowfin bream	J	J, A	J, A	A		S		А			
Mulloway				J, A		S					
Bully mullet			J	J, A	J		S				
Luderick	J	J		А		S		А			
Long-finned eel		А	А	А	J, A		S				
Blue swimmer crab				J, A							
Mud crab	J, A		J				S				
King prawn		J	J	J			S, A				
Greasyback prawn			J, A	J, A		S					
School prawn			J, A	J, A			S				

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1.21 CLIMATE CHANGE

Increasingly climate change is seen as a threat facing the marine and estuarine zones. Potential impacts of climate change are sea level rise, changes in ocean temperatures and weather patterns affecting coastal areas. Shorelines are currently predicted to retreat at a ratio of 10:1, that is, 10m of retreat for every 1m rise in sea level (CSIRO, 2002). Under current climate change scenarios there is predicted to be a decrease in cyclonic activity during El Nino years and more frequent and intense activity during La Nina years (Hennessy et al, 2004) which will result in increased wave activity and related coastal erosion issues during these occurrences. Changes in ocean temperatures can alter natural distribution of species important for the commercial fishery with temperate species contracting south. More intense storm activity may also affect the frequency of flooding which has implications for sedimentation and decreased light penetration in estuarine and nearshore areas (Walsh, 2004). This may result in negative impacts on key habitats such as marine delta shoals and seagrasses. Wetland communities may become constrained by elevation or the presence of development at their landward edge. The occurrence of some coral species in Northern NSW waters may be impacted by the effects of coral bleaching events and increased acidification of the oceans.

THE COMMERCIAL FISHING INDUSTRY IN NORTHERN NSW

The Commercial fishing industry is comprised of two main sectors which are described below:

- The first is the harvesting sector which is comprised of six main fishery types which operate in the estuarine and marine areas.
- The second sector represents the activities of the Fishermen's Co-operative and licensed fish receivers and is described as the handling, processing and retail sector.

The seasonal and relatively diverse nature of fishing activity in the Northern NSW region means that most fishers operate in more than one fishery with many utilising a variety of gear types for different areas and conditions. Fishery Management Strategies (FMS) have been implemented by NSW Fisheries for all of the State fisheries outlined below which govern the operations of fishers in that industry sector. A complex share management program has been implemented in each of the main fisheries which aims to control the amount and type of fishing effort deployed in each fishery. The main fisheries of the study area are:

- 1. Estuary General
- 2. Estuary Prawn Trawl
- 3. Ocean Hauling
- 4. Ocean Prawn Trawl
- 5. Ocean Trap and Line
- 6. Lobster
- 7. Tuna (Commonwealth fishery)

The management and regulation of these fisheries is carried out by the NSW Fisheries Department, except the Tuna fishery which is regulated by the Commonwealth.

The following sections provide an overview of each fishery type operating in the study area.

1.22 LOBSTER FISHERY

The lobster fishery is a small but valuable industry in Northern NSW. The main target species is the Eastern Rock Lobster (*Jasus verreauxi*) although southern rock lobster, tropical rock lobster and painted rock lobster are also taken. Lobster is caught in inshore areas using small beehive or square traps or offshore using large rectangle traps. A small number are also taken by hand. The fishery is managed via a quota system used in combination with a Total Allowable Commercial Catch (TACC) which is set by an independent committee. The TACC for 2008/09 was 128 tonnes for all of NSW. In Northern NSW there are 2 lobster fishermen working out of the Tweed, 1 out of the Ballina, 9 out of the Lower Clarence and 14 out of Coffs Harbour. Due to the small number of operators NSW Fisheries does not release catch figures for the lobster fishery due to privacy concerns.

1.23 ESTUARY GENERAL FISHERY

The Estuary General Fishery is a multi-method fishery which includes all forms of commercial estuarine fishing aside from estuarine trawling. The most frequently used method is haul-netting, with other methods being set pocket net, trapping, hand lining and hand gathering of species such as pipis and beachworms. The primary management controls used in the fishery include:

- limits on the number of fishers operating,
- temporal and spatial closures,
- gear restrictions, and
- minimum size limits.

The Richmond River has traditionally supported a productive estuarine fishery although this has been negatively impacted in recent years by a number of fish kill events associated with river deoxygenation which has resulted in closures of the fishery. Sampling undertaken by NSW Fisheries has indicated that fish stocks have been able to recover from these events and the fishery remains active. The Clarence River supports a relatively large estuarine fishery. Species targeted in this fishery include mullet, whiting, luderick, yellowfin bream, blue swimmer crab, mud crab and dusky flathead. Mullet are captured using haul seines and set gillnets with the highest catches occurring in late summer and autumn when movement of mature fish through the estuary is greatest. **Figure 3** shows the total weights of product landed in the three regions for the Estuary General Fishery and the weight of product from all other NSW regions for the last 10 years. It shows that there has been a gradual decline over the ten years across other regions in NSW, with the study area being at relatively stable levels since 2002.



Figure 3: Estuary General total weights per region from 1998 – 2008 (Source: I&I NSW ComCatch 27-10-09 extract)

1.24 ESTUARY PRAWN TRAWL FISHERY

The Estuary Prawn Trawl Fishery operates in the Clarence River targeting school prawns. Prawns are caught using a trawl otter net, although a small proportion are also taken by pocket netting in the Estuary General Fishery. The fluctuations in the prawn catch have been attributed to changes in the distribution and abundance of prawns associated with the influence of rainfall (Ruello, 1973). The majority of prawns are caught during the dark of the moon on either run out or slack tides. Management controls include:

- restrictions on the number of trawlers fishing the river,
- the size and number of nets, and
- the times when fishing can occur.

The trawl seasons commences in October in Lake Wooloweyah with the main river opening in December. The season closes at the end of May the following year. Trawling is prohibited in the Broadwater and most of the Oyster Channel and upstream of the Ulmarra ferry. No river trawling is permitted at night or on weekends or public holidays. In recent years the fishery has taken on mandatory use of bycatch reduction devices which have reduced the amount of unwanted species caught in the net. There have also been recent closures of the Estuary Prawn Trawl fishery which have been self imposed by the fishermen. **Figure 4** shows weight of product taken from the Clarence River Estuary Prawn Trawl fishery for the last 10 years and demonstrates the fluctuations in landings. It is notable that the Clarence continues to provide the majority of school prawn landings in NSW which is approximately 60% of total weight across NSW.



Figure 4: Estuary Prawn Trawl total weights from 1998 – 2008 for Clarence River and all other NSW regions (Source: I&I NSW ComCatch 27-10-09 extract)

1.25 OCEAN HAULING FISHERY

Beach hauling is conducted on a number of ocean beaches in Northern NSW using seine nets which are set around sighted schools of fish and then hauled in by hand or with the aid of vehicles. The fishery targets approximately 20 species of which sea mullet, Australian salmon, yellowfin bream, sea garfish, luderick, sand whiting, pilchards, yellowtail, blue mackerel, sweep, sprat, jack mackerel, dart, silver trevally, anchovy and bonito are the principal species (NSW Fisheries, 2002a). Management of this fishery includes:

- input controls regulating the size of fishing gear,
- limiting the number of fishers in each part of the industry, and
- a range of closures.

Figure 5 shows the total weights of product landed in all applicable zones for the Ocean Haul fishery for the last 10 years. It is notable that while landings have increased in the rest of NSW they have stayed fairly consistent in Northern NSW.



Figure 5: Weight of product landed in zones 1, 2, 3, and all other NSW zones for Ocean Haul Fishery 1998 – 2008 (Source: I&I NSW ComCatch 27-10-09 extract)

1.26 OCEAN PRAWN TRAWL FISHERY

The offshore prawn fishery represents the most valuable commercial fishery in the Northern NSW area. While offshore school prawns provide a proportion of the catch, eastern king prawns provide the best returns to fishers. Fishing for prawns is generally undertaken at night, however trawlers also operate during the day in times of flood. Offshore school prawns are caught in water depths of 3 - 12 fathoms, while king prawns are caught in depths ranging from 12 - 100 fathoms. Fishing is generally undertaken for about 110 - 140 nights per year, dependent upon weather conditions and the productivity of the fishery (Mason, 1991). A number of species including spot whiting, flathead, bugs and octopus are taken as secondary species of prawn trawling operations. There has been some concern raised about the level of bycatch and its effect on non-target species. Efforts have been made to address this through the use of BRD's. All vessels operating in this fishery use triple rig prawn trawling gear.

The Ocean Prawn Trawl is a share management fishery with fishers requiring a certain amount of shares to operate. There are a number of seasonal closures in specific areas of the fishery for the purposes of protecting and conserving key habitat, to manage the volume of fishing effort in an area, and to minimise by-catch and the impacts of the fishery (NSW DPI, 2004). There have also been a number of areas where commercial fishers have implemented closures to protect juvenile king prawns. Other management controls include restrictions on gear type and the size and capacity of boats. **Figure 6** shows the total weights of product landed in the three zones and all other NSW zones for the Ocean Prawn Trawl Fishery for the last 10 years. The Lower Clarence area is shown to be the biggest contributor of product in all of NSW, with Zones 1 and 3 remaining relatively stable compared to the declining trend across the rest of NSW, including Zone 2.



Figure 6: Weight of product landed in zones 1, 2, 3, and all other NSW zones for Ocean Prawn Trawl Fishery 1998 - 2008 (Source: I&I NSW ComCatch 27-10-09 extract)

1.27 OCEAN TRAP AND LINE FISHERY

The ocean trap and line fishery targets a number of species including snapper, morwong, yellowtail kingfish, bonito, silver trevally and leather jackets, although this can vary according to the season and catch rates. Spanner crabs are also harvested in the Northern NSW area. Approximately 70 percent of the snapper is harvested by trap fishers and the rest by bottom set longlines and handlines. Line caught fish are preferred for the fresh fish markets, particularly for export, as they are generally in better condition. In addition to traps most fishers also use handlines and droplines to target reef fish and pelagic species. Management controls have been put in place, which act to limit the efficiency and capacity of fishers including:

- restrictions on the number of endorsements,
- the amount, design and dimensions of fishing gear, and
- the areas that may be worked.

Figure 7 shows the weight of product landed in the Ocean Trap and Line Fishery for the last 10 years. It is noted that while landings have decreased in the rest of NSW they have stayed fairly consistent in Northern NSW.



Figure 7: Weight of product landed in zones 1, 2, 3, and all other NSW zones for Ocean Trap & Line Fishery 1998 – 2008 (Source: I&I NSW ComCatch 27-10-09 extract)

1.28 COMMONWEALTH TUNA FISHERY

Commercial fishing for tuna species occurs in waters from the edge of the continental shelf out to 130 nautical miles along most of the East Australian coast. A small number of longline boats operate out of the Northern NSW ports, while visiting boats from southern areas also use processing facilities within the study areas at various times of the year. The longline season for yellowfin tuna commences off Southern Queensland and Northern NSW in August and spreads southwards following the warm EAC along the coast. The longlines consist of a main line and a series of branch lines with baited hooks with between 250 - 600 hooks set each day. There are 2 - 3 boats targeting tuna working out of Coffs Harbour.

1.29 FISHING EFFORT AND HARVESTING LEVELS IN NORTHERN NSW

Figure 8 shows the level of fishing effort for each of the operating fisheries as determined by the amount of months fished. This information is derived from the monthly catch returns that are required to be provided by all commercial fishers to NSW Fisheries. Fishing effort in the Estuary General and the Ocean Trap and Line Fisheries has declined significantly. This decline is mirrored in the number of fishing businesses reporting and is thus accounted for by the reduction in participating fishers. Effort in the Ocean Prawn Trawl Fishery increased slightly in the first half of the decade before falling away in the second half. This is consistent with the reduction of operators that has occurred in the last five years. Effort in the Ocean Haul and Estuary Prawn Trawl Fisheries has remained fairly consistent.



Figure 8: Fishing effort in Northern NSW for each fishery, 1998 – 2008 (Source: I&I NSW ComCatch 27-10-09 extract)

This effort data can be compared against the gross weight of product landed per fishery as demonstrated in **Figure 9**. Comparing the above figures with **Figure 9** shows the following:

- The Ocean Prawn Trawl Fishery shows large fluctuations in catch over the first five years of the decade which
 may be due to fluctuations in resource stock levels. In the second half of the decade catches have mirrored the
 declining effort in the fishery.
- The Estuary General Fishery catch weights have also shown a reduction directly relative to the decrease in fishing effort.
- The Ocean Haul and Estuary Prawn Trawl Fisheries have shown fluctuating catch levels with an overall steady trend consistent with the effort levels seen for the fisheries.
- The Ocean Trap and Line Fishery has shown a fairly stable level of landings, even though the effort levels for the fishery have been declining over the same period. For marine ecosystems, reef fish have been proposed as potential indicators of overall ecosystem condition (DECCW, 2009). The relatively stable catch rates experienced in the fishery combined with the reduction in fishing effort over the same period would indicate a fairly healthy marine ecosystem and sustainable levels of harvesting.



Figure 9: Gross weights landed for each fishery in Northern NSW, 1998 – 2008 (Source: I&I NSW ComCatch 27-10-09 extract)

NSW Fisheries undertook a major assessment of fish stocks in NSW in 2007-2008. Most of the key species have been classified as fully fished, indicating that harvesting is probably sustainable, but that there should be no significant expansion of commercial or recreational catches (DECCW, 2009). Gemfish, eastern sea garfish and mulloway have been identified as overfished prompting a review of management arrangements for those species.

THE COMMERCIAL CATCH – PROCESSING SECTOR

This sector includes the handling, processing and transport departments for the Co-ops as well as the merchandise, fuel trading and retail operations. The majority of the commercial catch harvested in the Northern NSW region is processed by the fishermen's Co-ops which operate factories at Ballina, Iluka, Maclean and Coffs Harbour as well as the smaller Co-ops at Brunswick Heads, Evans Head and Macleay River. Government deregulation of fish receivers occurred in 1999 which meant that fishers could sell to any person who held a fish receivers license. While this has increased the potential size of the market for fisheries product it has placed pressure on the traditional Co-op system. In some cases operators will move between selling to the Co-ops or to licensed fish receivers based on price considerations. In some of these cases operators will continue to use Co-op facilities while selling outside the Co-op system. Some unregulated sale of product also continues to occur though this would be less than 10% of all product sold.

The value and saleability of seafood is dependent upon its condition on reaching market. Accordingly, it is of utmost importance that seafood products are handled appropriately at each stage of the production system. The operations of the commercial fishers and the subsequent handling, processing and transport sectors determine the quality of seafood produced for sale by the Co-ops. The large majority of fish sold on both domestic and export markets are frozen or chilled. Fish are sold whole, gilled and gutted, in cutlet or fillet form. Crustaceans are marketed fresh ('green') or cooked, either whole or as tails. Product is also sent to the Sydney Fish Market which is administered by the NSW Fish Marketing Authority. Fish are transported to market under refrigeration in insulated trucks which are run by the Co-ops or in some cases by contracting refrigerated transport companies.

The bulk of export product from the commercial catch goes to Thailand, while some product is sent to Saudi Arabia, Egypt and to a lesser extent New Zealand. All processing operations which export seafood product must be registered with the Australian Quarantine and Inspection Service (AQIS) and must meet the designated standards. In the long term there is an increasing trend towards the mechanisation of processing operations, with the possibility of resultant impacts for employment in the processing sector. The value-adding of fish and crustacea increases the saleability of the product and increases the opportunities for employment and income generation in the industry and is one of the areas with potential for future development. **Figure 10** shows a schematic representation of the commercial fishing industry production system.



Figure 10: Schematic representation of the commercial fishing industry production system

1.30 BALLINA

The processing and retail operations for the Ballina Co-op are located on River Street, Ballina and incorporate a modern building and office with a prominent retail outlet. The approximate value of these facilities is over \$1 million while the value of plant and equipment operated by the Co-op is approximately \$80,000. Fisheries product is transported to the Co-op a short distance by road from the Council owned wharf on the Richmond River. There are 10 fulltime employees working at the Co-op and another 15 casual staff which includes office staff.

The gross value of each of the fisheries operating in the Ballina area (Region / Zone 1) is shown in **Figure 11**. There has been a general decline in the gross value of product for all the operating fisheries (except Ocean Haul) which can be attributed to the decrease in weight of product landed. The Ocean Haul Fishery has shown an increase in gross value of product with a slight increase in the weight of product landed.

The Ocean Prawn Trawl Fishery has been the highest grossing fishery over the last 10 years. The Ocean Prawn Trawl Fishery had a peak in the middle of the decade, with levels decreasing to present value. However it should be noted that overall the value of product from the Ocean Prawn Trawl fishery has increased slightly over the decade. Ocean Trap and Line has remained fairly stable, and as indicated in Section 7.8 this indicates that this fishery is being harvested at a sustainable rate.



Figure 11: Gross Value of each Fishery in Ballina area, 1998 – 2008 (Source: I&I NSW ComCatch 27-10-09 extract)

1.31 Lower Clarence

The Maclean processing factory has been operating successfully for more than 60 years and has gradually expanded with the addition of modern ice making equipment, extra cold storage rooms, a chandlery and hardware section, offices and a retail shop. The Co-op operates blast, plate and brine freezers. The ocean catch is primarily processed at the Iluka factory, which was constructed in response to the increasing offshore fishing activity. The Iluka factory has been constructed to the standards required for export of fish product and enables ocean product to be landed directly on to the wharf ready for processing and transport. The Iluka depot also incorporates a retail shop. There are 19 fulltime employees and 117 casual employees employed by the two processing factories, this figure includes office staff. The total value of the property and plant operated by the Co-op is \$5.5 million. Major expenditures by the co-operative include electricity, building repairs, finance, wages and salaries. The haulage department of the Co-op operates four trucks worth approximately \$800,000 and employs three drivers. These trucks also transport seafood products from the other North Coast Co-ops to the Sydney Fish Market. Frozen seafood products are also exported overseas.

The gross value of each of the fisheries operating in the Lower Clarence (Region / Zone 2) is shown in **Figure 12**. The Ocean Prawn Trawl fishery has had the highest gross value of product over the last 10 years. There has been a significant decrease in the value of this fishery in recent times which is attributable to the decrease in the weight of product landed, due to reduced fishing effort. The Estuary Prawn Trawl fishery has been fairly consistent in its gross value over the last ten years. This is due to the consistent fishing effort in this fishery as indicated in **Figure 8**. The Estuary General fishery has decreased slightly in value, corresponding to reduced fishing effort. The Ocean Trap and Line, and the Ocean Haul fisheries have remained relatively stable in value over the 10 years, again indicating relatively stable fishing levels in these fisheries.



Figure 12: Gross Value of each Fishery in Clarence area, 1998 – 2008 (Source: I&I NSW ComCatch 27-10-09 extract)

1.32 COFFS HARBOUR

The processing and retail operations for the Coffs Harbour Co-op are located at the main town boat harbour which allows direct unloading of fishing boats into the processing area. This facility also incorporates a restaurant and office from where Co-op activities are managed. The Co-op has recently made significant investments into the upgrade of freezers, cool room, ice storage rooms and hard ice plant. In addition there has been further money invested into the restaurant business operated by the Co-op. The approximate value of property and plant held by the Co-op is over \$1.5 million. There are 10 fulltime employees working at the Co-op and another 15 casual staff including office workers.

The gross value of each of the fisheries operating in the Coffs Harbour area (Region / Zone 3) is shown in **Figure 13**. The Ocean Prawn Trawl Fishery is demonstrated to have taken a significant decline which is consistent with the drop in weight of product landed. The gross value for the Estuary General Fishery has shown a slight increase over the last decade and at present is the highest value fishery operating in the area. This however does not take into account the Commonwealth controlled Tuna fishery which is a relatively high value fishery and is operating in the area. The gross values for Ocean Haul and Ocean Trap and Line fisheries have remained relatively stable over the decade.



Figure 13: Gross value of each Fishery in Coffs Harbour area, 1998 – 2008 (Source: I&I NSW ComCatch 27-10-09 extract)

ECONOMIC IMPACTS OF THE COMMERCIAL FISHING INDUSTRY

1.33 REGIONAL ECONOMIC IMPACT ANALYSIS

Regional economic impact analysis involves assessing the economic significance of an industry, in this case the commercial fishing industry, to a particular area. One way of assessing the regional economic significance of an industry is through the economic modelling technique of input-output analysis. This technique allows the quantification of the economic significance of regional industry sectors in terms of output, income, employment and value added. The basic premise underlying the input-output model is that industries do not operate in isolation from each other within an economy but, rather, are integrated with other businesses through the purchase of inputs and the sale of outputs. Consequently, if changes occur in one industry, repercussions will flow on to other industries through business transactions. Accordingly, the growth or decline in one industry will facilitate growth or decline in linked industries (Tamblyn & Powell, 1988).

The economic significance of an industry such as commercial fishing can be measured in terms of direct and indirect effects:

- The direct effects are those from the commercial fishing industry's expenditure in purchasing goods from other industries (suppliers) and businesses.
- The indirect effects are those from these other industries (suppliers) and businesses increasing their purchases to meet the additional demand from the commercial fishing industry.
- Consumption induced effects result from the spending of fishing derived income, and recognise that the level of local production is important in determining regional levels of household consumption and that this in turn will be spent mainly locally and so influence the level of regional consumption and the level of output of the industry.

The total or flow-on benefits accruing to the economy are the sum of the direct, indirect and consumption induced effects.

Input-output analysis provides four measures of economic impact, these being output, income, employment and value added. These impacts are determined using multipliers which are ratios measuring the relationship between the initial stimulus and the total impact, as follows:

- 1. The output impact measures the increase in gross sales throughout the whole economy by summing all the individual transactions resulting, directly and indirectly, from the economic stimulus.
- 2. The income impact measures the additional amount of wages and salaries paid to employees of the industry under consideration and to other industries benefiting from the stimulus to the economy.
- 3. The employment impact measures the number of jobs created by the stimulus, both directly and indirectly.
- 4. The value added or Gross Regional Product (GRP) impact measures only the net activity at each stage of production. GRP is defined as the addition of consumption, investment and government expenditure, plus exports of goods and services, minus imports of goods and services for a region.

Input-output techniques provide a good approach for taking account of the inter-relationships between the various sectors of the economy in the short-term and hence are an appropriate tool for determining the direct, indirect and induced economic impact of the commercial fishing industry on the economy of the Northern NSW region and specifically the major catchment areas of Ballina, Lower Clarence and Coffs Harbour (Laurence, 2010).

Laurence Consulting undertook economic models for Ballina, Lower Clarence, Coffs Harbour and Northern NSW. The report titled "*Economic Impact of the Commercial Fishing Industry in Northern New South Wales*" is included in **Appendix C**. The following is a summary of the results of this modelling.

1.34 ECONOMIC IMPACTS

The economic impacts of the commercial fishing industry for the study areas in 2007-2008, as determined through the economic modelling undertaken by Laurence Consulting are shown in **Tables 4 to 7**.

1.34.1 Ballina

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									-							

	Direct	Indirect	Total Industry	Consumption	Total Flow			
	(D)	(I)	(D + I)	(C)	(D + I + C)			
Harvesting								
Output (\$m)	2.8	2.8	5.7	3.5	9.2			
Income (\$m)	0.4	0.5	0.9	0.5	1.4			
Employment (fte persons)	15.9	7.6	23.5	9.6	33.1			
Value added (\$m)	1.2	0.9	2.1	1.0	3.1			
Retail, Handling & Processing								
Output (\$m)	1.8	1.8	3.7	4.0	7.6			
Income (\$m)	0.6	0.4	1.0	0.5	1.5			
Employment (fte persons)	23.5	6.5	30.0	10.8	40.8			
Value added (\$m)	0.9	0.7	1.7	1.1	2.8			
Total Impact								
Output (\$m)	4.7	4.7	9.3	7.5	16.9			
Income (\$m)	1.0	0.9	1.9	1.0	2.9			
Employment (fte persons)	39.4	14.1	53.5	20.4	73.9			
Value added (\$m)	2.1	1.7	3.8	2.2	6.0			

The commercial fishing industry based out of the Ballina Co-op recorded gross sales of fish caught of approximately \$2.8 million in 2007/08, whilst retail activities undertaken through the co-operative realised a further \$1.8 million in output. These figures were modelled to determine the following:

- An estimated direct output of \$4.7 million and additional production induced output of \$4.7 million through other industries. Consumption induced effects worth \$7.5 million resulting in a total flow-on effect of **\$16.9 million** derived from output of the industry.
- An estimated direct income (wages and salaries) of \$1.0 million, with \$0.9 million in additional production induced income in other industries. Consumption induced effects were worth \$1.0 million resulting in a total flow-on effect of \$2.9 million in income generated.
- Approximately 40 direct full-time equivalent employment positions, with an estimated additional 14 production induced employment positions gained indirectly through other industries. Consumption induced effects provided another 20 jobs resulting in total flow-on employment of 74 people.
- An estimated increase in GRP of \$2.1 million from direct effects, with a production induced impact of \$1.7 million through other industries. Consumption induced effects were worth another \$2.2 million resulting in total flow-on impacts of \$6.0 million in value added.

1.34.2 Lower Clarence

	Direct	Indirect	Total Industry	Consumption	Total Flow On			
	(D)	(I)	Impact (D + I)	Induced (C)	Effect (D + I + C)			
Harvesting								
Output (\$m)	9.9	9.7	19.6	11.0	30.5			
Income (\$m)	1.5	1.3	2.8	1.5	4.2			
Employment (fte persons)	92.3	21.62	113.9	29.4	143.3			
Value added (\$m)	4.2	2.9	7.1	3.2	10.3			
Retail, Handling & Processing								
Output (\$m)	16.0	16.7	32.6	28.8	61.5			
Income (\$m)	4.0	3.3	7.3	3.9	11.1			
Employment (fte persons)	151.4	60.4	211.8	77.3	289.1			
Value added (\$m)	6.5	6.7	13.3	8.3	21.6			
Total Impact								
Output (\$m)	25.9	26.4	52.2	39.8	92.0			
Income (\$m)	5.5	4.6	10.1	5.3	15.4			
Employment (fte persons)	243.7	82.0	325.8	106.7	432.4			
Value added (\$m)	10.8	9.6	20.4	11.5	31.9			

Table 5: Economic impact of commercial fishing industry - Clarence Co-operative - 2007/2008

The commercial fishing industry in the Lower Clarence area recorded gross sales of fish caught of approximately \$9.9 million in 2007/08, whilst retail activities undertaken through the co-operative realised a further \$16.0 million in output. These figures were modelled to determine the following:

- An estimated direct output of \$25.9 million and additional production induced increases in output of \$26.4 million through other industries. Consumption induced effects worth \$39.8 million resulting in a total flow-on effect of \$92.0 million derived from output of the industry.
- An estimated direct income (wages and salaries) of \$5.5 million, with \$4.8 million in production induced income generated through flow on effects in other industries. Consumption induced effects were worth \$5.3 million resulting in a total flow-on effect of \$15.4 million in income generated.
- Approximately 244 direct full-time equivalent employment positions, with an estimated additional 82 production induced employment positions gained indirectly through other industries. Consumption induced effects provided another 106 jobs resulting in total flow-on employment of 432 people.
- An estimated increase in GRP of \$10.8 million from direct effects, with a further production induced impact of \$9.6 million through other industries. Consumption induced effects were worth another \$11.5 million resulting in total flow-on impacts of \$31.9 million in value added.

1.34.3 Coffs Harbour

	Direct	Indirect	Total Industry	Consumption	Total Flow On			
	(D)	(1)	(D + I)	(C)	(D + I + C)			
Harvesting					<u> </u>			
Output (\$m)	5.1	5.0	10.1	6.4	16.5			
Income (\$m)	0.8	0.8	1.6	0.9	2.5			
Employment (fte persons)	32.4	13.4	45.8	17.6	63.4			
Value added (\$m)	2.2	1.6	3.8	1.8	5.6			
Retail, Handling & Processing								
Output (\$m)	7.1	7.0	14.1	15.3	29.4			
Income (\$m)	2.3	1.6	3.8	2.1	5.9			
Employment (fte persons)	91.0	25.3	116.3	42.3	158.6			
Value added (\$m)	3.6	2.9	6.4	4.4	10.9			
Total Impact								
Output (\$m)	12.2	12.0	24.2	21.7	46.0			
Income (\$m)	3.0	2.4	5.5	3.0	8.4			
Employment (fte persons)	123.4	38.7	162.1	59.9	222.0			
Value added (\$m)	5.8	4.5	10.2	6.3	16.5			

Table 6: Economic impact of commercial fishing industry - Coffs Harbour Co-operative - 2007/2008

The commercial fishing industry in the Coffs Harbour area recorded gross sales of fish caught of approximately \$5.1 million in 2007/08, whilst retail activities undertaken through the co-operative realised a further \$7.1 million in output. These figures were modelled to determine the following:

- An estimated direct output of \$12.2 million and additional production induced increases in output of \$12.0 million through other industries. Consumption induced effects were worth \$21.7 million resulting in a total flow-on effect of \$46.0 million derived from output of the industry.
- An estimated direct income (wages and salaries) of \$3.0 million, with \$2.4 million in additional production induced income generated through flow on effects in other industries. Consumption induced effects were worth \$3.0 million resulting in a total flow-on effect of \$8.4 million in income generated.
- Approximately 123 direct full-time equivalent employment positions, with an estimated additional 39 production induced employment positions gained indirectly through other industries. Consumption induced effects provided another 60 jobs resulting in total flow-on employment of 222 people.
- An estimated increase in GRP of \$5.8 million from direct effects, with a further production induced impact of \$4.5 million through other industries. Consumption induced effects were worth another \$6.3 million resulting in total flow-on impacts of \$16.5 million in value added.

1.34.4 Northern NSW

	Direct	Indirect	Total Industry	Consumption	Total Flow On
	(D)	(I)	(D + I)	(C)	(D + I + C)
Harvesting					
Output (\$m)	36.3	36.1	72.4	44.8	117.2
Income (\$m)	5.4	5.9	11.3	6.1	17.3
Employment (fte persons)	222.6	97.4	320.0	123.9	444
Value added (\$m)	15.5	11.6	27.2	12.9	40.1
Retail, Handling & Process	sing (<i>data</i>	from Ballir	na, Clarence and	Coffs Harbour C	o-ops only)
Output (\$m)	24.9	25.4	50.3	48.5	98.8
Income (\$m)	6.9	5.4	12.2	6.5	18.8
Employment (fte persons)	260	95.1	355.1	134.1	489.2
Value added (\$m)	11.0	10.4	21.4	14.0	35.4
Total Impact					
Output (\$m)	61.2	61.5	122.7	93.3	216.0
Income (\$m)	12.3	11.3	23.5	12.6	36.1
Employment (fte persons)	482.6	192.5	675.1	258	933.2
Value added (\$m)	26.5	22.0	48.6	26.9	75.5

Table 7: Economic impact of commercial fishing industry – Northern NSW (DPI zone/region 1, 2 & 3, and combined data from Co-ops) - 2007/2008

NSW Fisheries have provided data on output for the Northern NSW region which takes in Fisheries Zones / Regions 1, 2 and 3. The commercial fishing industry in Northern NSW which includes Ballina, Lower Clarence and Coffs Harbour Coops as well as a number of smaller fishermen's co-ops and non co-op aligned operators recorded gross sales of fish caught of approximately \$36.3 million in 2007/08. It should be noted that this figure is calculated at Sydney Fish Market prices, whereas **Tables** 4 to 6 use prices determined at the Co-ops. The value of output of the retail, handling and processing sectors for Ballina, Lower Clarence and Coffs Harbour Co-ops for 2007/08 was \$24.9 million. It should be noted that this figure does not include the operations of the smaller Co-ops (outside the study area but within Zones/Regions 1, 2, & 3). It has been used as it is assumed the majority of handling & processing in the region occurs at the Co-ops of the study area. These figures were modelled to determine the following:

- An estimated direct output of \$61.2 million and additional production induced increases in output of \$61.5 million through other industries. Consumption induced effects were worth \$93.3 million resulting in a total flow-on effect of \$216 million derived from output of the industry in Northern NSW.
- An estimated direct income (wages and salaries) of \$12.3 million, with \$11.3 million in additional production induced income generated through flow on effects in other industries. Consumption induced effects were worth \$12.6 million resulting in a total flow-on effect of \$36.1 million in income generated.
- Approximately 483 direct full-time equivalent employment positions, with an estimated additional 192 production induced employment positions gained indirectly through other industries. Consumption induced effects provided another 258 jobs resulting in total flow-on employment of 933 people.
- An estimated increase in GRP of \$26.5 million from direct effects, with a further production induced impact of \$22 million through other industries for a total industry value added of \$48.6 million. Consumption induced effects were worth another \$26.9 million resulting in total flow-on impacts of \$75.5 million in value added.

1.35 INCOME AND EMPLOYMENT

Direct employment in the commercial fishing industry in Northern NSW can either be in harvesting operations or through the associated handling, retail and processing sectors. Within the harvesting sector fishers can either be owner-operators, nominated fishers, employees or crew depending on the fishery. Traditionally fishing operations have been passed from father to son with the boats, expertise and local knowledge kept in the family. This is still occurring to a certain extent in the fishery, with a small number of young fishers taking up licenses. Most offshore operators employ at least one crew member and may take on extra crew dependent on the size of the boat and seasonal fluctuations in the catch. The number of crew members employed on a full and part time basis, the average wage and range of crew wages for 2008/09, as determined from the survey of commercial fishers is shown in **Table 8**. Weekly crew wages can be seen to be relatively high, however the seasonal nature of the work and the impact of weather conditions on the hours worked should be taken into consideration.

CREW MEMBER	FULL TIME	PART TIME	AVERAGE WAGE / WEEK	RANGE / WEEK
1	62	37	\$ 870	\$ 200 – 1,900
2	12	6	\$ 750	\$ 190 – 960
3	3	12	\$ 390	\$ 190 – 960

Table 8: Number	. emplovmer	nt status and	wage of crew	in Northern NSW

The number of people employed in the actual handling and processing of fish product is dependent upon the seasonal fluctuations in the catch and specific projects which the Co-ops undertake. Even during the peak fishing seasons there are fluctuations in the volume of labour required dependent on the daily and weekly delivery of product from the boats. The great majority of fishing related jobs in Northern NSW are taken by local residents. **Table 9** shows the number of operating fishers and the number of handling, processing and retail workers directly involved in the industry in each of the study areas in 2008/09. Coffs Harbour has a relatively large amount of people employed in the retail, handling and processing sector on account of its operation of a restaurant and related facilities. The direct employment figures provided in the economic modelling are lower than the actual amount of people working in the industry. It should be noted that the economic modelling results are for full time equivalent positions, whilst the actual figures account for fishers and employees working on a full-time, part-time and casual basis.

Table 9: Number of people employed in fishing industry in 2008/09

	Ballina	Lower Clarence	Coffs Harbour	Total
Harvesting				
Total Number of Fishermen	34	142	53	229
Retail, Handling & Processing				
Total Number of People Employed				
(includes part-time & casual)	25	120	138	283

The average range of incomes for commercial fishers as determined by the 2006 census is shown in **Table 10**. The range of incomes shown reflects the different size of fishing operations, the levels of fishing effort applied, and the skill and experience of different operators. **Table 10** shows that 46% of fishers earn less than \$400 per week indicating that a large proportion of fishers receive a weekly wage lower than the regions average. The survey conducted with this report showed that the fishers derived an average of 82% of their income directly from fishing activity. When examining the income figures determined for operators in the harvesting sector through the economic modelling and in the census data it is apparent that they are fairly low compared to the State average. This can be attributed to the fact that the level of direct wages and salaries returned to agricultural and fishing sectors is generally proportionally lower than other industries due to a higher level of compensation derived through gross operating surplus/gross mixed income (Laurence, 2010).

Industry	Commercial Fishing										
Individual Income (weekly)	Neg income	Nil income	\$1 - \$149	\$150 - \$249	\$250 - \$399	\$400 - \$599	\$600 - \$799	\$800 - \$999	\$1,000 - \$1,299	\$2,000 or more	Not stated
Ballina	0	3	0	3	5	10	0	0	0	0	3
Clarence Valley	3	3	3	12	18	27	25	6	5	3	0
Coffs Harbour	4	0	7	0	13	3	6	0	0	0	0
TOTAL	7	6	10	15	36	40	31	6	5	3	3

Table 10: Range of incomes of commercial fishers in Northern NSW

Data Source: 2006 Census of Population and Housing

1.36 TOTAL FLOW-ON ECONOMIC IMPACT

The tables shown in Section 9.2 identify the total flow on economic impacts associated with the operation of the commercial fishing industry within the study areas. The survey conducted as part of this report sought to identify how some of those flow on impacts which result from the expenditure of fishing derived income are distributed in the local and regional economies. There are two identifiable types of expenditure. Operating expenditure refers to the costs involved in the running and maintenance of a fishing operation and any capital investment which occurs in that operation. Household expenditure (a consumption induced effect) refers to the spending of fishing derived income on household and other goods and services. The tables below summarise the results of the fishers survey.

1.36.1 Operating expenditure and capital investment

The average annual operating costs for commercial fishers in Northern NSW and where this expenditure occurred in 2008/09, is shown in **Table 11**. This shows that 34% of operating expenditure is distributed locally through the Co-ops, another 35% is spent in the local and regional economy while 31% of expenditure occurs outside the region. Fuel makes up the major component of expenditure, approximately 30% of all expenditure, with a steady increase in fuel prices over the last 12 years. The following table has been developed using data from the results of the survey of fishers in the study area.

TYPE OF EXPENDITURE	CO -OPERATIVE (\$)	NORTHERN NSW REGION (\$)	OUTSIDE REGION (\$)
Fishing equipment	6,780	4,720	16,060
Safety equipment	1,170	790	1,450
Insurance	2,630	4,800	5,150
registrations	2,040 1,580		1,500
permits	2,740	2,480	5,370
Boat & Mechanical repairs	7,150	9,140	19,000
Vehicle expenses	3,580	3,490	3,500
Hardware	2,700	3,100	0
Fuel/Oil	22,950	23,350	0
Other	7,770	7,750	2,300

Table 11: Average annual operating costs for commercial fishers in Northern NSW and the distribution of those expenses for 2008/09

A description of the types and value of the vessels operating in the commercial fishery is provided in **Table 12**, along with an indication of the value of the fishing gear used. The majority of the boats in the fishing fleet are controlled by owner-operators, with fishing ventures financed by individual savings or by local lending institutions. The owner-operator nature of most fishing businesses in the region contrasts with the corporatised form of business conducted in other industries whose access to investment funds is more broadly based, and for which security is less closely identified with an individual operator. The table below highlights that there is considerable investment in equipment for the fishers of the region. The following table has been developed using data from the results of the survey of fishers in the study area.

Table 12: Descri	ption of the types and	value of boats in study	y area

	TRAWLER	POWERBOAT	POWERED PUNT	UNPOWERED PUNT
Approx. Number	55	75	110	20
Average Engine Power (HP)	170	100	30	n/a
Average Hull (m)	14	6.5	6	6
Average Value of Boat (\$)	250,000	32,500	11,000	4,500
Average Value of Gear (\$)	25,000	15,000	15,000	6,000
Estimated Total Value of Boats (\$)	13,750,000	2,438,000	1,210,000	90,000
Estimated Total Value of Gear (\$)	1,375,000	1,125,000	1,650,000	120,000

1.36.2 Household and other expenditure

An indication of how fishers' expenditures are distributed in the local economy, as determined by the survey of commercial fishers conducted as part of this report, is provided in **Table 13**, which indicates that the flow-on benefits of the commercial fishing industry are impacting primarily in the local economic area. As a result, the operation of the fishing industry affects the economic performance of the local economy and regional economies.

ITEM	TOTAL ANNUAL EXPENDITURE (\$) (All Fishers)	AVERAGE ANNUAL EXPENDITURE (\$) (per Fisher)	AVERAGE WEEKLY EXPENDITURE (\$)	PERCENTAGE OF FISHERS MAKING PURCHASES
Food	2,604,940	12,830	247	94
Clubs/ Pubs/ entertainment	819,140	4,030	78	76
Dining out/ take away	554,190	2,730	53	73
Children's activities	1,530,620	7,540	145	36
Sport	733,640	3,610	70	30
Rent	3,096,420	15,250	293	18
Medical bills	362,750	1,780	37	70
Phone	322,280	1,580	33	91
Electricity	371,430	1,830	38	85
Rates	493,870	2,430	51	82
Bank/accountants fees	438,510	2,160	45	79
Vehicle maintenance	687,970	3,380	71	82
Education	320,890	1,580	30	39
Tradesmen	262,250	1,290	48	48
Holidays	355,970	1,750	42	42
Mortgage	2,646,030	13,030	58	58
Clothes	244,300	1,200	79	79
Insurance	349,040	1,710	73	73
New vehicle	1,286,740	26,410	508	27
Household appliances	249,020	2,110	41	61
Furniture	162,230	2,220	43	42

Table 13: Expenditure in Northern NSW region

1.37 COMPARISON OF INDUSTRY IN LOWER CLARENCE 1995 TO 2010

McVerry (1995) conducted a Socio-economic evaluation of the Clarence River Commercial Fishery which acted as a starting point this report. A comparison of the state of the industry in the Lower Clarence in 1995 compared to current state of the industry presents some interesting points as follows:

- Population growth and a shift in the demographic have resulted in changes to the economic structure of the Lower Clarence region particularly in the coastal area.
- While there has been increased recognition of the importance of estuarine habitat there continues to be issues associated with land management which impact negatively on estuarine health.
- Primary Industries continue to play an important role in the regional economy.
- The weight of product landed has remained steady in the Ocean Haul and Ocean Trap and Line Fisheries.
- The weight of product landed has declined slightly in the Estuary General Fishery.
- The weight of product landed has declined significantly in the Ocean Prawn Trawl Fishery.
- The weight of product landed has fluctuated in the Estuary Prawn Trawl Fishery.
- The fisheries which have shown decline in weight of product have had comparable declines in fishing effort.
- Despite these decreases in the weight of product landed the direct value of output has increased from \$14.0 million to \$25.9 million.
- The amount of jobs generated directly by the industry has decreased from 332 to 243 jobs. Even though employment levels have decreased the industry is still an important source of employment and income for the region.

SOCIAL IMPACTS

1.38 PROFILE OF COMMERCIAL FISHERS

The age and gender of fishers operating in the commercial fishing industry within the study area is shown in **Table 14**. The majority of fishers in the study area are male and in the 40-50 years of age bracket and have a long term connection to fishing having worked an average of 26 years in the industry. The survey conducted as part of this report found that fishers had between 2 and 3 dependants while 30% had at least one dependant of school age which indicates that about one-third of the fishers operating in the area support young families.

A telephone based social survey of Ocean Prawn Trawl fishers (primarily from the study area) conducted by Roy Morgan in 2001 had a response level of 60%. The survey found that fishers work an average of 63.5 hours per week and that 64% of Ocean Prawn Trawl fishers come from multi-generational fishing families, which may indicate longer term social association and integration with communities (Dominion Consulting, 2004). Direct participation of females in the Ocean Prawn Trawl Fishery was 5%, however 47% of fishers' female partners are involved in the general operation of the business. This is important as it indicates that almost half of these businesses are providing employment and income for both the fisher and their partner. Fishers were found to have high levels of residency, averaging 19.4 years and high levels of home ownership with 84% owning or paying off a home (Roy Morgan, 2001a).

Industry of Emp	loyment	Commercial Fishing							
Age 10 Year Age 0	Groups	10 – 19 years	20 – 29 years	30 – 39 years	40 – 49 years	50 – 59 years	60 – 69 years	70 – 79 years	TOTAL
Ballina	Male	0	5	4	5	4	0	3	21
	Female	0	0	0	0	0	0	0	0
Clarence Valley	Male	6	8	12	32	17	9	0	84
	Female	0	3	4	10	4	3	0	24
Coffs Harbour	Male	0	4	10	7	4	0	0	25
	Female	0	0	6	0	3	0	0	9
Total	Male	6	17	26	44	25	9	3	130
	Female	0	3	10	10	7	3	0	33

Table 14: Age and gender of commercial fishers in the Ballina, Clarence Valley and Coffs Harbour areas

Data Source: 2006 Census of Population and Housing

Table 15 shows the education level of commercial fishers in the study area. This demonstrates that the majority of fishers completed schooling to the Grade 10 level. This lower level of formal education achieved by some fishers can impact on their capacity to undertake retraining associated with a career change. The Roy Morgan 2001 survey investigated the fishers skill base and their willingness to pursue retraining for other forms of employment. Fishers were asked about their capacity to consider alternative employment either full-time, part-time, or whether they could not get employed outside the fishing industry. The results were:

- 15% could get full time employment outside fishing
- 14% could get part time employment outside fishing and
- 67% could not get employed outside fishing.

The 67% who indicated that they could not get employment outside of fishing were asked if they would consider retraining. A total of 21% would and 74% would not consider re-training and 5% of fishers were undecided. The fishers who would not consider retraining were asked about their reasons. Participants indicated that their capacity or willingness to move to other industries for employment was inhibited by the following reasons:

- age,
- experience,
- fishing lifestyle,
- fishing family tradition, and
- investment in the fishing business/equipment (Roy Morgan, 2001a)

Table 15: Education level of commercial fishers in Ballina, Clarence Valley and Coffs Harbour

Industry	Commercial Fishing					
Highest Year of School Completed	Year 12 or equivalent	Year 11 or equivalent	Year 10 or equivalent	Year 9 or equivalent	Year 8 or below	
Ballina	4	0	13	4	0	
Clarence Valley	19	8	54	12	10	
Coffs Harbour	7	5	17	4	3	
Total	30	13	84	20	13	

Data Source: 2006 Census of Population and Housing

The long term connection of fishermen and their families to their local area suggests that they make up an important part of the local community and contribute to the social fabric of the town. The survey conducted in this study found that many fishers maintain membership in local clubs and organisations as demonstrated in **Table 16**.

Type of Club	Percentage of fishers belonging to clubs (%)
Sporting	71
RSL	12
Religious	2
Social	4
Environmental	2
School	9
Percentage of fishermen belonging to at least one club	81.8
Percentage of fishermen belonging to more than one club	51.5

Table 16: Percentage of fishers belonging to clubs within Northern NSW

The factors described above are important when considering the implications of any changes in fishing activity within the study area. The demographics of the fisher population in the region indicate:

- The existence of operators with a long term and multi-generational connection both to their trade and to their community provides a solid basis for the operation of the industry.
- The fact that fishing is a way of life for many operators can act to inhibit their willingness and ability to retrain and move into a new career if indeed those opportunities exist.
- The increased age and the lower levels of formal education attained by some fishers can further impede the process of retraining.
- The relatively high levels of unemployment in the study area (7% in 2010) can also make the process of moving out of the industry into other employment more difficult.
- The fact that only 16% of fishers are under the age of 30 indicates that there is a lack of transfer of skills to a younger generation to keep the industry operational in the long term.

If and when any structural adjustment occurs within the industry it is important that options to deal with these potential issues are addressed by government and that alternative training and employment options are actively explored for operators who choose to or are forced to leave the industry. It is also critical to ensure that new operators are encouraged into the industry with appropriate transfer of skills.

1.39 Socio-Economic Index

An analysis of the socio-economic condition of the communities in which the commercial fishing industry operates in the study area is provided through the use of ABS Census data 2006 on the 'Socio-economic Indexes for Areas' (SEIFA). SEIFA is a product developed especially for those interested in the assessment of the welfare of Australian communities. The ABS has developed four indexes to allow ranking of regions/areas, providing a method of determining the level of social and economic well-being in each region. SEIFA uses a broad definition of relative socio-economic disadvantage or advantage in terms of people's access to material and social resources, and their ability to participate in society (ABS, 2006). The SEIFA ratings are based on a 1000 units measurement, for example the most disadvantaged town in NSW has an index rating of 821 while the least disadvantaged has a rating of 1100.

The four indexes in SEIFA 2006 are:

- Index of Relative Socio-economic Disadvantage: is derived from Census variables related to disadvantage, such as low income, low educational attainment, unemployment, and dwellings without motor vehicles.
- Index of Relative Socio-economic Advantage and Disadvantage: a continuum of advantage (high values) to disadvantage (low values) which is derived from Census variables related to both advantage and disadvantage, like households with low income and people with a tertiary education.
- Index of Economic Resources: focuses on Census variables like the income, housing expenditure and assets of households.
- Index of Education and Occupation: includes Census variables relating to the educational and occupational characteristics of communities, like the proportion of people with a higher qualification or those employed in a skilled occupation.

Ballina and Coffs Harbour local government areas show moderate SEIFA ratings while the Clarence Valley local government area, which is home to the majority of fishers in the study area, has low index ratings. **Table 17** provides a summary of the SEIFA ratings for the study area.

LGA	Index of Relative Socio-economic Disadvantage	Index of Relative Socio-economic Advantage and Disadvantage	Index of Economic Resources	Index of Education and Occupation
Ballina	992	986	985	980
Clarence Valley	934	913	942	909
Coffs Harbour	967	957	956	948

Table 17: Socio-economic Index for Areas (SEIFA) ratings for the study areas

Data Source: 2006 ABS Census

The ratings indicate that the Clarence Valley region is within the bottom 20% of socio-economically disadvantaged areas in NSW. The SEIFA ratings confirm that re-training and entering other areas of employment would be difficult for fishers leaving the industry. Any changes in fishing activity that results in a decrease in income for current fishers, would also impact their spending in the local economy. Any negative multiplier effects from a reduction in fishing activity would be small in the regional economy. However there may be local distributional impacts in the small townships where fishers live (Dominion Consulting, 2004). In areas of greater socio-economic disadvantage these potential impacts would be more keenly felt. It is considered that continuation of a viable fishing industry in the study area and its flow-on socio-economic impacts are important for the maintenance of the local community and economy.

1.40 FISHERS PERSPECTIVE

Table 18 provides some indication about how fishers feel about the future of their industry. While the vast majority of fishers expect to continue to be working in the industry in 5 years time there is a significant segment of the working population who are negative about the future of the industry.

Table 18: Fishers opinions on future of commercial fishing industry

Opinions	
% Positive about Industry	33 %
% Negative about Industry	46 %
% Neutral about Industry	21 %
% Expect to be working in Industry in 5 years time	91 %
% Expect to not be working in Industry in 5 years time	9 %

Of the 91% of fishers that expect to still be working in the industry in 5 years time, 37% of these would leave the industry if they could. The reasons they do not leave the industry is primarily due to lack of other qualifications or training, or that they need a buyer of their business to allow them to retire.

The survey undertaken by fishers also included an opportunity for them to provide comments about the future of the industry. These comments have been summarised and are provided below in order to demonstrate some of the issues that are relevant to fishers. It is important to note that these opinions and the following comments are provided in this report to give readers a general understanding of the views of fishers working in the industry. It is considered that actively engaging fishers to contribute to the future management strategies of the industry may result in reducing negative perceptions held by operators.

General Negative Comments:

- Increasing pressures on industry including marine park areas and associated regulations, amateur fishers, government regulations, aboriginal claims.
- Rising fuel costs in combination with poor prices for seafood product make it hard to continue making a living.
- Competition from imports affects the prices and saleability of product, particularly imported prawns.
- Health of estuaries are vital to protect juvenile prawns and fish, changing land uses affect the estuaries.
- Need to educate public about industry and that it operates in a sustainable manner.
- Negative community perceptions / opinions affect the industry.
- Poor marketing of the industry.
- Government needs to consult more with industry and fishermen when undertaking regulation and management changes.
- Overfished needs buy out to make the industry more viable for fishers that want to remain in the industry.
- Fishers have had to diversify to have a viable annual income seasonal agricultural work.
- Trawlers going broke due to rising costs, without returns to compensate.
- The industry needs new energy and new blood.

General Positive Comments

- Strong viable and sustainable industry however it is affected by weather and NSW Fisheries management requirements.
- Hard work but rewarding and good lifestyle.
- It is a good, viable industry as long as fishers are given access to resource.

Comments on Choice to continue Working in 5 Years

- Will only continue to work in Industry as has no other training or qualifications.
- Continue to work as need to support family / children.
- Would like to retire but need to sell boat/business to retire therefore continue working until buyer turns up.
- Will be retiring within 5 years.
- Will have to work outside area to have a sufficient annual income.
- Want to pass business onto family member but not keen to do this as it is difficult to make a living.

1.41 CONTRIBUTION OF THE INDUSTRY TO TOURIST AMENITY

The commercial fishing industry also contributes to the character of the towns it operates from. This can be important from a tourism perspective with the fishing boats and dock areas providing a point of interest for many people. Tourists enjoy the fish and prawns cooked at the local fish shop or Coop, as evidenced by seafood sales in tourist destinations (Roy Morgan, 1999). The Clarence tourism website promotes the commercial fishing industry as an attraction of the area as evidenced in the quote below and by the inclusion of various photographs of fishing vessels.

"Yamba is famous for its fishing. Yamba is the home port to one of the largest commercial fishing fleets in the state. Watching the fleet go out of the heads in the early evening and returning at dawn with their catch is a sight not to be missed." (Clarence Tourism, 2010)

1.42 SEAFOOD SUPPLY

The supply of seafood product from the Northern NSW area is one of the significant benefits arising from the operation of the industry. At the local level the ability of the community to be able to access fresh local product at affordable prices is very important. From a sustainability perspective the provision of food sources from the local area results in a substantially decreased carbon footprint when compared to food that is produced outside of the region. This factor is expected to become more important in coming years with greater public awareness of these issues. Wild caught seafood has great nutritional benefits and makes up an important component of a well balanced diet. Seafood consumption has increased in Australia to approximately 15 kg/capita/yr; up from approximately 5kg/capita/yr in the 1950's (Ruello, 1999). In the small regional towns in the study area the Co-ops retail outlets are well known and frequented. The ability to access fresh seafood is of particular importance for the tourism industry with many visitors to the area keen to partake in fresh local product.

Figure 14 shows the weight of product supplied from the study area as compared to the total weight of product supplied from all other zones in NSW and all of NSW. It is evident that the study region is a major contributor to the total product landed in NSW. This is particularly relevant in both the Estuary and Ocean Prawn Trawl Fisheries where contributions from the Lower Clarence Fishery make up the majority of the state wide catch.



Figure 14: Weight of product supplied from study area vs the total weight of product supplied from all other zones in NSW and all of NSW, 1998 – 2008 (Source: I&I NSW ComCatch 27-10-09 extract)

FACTORS AFFECTING THE COMMERCIAL FISHERIES IN THE REGION

Commercial Fisheries in the study area have been affected by a variety of issues over the past 15 years, including:

- Declining profitability increasing costs
- Increasing imports and decreasing value of exports
- Marine Park Areas and associated buy-outs
- · Recreational fishing havens and loss of access by the commercial sector
- Government regulation and management
- Employment and Skill base
- Perception of Industry
- Environmental factors

These issues have contributed to the reduction in number of fishing businesses operating in the study area. Operators leaving the industry for various reasons are not being replaced by new operators entering the industry. **Figure 15** indicates the number of fishing businesses reporting catch in Northern NSW in the last decade. The Estuary General, Ocean Trap and Line and Ocean Prawn Trawl fisheries all show a significant decrease in the number of operators reporting catch. The number of Ocean Haul operators has decreased slightly while Estuary Prawn Trawl operators reporting catch has remained fairly steady. This decline in fisher numbers is seen to be fairly constant across each of the three study areas and represents a reduction in the number of fishing businesses by approximately one third.



Figure 15: Number of fishing businesses reporting catch in Northern NSW, 1998 – 2008 (Source: I&I NSW ComCatch 27-10-09 extract)

1.43 **P**ROFITABILITY OF THE INDUSTRY

One of the main pressures faced by commercial operators is the diminishing returns from the operation of their businesses. Input costs required to run the business have seen a significant increase. This has been most apparent in the cost of fuel. The rising cost of fuel has placed considerable strain on fishers over recent years and is an important component when considering the continuing viability of operators in the area. Fuel costs have risen by approximately 40% over the last decade (ABARE, 2009). The fisher survey indicated that approximately 30% of operating costs were for fuel. This compares to the 20% which was found in the survey conducted in the Lower Clarence 15 years ago (McVerry, 1995). This increase in operating costs has not been met by corresponding increases in the price received by fishers for product. Fisheries products on the domestic market have had to compete with the cheaper imports which are allowed into Australia. While the local product is generally of superior quality, consumers are often influenced in their choices by cost considerations. The prices received for export product have also fallen associated with the strengthening of the Australian dollar. The combination of competition from cheap imported fisheries product and diminished export returns against increased operating costs has had a significant negative effect on the profitability of commercial fishers and is identified as one of the primary reasons for the decline in the industry over the last decade.

1.44 IMPORTS AND EXPORTS

Figure 16 shows the amount of import and export of fresh/chilled fish and processed seafood in Australia over the last 15 years. Exports of fresh and chilled fish have been significantly larger than imports however there is a decreasing trend in exports over the last five years while there has been a small but steady increase in imports of fresh and chilled fish. Exports of processed seafood have decreased from 2000 to 2008, while imports have increased. The decline in exports is attributable to decreases in the volume of production and a decline in the value of key export species associated with exchange rate movements. In recent times the strength of the Australian dollar against the currencies of major trading partners has reduced the competitiveness of Australian fisheries exports (DAFF, 2008).



Figure 16: Exports and Imports of seafood into Australia 1993-2008 (Source DAFF, 2008)

1.45 MARINE PROTECTED AREAS AND GOVERNMENT BUYOUTS

The NSW government has committed to implementing a system of Marine Protected Areas (MPA's) in the State. MPA's are established to protect and conserve many different types of marine environments and the animals and plants that live in them while offering areas for commercial use, recreation, education and research (I & I NSW, 2005). There are 2 MPA'S established in the study area. Cape Byron Marine Park was formed in 2002 and covers approximately 22 000 hectares and extends from Brunswick Heads south to Lennox Head. It extends seaward from the mean high water mark to the 3nm limit of State waters and includes the tidal waters of the Brunswick River, Belongil and Tallow Creeks. The Solitary Islands Marine Park (SIMP) was formed in 1998 and covers approximately 71,000 ha and stretches south from Sandon River to Muttonbird Island. It extends seaward from the high water mark out to the 3nm State limit and incorporates estuaries to their tidal limit. Adjacent to this is the Commonwealth managed Solitary Island Marine Reserve.

There have been significant implications arising from the formation of these MPA's for the commercial fishing industry. The rezoning associated with the formation of the parks has meant a loss of fishing grounds and or restrictions of fishing activities that can be undertaken in the MPA's. This resulted in a loss of potential income to commercial fishers who had traditionally worked those areas. The process of stakeholder consultation that was carried out as part of the formation of the MPA's identified this problem and NSW Fisheries decided on a program of commercial fishing buyouts which were designed to compensate those fishers affected by the establishment of the MPA's. The establishment of the Cape Byron MPA saw the removal of 21 fishing businesses from the area at a cost of \$3.9 million dollars to the State government. Commercial fishers operating in Fisheries Zone 1 and out of the Brunswick Heads and Ballina Co-ops were most impacted by the process. The establishment of the SIMP saw a buyout process which removed 30 commercial operators from the area at a cost of \$4.1 million dollars. These fishers were primarily from the Fisheries Zone 3 area and working out of the Coffs Harbour and Wooli Co-ops. It is significant that the Wooli Co-op has subsequently ceased operation associated with a loss of members and associated impacts on profitability. **Map 3** shows the Cape Byron and SIMP areas.

In March 2010, Minister Peter Garrett announced Areas for Further Assessment (AFA) for the East Marine Region. It is expected that this process of assessment would involve the development of a network of 'multiple use' and 'no-take' marine reserves in Commonwealth waters. A draft marine bioregional plan is due out in early 2011 which will detail proposals for a network of marine reserves in the East Marine Region. Stakeholders and the public will be able to give feedback to government during statutory consultation periods before the draft plan and following release of the draft plan. Map 3 shows the newly declared Clarence AFA which covers approximately 14,061 km² (i.e. 1,406,100 ha) and the existing MPA's in State controlled waters. The potential for the establishment of a new MPA directly adjacent to the existing Solitary Islands MPA is a significant development for the commercial fishing industry in the region. The area outlined in the AFA comprises a major proportion of the Ocean Prawn Trawl and Trap and Line Fishing grounds for Lower Clarence Fishers and all of the fishing grounds for those same fisheries for Coffs Harbour operators. Depending on the outcomes of the assessment process there is the potential for loss or restriction of fishing activity in these areas which will have significant impacts on both the harvesting and the retail, handling and processing sectors of the commercial fishing industry in the Lower Clarence and Coffs Harbour areas and flow-on effects on the local and regional economies. Full and open consultation with the commercial fishing industry as well as all other relevant stakeholders will assist in determining the long term impact of any reduction or removal of fishing areas. The impacts of any such reduction need to be understood from both an economic, social and seafood supply perspective.

Map 3: Clarence Area for Further Assessment



1.46 GOVERNMENT REGULATION AND MANAGEMENT

Fisheries management presents different challenges than in many other industries (Stevens, 2007) because of:

- the community owned nature of the resource,
- the competitive nature of the operating environment,
- the diversity of stakeholders,
- the biological and ecological dynamics and uncertainties involved, and
- the risk of stock collapse through excessive fishing effort if appropriate management intervention does not occur

Over the last 15 years the commercial fishing industry in NSW has seen significant changes associated with fisheries management initiatives resulting in an incremental increase in regulation designed to reduce fishing effort and limit pressure on the resource. The result of this approach whether intended or not has been to reduce the operational efficiency of commercial operators. The combination of increased regulation and the decreasing operational returns has limited the ability and willingness of fishers to invest in, continue to operate or sell their operations. These factors may
account for some of the latent fishing operations that are found in the industry. Some operators are seen to be holding on to their fishing endorsements in the hope that further industry restructuring will provide a financially viable exit strategy.

Commercial fishers are generally small operator owned businesses with a long time connection to their trade. The individualistic nature of many fishers and the nature of their working environment has often meant that they have not been active in affecting the way they are managed by government or in promoting their interests as a group. As a result successive layers of regulation have been imposed with limited input from the actual operators. Fishers ability to understand and navigate their way through the changing fisheries management landscape has sometimes been problematic with generally negative perceptions held about the regulatory environment in which they operate. In response to the current state of the industry in NSW there is a move to Commercial Fisheries Reform being undertaken by NSW Fisheries (I & I) and Seafood Industry Advisory Council (SIAC) which aims to deliver the following outcomes:

- To improve the viability of the commercial fishing sector;
- To facilitate autonomous adjustment in fisheries with excess capacity;
- To provide industry with the opportunity to link a fisher's financial investment in the industry to their proportional right to fish (or take fish);
- To provide a broader range of management options when dealing with sustainability problems.

The implementation of these reforms would be built around a program of structural adjustment based on exit grants to remove all a portion of latent fishing businesses and those operating businesses that desire to leave the industry. New minimum share holding requirements may be set for some fisheries that are in agreement with the linking of shares to resource access or effort units. Operators would be made fully aware of the post reform operating environment to assist in their short and long term businesses planning decisions. The reforms are also intended to streamline regulation and administration in order that existing impediments to efficiency are removed. The intention is that these reforms will setup a new baseline from which business can make adjustments without the need for continuing government intervention with fully tradeable ongoing access rights to the resource. In turn there would be an efficient system of cost recovery to pay for the revised regulatory framework. The implementation of these proposed reforms is dependent on the ability of industry and governments to work together towards the goal of an environmentally and economically sustainable industry.

1.47 EMPLOYMENT AND SKILLS BASE

The tables and comments of fishers shown in Section 10.0 highlight that the fishing industry has an aging population with few new recruits coming into the industry. **Table 13** shows that most fishers went to work after grade 10 and learnt their trade on the job. This trend is repeated across many of the primary industries in the region and is a serious consideration for the future of the industry. Until the economic future of commercial fishing is clearly defined with access to a sustainable resource base guaranteed, commercial fishers will be unwilling to take on new employees and provide the required training that is so essential for the life of a fisher. The TAFE training system can assist in areas of health and safety, navigation, and licensing of boat operators etc. However, the nature of the working environment is such that fishing skills are learnt on the job and require a gradual learning through experience gained over a number of years of work with a transfer of intergenerational knowledge whilst on the job. Initiatives that encourage the entry of young workers into the industry need to be developed.

1.48 **PERCEPTION OF INDUSTRY**

The urbanisation of modern society has resulted in a lack of understanding about the processes that put food on our tables. Following this there has been a shift in community perceptions about the value of primary industries with industries such as farming and fishing being less valued by society. Negative perceptions of the commercial fishing industry result from a lack of understanding about the sustainable nature of harvesting operations and their impact on the environment. These perceptions need to be actively countered by the industry in order that its value to the community and economy is understood and appreciated. Programs such as the "Aussie Seafood brought to you by Our Fishermen" developed by the Sydney Fish Market are a positive initiative to improve perceptions within the industry and the broader community.

By the same token fishers must continue to work in an environmentally responsible manner and act to support reforms that protect fisheries habitat and ensure the long term provision of the resource. Fishers must become more active in affecting the way they are dealt with by government and take ownership of the future direction of their industry through positive participation in the current reform program that is underway. Likewise government and fisheries managers must engage with fishers and seek to restore confidence that they are acting in the best interests of the industry.

1.49 Environmental Factors

1.49.1 Habitat loss

The health of the commercial fisheries in coastal NSW is a direct function of the health of the ecosystem that sustains it. The estuarine areas of Northern NSW are a primary driver of fisheries productivity for both the estuarine and offshore fisheries. The development of the coastal areas of Northern NSW for agricultural production and urban expansion is seen to have had a significant negative impact upon the health of the estuarine systems in the area over time. Disturbance of both the upper and lower catchment has resulted from the extensive land modifications, resulting in major changes to the hydrology and wetland systems of the rivers, creeks and estuaries in the area. It is estimated that 60% of coastal wetlands have been lost or degraded over the last 200 years. This has impacted negatively on the abundance of fish stocks and affected the resilience of the resource in terms of its reproductive capacity. It is evident that human management of terrestrial areas has taken precedence over the management of aquatic areas with subsequent negative outcomes for the latter. The movement towards total catchment management and the recognition of the importance of healthy waterways in the general community is important to prevent the further decline in estuarine health. Representatives for the commercial fishing industry have been vocal in the push for conservation and protection of aquatic habitats.

The movement towards the establishment of MPA's is one way that government is acting to protect fisheries habitat. It is important to understand the positive and negative implications of the establishment of MPA's on fisheries. Improvements to habitat associated with the restriction of human activities in those areas can allow for increased diversity, biomass, productivity and abundance of fish communities. This can have important long term ramifications for fisheries production related to increases in the size and number of fish and invertebrates in sanctuary zones. While the declaration of MPA's does not address all the threats to the oceans and estuaries such as pollution, disease, invasive species, flood mitigation programs and works and climate change, the removal or modification of the direct impacts of commercial harvesting activities in specific areas can contribute to an improvement in overall health of marine ecosystems and provide a benchmark against which impacted areas can be compared.

1.49.2 Fishing pressure

Future increases in the population will mean increased public demand for fisheries products which is fulfilled in part by the wild harvest commercial fishing industry. In addition to this the burgeoning coastal population in Northern NSW will act to increase the pressure from recreational fishing activities. A survey of recreational fishers in NSW undertaken in 2001 indicated that the recreational harvest of fish was about 40% of the estuarine commercial harvest and about 20% of the oceanic commercial harvest, but the share of the resource varied greatly between species (DECCW, 2009). While the level of commercial fishing effort is shown to have fallen over the last 10 years, the level of recreational effort and the percentage of the total catch is expected to have remained stable with no real limitations on potential fishing effort. The reduction in fishing effort identified in the commercial fishing industry and the management controls placed on both the commercial and recreational sectors are acting to ensure the long term sustainability of aquatic resources by limiting excessive pressure on fisheries resources.

CONCLUSIONS

The commercial fishing industry has been an integral part of the Northern NSW region for over 150 years, and has had a role in the historical development of the Ballina, Lower Clarence and Coffs Harbour areas. In recent times the Northern NSW region has been undergoing a transformation associated with increases and changes in the population demographic resulting in a movement away from its traditional primary industry base to a service based economy.

The state of the estuarine and marine environments is critical to the operation of the commercial fishing industry with the following points highlighted:

- The Marine environment in Northern NSW is unique in that it represents an interface between the subtropical waters to the north and the temperate waters to the south.
- The size and dynamic nature of the marine environment has ensured the ecosystem health of the region.
- Estuaries in Northern NSW have undergone substantial modifications associated with changing land use, with negative implications for ecosystem health.
- The estuarine environment is a primary driver of fisheries productivity.
- The total catchment management approach supported by the fishing industry is important in the restoration of estuarine habitat.
- Climate change represents an ongoing challenge for the industry.

The commercial fishing industry harvesting sector, in the study area, is divided into six main fisheries types that operate within a State managed regulatory framework. The following points are made for these fisheries across the 3 main study areas over the period 1998-2008:

- Estuary General Fishery has seen a 1/3 reduction in businesses reporting catch and fishing effort which is reflected in the weight of product landed for the fishery.
- Estuary Prawn Trawl remains active in Clarence River with a stable effort base and fluctuations in catch associated with weather conditions.
- Ocean Hauling Fishery shows a slight decline in the number of businesses reporting catch but a stable amount of fishing effort and weight of catch landed.
- Ocean Prawn Trawl fishery has seen a 1/3 reduction in businesses reporting catch which has been most evident in the last five years, a decline in fishing effort and declines in product landed particularly in the Lower Clarence area.
- Ocean Trap and Line Fishery has seen a greater than 1/3 reduction in businesses reporting catch and a major reduction in fishing effort, however the total weight of product landed has only reduced slightly.
- The stable catch rates shown in the Ocean Trap and Line Fishery indicate that the marine ecosystem supporting reef fish is in a good condition.
- NSW Fisheries have recently undertaken a major assessment of fish stocks which indicated most fisheries are
 probably sustainable but that there should be no expansion of catches.

The handling, processing and retail sector of the commercial fishing industry provides the mechanism by which the commercial catch is dealt with and is vital to the operation of the industry. The following points are made for this sector across the 3 main study areas over the period 1998-2008:

- Deregulation has placed pressure on the viability of Co-ops, from licensed fish receivers.
- The value adding of product presents opportunities to increase the returns to fishers and Co-ops.
- There is potential for consolidation of the existing Co-ops in Northern NSW to ensure their operational viability in the long term.

Despite the apparent decline in the weight and value of product processed by the industry its continued operation provides important economic and social benefits to the local and regional economies in which it operates. These benefits are quantified in the economic modelling conducted as part of this report which identified the following total flow-on impacts (sum of the direct, indirect and consumption induced impacts) arising from the operation of the industry:

- Ballina
 - Output of \$16.9 million
 - Income generated \$2.9 million
 - 74 Employment positions generated
 - Estimated increase in GRP of \$6.0
- Clarence
 - Output of \$92.0 million
 - Income generated \$15.4 million
 - o 432 Employment positions generated
 - Estimated increase in GRP of \$31.9 million
- Coffs Harbour
 - Output of \$46.0 million
 - o Income generated 8.4 million
 - o 222 Employment positions generated
 - Estimated increase in GRP of \$16.5 million
- Northern NSW
 - Output of \$216.0 million
 - Income generated \$36.1 million
 - 933 Employment positions generated
 - Estimated increase in GRP of \$75.5 million

The commercial fishing industry continues to make a significant contribution in terms of output, income, employment and GRP.

- Two-thirds of the money generated by the operation of the industry is spent in the local and regional economies.
- The great majority of employment opportunities associated with the industry are filled from the local communities in which the industry operates.
- The industry in Northern NSW provides about one-third of the product (fish) landed in the whole of NSW.

Following on from these economic benefits are important social impacts arising from the operation of the industry as follows:

- The long term connection of fishermen and their families to their local area suggests that they make up an important part of the local community and contribute to the social fabric of the town.
- One-third of the fishers operating in Northern NSW support young families.

- The increased age and the lower levels of formal education attained by some fishers combined with the relatively high levels of unemployment in the study area can make the process of retraining and moving out of the industry into other employment difficult.
- The fact that only 16% of fishers are under the age of 30 indicates that there is a lack of transfer of skills to a younger generation to keep the industry operational in the long term.
- SEIFA ratings indicate that the Lower Clarence area has a higher level of socio-economic disadvantage which increase the relative importance of the fishing industry to the local economy.

There are seen to be a number of key factors affecting the profitability of the commercial fishing industry both locally and at the State level and this is seen as significant in the decline of the industry over the last decade. These key factors include:

- Operators have been faced with escalating fuel costs with a 40% increase over the last 10 years.
- Prices paid to fishers for product have not kept pace with input costs with serious implications for the bottom line of fishing businesses.
- An influx of cheaper imported product onto the domestic market.
- There has been a decline in value of key export species associated with the strength of the Australian dollar.
- There has been an increasing regulatory burden placed on operators.

The introduction of MPA's and Recreational Fishing Havens by the State and Commonwealth government has impacted the industry with the SIMP and Cape Byron MPA's both within the study area resulting in:

- A loss of fishing grounds and a restriction of operations for fishers which reduces fishing options with subsequent flow-on impacts on some businesses profitability.
- A buyout process which has removed a number of operators from the Northern NSW area.
- A potential reduction in the supply of seafood from some fisheries.

The last 15 years have seen considerable changes in the regulatory environment for operators resulting in:

- An incremental increase in regulation designed to decrease fishing pressure has acted to reduce the operational efficiency of fishing businesses.
- A perception from operators that they are overregulated as an industry.
- A decrease in maintenance and investment in fishing operations with subsequent negative impacts on the condition of the fishing fleet.

It is apparent that the industry is moving into another period of reform with a process of new measures currently under consideration by government and industry which calls for:

- The implementation of a structural adjustment scheme designed to further reduce fishing effort through the removal of all latent fishing businesses and a significant reduction in the number of operating businesses.
- New minimum shareholding requirements in some fisheries.
- Streamlining of regulation and removal of regulation deemed to be reducing operational efficiency.
- New cost recovery structure to pay for revised regulatory framework.

Evaluation of the current state of commercial fishing in Northern NSW and indeed across the State indicates that there needs to be some change in the status quo in the industry. Commercial fishers cannot continue to operate in an environment of decreasing profitability and increasing regulatory restrictions. Structural reform of the industry is important to ensure that it remains viable in the long term. The extent and timeframe in which the proposed new measures will impact the industry is important. Concurrent to this regulatory reform there is the potential for the formation of a new Commonwealth administered MPA known as the 'Clarence' AFA. In addition to this the state based marine park surrounding the Solitary Islands is presently under review with a proposed increase of 8% for sanctuary zones taking the total no-take area for this marine park to 20% and a plan to ban prawn trawling in the park 2 years after the declaration of the new plan of management.

Industry and fisheries managers need to remain aware that there is the potential for these three factors, which are developing independently of each other but in a similar timeframe (the next two to three years), to coincide and bring about dramatic changes to the industry in the area. A removal of fishing operators associated with the State government structural adjustment scheme and the State government review of the Solitary Islands marine park combined with the potential for a new Commonwealth buyout program, associated with the creation of Clarence MPA in the area, may reduce the number of fishing operators to the extent that the viability of the industry comes into serious question. Such a scenario should be unacceptable to government, industry and the wider community.

Government, both State and Commonwealth, together with industry representatives need to develop management strategies based on:

- the long term economic viability of the industry,
- the sustainable use of the resource,
- the protection and rehabilitation of fisheries habitats, and
- securing the provision of seafood supply for the community.

In a future where the sustainability and security of food resources will become so important, it is vital that the local commercial fishing industry is supported both by government and the wider community. People need to recognise the contribution of the industry to the provision of local and regional food security, and the efforts the industry has made to ensure that the harvest of resources remains sustainable. It is important that the productive capacity and the unique skill-set of commercial fishers are maintained. The development of new markets, value adding and the full utilisation of the harvested product will assist in maintaining the viability of the commercial fishing industry into the future.

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APPENDIX A – NSW FISHERIES REGION / ZONE MAPS



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4



APPENDIX B – NSW FISHERIES DATA

Estimated GVP

Estimated Gross Value of Product (GVP) based on reported catch from the areas identified, using monthly average species prices based on SFM data. Source: I&I NSW ComCatch 27-10-09 extract (excl Inland, Abalone, Lobster & SUTS fisheries)

Est. GVP (\$'000)	Fiscal											
EG, EPT, OH, OT & OTL fisheries	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Ballina area	6,539	6,658	7,999	8,938	8,707	8,200	7,889	6,946	6,952	5,696	6,845	5,783
FRDC Clarence area	14,588	17,935	15,152	18,743	14,326	13,898	10,221	8,959	9,124	10,837	11,359	9,107
FRDC Coffs Harbour area	5,695	5,520	5,414	6,108	5,821	6,305	5,132	4,536	4,052	4,311	4,678	2,664
FRDC mixed ocean areas	2,538	2,733	8,246	10,842	11,197	11,991	11,049	9,390	8,878	8,574	11,415	7,619
FRDC area Est. GVP (\$'000)	29,360	32,846	36,811	44,630	40,050	40,394	34,292	29,831	29,006	29,417	34,296	25,173
NSW total Est. GVP (\$'000)	72,292	71,082	75,919	86,356	80,006	79,857	71,014	67,658	71,305	77,328	79,558	69,226

Est. GVP (\$'000)	Fiscal											
Estuary General Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Ballina area	2,350	2,313	3,336	2,776	2,176	2,546	2,049	2,128	1,549	1,726	1,539	1,480
FRDC Clarence area	3,948	3,887	2,964	2,686	2,881	2,740	2,406	2,357	2,828	2,852	3,053	2,666
FRDC Coffs Harbour area	1,273	1,296	1,362	1,225	1,473	1,697	1,609	1,500	1,434	1,542	1,513	1,278
FRDC mixed ocean areas	6.286	8	42	48	45	77	57	40	3	33	37	17
FRDC area Est. GVP (\$1000)	7,571	7,504	7,704	6,735	6,575	7,060	6,120	6,025	5,815	6,153	6,142	5,442
NSW total Est. GVP (\$'000)	23,158	22,432	22,593	21,614	20,811	21,330	20,004	19,604	20,516	22,129	21,973	20,685

Est. GVP (\$'000)	Fiscal											
Ocean Hauling Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Ballina area	418	203	309	476	595	355	938	847	890	313	1,231	858
FRDC Clarence area	469	421	234	245	180	127	454	459	192	584	1,002	781
FRDC Coffs Harbour area	1,076	731	816	1,279	940	872	906	1,113	591	974	1,253	204
FRDC mixed ocean areas	455	289	95	155	125	49	123	47	732	51	34	12
FRDC area Est. GVP (\$'000)	2,417	1,644	1,454	2,156	1,841	1,403	2,421	2,466	2,405	1,922	3,520	1,855
NSW total Est. GVP (\$'000)	8,227	4,886	5,915	6,971	8,331	9,223	10,390	12,716	14,444	17,176	15,889	15,443

Est. GVP (\$'000)	Fiscal											
Ocean Trawl Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Ballina area	2,074	2,746	3,003	4,265	4,547	3,624	3,340	2,797	3,127	2,531	2,772	2,408
FRDC Clarence area	7,984	10,996	7,894	12,253	8,893	7,992	4,698	4,045	3,152	3,403	4,040	3,409
FRDC Coffs Harbour area	1,839	2,321	2,082	2,555	2,509	2,860	1,754	989	1,145	867	754	300
FRDC mixed ocean areas	1,924	2,246	7,256	9,940	10,248	10,865	9,907	8,550	7,198	6,913	9,323	6,061
FRDC area Est. GVP (\$'000)	13,821	18,309	20,235	29,013	26,197	25,341	19,700	16,381	14,622	13,714	16,890	12,178
NSW total Est. GVP (\$'000)	26,966	30,062	31,030	40,512	36,197	35,326	28,387	24,416	23,625	22,683	25,602	19,846

Est. GVP (\$'000)	Fiscal											
Ocean Trap & Line Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Ballina area	1,697	1,396	1,352	1,420	1,389	1,674	1,561	1,175	1,386	1,126	1,302	1,036
FRDC Clarence area	1,325	1,229	1,270	1,154	1,007	928	631	928	835	941	836	555
FRDC Coffs Harbour area	1,507	1,172	1,154	1,048	898	876	865	933	881	928	1,158	882
FRDC mixed ocean areas	160	190	853	698	779	1,001	962	754	946	1,577	2,021	1,529
FRDC area Est. GVP (\$'000)	4,689	3,986	4,630	4,321	4,072	4,479	4,019	3,789	4,048	4,572	5,318	4,002
NSW total Est. GVP (\$'000)	11,486	10,335	11,226	10,755	11,054	10,224	8,912	8,639	9,514	11,236	12,350	9,851

Est. GVP (\$'000)	Fiscal											
Estuary Prawn Trawl Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Ballina area												
FRDC Clarence area	862	1,403	2,788	2,405	1,365	2,111	2,032	1,171	2,117	3,057	2,427	1,696
FRDC Coffs Harbour area												88
FRDC mixed ocean areas												
FRDC area Est. GVP (\$'000)	862	1,403	2,788	2,405	1,365	2,111	2,032	1,171	2,117	3,057	2,427	1,696
NSW total Est. GVP (\$'000)	1,348	2,020	4,214	4,456	2,515	3,377	3,179	2,200	3,121	4,057	3,646	3,351

Number of FB Reporting

Number of Fishing Businesses (FBs) reporting catch from the areas identified. (excl Inland, Abalone, Lobster & SUTS fisheries) Source: I&I NSW ComCatch 27-10-09 extract

No. of FB reporting	Fiscal											
EG, EPT, OH, OT & OTL fisheries	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Ballina area	168	183	174	162	167	152	146	125	126	104	104	108
FRDC Clarence area	294	299	292	287	263	235	207	203	183	190	197	185
FRDC Coffs Harbour area	162	161	152	143	122	124	109	102	95	93	95	85
FRDC mixed ocean areas	44	52	105	88	98	106	98	92	81	81	83	72
FRDC area No. reporting FBs	529	534	537	506	499	474	427	412	379	364	374	348
NSW total No. reporting FBs	1383	1343	1272	1228	1167	1048	988	955	909	862	818	760

No. of FB reporting	Fiscal											
Estuary General Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Ballina area	72	83	82	70	70	55	55	52	52	45	42	49
FRDC Clarence area	161	158	147	143	137	113	109	104	103	104	108	95
FRDC Coffs Harbour area	68	70	74	61	55	55	47	43	45	42	44	38
FRDC mixed ocean areas		4	5	4	3	6	2	3	1	1	3	1
FRDC area No. reporting FBs	276	274	272	244	239	212	195	185	186	179	183	168
NSW total No. Reporting FBs	854	820	718	682	628	528	515	487	484	467	443	406

No. of FB reporting	Fiscal											
Ocean Hauling Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Ballina area	13	13	7	12	11	10	13	12	6	6	6	10
FRDC Clarence area	35	31	28	31	28	24	23	23	20	18	21	8
FRDC Coffs Harbour area	30	23	26	27	22	25	21	19	19	23	27	12
FRDC mixed ocean areas	5	3	2	3	3	2	2	3	3	2	1	2
FRDC area No. reporting FBs	79	67	59	69	63	59	56	54	46	45	53	29
NSW total No. Reporting FBs	269	239	192	200	187	175	168	155	146	136	150	102

No. of FB reporting	Fiscal											
Ocean Trawl Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Ballina area	45	48	42	51	45	47	42	38	44	31	30	25
FRDC Clarence area	89	93	82	86	71	72	60	52	45	41	39	32
FRDC Coffs Harbour area	36	38	33	36	35	34	26	20	11	12	13	10
FRDC mixed ocean areas	32	39	67	55	64	69	68	65	53	47	49	37
FRDC area No. reporting FBs	134	134	137	137	137	142	129	123	103	89	87	73
NSW total No. Reporting FBs	247	248	233	229	227	225	203	193	174	156	141	125

No. of ED reporting	Fiend											
No. of FB reporting	FISCAL											
Ocean Trap & Line Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Ballina area	66	61	62	50	60	56	52	47	45	35	41	39
FRDC Clarence area	98	95	93	87	73	65	49	53	39	46	48	52
FRDC Coffs Harbour area	69	63	55	50	34	35	33	41	40	38	36	37
FRDC mixed ocean areas	7	8	34	33	34	34	35	26	27	35	33	35
FRDC area No. reporting FBs	202	195	193	172	157	148	127	130	115	111	115	114
NSW total No. Reporting FBs	495	462	436	400	370	337	304	296	276	265	246	239

No. of FB reporting	Fiscal											
Estuary Prawn Trawl Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Ballina area												
FRDC Clarence area	51	58	85	68	68	70	70	61	62	70	63	58
FRDC Coffs Harbour area												
FRDC mixed ocean areas												
FRDC area No. reporting FBs	51	58	85	68	68	70	70	61	62	70	63	58
NSW total No. Reporting FBs	104	107	192	161	156	149	148	135	133	126	120	107

Reported Effort - Fisher Months

Reported Effort (fisher months) based on reported catch from the areas identified, using monthly average species prices based on SFM data. (excl Inland, Abalone, Lobster & SUTS fisheries) Source: I&I NSW ComCatch 27-10-09 extract

Effort (fisher months)	Fiscal											
EG, EPT, OH, OT & OTL fisheries	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Balina area	1,196	1,224	1,190	1,112	1,134	1,039	1,005	916	864	741	735	670
FRDC Clarence area	2,471	2,416	2,310	2,268	2,056	1,870	1,663	1,548	1,468	1,528	1,483	1,128
FRDC Coffs Harbour area	1,178	1,100	1,015	935	849	823	795	715	706	686	693	514
FRDC mixed ocean areas	197	189	541	534	627	650	702	678	557	544	611	428
FRDC area Effort (fisher months)	4,760	4,690	4,753	4,583	4,424	4,155	3,915	3,640	3,400	3,337	3,343	2,576
NSW total Effort (fisher months)	12,808	12,193	11,758	11.358	10,719	9,635	9,226	8,723	8,299	7,900	7.540	6.253
						.,	-	-,	-	.,		
Effort (fisher months)	Fiscal											
Estuary General Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
EBDC Balina area	574	621	615	534	549	473	473	439	407	363	354	366
EBDC Clarence area	1 257	1 209	1 077	1.063	1.062	954	99.4	865	849	856	830	600
EBDC Coffe Harbour area	503	500	482	431	409	415	400	347	381	371	366	260
EBDC mixed ocean areas	505	500	10	10	20	19	10	12	4	7	14	
EBDC area Effort (linker menthe)	0.000	2.070	2.114	1 004	1 004	1 405	1740	1 602	1 500	1	1.500	1 104
NSW tatal Effect (lister ments)	2,290	2,270	2,114	1,064	1,004	1,000	1,746	1,605	1,062	1,002	1,020	1,154
resw total Enort (Inner months)	7,330	6,910	6,065	5,786	5,439	4,/43	4,0/7	4,328	4,282	4,116	3,864	3,206
Effort (fisher months)	Fiscal											
Ocean Hauling Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
EBDC Balina area	54	34	24	58	60	45	69	68	41	23	29	41
EBDC Clarence area	103	82	66	81	69	51	77	65	48	40	49	20
EBDC Coffe Harbour area	126	110	96	98	101	96	74	65	76	82	113	49
EBDC mixed ocean areas	23	16	6	8		13	11	20	17	11	6	5
EBDC area Effort (fisher months)	306	241	191	244	229	205	224	216	190	150	195	112
NSW tatal File + (lister menths)	1105	241	704	244	200	200	201	210	100	100	100	112
Cifart (linker months)	Firm											
Occess Terrel Dishers	ristar	1000/00	1000/00	anna la s	0004/00	anna ina	accesie.	0004/05	occurico:	openier.	0007100	0000100
CDDC D-King see	189/186	1996/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2000/06	2006/07	2007/08	2008/09
FRDC Balina area	210	222	230	264	280	2/2	250	206	219	187	168	138
FRUC Clarence area	663	72/	562	084	481	495	361	321	265	242	246	161
FRUC Cons Harbour area	186	219	194	166	163	166	140	90	72	61	52	31
FRUC moled ocean areas	136	130	309	308	402	4/9	033	50e	382	32/	349	201
FRUC area Effort (lisher months)	1,087	1,207	1,260	1,259	1,295	1,318	1,200	1,076	896	796	782	564
NSW total Effort (fisher months)	2,172	2,239	2,215	2,162	2,159	2,109	1,961	1,796	1,570	1,360	1,257	962
Effort (fisher months)	Fiscal											
Ocean Trap & Line Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Balina area	469	420	394	342	337	299	264	273	262	216	248	180
FRDC Clarence area	594	505	507	509	423	338	272	306	239	255	250	233
FRDC Coffs Harbour area	531	367	354	332	249	229	269	278	240	231	232	220
FRDC mixed ocean areas	38	38	168	164	162	163	177	153	159	203	247	171
FRDC area Effort (fisher months)	1,546	1,321	1,355	1,298	1,112	980	924	931	843	844	905	716
NSW total Effort (fisher months)	3,728	3,426	3,301	3,113	2,834	2,485	2.327	2,236	2.070	2.029	2.001	1,720
		-1	-1		-1	-,	-1	-,		-,	-	
Effort (fisher months)	Fiscal		112		8.5mm	~	121		1.00 m			
Estuary Prawn Trawl Fishery	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
FRDC Balina area												
FRDC Clarence area	276	304	497	424	367	404	417	350	385	428	364	281
FRDC Coffs Harbour area												
FRDC mixed ocean areas												
FRDC area Effort (fisher months)	276	304	497	424	367	404	417	350	385	428	364	281
NSW total Effort (fisher months)	589	605	1,149	1.069	995	903	960	865	806	811	726	624



APPENDIX C – ECONOMIC MODELING REPORT

Economic Impact of the Commercial Fishing Industry in Northern New South Wales

February 2010



CONTENTS

Introduction	1
Impact Assessment	2
Approach	2
Output 2	
Income 2	
Employment	3
Value Added	3
Limitations	3
Description of Stimulus	4
Sectors Impacted	4
Data Inputs	4
Displacements & Leakages	6
Economic Impact	7
Ballina Catchment	7
Lower Clarence Catchment	9
Coffs Harbour Catchment	11
Regional Impacts	13
Regional Impacts – Zones & Regions 1, 2, & 3 (DPI Data)	15
Appendix A: Disaggregated Industry Output	16

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INTRODUCTION

Lawrence Consulting was commissioned by Native Foresters to undertake an assessment of the economic impact of the commercial fishing industry in the Northern New South Wales region (specifically, the major catchment areas of Ballina, Lower Clarence and Coffs Harbour) for the financial years of 2007/2008 and 2008/2009, on behalf of the Professional Fisherman's Association.

The following sections of this report present the results of the economic impact analysis.

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IMPACT ASSESSMENT

APPROACH

This section outlines the input-output methodology that was used to examine the economic activity generated by the commercial fishing industry on the economy of the Northern Rivers region of New South Wales and specifically the major catchment areas of Ballina, Lower Clarence and Coffs Harbour.

The contribution to the economies of the regions being analysed of the commercial fishing industry and its component activities – namely, harvesting, handling / processing and retail – is applied to the relevant industry sectors of the inputoutput model of the associated economies to examine the impact. This analysis utilised separate regional input-output tables developed for the Ballina and Coffs Harbour local government areas (LGAs), Clarence Valley – Coast statistical local area (SLA) and Northern Rivers region to identify the impact of the commercial fishing industry.

The stimulus from economic activity can be traced through the economy in several different ways:

- The first round effect, or direct effect, are those from the activities expenditure in purchasing goods from other industries;
- The second round effects are those from the supplying industries increasing their purchases to meet the additional demand. The second and subsequent rounds of purchasing are termed the indirect effects; and
- The consumption-induced effects, which recognise that the level of local production is important in determining regional levels of household consumption, that this in turn will be spent locally to a large extent and therefore influence the level of regional consumption and the level of output of each sector.

Note: Caution should be exercised when interpreting the consumption impacts as they are generally expected to overestimate the actual impact.

These effects can be represented by multipliers. There are commonly four different types of multipliers:

- Output;
- Income:
- Employment; and
- Value added.

Output

The output impact measures the increase in gross sales throughout the whole economy by summing all the individual transactions resulting, directly and indirectly, from the economic stimulus. The output impacts, are however, regarded as overstating the impact on the economy as they count all goods and services used in one stage of production as an input to later stages of production, hence counting their contribution more than once.

Income

The income impact measures the additional amount of wages and salaries paid to employees of the industry under consideration and to other industries benefiting from the stimulus to the economy. Note: The level of direct wages and salaries returned to agricultural and fishing sectors is generally proportionally lower than other industries due to a higher level of compensation derived through gross operating surplus/gross mixed income.



Employment

The employment impact measures the number of jobs created by the stimulus, both directly and indirectly. It should be noted that the short-term response to increased demand might be for employers to ask existing staff to work overtime. As a consequence, lower employment than the level indicated by the economic impact of the stimulus will result. This short-term scenario is particularly true where the demand stimulus is seen as temporary or where there is spare capacity in the economy (i.e. unemployment).

Value Added

The value added or Gross Regional Product¹ (GRP) impact measures only the net activity at each stage of production. GRP is defined as the addition of consumption, investment and government expenditure, plus exports of goods and services, minus imports of goods and services for a region. The GRP impacts are the preferred measure for the assessment and contribution of a stimulus to the economy.

LIMITATIONS

Limitations or qualifiers that should be raised when using input-output analysis include:

- The inputs purchased by each industry are a function of the level of output of that industry. The input function is
 generally assumed linear and homogenous of degree one (which implies constant returns to scale and no substitution
 between inputs);
- Each commodity (or group of commodities) is supplied by a single industry or sector of production. This implies that there is only one method used to produce each commodity and that each sector has only a single primary output;
- The total effect of carrying on several types of production is the sum of the separate effects. This rules out external economies and diseconomies and is known simply as the additivity assumption. This generally does not reflect real world operations;
- The system is in equilibrium at given prices. This is obviously not the case in an economic system subject to external influences;
- In the static input-output model, there are no capacity constraints so that the supply of each good is perfectly elastic. Each industry can supply whatever quantity is demanded of it and there are no capital restrictions. This assumption would come into play depending upon the magnitude of the changes in quantities demanded, brought about through changes in taxation levels; and
- The input-output model is an optimisation model that allocates resources between sectors to their most efficient use. This is not expected to happen all of the time in the "real world" and as such results from the input output analysis may overestimate the actual impact delivered on ground.

Input-output techniques provide a solid approach for taking account of the inter-relationships between the various sectors of the economy in the short-term and hence are an appropriate tool for determining the direct, indirect and induced economic impact of the commercial fishing industry on the economy of the Northern Rivers region and specifically the major catchment areas of Ballina, Lower Clarence and Coffs Harbour.

¹ This is also known as Gross State Product (GSP) or Gross National Product (GNP) depending on the level of the analysis.



DESCRIPTION OF STIMULUS

Sectors Impacted

The sectors of the economy that will be impacted through the analysis include:

- Commercial fishing;
- Other food products (manufacturing); and
- Retail trade.

Disaggregated industry outputs were provided as part of the analysis to demonstrate the total direct and indirect impact on all 109 sectors included in the input-output model; these are provided in Appendix A.

Data Inputs

The assessment is to estimate the economic impact to each major catchment area and the wider Northern Rivers region of the commercial fishing industry in Ballina, Lower Clarence and Coffs Harbour. Separate elements of the industry have been identified and modeled separately for each region, namely harvesting, processing and retail; output and employment data for financial year 2008/09 for each catchment area that was utilised in the economic impact assessment is summarised in the following table.

Table 1: Summary of Output and Employmer	t, Commercial	Fishing Catchme	nts, Northern Rive	rs, 2008/09
	Ballina	Lower	Coffs Harbour	Total
		Clarence		
Harvesting				
Total Number of Fishermen	34	142	53	229
Total Fish Catch Value (\$)	2,573,926	7,691,071	3,977,600	14,242,597
Total Gross Sales (\$)	2,838,200	9,337,892	4,245,939	16,422,031
Retail, Handling & Processing				
Output of Co-Op activities (excl. fish account)				
(\$)	1,740,121	16,815,068	7,589,715	26,144,904
Cost of goods/services (\$)	1,618,110	13,914,281	4,820,890	20,353,281
Employment	25	120	138	283
Wages (\$)	365,730	2,483,332	1,824,077	4,673,139

Harvesting, processing and retail; output and employment data for financial year 2007/08 for each catchment area was also utilised in the economic impact assessment, to provide a comparison, and is summarised in Table 2.

Table 2: Summary of Output and Employment, Commercial Fishing Catchments, Northern Rivers, 2007/08								
	Ballina	Lower Clarence	Coffs Harbour	Total				
Harvesting								
Total Number of Fishermen	34	155	51	240				
Total Fish Catch Value (\$)	2,578,213	8,703,070	4,799,342	16,080,625				
Total Gross Sales (\$)	2,831,146	9,898,937	5,135,430	17,865,513				



Retail, Handling & Processing				
(\$)	1 845 158	15 959 896	7 085 100	24 890 154
Cost of goods/services (\$)	1,717,397	13,143,301	5,020,021	19,880,719
Employment	25	136	118	279
Wages (\$)	374,130	2,437,659	1,385,673	4,197,462



Displacements & Leakages

Displacement arises when an economic stimulus such as a development project or initiative takes market share from other existing local firms or organisations, or 'displaces' alternative uses of project funds that might otherwise have occurred. Leakages are defined as the proportion of project outputs that flow out of the catchment area, i.e. purchases from outside the region. For the purpose of this analysis, it has been assumed that each catchment area analysed is a closed economy, that is, any displacement and leakages are considered marginal. All expenditure related to these industries is therefore assumed to be made within the region in order to represent the change in economic activity.



ECONOMIC IMPACT

Ballina Catchment

Financial Year 2008 - 2009

The commercial fishing industry in the Ballina catchment area recorded gross sales of fish caught of approximately \$2.8 million in 2008/09, whilst retail activities undertaken through the co-operative realised a further \$1.7 million in output. The economic impacts associated with the commercial fishing industry for the Ballina LGA include (refer Table 3):

- An estimated direct output of \$4.6 million and additional flow on increases in output of \$4.6 million through other industries, for a total direct and indirect impact of \$9.1 million;
- An estimated direct income (wages and salaries) of \$1.0 million, with \$0.9 million in additional income generated through flow on effects in other industries;
- Approximately 38.1 direct full-time equivalent employment positions, with an estimated additional 13.7 employment positions gained indirectly through other industries; and
- An estimated increase in GRP of \$2.1 million from direct effects, with a further flow on impact of \$1.6 million through other industries for a total industry value added of \$3.7 million.

	Table 3: Economic Impact of Commercial Fishing Industry, Ballina, 2008/09						
	Direct (D)	Indirect (I)	Total Industry Impact (D + I)	Consumption Induced (C)	Total Impact (D + I + C)		
Harvesting			()	()			
Output (\$m)	2.8	2.8	5.7	3.6	9.2		
Income (\$m)	0.4	0.5	0.9	0.5	1.4		
Employment (FTE)	16.0	7.6	23.6	9.7	33.2		
Value Added (\$m)	1.2	0.9	2.1	1.0	3.2		
Retail, handling &							
processing							
Output (\$m)	1.7	1.7	3.5	3.7	7.2		
Income (\$m)	0.6	0.4	0.9	0.5	1.4		
Employment (FTE)	22.2	6.1	28.3	10.2	38.5		
Value Added (\$m)	0.9	0.7	1.6	1.1	2.7		
Total impact							
Output (\$m)	4.6	4.6	9.1	7.3	16.4		
Income (\$m)	1.0	0.9	1.8	1.0	2.8		
Employment (FTE)	38.1	13.7	51.9	19.8	71.7		
Value Added (\$m)	2.1	1.6	3.7	2.1	5.8		



Financial Year 2007 - 2008

The commercial fishing industry in the Ballina catchment area recorded gross sales of fish caught of approximately \$2.8 million in 2007/08, whilst retail activities undertaken through the co-operative realised a further \$1.8 million in output. The economic impacts associated with the commercial fishing industry for the Ballina LGA for 2007/08 are only slightly different to 2008/09 and include (refer Table 4):

- An estimated direct output of \$4.7 million and additional flow on increases in output of \$4.7 million through other industries, for a total direct and indirect impact of \$9.3 million;
- An estimated direct income (wages and salaries) of \$1.0 million, with \$0.9 million in additional income generated through flow on effects in other industries;
- Approximately 39.4 direct full-time equivalent employment positions, with an estimated additional 14.1 employment positions gained indirectly through other industries; and
- An estimated increase in GRP of \$2.1 million from direct effects, with a further flow on impact of \$1.7 million through other industries for a total industry value added of \$3.8 million.

_	Table 4: Economic Impact of Commercial Fishing Industry, Ballina, 2007/08						
	Direct (D)	Indirect (I)	Total Industry Impact (D + I)	Consumption Induced (C)	Total Impact (D + I + C)		
Harvesting							
Output (\$m)	2.8	2.8	5.7	3.5	9.2		
Income (\$m)	0.4	0.5	0.9	0.5	1.4		
Employment (FTE)	15.9	7.6	23.5	9.6	33.1		
Value Added (\$m)	1.2	0.9	2.1	1.0	3.1		
Retail, handling &							
processing							
Output (\$m)	1.8	1.8	3.7	4.0	7.6		
Income (\$m)	0.6	0.4	1.0	0.5	1.5		
Employment (FTE)	23.5	6.5	30.0	10.8	40.8		
Value Added (\$m)	0.9	0.7	1.7	1.1	2.8		
Total impact							
Output (\$m)	4.7	4.7	9.3	7.5	16.9		
Income (\$m)	1.0	0.9	1.9	1.0	2.9		
Employment (FTE)	39.4	14.1	53.5	20.4	73.9		
Value Added (\$m)	2.1	1.7	3.8	2.2	6.0		



Lower Clarence Catchment

Financial Year 2008 - 2009

The commercial fishing industry in the Lower Clarence catchment area recorded gross sales of fish caught of approximately \$9.3 million in 2008/09, whilst handling / processing and retail activities undertaken through the co-operative realised a further \$16.8 million in output. The economic impacts associated with the commercial fishing industry for the Clarence Valley – Coast SLA include (refer Table 5):

- An estimated direct output of \$26.2 million and additional flow on increases in output of \$26.4 million through other industries, for a total direct and indirect impact of \$52.5 million;
- An estimated direct income (wages and salaries) of \$6.0 million, with \$4.8 million in additional income generated through flow on effects in other industries;
- Approximately 267.7 direct full-time equivalent employment positions, with an estimated additional 82.0 employment positions gained indirectly through other industries; and
- An estimated increase in GRP of \$11.5 million from direct effects, with a further flow on impact of \$9.7 million through other industries for a total industry value added of \$21.2 million.

Table 5: Economic Impact of Commercial Fishing Industry, Lower Clarence, 2008/09							
	Direct	Indirect	Total Industry	Consumption	Total Impact		
	(D)	(I)	Impact	Induced	(D + I + C)		
			(D + I)	(C)			
Harvesting							
Output (\$m)	9.3	9.1	18.5	10.3	28.8		
Income (\$m)	1.4	1.2	2.6	1.4	4.0		
Employment (FTE)	87.1	20.4	107.5	27.7	135.2		
Value Added (\$m)	4.0	2.7	6.7	3.0	9.7		
Retail, handling &							
processing							
Output (\$m)	16.8	17.3	34.0	32.5	66.5		
Income (\$m)	4.6	3.6	8.2	4.4	12.6		
Employment (FTE)	180.6	61.6	242.3	87.0	329.2		
Value Added (\$m)	7.5	7.0	14.5	9.3	23.9		
Total impact							
Output (\$m)	26.2	26.4	52 5	42 8	95.3		
Income (\$m)	6.0	4.8	10.8	57	16.5		
Employment (FTE)	267.7	82.0	349.7	114.7	464.4		
Value Added (\$m)	11.5	9.7	21.2	12.4	33.6		



Financial Year 2007 - 2008

The commercial fishing industry in the Lower Clarence catchment area recorded gross sales of fish caught of approximately \$9.9 million in 2007/08, whilst handling / processing and retail activities undertaken through the co-operative realised a further \$16.0 million in output. The economic impacts associated with the commercial fishing industry for the Clarence Valley – Coast SLA in 2007/08 include (refer Table 6):

- An estimated direct output of \$25.9 million and additional flow on increases in output of \$26.4 million through other industries, for a total direct and indirect impact of \$52.2 million;
- An estimated direct income (wages and salaries) of \$5.5 million, with \$4.8 million in additional income generated through flow on effects in other industries;
- Approximately 243.7 direct full-time equivalent employment positions, with an estimated additional 82.0 employment positions gained indirectly through other industries; and
- An estimated increase in GRP of \$10.8 million from direct effects, with a further flow on impact of \$9.6 million through other industries for a total industry value added of \$20.4 million.

Table 6: Economic Impact of Commercial Fishing Industry, Lower Clarence, 2007/08						
	Direct (D)	Indirect (I)	Total Industry Impact (D + I)	Consumption Induced (C)	Total Impact (D + I + C)	
Harvesting						
Output (\$m)	9.9	9.7	19.6	11.0	30.5	
Income (\$m)	1.5	1.3	2.8	1.5	4.2	
Employment (FTE)	92.3	21.6	113.9	29.4	143.3	
Value Added (\$m)	4.2	2.9	7.1	3.2	10.3	
Retail, handling &						
processing						
Output (\$m)	16.0	16.7	32.6	28.8	61.5	
Income (\$m)	4.0	3.3	7.3	3.9	11.1	
Employment (FTE)	151.4	60.4	211.8	77.3	289.1	
Value Added (\$m)	6.5	6.7	13.3	8.3	21.6	
Total impact						
Output (\$m)	25.9	26.4	52.2	39.8	92.0	
Income (\$m)	5.5	4.8	10.1	5.3	15.4	
Employment (FTE)	243.7	82.0	325.8	106.7	432.4	
Value Added (\$m)	10.8	9.6	20.4	11.5	31.9	



Coffs Harbour Catchment

Financial Year 2008 - 2009

The commercial fishing industry in the Coffs Harbour catchment area recorded gross sales of fish caught of approximately \$4.2 million in 2008/09, whilst retail activities undertaken through the co-operative realised a further \$7.6 million in output. The economic impacts associated with the commercial fishing industry for the Coffs Harbour LGA include (refer Table 7):

- An estimated direct output of \$11.8 million and additional flow on increases in output of \$11.6 million through other industries, for a total direct and indirect impact of \$23.5 million;
- An estimated direct income (wages and salaries) of \$3.1 million, with \$2.4 million in additional income generated through flow on effects in other industries;
- Approximately 124.2 direct full-time equivalent employment positions, with an estimated additional 38.2 employment positions gained indirectly through other industries; and
- An estimated increase in GRP of \$5.6 million from direct effects, with a further flow on impact of \$4.4 million through other industries for a total industry value added of \$10.0 million.

Table 7: Economic Impact of Commercial Fishing Industry, Coffs Harbour, 2008/09						
	Direct (D)	Indirect (I)	Total Industry Impact (D + I)	Consumption Induced (C)	Total Impact (D + I + C)	
Harvesting						
Output (\$m)	4.2	4.1	8.4	5.3	13.7	
Income (\$m)	0.6	0.7	1.3	0.7	2.0	
Employment (FTE)	26.8	11.1	37.8	14.6	52.4	
Value Added (\$m)	1.8	1.3	3.1	1.5	4.7	
Retail, handling &						
processing						
Output (\$m)	7.6	7.5	15.1	16.4	31.5	
Income (\$m)	2.4	1.7	4.1	2.2	6.4	
Employment (FTE)	97.5	27.1	124.6	45.3	169.9	
Value Added (\$m)	3.8	3.1	6.9	4.8	11.6	
Total impact						
Output (\$m)	11.8	11.6	23.5	21.7	45.2	
Income (\$m)	3.1	2.4	5.4	3.0	8.4	
Employment (FTE)	124.2	38.2	162.4	59.9	222.3	
Value Added (\$m)	5.6	4.4	10.0	6.3	16.3	



Financial Year 2007 - 2008

The commercial fishing industry in the Coffs Harbour catchment area recorded gross sales of fish caught of approximately \$5.1 million in 2007/08, whilst retail activities undertaken through the co-operative realised a further \$7.1 million in output. The economic impacts associated with the commercial fishing industry for the Coffs Harbour LGA in 2007/08 include (refer Table 8):

- An estimated direct output of \$12.2 million and additional flow on increases in output of \$12.0 million through other industries, for a total direct and indirect impact of \$24.2 million;
- An estimated direct income (wages and salaries) of \$3.0 million, with \$2.4 million in additional income generated through flow on effects in other industries;
- Approximately 123.4 direct full-time equivalent employment positions, with an estimated additional 38.7 employment positions gained indirectly through other industries; and
- An estimated increase in GRP of \$5.8 million from direct effects, with a further flow on impact of \$4.5 million through other industries for a total industry value added of \$10.2 million.

Table 8: Economic Impact of Commercial Fishing Industry, Coffs Harbour, 2007/08						
	Direct (D)	Indirect (I)	Total Industry Impact (D + I)	Consumption Induced (C)	Total Impact (D + I + C)	
Harvesting						
Output (\$m)	5.1	5.0	10.1	6.4	16.5	
Income (\$m)	0.8	0.8	1.6	0.9	2.5	
Employment (FTE)	32.4	13.4	45.8	17.6	63.4	
Value Added (\$m)	2.2	1.6	3.8	1.8	5.6	
Retail, handling &						
processing	7 4	7.0	44.4	15.0	00.4	
	1.1	7.0	14.1	15.3	29.4	
Income (\$m)	2.3	1.6	3.8	2.1	5.9	
Employment (FIE)	91.0	25.3	116.3	42.3	158.6	
Value Added (\$m)	3.0	2.9	6.4	4.4	10.9	
Total impact						
Output (\$m)	12.2	12.0	24.2	21.7	46.0	
Income (\$m)	3.0	2.4	5.5	3.0	8.4	
Employment (FTE)	123.4	38.7	162.1	59.9	222.0	
Value Added (\$m)	5.8	4.5	10.2	6.3	16.5	



Regional Impacts

Financial Year 2008 - 2009

The economic impacts associated with the commercial fishing industry in the major catchment areas of Ballina, Lower Clarence and Coffs Harbour for the Northern Rivers region are summarised in Table 9 and include:

- An increase in estimated direct output of \$42.6 million and additional flow on increases in output of \$42.7 million through other industries, for a total direct and indirect impact of \$85.3 million;
- An increase in estimated direct income (wages and salaries) of \$10.1 million, with \$8.3 million in additional income generated through flow on effects in other industries;
- An estimated increase of 396.8 direct full-time equivalent employment positions, with an estimated additional 142.4 employment positions gained indirectly through other industries; and
- An estimated increase in GRP of \$19.2 million from direct effects, with a further flow on impact of \$16.1 million through other industries for a total industry value added of \$35.3 million.

Table 9: Economic Impact of Commercial Fishing Industry, Northern Rivers, 2008/09					
	Direct (D)	Indirect (I)	Total Industry Impact (D + I)	Consumption Induced (C)	Total Impact (D + I + C)
Harvesting					
Output (\$m)	16.4	16.3	32.7	20.3	53.0
Income (\$m)	2.4	2.7	5.1	2.7	7.8
Employment (FTE)	100.7	44.1	144.8	56.1	200.9
Value Added (\$m)	7.0	5.3	12.3	5.9	18.1
Retail, handling &					
processing					
Output (\$m)	26.2	26.4	52.6	52.9	105.4
Income (\$m)	7.6	5.7	13.3	7.1	20.4
Employment (FTE)	296.1	98.4	394.4	146.3	540.7
Value Added (\$m)	12.2	10.7	23	15.3	38.3
Total impact					
Output (\$m)	42.6	42.7	85.3	73.1	158.4
Income (\$m)	10.1	8.3	18.4	9.9	28.3
Employment (FTE)	396.8	142.4	539.2	202.3	741.6
Value Added (\$m)	19.2	16.1	35.3	21.1	56.4



Financial Year 2007 - 2008

The economic impacts associated with the commercial fishing industry in the major catchment areas of Ballina, Lower Clarence and Coffs Harbour for the Northern Rivers region for 2007-08 are summarised in Table 10 and include:

- An increase in estimated direct output of \$42.8 million and additional flow on increases in output of \$43.1 million through other industries, for a total direct and indirect impact of \$85.9 million;
- An increase in estimated direct income (wages and salaries) of \$9.5 million, with \$8.3 million in additional income generated through flow on effects in other industries;
- An estimated increase of 369.6 direct full-time equivalent employment positions, with an estimated additional 143.0 employment positions gained indirectly through other industries; and
- An estimated increase in GRP of \$18.7 million from direct effects, with a further flow on impact of \$16.1 million through other industries for a total industry value added of \$34.8 million.

Table 10: Economic Impact of Commercial Fishing Industry, Northern Rivers, 2007/08					
	Direct (D)	Indirect (I)	Total Industry Impact (D + I)	Consumption Induced (C)	Total Impact (D + I + C)
Harvesting					
Output (\$m)	17.9	17.8	35.6	22.0	57.7
Income (\$m)	2.6	2.9	5.6	3.0	8.5
Employment (FTE)	109.6	47.9	157.5	61.0	218.5
Value Added (\$m)	7.6	5.7	13.4	6.4	19.7
Retail, handling & processing					
Output (\$m)	24.9	25.4	50.3	48.5	98.8
Income (\$m)	6.9	5.4	12.2	6.5	18.8
Employment (FTE)	260.0	95.1	355.1	134.1	489.2
Value Added (\$m)	11.0	10.4	21.4	14.0	35.4
Total impact					
Output (\$m)	42.8	43.1	85.9	70.5	156.4
Income (\$m)	9.5	8.3	17.8	9.5	27.3
Employment (FTE)	369.6	143.0	512.7	195.1	707.8
Value Added (\$m)	18.7	16.1	34.8	20.4	55.2



Regional Impacts – Zones & Regions 1, 2, & 3 (DPI Data)

Financial Year 2007 - 2008

The economic impacts associated with the commercial fishing industry in the NSW Department of Primary Industries Zones and Regions 1, 2 and 3, which encompasses the Northern NSW area, including Ballina, Lower Clarence and Coffs Harbour, are summarised in Table 11. It should be noted that the Department did not have data relating to the Retail / Handling & Processing, and only the Harvesting data was modelled. The economic impacts of harvesting in these zones and regions, include:

- An increase in estimated direct output of \$36.3 million and additional flow on increases in output of \$36.1 million through other industries, for a total direct and indirect impact of \$72.4 million;
- An increase in estimated direct income (wages and salaries) of \$5.4 million, with \$5.9 million in additional income generated through flow on effects in other industries;
- An estimated increase of 222.6 direct full-time equivalent employment positions, with an estimated additional 97.4 employment positions gained indirectly through other industries; and
- An estimated increase in GRP of \$15.5 million from direct effects, with a further flow on impact of \$11.6 million through other industries for a total industry value added of \$27.2 million.

Table 11: Economic Impact of Commercial Fishing Industry, Northern NSW (Zones 1, 2 & 3) – DPI Data, 2007/08					
	Direct (D)	Indirect (I)	Total Industry Impact (D + I)	Consumption Induced (C)	Total Impact (D + I + C)
Harvesting			(,	(-)	
Output (\$m)	36.3	36.1	72.4	44.8	117.2
Income (\$m)	5.4	5.9	11.3	6.1	17.3
Employment (FTE)	222.6	97.4	320.0	123.9	444.0
Value Added (\$m)	15.5	11.6	27.2	12.9	40.1



APPENDIX A: DISAGGREGATED INDUSTRY OUTPUT

Table A1: Total Output Per Industry (Direct and Indirect), Co	ommercial Fishing	g Industry, Nort	hern Rivers (\$ mi	llion), 2008/09
Industry sector	Ballina	Lower	Coffs Harbour	Northern
		Clarence		Rivers
Sheep	0.010	0.064	0.034	0.132
Grains	0.009	0.259	0.003	0.200
Beef cattle	0.032	0.321	0.121	0.529
Dairy cattle	0.006	0.032	0.024	0.113
Pigs	0.005	0.031	0.016	0.073
Poultry	0.008	0.048	0.024	0.122
Other agriculture	0.101	0.785	0.154	1.292
Services to agriculture; hunting and trapping	0.014	0.150	0.028	0.209
Forestry and logging	0.004	0.029	0.025	0.091
Commercial fishing	2.856	9.899	4.277	16.753
Coal	0.005	0.035	0.011	0.046
Oil and gas	0.106	1.074	0.258	1.063
Iron ores	0.002	0.018	0.009	0.024
Non-ferrous metal ores	0.008	0.014	0.025	0.078
Other mining	0.008	0.108	0.009	0.113
Services to mining	0.000	0.022	0.003	0.023
Meat and meat products	0.065	0.519	0.225	1.007
Dairy products	0.021	0.176	0.084	0.312
Fruit and vegetable products	0.008	0.054	0.029	0.095
Oils and fats	0.013	0.142	0.024	0.165
Flour mill products and cereal foods	0.033	0.317	0.074	0.323
Bakery products	0.017	0.162	0.059	0.233
Confectionery	0.008	0.079	0.023	0.100
Other food products	0.301	5.081	0.181	5.620
Soft drinks, cordials and syrups	0.009	0 074	0.037	0 117
Beer and malt	0.003	0.030	0.012	0.040
Wine spirits and tobacco	0.009	0.051	0.020	0.070
Textile fibres varies and woven fabrics	0.009	0.030	0.020	0.070
Textile products	0.009	0.000	0.010	0.002
Knitting mill products	0.003	0.000	0.022	0.000
Clothing	0.000	0.010	0.000	0.020
Footwear	0.013	0.000	0.010	0.071
Leather and leather products	0.003	0.020	0.000	0.020
Soumill products	0.002	0.013	0.004	0.019
Other wood products	0.009	0.009	0.030	0.143
Duller wood products	0.035	0.149	0.007	0.009
Pulp, paper and paper board	0.007	0.043	0.029	0.093
Paper containers and products	0.014	0.101	0.041	0.200
Printing and services to printing	0.043	0.200	0.109	0.515
Publisning; recorded media and publisning	0.041	0.287	0.162	0.503
Petroleum and coal products	0.444	2.325	0.809	2.889
Basic chemicals	0.035	0.141	0.066	0.314
Paints	0.014	0.071	0.026	0.100
Medicinal and pharmaceutical products, pesticides	0.010	0.056	0.023	0.111
Soap and other detergents	0.003	0.018	0.009	0.030
Cosmetics and toiletry preparations	0.001	0.006	0.002	0.007
Other chemical products	0.023	0.056	0.020	0.097
Rubber products	0.027	0.154	0.060	0.203
Plastic products	0.040	0.221	0.078	0.350



Table A1: Total Output Per Industry (Direct and Indirect)	, Commercial Fisl	hing Industry, Nor	thern Rivers (\$ m	illion), 2008/09
Industry sector	Ballina	Lower	Coffs Harbour	Northern
		Clarence		Rivers
Glass and glass products	0.004	0.028	0.013	0.044
Ceramic products	0.002	0.009	0.005	0.017
Cement, lime and concrete slurry	0.005	0.023	0.012	0.043
Plaster and other concrete products	0.003	0.016	0.007	0.027
Other non-metallic mineral products	0.006	0.031	0.016	0.055
Iron and steel	0.040	0.118	0.104	0.293
Basic non-ferrous metal and products	0.013	0.044	0.039	0.121
Structural metal products	0.027	0.144	0.073	0.212
Sheet metal products	0.017	0.104	0.042	0.153
Fabricated metal products	0.042	0.208	0.147	0.400
Motor vehicles and parts; other transport equipment	0.046	0.200	0.108	0.383
Ships and boats	0.031	0.212	0.048	0.242
Railway equipment	0.000	0.002	0.001	0.004
Aircraft	0.005	0.018	0.013	0.047
Photographic and scientific equipment	0.012	0 059	0.018	0 078
Electronic equipment	0.037	0.000	0.079	0.282
Household appliances	0.004	0.101	0.015	0.202
Other electrical equipment	0.004	0.020	0.010	0.041
Agricultural mining and construction machinery lifting	0.000	0.100	0.054	0.244
and material handling equipment	0.020	0.140	0.007	0.200
And material nationing equipment	0 101	0 609	0 200	1 1 1 1
Drefebriceted buildings	0.191	0.000	0.300	1.111
Freiabricated buildings	0.000	0.003	0.001	0.004
Athen menufacturing	0.002	0.010	0.000	0.020
	0.041	0.138	0.077	0.267
	0.040	0.271	0.119	0.438
Gas supply	0.006	0.046	0.015	0.063
Water supply; sewerage and drainage services	0.017	0.093	0.044	0.166
Residential building construction	0.000	0.000	0.000	0.000
Other construction	0.010	0.023	0.017	0.073
Construction trade services	0.107	0.485	0.256	0.883
Wholesale trade	0.252	0.827	0.534	2.027
Wholesale mechanical repairs	0.013	0.084	0.045	0.143
Other wholesale repairs	0.040	0.213	0.121	0.380
Retail trade	1.785	13.521	7.749	23.077
Retail mechanical repairs	0.086	0.370	0.249	0.840
Other retail repairs	0.018	0.128	0.072	0.218
Accommodation, cafes and restaurants	0.103	0.722	0.350	1.062
Road transport	0.074	0.478	0.260	0.927
Rail, pipeline and other transport	0.006	0.057	0.022	0.095
Water transport	0 024	0 189	0.037	0 146
Air and space transport	0.028	0 137	0.082	0 279
Services to transport: storage	0.072	0.391	0 190	0.718
Communication services	0.072	0.843	0.445	1 487
Banking	0.104	0.040	0.440	0 743
Non-bank finance	0.073	0.070	0.241	0.740
	0.031	0.203	0.123	0.403
Requires to finance, investment and insurance	0.037	0.103 0.109	0.031	0.000
	0.040	U. 100	0.123	0.304
Ownership of owenings	0.000			0.000
Chien property services	0.303	2.507	1.151	3./ 10
Scientific research, technical and computer services	0.081	0.417	0.241	0.788
Legal, accounting, marketing and business	0.303	1.482	0.929	2.932


Table A1: Total Output Per Industry (Direct and Indirect), Commercial Fishing Industry, Northern Rivers (\$ million), 2008/09				
Industry sector	Ballina	Lower	Coffs Harbour	Northern
		Clarence		Rivers
management services				
Other business services	0.198	1.220	0.712	2.186
Government administration	0.025	0.149	0.073	0.244
Defence	0.000	0.000	0.000	0.000
Education	0.028	0.119	0.068	0.229
Health services	0.005	0.018	0.013	0.041
Community services	0.000	0.000	0.000	0.000
Motion picture, radio and television services	0.051	0.314	0.184	0.579
Libraries, museums and the arts	0.011	0.051	0.032	0.110
Sport, gambling and recreational services	0.006	0.037	0.022	0.065
Personal services	0.008	0.032	0.022	0.070
Other services	0.002	0.013	0.006	0.021
Total	9.141	52.530	23.479	85.260