Volume 4

Consultants' Reports

This is the fourth of four volumes

of the

Environmental Impact Statement

on the

Ocean Trawl Fishery

Note: The NSW Department of Primary Industries, incorporating NSW Fisheries, was established on 1 July 2004. Any reference in this document to NSW Fisheries is a reference to the NSW Department of Primary Industries.

Table of Contents

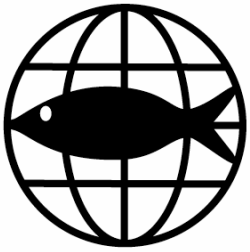
Dominion Consulting Pty Ltd

An Assessment of Economic and Social Issues in the New South Wales Ocean Trawl Fishery Management Strategy

Umwelt (Australia) Pty Ltd

Ocean Trawl Fishery Management Strategy –

Assessment of Indigenous issues and Historic Heritage issues



Dominion CONSULTING Pty Ltd

Consulting in fisheries management, economics and training

An Assessment of Economic and Social Issues in the New South Wales Ocean Trawl Fishery Management Strategy

A Report to NSW Fisheries

By

Dominion Consulting Pty Ltd

April 2004

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The normal disclaimer applies.

CONTENTS

B. Review of Existing Situation

(a) Background

The Department of Infrastructure, Planning and Natural Resources (DIPNR) (formerly Planning NSW) guidelines require that the impacts of a Fisheries Management Strategy are assessed as part of an Environmental Impact Statement (EIS) (PNSW 2002). These guidelines have included relevant matters to meet the Commonwealth "Benchmarks and Terms of Reference for Environmental Assessment of Fisheries" and to satisfy the Commonwealth Government "Guidelines for the Ecologically Sustainable Management of Fisheries" for the purposes of *Environmental Protection and Biodiversity Conservation Act 1999* (PNSW 2002).

The environmental assessment is an examination of the environmental impacts of the fishing activities and considers biological, biophysical, economic and social issues (PNSW 2002). Under the principles of Ecologically Sustainable Development (ESD), the DIPNR guidelines include assessment of the economic and social impacts of any proposed fishery management strategies according to prescribed economic and social considerations. This is to make the economic and social aspects of sustainable resource use and management more transparent in the decision-making process. It also enables potential policy impacts to be mitigated in the policy development process, rather than after the event.

The economic and social assessment sections of the DIPNR guidelines require a review of existing fisheries information in section 3 (B) and an evaluation of the likely implications of the plan (Fishery Management Strategy) in section 3 (E). The DIPNR guidelines for commercial fisheries were used in the EIS for three commercial fisheries (Estuary General, Estuary Prawn Trawl and Ocean Hauling) prior to 2004 and the current guidelines have been refined following these studies.

The management of the ocean fisheries in New South Wales (NSW) has not previously integrated economic and social information into the planning process in a formal manner. In undertaking the assessment, there is a lack of information on basic economic characteristics of fishing operations and the secondary seafood industries. There were no previous state-wide economic surveys prior to the survey for the EIS process in 2001, or economic appraisals of the sustainability of fishing operations. There has been some social information on fishers, but little on the social composition of fishing communities in NSW. The current study is a first attempt to gather and analyse economic and social information in order to appraise the fisheries management strategies proposed for the ocean fisheries in NSW.

Much of the available economic and social information comes from regulatory sources, such as NSW Fisheries licence records and fishers' catch returns. Catch records can be combined with price information available from the Sydney Fish Markets Pty Ltd to impute revenues to fishers and fisheries in order to estimate a value at point of first sale. This may give a minimum estimated value and probably underestimates the prawn industry catch value at first sale.

The current study is not intended as a "valuation" of the fishing industry and existing economic and social information is presented as a background to the assessment of specific fishery management strategies envisaged in the future management of the ocean trawl fishery. The secondary information available on the seafood industry is limited, coming from licensing details of registered premises. There is no publicly available descriptive information or an economic profile of the processing, wholesaling and retail sections of the NSW seafood

industry. This leaves an information void in which secondary value estimates of the seafood industry in NSW are not available.

To gain up to date economic and social information for the assessment process across all fishery primary producers in NSW who directly interface with the fish resource two surveys were commissioned by NSW Fisheries in May 2001. Survey of the secondary level of the seafood industry and this is recommended for future work. The economic and social surveys were to gain information on the fishers and their fishing operations, to enable the impacts of implementing fishery management strategies to be appraised. Given this is part of a new fishery assessment process, subsequent research and information gathering is recommended for future appraisals as per section 3 of the guidelines.

The social assessment of the fisheries management strategies also uses existing administrative information from license records and has been augmented by a telephone survey of fishers in NSW. This information was gathered to fill the most immediate information shortfalls for assessment purposes and to give a social profile of the state's fishers in relation to the impending need created by the Fisheries Management Strategy. This approach will need to be augmented with further fishing community surveys in the future. There is a lack of independent surveyed community opinion on fishing issues.

This economic and social fishery management strategy assessment is a part of a process of more accountable and transparent fisheries management and improved ecological sustainability.

(b) Available Information for Review

Initial analysis of available data revealed a deficit of economic and social information, with the available data coming from the licensing and catch record information held by NSW Fisheries. Available data for the social assessment was accessed via the Bureau of Rural Science, Social Science unit from the Australian Bureau of Statistics (ABS). Only partial results of the 2001 ABS census are available for the analysis, the others not available till late 2003. Aggregate ABS data is of limited use to a specific fishery (Ocean Prawn Trawl and Ocean Fish Trawl) study being across fishery administrations, thus including Commonwealth and interstate fishing activity. The NSW EIS process and ABS data access is an area for future development. Separate social and economic surveys were undertaken across all commercial fisheries in NSW in the May-June period of 2001 in order that subsequent environmental impacts assessments could benefit from improved information.

The survey was able to address shortages in information on the fishing industry at the primary level of fishing enterprises and fishers. The limitations on data are discussed. As part of the assessment process, recommendations are made on how to improve the data available for future assessments. There are four main sources of information and data for the economic and social assessment, and some background on each of the data sources used in the assessment is given below:

a) Existing NSW Fisheries licensing records have some fisher details such as date of birth and postcode. The licensing records can also show endorsements holdings and fisher file and business number. Catch and effort information from the NSW Fisheries database can be added to existing licensing information.

b) An economic survey was executed by mail in May/June 2001 by Roy Morgan Research (see Appendix 1). The state-wide survey had 259 responses from 1,640 fishers contacted

(15.7%). In the Ocean Trawl fishery 69 of 249 active fishers responded (27%). The sample of fishing businesses with OPT and OFT fishing had a higher response rate and is proposed as being reasonably representative of operators in the ocean trawl fishery. The survey results have been analysed for each fishing business in the Ocean Trawl fishery. A fishing business may have one or more endorsements to different fisheries. The economic survey will be referred to **"RM-ES";**

c) A social survey was executed by telephone in May 2001 by Roy Morgan Research (see Appendix 3). A total of 870 fisher responses were recorded from a total of 1,751 fishers contacted state-wide in New South Wales. Of the total state-wide replies, 187 (21%) replies were from Ocean Prawn Trawl endorsement holders who constitute 60% of total OPT endorsement holders (311) statewide. A total of 73 (8%) replies of the total state-wide replies were received from Ocean Fish Trawl endorsement holders who constitute 74% of total OFT endorsements (99). The survey results have been analysed for the Ocean Prawn Trawl fishery and will be referred to as **"RM-SS"**; and

d) The Sydney Fish Market average monthly prices for species, enables the catch data from catch and effort returns estimated an imputed Sydney value at time of first sale - the "Sydney index". This infers that the estimated landed prices of all seafood landed is the monthly average price at first sale in Sydney and may under or over report the revenue associated with individual fishers. As a price at first sale, it does not include market deductions (circa 10%), and it does not account for export sales which may exceed Sydney prices. Data sourced from Department's records will be referred to as "**NSWF**" or "**Sydney index**" in the study.

Other sources of information have been cited, including general literature and available government and industry statistics.

4: Economic Issues

The DIPNR guidelines must be considered by those parties responsible for preparing an EIS to assess the likely significance of impacts of implementing a Fishery Management Strategy. The guidelines for reviewing existing information on economic issues include:

a) Outline the investment in the fishing fleet on a state-wide and regional scale;

b) Outline location, age and investment of fishing associated businesses and infrastructure such as processing facilities and slipways, transport (water and road), berthing facilities, maintenance and repairs and cold stores;

c) Identify direct (e.g. boat owners, skippers and crew) and indirect (e.g. traders and suppliers) employment by regions including the proportion of fishers with income from other commercial fisheries and/or other non-fishing employment, the seasonality of employment and the demographic profile of those directly and indirectly employed in the fishery;

d) Outline the economic return from the fishery including its contribution to individual, regional and state income; and the value of licences currently held by individual fishers in the fisheries;

e) Existing economic multiplier effects, economic rents and community contributions;

f) Outline the markets for fish species (and the marketing forms) harvested in this fishery and the contribution these fisheries make towards supplying seafood to consumers on a State and regional basis; and

g) Summarise the overall risks to the economic viability of the fishery from the current operational arrangements taking into consideration the likelihood/frequency of impacts and the consequence of the impacts occurring.

The guidelines are presented to guide the reader with a response stated below each guideline.

PNSW Guideline (a): **Outline the investment in the fishing fleet on a state-wide and regional scale**

1. Fishing fleet in the OT fishery

Vessels in the ocean trawl fishery are diverse as businesses and fishers can have several licensed vessels. The ocean trawl fishing businesses have 407 OPT boats and OFT 130 boats from a state-wide total of 2,950. In OPT fishery, they are wheel house, decked vessels range from 9m to 20m in length with average power of 175hp (NMB, 2000; 2003). In OFT fishery, they are wheel housed, decked vessels, ranging between 12m and 19m in length with average power of 250hp (NMB, 2000; 2003). The average length of OPT boats is 11.4m and standard deviation is 5.2m. The average length of OFT boats is 13.2m with a standard deviation of 6.0m. Vessels have commercial fishing equipment as allowed, some with mechanical refrigeration equipment, others ice only, some with utility type motor vehicle or direct unloading to co-op wharves (NMB, 2000).

The NSW Fisheries licence data confirms that trawl fishers may have several small vessels being held by one fishing business. Figures BE1a and BE1b report available details on the vessels in all fisheries held by OPT and OFT endorsed fishers.

Figure BE1a: The distribution of lengths of vessels owned by OPT fishers (NSWF- Licence records).

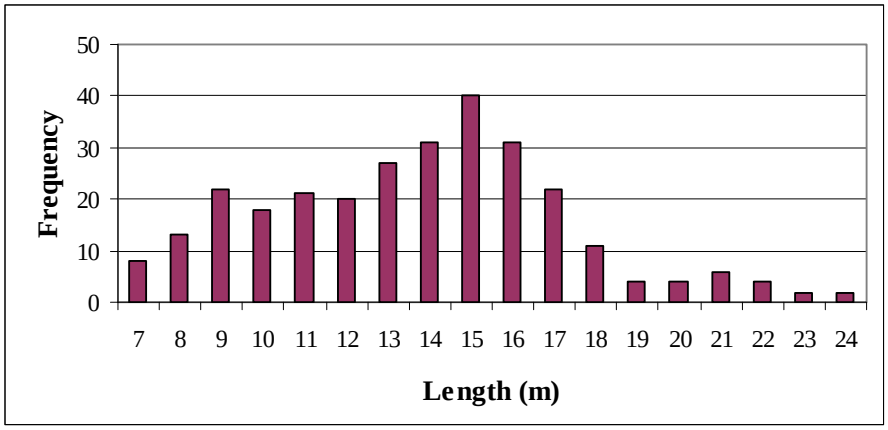
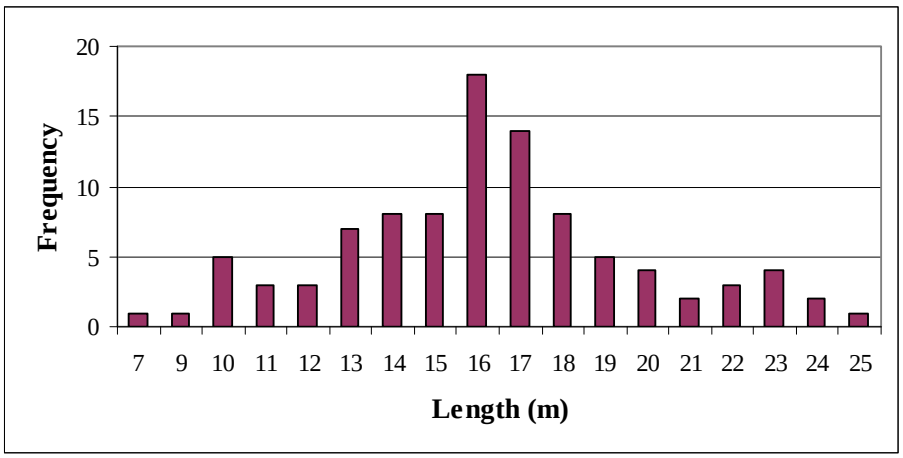


Figure BE1b: The distribution of lengths of vessels owned by OFT fishers (NSWF- Licence records).



2. Investment in the ocean trawl fishery on an individual level

Capital investment in the fishery by fishers is in the form of vessels, equipment and licences. The appraisal of a capital value is complicated by restrictions on transferability and the additional items included within business deals, such as boats, nets, sheds and equipment. In addition, investment in the fishery also involves investment in processing/value adding.

There is no publicly available data on Ocean trawl business values. The available data comes from commercial boat brokers and indicates that capital investment ranges from approximately $70,000 to $850,000 in OPT and from $80,000 to $500,000 in OFT (Newcastle Marine Brokers, 2000). The average capital investment is approximately $300,000 in the Ocean Prawn Trawl fishery, and $240,000 in the Ocean Fish Trawl fishery, though capital values will differ due to the diversity of businesses, their fishing activities and fishing assets (Newcastle Marine Brokers, 2003; 2000).

In a fishery which has been under management and restructuring, there is an expectation of maintaining and increasing economic viability through time. This profitability should then be reflected in enhanced endorsement and business values. More accurate information is needed on fishery licence and business values. This need will increase, as share values need be monitored as an indicator of viability, when the new FMS is implemented.

3. Investment in the OT fishing businesses on a state-wide scale

Based on available information from Newcastle Marine Brokers (2003), the total capital investment in the active ocean trawl fishing businesses is estimated at approximately $73m[1]. These are conservative capital investment estimates should be treated with caution.

4. Investment in the processing facilities/value added in the fishery

Processing of certain species in the ocean trawl fishery takes place on board (e.g. the cooking of prawns), or on land (e.g. the filleting of fish). Details on the degree of processing are not available. Fishermen's Co-operatives are located at many of the major ports and undertake low levels of fish processing for local markets. More significant processing facilities are located at

[1] From available data 207 OPT x $300,000 =$62.1m and 45 OFT x $240,000 =$10.8m.

Iluka, Tuncurry, Newcastle, Wollongong and Eden. Information on investment in these processing facilities is not available.

PNSW Guideline (b) **Outline location, age and investment of fishing associated businesses and infrastructure such as processing facilities and slipways, transport (water and road), berthing facilities, maintenance and repairs and cold stores.**

This section reviews the available information on businesses associated with fishing.

1. Processing and cold store facilities

The estimates come from the data submitted to NSW Fisheries in registering fish receivers and the forms have limited information on the NSW seafood processing sector and are shown in aggregate to preserve confidentiality.

NSW Fisheries has a system of Registered Fish Receivers (RFR) and Restricted Registered Fish Receivers (RRFR) to enable monitoring of the seafood industry. The system has two categories of receivers:

- RFR, for large seafood receivers of which there are 92 state-wide, and
- RRFR, generally smaller holders of consent forms to sell catch locally and which number 84 state-wide.

The information available on Fish Receivers (Registered Fish Receivers and Restricted Registered Fish Receivers), cold stores and vehicles has been reviewed. Tables BE1a&b and Tables 2a&b were compiled from the regulatory forms and can give some indication as to the number of licensed processing facilities associated with OPT and OFT fisheries and their location, and report an estimation of the RFR and RRFR holders handling species associated with the OPT and OFT fisheries – (there is limited data and it should be treated with caution). Information on age and investment is not available for review.

Table BE1a: The RFRs associated with the OPT fishery in NSW (Source: NSWF Fish receiver records).

Region	Area	No. RFRs	With Cold Store	No. Cold Vehicles	OPT	OPT No. Cold Vehicles	OPT No. Cold Store
North	Tweed-Manning	38	34	39	11	7	9
Central	Wallis-Sydney	29	21	30	18	13	18
South	Illawarra - Far South Coast	25	22	33	7	6	7
Total		**92**	**77**	**102**	**36**	**26**	**34**

Table BE1b: The RFRs associated with the OFT fishery in NSW (Source: NSWF Fish receiver records).

Region	Areas	No. RFRs	With Cold Store	No. Cold Vehicles	OFT	OFT No. Cold Vehicles	OFT No. Cold Store
North	Tweed-Manning	38	34	39	9	6	7
Central	Wallis-Sydney	29	21	30	3	2	2
South	Illawarra - Far South Coast	25	22	33	1	1	1
Total		**92**	**77**	**102**	**13**	**9**	**10**

Approximately 34 of 36 OPT RFRs and 9 of 13 OFT RFRs have cold stores. About 50% of cold stores have ice box arrangements in place to maintain quality (Table BE1b).

Table BE2a: The RRFRs associated with the OPT fishery in NSW (Source: NSWF Fish receiver records).

Region	Areas	No. RRFRs	OPT	No. of Cold Stores	No. of Ice Boxes
North	Tweed-Manning	22	8	3	3
Central	Wallis-Sydney	26	12	5	2
South	Illawarra-Far South coast	35	4	3	1
Total		**83**	**24**	**11**	**6**

Table BE2b: The RRFRs associated with the OFT fishery in NSW (Source: NSWF fish receiver records).

Region	Areas	No. RRFRs	OFT	No. of Cold Stores	No. of Ice Boxes
North	Tweed-Manning	22	9	4	5
Central	Wallis-Sydney	26	9	6	0
South	Illawarra-Far South coast	35	16	10	6
Total		**83**	**34**	**20**	**11**

Tables BE1a and BE2a indicate the location of RFRs and RRFRs associated with the OPT fishery. It is estimated that 36 of the 92 RFRs establishments in the state (39%) may work with OPT species, but the proportion and volume of business is unknown. There are 18 of 36 RFRs (50%) associated with OPT species in the central area (Wallis-Sydney), and less in the north and south of the state.

Table BE1b and Table BE2b indicate the location of RFRs and RRFRs associated with the OFT fishery. It is estimated that 13 of the 92 RFRs establishments in the state (14%) may work with OFT species, but the proportion and volume of business is unknown. There are 9 of 13 RFRs (69%) associated with OPT species in the northern area (Tweed-Manning), and less in the central and south of the state.

The RRFR data indicates that of 83 RRFRs state-wide, 24 (29%) may have involvement with OPT species and 34 (41%) may have involvement with OFT species.

2. Transport facilities

Road transport in the ocean trawl fishery is required to take the catch from the landing point to market via processors or cooperatives. From state-wide seafood industry records there are 25 seafood transport vehicles capable of holding fish at temperatures below 5 degrees C, associated with establishments which handle ocean trawl species amongst other seafood. An unknown proportion of this capacity would be directly attributable to the ocean trawl fishery.

3. Port facilities

Information on port infrastructure comes from records held by Department of Land and Water Conservation (DLWC) and licensing records for fish receivers held by NSW Fisheries. The operators in the Ocean Trawl Fishery use ports for boat storage and operation. A list of all public port assets for NSW was obtained from the Department of Land and Water Conservation. This was then compared with areas of operation of the Ocean Trawl fishers, Fishing Co-operatives and towns in coastal NSW. The major port facilities available to fishers in the Ocean Trawl Fishery and interview comments are presented in Tables BE3a&b. Most of the northern ports are used for OPT fishery and southern ports are used for OFT fishery.

Table BE3a: The ocean prawn trawl fishery and public port assets in NSW. Comments on ocean prawn trawl fishery use (Source: DLWC).

		Asset Type ID					
Town	**Port Assets**	**HBR**	**JET**	**WHV**	**ACC**	**OPT (Y/N)**	**Comment - OPT**
Tweed Heads	Tweed Heads	1	2		1	Y	Vessels use port
Brunswick Heads	Brunswick Heads	1	3	2	1	Y	Vessels use port
Ballina	Ballina	1	1	2	1	Y	Vessels use port
Evans Head	Evans Head	1	1	1	1	Y	Vessels use port
Iluka	Iluka	1	2	2	1	Y	Vessels use port
Yamba	Yamba	1	2	1	1	Y	Vessels use port
Maclean	Maclean					Y	Vessels use port
Wolli	Wooli	1		1	1	N	N/A
Coffs Harbour	Coffs Harbour	1		5	1	Y	Vessels use port
	South West Rocks	1	2	1	1	Y	Vessels use port
Port Macquarie	Port Macquarie	1		2	1	Y	Vessels use port
Laurieton	Camden Haven	1	1	2	1	Y	Vessels use port
Crowdy Head	Crowdy Head	1	2	1	1	Y	Vessels use port
Taree						N	N/A
Tuncurry	Tuncurry	1	1	3		Y	Vessels use port
Nelson Bay	Nelson Bay	1	1	5	1	Y	Eastern King prawns occationally teken off Norah Head and Broken Bay
Tea Gardens	Tea Gardens	1		1		N	N/A
Wickham	Raymond Terrace	1	1		1	N	N/A
Newcastle	Swansea	1	1			N	N/A
Pittwaters						Y	Vessels use port
Brisbane waters						Y	Vessels use port
Mannering Park						N	N/A
Tacoma						N	N/A
Brooklyn	Brooklyn	1	1			N	N/A
Pyrmont						Y	Vessels use port
Mascot	Cooks River					N	N/A
Wollongong	Wollongong	2	1	1	1	N	N/A
	Bellambi	1	1			N	N/A
Berkley	Berkeley	1	1	2	1	N	N/A
	Port Kembla	1	1			N	N/A
	Shellharbour	1		1	1	N	N/A
	Kiama	1	1	1	1	N	N/A
Nowra	Greenwell Point	1	1			Y	Vessels use port
Huskisson						N	N/A
Ulladulla	Ulladulla	1	1	2	1	N	N/A
	Batemans Bay	1	2	2	1	Y	Vessels use port
	Narooma	1	1	3	2	N	N/A
Bermagui South	Bermagui	1	3		1	N	N/A
Eden	Eden	1	2	3	1	Y	Vessels use port
	Throsby Creek	1	2	2	1	N	N/A

(Key: HBR – harbour; JET- jetty; WHF –wharf; ACC – access ramp)

Table BE3b: The ocean fish trawl fishery and public port assets in NSW. Comments on ocean fish trawl fishery use (Source: DLWC).

		Asset Type ID					
Town	**Port Assets**	**HBR**	**JET**	**WHV**	**ACC**	**OFT (Y/N)**	**Comment - OFT**
Tweed Heads	Tweed Heads	1	2		1	N	N/A
Brunswick Heads	Brunswick Heads	1	3	2	1	N	N/A
Ballina	Ballina	1	1	2	1	N	N/A
Evans Head	Evans Head	1	1	1	1	N	N/A
Iluka	Iluka	1	2	2	1	N	N/A
Yamba	Yamba	1	2	1	1	N	N/A
Maclean	Maclean					N	N/A
Wolli	Wooli	1		1	1	N	N/A
Coffs Harbour	Coffs Harbour	1		5	1	N	N/A
	South West Rocks	1	2	1	1	N	N/A
Port Macquarie	Port Macquarie	1		2	1	N	N/A
Laurieton	Camden Haven	1	1	2	1	N	N/A
Crowdy Head	Crowdy Head	1	2	1	1	Y	Some boats have endorsements but not used on regular basis
Taree						N	Pool access across bar
Tuncurry	Tuncurry	1	1	3		Y	Some boats have endorsements but not used on regular basis
Nelson Bay	Nelson Bay	1	1	5	1	Y	Vessels use port
Tea Gardens	Tea Gardens	1		1		N	N/A
Wickham	Raymond Terrace	1	1		1	Y	Vessels use port
Newcastle	Swansea	1	1			Y	would not be used on regular basis
Mannering Park						N	N/A
Tacoma						N	N/A
Brooklyn	Brooklyn	1	1			N	N/A
Pittwaters						Y	some OFT would land here
Brisbane waters						Y	some OFT would land here
Pyrmont						Y	Vessels use port
Mascot	Cooks River					N	N/A
Wollongong	Wollongong	2	1	1	1	Y	Vessels use port
	Bellambi	1	1			N	N/A
Berkley	Berkeley	1	1	2	1	N	N/A
	Port Kembla	1	1			N	Some landings may be made here
	Shellharbour	1		1	1	N	N/A
	Kiama	1	1	1	1	Y	Vessels use port
Nowra	Greenwell Point	1	1			Y	Vessels use port
Huskisson						N	N/A
Ulladulla	Ulladulla	1	1	2	1	Y	Vessels use port
	Batemans Bay	1	2	2	1	Y	Vessels use port
	Narooma	1	1	3	2	N	N/A
Bermagui South	Bermagui	1	3		1	Y	Vessels use port
Eden	Eden	1	2	3	1	Y	Vessels use port
	Throsby Creek	1	2	2	1	N	N/A

(Key: HBR – harbour; JET- jetty; WHF –wharf; ACC – access ramp)

4. Maintenance and repair facilities

Information on boat maintenance and repair facilities is not available for this review.

PNSW Guideline (c): **Identify direct (e.g. boat owners, skippers and crew) and indirect (e.g. traders and suppliers) employment by regions including the proportion of fishers with income from other commercial fisheries and/or other non-fishing employment, the seasonality of employment and the demographic profile of those directly and indirectly employed in the fishery.**

1. Employment

The NSW Fishing industry has direct employment in fishing operations and indirect employment through processors, cold stores and traders. Current information is available for direct fisher employment only, with the social survey (RM-SS) giving new employment estimates. Fishers are employed in their businesses and each business may have several fishers. Fishers can be either owner operators, nominated fishers, employees or crew, depending on the fishery. However the analysis is complicated by the ability of fishers to form several businesses, or be part of partnerships and companies. All this also takes place within the broader state wide activity patterns of fishers fishing in different fisheries where one person can be endorsed in several other fisheries. The following facts from the database are provided at State-wide and for the Ocean Trawl fishery.

The social survey investigated employment in the Ocean Trawl fishery. There were 182 respondents holding OPT endorsements and 73 holding OFT endorsements. Each was asked: How many people have you employed in the last 12 months? (Full-time, F-T or Part-time, P-T). The results are presented in Table BE4a and Table BE4b.

Table BE4a: Estimation of number of employees in the ocean prawn trawl fishery sample (Source: RM- SS)

No. of Employees	Frequency	Total Employees	Full-time	Part-time
0	49	0	0	0
1	35	35	25	10
2	22	44	32	12
3	18	52	29	23
4	19	75	39	36
5	1	5	0	5
6	5	30	9	21
8	1	8	8	0
10	1	10	10	0
12	1	12	12	0
15	1	15	15	0
20	1	20	20	0
>20	28	185	64	121
Total	**182**	**491**	**263**	**228**

Table BE4b: Estimation of number of employees in the Ocean Fish Trawl fishery (Source: RM-SS).

No. of Employees	Frequency	Total Employees	Full-time	Part-time
0	18	0	0	0
1	11	11	7	4
2	9	18	14	4
3	5	15	9	6
4	7	28	16	12
5	1	5	0	5
6	4	24	14	10
7	1	7	4	3
10	1	10	10	0
12	2	24	24	0
15	1	15	15	0
20	1	20	20	0
>20	4	135	14	121
Total	**65**	**312**	**147**	**165**

In the OPT fishery, of the 182 respondents, 49 had no employees and 133 had a total of 491 employees, of whom 263 were full-time and 228 part-time. In OFT fishery, out of 65 respondents, 18 had no employees and remaining 47 had a total 312 employees of whom 147 were full-time and 165 were part-time. Assuming the sample is representative, given there were 182 responses from 311 OPT fishers and 65 responses from 99 OFT fishers it is proposed to adjust the survey estimate[2].

There are approximately 803 to 1,314[3] people employed in the ocean trawl fishing businesses. The estimates of employment need to be seen in the context of all fishing activity state-wide, rather than for each administered fishery and requires further investigation to exclude double counting.

The social survey employment estimates also include the employment of fishers' partners. In the survey sample, 47% of OPT fishers had their marital partners "in the business" of which 52% were full-time and 46% were part-time, and 55% of OFT fishers had their marital partners "in the business" of which 50% were full-time and 50% were part-time.

Table BE5 presents details about percentage of ocean trawl fishers employed in each district in NSW.

[2] Based on Social Survey, adjustment is proposed in the ratio of 311/182 = 1.7 (OPT) and 99/65=1.5 (OFT)
[3] active 182 OPT fishers + between 491 [sample data] and 839 [expanded data] employees, and active 65 OFT fishers + between 312 [sample data] and 475 [expanded] employees. 491+312=803 and 839+475=1,314.

Table BE5: Employment of ocean trawl fishers by regions (Source: ABS)

Zone	Home District	P'code Pop'n	P'code Fishers	P'code OPT Fishers	P'code OFT Fishers	SEIFA	Unemployed (%) 2001*	Employed in C.F. (%) of labour force	Employed in OPT & OFT as % of labour force
1	TWEED	41,938	63	13	0	922.2	12.2	0.37	0.08
	RICHMOND	28,558	87	38	1	930.2	12.2	0.85	0.46
2	CLARENCE	43,353	259	121	6	919.2	13.6	3.12	1.53
3	COFFS HARBOUR	55,625	110	32	10	939.8	17.5	0.67	0.10
	HASTINGS	61,291	90	19	3	936.4	14.4	0.68	0.15
4	MANNING	37,878	80	10	4	914.1	11.5	0.67	0.10
	WALLIS LAKE	22,704	105	11	6	939.0	11.7	2.78	0.17
	PORT STEPHENS	52,562	101	26	0	966.6	10.4	1.33	0.17
	HUNTER	52,557	55	22	4	933.2	10.3	0.18	0.06
	CENTRAL COAST	206,143	102	4	2	976.8	6.5	0.00	0.00
5	HAWKESBURY	2,380	30	0	0	1004.5	6.1	0.00	0.00
	SYDNEY	3,276,207	189	26	24	1047.0	6.1	0.00	0.00
6	ILLAWARRA	65,532	50	5	4	934.7	8.3	0.13	0.01
	SHOALHAVEN	53,871	75	9	6	945.1	10.9	0.81	0.04
7	BATEMANS BAY	34,836	105	42	34	957.6	12.6	1.18	0.18
	MONTAGUE	8,135	53	9	8	955.1	13.0	1.54	0.23
	FAR SOUTH COAST	3,726	61	12	24	916.2	9.3	2.56	1.01
Total		4,047,296	1,615	399	136	945.3	11.1	0.92	0.27

2. Sources of fishers' incomes

All fishers were asked regarding the percentage of their income from fishing as compared to non-fishing. Income from directorships and general investments was also identified as reported in Tables BE6a and BE6b.

Table BE6a: The percentage of income from fishing and non-fishing sources in which OPT fishers participated in the last 12 months (Source: RM-SS).

No. of fishers (n=180)	Source of income (%)			
	OPT fishing	**Fishing related work**	**General Investments**	**Other Industries**
6	<10	48	17	36
-	10-19	-	-	-
3	20-29	53	3	23
-	30-39	-	-	-
-	40-49	-	-	-
4	50-59	25	3	23
-	60-69	-	-	-
6	70-79	1	8	18
6	80-89	8	-	13
155	**90-100**	0	0	0

The social survey results indicate that OPT fisher highly dependent on fishing. In the Ocean Prawn Trawl fishery, 155 (86%) of 180 fishers who responded to this question have 90-100% income from fishing. Part-time fishing involvement is limited, with 9 (5%) from 180 persons having less than 30% of income from OPT fishing and up to 30% of income from another industries.

Table BE6b: The percentage of income from fishing and non-fishing sources in which OFT fishers participated in the last 12 months (Source: RM-SS).

No. of fishers (n=65)	Source of income (%)			
	OFT fishing	**Fishing related work**	**General Investments**	**Other Industries**
3	<10	32	33	35
-	10-19	-	-	-
1	20-29	80	-	-
-	30-39	-	-	-
1	40-49	47	5	-
1	50-59	-	10	40
-	60-69	-	-	-
2	70-79	-	13	13
3	80-89	8	10	-
54	**90-100**	-	0	0

The OFT fishers also highly dependent on the OFT fishery as 54 (83%) of 65 fishers who responded to this question have 90-100% income from OFT fishing and another 5 with 70 - 80% income from OFT fishing. Part-time fishing involvement is limited in this fishery.

3. Seasonality of employment

There was no previous data on seasonal employment prior to this study. Employment opportunities for fishers in other industries have been investigated through the social survey (RM-SS). The seasonality of part-time work in other industries was investigated in the social survey by asking “in what months did you undertake paid employment outside the fishing industry”? Figures BE2a and BE2b report monthly frequencies and annual frequencies for those who worked all year.

The comparison of the survey responses and the NSW Fisheries catch and effort database indicates that OPT fishers are working in other industries from February to November (see Social section for further analysis of non-fishery employment). The OFT fishers are working in other industries from January to June and October to December and (Figure BE2b). Approximately 40% of the ocean trawl fishers work all year round.

Figure BE2a: Percentage fishers with employment outside fishing, (including all year round) in the OPT fishery (Source: RM-SS).

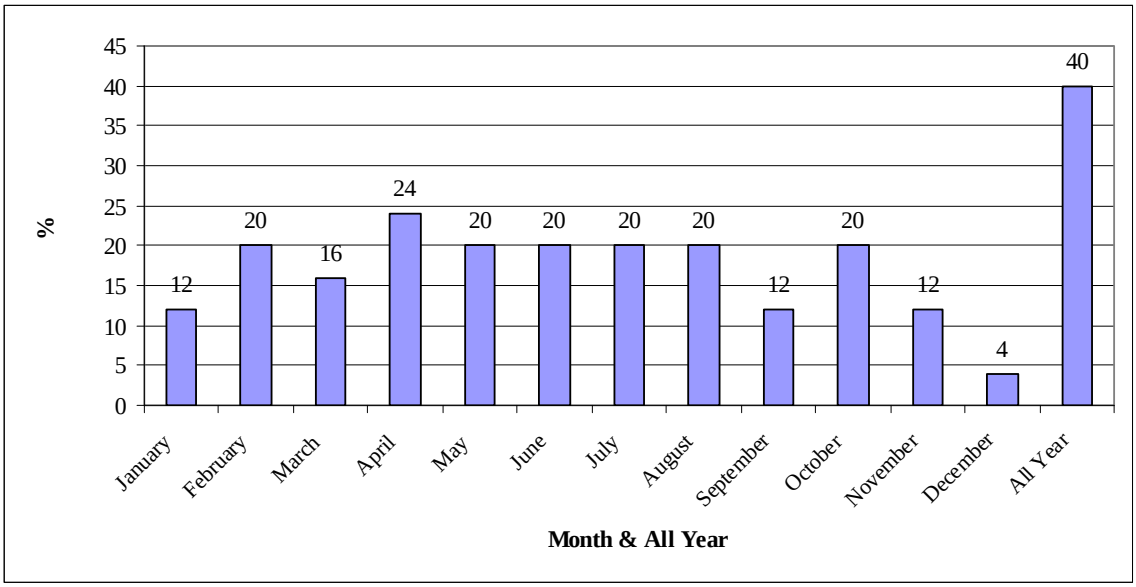
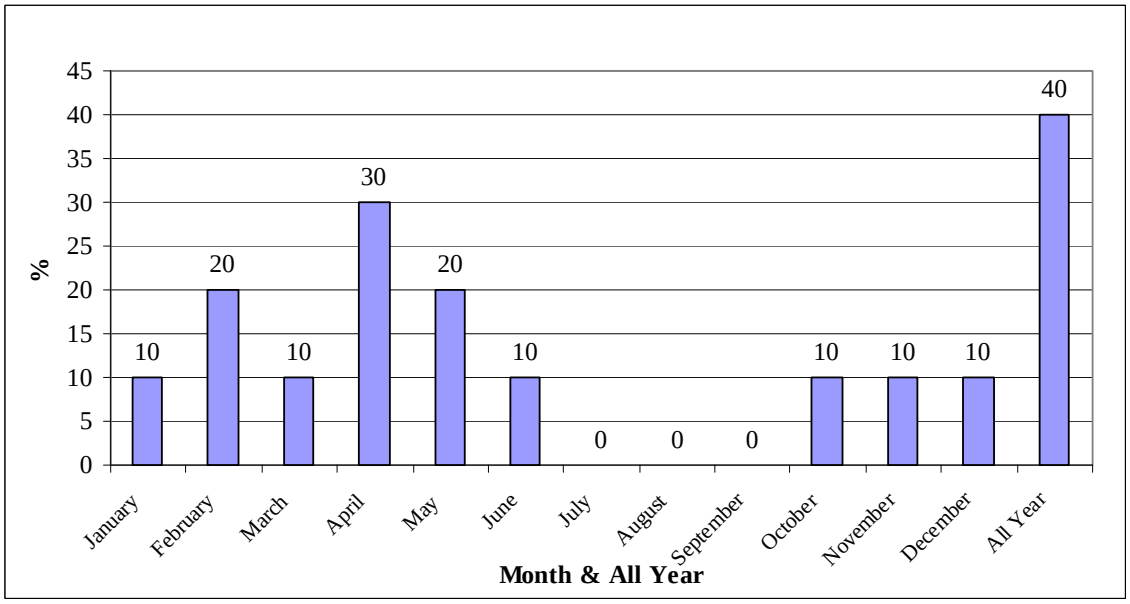


Figure BE2b: Percentage of fishers with employment outside fishing, (including all year round) in the OFT fishery (Source: RM-SS).



4. Demographics of ocean trawl fishers

The social survey enable us to prepare a demographics of ocean trawl fishers (Table BE7).

Table BE7: The demographics of ocean trawl fishers (Source: RM -SS and NSWF licence data).

State-wide Profile	All NSW	OPT	OFT	State-wide Profile	All NSW	OPT	OFT
Mean age of fisher (years)	54.1	45.1	45.4	**Partner employed in Fishing Business**	32%	47%	55%
Age range	16-88	17-83	22-79	**Mean number of Children <16 years**	0.92	1.08	1.32
Percent males	97%	95%	92%	**(Other) Dependants**			
Mean years resident in town	20.3	19.4	22.3	None	63%	61%	62%
Mean years in Fishing Industry	22.1	**14.8**	**6.5**	Spouse	23%	21%	16%
Generations in Fishing Industry	1.5	1.6	2.3	Children Over 16 yrs and Others	14%	18%	22%
Mean Hours /week in fishing industry	70.2	63.5	64.1	**Employed Status**			
Percent currently employed in other industries	19%	13%	14%	An Owner/ Operator	87%	80%	78%
Housing Tenure				A Non-Fishing Owner	3%	4%	10%
Own	49%	52%	56%	An Employee Skipper	4%	12%	11%
Paying off	32%	32%	34%	A Nominated Fisher	4%	2%	1%
Renting	16%	13%	8%	Other	1%	2%	0%
Other	3%	3%	2%	**Employees (%)**			
Education				0	65%	27%	15%
Did Not Finish Primary School	2%	3%	4%	1 or more	35%	73%	85%
Finished Primary School	4%	3%	3%	**Mean Individual net taxable income ($)**	50,713	48,336	65,669
Year 7/ 1st Form	4%	4%	8%	**Mean Household net taxable income**	58,710	71,933	71,096
Year 8/ 2nd Form	10%	8%	7%	<$6,000	2%	3%	1%
Year 9/ 3rd Form	17%	13%	23%	$6,000 - $9,999	1%	1%	1%
Year 10/ 4th Form	32%	41%	33%	$10,000 - $19,999	4%	3%	1%
Year 11/ 5th Form	4%	5%	3%	$20,000 - $29,999	12%	9%	7%
Year 12/ 6th Form	11%	11%	7%	$30,000 - $39,999	12%	10%	10%
Trade Or TAFE Certificate(s)	10%	8%	8%	$40,000 - $49,999	7%	7%	7%
Industry Or Business Course(s)	2%	2%	3%	$50,000 - $59,000	5%	5%	7%
University Degree/ Tertiary Education	3%	2%	0%	$60,000 - $69,999	5%	5%	4%
Other	1%	1%	1%	$70,000 - $79,999	3%	5%	3%
Marital Status				$80,000 - $89,999	3%	4%	7%
Married or relationship	80%	82%	89%	$90,000 - $99,999	1%	0%	0%
Single	11%	**11%**	**3%**	$100,000 +	5%	9%	11%
Other (Divorced, separated, widowed)	8%	6%	8%	Can't say	31%	30%	34%
				Refused	9%	9%	7%

PNSW Guideline (d) **Outline the economic return from the fishery including its contribution to individual, regional and state income; and the value of licences currently held by individual fishers in the fisheries.**

1. The contribution of ocean trawl fishery to NSW state economy

The details about the total catch and total value of catch associated with the ocean trawl fishery in the 1997/98-2001/02 period are presented in figures BE3a and BE3b. In the OPT fishery, the total catch in the 1997/98-2001/02 period was between 2,226 and 3,607 tonnes and had an estimated value at first sale of $20.9-$33.0 million as reported in Table BE8. The OPT fishery had an annual average revenue of $24.6m in the 1997/98-2001/02 period and was approximately 36% by revenue of the total annual fishery production in NSW.

In the OFT fishery, the total catch in the same period was between 1,964 and 1,017 tonnes and had an estimated value at first sale of $3.1-$5.2 million. The OFT fishery had an annual average revenue of $4m and approximately 6% of the total NSW revenue.

These estimates are for financial years and not included the revenue from the Abalone fishery as the data available only for calendar years[4]. Given the first sale revenue estimates are from the Sydney index, they should be treated as a minimum estimate.

Table BE8: The total revenue of fisheries production in different fisheries in NSW (excluding Abalone) in the years 1997/98-2001/02 (millions $ nominal)

Year	EG	EPT	OH	OPT	OFT	OTL	RL	Total
1997/98	19.0	2.6	7.2	20.9	5.2	11.2	4.2	70.3
1998/99	18.0	3.2	4.1	23.4	4.1	9.6	3.8	66.2
1999/00	17.2	3.8	4.4	22.4	3.9	9.8	4.5	66.0
2000/01	17.7	4.2	5.9	33.0	3.9	9.9	N/A	74.6
2001/02	15.0	1.7	8.5	23.5	3.1	8.3	4.4	64.5
Average	**17.4**	**3.1**	**6.0**	**24.6**	**4.0**	**9.8**	**4.2**	**69.2**
%	**25%**	**4%**	**9%**	**36%**	**6%**	**14%**	**6%**	**100%**

Source: NSWF- Sydney index. Key: EG Estuary General; EPT Estuary Prawn Trawl; OH Ocean Haul; OPT Ocean Prawn Trawl; OFT Ocean Fish Trawl; OTL Ocean Trap and Line and RL Rock Lobster. N/A Not Available.

[4] The abalone fishery in 2002 financial year had estimated annual total revenue of $12.5m and was approximately 15% of the total annual fishery production in NSW of $81.7m.

Figure BE3a: Total catch (Kg) and total value ($, nominal) of catch associated with the ocean prawn trawl fishery in the 1997/98-2001/02 period (Source: NSWF-Sydney Index).

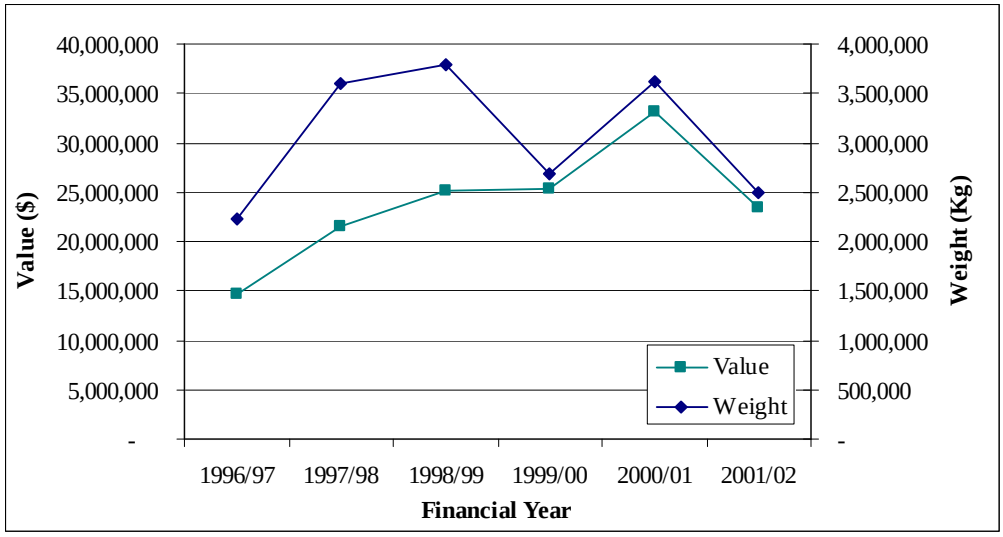
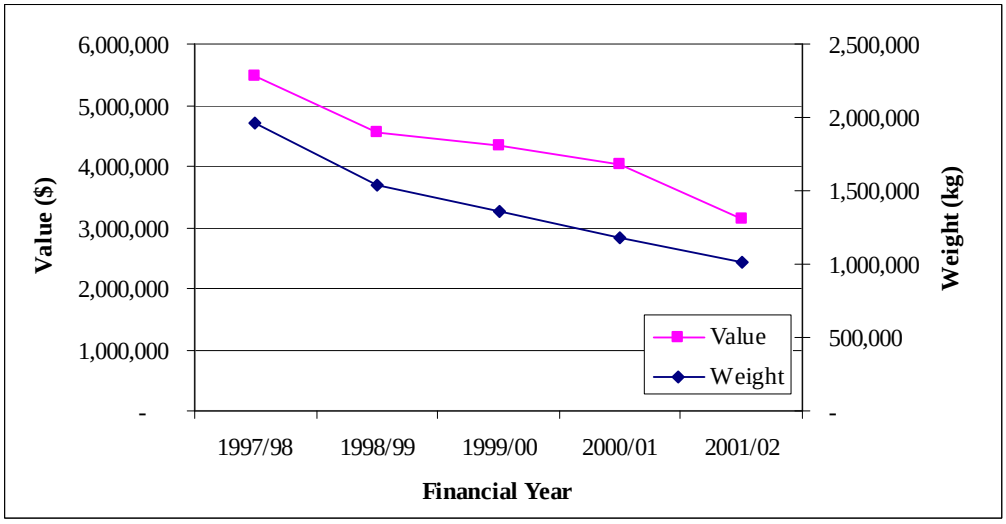


Figure BE3b: Total catch (kg) and total value ($, nominal) of catch associated with the ocean fish trawl fishery in the 1997/98-2001/02 period (Source: NSWF-Sydney Index).



2. The contribution of ocean trawl fishery to regional incomes in NSW

The NSW fishery revenue for different regions and districts along the NSW coast is reported in Table BE9. Due to the mixed endorsement holdings of ocean trawl fishers across several fisheries, the revenue associated with catches across several fisheries made by fishers and fishing businesses holding OPT endorsements is greater than $23.5m per annum and was $25.3m in 2001-2002 (see Table BE10a). The OPT fishers operate regionally within this State-wide picture of fishery interaction.

The state wide fishery relationships reported in Table BE9 reveal that the Clarence district has 21% of state wide fishing revenue, reflecting the OPT, EG and EPT fisheries in that region. The final column of Table BE9 illustrates the regional dependence on the ocean trawl

fishery. The OPT fishery is based in the northern zones of the state and the OFT fishery is based in the central and southern zones of the state. The districts north of Sydney have approximately 80% of the revenue from state wide fish production.

The regional fishery revenue associated with OPT and OFT endorsed fishing businesses is reported in Table BE10a and BE10b for 2001-2002 across all fisheries giving the total catch in each district as a percentage of the total of $23.5m (OPT) and 3.1m (OFT). In Table BE10a the OPT revenues indicate the OPT catch as a percentage of total catch in a district for the year 2001-2002.

Table BE9: State- wide fishery revenue ($) in different districts of NSW in 2001-2002 ($'000, Source: NSWF- Sydney Index).

DISTRICT	EG	EPT	OH	OPT	OFT	OTL	TOTAL	OPT+ OFT as %
TWEED	900,949	438	576,367	2,344,637	-	387,299	4,209,690	7%
RICHMOND	1,007,363	-	-	3,341,739	-	907,436	5,256,538	9%
CLARENCE	2,355,254	882,819	370,649	9,025,670	-	187,256	12,821,649	21%
COFFS HARBOUR	408,534	-	246,167	2,761,949	-	1,118,041	4,534,691	8%
HASTINGS	1,223,598	11,127	388,535	2,043,619	13,936	261,298	3,942,114	7%
MANNING	869,773	-	492,739	446,096	917	509,840	2,319,366	4%
WALLIS LAKE	2,320,590	10,071	720,373	589,809	1,781	350,305	3,992,930	7%
PORT STEPHENS	635,945	7,804	263,353	844,338	812,998	184,804	2,749,242	5%
HUNTER	1,176,752	195,268	105,178	825,905	1,092,836	286,444	3,682,383	6%
CENTRAL COAST	954,193	67,976	94,519	-	-	721,322	1,838,009	3%
HAWKESBURY	165,114	274,894	-	-	-		440,008	1%
SYDNEY NORTH	413,546	133,614	1,192	599,900	742,429	186,906	2,077,586	3%
SYDNEY SOUTH	311,096	30,182	35,547	34,306		290,993	702,124	1%
ILLAWARRA	832,267	645	1,020,215	-	-	600,185	2,453,313	4%
SHOALHAVEN	741,928	33,678	47,797	189,233	-	963,499	1,976,134	3%
BATEMANS BAY	253,601	2,242	153,385	43,226	301,647	390,939	1,145,038	2%
MONTAGUE	286,980	-	369,194	156,505	41,231	694,518	1,548,428	3%
FAR SOUTH COAST	214,748	-	3,585,295	234,951	139,357	289,764	4,464,116	7%
TOTAL	**15,075,243**	**1,650,757**	**8,470,506**	**23,515,464**	**3,147,132**	**8,334,141**	**60,193,241**	**100%**

Table BE10a: Fisher revenue for OPT fishers in the OPT and other fisheries in different districts of NSW in 2001-2002 ($ '000, Source: NSWF- Sydney Index).

ZONE	DISTRICT	EG	EPT	OH	OPT	OFT	OTL	TOTAL	OPT % of District
1	TWEED	-	-	-	**2,344,637**	-	318	2,344,955	100%
1	RICHMOND	-	-	-	**3,341,739**	-	38,370	3,380,109	99%
2	CLARENCE	4,657	1,854	-	**9,025,670**	-	5,820	9,038,002	100%
3	COFFS HARBOUR	-	-	-	**2,761,949**	-	454	2,762,403	100%
3	HASTINGS	-	-	-	**2,043,619**	13,936	28,657	2,086,212	98%
4	MANNING	-	-	-	**446,096**	917	-	447,013	100%
4	WALLIS LAKE	-	9,589	-	**589,809**	1,781	-	601,179	98%
4	PORT STEPHENS	-	4,796	29,141	**844,338**	473,090	12,950	1,364,314	62%
4	HUNTER	-	12,351	-	**859,486**	448,646	-	1,320,483	65%
5	SYDNEY NORTH	-	-	-	**599,900**	559,176	10,041	1,169,117	51%
5	SOUTH OF SYDNEY	2,131	-	-	**658,221**	154,020	18,722	833,093	79%
	TOTAL	**6,788**	**28,590**	**29,141**	**23,515,464**	**1,651,566**	**115,331**	**25,346,880**	**93%**

Table BE10b: Fisher revenue for OFT fishers in the OFT and other fisheries in different districts of NSW in 2001-2002 ($ '000, Source: NSWF- Sydney Index).

ZONE	DISTRICT	EG	EPT	OH	OPT	OFT	OTL	TOTAL	OFT % of District
3	HASTINGS	-	-	-	7,345	**13,936**	-	21,282	65%
4	MANNING	-	-	-	100,061	**917**	-	100,978	1%
4	WALLIS LAKE	-	-	-	71,327	**1,781**	-	73,108	2%
4	HUNTER	-	-	-	281,368	**1,092,836**	-	1,374,204	80%
4	PORT STEPHENS	-	-	-	576,362	**812,998**	3,351	1,392,711	58%
5	SYDNEY NORTH	-	-	-	514,805	**742,429**	10,041	1,267,274	59%
7	BATEMANS BAY	-	-	-	5,469	**301,647**	4,495	311,610	97%
7	MONTAGUE	4,249	-	44,512	-	**41,231**	1,006	90,998	45%
7	FAR SOUTH COAST	-	-	-	63,019	**139,357**	-	202,377	69%
	TOTAL	**4,249**	-	**44,512**	**1,619,757**	**3,147,132**	**18,892**	**4,834,542**	**65%**

The revenue of OPT fishers in districts such as Tweed, Richmond, Clarence, Coffs Harbour and Hastings is approximately 80% of total revenue of the OPT fishery. In the OFT fishery, approximately 80% of the OFT revenue comes from districts Hunter, Port Stephens and Sydney North.

The revenue from the OPT and OFT fisheries as a share of total fishing catch revenue is reported in Table BE9. The regional dependence on ocean trawl fishing by district was reported in Tables BE10a and BE10b for the different zones in both fisheries. In Table BE10a regions, in which OPT revenue is greater than 50% of total district revenue of OPT in most districts. However, approximately 80% of the total OPT revenue comes from districts such as Tweed, Richmond, Clarence, Coffs Harbour and Hastings. In the OFT fishery, districts such as Hastings, Hunter, Port Stephens, Sydney North, Batemans Bay, Montague and Far South Coast have more than 45% of total district revenue, but approximately 80% of the total revenue of OFT comes from districts Hunter, Port Stephens and Sydney North (Table BE10b).

The OPT fishers in districts such as Tweed, Richmond, Clarence, Coffs Harbour and Hastings are relatively most dependent on the ocean prawn trawl fishery. The OFT fishers in Port Stephens, Hunter, and Sydney North districts are relatively most dependent on the ocean fish trawl fishery.

3. The contribution of ocean trawl fishery to fishers' individual incomes

The Ocean Trawl fishery has commercially licensed fishers operating in coastal NSW. The list of administrative zones is reported in the Ocean Trawl Fishery Management Strategy. Fishing effort records are available through the NSW Fisheries logbook system. Those records before 1997 are less precise than recent logbook records. There were 311 OPT and 99 OFT endorsements in the ocean trawl fishery in 2001/02. Of these approximately 252 (61.5%) have reported fished in the ocean trawl fishery and other fisheries in which they hold endorsements. Approximately two thirds of OPT businesses were in the north of the state (regions 1-4) and one third in the south (regions 5-7). The majority of OFT businesses with OFT endorsements are in the southern region of the state.

Income from all sources

Fisher income data is available from the social survey. In the ocean prawn trawl fishery, the distribution of income question revealed a mean household income of circa $63,941. In case of ocean fish trawl fishery a mean household income of circa $63,047. A significant number of incomes of $100,000 or over were recorded both in OPT (59%) and OFT (57%), but as these figures represent personal income from all industries, they may also reflect financial diversification and business interests outside the Ocean Trawl fishery.

Income from ocean trawl fishing

Figures BE4a&b display information related to cumulative revenue and numbers of fishers in the OPT and OFT fisheries. In businesses with an OPT endorsement it should be noted that:

- the top 50% of fishers take 87% of the fishery revenue;
- the top 10% take 32% of fishery revenue;
- the top 20% take 52% of fishery revenue;
- the top 30% take 68% of fishery revenue; and
- the bottom 50% take 13% of revenue indicating part time fishers.

In businesses with an OFT endorsement it should be noted that:

- the top 50% of fishers take 93% of the fishery revenue;
- the top 10% take 43% of fishery revenue;
- the top 20% take 67% of fishery revenue;
- the top 30% take 80% of fishery revenue; and
- the bottom 50% take 7% of revenue indicating part time fishers

Figure BE4a: The cumulative revenue and cumulative number of endorsed fishers in the OPT fishery in 2001-2002 (Source: NSWF-Sydney Index).

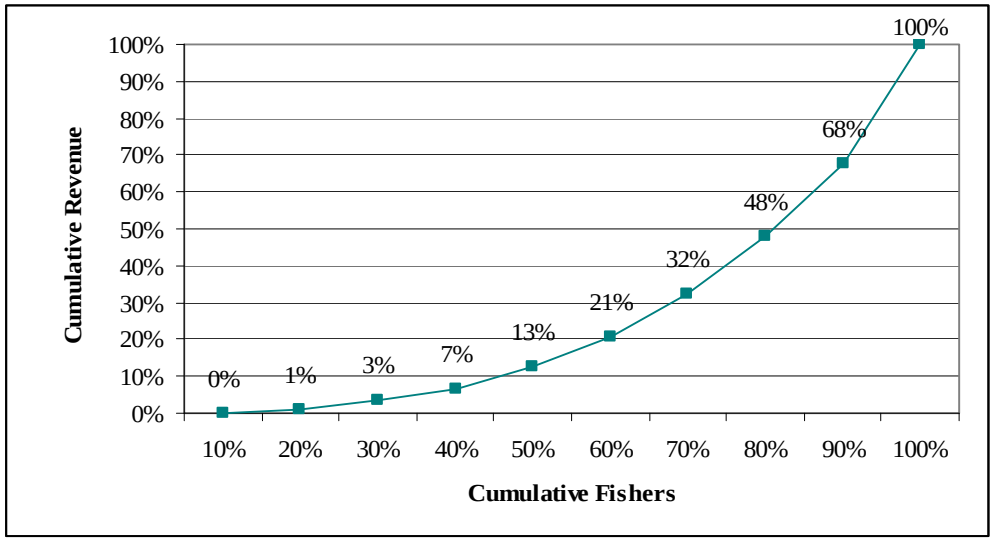
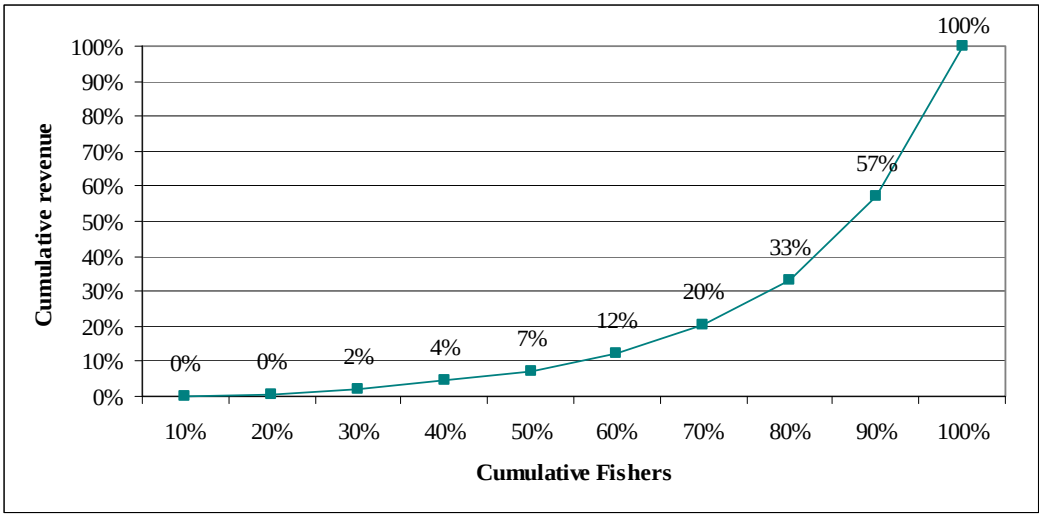


Figure BE4b: The cumulative revenue and cumulative number of endorsed fishers in the OFT fishery in 2001-2002 (Source: NSWF-Sydney Index).



Economic performance of fishers

There is no previous information on economic performance of fishers in the OPT fishery. The only previous economic survey work covering some OPT fishers was by IPART (1998). The IPART study did a brief review of a cross section of fishing businesses in NSW, in order to establish their capacity to pay management charges. A fishing industry economic survey (RM-ES) was conducted in order to appraise fishing industry profitability and economic viability.

Fishing businesses and owner operators act as firms fishing among the portfolio of fishery choices available to them. An economic survey can measure the performance of the firm across all its fishing activities and give a profile of firms in the fishing industry. When we come to assess the economic performance of firms in a given fishery, we need to examine the scope of production of the firms – i.e. which combinations of fisheries does it access? We can use *pro rata* methods to attribute an economic performance of firms in each fishery. This could potentially give a rate of return for the firms in a particular fishery, but the estimate would be somewhat arbitrary, depending on the allocation of capital costs between fishing activities.

Most OPT endorsement holders also hold endorsements to fish in Fish Trawl and Ocean Trap and Line, Estuary General and Estuary Prawn Trawl fisheries. Most OFT fishers also have endorsements in OPT and OTL fisheries. In examining the economic performance of these fisheries, there are many businesses also fishing in other endorsed fisheries. The attraction of the OPT fishery relative to fishing the OFT was estimated through the economic survey.

The economic survey indicates that 41% (20 of 49) of OPT business respondents are earning an economic surplus, meeting opportunity costs and economic depreciation assumed for long-term viability. These operators are contributing to the local, state and national economy in terms of economic profit contributing to Gross Domestic Product (GDP). Other evidence of perceived economic surplus may include the entry of new fishers, which has happened in recent years (see fishers and licence duration in social section). This may also be

as much a social phenomenon, due to children and relatives of fishers entering the fishery, rather than an indicator of long term fishing prosperity.

The remaining 59% of operators are under the long-term viability measure, not contributing profit to GDP, but will contribute to economic activity through their purchases of inputs and factors of production (e.g. labour and capital) and thus to GDP through the profits and labour payments of firms from whom they purchase inputs. Workers employed by unprofitable fishing firms also contribute to economic activity through their consumer purchases.

The mean net economic return across businesses with OPT and OFT fishing endorsements was 2% to capital and the median net return was -7%, indicating 50% of operators falling below this level in the single year of operation examined. OPT only businesses had a gross operating profit of 2% and OPT/OFT businesses had a gross operating profit of 10% OPT and other businesses had a gross operating profit of -24% The results indicate significant long run economic viability issues for those OPT fishers more involved with other fisheries, other than OFT.

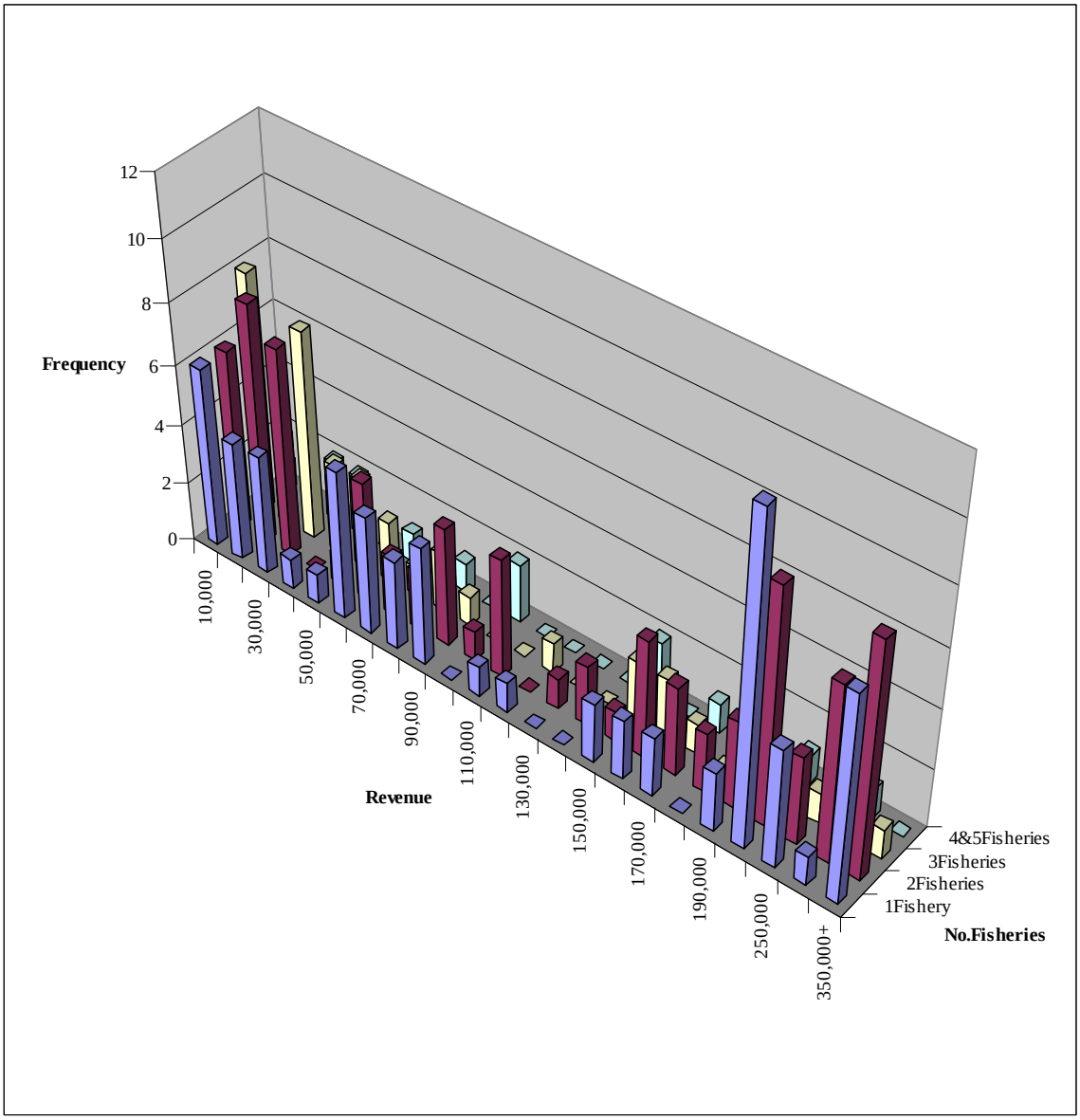
The profitability is less than optimal due to the excessive number of boats and the impacts of excessive effort levels on future catch prospects. The excessive number of producers may also constitute a "crowding" problem and interactions between OT fisher and with other fishers may reduce profitability.

Economic net returns within the social and socio-economic context of rural NSW requires further study, incorporating the contribution to household income from work in other sectors and family income, including welfare and social security payments. This should be part of future research work.

Distribution of income among fishers

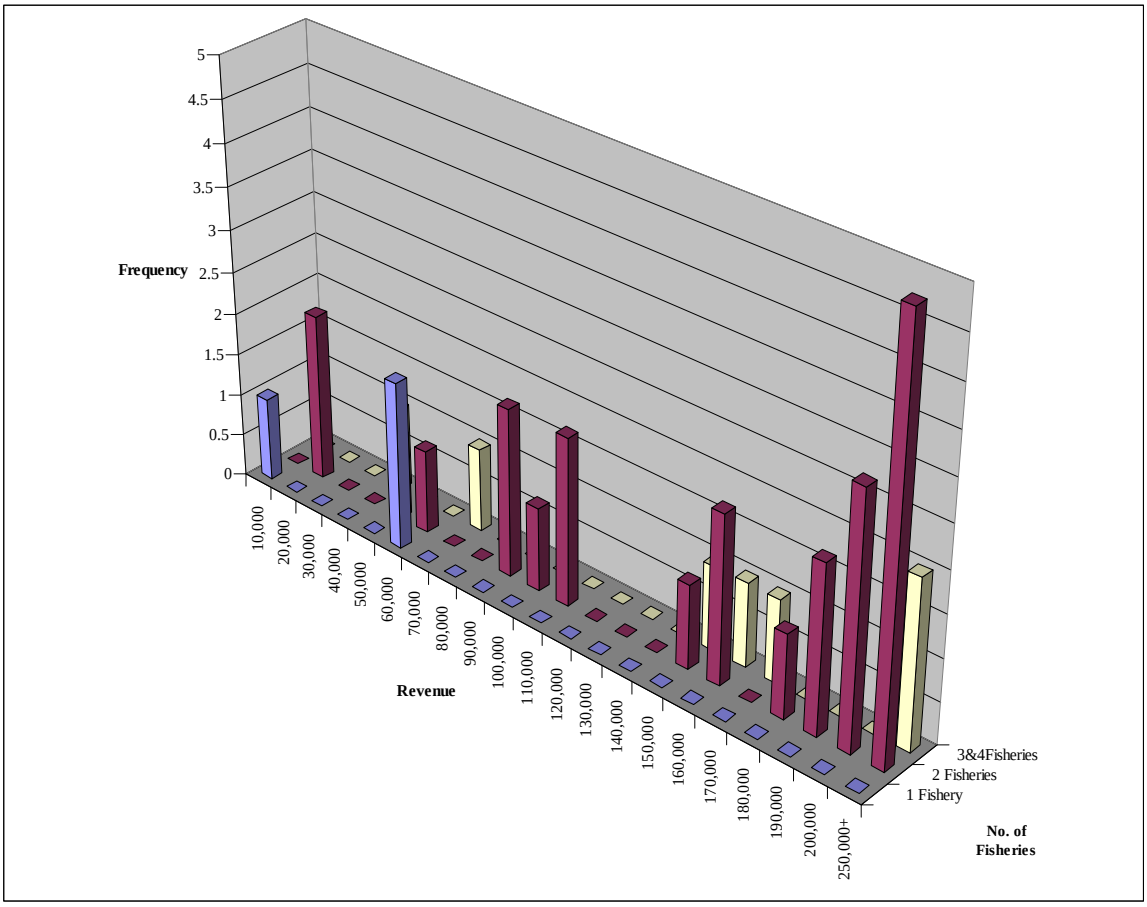
The distribution of income is available through several measures. Firstly, revenues associated with each Ocean Trawl endorsed catch combination are reported in Tables BE5a&b. The OPT only fishers have below average revenue in comparison to other fishing combinations, as seen in the average revenue results (Appendix tables 1-3). The distribution of annual revenue varies widely by fishing category, as reported by the coefficient of variation. Gross returns by OPT and OFT endorsed fishing businesses are plotted for the single and multiple fishing businesses in Figures BE5a&b.

Figure BE5a: Frequency distribution of annual fishing revenue for OPT fishers in 2001-2002 fishing OPT only, 2, 3 or 4 fisheries (Source: NSWF-Sydney Index).



Figures BE5a&b confirm the diversity in revenue among fishers, where a total of 8 OPT only and 1 OFT only fishers have fishing revenue below $20,000 per annum, probably being part time fishers. Tables BE5a&b and Figures BE4a&b indicate the variation in estimated fishing revenue.

Figure BE5b: Frequency distribution of annual fishing revenue for OFT fishers in 2001-2002, fishing OPT only, 2, 3 or 4 fisheries (Source: NSWF-Sydney Index).



The ocean trawl fishers hold multiple endorsements. Tables BE11a&b BE12a&b and BE13a&b report the level of dependence of multiple endorsement holders on the OPT and OFT fisheries. OPT dependence generally reduces with increasing numbers of fishery endorsements. In the ocean trawl fishery, major catch inter-dependencies are with the Ocean Fish Trawl and Ocean Trap and Line fisheries. Comparison of percentages enables inferences to be made on the relative gross revenue in each fishery according to the Sydney price index.

Table BE11a: The distribution of average annual revenue for OPT fishers fished both in OPT and other fisheries in 2001-2002 (Source: NSWF-Sydney Index).

No. of Active fisheries	No. of Fishers	Total Revenue ($)	Average Revenue ($)	standard deviation	Coefficient of variation
1	67	9,945,882	148,446	120,912	0.8
2	72	12,109,447	168,187	152,418	0.9
3	20	2,399,974	119,999	118,149	1.0
4	8	1,325,178	160,719	90,943	0.6
Total	**167**	**25,780,481**	**154,374**	**133,760**	**0.9**

Table BE11b: The distribution of average annual revenue for 35 active OFT fishers fishing within the OPT fishery in 2001-2002 (Source: NSWF-Sydney Index).

No. of Active fisheries	No. of Fishers	Total Revenue ($)	Average Revenue ($)	standard deviation	Coefficient of variation
1	3	145,938	48,646	34,854	0.7
2	24	3,949,474	90,415	96,290	1.1
3	8	1,253,095	98,750	108,786	1.1
Total	**35**	**5,348,507**	**88,740**	**99,189**	**1.1**

Table BE12a: The distribution of total revenue for OPT endorsed fishers and other fishery endorsements (2001-2002) (Source: NSWF-Sydney Index).

No. of active fisheries	No. of fishers	%	OPT Catch ($)	%	Total Catch ($)	%	% OPT
Endorsed - no catch	104	33%	-		0	0%	0%
Endorsed - other catch	40	13%	-		2,639,634	9%	0%
1	67	22%	9,945,882	43%	9,945,882	35%	100%
2	72	23%	10,357,793	44%	12,109,447	43%	86%
3	20	6%	1,955,853	8%	2,399,974	8%	81%
4	8	3%	1,107,539	5%	1,325,178	5%	84%
Total	**311**	**100%**	**23,367,067**	**100%**	**28,420,115**	**100%**	**82%**

Table BE12b: The distribution of total returns for OFT endorsed fishers and other fishery endorsements (2001-2002) (Source: NSWF-Sydney Index).

No. of active fisheries	No. Fishers	%	OFT Catch ($)	%	Total Catch ($)	%	% OFT
Endorsed - no catch	54	55%	0		0	0%	0%
Endorsed - other catch	10	10%	0		2,849,943	35%	0%
1	3	3%	145,938	5%	145,938	2%	100%
2	24	24%	2,169,963	70%	3,949,474	48%	55%
3	8	8%	789,999	25%	1,253,095	15%	63%
Total	**99**	**100%**	**3,105,900**	**100%**	**8,198,450**	**100%**	**38%**

Table BE13a: The catch combinations in the OPT fishery by OPT endorsed fishers with other fishery endorsements 2001-2002 and inferred dependence (Source: NSWF-Sydney Index).

Catch combination	No. of Fishers	%	OPT Revenue ($)	%	Total Revenue ($)	%	% OPT
OPT only	67	22%	9,945,882	43%	9,945,882	35%	100%
OPT+OFT+others	58	19%	2,170,794	9%	4,302,698	15%	50%
OPT+OTL+Others	31	10%	2,770,369	12%	2,874,256	10%	96%
EG+EPT+Others	16	5%	77,032	0%	948,598	3%	8%
Other OPT+OTL+OFT+ EPT+RL+Others	35	11%	8,386,116	36%	10,348,681	36%	81%
Endorsed - no catch	104	33%	-	0%	-	0%	0%
Total	**311**	100%	**23,350,193**	**100%**	**28,420,115**	**100%**	**82%**

Table BE13b: The catch combinations in the OFT fishery by OFT endorsed fishers with other fishery endorsements 2001-2002 and inferred dependence (Source: NSWF-Sydney Index).

Catch Combination	No. of Fishers	%	OFT Revenue ($)	%	Total Revenue ($)	%	% OFT
OFT Only	8	8%	998,364	32%	998,364	12%	100%
OFT + OPT	23	23%	1,976,286	64%	3,895,522	48%	51%
OFT+OPT+OTL+OH+RL	4	4%	131,250	4%	454,621	6%	29%
Endorsed - no catch	54	55%	-	0%	-	0%	0%
Endorsed - other catch	10	10%	-	0%	2,849,944	35%	0%
Total	**99**	**100%**	**3,105,900**	**100%**	**8,198,451**	**100%**	**38%**

Switching behaviour

Fishers were asked to apportion effort in each endorsed fishery expressing it as a percentage of total annual effort. Similarly revenue was expressed as a percentage of total revenue in each fishery. The ratio of percentages (i.e. R (OPT) = % revenue in OPT / % effort in OPT) is an index of the revenue of effort from that fishery. Then we can compare R(OPT)/R(OFT) as a new relative ratio.

Of the 49 OPT fishers surveyed, 30 are in the OPT fishery and 19 switch to the OFT on occasions. Of these 19 fishers, 7 fishers appear to gain higher daily revenue in OPT and 6 have higher daily revenue from their days in OFT. The remaining 6 have equal daily revenues in switching between the OPT and OFT fisheries.

A cost-benefit schedule of the ocean trawl fishery

The fishery has not been subjected to a gross cost-benefit analysis. Environmental accounting under the principles of Ecologically Sustainable Development (ESD) requires that all inputs are priced at their true cost. In the fisheries case, this would include the operational costs, costs of management and ancillary services, and the costs incurred in any depletion of the fish stock (ABARE, 2000; p16).

The economics of fisheries management enables an appraisal to be made of the economic contribution of the fishery to the economy and to analyse the impact of the changes advocated in the FMS. ESD principles dictate that resources should be valued at their market

values and those subsidies should be taken into account in the form of an environmental accounting statement.

The NSWF costs of management, research and compliance, (less any of these cost recovered from industry), should be added to the costs of fishing operations to give a full economic cost. The rise or fall in the value of the fish stocks should also be included in an economic account as illustrated in Box 1 below:

Box 1: An economic account for the ocean trawl fishery (2003-04)

	($million)
Gross revenue from catch*	27.40
Less:	
Economic cost of operations**	26.27
Operational Economic surplus	**1.13**
Less:	
Cost subsidies***	0.48
Total economic contribution	0.65
Plus rise or fall in fish stocks****	0.00
Total of environmental account	**0.65**

* This is the estimated value of catch from all fishing businesses in the ocean trawl fishery based on the 1999-2000 economic survey results.

** This is the estimated economic cost of fishing inferred from the 1999-2000 economic survey results for all fishing businesses. The total economic costs include opportunity costs, costs of licences and some costs of management. Total economic cost in 2003-04 is 3% per annum greater than 1999-2000 data

*** To the operational surplus (TR-TC), costs of management not attributed to fishers under current cost policy are added (e.g. management, research, compliance, etc). IPART estimate of this cost is $1.007m less fishers' payments already in economic costs $0.53m. This does not include Commonwealth fuel or other primary producer subsidies.

**** The changes in value of the stocks are unknown and are assumed to be zero.

The cost benefit schedule illustrates how the operational performance of the fishery, management charges and stock health can be related. The intention of the FMS is to move towards greater economic viability and full cost recovery by 2007/08.

4. The value of licences currently held by individual fishers in the fisheries

Detailed inference on licence trading is difficult due to the lack of discrete licence value information. Licences are sold as part of business packages and may include several endorsements and business assets. Where licence value estimates are available in a fishery they can reflect short run effects which are not necessarily associated with a healthy fishery, reflecting over-capacity or over-fishing (ABARE, 2000). Nonetheless, interpreted correctly, licence prices can be a useful indicator of the performance of the industry in generating net value or rent.

PNSW Guideline (e) **Existing economic multiplier effects, economic rents and community contributions.**

1. Economic rents and community contributions

Economic rent refers to the resource rent in a fishery. The resource rent is an economic surplus which is part of the difference between the Total Revenue of effort and the Total Cost of effort across the fishery. Resource rent is made up of different elements and is the surplus attributable to the marginal fisher's last unit of effort, times the units of effort applied to the fishery (Reid and Campbell, 1998). This reflects the value of access to the resource. The balance of total rent and resource rent are intra-marginal rents, attributable to the skills of fishers and reflect innovation and skills in a healthy industry.

The economic survey of the ocean trawl fishery indicated that 49% of fishing businesses had an economic surplus. This information is inadequate to estimate the amount of resource rent in the fishery, which requires a bio-economic study and an estimate of the revenue derived from effort less the total cost of effort across the whole fishery. When resource rent is measured as the surplus from the marginal fisher's last unit of effort applied, it is likely that given the diversity in operations in the fishery, the marginal fisher's effort would reveal no resource rent. It is also likely that the more efficient fishers are in operating surplus due to their superior skills and knowledge.

The contributions to the community can come in several forms. As previously discussed, revenue and employment are generated by those fishing and economic activity contributes to the community as will be discussed in the section on multiplier effects. However the long term contribution of the ocean fishery resources to society can only be realised through management of the fishing industry in order to produce resource rent. Underperformance of management leads to a loss of economic rent from the fishery and hence a loss for society.

If rent is generated by management, it can be retrieved through royalty (*ad valorem)* charges by management, or can be left with the fisher. This is a decision for government. Bio-economic modelling is needed to estimate the optimum level of fishing effort and to predict the maximum economic rent that may be realised in the fishery.

Currently under category 2 share management a nominal rental payment of $100 per shareholder per annum is made, irrespective of the level of economic performance in the fishery.

Some payments by fishers are transfers from fishers to government for management services provided and hence contribute to the community in paying for services which were formerly subsidised by the community. In November 2000, the Government announced that over the succeeding five years NSW Fisheries would develop and implement a fair and transparent cost recovery framework for category 2 share management fisheries. NSW Fisheries recoups costs that are attributable to industry through a cost recovery policy. The cost recovery policy applies to existing services traditionally provided by NSW Fisheries in administering and regulating commercial fishing.

In summary, the current management of the ocean trawl fishery yields less resource rent than could be obtained under a management regime with reduced effort levels. The

community looses potential contributions which could be made from resource rent by a profitable fishery through time.

2. Review of information on multipliers in the NSW fishing industry

Economic multipliers come from input-output modelling of economies and relate to the flow-on impacts of expenditure within a closed local economy and the revolving benefits of this. Similarly employment multipliers estimate the impacts on employment of expenditures in the locality.

There is no current information on the multipliers in the Ocean trawl fishery. In this section several historical fishing community studies appraising the multipliers and flow-on impacts in the NSW fishing industry are cited. These studies can be used as a guide to likely economic impacts of policies and with some careful interpretation are likely to be preferred to interpolations from non-fishing industry material. In particular note should be taken of changes in the structure and operations of the industry since the years in which the studies were undertaken (Dr R. Powell, pers. comm.).

The available literature enables discussion of multipliers in four fishing communities in NSW, Eden and Ulladulla (Powell et al., 1989), the Northern NSW region (Tamblyn and Powell, 1988) and the Clarence region (McVerry, 1996). Table BE14 presents multiplier estimates from the economic studies of fisheries in coastal regions of NSW.

The economic significance of an industry, such as commercial fishing, can be measured in terms of direct and indirect effects. The direct effects are a measure of the value of output of the industry itself, the number of people employed and the income they receive. The indirect effects can be divided into production induced and consumption induced effects. Production induced effects are the industry's purchase of goods and services from other industries. Consumption induced effects arise from the spending of household income received as payment for labour. The multipliers indicate the size of those impacts relative to the level of sales to final demand. The Type II ratios reflect the relationship between the total impact (direct and indirect) to the direct effect. In Table BE 14 Type II value of 1.91 infers that for every dollar of direct output, there is a total impact of $1.91 due to both direct ($1) and indirect ($0.91) effects. The consumption and production induced components of the $0.91, are $0.72 and $0.19 respectively.

A significant issue is whether the multipliers and/or estimated flow-on impacts include the downstream effects of transport, marketing and packing. The calculation of multipliers from fishing will only include the linkages effects that occur back through the supply of inputs to fishermen and not any effects downstream toward the consumer.

Output flow-on effects

From the initial output of one dollar there are total flow-on output effects ranging between 41.7 cents (non trawl Eden) and 91.0 cents (northern NSW). Those levels of flow-on effect are relatively modest. They refer to the level of the flow-on effects within the small local area. In most cases, this reflects the limited capacity of the local economy to supply inputs to the fishing activities as well as the relatively low level of purchased inputs used. Comments from each study are discussed below.

Discussion

A state-wide perspective the comparison of Eden and Ulladulla in 1978-88 with the Northern NSW 1984-85 and the Clarence in 1992-93 shows a contrast in the nature of the fisheries, time periods, regions and what is included in the analysis i.e. fishing only, or processing, handling, transport and less usually wholesale and retail.

The Eden and Ulladulla trawl fishing flow-ons reflect the structure of the trawl industry and the influence of the Orange Roughy catch in the late 1980s.

In the Northern NSW study based on 1984-85 data and covering the Tweed Heads to Tuncurry area, the activity in a range of fisheries, especially the prawn industry sector, is captured. The Clarence region study in 1992-93 focuses on the fishing activity and processing in the Clarence at that time.

Given our interest is in the flow-on effects associated with the Ocean Trawl fishery in the current year 2002 period, the use of historical information is limited but gives an indicator as to previous multiplier values. It is likely that either the Northern NSW and Clarence results will be a representative source of "typical" multiplier values for impact appraisal in the OPT fishery. The Northern NSW regional study covers the region in which the prawn industry is a major contributor. The two potential differences to take note of are the type of fishery included and what of the downstream activities are included – processing etc. (Dr R. Powell, pers. comm.).

Conclusion

The Northern NSW study indicates fishing as 82% of the total flow-on effect. Both the southern and northern studies indicate that the ratio of all effects, to direct fishing effects, is between 1.5 and 2.0, with one result of 2.4 (Tamblyn and Powell, 1988; Powell *et al.*, 1988). Local multiplier effects are likely to be relatively small at around 1.5 for most fishing activities. Even in that case, the larger part of the flow-ons will be consumption-induced effects. That reflects a relatively low level of use of purchased operating inputs apart from labour, while many of the specialist inputs used are not likely to be produced locally. The multiplier will be higher where there is a significant amount of on-shore activities associated with handling, marketing and transporting the catch. The more value adding undertaken within the local area, the higher the multiplier. That could result in multipliers near to 2.0 (Dr. R. Powell, pers. comm.).

Table BE14: Output, income and employment multiplier estimates from fishing community studies in NSW (Tamblyn and Powell, 1988; McVerry, 1996; and Powell *et al*., 1989).

OUTPUT (a)	Initial	Production induced	Consumption induced	Total	Type II ratio
Northern NSW (1)					
Fishing	1	0.1933	0.7166	1.91	1.91
Clarence (2)					
Fishing	1	0.091	0.787	1.877	1.877
Ulladulla (3)					
Trawl	1	0.2368	0.3269	1.5637	1.5637
Non trawl	1	0.2233	0.3409	1.5642	1.5642
Eden (3)					
Trawl	1	0.218	0.2206	1.4387	1.4387
Non trawl	1	0.2203	0.1977	1.4179	1.417
Process+	1	0.4256	0.1051	1.5307	1.5307
INCOME (b)	**Initial**	**Production induced**	**Consumption induced**	**Total**	**Type II ratio**
Northern NSW (1)					
Fishing	0.4999	0.0556	0.2691	0.8329	1.662
Clarence (2)					
Fishing	0.59	0.026	0.308	0.924	1.566
Ulladulla (3)					
Trawl	0.2999	0.069	0.1266	0.4955	1.6524
Non trawl	0.3156	0.0692	0.1321	0.5168	1.6378
Eden (3)					
Trawl	0.2999	0.0498	0.0802	0.4299	1.4337
Non trawl	0.2489	0.0644	0.0719	0.3852	1.5475
Process+	0.0621	0.1044	0.0382	0.2047	3.2982
EMPLOYMENT (b)	**Initial**	**Production induced**	**Consumption induced**	**Total**	**Type II ratio**
Northern NSW (1)					
Fishing	0.0376	0.004	0.0181	0.0596	1.5868
Clarence (2)					
Fishing	0.029	0.001	0.014	0.044	1.499
Ulladulla (3)					
Trawl	0.0184	0.0036	0.0062	0.0282	1.5363
Non trawl	0.0268	0.0032	0.0065	0.0365	1.3592
Eden (3)					
Trawl	0.0184	0.0023	0.0033	0.0239	1.3009
Non trawl	0.0147	0.0024	0.0029	0.02	1.3669
Process+	0.0034	0.0055	0.0016	0.0106	3.06

(a) per dollar of output
(b) employment / $'000 of output

Sources:
(1) Tamblyn & Powell, 1988
(2) McVerry, 1996.
(3) Powell et al. 1989

The Regional expenditure of fishers

Fisher expenditures can be divided into expenditure on employment, inputs for the fishing process and capital items for fishing. The previous section examined results of detailed regional expenditure studies, which give multipliers showing employment and production induced expenditure effects. Capital and input expenditures are investigated below. Little information exists on regional expenditure interactions. The regional nature of expenditures can also be seen by examining the larger scale purchases of the OPT endorsed businesses. In

the social survey 182 fishers were asked about the amount and location of their major purchase over $1,000 and the expenditure locations are reported in Figures BE6a and G6b.

Figure BE6a: Towns outside local area in which OPT fishers made a major expenditure over $1,000 in last 12 months (Source: RM-SS).

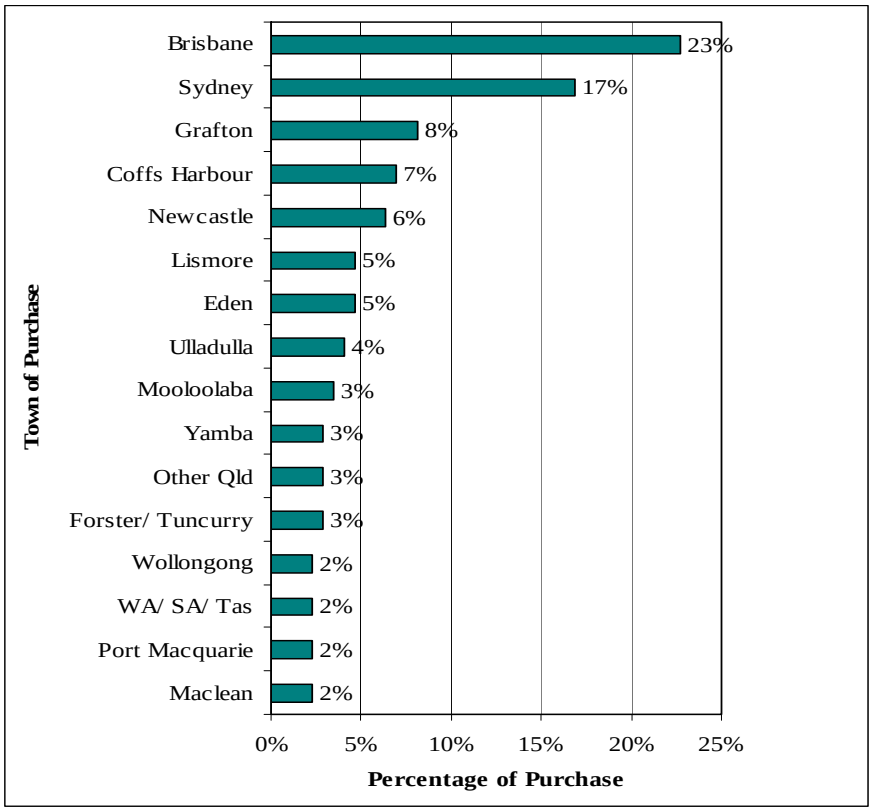
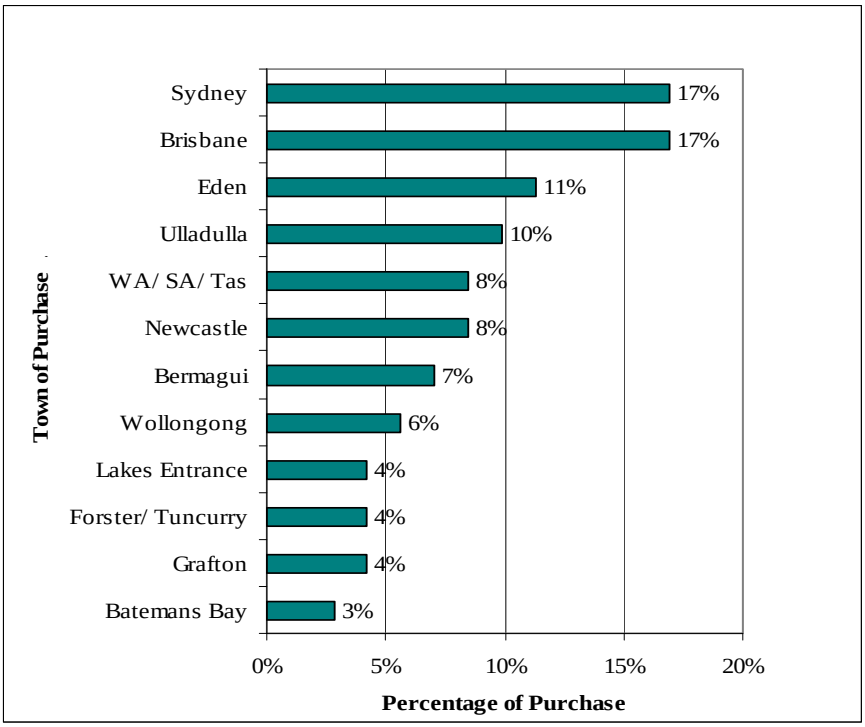


Figure BE6b: Towns outside local area in which OFT fishers made a major expenditure over $1,000 in last 12 months (Source: RM-SS).



In the ocean prawn trawl fishery, 182 fishers who spent approximately $3m on items outside their local area were interviewed. Fuel, new boats, and inboard engines are the major expenditure constituting 54% of OPT expenditure outside of the local area as reported in Table BE15a&b. In the ocean trawl fishery 73 fishers spent approximately $1.5m on items outside their local area. New boats, fuel and inboard engines are the major expenditure constituting approximately 60% of OFT expenditure outside of the local area.

Tables BE16a&b report the pattern of expenditure on major purchases (total number of purchases 164 OPT and 71 OFT) for 119 of 187 OPT and 51 of 73 fishers. Generally, OPT fishers living in towns of residence in the north of the state purchase some major items in their respective areas with Sydney having trade with a range of areas. The OFT fishers living in towns of residence in the south of the state purchase some major items in their respective areas with Sydney and Brisbane having trade with a range of areas. There is a major purchase link between fishers residing in the northern region using Brisbane, Grafton and Coffs Harbour for major OPT business purchases, and between Newcastle, Bermagui, Ulladulla, Eden and OFT fishers' purchases.

Table BE15a: Purchase of items outside local area in which OPT fishers made expenditure over $1,000 in last 12 months (Source: RM-SS)

Item Purchased	Sum of Expenditure ($)	%	Item Purchased	Sum of Expenditure ($)	%
Fuel/Oil	851,500	27.52%	Propellors	23,000	0.74%
Boat/new Boat	500,000	16.16%	Hooks	12,000	0.39%
Inboard Engines	331,800	10.72%	Provisions	7,500	0.24%
Other	296,200	9.57%	Slipping vessel	7,500	0.24%
Nets	154,400	4.99%	Plotters	7,000	0.23%
Car/Ute	152,000	4.91%	Trailers	5,500	0.18%
Gear Box	125,000	4.04%	Paint	4,300	0.14%
Electronics	122,600	3.96%	Traps	4,000	0.13%
Pump/ gen sets.	111,400	3.60%	Outboard engines	2,500	0.08%
Repairs	89,700	2.90%	GPS	2,000	0.06%
Wire	85,200	2.75%	Filters	1,800	0.06%
Winches	80,000	2.59%	Licence fees	1,500	0.05%
Bait/ Ice	59,000	1.91%	Otter Boards	1,200	0.04%
Fishing gear	30,000	0.97%	Diving gear	1,000	0.03%
Radar	23,800	0.77%	Floats	700	0.02%
Grand Total				**3,012,600**	**100.0%**

Table BE15b: Purchase of items outside local area in which OFT fishers made expenditure over $1,000 in last 12 months (Source: RM-SS)

Item Purchased	Sum of Expenditure ($)	%	Item Purchased	Sum of Expenditure ($)	%
Boat/new Boat	400,000	26.6%	Fishing gear	25,000	1.7%
Fuel/Oil	299,500	19.9%	Licence fees	15,000	1.0%
Inboard Engines	185,500	12.4%	Slipping vessel	7,500	0.5%
Other	144,400	9.6%	Plotters	7,000	0.5%
Nets	117,500	7.8%	Bait/ Ice	4,000	0.3%
Wire	61,400	4.1%	Radar	4,000	0.3%
Repairs	58,500	3.9%	Provisions	3,500	0.2%
Electronics	52,300	3.5%	GPS	2,000	0.1%
Pump/ gen sets.	44,000	2.9%	Hooks	2,000	0.1%
Car/Ute	35,000	2.3%	Filters	1,800	0.1%
Winches	27,000	1.8%			
Total				**1,425,100**	**100.0%**

Table BE16a: Town of residence and town of major purchase locations, in which OPT fishers made an expenditure of over $1,000 in last 12 months (Source: RM-SS).

	Town with major purchase over $1,000															
Town of Residence	**Brisbane**	**Grafton**	**Forster/ Tuncurry**	**Newcastle**	**Sydney**	**Ulladulla**	**Eden**	**Lismore**	**Yamba**	**Coffs Harbour**	**Mooloolaba**	**Maclean**	**Other Qld**	**Port Macquarie**	**Taree**	**Wollongong**	**TOTAL**
Queensland	-	-	-	-	-	-	-	-	1	1	-	-	1	-	-	-	**3**
Tweed Heads	1	-	-	-	-	-	-	-	-	1	1	-	2	-	-	-	**5**
Ballina	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**2**
Evans Head	5	-	1	-	2	-	-	3	-	1	-	-	1	1	1	-	**15**
Iluka	4	2	-	-	2	-	-	2	1	-	-	1	-	-	-	-	**12**
Yamba	3	2	-	-	1	-	-	-	1	-	-	-	-	-	-	-	**7**
Clarence River	8	5	-	-	-	-	-	3	1	2	4	3	-	-	-	-	**26**
Coffs Harbour	9	2	-	1	5	-	-	-	1	-	-	-	-	1	-	-	**19**
Port Macquarie	2	1	-	-	2	-	-	-	-	2	-	-	-	1	-	-	**8**
Camden Haven	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	**2**
Crowdy Head	2	2	-	-	2	-	-	-	-	-	1	-	-	-	-	-	**7**
Port Stephens	1	-	1	4	-	1	-	-	-	-	-	-	-	-	-	-	**7**
Newcastle	-	-	1	2	1	-	-	-	-	-	-	-	-	-	-	-	**4**
Hawkesbury River	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	**1**
Sydney Harbour	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	**1**
Wollongong	1	-	1	1	3	2	2	-	-	-	-	-	-	-	-	1	**11**
Ulladulla	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-	1	**4**
Batemans Bay	-	-	-	-	3	1	-	-	-	-	-	-	-	-	-	1	**5**
Bermagui	-	-	-	-	1	3	2	-	-	1	-	-	-	-	-	1	**8**
Eden	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1	-	**3**
Other	1	-	1	1	3	-	2	-	-	3	-	-	1	1	1	-	**14**
Total	**39**	**14**	**5**	**11**	**29**	**7**	**8**	**8**	**5**	**12**	**6**	**4**	**5**	**4**	**3**	**4**	**164**

Table BE16b: Town of residence and town of major purchase locations, in which OFT fishers made an expenditure of over $1,000 in last 12 months (Source: RM-SS).

	Town with major purchase over $1,000												
Town of Residence	**Brisbane**	**Grafton**	**Forster/ Tuncurry**	**Newcastle**	**Sydney**	**Wollongong**	**Ulladulla**	**Batemans Bay**	**Bermagui**	**Eden**	**Lakes Entrance**	**WA/ SA/ Tas**	**TOTAL**
Tweed Heads	-	-	-	-	-	-	-	-	-	-	-	-	
Ballina	2	-	-	-	-	-	-	-	-	-	-	-	**2**
Yamba	1	-	-	-	-	-	-	-	-	-	-	-	**1**
Clarence River	-	1	-	-	-	-	-	-	-	-	-	-	**1**
Coffs Harbour	2	1	-	-	1	-	-	-	-	-	-	1	**5**
Manning River	1	-	-	-	-	-	-	-	-	-	-	-	**1**
Camden Haven	-	-	-	-	-	-	-	-	-	-	-	-	
Crowdy Head	2	1	-	-	1	-	-	-	-	-	-	-	**4**
Port Stephens	1	-	1	4	-	-	1	-	-	-	-	1	**8**
Newcastle	-	-	1	-	1	-	-	-	-	-	-	-	**2**
Hawkesbury	-	-	-	-	1	-	-	-	-	-	-	-	**1**
Sydney Harbour	-	-	-	1	-	-	-	-	-	-	-	-	**1**
Wollongong	-	-	1	-	2	1	1	-	-	1	-	-	**6**
Greenwell Point	-	-	-	-	-	-	-	-	-	-	-	-	
Ulladulla	-	-	-	-	-	1	-	-	2	3	1	1	**8**
Batemans Bay	-	-	-	-	2	1	1	1	-	-	-	-	**5**
Bermagui	-	-	-	-	1	1	3	-	-	2	-	-	**7**
Eden	1	-	-	-	2	-	1	1	2	1	2	3	**13**
Other	2	-	-	1	1	-	-	-	1	1	-	-	**6**
Total	**12**	**3**	**3**	**6**	**12**	**4**	**7**	**2**	**5**	**8**	**3**	**6**	**71**

PNSW Guidelines (f) **Outline the markets for fish species (and the marketing forms) harvested in this fishery and the contribution these fisheries make towards supplying seafood to consumers on a State and regional basis.**

Marketing

There are three major prawn species (school, eastern king and royal red) taken by the ocean prawn trawl fishery. In the Ocean Fish Trawl fishery, Silver Trevally comprises approximately 30% of the total catch, with Tiger Flathead, Redfish, John Dory and several species of Shark also being significant catch species (NSW Fisheries, 2003a).

In the period prior to deregulation of fish marketing, NSW had a system of fish marketing cooperatives, certificates of exemption and consents given to fishers to sell outside

the regulated system. Deregulation of fish marketing has brought a new system and granted Fish Receivers certificates to fishers and fishing companies. Under the new system cooperatives have a less central place than before.

The economic survey asked fishers to state their main marketing options by type of fish receiver and does not reflect product volume or value. OPT fishers do not use agents. The OPT only fishers tend to supply the co-operatives (72%) and Sydney Fish Market (11%), OPT/OFT fishers tend to supply the co-operatives (57%), shops (21%) and Sydney Fish Market (14%) and OPT/Others tend to supply the co-operatives (70%) and shops (13%) as reported in Table BE16 (RM-ES). Sydney fish markets is used only by 11% of OPT fishers.

Table BE16: Frequency of marketing alternatives for ocean trawl fishers (Source: RM-ES 2000-01). (Note: by number of fishers in survey, not volume of product).

Market	OPT only	%	OPT/OFT	%	OPT/ Others	%	Total
Coops	13	72	8	57	16	70	38
Shops	0	0	3	21	3	13	6
Agents NSW	1	6	0	0	1	4	2
Agents QLD	1	6	0	0	0	0	1
Agents VIC	0	0	1	7	1	4	4
Sydney Fish Market	2	11	2	14	2	9	12
Bait	1	6	0	0	0		1
Total	**18**	**100**	**14**	**100**	**23**	**100**	**58**

Some recent information on trends in national seafood marketing is presented in FRDC (2001), but has little Ocean Trawl fishery content. Ruello and Associates (2000) review general retail and consumption of seafood in Sydney and emerging trends since a similar study of retail outlets in 1991.

Trends in fish/prawn species

The average price of species in the ocean prawn fishery depends on the market examined. The Sydney index information is comparatively a good indicator of value at first point of sale for eastern king prawn and royal red prawn species caught in the ocean trawl fishery (Mark Everson, Pers. Comm.)

The Sydney price in nominal terms has increased for eastern king prawn from $7.85/kg to $21.05/kg in the 1981-2002 period as reported in Figure BE7a (Source: NSWF- Sydney Index). In the case of royal red prawn, there has been no considerable increase in the average price (from $3.35/kg in 1985 to $3.90/kg in 2002). The Sydney Fish Market Price for school prawns has increased from $3.30/kg to $7.30/kg, and this may be an underestimate of prices received in the north of the state as Sydney is not the main market for school prawns. For example, the Clarence River Fishermen's cooperative prices for school prawns range from approximately $4.00/kg to $10.00/kg and the value can vary widely depending on how and where the school prawns are caught as a very small percentage of total school prawn catch comes from the ocean waters (Per. Comm. Mark Everson of Clarence River Fishermen's Cooperative Ltd.)

Figure BE7a: Average price ($/kg, nominal) of all prawn species in the 1981-2002 period (Source: NSWF-Sydney Index).

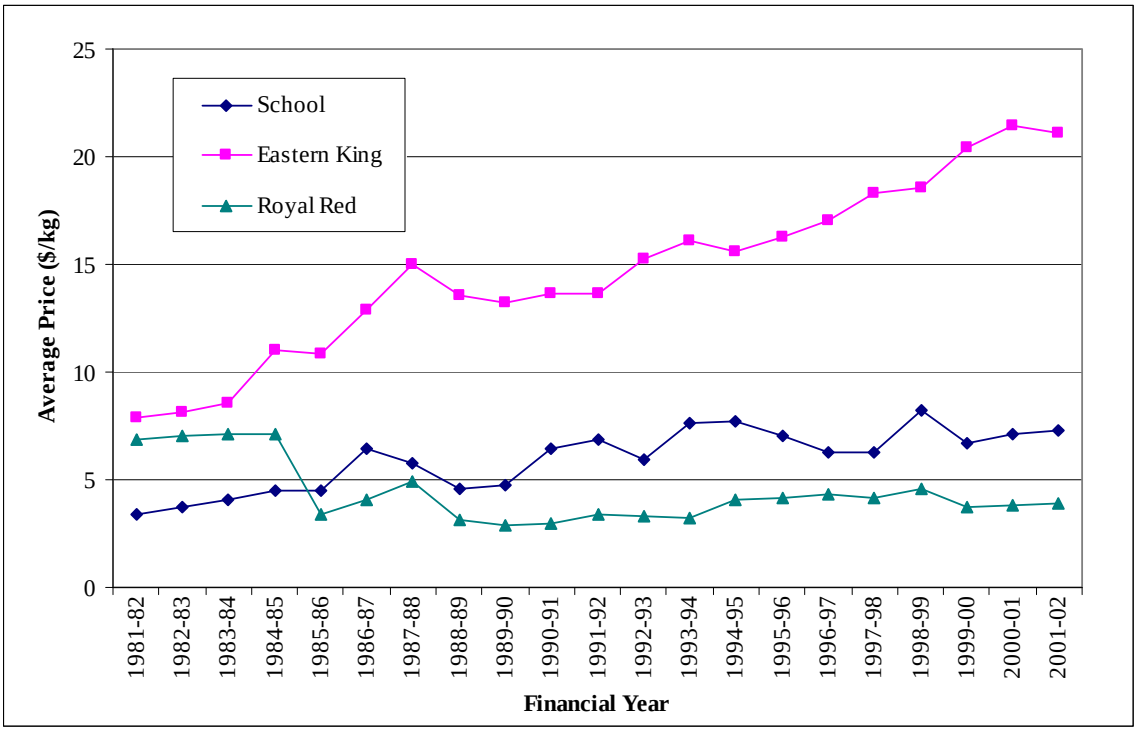
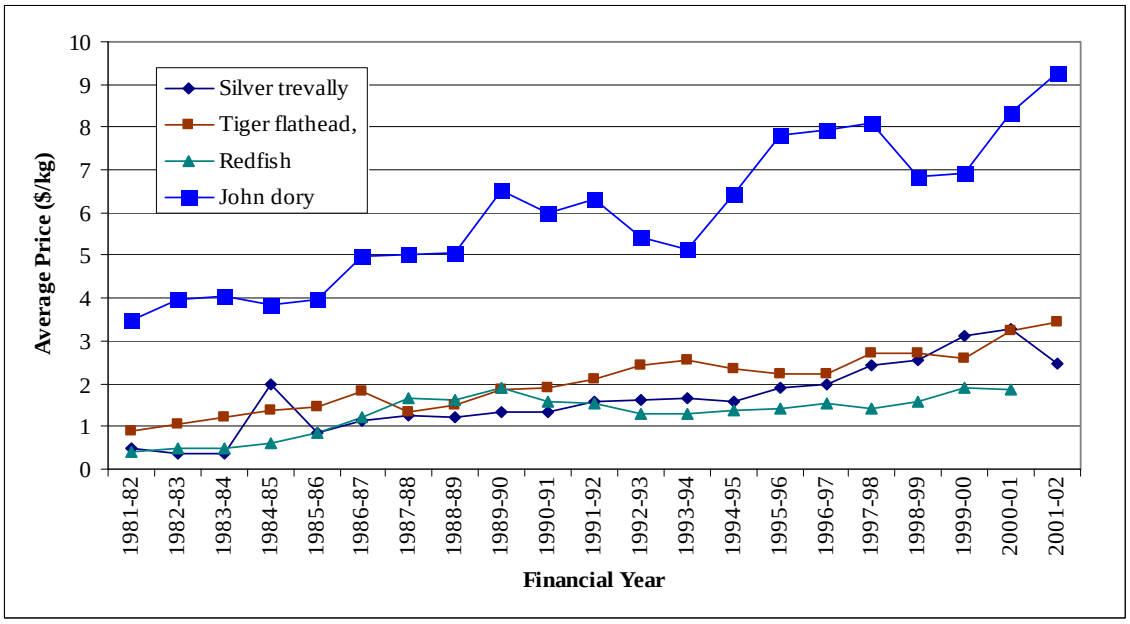


Figure BE7b: Average price ($/kg, nominal) of major fish species in the 1981-2002 period (Source: NSWF-Sydney Index).



The Sydney price for Silver Trevally in nominal terms has increased from $0.47/kg to $2.48/kg, for Tiger Flathead from $0.88 to $3.46, for Redfish $0.42 to $1.84 and for John Dory $3.5 to $9.30 in the 1981-2002 period (NSWF- Sydney Index). This nominal price rise was less than inflation for the period.

Overseas markets

A small portion of the catch from the ocean trawl fishery is exported. The economic survey revealed OPT fishers exported 3.5% of their product by value, OPT/OFT fishers exported only 0.3% and OPT/Others exported 8.9% to outside Australia (see Table BE17). These equated to approximately $15,000, $800, $17,000 per fisher and an average of $12,000 per fisher among 49 fishers (RM-ES). This equates to exports of approximately $3.0m from the fishery, but this should be treated with caution.

Table BE17: Export from the Ocean Trawl fishery outside Australia, extracted from the economic survey of operators (Source: RM-ES)

	OPT only	**OPT/OFT**	**OPT/Others**	**Total**
Average % export	3.5	0.3	8.9	4.6
Std Dev of % exported	8.1	1.3	20.7	13.9
Total exported ($)	230,006	12,500	330,567	573,072
Average Export/fisher ($)	15,334	833	17,398	11,695
Total	**15**	**15**	**19**	**49**

Contribution of the ocean trawl fishery towards supplying seafood to consumers

The OPT fishery supplied between 2,226 and 3,607 tonnes of prawns and fish during 1997/98-2001/02. In the same period, the OFT fishery supplied between 1,964 and 1,017 tonnes of fish. NSW Fisheries records indicate that more than 300 species of fish and 80 species of invertebrates were recorded in fish and prawn trawl catches.

NSW Fisheries records indicate the main species landed in 2000/01 by the prawn trawl sector were eastern king prawns (953 t), school whiting (689t), octopus (425t), school prawns (326t), royal red prawns (210t) and cuttlefish (113t). Catches of a further 11 species exceed 10t.

The main species landed in 2000/01 by the fish trawl sector were school whiting (264t), tiger flathead (152t) and silver trevally (112t). Catches of further 16 species exceed 10t.

PNSW Guideline (g) **Summarise the overall risks to the economic viability of the fishery from the current operational arrangements taking into consideration the likelihood/frequency of impacts and the consequence of the impacts occurring.**

The risks to economic viability

The review of the existing information on the current situation in the ocean trawl industry and existing management arrangements indicates that the fishery is economically underperforming. Effort levels are in excess of the profit maximising level and there is significant overcapacity in the fishery. Existing management regulations have been insufficient to restrict effort and reduce or contain fishing capacity. As a result, the fishery is currently not generating sufficient resource rent.

The major risks to the economic viability of the fishery are:

- excess active fishing effort;
- potential activation of latent fishing effort;
- insufficient controls on fishing effort and lack of economic incentives to fishers;
- increasing management and restructuring costs;
- loss of economic rent; and
- lack of access security for long-term business certainty.

Other risks include insufficient data to monitor economic performance and develop social indicators, and continuing improvements in fishing technology (effort creep). The levels of these risks may vary between the ocean prawn trawl and ocean fish trawl fisheries, but will be discussed together. The following section describes the risks.

In addition to the risks outlined above, ocean trawl fishers are faced with other risks that are outside the control of the management of the fishery, but that affect returns that can be made from fishing. For example, higher operating costs as a result of, for example, higher fuel costs, may affect fishers' returns. Likewise, price falls as a result of, for example, competition from lower priced imports may affect the return that can be made from fishing.

Major risks

Excess active fishing effort

As observed by NSW Fisheries (2003b), current fishing effort exceeds the level that would support fishing businesses that are commercially viable or ecologically sustainable. The economic survey supports this finding, as long-run economic surplus exists for only 41% of fishing businesses surveyed, covering opportunity costs of capital, imputed labour and economic depreciation. Effective effort containment and reduction policies need to be implemented to address this risk.

Potential activation of latent fishing effort

In addition to excess active fishing effort, there is a high level of latent effort in the fishery. In discussions below, the term latent effort is used. Latent effort is defined as under-utilised, or only partially utilised, fishing capacity. For this current review of the ocean trawl fishery we considered latent effort in the 2001/2002 financial year.

Latent effort can be thought of as having three layers in the ocean trawl fishery. Firstly, some businesses may not be fishing on any of their endorsements for a variety of reasons. For example, ill health, old age, or working in another industry or jurisdiction. The social section of this report provides further details. These business operators could activate their endorsements by fishing or transfer to other operators, hence raising active effort in the fishery. Holding the licence as a fishing right for its option value is a permissible option and owners incur management costs and licence fees.

Secondly, some OPT and OFT endorsement holders fish in other fisheries by choice. They have chosen to fish other fisheries for a variety of reasons and to hold the OPT and OFT endorsement for its option value. They may choose to fish in the OT fishery again next season. This behaviour may reflect both economic and social reasons and also perceived resource catch rates among alternative fisheries.

Thirdly, there are fishers in the Ocean Trawl fishery who could increase their effort by increasing the days fished to a higher level.

According to NSW Fisheries 2001/02 records, 104 of 311 (33.4%) OPT fishers and 54 of 99 (54.5%) OFT fishers have not reported any catch. Assuming each of the 410 (311+99) ocean trawl fishing businesses has at least one boat capable of fishing, it is estimated that approximately 158 (38.5%) boats are not currently fishing in the ocean trawl fishery. These latent vessels and vessels fishing a few days per year have considerable potential to increase fishing effort in response to improved economic conditions in the fishery. This activation could erode the profit of all operators in the fishery. Costly restructuring initiatives may be ineffective if effort levels are not restricted in order to keep value in the fishery.

Insufficient controls on fishing effort and lack of economic incentives to fishers

Current management arrangements have been insufficient to contain fishing effort, and overcapitalisation in the fishery.

Consequently, there are currently insufficient:

- economic incentives to active fishers to rationalise their fishing effort;
- secure, well defined, well developed long term access rights;
- incentives for fishers to invest in building up the fishery biomass and to develop long-term business plans;
- vessel decommissioning payments; and
- co-management arrangements to reduce management costs and increase compliance.

Licencing policy has led to a considerable reduction of licence holders in NSW managed commercial fisheries since 1990 with improvements in economic viability. Dominion notes that NSW Fisheries has a commitment to further restructuring as stated in the Minister for Fisheries vision statement, *Vision for the NSW Seafood Industry*.

It is essential that a structural adjustment framework be developed in order to adjust overcapacity in the trawl fishery. Overcapacity issues can be addressed by reducing the total number of fishing vessels and removing low performing and latent fishing endorsements from the fishery. As existing policies have proved to be insufficient to achieve these goals, there is a need to develop incentive-based management tools.

Increasing management and restructuring costs

Many fishers will have difficulty in meeting additional management and restructuring costs. Management costs represent an outgoing for businesses, whereas restructuring costs involve debt and eventually have a return from assets purchased.

A rise in either management costs or debt levels may lead to more fishing effort being produced by fishers to gain additional income. This is undesirable for general industry profitability.

Loss of economic rent

Currently the ocean trawl fishery is underperforming by not generating sufficient resource rent. Existing information only enables us to identify the percentage of fishing

businesses with economic surplus, and is inadequate to estimate the loss of economic rent from the fishery. A bio-economic modelling is needed to estimate optimum level of fishing effort and the maximum economic rent in the fishery.

Lack of access security for long-term business certainty

Limited access security and lack of long term access rights are impediments for fishers to develop long-term business plans and for making large investments.

Other risks

Inadequate economic information to monitor economic viability of the fishery

Historically, NSW Fisheries research efforts focused on biological, ecological and technological aspects of the fisheries. The economic, social and institutional aspects have been insufficiently addressed. There is no framework to monitor the economic viability of the fishery and no adequate information to develop bio-economic models to determine optimum effort levels. It is unlikely that policymakers will be able to develop efficient long term policies for sustainable management of the fishery without this information. The current situation is short term.

Continuing improvements in fishing technologies (effort creep)

Continuing improvements in fishing technologies enable fishers to increase their total fishing effort which is a major risk to the economic viability of the fishery. Continuing improvements in fishing technology is a major contributor to increasing vessel capacity and to identifying new fishing zones/areas that were previously unknown or inaccessible. Existing policies have unitised fishing power to address this effort substitution, but there is great diversity among the fishing fleet. A restriction on days fished is required to contain effort creep, or a change to output based fishery management regimes.

5: Social Issues

5.1 Fishers social capital

Introduction

The background to the social assessment of the Ocean Trawl Fishery Management Strategy (OTFMS) is given at the commencement of the Economic section. The available information is used to address the social issues surrounding the introduction of the OTFMS. Given the lack of previous studies, the review addresses the Department of Infrastructure, Planning and Natural Resources (DIPNR) guidelines to the extent that information is available. Relevant information gaps have been identified. The need for future research is presented in this section.

The environmental assessment guidelines issued by DIPNR require examination of social information on fishers and their communities associated with the ocean trawl fishery, including:

- the community values associated with the commercial fishery, in particular; social capital issues, skill base and transferability of skills;

- the community views and perceptions of the fishery and include a brief analysis of how these views and perceptions were formed;
- the importance of social identity and job satisfaction as a reason for being a commercial fisher in these fisheries; and
- the overall social risk to fishers from the current operational arrangements taking into consideration the likelihood/frequency of impacts and the consequence of the impacts occurring.

The DIPNR guidelines for social issues will be followed below. The guidelines are presented as headings to guide the reader, with a response stated below each guideline.

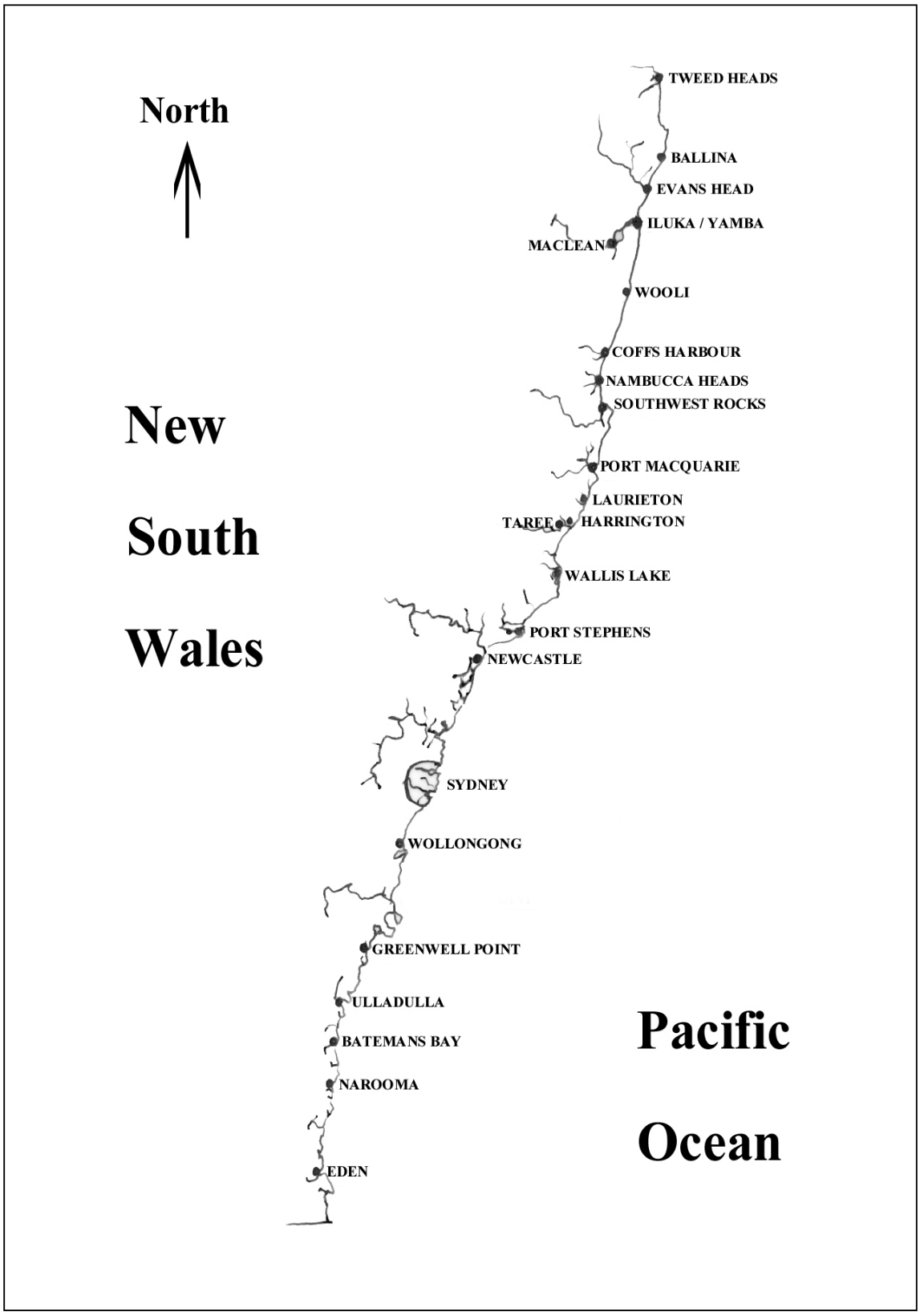
PNSW Guideline (a) **Outline the community values associated with the commercial fishery, in particular; social capital issues, skill base and transferability of skills.**

The profile of fisher communities in coastal NSW for all commercial fishers is reported in Appendix 3. The information on ocean trawl fishers and their communities has been extracted and are summarised in Table BS1, which reports social indices for Ocean Trawl fishers at the zone and district level from ABS and licensing data. This can be used in appraising management impacts at district or grouped post code level. Figure BS1 is a map of coastal fishing towns along the NSW coast and can be used in conjunction with district and postcode Tables BS1 &BS2.

The ocean prawn trawl business owners inhabit a range of small towns and the social survey identified that there were 175 OPT endorsement holders using 34 “home ports” in NSW. In Table BS2 ABS postcode data enables OPT fishers to be identified as part of fishing communities in NSW[5]. Maps of ABS socio-economic fisher census data are reported at the post code level in Appendix 3, an approximation to towns and fisher communities. The definition of fisher communities is an area for further work.

[5] This is explained in Appendix 3, where the available data is for postcodes with over 10 NSW commercial fishers.

Figure BS1: Map of fishing towns on the New South Wales coast.



The regional location of fishers by district is reported in Tables BS1 and BS2. Fishers were asked about their pattern of travel for their main fishing activity. The ocean trawl fishers are approximately 33% of all NSW fishers (Table BS1). Unemployment by region is higher in

rural NSW and will be investigated later in this section. The Socio-Economic Index for Areas (SEIFA) is a measure of socio-economic disadvantage, relative to 1,000 units. In Table BS1, most of rural NSW fishing zones are under 950 on the SEIFA index, while Sydney exceeds 1,000. Median weekly income data for regions in 1996 show a similar situation.

Table BS1: Summary table of social indices for OPT fishers in zones and districts of NSW[6]

Zone	Home District	P'code Pop'n	P'code Fishers	P'code OPT Fishers	P'code OFT Fishers	SEIFA	Med. Ind. Income ($/wk) 2001*	Unemployed (%) 2001*	Employed in C.F. (%) of labour force	Employed in OPT & OFT as (%) of labour force
1	TWEED	41,938	63	13		922.2	250.0	12.2	0.37	0.08
	RICHMOND	28,558	87	38	1	930.2	283.3	12.2	0.85	0.46
2	CLARENCE	43,353	259	121	6	919.2	250.0	13.6	3.12	1.53
3	COFFS HARBOUR	55,625	110	32	10	939.8	275.0	17.5	0.67	0.10
	HASTINGS	61,291	90	19	3	936.4	250.0	14.4	0.68	0.15
4	MANNING	37,878	80	10	4	914.1	250.0	11.5	0.67	0.10
	WALLIS LAKE	22,704	105	11	6	939.0	250.0	11.7	2.78	0.17
	PORT STEPHENS	52,562	101	26		966.6	316.7	10.4	1.33	0.17
	HUNTER	52,557	55	22	4	933.2	350.0	10.3	0.18	0.06
	CENTRAL COAST	206,143	102	4	2	976.8	416.7	6.5	0.00	0.00
5	HAWKESBURY	2,380	30			1004.5	400.0	6.1	0.00	0.00
	SYDNEY	3,276,207	189	26	24	1047.0	450.0	6.1	0.00	0.00
6	ILLAWARRA	65,532	50	5	4	934.7	350.0	8.3	0.13	0.01
	SHOALHAVEN	53,871	75	9	6	945.1	300.0	10.9	0.81	0.04
7	BATEMANS BAY	34,836	105	42	34	957.6	250.0	12.6	1.18	0.18
	MONTAGUE	8,135	53	9	8	955.1	250.0	13.0	1.54	0.23
	FAR SOUTH COAST	3,726	61	12	24	916.2	250.0	9.3	2.56	1.01
Total		**4,047,296**	**1,615**	**399**	**136**	**945.3**	**306.0**	**11.1**	**0.92**	**0.27**

Key: Postcode population as of 2001; postcode fishers-for all NSW and OPT&OFT fishers; *Unemployed by postcode as of ABS 2001 census; SEIFA - Socio-economic index for areas (ABS), Med. Ind. Inc.- median individual income per week as of 2001 census; Employed in commercial fishing (or OPT&OFT) as percentage of labour force; see Appendix 1 for a fuller explanation of variables.

Table BS1 shows that OPT fishers are distributed along most districts in the northern region and OPT fishers are most numerous (121 of 399) in the Clarence district. Most OFT fishers are in the southern districts and Coffs Harbour district in the northern region. In Table BS1, the second last column reports all commercial fishers as a percentage of the local working population and the last column reports OPT and OFT fishers as a percentage of the local working population. OPT fishers in the Clarence area and OFT fishers in the Far South Coast have the highest percentage of fishers in the work force indicating economic and social dependence. In areas of higher general population, the fishers as percentage of labour force method does not reflect the size of the fishing community as the general work force is large relative to the number of commercial fishers.

Table BS2 reports major home post codes for OPT and OFT fishers within districts and illustrates the diversity in community structures in those post code areas. OPT fishers are most numerous in the Clarence region and in postcodes from Tweed to Sydney. Ocean trawl fishers form a substantial part of the NSW fishing community in many postcodes ranging from 4% to 47% of local fisher numbers. A significant number of postcode areas with ocean trawl fishers fall below 920 on the SEIFA index of disadvantage and may well be more adversely impacted by changes under the FMS.

[6] Source: ABS 2001 census, BRS and NSWF licence data.

Table BS2: ABS social index data on OPT and OFT fishing communities in NSW at the postcode level (Source ABS/BRS; NSWF licence data).

Zone	Home District	P'code Pop'n	P'code Fishers	P'code OPT Fishers	P'code OFT Fishers	OPT+OFT	%	SEIFA	Med. Ind. Income ($/wk) 2001*	Unemployed (%) 2001*	Employed in C.F. (%) of labour force	Employed in OPT & OFT as (%) of labour force
1	TWEED	41,938	63	13		13	21%	922.2	250.0	12.2	0.37	0.08
	RICHMOND	28,558	87	38	1	39	45%	930.2	283.3	12.2	0.85	0.46
2	CLARENCE	43,353	259	121	6	127	49%	919.2	250.0	13.6	3.12	1.53
3	COFFS HARBOUR	55,625	110	32	10	42	38%	939.8	275.0	17.5	0.67	0.10
	HASTINGS	61,291	90	19	3	22	24%	936.4	250.0	14.4	0.68	0.15
4	MANNING	37,878	80	10	4	14	18%	914.1	250.0	11.5	0.67	0.10
	WALLIS LAKE	22,704	105	11	6	17	16%	939.0	250.0	11.7	2.78	0.17
	PORT STEPHENS	52,562	101	26		26	26%	966.6	316.7	10.4	1.33	0.17
	HUNTER	52,557	55	22	4	26	47%	933.2	350.0	10.3	0.18	0.06
	CENTRAL COAST	206,143	102	4	2	6	6%	976.8	416.7	6.5	0.00	0.00
5	HAWKESBURY	2,380	30				0%	1004.5	400.0	6.1	0.00	0.00
	SYDNEY	3,276,207	189	26	24	50	26%	1047.0	450.0	6.1	0.00	0.00
6	ILLAWARRA	65,532	50	5	4	9	18%	934.7	350.0	8.3	0.13	0.01
	SHOALHAVEN	53,871	75	9	6	15	20%	945.1	300.0	10.9	0.81	0.04
7	BATEMANS BAY	34,836	105	42	34	76	72%	957.6	250.0	12.6	1.18	0.18
	MONTAGUE	8,135	53	9	8	17	32%	955.1	250.0	13.0	1.54	0.23
	FAR SOUTH COAST	3,726	61	12	24	36	59%	916.2	250.0	9.3	2.56	1.01
Total		**4,047,296**	**1,615**	**399**	**136**	**535**	**33%**	**945.3**	**306.0**	**11.1**	**0.92**	**0.27**

Similarly, a range of areas record median individual weekly incomes of approximately $250 in the 2001 census. Several postcodes have more than 20% of ocean trawl fishers in the work force (for example; Shoalhaven, Tweed, Hastings, Port Stephens, Sydney, Montague, Coffs Harbour, Richmond, Hunter, Clarence, Far South Coast and Bateman's Bay). Conversely, some postcodes have relatively few ocean trawl fishers as a percentage of the work force (for example Central coast, Wallis Lake, Manning and Illawarra), though this should be interpreted with caution, given the weakness of this method in areas of high population. Table BS2 indicates the numbers of ocean trawl endorsed fishers in each post code and this should be referred to in any inference.

The numbers of direct and indirect employees associated with the ocean trawl fishery and the multiple endorsement structure are reviewed in the economic section. The social survey enabled us to develop demographic profile of ocean trawl fishers.

Ocean Prawn Trawl Fishers Profile (Source: RM-SS)

The average age of NSW commercial fishers is 54.1 years and is higher than the 45.3 years recorded for all Queensland fishers (Fenton and Marshall, 2001). The average age of the OPT fisher is 45.1 years. The 187 OPT fishers interviewed had low rates of formal education, with 72% achieving year 10 education or below. Approximately 10% had a trade or business training.

Participation of females in direct fishing is 5% according to the survey and 47% of fishers' partners are employed in OPT fishing businesses. Approximately 80% of OPT fishers are owner operators with an average of 14.8 years of fishing experience. The OPT fishers work an average of 63.5 hours per week and about 13% of OPT fishers work in other (non-fishing) industries. Fishers have high levels of residency, averaging 19.4 years and high levels of home ownership with 84% owning or paying off a home.

Table BS3: Dependent children below 16 years of age for OPT and OFT businesses (RM-SS).

	OPT			**OFT**		
No. of Children	**Frequency**	**Total children**	**%**	**Frequency**	**Total children**	**%**
0	98	0	52%	33	0	45%
1	21	21	11%	9	9	10%
2	37	74	38%	16	32	35%
3	24	72	37%	10	30	33%
4+	7	28	14%	5	20	22%
Total	**187**	**195**	**100%**	**73**	**91**	**100%**

In the ocean prawn trawl fishery, fishing forms a significant part of individual fisher's income, with 132 of 182 (73%) fishers who responded to this question have 100% income from fishing, and another 29 with over 80% income from fishing. Part-time fishing involvement is limited, with 11(6%) from 182 fishers having less than 30% of income from fishing, and up to 48% of income from other industries.

The OPT fishers' net taxable income from all industries was $48,336 after tax, of an average household income of $71,933, indicating the overall contribution of 68% by fishers to household income.

In examining the information from social survey on dependants, it was found that 52% of OPT fishers had no dependent children under 16 years of age as reported in Table BS3. The balance of 89 OPT fishers had 195 dependent children under 16 respectively, representing families with an average of 2.2 children per family. About 61% of ocean prawn trawl fishers had no financial dependents, 21% had dependent spouses and 18% had dependent grandparents, parents, stepchildren and children over 16 years. Of 187 OPT endorsement holders contacted, 139 had been fishing in OPT in the previous 12 months.

Ocean Fish Trawl Fishers Profile (Source: RM-SS)

The average age of the OFT fishers is 45.4 years respectively. The 73 OFT fishers interviewed had low rates of formal education, with 78% achieving year 10 education or below. Approximately 8% had a trade or business training.

Participation of females in direct fishing is 8% and 55% of fishers' partners are employed in OFT fishing businesses. Approximately 78% of OFT fishers are owner operators, average over 6.5 years of fishing experience, work an average of 64.1 hours per week, and 14% of OFT fishers work in other industries. Fishers have high levels of residency, averaging 22.3 years and high levels of home ownership, with 84% owning or paying off a home.

Fishing forms a significant part of individual fisher's income, with 48 of 65 (74%) fishers who responded to this question have 100% income from fishing and another 9 (14%) fishers earn 80 - 90% of their income from fishing. Part-time fishing involvement is limited, with 4 (6%) from 65 fishers having less than 30% of income from fishing and up to 35% of income from another industries.

Of 73 OFT fishers contacted, 57 had been fishing in OFT fishery in the last 12 months. The balance of sampled endorsement holders were fishing elsewhere. The OFT Fishers' net taxable income from all industries was $65,669 after tax, of an average household income of $71,096 indicating the overall contribution of 92% by fishers to household income.

About 45% of OFT fishers had no dependent children below 16 years of age as reported in Table BS4. The balance of 40 OFT fishers had 91 dependent children under 16 years of age, representing families with an average of 2.2 children per family. About 62% had no financial dependents, 16% had dependent spouses and 22% had dependent grandparents, parents, stepchildren and children over 16 years of age.

PNSW Guideline (b) **Outline community views and perceptions of the fishery and include a brief analysis of how these views and perceptions were formed.**

The Ocean Trawl fishers are a part of the rural coastal NSW community. There have been no formal studies of community values, views and perceptions and this requires further research.

Views of the community on commercial prawn trawling are varied. As most fishing activity occurs away from land this limits comments to inshore and port areas where vessels reside. The public often note occasional dead fish, odours and wastes associated with commercial fishing as evidenced by letters received by NSW Fisheries. Similarly landing sites and fish cleaning areas can reduce amenity. Definitive public views on fishing are difficult to obtain given the differing views on fishing issues within the community.

A public telephone survey was undertaken by Roy Morgan Research in 1999 investigating general community attitudes to a recreational fishing licence. There was a general community concern that the marine environment should be looked after. The Roy Morgan (1999) survey of 500 persons in NSW indicated that 95% of person felt it was important "that our fish stocks are well looked after". In the same survey 44% of responses prioritise "looking after the environment" as the most important aspect of managing fisheries.

The community expect ocean trawl fishers to provide fresh seafood for the majority of the population who do not catch their own prawns and fish. This is also difficult to measure, but is evidenced by local demand for seafood.

Tourists enjoy the fish and prawns cooked at the local fish shop or Coop, as evidenced by seafood sales in tourist destinations, but are also concerned over loss of environmental amenity (Roy Morgan, 1999). Recreational fishers also use locally produced prawns as a major bait source. This local production of bait prawns is preferable to prawns being imported from other areas, or even from abroad creating bio-security concerns.

PNSW Guideline (c) **Determine the importance of social identity and job satisfaction as a reason for being a commercial fisher in these fisheries.**

The Importance of social identity

There is no accepted definition of "fishing communities" and this requires further analysis of economic and social interactions and linkages between fishers and between communities (Fenton *et al* 2000).

The ages obtained from licence records of fishers operating in the 1999-2000 period are reported in Figures BS2a and BS2b for all OPT and OFT fishers and those active in 1999-2000. The mean age is approximately 45 years for ocean trawl fishers. Of these, 14% of OPT and 18% of OFT fishers are aged greater than 60 years and will be entitled to the age pension within the lifetime of the OTFMS.

Figure BS2a: Age distribution of OPT fishers (Source: NSWF licence records)

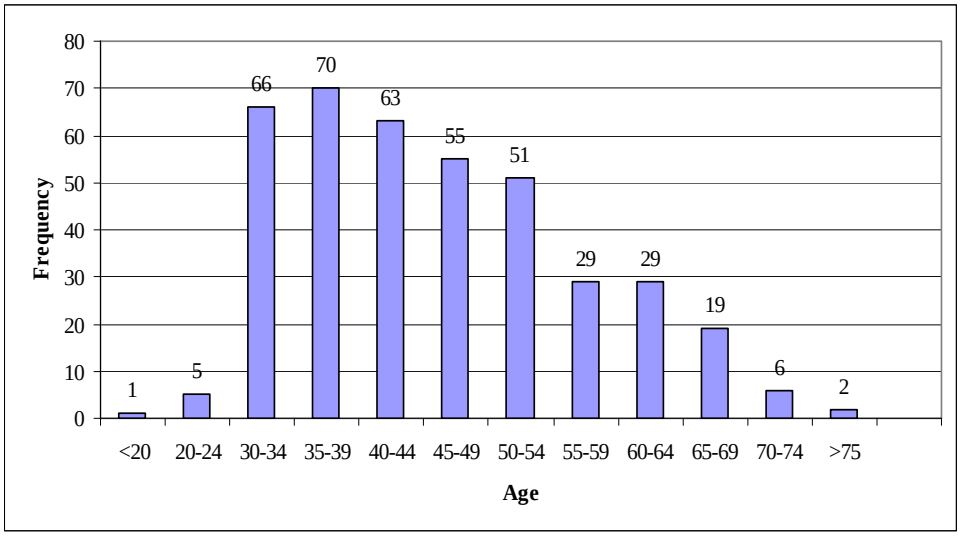
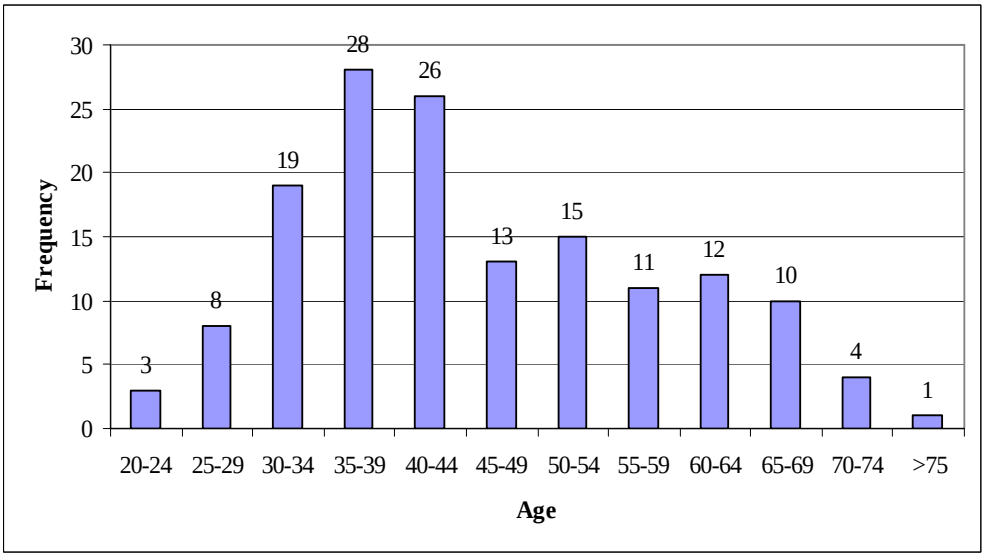


Figure BS2b: Age distribution of OFT fishers (Source: NSWF licence records)



In Table BS4 about 24% of OPT 32% of OFT fishers show significant travelling i.e. over 50km per day in their fishing operations. This may reflect the travel by ocean trawl fishers arising from their other fishing activities or be time spent steaming to fishing locations.

Table BS4: Travel distance to main fishing site in the ocean trawl fishery (Source: RM- SS)

	OPT		OFT	
Distance/Time	**Freqency**	**%**	**Freqency**	**%**
<25km, 1 hr by boat	85	47%	31	42%
25km-50km, 1- 2 hrs by boat	40	22%	16	22%
50km-100km, 2-3 hrs by boat	33	18%	13	18%
>100km , >3 hrs by boat	11	6%	10	14%
Can't say	10	6%	3	4%
Total	**179**	**100%**	**73**	**100%**

Table BS5: Residency of OPT and OFT fishers at current postcode (Source: RM-SS)

	OPT		OFT	
Years	**Frequency**	**%**	**Frequency**	**%**
<1	2	1%	0	0%
1-5	21	11%	6	8%
6-10	26	14%	6	8%
11-15	19	10%	6	8%
16 - 20	19	10%	8	11%
21 - 25	19	10%	5	7%
26 - 30	22	12%	9	12%
Over 30 years	59	32%	33	45%
Can't say	0	0%	0	0%
Total	**187**	**100%**	**73**	**100%**

Fishers were asked how many years they have lived in their current postcode area? The results are reported in Table BS5. Approximately 74% of OPT and 84% of OFT fishers have been living in the same postcode area for 10 years or more, and about 12% (OPT) and 8% (OFT) have moved their postcode residency in the last 5 years. The ocean trawl fisher population is reasonably sessile, with limited operational travelling behaviour and has a significant number of fishers who have been resident in a local area for a long time. This is probably an indication of their community involvement in local areas.

There is no one accepted measure of social capital (NSW government, 1997b). Fishers are often a significant part of the social infrastructure in small coastal communities. For example, an illustration of the potential contribution of fishers to local community life through their club memberships in the Clarence community are reported in Table BS6 from McVerry (1996). Clubs can be a place for fishers to socialise with other fishers, workers and the community. There is no other available information on fishers and social capital in NSW.

Table BS6: Fishers as a percentage of club memberships in the Clarence region (McVerry, 1996).

Type of Club	Fishers as % of Club Membership
Bowling	41
Golf	27
RSL	18
Soccer, Football, Coastguard	4
Surf,Cricket, Lions	3
Softball, Rowling, Horse, Clarence Catchment Management	2
Bike, Naval Reserve	1

Job satisfaction within the ocean trawl fishery

The social survey asked questions to provide information on industry working practices. Part of the fishers' life style is that fishing takes more hours than the conventional 40 hour week. Fishers were asked to estimate their average working week in normal, low and high seasons. The estimates from the telephone interview are reported in Figures BS3a and BS3b.

The data suggest that normal weekly working hours per week are 64.0 for OPT fishers and 63.3 for OFT fishers. This is significantly in excess of the 42 hours per week estimated by ABS for fishers nationally (ABS, 1996). High season estimates exceed 75 hours/week while low season hours per week are 51 for OPT and 54 for OFT fishers.

Figure BS3a: Hours worked per week in Normal, Low and High seasons in the OPT fishery (Source: RM-SS).

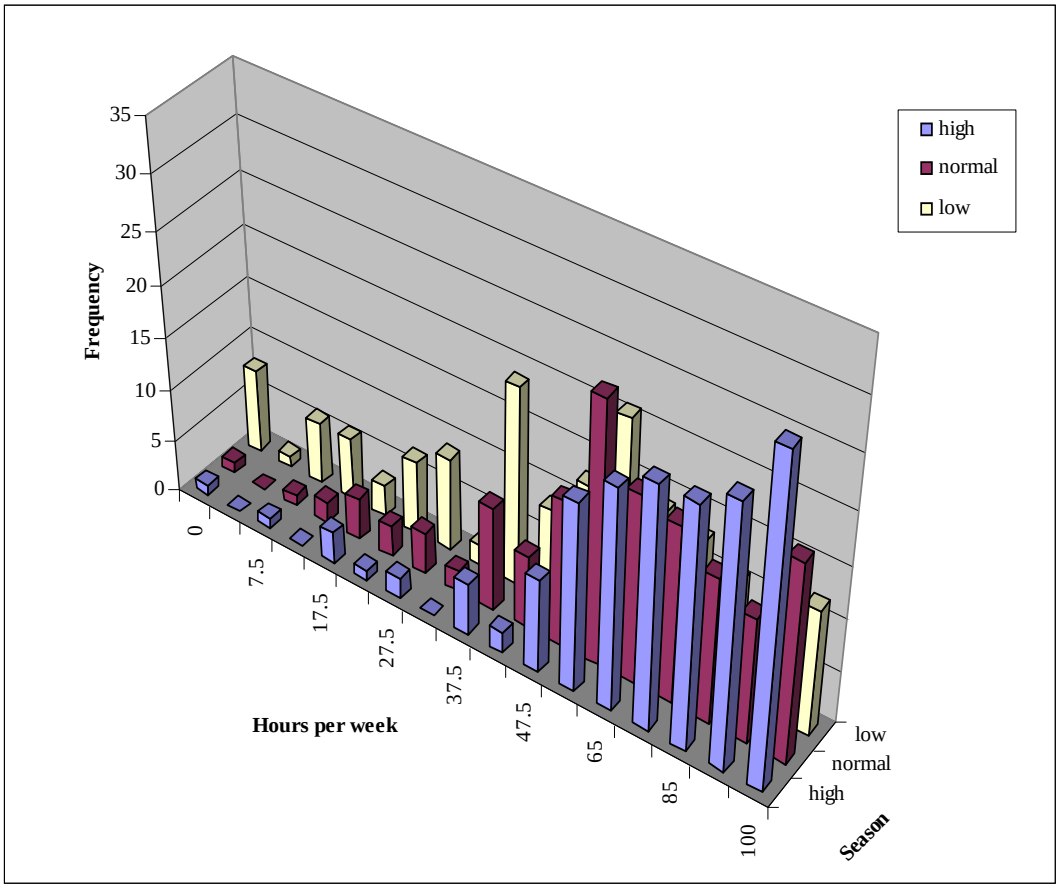
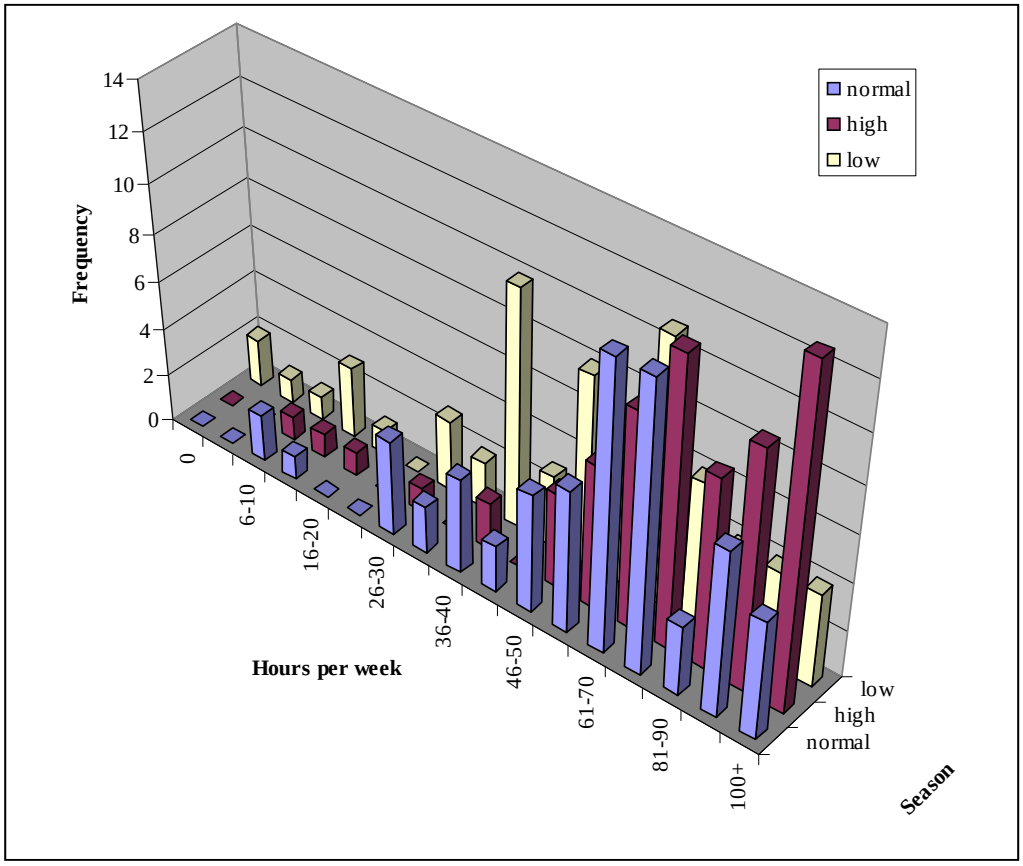


Figure BS3b: Hours worked per week in Normal, Low and High seasons in the OFT fishery (Source: RM-SS).



Fishing is a diverse activity and can lead to industrial injury. Figures BS4a and BS4b indicate the level of industry related injuries in the ocean trawl fishery. Approximately 86% (161 of 187) of OPT fishers and 88% (64 of 74) of OFT fishers had no fishing injuries in the previous 12 months, but that 13% (25) of OPT fishers and 11% (8) of OFT fishers were out of fishing for 1 week or more in the previous year through industrial injury.

Figure BS4a: Duration of non-working time from industrial injury in commercial fishing in the OPT fishery (Source: RM-SS)

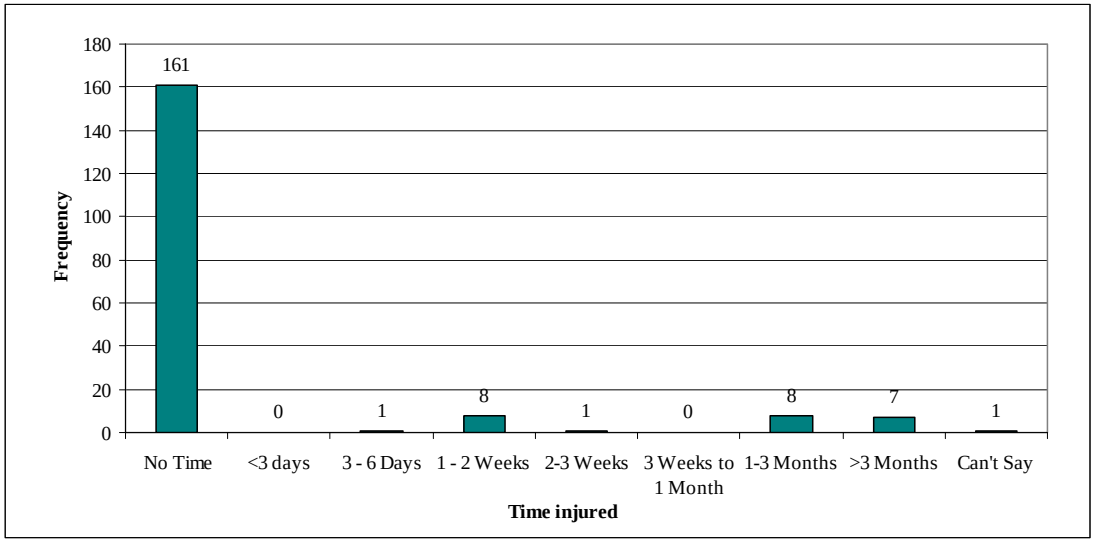
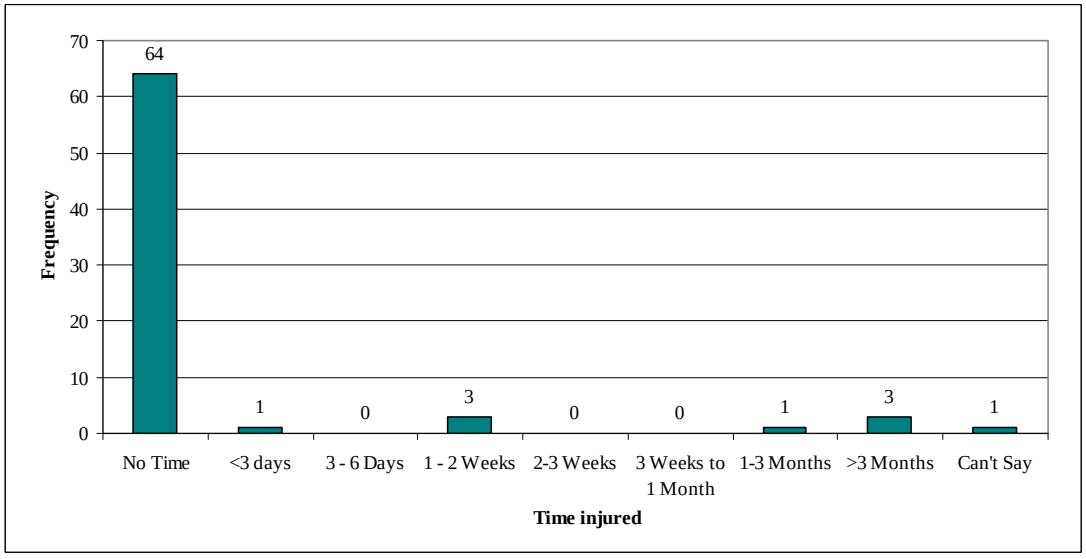


Figure BS4b: Duration of non-working time from industrial injury in commercial fishing in the OFT fishery (Source: RM-SS)



A measure of fisher's experience, which contributes to the sense of fishing industry involvement and community, is the years of fisher involvement with the

industry. License record information goes back to 1977 for the OPT and OFT fishers, have been summarised in Figures BS5a and BS5b and show that 31% of fishers interviewed were fishing prior to 1977 when current electronic licence records began.

Figure BS5a: Number of years OPT fishers have been licenced in NSW (NSWF licence data).

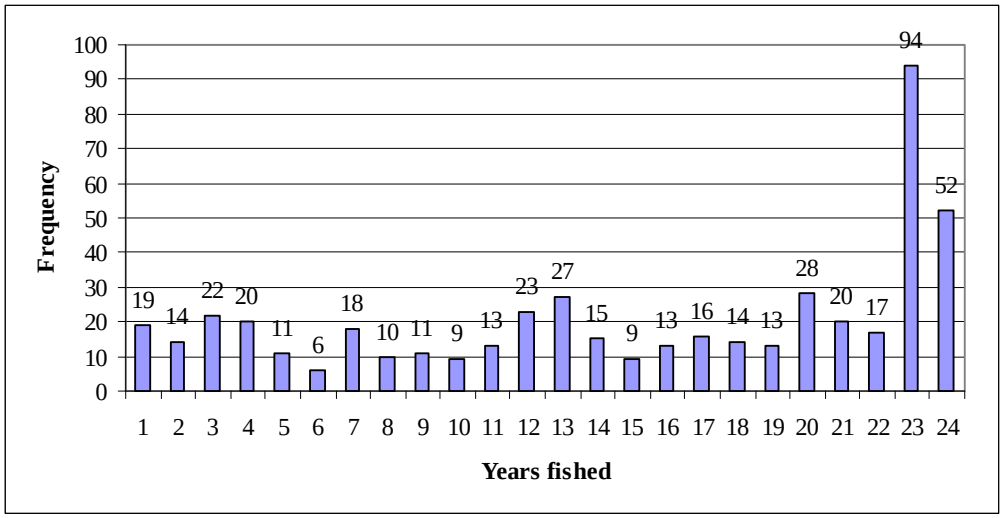
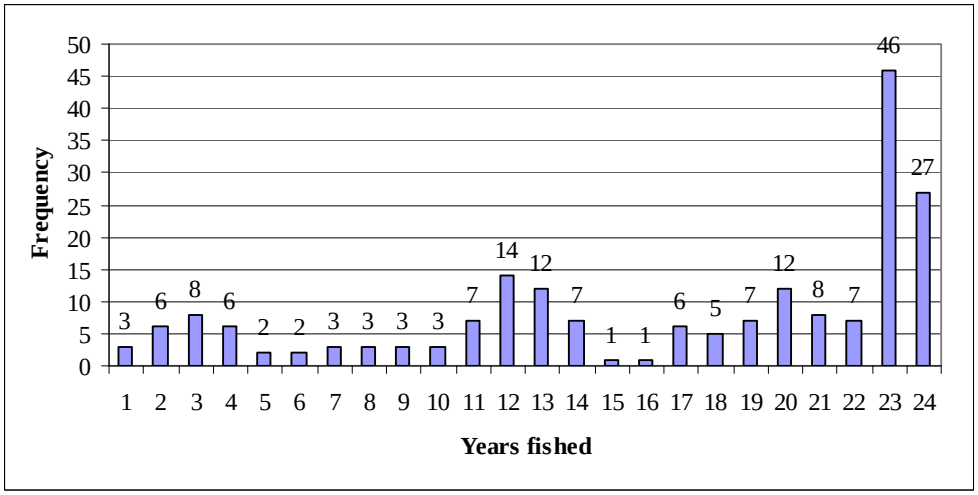


Figure BS5b: Number of years OFT fishers have been licenced in NSW (NSWF licence data).



The mean licence duration is 14.8 years for OPT fishers and 16.6 years for OFT fishers. Approximately 53% (OPT) - 61% (OFT) fishers have over 20 years of experience. Figures BS6a and BS6b report the number of years fishers had been in the NSW fishing industry.

Figure BS6a: Frequency plot of years fished by OPT fishers in NSW fishing industry (Source: RM-ES).

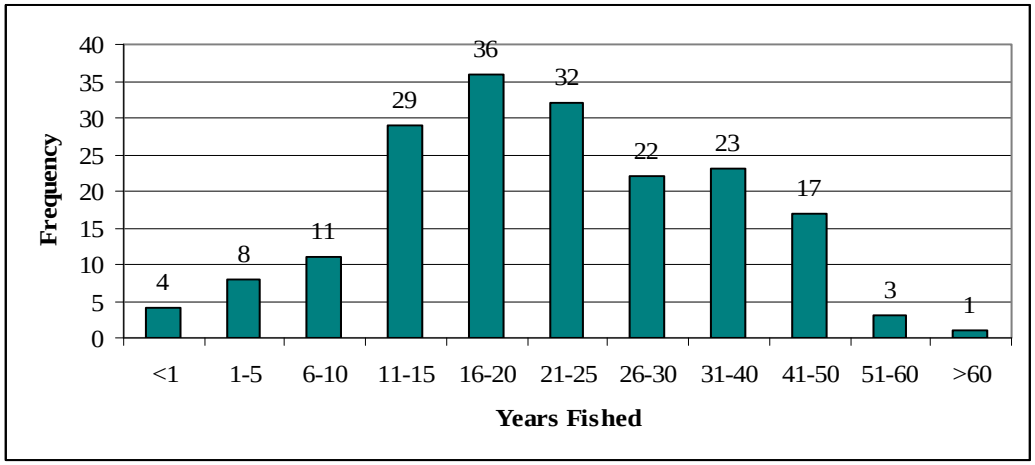
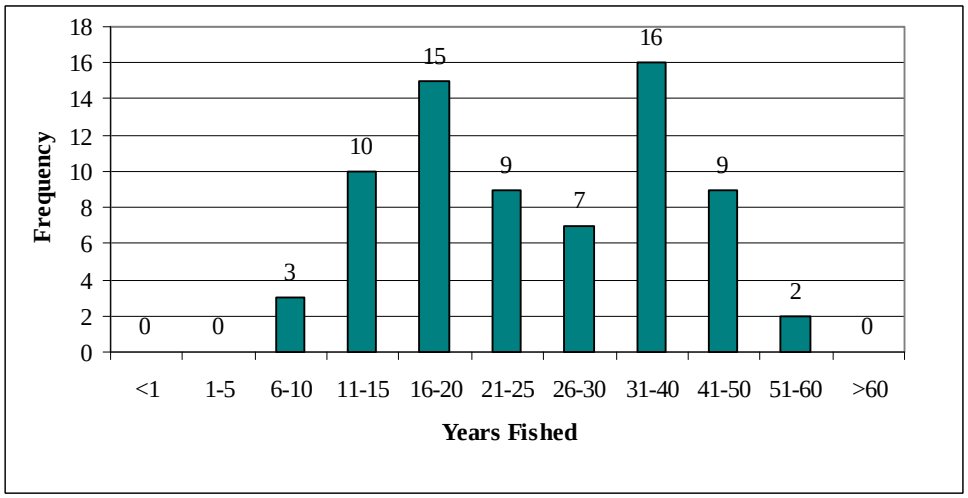


Figure BS6b: Frequency plot of years fished by OFT fishers in NSW fishing industry (Source: RM-ES).



Both private and social capital is potentially seen in family involvement in fishing. Fishers were asked how many generations their family had been in the NSW fishing industry. The first generation fishers, reflect entrants who may be more capable of adjustment than fishers from multi-generational fishing families.

Figure BS7a: Percentage of OPT fishers with family history in fishing (Source: RM-SS).

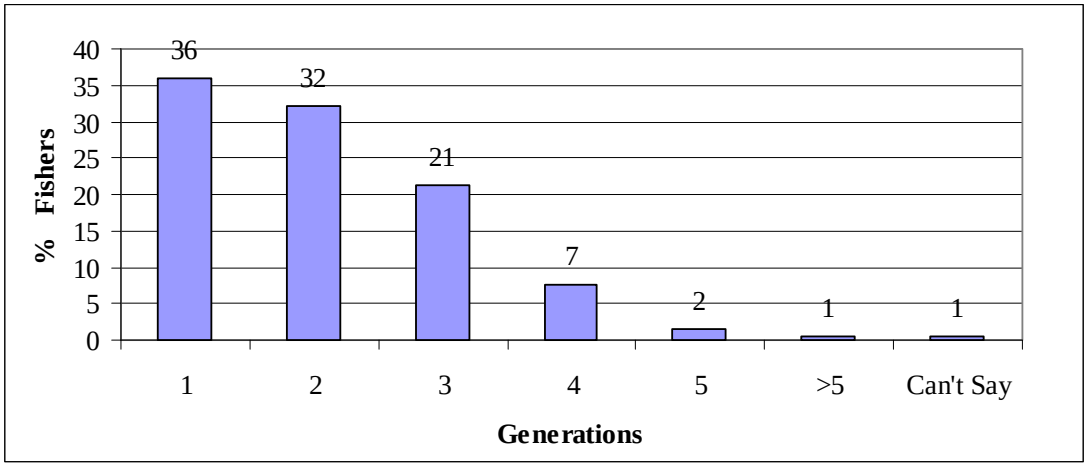
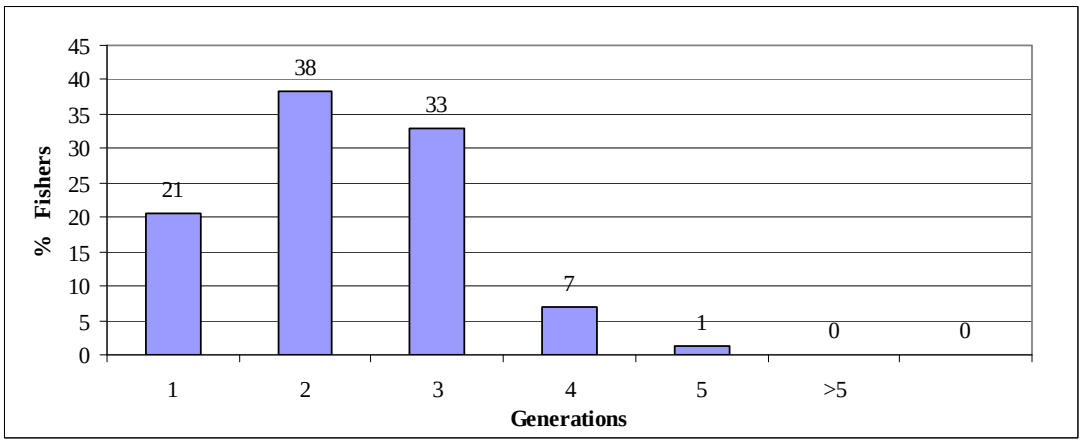


Figure BS7b: Percentage of OFT fishers with family history in fishing (Source: RM-SS).



There are 64% of OPT and 79% of OFT fishers with two or more generations of involvement in fishing (Figures BS7a and BS7b), which may indicate longer term social association and integration with communities and potential to be significant contributors to social capital.

The extent of part-time and full-time fishing is reported in the economic issues section. The fisher skills base was investigated through questions in the social survey. Fishers were asked about their current work in other industries and their capacity and willingness to transfer from fishing to other industries.

In the Ocean Prawn Trawl fishery, 13% OPT fishers worked in other industries. Of these 26 OPT fishers (from 187 interviewed) who were undertaking paid work outside the industry:

- 28% would consider earning all their income from that other industry;

- 60% would not; and
- 12% were undecided.

All 187 OPT fishers were asked about their capacity to consider alternative employment either full-time, part-time, or could not get employed outside fishing, as fishing is "all I know":

- 15% (28) could get FT employment outside fishing
- 14% (27) could get PT employment outside fishing and
- 67% (125) could not get employed outside fishing – fishing is "all I know".
- 4% (7) don't know/ can't say.

The 125 fishers from 187 who answered "I probably could not get employed outside fishing, as fishing is all I know" were asked if they would consider re-training. A total of 21% (26) would and 74% (93) would not consider re-training and 5% (6) of fishers were undecided.

In the ocean fish trawl fishery, 14% OFT fishers worked in other industries. Of these 10 OPT fishers (from 73 interviewed) who were undertaking paid work outside the industry:

- 50% would consider earning all their income from that other industry;
- 30% would not; and
- 20% were undecided.

All 73 OFT fishers were asked about their capacity to consider alternative employment either full-time, part-time, or could not get employed outside fishing, as fishing is "all I know":

- 18% (13) could get FT employment outside fishing
- 11% (8) could get PT employment outside fishing and
- 68% (50) could not get employed outside fishing – fishing is "all I know".
- 3% (2) don't know / can't say.

Table BS7: Reasons for not considering re-training to industries outside fishing (Source: RM-SS).

Reason	Frequency	%	Frequency	%
I'm too old	48	48%	18	47%
Fishing is the only industry I know	34	34%	14	37%
I enjoy fishing	33	33%	10	26%
It's a family business	14	14%	3	8%
I've invested in fishing equipment	11	11%	6	16%
Bad health/ injuries	3	3%	1	3%
Risk of unemployment	3	3%	0	0%
Illiterate/ low education	1	1%	1	3%
Language barrier	1	1%	1	3%
Other	6	6%	1	3%
Can't say	0	0%	0	0%
Total	**99**	**100%**	**38**	**100%**

The 50 fishers from 73 who answered "I probably could not get employed outside fishing, as fishing is all I know" were asked if they would consider retraining. A total of 24% (12) would and 70% (35) would not consider re-training and 6% (3) of fishers were undecided.

The 99 OPT and 38 OFT fishers who would not consider retraining, were asked about their reasons which are reported in Table BS7. Participants generally gave more than one response. Age was the major reason for not considering retraining, followed by only having experience in the fishing industry and enjoying fishing. All of these are inhibitors to the mobility of labour. Those who indicated a willingness to retrain were asked about their interest in retraining into other industries. The results are reported in Table BS8.

Table BS8: Industries which fishers would consider retraining into (Source: RM-SS).

OPT			OFT		
Industry	**Frequency**	**%**	**Industry**	**Frequency**	**%**
Charter Fishing	4	15%	Charter Fishing	3	25%
Building Industry	2	8%	Farming	1	8%
Government Employment	1	4%	Building Industry	1	8%
Tourism/ Hospitality	1	4%	Landscaping/ Gardening	1	8%
Other	6	23%	Other	1	8%
Can't say	13	50%	Can't say	5	42%
Total	**26**	**100%**	**Total**	**12**	**100%**

The social survey information shows the OPT fishers to be dependent on the fishing industry with approximately 70% of fishers indicating they have limited capacity or willingness to move from fishing to other employment. Approximately

28% of OPT and 50% of OFT would be able to consider employment outside fishing. Of those who would not, age, experience, fishing lifestyle, fishing family tradition, and investment in the fishing business/equipment inhibit fishers' capacity to move to other industries. This "psychic income" from fishing is highly regarded by fishers, who do not feel they would be satisfied by other work in the same way. This reduces fisher mobility in the work force.

There has been little investigation of fisher mobility in the Australian fishing industry, but some notable social studies, such as Bell and Nalson's seminal study in 1974, focus on issues for NSW dairy farmers facing industry viability and restructuring issues. Farmers were found to have strong identification with the land, farming and had low mobility. A range of quotes about the mobility of farmers from Bell and Nalson, (1974) is presented in Box BS1 and may apply to fishers in the Ocean trawl fishery.

A study analogous to the Bell and Nalson's work is required across all fishers in NSW to confirm this material. There are significant social issues for fishers below retirement age seeking other employment. These will vary from area to area as indicated later in the social assessment.

Box BS 1: Quotes on social mobility issues for dairy farmers in northern NSW
(Bell and Nalson, 1974).

It is not necessarily the worst farmers who leave the industry, but those who recognise other opportunities and are prepared to take the risk of turning to some other occupation. …..those that remain could be a hard core residue of economically and socially depressed farmers.

Farmers with off farm work were less inclined to be in poverty, compared with those without dual occupations.

Few respondents had alternative work. Social explanations are that farmers are farmers by tradition and it may also reflect lack of available opportunities for alternative work in different areas.

Social reasons for exiting farming may be the long hours involved in the industry, affording little leisure time, the advanced age of respondents and their wives, a potential labour shortage through sons leaving the industry, and reasons such as sickness and disputes around farming issues.

Old farmers, with no one following in the business, were not prepared to invest in new equipment.

Parents may not be encouraging children into the industry, but encourage education etc.

"Retreat farming" with the farmer holding on until eligible to receive the old age pension. Wife dissatisfaction is a major social influence in the dairy sector.

Many respondents were third generation and value farming as a way of life. With the independence it affords, are loath to leave their local social environment, friends, neighbours and relatives and the voluntary associations in which they have been active.

Away from farming they will have to compete with others for land based jobs. There may be a shortage of part-time labouring jobs.

The intergenerational nature of occupational mobility - most farmers transfer from one type of farming to another. Socially many farmers stay within 30 miles of place of birth. These ties may prevent farmers taking opportunities outside their area.

Farmers are independent and have a history of shunning government initiatives preferring voluntary adjustment. They also tend to shun the CES (Commonwealth Employment Service) and rely on their own initiative.

Regions fished and regional unemployment statistics

The regional importance of the ocean trawl fishery to the local community is reported in Tables BS1 and BS2. Unemployment data is available from current ABS statistics (ABS, 2003) only at a more aggregated level than the 1996 census data, which is available for each postcode. Table BS9 reports recent ABS unemployment data for the year 2001 for rural areas of coastal NSW.

Table BS9: ABS statistical regions and rural coastal area male unemployment (ABS, Feb. 2001).

Area	Labour force ('000)	Unempolyment 2001 ('000)	%Male
Richmond-Tweed & Mid-North Coast SRs	106.1	15.8	14.90%
Gosford -Wyong SR	71.4	6.2	8.70%
Hunter SR	171.8	18.1	10.50%
Newcastle SR	149.8	17.4	10.50%
Sydney	-	-	6.00%
Illawarra SR	112.2	8.4	7.50%
South Eastern SR	152.9	12.2	8.00%
NSW Total			**7.20%**

Regional unemployment data indicates higher rates of unemployment in areas away from Sydney, being higher in the north than in the south. Male unemployment by age group also varies in NSW as reported in Table BS10.

Table BS10: The percentage of Male unemployment by male age group in NSW (ABS 2001 census).

Age	15-19	20-24	25-34	44-54	55-64	65 and over	35-44
% unemployed	24%	15%	8%	7%	6%	7%	3%

The fishing population in the ocean trawl fishery is almost entirely male, with only 5% and 8% female OPT and OFT fishers respectively. More detailed statistics for unemployment by regional postcode are available from ABS 1996 and 2001 census statistics in Table BS2.This gives a longer term view of regional unemployment in postcodes of coastal NSW.

Fisher numbers and unemployment at the postcode level are reported in Table BS1 and BS2. The range of unemployment is from 3.15% in Central coast, to 27% in Coffs Harbour area. The impact of the FMS and unemployment are assessed in the second part of this report.

PNSW Guideline (d) **Summarise the overall social risk to fishers from the current operational arrangements taking into consideration the likelihood/frequency of impacts and the consequence of the impacts occurring.**

The current profile of ocean trawl fishers enables us to identify the overall social risks to fishers. The overall social risks to fishers from the current operational arrangements in the ocean trawl fishery include:

- reduction in employment opportunities;
- loss of fishing lifestyle;
- lack of alternative employment opportunities;
- insufficient fishers' involvement in management;
- conflicts;
- uncertainty;
- lack of secure, well developed property rights; and
- insufficient information on social aspects of the fishery.

Reduction in employment opportunities

Existing information shows that there are too many fishers depending on the ocean trawl fishery. Apparently between 839 and 1,314 persons are employed full-time and part-time in offshore trawling and associated fishing businesses (e.g. processing, marketing, boat building, fishing equipment manufacturing etc). Given that 59% of ocean trawl fishing businesses are not economically viable in the long run, they may choose to exit the fishery, and become increasingly dependent on other industries or social security benefits.

Loss of fishing lifestyle

Fishing is a way of life for most fishers. The profile of ocean trawl fishers shows that, fishers were found to be an aged, highly resident population, with substantial fishing experience and knowledge with strong family involvement in fishing. There are 64% of OPT and 79% of OFT fishers with two or more generations of involvement in fishing. Fishers were insistent about their identity as fishers and were unable, or unwilling, to consider re-training. Half of the businesses surveyed have their partners involved in their businesses. There were approximately 300 children below 16 years of age depending on the ocean trawl fishers.

Lack of alternative employment opportunities

As the fishing communities tend to focus around key coastal towns where employment opportunities are less, any reduction in fishing effort will have adverse impacts creating unemployment. As regional unemployment in NSW is higher on the North coast of NSW and areas outside Sydney, it is a significant issue for both outgoing and aging fishers considering alternative employment.

Conflicts

There are number of unresolved issues between ocean trawl fishers and ocean trap and line and lobster fishers regarding access to fishing grounds. These arise when fishers work in the same areas and target or incidentally catch the same species.

Uncertainty

Uncertainty is a risk to the fishery as policy changes and restructuring may reduce investment confidence until benefits become apparent. Institutional issues like frequent changes in fisheries policies, and inconsistencies between State and Commonwealth legislation create uncertainty within the industry. Many of the fishers in the OFT in the south are endorsed in the Commonwealth's South East Trawl fishery. Such uncertainties impede development of long-term business plans that are important to achieve long-term economic viability of individual fishing businesses. The Commonwealth's south east trawl fishery is managed by species quotas. Should the NSW fishery conform with this?

Lack of secure, well developed access rights

Lack of secure, well developed access rights is a risk to the fishery as fishers have not got a guarantee of sufficient tenure to plan for long term investment. An increase in tenure may also increase incentives for improved stewardship.

Inadequate information on social aspects of the fishery

The collection, analysis and application of socio-economic information has not previously been a priority in the list of NSW Fisheries research programs. Research programs to strengthen the socioeconomic database for the fishery and monitor socio-economic changes in the fishery must be developed. Information on fishers' views and perceptions towards on key issues in the fishery, their behaviour under existing policies, and their ability to participate in management (e.g. co-management arrangements) is also necessary for effective management of the fishery. This information will enable MAC members and other interested parties to effectively assess the socioeconomic implications of existing policies and appropriately advise the policymakers.

E: Assessment of the potential impacts of implementing the Daft Fishery Management Strategy

The Department of Infrastructure, Planning and Natural Resources (DIPNR) (formerly Planning NSW) Environmental Impact Statement (EIS) guidelines (PNSW 2002), require that the potential economic and social impacts of implementing the draft Ocean Trawl Fishery Management Strategy (OTFMS) are assessed.

3. Economic Issues

3.1 Assessment framework

As indicated in the Ocean Trawl Fishery Management Strategy it is the NSW Government's intention to promote a viable fishing industry, consistent with ecological sustainability and ensure cost-effective and efficient management and compliance in the ocean trawl fishery. A number of 'management responses' have been proposed in the OTFMS to achieve these goals. As required by the guidelines, **this section outlines the potential change in economic viability of ocean trawl operators as a result of implementing the Draft FMS** with a focus on assessing:

a) the ability of fishers to pay increased management costs in this fishery while taking into account increased management costs accrued in other NSW fisheries (e.g. Estuary Prawn Trawl);

b) likely changes in patterns of investment (directly in fishing as well as in associated businesses such as processing facilities and slipways) on a State and regional basis as a result of implementing the Draft FMS;

c) likely changes in employment in the fisheries on a State and regional basis as a result of implementing the Draft FMS;

d) likely changes in economic returns to fishers on an individual, regional and State basis as a result of implementing the Draft FMS;

e) estimate the likelihood of any new markets being developed for bycatch species and the likelihood the fishery could increasingly target these species if new markets are developed;

f) the impacts to seafood markets of any changes in seafood supply as a result of the Draft FMS while taking into consideration changes caused by other Fishery Management Strategies and major initiatives such as the implementation of recreational fishing havens; and

g) summarise the change in risks to the economic viability of the fishery from the management changes described in the Draft FMS taking into consideration the likelihood/frequency of impacts and the consequence of the impacts occurring.

The wider NSW Government assessment framework

The purpose of economic appraisal, in an environmental context, is "*to achieve a socially efficient allocation of scarce resources i.e. one which maximises the return, including the environmental capital stock, in order to maximise economic welfare of all citizens over time*" (NSW Government 1997c Annex 5). This requires that benefits and costs are measured through market values. Total social costs and benefits also include running down, or building up of the environment (NSW Government 1997c Annex 5). The current analysis is undertaken in the light of these aspects.

The major economic assessment technique is cost-benefit analysis (CBA), which quantifies in money terms all major costs and benefits, providing a consistent basis for evaluating costs and benefits, though it does not necessarily show the distribution of benefits or costs (NSW Government, 1997c).

Our approach to the assessment

The DIPNR guidelines require the focus of the assessment to be the impacts on "*the potential change in economic viability of ocean trawl operators as a result of implementing the Draft FMS***"**. While most of the guidelines ask for industry impacts, guideline 3(g) indicates that "*the risks to the viability of the fishery"* should be assessed. The guidelines have focused on impacts on the fishing industry, but we also assess fishery wide issues.

It is proposed that the following approach will be taken to analyse the economic impacts of the FMS. We will:

- *identify and describe the management responses in the FMS with the potential to change in the economic viability of ocean trawl operators;*
- *appraise management responses with economic impact on viability of the operators and on the fishery as presented in an overview table (Table E1); and*
- *identify and assess the most highly impacting viability issues in detail, with medium and low impact economic issues being discussed generically.*

The available descriptive economic information has been described in the previous section. There is insufficient economic data available to appraise the impacts several of the issues proposed in the Fishery Management Strategy. This limit should be recognised by the reader and where insufficient data are available, this will be indicated.

The management goals from the FMS document (FMS, 2003) and responses with economic impact are described in Table E1.

Table E1: Management Responses to the ocean trawl Draft FMS, ranked by potential economic impacts on operators and the fishery.

Management Response	Description of Response	Goals	Impact
5.1 (a)	Optimise biological yield	2,4,5,7	High
5.1(b)	Maximise the economic return to the fishery	2,4,5,7	High
5.2 (a), 2.1 (e)	Manage fishing effort	2,4,5	High
5.4 (a)	Implementation of share management provisions	2,4,5	High
2.2 (a)	Overfished species recovery	2,4,5	Medium
5.3 (a)	Performance measure for assessing viability at the individual fishing level	5,7	Medium
5.3 (c)	Promote the best harvest practices	5,6	Medium
5.3 (d)	Develop a cost recovery framework	4,5,6	Medium
1.1 (b), 2.1 (f), 6.3 (c)	Closures, refuge areas	1,2,6	Low
1.2 (b)	Developing more effective BRDs	1,4,5,6	Low

The review of existing data indicated major risks to the economic viability of the fishery from:

- excess active fishing effort;
- potential activation of latent fishing effort;
- insufficient controls on fishing effort and lack of economic incentives to fishers;
- increasing management and restructuring costs;
- loss of economic rent; and
- lack of access security for long-term business certainty.

Continuing improvements in fishing technologies (effort creep) was also identified as a risk.

The management responses have proposed measures to address these risks and will be assessed below.

3.2. Assessment of the Ocean Trawl Fishery Management Strategy

The following section assesses the proposed management responses to the risks previously identified and evaluates their potential impacts on the operators and on the fishery.

Management response 5.4a: **Implementation of Share Management Provisions of the Fisheries Management Act, 1994.**

Background

Validated catch history in the approved catch history periods was the historical basis for allocation of existing entitlements in the ocean trawl fishery. Under *Category 1 Share Management*, shares will be allocated to each endorsement holders on some basis, yet to be determined. The Category 1 shares will have a perpetual duration, are tradeable and fishers have a statutory right to be compensated if the government cancels the shares.

Assessment

The potential impact on economic viability of moving to a more enhanced access right is expected to be positive (Guideline 3). Under the required share management plan, which must be reviewed every 10 years, category 1 shares provide more security of access for fishers than the current restricted fishery regime or the previously proposed move to the category 2 scheme. They have increased divisibility which assists in trading and have increased duration over an annual licence.

Category 1 shares are shares in access and do not automatically restrict effort. They are not linked to catch or effort restraining measures such as ITQs, in the NSW Abalone and Rock Lobster fisheries. Without being linked to restricted effort or catch, they will not increase the economic returns to shareholders in the long term (Guideline 3d).

The FMS is insufficiently clear on how effort will be reduced. If minimum shareholdings are implemented this will force fishers to trade shares, with some choosing to exit the fishery, and thus reduce capacity in the fishery. However, minimum shareholdings alone will not contain effort levels in the fishery. Trading of shares under a minimum shareholding may decrease the ability of fishers to pay increased management costs in the short term, due to an increase proportion of management costs being borne by each remaining fisher as others exit (Guideline 3a). In the longer term if category 1 shares are linked to total effort restrictions, ability to pay management costs will increase with profitability. Under minimum shareholdings, buying additional shares is required to remain in the fishery. This will likely increase new investment in the fishery (Guideline 3b). Minimum shareholdings are likely to reduce employment in the short term, as the industry trades shares and downsizes (Guideline 3c).

Implementing category 1 shares will give owners an incentive to increase the value of the shares through building up the fish stocks and enables businesses to develop *10 year business plans* and to obtain funds from financial organizations to make investments in their businesses. Shareholders will regard shares as an investment or superannuation and should be concerned about restricting effort in the fishery to increase profit and hence share value.

At this stage, the basis of allocation for shares is likely a combination of access right and recognized catch history and may raise equity issues between fishers (Guideline 3).

5.2 (a) Manage fishing effort in the ocean trawl fishery by:

(i) limiting the number of each endorsement type so as to minimise the potential activation of latent fishing effort

(ii) maintaining the hull capacity, engine power and net length restrictions that apply to the offshore sector of the ocean prawn trawl fishery and extend these rules to the other sectors of the ocean trawl fishery (i.e. inshore prawn trawl, deepwater prawn trawl, northern fish trawl and southern fish trawl)

(iii) establishing a maximum level of fishing effort for each sector of the ocean trawl fishery to be achieved within 10 years of the commencement of the share management plan, and

(iv) investigating the efficacy of limiting the number of days/nights each boat may work in the prawn trawl and fish trawl sectors of the fishery.

Background

Excess capacity and high effort levels have been identified as major economic risks in this fishery. The overcapacity in the fishery means that some endorsements are latent, those fishers probably fishing in other fisheries. Ocean fishers current levels of active effort are above the profit maximising level of fishing effort.

The introduction of category 1 share management increases fisher security, but does not address the long term viability issue. The FMS indicates an intent to limit the activation of latent effort, but the level of structural adjustment or the means to achieve it are not specified. Limiting the activation of latent fishing capacity can happen through a range of adjustment tools, such as:

- share allocation;
- minimum shareholdings limits;
- higher requirements for new entrants; and
- surrenders and buybacks.

Each tool would have different implications for fishers.

Attempts to improve profitability in the fishery through reduction of active effort may also give an incentive for latent effort to activate. Given the multi endorsed nature of fishing businesses, improvements in OT fishery profitability may cause fishers with low levels of effort in several fisheries to increase their effort in the OT component of their fishing business.

Assessment

Each part of the management response is assessed in turn.

- limiting the number of each endorsement type, so as to minimise the potential activation of latent fishing effort.

The FMS does not indicate how it will limit the number of each endorsement and hence the activation of latent effort.

Share allocation criteria have the capacity to achieve such reductions within the bounds of equity required in such a process. Currently NSW Fisheries is in the process of finalising the share allocation criteria, and that the criteria for the ocean trawl fishery will differentiate between active and inactive entitlements based on validated catch history.

Minimum shareholding requirements could reduce capacity in each sector of the fishery.

An example of the cost of implementing minimum shareholdings at a level that would remove latent effort is reported in Box 1.

Box 1: An example of the cost of implementing minimum shareholdings to remove fishing capacity.

A reduction of latent fishing capacity could take place through a minimum shareholdings limits. If for example all endorsement holders had 100 shares, then a minimum shareholding limit of 120 would mean shareholders would have to buy shares from others fishers.

Removing latent effort would require a 40% reduction in total capacity (number of boats) and would reduce the current active boats from 410 to 252, a reduction of 158 boats. A reduction of 40% of boat capacity may equate to each remaining business having to purchase the equivalent of 40% of the value of an ocean trawl fishing business in the form of shares.

The cost of the reduction in capacity is related to the method of share allocation. *For example*, fishers having to buy 40% of 100 shares over an agreed time period (1 to 5 years), may equate to 40% of the market price of a typical fishing business that may be expected to exit the fishery. If the market value of the smaller ocean prawn trawl businesses choosing to exit is approximately $50,000, then a business which wishes to remain would pay approximately $20,000 over the term of the minimum shareholding adjustment. *(The estimates are given as examples. Industry would need to assist in predicting the appropriate capital values under the specific assumptions of the program they propose).*

It is expected that holders of latent endorsements, low income, or elderly fishers may be likely to sell their shares. Fishers with high opportunity costs may take the chance to exit the fishery and work somewhere else. The pattern of trading under share management should be monitored.

The costs of purchasing shares may lead to increased active effort levels in the fishery as fishers seek additional revenue. Thus a total effort cap is needed in the wake of capacity adjustment and eventual control of individual fisher effort by limiting the number of fishing days/nights fished.

During a period of capacity adjustment via minimum share holdings, the impact on industry viability is expected to be negative (Guideline 3d). The cost of

fishing now includes the amount required to purchase additional shares to stay in the fishery. Even though this is a payment which gives the fisher additional equity, it is likely that fishing effort will rise to increase revenue in this situation.

Higher requirements for new entrants enable managers to restrict entry by placing specific criteria that new entrants have to meet, for example, holding a certain number of shares. Excess capacity can be reduced by surrender provisions or buy back schemes. Shares could be surrendered under certain circumstances and a buy back scheme may go further with fishers wishing to remain in the fishery offering to buy back capacity from those who wish to exit. The economic implications of this are similar to minimum shareholdings as described in Box 1. Often government can be involved in buyback regimes in facilitating access to capital or in matching industry generated funding in order to assist industry restructuring.

- *Maintaining vessel capacity restrictions*;

It is envisaged that vessel capacity restrictions, such as horsepower and other unitisations would remain in place. In an input control management regime these restrict efficiency in order to contain effort levels. In an input-based control strategy there is always a possibility of substituting controlled inputs with other less regulated inputs. In this fishery, controlling the number of boats may be substituted by fishers working more days/nights. The economic benefits from vessel capacity restrictions will depend on the regulations that maintain total capacity and total effort in the fishery.

- *Establishing a maximum level of fishing effort within 10 years:*

Irrespective of the mechanisms being used for effort reduction, there is a need to define a target for the total effort level in the fishery in the longer term. The FMS proposes that the maximum total level of fishing effort be achieved within 10 years of the commencement of the share management plan. The program will establish interim effort milestones to be achieved within the envisaged 10 year period.

The maximum level of fishing effort required to sustainable harvest of the target prawn species is yet to be determined by the Total Allowable Catch Setting and Review Committee. A bio-economic model would be required to determine the profit maximising level of effort in the fishery. Without such direction the TAC committee may not be able to contain, or reduce effort levels in the fishery, on any basis other than relative to past practice. It is probable that given past management and levels of latent effort, the total effort levels could be reduced substantially (Dominion, 1998).

It is unlikely that management can maintain a total effort limit without a quantitative effort limit on the individual producer's fishing effort. Absence of an individual effort limit makes catch rates and costs of operation the only economic restriction on total effort in the fishery.

A total effort limit set at less than current levels of total effort would probably increase profitability, though this depends on the costs of restructuring and management and the level of compliance with the total effort limit (Guideline 3).

External assistance from government may be required to assist adjustment and bring the fishery onto a more sustainable footing. This could be in the form of providing access to low interest capital for industry adjustment, as well as a "one off" injection of funds to facilitate industry adjustment.

Establishing a maximum level of fishing effort within 10 year may:

- increase the ability of fishers to pay increased management costs within 10 years (Guideline 3a);
- reduce investment in the fishery, as fishers may reduce their vessels and other inputs (Guideline 3b);
- reduce employment as effort levels will be reduced requiring fewer fishers (Guideline 3c); and
- increase economic returns to fishers within 10 years (Guideline 3d).

Experience in other fisheries would indicate that individual limits on effort should be investigated.

- *Investigate the efficacy of limiting the number of days/nights of fishing*

The primary economic risk in the fishery is the lack of control on total fishing effort. The total number of days/nights fished in the prawn trawl and fish trawl sectors of the fishery may be contained by limiting the number of days/nights available to each vessel operator.

Reductions in capacity will not reduce overall effort in the fishery because of the ability of the remaining boats to fish more days/nights. Effective effort limitation of the individual producer at the days/nights fished level, will make total effort binding on shareholder behaviour in the fishery. This will ensure the value of the shares can increase and is not eroded by some vessels increasing effort without limit.

The management response intends to investigate the efficacy of implementing a limited days and nights regime. Reviews of the post adjustment performance of the Queensland East coast trawl fishery should be made available to industry as part of the appraisal. Similarly the cost of implementing and maintaining the regime should be determined.

Allocation of days/nights fished would have to be consistent with category 1 share management. Monitoring would involve the cost of vessel monitoring.. These vessel monitoring costs may be minor in terms of benefits from keeping effort controlled and from the increase in capital share value of a limited number of days/nights in the fishery. Ideally the days/nights allocated to the individual business should be tradable to realise economic efficiency.

The establishment of days/nights fished regime would initially raise equity issues in the allocation of day/nights as days fished are not necessarily equal units of effort due to the different capacity (number of vessel units) held by each fisher. Limiting the number of days/nights of fishing effort to below current total effort levels is likely to:

- increase the economic viability of fishers and the fishery (Guideline 3);

- increase the ability of fishers to pay increased management costs (Guideline 3a);
- reduce capital in the fishery as capacity adjusts, with possible new investment in the longer term (Guideline 3b);
- reduce employment (Guideline 3c); and
- increase economic returns to fishers and increase the level of rent in the fishery (Guideline 3d).

In summary, this FMS management response (5.2a) needs to more clearly propose the steps to contain or remove latent effort, and to reduce active effort levels in the OT fishery. Addressing these issues is essential to the maintenance of long term business viability in the OT fishery.

It is unlikely that total fishing effort can be held at current levels without decisive policy steps being implemented. If total fishing effort continues to rise at historic rates, the fishery may have to implement restrictions on individual fishing effort through limits on days/nights fished in the next 5 years. Alternatively output control alternatives, such as individual transferable quotas, or royalties could also be appraised. However the fishery could benefit from the FMS being clearer on the restriction and management of effort in the fishery.

Management response 5.1a: **Optimising biological yield for target species &**
Management response 5.1b: **Identify and implement strategies to maximise the economic return to the fishery**

Background

As indicated in the FMS, many important fish species are being taken at sizes below the optimum size for the species resulting in growth overfishing. Capturing fish and prawn species that are below optimum size must be reduced. Target species must be captured at their optimum sizes to optimise biological yield for target species.

Assessment

Optimising the biological yield will have significant long-term bio-economic implications for resource productivity, stock rebuilding and hence viability of the industry. Maintaining sustainable stock levels of target species is essential and minimising negative impact of fishing operations on marine ecosystem is part of this process.

NSW Fisheries noted that given some knowledge about the biological aspects of the primary species and key secondary species, it is possible to determine the optimum biological size to harvest each species. This should be part of future research and has implications for fishing gear selectivity also.

For prawn management the estuary prawn trawl EIS has proposed the Prawn Resource Forum. This body would be able to oversee changes in prawn harvesting policies which could increase bio-value in the entire prawn sector. For example: the economic benefits of optimising biological yield for each prawn species can be modelled by age and price structured bio-economic analysis. This could lead to alterations in the harvesting regime to maximise the net returns available from the prawn stock through time. Obtaining the maximum value may require implementing

species specific gear, spatial and time based harvest strategies in the fishery. Applying the appropriate fishing gear selectivity could be part of such strategies.

Generally as management restricts effort in the fishery, the capacity of the resource to yield optimal sized fish increases. Optimising the biological yield for each target species in the fishery will increase economic returns to fishers (Guideline 3d) which in turn will increase the ability of fishers to pay increased management costs (Guideline 3a).

Maximising economic return

We have previously examined FMS proposals for managing effort and optimal harvesting strategies as ways of maximising profit.

Existing input controls may not lead to increased productivity from effort, nor minimise the total cost of effort to increase economic returns in the fishery (Guideline 3d). There is a need to implement more effective management methods to maximise the economic return in the fishery. Using a limit on days and nights fished by individual businesses is probably more acceptable to fishers than a move to catch based controls in the prawn fishery, though the finfish fishery operators interface with the Commonwealth's South East Fishery and may prefer a catch limiting regime.

Under input controls total effort is likely to increase through time and must be addressed every year which may involve annual reductions in the number of nights fished. In the longer term management may appraise a change to output control methods which may provide economic incentives to fishers to rationalise their fishing activity to increase economic returns and hence the value in the fishery. However the cost of implementation and maintenance of output controls is often high and would need appraised before moving regimes.

Management response 5.3c: **Promoting the best post-harvest practices**

Improving post-harvest practices such as handling, processing, and distribution are important to utilise the fish/prawn catch in a cost effective and efficient way and hence increase the economic returns in the fishery (Guideline 3d). For example, minimizing waste, adding value, developing new products, increasing consumers' safety and confidence, and ensuring consumers that the product was harvested in a sustainable manner, are some of the areas where fishers may increase their profits.

As promoting the best post-harvest practices requires efficient equipment, advanced technology and skilled people, the total investment in the seafood industry (Guideline 3b) and the employment may increase (Guideline 3c).

Management responses 1.1b, 2.1f, 2.1g & 6.3c: **Implementing closures and refuge areas for targeted species**

Background

Implementing area and time closures is necessary to avoid growth over fishing in the fishery, protecting critical habitats and recovering ecosystem. The FMS proposes to establish closures and refuge areas for species targeted by trawling.

Assessment

The risk from having insufficient area closures and refuges for fish and prawns is potential stock depletion.

Closures may have positive impacts on the ecosystem as they help damaged habitats to recover. However, if the total effort in the fishery is excessive, closing areas may only bring an undesirable increase in fishing activity in other areas. Assuming the FMS addresses effort levels as planned, closures may increase future yields in areas adjacent to closed areas and lead to an increase in total economic returns (Guideline 3d).

Management response 1,2b: **Refine and improve methods for reducing incidental catches in the fishery**

Background

In the ocean trawl fishery, by-catch impacts several species that are targeted in other commercial fisheries. The FMS proposes to develop and implement more effective by-catch reduction devices (BRD).

Assessment

Implementation of by-catch reduction devices as part of the FMS in the ocean prawn trawl fishery can have both positive and negative impacts on fishers' incomes and catch composition. BRDs are a form of gear regulation and risk increasing inefficiency. However in addressing the by-catch issue in the ocean trawl fishery, fishers in other fisheries where ocean trawl by-catch species are targeted, may gain a benefit from the regulation and be unaware of the origin.

Fishers in the ocean trawl may bear higher operational costs in using BRDs, with some potential benefits from improved catch quality and hence higher prices to fishers. There is a possibility of reduction in total catch and hence total revenue (Guideline 3d), which in turn will decrease the ability of fishers to pay increased management costs (Guideline 3a). The use of gear developments may also align to the FMS attempting to increase economic benefits from time of capture of species in which gear selectivity will be important.

The costs and benefits from developing and implementing effective BRDs are currently unknown. If fishers have to buy new by-catch reduction devices, this may increase investment in the fishery which represents additional capitalisation with unknown returns.

Management response 2.2a: **Recovery of overfished species**

Restoring overfished populations will have number of biological, ecological and economic benefits. As most species in the ocean trawl fishery are of high value, the potential economic benefits of rebuilding any overfished species may be significant due to the sustainable benefit from access to additional fish in subsequent years.

The FMS proposes rebuilding overfished species through closures, changes in selectivity and size limits. This requires cost benefit appraisals of the proposed changes. The short terms loss should be compared with the potential gains and may give increased economic returns to fishers (Guideline 3d), increased jobs in the fishery (Guideline 3c), and an increased economic contribution to local, regional and national economies. But these benefits will largely depend on the rate of recovery and they must be weighed against the costs of recovery programs and the inherent risks from action and inaction.

Management response 5.3a: **Developing a performance measure for assessing viability at the individual fishing business level**

Background

The FMS suggests assessing the economic viability at the fishing business level is important as there is no framework in place to assess the performance of individual fishing businesses.

Assessment

Developing performance measures for assessing viability at the individual fishing business level is not the recommended way to monitor economic viability / performance in a fishery (Gooday and Galeano, 2003). Knowledge of the commercial viability of their business is a basic responsibility of the business owner, not the role of government. There are inherent confidentiality problems in having government agencies involved in monitoring individual business activities, including privacy concerns.

Periodic independent assessment of industry viability can enable managers to be aware of industry viability issues through simple calculations on a typical average business. Problems with the viability of individual businesses can also be communicated to management through the MAC process. The fishery wide returns can then be developed as an indicator of economic health (Gooday and Galeano, 2003).

Monitoring as proposed would reduce economic profitability due to the cost of the exercise (Guideline 3) and reduce the ability of fishers to pay increased management costs (Guideline 3a).

Management response 5.3d: **Develop and implement a fair and transparent cost recovery framework for the ocean trawl fishery**

Background

On 2 November 2000 the government announced that over the succeeding 5 years NSW Fisheries would develop and implement a fair and transparent cost recovery framework for category 2 share management fisheries. From 2005, recovery of costs that have been identified as attributable to industry, will be progressively introduced over a further 3 years. Returning the entire fishery to an economic surplus within 5 years from implementing share management plan, requires a number of changes in the fishery in terms of effort adjustment and allocation of resources. In order to achieve this goal, the FMS proposes a number of changes.

The key changes include:

- allocation of shares based on validated catch history;
- longer term allocation of fishing entitlements – category 1;
- limiting endorsement types and the activation of latent effort;
- effort reduction through minimum shareholdings; and
- setting the maximum level fishing capacity within 10 years.

The impacts of implementing cost recovery are discussed below, focussing on the ability of fishers to meet increased fishery management charges (Guideline 3a).

Assessment

The economics of fisheries management enables an appraisal to be made of the economic contribution of the fishery to the economy and to analyse the impact of the changes advocated in the FMS. ESD principles dictate that resources should be valued at their market values and those subsidies should be taken into account in the form of an environmental accounting statement.

Box E2 assesses the ability of fishers to meet increased fishery management charges in a 5 year period (2003/04 -2007/08) by projecting currently available data and information.

Box E2: A projected management cost account for the OTFMS (2003/04 - 2007/08)

($million)	**2003/04**	**2004/05** ($million)	**2007/08** ($million)
Gross revenue from catch (i)	27.40	28.22	30.84
Less economic cost of effort (ii)	25.74	26.51	28.97
Operational economic surplus	**1.66**	**1.71**	**1.87**
Management charges to industry (iii)	0.53	0.69	1.01
less cost subsidies (iv)	0.48	0.32	0.00
Additional cost of FMS (v)	0.10	0.10	0.10
Plus rise or fall in fish stocks (vi)	0.00	0.00	0.00

Total additional FMS related costs	1.21	1.21	1.21
Total economic contribution	**0.35**	**0.40**	**0.56**

(i) This is the value of catch from all businesses in the ocean trawl fishery (see Box 1) rising at 3% per annum.

(ii) Total cost of effort less management charges (26.27- 0.53 = 25.74) rising by 3% per annum.

(iii) Costs of management attributed to fishers under current cost policy are added. IPART estimate of this cost is $1.007m less fishers payments already in economic costs 0.53m. Fishers are to pay all charges by 2007/08.

(iv) Current $0.48m of subsidised management costs will be reduced to zero by 2007/08.

(v) Estimate of additional cost of FMS (A value of $100,000 recurrent has been assumed).

(vi) The changes in value of the stocks are unknown and are assumed to be zero.

By projecting available economic data for a five year period from 2003/04, considering increased management charges due to removal of latent fishing businesses, it is envisaged that the fishery will still be in economic surplus by 2007/08 (see Box E2). The purchases of additional shares to remain in the fishery are not explicitly considered in the total analysis as they are an increase in equity for the purchaser, as opposed to management charges which are an expense. The envisaged amount, if any, is unknown due to the lack of specific policy detail in the FMS.

Box E3: Projected estimates of costs per fisher under the OTFMS (2003/04 - 2007/08)

	2003/04 ($)	**2004/05** ($)	**2007/08** ($)
Operational Economic surplus*	4,044	6,777	7,405
Management charges (i)	1,293	2,755	4,008
FRCAC/EIS (ii)	230	230	-
FRDC (iii)	115	115	115
New FMS charges (iii) & (iv)	397	397	397
Share rental (iii)	-	100	100
Total charges	2,035	3,579	4,620
Total economic contribution	**2,009**	**3,180**	**2,875**

(i) IPART estimate of this cost is $1.007m. Current management charge 1,658,000/410= 4,044. Management charges will increase if 158 latent fishing businesses were removed and management costs had to be shared by the remaining 252 active fishing businesses.

(ii) FRCAC expenses are $150 and EIS $80 per fisher in first 3 years only.

(iii) c.p.i. is not included

(iv) Estimate of additional cost of FMS $100,000/252 businesses.

* Operational economic surplus from Box 2

Projected estimates of costs per fisher under the OTFMS during the five year period (2003/04 -2007/08) are presented in Box E3. Under the FMS, the costs of management will be increased with new costs to fishers. With a reduction of 158

(latent) fishing business numbers in the fishery, the total charges per an average fishing business is estimated to increase from current $2,035 to $4,620 in 2007/08. This assumes a reduction in fishing business numbers which would increase the portion of management costs to each remaining fisher. An estimated $100,000 increase is included in respect of new programs in the FMS as an estimate of envisaged program costs.

If an adjustment as in the example in Box 1 was considered, businesses would have to pay $20,000 over a five year period to remain in the fishery i.e. $4,000 per annum for 5 years. This is not included in the account above, but is a conservative indication of potential adjustment costs.

Removing latent effort will not increase economic viability in the fishery. In order to increase economic benefits in the long-term, fishing businesses have to reduce active effort in the fishery by buying-out more active effort in excess of latent effort. If full management costs are to be recovered from fishers within 5 years, the fishery should return to economic surplus during that period, instead of the 10 years to implement maximum effort levels as suggested in the FMS.

FMS objective 6.3: **Ensure cost-effective and efficient management of the ocean trawl fishery.**

One of the objectives (6.3) of the FMS is to *'ensure cost-effective and efficient management of the ocean trawl fishery'*. The proposed management responses in the FMS (the fishing business card system, transferring jurisdiction for trawling to the Commonwealth, and reviewing and rationalising the closure regime) are indirectly related to achieving this objective.

The provision of efficient and cost effective fisheries management involves not only providing a given level of management services at least cost, but also ensuring that the management services provided produce the highest possible net benefits to the fishery (Gooday and Galeano 2003; Latacz-Lohmann 2001).

Fuller incorporation of cost-effective and efficient management requires a framework for improving the quality of fishery management service delivery. There would be specification of each of the services to be delivered and clarification of acceptable performance standards within the agreed costs of management. The effectiveness and efficiency of a management service delivery framework requires further development under the FMS, before it can be assessed.

Other management responses with economic impacts

For identified trawl grounds inside 3 nautical miles south of Barrenjoey Headland, the FMS proposes to enter negotiations with the Commonwealth with a view to transferring jurisdiction for fish trawling to the Commonwealth and close remaining areas to fish trawling (6.3b), with the exception of areas identified for targeting school whiting, to be retained within NSW jurisdiction. This development will reduce management costs, uncertainties in catch and effort data, and conflicts between state and Commonwealth fishers.

The costs of management to NSW trawl fishers under this arrangement may vary from current State based cost recovery. In the OFT many fishers are currently endorsed by the Commonwealth government and will be familiar with the relative management costs. Consistency with other jurisdictional or natural resource management requirements (6.5a) is necessary to avoid conflicts and to increase compliance in the fishery.

Encouraging fishers to participate in decision-making will increase their cooperation to comply with the management regulations. Providing more information about fishery management issues, implementing educational and communication programs will enable fishers to effectively participate in developing as well as implementing management regulations. The greater the degree of cooperation between fishers and managers, the lower the likely costs of regulation (Whitmarsh, 1998).

Moving from a district level compliance strategy to a state-wide strategy (6.1i) will have several advantages. For example, it will reduce administrative and implementation costs, a universal compliance strategy for all ocean trawl fishers in NSW, and works as a basis for conflict resolution and hence better cooperation among fishers. A State-wide compliance strategy will also help reduce conflicts between ocean trawl fishers and other commercial and recreational fishers.

The Fishing Business Card system will enable NSW Fisheries to increase the quality of data on fishing operations which in turn used to improve the understanding of changes in fishing businesses. It will also help monitor illegal activities in the fishery.

Implementing vessel monitoring systems (VMS) and catch and effort reporting systems (6.1iii) will enable NSW Fisheries to effectively implement management regulations and assess the status of the fishery on a regular basis. For example, area closures and marine parks, compliance with jurisdictional and inter-fishery boundaries, illegal fishing, and days/nights each vessel fished can be monitored more effectively. Fishers will be able to communicate more effectively with other fishers and the department and exchange valuable information.

Monitoring the status of stocks (2.1d) and estimation of commercial, recreational, indigenous and illegal catch (4.1 a) are fundamental requirements to manage any fishery. The catch and effort data helps to assess the status of target species and appropriately allocate resources and increase equity in the fishery.

Guideline **(g) Summarise the change in risks to the economic viability of the fishery from the management changes described in the Draft FMS taking into consideration the likelihood/frequency of impacts and the consequence of the impacts occurring.**

3.3 Change in risks to the economic viability of the fishery

Change in major risks

Risks: Excess active fishing effort and latent fishing effort

The major economic risk in the fishery is excess active fishing effort. Total effort needs to be reduced to a level that would support fishing businesses that are economically viable. There is also a high level of latent effort in the fishery. The vessels that are not fishing, or fishing a few days per year due to commitments in other fisheries, have considerable potential to increase fishing effort in response to improved economic conditions in the OT fishery.

FMS responses:

Limiting the number of each endorsement type so as to minimise the potential activation of latent fishing effort:

The FMS does not sufficiently explain which measures to contain latent effort will be implemented. Share allocation and minimum shareholdings are tools that may be used to restrict vessel capacity and surrender and buyback schemes are also possible. Category 1 share management alone is insufficient to control rising total effort and existing overcapacity in this fishery

Changes in risks from establishing maximum level of fishing effort within 10 years:

The FMS aims to establish a maximum level of fishing effort in the 10 year view in order to achieve a fishery that is commercially viable in the longer term, but the recommended level is not stated. The current level of effort in the fishery is above the profit maximising level and the preferred total effort limit in the fishery could be indicated in the FMS.

Attempting to hold total effort at current levels, may require minimum shareholdings to enable industry to adjust, but is probably only a temporary stage in which total effort levels may rise as fishers seek more revenue to meet costs and new borrowings. The introduction of transferable numbers of days and nights per fishing business is probably required in the 5 year view to control effort and enhance profitability.

A proposed 10 year period to establish desired effort levels (5.2a iii) may not be sufficiently compatible with other management response (5.3 d) that aim to recover full costs in 5 years. Policies must be developed to restructure the fishery in a way that increases the economic returns in the fishery and hence recover full management charges within 5 years.

Efficacy of limiting the number of days/nights of fishing in managing fishing effort:

Investigating the efficacy of limiting the number of days/nights each boat may work in the fishery will be a step forward towards developing a more efficient management regime for maintaining effort levels in the fishery if adopted. Each

fishing business would be allocated a specific number of days/nights they can fish in a year.

Initially total effort can be contained by controlling number of days/nights, but in the long-term total fishing effort may increase, as producers maximize the use of unregulated inputs. The positive results from limiting the number of days/nights fished in maintaining total effort can only be realised if other input regulations are also effective and if the total effort limit takes account of ongoing rises in technical efficiency.

If implemented, fishing days/nights should be transferable and tradable in order to increase efficiency and the value of the shares. Transferability and tradability may have some negative impacts if they are not attached to vessel capacity in the allocation process.

Risk: Increasing management and restructuring costs

Given the current level of viability in the fishery, it is envisaged that many fishers will have difficulty in meeting additional management costs.

Under the FMS, the costs of management will be increased with new costs to commercial fishers. Prior to 2007-08 period the intention is to change the basis of charges, relating management charges to business shareholdings, but without knowing how the costs of management will be distributed amongst fishers, it is not possible to model the impact of that change.

Removing latent effort would equate to approximately a 40% reduction in total number of fishing businesses in the fishery in 2003/04. The total costs (excluding share buy-back charges) per fishing business is estimated to increase from current $2,035 to $4,620 as additional new program costs are added and the total costs are divided between fewer operators. If share purchase costs were of the order of $4,000 per annum for five years, fishers would be borrowing to gain new equity and this would impact fishing business viability.

Costs of restructuring impacts the ability of the fishing enterprise to pay debt incurred in purchasing shares. However for the debt incurred, the business receives increased assets and each exiting fisher also receives payment through selling their shares. Restructuring costs are therefore different in impact to the fixed nature of management costs.

Risk: Poorly defined access rights and insufficient control on effort

The current restricted fishery access right regime gives access for one year duration with expectation of renewal. The rights issued under the category 1 share management give secure access in perpetuity and has compensation provisions. Category 1 shares gives fishers a more divisible share of access, but there is nothing to restrict the amount of effort applied or catch taken.

The proposal of a total limit on effort in each fishery by implementing a limited number of days and nights per operator, makes effort limits binding on the individual

fisher. Days and nights should be transferable, to improve economic efficiency through trading. Such a scheme is used in the management of the Queensland East Coast Trawl Fishery. The equivalent measure in the fish trawl part of the NSW fishery may be less desirable than having quota for fish species as in the Commonwealth's South East Fishery. The FMS does not examine this option for the fish trawl fishery.

Risk: There is currently no resource rent in the fishery

The FMS is insufficiently clear on the action that will be taken to increase resource rent in the fishery through restriction of fishing effort. Limiting overcapacity through limits in endorsement types and limiting the activation of latent effort does not increase resource rent. A reduction in the total level of fishing effort will generate resource rent and will likely require limits on days/nights fished to be most effective. Category 1 should give fishers the incentive to take action to reduce effort as reduction in rent will negatively impact their share value.

The time frame for resource rent to become available may be greater than five years and depends on the efficacy of the FMS in removing latent effort and on the level of restriction in total effort via limiting days and nights per fisher. Such input restrictions are eroded by improving technology and may ultimately require total effort to be reduced annually by the rate of technical change or by a change to output controls, such as ITQs or royalties. Currently the FMS needs to more clearly state how effort will be limited in order to produce more resource rent.

Change in other risks

Risk: Inadequate economic performance monitoring and social performance indicators

The need for economic research has been recognised and the FMS proposed identified a research area '*the economic viability of trawl fishing and flow-on benefits to the community'*. Research should concentrate on enhancing profit in the fishery, as any flow-on benefits depend on fishery output to impact the local community. There is very little information available on social aspects of the ocean trawl fishery and there is no proposal in the FMS for social research to address this deficiency.

Risk: Continuing improvements in fishing technologies (effort creep)

Restrictions on input controls are becoming ineffective because of effort substitution due to continuing improvements in fishing technologies and hence increase in total fishing effort. The FMS does not have any management response to address this issue. Therefore, the level of this risk increases as technology advances. In the longer term, the containment of effort and effort creep may require an evaluation of moving to output controls. This could involve using either quantitative or royalty based policies on a fishery with fewer operators than at present.

4. Social Issues

The environmental assessment guidelines issued by the DIPNR require that we assess the potential social impacts of implementing the draft OTFMS against the following criteria:

- likely changes in social impacts on fishers, their families or any local communities;
- whether the risk of social impacts are changed;
- whether the level of job satisfaction among commercial fishers is likely to change; and
- likely employment fate of any fishers exiting the industry.

Social issues arising from implementing a new management plan fall into several categories.

Firstly, there are socio-economic impacts arising directly from how the fisheries management strategy impacts the resource and the social system involving fishers, including the community.

Secondly, a plan brings changes, with social issues to be addressed by fishers. The socio-economic impacts are most readily quantified. Other measures of the capacity and willingness of fishers to respond or incorporate change are more difficult to estimate, requiring substantial fisher consultation and communication.

Other elements may be deemed to be important to individual fishers, but there is insufficient baseline information to independently evaluate fishers' opinions. The analysis is constrained by the available information, the resources available to the study and the lack of adequate background information in this emerging area. The following framework was used to assess the potential social impacts of implementing the draft OTFMS.

4.1 Assessment framework

Social impact assessment of fishery management plans is a recent innovation in NSW. In the NSW Government's guidelines (NSW Government 1997b) for assessing social impacts, the following measures of community wellbeing are recommended:

- economic and financial measures - income measures, poverty lines, household expenditure, quality of life measures - leisure time, air and water quality, rates of illness and life expectancy, educational attainment levels, housing size and density, availability of social services; and
- an assessment of intangible factors- quality of life measures, such as community spirit, levels of social cohesion, confidence in public institutions and intangible aspects of social well being including "social capital".

The NSW Government guidelines indicate there is no one measure of social well being and that while economic measures dominate many assessments, the quality

of life measures and intangibles should be considered in policy assessment. Governments can use social assessments to "better anticipate the effects on policies and programs". When social impacts are made more transparent, policy trade-offs are highlighted and subsidiary policies to deal with negative impacts on particular areas and groups may be formulated" (NSW Government, 1997b).

The NSW Government Guidelines suggest "*it is not possible to establish a single SIA methodology to apply at a state-wide policy and program level because of the nature and impact of the policies often extend across regions and groups"* (NSW Government, 1997b, p9). The guidelines set a broad perspective or framework for social assessment summarised in a "quick test summary table" (NSW Government, 1997b, p23) as shown in Box E4.

Box E4: Quick test summary table (adapted from NSW Government, 1997b, p23).

1) Describe the policy objective;
2) Identify the social impacts of the proposed policy;
3) Measuring change and social impacts;
4) Evaluating social impacts and social justice principles; and
5) Responding to impacts (monitoring, management and mitigation)

Further Government guidelines extend to the *Rural Community Impacts Statements* (NSW Government 1997a). In these the economic and social characteristics of rural communities in NSW are specifically recognised and recommended to be included in government decision making as summarised in Box E5. It is likely that rural fishing communities in coastal NSW struggle with similar issues.

Box E5: Summary of Characteristics Rural Communities after NSW Government (1997a).

- **Geographic isolation** - business being based at a distance from suppliers or markets;
- **A narrow and variable economic base-** being dependant on one industry, coal mining, forestry, fishing etc, also being influence by public sector employment changes;
- **Physical isolation and small population size** – individual families may live outside community centres and a greater distance from a more substantial regional service centre. Isolation limits social interaction, cultural and employment opportunities and access to public sector services and facilities. Communities may have small populations and express feelings of vulnerability being at a distance from the central decision making process.
- **A strong 'self help' culture** – rural and regional communities are often "typified by values of self reliance, resourcefulness and independence, often responding to opportunities or threats with a strong and cohesive communal spirit".
- **A strong attachment to place** – strong emotional/cultural attachments to as geographical location or place.

- **Rural industries have a major impact in the environment -** rural and regional communities are custodians of most of the land of the state and intensively use natural resources.
- **Economic performance is dependent on environmental conditions** – primary industries depend on environmental resources used as their inputs.

Social impacts and fisheries management

The social impact assessment of fisheries management strategies in NSW is a new development and requires some adaptation of accepted analytical frameworks for assessment to suit the fisheries issues and to fulfill the environmental assessment guidelines issued by DIPNR.

In natural resource studies a four stage procedural framework is proposed by Fenton *et al* (2000) as:

- assessment (including scoping and profiling);
- prediction;
- mitigation; and
- monitoring.

These steps concur with the DIPNR and NSW Government Social Impact guidelines (NSW Government 1997b). However, the appraisal of social impacts of management of a natural resource also needs to incorporate the linkages between the changes in the social system induced by management and the affect on the resource system, and how changes in the resource system impact the social system. Fenton *et al.* (2000) recommend that the direction, strength, duration and positive and negative effects of the social system/resource system interactions, also need to be recognised. This can happen at several levels, but has a high information requirement beyond the scope of the current study and is recommended for further investigation.

The current study prioritises the socio-economic impacts from the fisheries management strategy. There are four basic questions need to be answered in Social Impact Analysis of any proposed fisheries management strategy, including (1) who will be affected; (2) what will happen to the people affected; (3) what social changes will occur under each proposed management alternative; and (4) how will any changes affect the social fabric and stability of the fishery and fishing communities (NMFS, 2000).

4.2 Assessment of the Ocean Trawl Fishery Management Strategy

The following procedure was used to identify and assess the potential social impacts of the FMS.

- The social impacts of each management strategy response are identified on fishers and the community and responses ranked into three levels – High, Medium and Low. The ranking reflects the predicted scale of total social impact. For example, total social impact may be determined as a function of the number of fishers affected by a policy, times the degree of impact of the policy on each fisher, or on

the community. Other policies impacting less people or impacting to a minor extent are then relatively less impacting in total.

- The implications of major impacts on fishers, their families and local communities were examined.
- Priority was given to the socio-economic dislocation arising from impacts identified in the previous economic assessment, given their potential impact greatest numbers of fishers and families in the fishing community. These management responses will have major social impacts on ocean trawl fishers as it leads to restructuring the entire fishery in terms of access and the level of effort.

The management goals and the responses in the Fishery Management Strategy were examined and those with potential social impacts are presented in Table E3.

Table E3: Ranking of socially impacting responses for the OTFMS

Management Response	Description of Response	Goals	Impact
1.1(b), 2.1 (f,g), 6.3 (c)	Closures and refuge areas	1,2,3,4,5,6,7	High
5.4 (a)	Implementation of category 2 share management provisions	2,4,5	High
6.3 (a)	Introducing the fishing business (skipper) card system	5,6	High
5.2 (a)	Manage fishing effort	2,4,5	High
6.1 (a)	Develop, implement and monitor a compliance plan	1,2,3,5,6	High
6.1 (c	Implementing an endorsement suspension and share forfeiture scheme	1,2,3,5,6	High
5.3 (d)	Develop a cost recovery framework	4,5,6	High
4.5 (a)	Conflicts	1,2,3,4,6	High
5.1 (b)	Maximise economic returns	2,4,5,7	Medium
4.3 (a)	Depth-wise restriction of trawling operations	1,2,6	Medium
4.2 (c), 4.3 (c)	Multiple use of fishing grounds (within and with other fisheries)	1,2,4,5,7	Medium
6.3 (b)	Transfer jurisdiction for fish trawling to commonwealth	1,2,3,4,5,6,7	Medium
6.5 (a)	Manage the OT fishery consistently with other jurisdictional or natural resource management requirements	1,3,4,5,6	Low/Medium
1.2 (d)	Code of Conduct	1,2,3,4,6	Medium
6.4 (a)	Establish a single MAC (OTMAC) for OPT and OFT	4,5,6	Medium
4.1 (a)	Estimate catch in all fisheries-comm, rec and ind	2,4,5,7	Low
1.2 (b)	Developing more effective BRDs	1,4,5,6	Low
4.4 (i)	Consistent with the Indigenous Fisheries Strategy	4,7	Low

Major impacts on fishers, their families and dependents, and local communities

Management responses that are aimed at allocating shares (secure access rights), reducing fishing capacity, recovering full management charges, and addressing conflicts and increasing compliance in the fishery will have significant impacts on fishers, their families and dependents, and local communities in terms of employment and incomes. The following section discusses these impacts.

Implementation of the share management provisions of the *Fisheries Management Act, 1994* (5.4.a) will provide fishers with some security of access to the fishery and enable them to develop a 10 year business plans and allow them to trade/transfer their shares. Fishers may be able to use their shares to obtain loans from banks and other financial institutions to buy additional shares. If fishery is closed, fishers will be compensated. Other impacts of this management response were discussed in the economic assessment section above. It must be noted that allocating shares for a 15 year period will not provide full security to make long term investment such as buying a new boat.

Implementing minimum shareholdings limit (5.2a) is expected to help adjust required capacity reduction in the fishery. Other regulations to achieve this goal, such as restricting number of days/nights fished (5.2a) are under consideration. Implementing these regulations will have both positive and negative impacts on fishers and other communities directly or indirectly involved in this fishery. Capping fishing activity at currently active levels will not have any negative impacts in the short-term in terms of displacing fishers or employees. If active effort is reduced to sustainable levels (which is below current active levels), a number of fishing businesses will exit the fishery and the impacts are discussed below.

Displacement of fishers

The move to minimum shareholdings will enable fishers to exit the fishery with a payment from the sale of shares. This is likely to displace fishers who are inefficient, or willing to leave the fishery for a number of other reasons (e.g. health problems, old age, better alternative businesses, lack of faith in fishing future).

Some fishing communities or regions are more vulnerable to impacts than others. The impacts vary from region to region, sector to sector, period to period as discussed below.

Regional impacts of any changes under the FMS can be estimated from the information reported from ABS social data in Table E2. For example, the potential impact on fishing communities of the removal of latent effort, a 40% reduction in fisher numbers for each region of the NSW coastline, is presented in Table E2.

Table E2: Social indices for ocean trawl fishers with an estimated reduction of 39% (latent effort) in fisher numbers shown by district and zone (Source: ABS)

Zone	Home District	P'code Pop'n	P'code Fishers	P'code OPT Fishers	P'code OFT Fishers	39% reduction in OPT	39% reduction in OFT	SEIFA	Med. Ind. Income ($/wk) 2001*	Unemployed (%) 2001*	Employed in C.F. (%) of labour force	Employed in OPT & OFT as (%) of labour force
1	TWEED	41,938	63	13	0	**5**	**0**	922.2	250.0	12.2	0.37	0.08
	RICHMOND	28,558	87	38	1	**15**	**0**	930.2	283.3	12.2	0.85	0.46
2	CLARENCE	43,353	259	121	6	**47**	**2**	919.2	250.0	13.6	3.12	1.53
3	COFFS HARBOUR	55,625	110	32	10	**12**	**4**	939.8	275.0	17.5	0.67	0.10
	HASTINGS	61,291	90	19	3	**7**	**1**	936.4	250.0	14.4	0.68	0.15
4	MANNING	37,878	80	10	4	**4**	**2**	914.1	250.0	11.5	0.67	0.10
	WALLIS LAKE	22,704	105	11	6	**4**	**2**	939.0	250.0	11.7	2.78	0.17
	PORT STEPHENS	52,562	101	26	0	**10**	**0**	966.6	316.7	10.4	1.33	0.17
	HUNTER	52,557	55	22	4	**9**	**2**	933.2	350.0	10.3	0.18	0.06
	CENTRAL COAST	206,143	102	4	2	**2**	**1**	976.8	416.7	6.5	0.00	0.00
5	HAWKESBURY	2,380	30	0	0	**0**	**0**	1004.5	400.0	6.1	0.00	0.00
	SYDNEY	3,276,207	189	26	24	**10**	**9**	1047.0	450.0	6.1	0.00	0.00
6	ILLAWARRA	65,532	50	5	4	**2**	**2**	934.7	350.0	8.3	0.13	0.01
	SHOALHAVEN	53,871	75	9	6	**4**	**2**	945.1	300.0	10.9	0.81	0.04
7	BATEMANS BAY	34,836	105	42	34	**16**	**13**	957.6	250.0	12.6	1.18	0.18
	MONTAGUE	8,135	53	9	8	**4**	**3**	955.1	250.0	13.0	1.54	0.23
	FAR SOUTH COAST	3,726	61	12	24	**5**	**9**	916.2	250.0	9.3	2.56	1.01
Total		4,047,296	1,615	399	136	**156**	**53**	945.3	306.0	11.1	0.92	0.27

The number of ocean prawn trawl fishers in zone 2, (Clarence), zone 3 (Coffs Harbour to Hastings) and zone 4 (Manning to Central Coast) are highest. The number of ocean fish trawl fishers in zone 5 (Hawkesbury and Sydney), zone 6 (Illawara to Shoalhaven) and zone 7 (Batemans Bay to Far South Coast) are highest.

An estimate of ocean trawl fishing community vulnerability to social and economic impacts is reported in Table E3 and Table E4. This ranks ocean trawl fishers as proportion of labour force, ranked highest to lowest to show dependence, and the SEIFA index, ranked lowest to highest to show relative disadvantage. They are combined to give a joint ranking of community vulnerability. An index of the vulnerability of ocean trawl fishing communities generated from ranking of community income dependence and the ranked SEIFA index giving each equal weighting.

The OPT fishing communities in the Clarence River area are most vulnerable, followed by the Manning and Richmond postcode areas. The OFT fishing communities in the Far South Coast area are more vulnerable, followed by Montague and Illawarra. Fishers are most vulnerable to changes from the socio-economic impacts under the FMS given their higher dependence, lower SEIFA score, or a combination of both. For these communities high unemployment also indicates potential difficulty in fishers finding alternative employment outside fishing.

Table E3: Joint ranking of community vulnerability for OPT fishers, (from ABS and NSWF data).

Home District	Employed in OPT as (%) of labour force	Rank labour	SEIFA	Rank SEIFA	Joint rank score	Unemployed (%) 2001*
CLARENCE	1.53	1	919.2	2	2	13.6
MANNING	0.1	5	914.1	1	5	11.5
RICHMOND	0.46	2	930.2	4	8	12.2
TWEED	0.08	6	922.2	3	18	12.2
WALLIS LAKE	0.17	3	939	7	21	11.7
HASTINGS	0.15	4	936.4	6	24	14.4
PORT STEPHENS	0.17	3	966.6	9	27	10.4
HUNTER	0.06	7	933.2	5	35	10.3
COFFS HARBOUR	0.1	5	939.8	8	40	17.5
CENTRAL COAST	0		976.8	10		6.5
HAWKESBURY	0		1004.5	11		6.1
SYDNEY	0		1047	12		6.1

Table E4: Joint ranking of community vulnerability for OFT fishers, (from ABS and NSWF data).

Home District	Employed in OFT as (%) of labour force	Rank labour	SEIFA	Rank SEIFA	Joint rank score	Unemployed (%) 2001*
FAR SOUTH COAST	1.01	1	916.2	1	1	9.3
MONTAGUE	0.23	2	955.1	4	8	13
ILLAWARRA	0.01	5	934.7	2	10	8.3
SHOALHAVEN	0.04	4	945.1	3	12	10.9
BATEMANS BAY	0.18	3	957.6	5	15	12.6

It is apparent that outside of Sydney and the Central Coast, ocean trawl fisher communities are more vulnerable to changes in their socio-economic wellbeing. This does not mean that fishing families in the Sydney/Central Coast area are less impacted by policies, but that these communities have more socio-economic alternatives than small rural isolated communities in coastal NSW.

Table E4 presents SEIFA data at the post code level. Those postcodes within vulnerable districts with low SEIFA indices are identifiable and illustrate how small numbers of fishers in certain postcodes are vulnerable to socio-economic impacts.

The higher number of ocean trawl entitlements reflect diversified fishing businesses where many fishers are part-time and fish seasonally. Estimates of adjustment in the ocean trawl fishery in the economic issues section indicate that 104 of 311 OPT and 54 of 99 OFT fishing businesses maybe removed by share trading in the next five year period. It is predicted that removed fishing businesses (in the form

of shares) would be a mix of latent entitlement holders, elderly fishers and fishers who catch below $10,000 per year.

Licence records indicate that approximately 14% of OPT and 18% OFT fishers are likely to retire in the next five years indicating that a 14% adjustment in the OPT fishery and 18% in the OFT fishery, could be filled by elderly fishers alone.

Part of the mitigation would be to investigate the position of elderly fishers and the impact of selling shares and receiving money on their age pension. Preliminary discussions with *Centrelink* indicate that income and asset tests apply and that a home owning fisher with partner would be able to have $200,500 in assets in addition to their home, before the pension payment would be reduced. Few ocean trawl businesses would exceed $200,000 and pension entitlements are unlikely to be impacted, though this depends on the financial status of the fisher.

The majority of fishers are below 60 years of age and wish to operate in ocean trawl fishing as a business or way of life. The results of the social survey indicate that both business and lifestyle are important aspects of familial and social identity among ocean trawl fishers. The social survey results also indicate that there are 64% of OPT and 79% of OFT with two or more generations of involvement in fishing, which shows longer term social association and integration with communities and the potential to be significant contributors to social capital. Some fishers are rural, low income part-time fishers, representing a "cottage industry", rather than the professional full-time industry proposed under the FMS.

The social impacts on dependents of displacement of the latent effort (approximately 40% of fishers) are estimated using data from the social survey results (see Table E5).

Table E5: The number of dependants impacted by the removal of latent effort. Source: RM-SS)

	No. of Dependents				**39% of Dependents**	
	OPT	**OFT**	**OPT Adj**	**OFT Adj**	**OPT**	**OFT**
Under 16 years	89	40	152	54	**59**	**21**
Over 16 years	33	16	56	22	**22**	**8**
Spouse	40	12	68	16	**27**	**6**
Total	**162**	**68**	**277**	**92**	**108**	**36**

Adj: Adjusted for 311 OPT and 99 OFT fishers based on the social survey results of 187 OPT and 73 OFT fishers

The numbers of dependants associated with OPT fishers is between 230 and 369. The numbers of dependants associated with OFT fishers is between 68 and 92. This is an upper estimate, as if older fishers exit the fishery, then the number of dependent children below 16 reduce towards zero. Displacing latent effort will impact approximately 144 fishers' dependents.

The impact of fisher displacement on the communities will also depend on the exiting fishers' catch levels (their current contribution towards output) and alternative income sources on leaving fishing**.** A multiplier of 1.5-2.0 (Dr R. Powell, pers. comm.) would apply to impacts where no other income, including social security was available.

Displacing approximately 40% of fishers under share management will only reduce catch by a few percent. Many of the fishers will move to other opportunities, or to the age pension and welfare. Any negative multiplier effects from any the change would be small in the regional economy. However, there may be local distributional impacts in small townships where fishers live. Payment received from selling shares may assist the local economy, depending on the pattern and amount of trade. Debt levels among remaining fishers would likely to rise with economic and social consequences. Should an area have a large number of low incomes, and elderly fishers, the impact of adjustment might be greater in that area.

Latent entitlements are held by fishers who have fished in the past, are not necessarily old and are probably undertaking some alternative employment. They have a mix of fishing experience and family connections with the fishing industry and have a limited capacity to retrain. Fishers earning less than $10,000 are part-time prawn fishers stating a willingness to work in other industries full-time. For both latent effort and low catchers, there is a limited capacity and willingness to retrain.

The use of minimum shareholdings to address effort levels in regions, together with the total allowable effort limit will also impact ocean trawl fishers, but the extent in terms of exiting fishing depends on their business's other endorsement holdings. It is likely that the impact of adjusting businesses and effort at the endorsement level will have a cumulative effect on top of business adjustments. A value of 5% has been assumed over 5 years, but this depends on the extent of the effort limits in each area.

There is no sufficient information to assess which sector within the ocean trawl fishery will be most affected. Given the number of multiple endorsed businesses, particularly with ocean prawn trawl endorsements, there may be significant cumulative impacts from the FMS on OPT and OFT business numbers.

Other social impacts

There are number of management responses that have considerable social implications are described below. These include responses relating to conflict resolution, increasing involvement of fishers in decision-making, increasing cooperation of fishers to implement regulations (compliance), penalties for non-compliance, Code of Conduct, and increasing equity in sharing resources.

As noted by Charles (1988), the effectiveness of proposed regulations will depend on the behavioural response of fishers and fishing communities to them, which in turn may be influenced by such socio-economic factors as income distribution, labour mobility, and the interaction of fishers' objectives with the property rights structure in the fishery. These socio-economic factors are not adequately addressed in the FMS.

Significant social cooperation will be needed in operationalising optimal management regimes, in which social implications should be addressed. From the social survey, there were 16% of fishers interviewed state-wide who refused to complete social surveys. Such levels of resistance to FMS initiatives, could also impact the acceptance of new operating rules, or codes of conduct, to the detriment of the fishery and the community. Most of the low impact social responses in the FMS require the cooperation of fishers and management, in order to increase compliance.

The implementation of the FMS will bring several challenges for compliance. It is envisaged that if the FMS responses are followed and communication and compliance are recognised in the co-management framework, then this will assist with the levels of compliance. Endorsement suspension and share forfeiture (6.1c) are being implemented for serious offences. The increases in the cost of operations and displacement of fishers may lead to an increase in illegal fishing. This would have to be monitored, particularly through information from fishers in each sector of the ocean trawl fishery.

Issues such as failure to keep addressing conflicts, compliance, communication and cultural issues will have negative impact on the co-management process and hence management of the fishery to the detriment of the community. These issues are central to the functioning of the new management strategy and to the reduction of conflict among stakeholders and with the community. The management responses such as promoting awareness (7.1a) and developing measures to improve communication among fishers, implement area and time closures to trawling (4.5a) may resolve some of the existing conflicts.

Scientific observer programs and food safety program development also depend on the cooperation of fishers. The Prawn Resource Forum should help in managing concerns over prawn use in the estuary and ocean fisheries and will be an initiative with short term and long term benefits in reducing conflict between estuary and ocean prawn fishers and promoting more regulated harvesting. Communication and the management advisory committee process are central to reducing conflicts among trawl fishers and between trawl fishers and other stakeholders.

Many social issues are larger than they can be resolved by the FMS and will only be resolved in longer time frames. For example, an FMS goal (5) is "*promoting a viable commercial fishery consistent with ecological sustainability*" and hence presumably maximising the direct monetary returns from the fishery. Questions need to be asked as to what social equity implications it has, given that lifestyle values, not direct financial returns and what motivates fishers to remain in the fishery despite economic viability concerns in the fishery.

When resources are harvested by a number of different groups, appropriate allocation is important. Information on the level of exploitation by such groups is necessary to develop strategies to allocate and manage resources in a sustainable manner. Proposed management response (4.1a) proposes to estimate commercial, recreational, indigenous and illegal catch and to address this issue.

The economic survey revealed the importance of accurate catch and price data to the management system. The integrity and accuracy of catch data needs to be

upheld to guarantee sustainability. When days effort become limited and minimum shareholdings apply, there will need to be substantial monitoring of the catch in the ocean trawl fishery, as incentives will exist to sell unrecorded catch for cash in order to meet new FMS charges and share purchase. This would then impact the ability of management to accurately monitor catch levels and to maintain sustainable stocks. Mitigation of this in the management system may be to recognise the high variability in the inter-annual abundance of prawn stocks and have flexible mechanisms to allow fishers to respond to fluctuations, hence reducing frustration among producers. Local management arrangements and the Prawn Resource Forum could contribute to this cooperative process with benefits to compliance levels.

Inter-sectoral allocation is less of an issue in the ocean fisheries with less interaction between commercial, recreational and indigenous fishers.

The FMS may limit the number of fisheries a business can operate in and thus tend to increase part-time or seasonal fishing. In the ocean trawl fishery, seasonal access can be either by full-time or part-time fishers, with justification for both. The social and ESD aspects of this issue needs to be examined in NSW, and even nationally, and is recommended in further work.

Transferring management responsibility of the fishing area inside 3 nm south of Barrenjoey Headland to the Commonwealth and closing remaining areas in NSW to fish trawling (6.3c) avoids duplication in management regimes and reduces monitoring and management expenses. It may also reduce the level of conflict between fishers. Consistency with other jurisdictional management requirements is extremely important to effectively and efficiently manage a fishery resource.

4.3 Changes in major social risks

As a result of implementing the OTFMS, we envisage the following changes in overall social risks in the fishery:

- the category 1 share scheme provides increased security and certainty for fishers. It should also increase incentives for fishers to add value to their shares as a form of investment or superannuation;
- fishing will be seen more as a commercial activity than a lifestyle, which may have negative impact on some fishers as their main objective is not maximising economic returns from the fishery, but making an income in coastal NSW;
- the major social impact involves the potential displacement of fishers and employees due to the removal of overcapacity in the fishery. Fishing lifestyle, old age, lack of skills to start alternative businesses, and lack of alternative employment opportunities are major impediments for fishers who wish to leave the fishery. However, structural adjustment can provide the basis for a viable commercial fishery, with more secure opportunities for investment, jobs and value adding, and would enable elderly fishers to retire with a payment from the sale of shares.
- there may be some reduction in conflicts as allocation of access rights and compliance issues are comparatively well addressed in the FMS. There is a

potential for new conflicts regarding allocation of shares, sharing responsibilities, authority and accountability of policy decision-making and management, and funding future research programs; and

- the need to monitoring social aspects in the fishery is likely to increase because of the need to monitor the effectiveness and impact of policies.

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Appendix 1: The NSW fishery economic survey and the ocean trawl fishery

This appendix summarises the methods and results of an economic survey of operators in the ocean prawn and fish trawl fisheries (ocean trawl). A state-wide economic survey was distributed by Roy Morgan Research Ltd and analysed for the ocean trawl fishery as part of the current study. The purpose of the survey was to determine the *operational surplus* of a range of fishing operators in the fishery.

The resource rent is an economic surplus which is part of the difference between the Total Revenue of effort and the Total Cost of effort across the fishery. Resource rent is made up of different elements and is the surplus attributable to the marginal fisher's last unit of effort, times the units of effort applied to the fishery (Reid and Campbell, 1998). This reflects the value of access to the resource. The balance of total rent and resource rent are intra-marginal rents, attributable to the skills of fishers and reflect innovation and skills in a healthy industry.

Estimation of rent also requires incorporation of effort and species considerations and is made more difficult by the multiple fishery behaviour of different fishers. Any profitability estimates in fisheries need to be related to the resource through bio-economic modelling to see if they are economically sustainable. This is not possible with information and data currently available.

Fishing operator survey

The state-wide survey had 259 responses from 1,640 fishers contacted (15.7%) by mail and three reminder telephone calls. In the ocean trawl fishery 69 of 249 active fishers responded (27%). The time allowed for the responses was limited with fishers returning surveys completed from their business records or forwarding accounts to Roy Morgan's. The survey allowed room for comments, but time did not allow for investigation of all of these unless they appeared substantial. The data forwarded has thus not been subject to as much cross checking as desirable and depends on fishers accurately completing the survey paperwork. The survey was developed from a pilot instrument intended to enable a smooth transition of accounting records to be possible. Other estimates of values and ages of capital items were queried on occasions, as some assets were beyond depreciable age, but were still in service.

The sample of OT fishers is assumed to be representative of the operators in the fishery. However the results were from a diverse range of businesses and as averages, should be interpreted with caution. It may not be given the potential for bias in terms of those who responded, which is unknown. As each fisher was contacted with the survey, the sample is of those who completed the survey and may be biased for inference purposes. Data is one for financial year and inferences from this for other years potentially under represents the degree of inter-annual variation found in prawn fisheries.

Fishing businesses and owner operators act as firms fishing among the portfolio of administered fisheries available to them. An economic survey can

measure the performance of the firm across all its fishing activities, but not an economic rate of return from a single fishery. Our results are for businesses with Ocean trawl endorsements. We are able to identify businesses which fish only OPT or OFT and can group them on that basis to estimate the performance of these businesses and hence the fishery.

Sustainability and fishing firms

In the NSW fishing industry we have fishing businesses and fishers contracted to those entities. The issues for sustainable management of the fishery resources is the overall level of effort exerted by industry on the fishery resources in NSW and the distribution of that effort among the various fish stocks. Under current management measures, effort is contained by regulations, endorsements, limits on fishing times, areas, gears and by the economics of operations. We wish to find if it pays to go fishing. However, the ongoing containment of effort requires a downward adjustment in the number of firms in the industry due to technical advancement, and rises in costs of fishing operations (Metzner and Rawlinson, 1999).

Total effort in the industry can be reduced by direct retirement of fishing businesses where money for voluntary adjustment is available, or by other industry self funded adjustment arrangements. After adjustment, remaining businesses may have improved economic performance for the same or less effort levels, due to more available catch being available in a region, and experience less congestion and competition between fishing operations. In any economically efficient change to the policy regime the winners' gains exceed the losers' losses, and a transfer payment may be possible through a levy on those fishers remaining. A central issue is the exit decision of firms from the industry. Where a firm fishes one fishery, this exit decision may be estimated more readily than if a firm has divided its fishing between two or more administered fisheries.

Current fishery endorsement capacity exceeds the level of effort applied to the Ocean Trawl fishery. This then leaves "latent effort" which is primarily an administrative construct except where fishers are genuinely not able to fish their endorsement due to ill health as previous discussed.

What should be the measure of economic health of the fishing industry?

A healthy fishing industry is one that derives enough sustainable revenue to cover its annual operating, fixed and capital costs which are determined through survey methods. They include wages, including an imputed wage to the owner/operator, running costs, maintenance and repairs, insurance, and levies which reflect fishery management costs. Capital costs are harder to measure, but in principle they represent the annual interest and depreciation on the vessel and gear. Interest cost is the rate of return which the capital could earn in another use: it is calculated as a percentage of the capital value where the percentage is the risk adjusted cost of capital. Depreciation is an annual cost which recognises the finite life of a fishing vessel. In principle, the annual depreciation compounded forward at the market rate of interest should provide a sum large enough to replace the vessel at the end of its economic life.

There are three main measures of the value of the capital of a fishing firm. These are the value of the vessel and gear:

- at historic cost – what was originally paid for the asset;
- at indemnity value –the insured value which is taken to be an estimate of current market value; and
- at replacement cost – what a new vessel and gear would cost.

The replacement cost is the basis for measuring the long-run health of the industry. If firms are able to earn the required risk adjusted rate of return and set aside sufficient funds to purchase a new vessel when the existing vessel is fully depreciated, then it is viable in the long-run. If revenue fell short of that amount then we would expect to see the market value of vessels falling, and perhaps some highly geared firms having trouble meeting loan interest and repayment schedules.

An important proviso to the above discussion is that the calculations are based on sustainable revenue, which may not be the case in a cross-sectional one year financial survey of fishing operations. It is a characteristic of the fishing industry that when stock conditions are bad, vessels are sometimes able to maintain their revenue to some extent by increasing effort; surviving by running down a different form of capital - the fish stock.

Appraising economic viability

Fishing enterprise viability can be estimated through accounting data collected in a survey. This gives an accounting view of a firm's individual performance, but is not good for measuring performance across different businesses in the fishing industry, or between industries. Economists adjust accounting data to gain more useful industry economic performance measures.

The residual of Total Revenue less Operating Costs is Operating Profit. Depreciation and the opportunity cost of capital are deducted to give economic profit or loss (Campbell and Nicholl, 1994). In the study a 7% opportunity cost of capital was included in economic costs after ABARE, (2000) which is 3% less than applied in Reid and Campbell, (1998) and Hassall and Associates (1999). Fisheries management charges and licence fees are included in operational costs, even though they are not technically a factor of production being a transfer payment from industry to government in respect of access and management services.

Labour costs are imputed from questions in the survey regarding days fished and unpaid days worked by the fishers and his family in the fishing industry. Wages rates for non-managerial private sector employment (trades and unskilled labour) were used to calculate an imputed value of labour (ABS, 2001). The basis of imputation was for an annual average wage of $34,320 ($660 per week) imputed on a daily basis. Imputation was made for paid an unpaid days and at a lesser fractional rate for staff and family members.

The discounted annualised sum was calculated in respect of meeting the replacement cost of the assets at the end of their lifespan from current income flows. The great variety in size and ages of vessels and capital equipment in the ocean trawl

fishery pose interesting questions in the analysis. When capital is valued at its opportunity cost, some small scale fishing operations with fully depreciated capital equipment lead to traditional measures of profitability, such as return to capital, being less applicable than for an industrial fishing fleet. Rates of return may be apparently high, or low, due to minimal capital value.

Ocean Trawl Fishery Profitability Results[7]

There were a total of 64 surveys returned from ocean trawl endorsement holders. Of these 49 were completed validly, the others choosing to omit business information. The survey replies from ocean trawl endorsement holders were divided into three operating groups for analysis: businesses fishing only OPT; OPT and OFT businesses; and OPT with other businesses and are reported in Appendix Table 1. This division was made to recognise the different levels of dependence on ocean trawl fishing among businesses with OPT and OFT endorsements.

Appendix Table 1: Respondent numbers mean business revenue and range of revenues for the three fisher business groups in the NSW ocean prawn trawl fishery (Source: RM-ES).

Vessel category	Respondent numbers	Average revenue ($)	Median revenue
OPT	16	207,746	3%
OFT/ OPT	14	402,257	3%
OPT and Other	19	79,848	4%
Total	**49**	**217,698**	**1%**

The variety in business categories and activity levels among fishers are evident. For the responding OPT businesses the major fishery overlap is with OFT fishing, 14 of the 49 businesses accessing the both fisheries.

Accounting measures

The survey results are reported in Appendix Table 2.

7 This material is supplied under the normal disclaimer in respect of information supplied by fishers and time constraints.

Appendix Table 2: The accounting revenues and costs for a representative Ocean Prawn Trawl and Ocean Fish Trawl fishing businesses (Source: RM-ES).

$	OPT only	OPT/OFT	OPT & Other	Average Vessel
Gross revenue	207,746	402,257	79,848	217,698
Direct costs*	136,311	281,648	60,244	150,922
Indirect costs**	61,470	76,848	23,107	51,216
Total costs	197,781	358,496	83,350	202,139
Gross operating profit	**9,965**	**43,762**	**- 3,502**	**15,559**
these costs include:				
* wages	50,248	101,121	14,722	52,046
** Interest	4,830	4,003	1,391	3,267

$	OPT only	OPT/OFT	OPT & Other	Average Vessel
Gross revenue	100%	100%	100%	100%
Direct costs*	66%	70%	75%	69%
Indirect costs**	30%	19%	29%	24%
Total costs	95%	89%	104%	93%
Gross operating profit	**5%**	**11%**	**-4%**	**7%**

The results report that direct operating expenses, such as bait, fuel, boat repairs, fishing gear repairs, freight costs and wages to employees, are 66%, 70%, 75% of revenue in the three activity group - OPT, OPT/OFT, and OPT & Others respectively. Indirect costs, such as boat and vehicle registrations, insurances, fishery management charges, rates, bank and business administration expenses, were 30%, 19% and 29% of revenue respectively, making total operational costs 95%, 89% and 104% of total revenue.

The wages recorded for were for employees as opposed to payments to owner operators, and were 25% of revenue for OPT and OPT/OFT, and 18% for OPT and others. This reflects the higher crewing required in OPT and OFT fishing. About 53% of the OPT fishers sampled had no interest payments to meet and 31% had annual interest payments of less than $5,000 per annum and 16% of greater than $5,000 per annum. Operating profit in the three business categories are estimated as 5%, 11% and -4% of gross revenue. Owner/fishers draw wages from their operating profit and little accounting profit is probable. In summary, conclusions on long run viability are difficult to draw from the accounting data and requires an economic approach.

Economic Results

The economic survey results include adjustments to give the economic depreciation, the imputed cost of labour and opportunity cost of capital and are reported in Appendix Table 3. The results for long run viability are presented in Appendix Box 1. In total, this indicates that 20 from 49 (41%) of all endorsed fishing businesses that replied to the survey were above long run economic viability, covering opportunity costs of capital, imputed labour and depreciation on the basis of being able to replace capital at the end of the lifespan of their assets.

Appendix Box 1: Long run economic viability – covering economic depreciation.

In the long term the following had positive average returns in excess of all costs including economic depreciation:
8 of the 16 (50%) OPT fishing businesses;
8 of the 14 (57%) OPT/OFT businesses; and
4 of the 19 (21%) OPT and others businesses;

Long run economic surplus exists for 41% of all OPT fishing businesses surveyed, being greatest in the OPT/OFT fishing operators. All OPT fishing businesses had an average economic rate of return to capital of 2% which equates to a 9% economic return prior to incorporating opportunity costs. This is an indicator of some rent in the fishery, providing conditions for fish sustainable stocks, capital capacity, prices of fish and inputs, and the management structure of the fishery are all met (ABARE, 2000; p16). The average net return was 2%, the median being -7%, with 50% of all OPT businesses having less than -7% net return.

The results indicate that the profitability in businesses which fished OPT and OPT/OFT, are higher than OPT businesses fishing in other fisheries which have lowest economic performance (-24%). The OPT and OPT/OFT results are more indicative of the economic returns from prawn and fish trawling.

Discussion of Economic Viability and the Ocean Trawl Fishery

The viability of fishing businesses in the OPT and OFT fisheries is investigated by the economic survey. This was for one financial year (1999-00) only. It should be augmented by a series of annual surveys to see profitability over a longer time horizon. The level of net returns are related to the value chosen for the opportunity cost of capital and the value placed on capital assets in survey responses (ABARE, 2000).

The economic surplus available varies between the three fishing operations and is highest for the OPT/OFT businesses. The economic net return enables long-term viability to be appraised with 41% of businesses having positive net returns and are thus viable in the long-run covering economic depreciation by setting aside enough now, to renew capital at a future date. The remaining 59% of operators are performing below the long run viability benchmark. This does not mean they cannot operate on a day to day basis, but that they forgo some element counted in economic costs as presented in Appendix Table 3

It is likely that fishers forgo payment for the time involved with the fishing business. The high labour commitment to fishing in the OPT is reported in Appendix Table 4 where the average OPT fisher spends 64% of their time on “unpaid” tasks of fishing, delivery time, repairs, maintenance, management and administration. Appendix Table 4 indicates labour is also contributed by family at a rate of 23% of fisher days and this was also included in the imputed labour cost.

Appendix Table 3: Results of the Economic survey of the Ocean Prawn Trawl fishing businesses in the financial year 1999-2000 (Source: RM-ES).

$	OPT only	OPT/OFT	OPT & Other	Average Vessel
Gross revenue	**207,746**	**402,257**	**79,848**	**217,698**
Less costs				
Cooperative expenses	1,217	19,202	2,573	7,248
Bait	10	33	3,893	1,523
Boat fuel	32,921	89,889	15,612	43,648
Repairs	30,844	42,724	6,919	25,204
Fishing gear	14,160	13,830	10,248	12,542
Vehicle fuel	5,576	2,807	3,657	3,984
Freight	254	8,173	1,227	3,056
Other Costs	1,081	1,912	1,394	1,457
Imputed labour	39,590	32,386	36,445	36,165
Total Direct Costs	**125,653**	**210,957**	**81,967**	**134,827**
Boat registration fees	4,455	5,894	1,967	3,931
Vehicle registration	1,080	1,323	720	1,021
Insurance	9,043	15,987	2,481	8,624
Fishery Man. Charges	236	7,382	842	2,659
Comm. Fish Licence	1,313	3,115	1,035	1,757
Accounting	1,375	3,871	1,157	2,055
Phone	2,035	3,238	943	1,980
Power	966	300	632	633
Rates	1,965	1,163	1,592	1,575
Bank	724	1,292	1,126	1,053
Economic depreciation	12,493	26,859	5,265	14,088
Op. cost of capital	22,274	37,933	9,386	22,070
Repairs	7,853	67	1,298	2,928
Repairs vehicle	4,795	865	1,244	2,215
Travel	833	8,520	63	2,887
Other costs	4,533	18,533	-	7,061
Total Indirect Costs	**75,973**	**136,342**	**29,753**	**76,537**
Total Economic Costs	**201,627**	**347,299**	**111,719**	**211,364**
Economic Gross Profit	**6,120**	**54,959**	**- 31,871**	**6,333**
Capital Asset Value	**318,205**	**541,893**	**134,086**	**315,288**
Economic rate of return to capital	**2%**	**10%**	**-24%**	**2%**
Observations	16	14	19	49

Appendix Table 4: The annual average unpaid and paid days fishing by business in the OPT (Source: RM-ES).

	OPT only	OPT/OFT	OPT/Others	All
No. of Respondents	15	15	19	49
Total Fisher days	180	159	208	184
Total fisher days unpaid	145	102	109	118
Fisher unpaid days as % of paid	**81**	**64**	**52**	**64**
Family days unpaid	72	69	29	55
Family days unpaid as % of paid fisher days	**40**	**44**	**14**	**30**

For example if the fisher's partner or family member works for less than the imputed pay rate, and the operators earn a satisfactory return, then the imputed wage calculation is possibly unreasonable (Standen, 1972; ABARE, 2000). Fishers may take less wages than the imputed rate to keep the business operational, in the face of alternative earning opportunities. Opportunity costs of capital can be forgone, as can depreciation, with fishers hoping to keep current assets operational beyond their envisaged lifespan, or to locate a second hand vessel if a replacement is required.

In discussing efficiency and farmer welfare in the NSW farming sector, Standen (1972) noted that replacement cost based measures for depreciation and off-farm imputed earnings may be invalid measures of opportunity costs of these resources in the rural industry context, tending to overstate off-farm benefits. For some fishers the opportunity costs for labour outside fishing may be close to zero, or if pensionable age, social security payments of up to approximately $10,000 per annum. Commonly fishers indicate they forgo payment for lifestyle and autonomy. This may even extend to short-term periods where fishers forgo wages, cease fishing or move to other industries until fishing improves. This substitution between fishing and other industries is likely an efficient strategy for fishers to remain in fishing in the long-term.

There are also impediments to fishers exiting the fishing industry. Lack of marketable fishing rights with restrictions on transferability, limit the sale of fishing licenses. Exiting the industry also involves outlays on transport, food and lodgings incurred during an industry transfer period. The prospect of false starts in new employment also restricts exiting and the psychic costs of changing occupation and place of living. The fishers in the OPT fishery maybe identify with the following quote made in respect of NSW Dairy Farmers: "If higher incomes are available only with a change in employment or location, then strong attachment to present positions could mean that the individuals would not be better off in the alternative positions" (Standen, 1972). The current analysis does not attempt to value these non-pecuniary values of going fishing and few other economic studies attempt this.

Conclusions

Long-run economic surplus exists for 41% of all OPT fishing businesses examined, being greatest in the OPT/OFT businesses. The OPT and OPT/OFT businesses had a net return to capital of 2% and 10% respectively, while OPT and Other businesses had a net return to capital of -24%. The average economic net return tocapital across all the businesses was 2%, the median net return being -7%.

The long-term viability of the lowest 59% of OPT fishing businesses is questioned, but has to be interpreted within the context of seasonal and part-time nature of fishing operations in the fishery, and the concept of the rural lifestyle and impediments to altering that lifestyle as previously discussed. The median rate of net return is –7% to capital, indicating half the businesses were below this rate of return in the 1999-2000 financial year.

The current survey results shed light on IPART's previous finding that "70% of fishers will encounter problems in their capacity to pay higher management charges" (IPART, 1998 p 63). Many operators will have difficulty in meeting

additional management or additional restructuring costs, as reported in the OPT assessment.

Economic return, national income and licence values

The economic survey if representative of industry indicates that 41% of businesses interviewed are contributing to the local, state and national economy in terms of economic profit – i.e. producing an economic surplus.

In a fishery which has been under management and restructuring there is an expectation of an increase in endorsement values through time. Available observations of endorsement/ business value data from Newcastle Marine Brokers suggests there has been no significant increase in OPT business values in recent years. This may reflect profitability and management rules which limit endorsement transfer. However since 1987 when the licence freeze came into being, licences went from the old $2 administrative charge to the $40,000-$100,000+ business values of the mid 1990s and current period.

Imputed fish market data indicates low increases in fish price trend at less than 1% per annum, though information on prawn prices from outside Sydney indicate that higher prawn prices may lead to a potential rise in endorsement and business values. Inference as to the price structure of licence trades is not possible due to a lack of licence purchase information.

Other evidence of perceived economic surplus may include the entry of new fishers, which has happened in recent years (see fishers and licence duration in social section), but this may be as much a social phenomenon due to sons of fishers entering, rather than and indicator of fishing prosperity.

Appendix 2: The Social Survey of the NSW Fishery

The available information in NSW was previously limited and relied entirely on the NSWF licensing system. Recognising this, a social survey was undertaken by telephone in May 2001 (RM-SS). The social survey had 870 replies from 1,751 fishing businesses contacted in NSW as reported in Appendix Box 2.

Appendix Box 2: The response rate for the NSW social telephone survey (Source: RM-SS).

	Frequency	**%**
Completed questionnaires	870	50%
No reply	115	7%
Engaged	36	2%
Unobtainable	136	8%
Appointments	59	3%
Repeated calls (6)	78	4%
Total unable to contact	424	24%
Refusals	278	16%
Terminations	179	10%
Refusals/terminations	457	26%
Total	**1,751**	**100%**

The response rate across all fishers in NSW was 50%. These figures compare well with the telephone survey of Queensland fishers (Fenton and Marshall, 2001), though there are 26% of refusals/ terminations and approximately 24% of fishers were unable to be contacted.

Some 10% of interviews were terminated, usually due to language problems during the interview. The completed interview results may not adequately reflect fishers from non-English speaking backgrounds. Approximately 16% of fishers refused to participate in the survey. This was due to a variety of reasons which can only be surmised, but which may indicate significant social discord between fishers and management in relation to the FMS and the Recreational Fishing Areas process and perceptions of management among fishers.

Of the total statewide replies, 187 (21%) replies were from Ocean Prawn Trawl endorsement holders who constitute 18% of all endorsement holders statewide. Of 180 OPT endorsement holders responded, 139 (74%) had been fishing in the OPT in the previous 12 months. Data records (NSW Fisheries data 2001-2002) show that there are 311 entitlement holders in the OPT fishery and 207 (67%) went fishing in 2001-2002. The sampled fishers are more active than the endorsed population.

A total of 73 (8%) replies of the total state-wide replies were received from Ocean Fish Trawl endorsement holders who constitute 6% of total state-wide endorsements. Of 73 OFT endorsement holders interviewed, 57 (78%) had been fishing in OFT in the previous 12 months.

Appendix 3: Community profile of commercial fishers in NSW

There has been no previous attempt to present a fishing community profile of the NSW Fishing Industry. The relevant social data of fishers in NSW was obtained from the ABS statistics via the Bureau of Rural Science Social Science unit and the numbers of commercial fishers in NSW from NSW Fisheries records. This was 1995 census data with 2001 census data when available. These are reported in Appendix Table 5.

Appendix Table 5: Social index data for NSW Fishing communities at the postcode level (Source: ABS, 1996; BRS 2003 and NSWF).

Zone	Home District	P. code	Town/Suburb	No. Fishers	Total Population	Unemployed (%)	SEIFA	Med. Ind. Income (wk)	Employed in C.F. (%) of labour force
1	TWEED	2485	TWEED HEADS	22	8,978	20.0	893	200-299	0.3
1	TWEED	2486	TWEED HEADS/BANORA POINT	22	24,984	14.4	953	200-299	0.41
1	TWEED	2487	CHINDERAH/OTHERS	19	7,976	16.2	921	200-299	0.41
1	RICHMOND	2472	BROADWATER/CORAKI	10	1,761	19.5	919	200-299	1.02
1	RICHMOND	2473	EVANS HEAD	25	2,613	16.8	900	160-199	1.02
1	RICHMOND	2478	BALLINA/OTHERS	52	24,184	13.7	972	200-299	0.52
2	CLARENCE	2460	LAWRENCE/OTHERS	24	29,145	14.8	951	200-299	1.212
2	CLARENCE	2463	MACLEAN/OTHERS	96	6,072	16.2	946	200-299	4.46
2	CLARENCE	2464	YAMBA/OTHERS	64	5,340	17.1	954	200-299	4.46
2	CLARENCE	2466	ILUKA	65	1,863	18.6	891	160-199	4.46
2	CLARENCE	2469	WOOMBAH/OTHERS	10	933	27.2	854	160-199	1.02
3	COFFS HARBOUR	2448	NAMBUCCA/OTHERS	18	8,690	19.1	927	160-199	0.8
3	COFFS HARBOUR	2450	COFFS HARBOUR	52	32,488	15.8	971	200-299	0.24
3	COFFS HARBOUR	2456	WOOLGOOLGA/URUNGA	20	11,848	20.5	944	200-299	0.46
3	COFFS HARBOUR	2462	WOOLI/OTHERS	20	2,599	20.0	917	160-199	1.19
3	HASTINGS	2431	SOUTH WEST ROCKS	33	3,965	18.6	926	160-199	0.78
3	HASTINGS	2440	CRESCENT HEADS/OTHERS	20	23,164	19.3	916	200-299	0.78
3	HASTINGS	2444	PORT MACQUARIE	37	34,162	15.2	966	200-299	0.48
4	MANNING	2427	HARRINGTON/COOPERNOOK	24	1,473	18.0	883	160-199	0.71
4	MANNING	2430	TAREE/OTHERS	35	28,312	14.0	950	200-299	0.71
4	MANNING	2443	LAURIETON/OTHERS	21	8,093	20.6	909	160-199	0.595
4	WALLIS LAKE	2423	BUNGWAHL/OTHERS	17	3,247	14.5	939	200-299	2.78
4	WALLIS LAKE	2428	FORSTER/TUNCURRY/OTHERS	88	19,457	15.1	939	200-299	2.78
4	PORT STEPHENS	2301	NELSON/SALAMANDER BAYS/OTHERS	27	25,046	11.1	997	200-299	1.04
4	PORT STEPHENS	2315	NELSON BAY/OTHERS	54	8,393	14.3	966	200-299	1.04
4	PORT STEPHENS	2324	TEA GARDENS/OTHERS	20	19,123	13.6	937	200-299	1.91
4	HUNTER	2280	BELMONT/OTHERS	10	22,225	10.5	989	200-299	0.05
4	HUNTER	2281	SWANSEA/OTHERS	15	11,349	14.3	935	160-199	0.05
4	HUNTER	2295	STOCKTON/OTHERS	12	5,058	12.8	918	200-299	0.555
4	HUNTER	2304	MAYFIELD/WARABROOK	18	13,925	17.6	890	200-299	0.07
4	CENTRAL COAST	2250	ERINA/OTHERS	10	57,810	7.7	1025	300-399	0
4	CENTRAL COAST	2251	AVOCA BEACH/OTHERS	11	29,370	8.5	1032	200-299	0
4	CENTRAL COAST	2256	WOY WOY/OTHERS	12	14,168	11.1	941	200-299	0
4	CENTRAL COAST	2257	EMPIRE BAY/OTHERS	10	25,326	11.6	957	200-299	0
4	CENTRAL COAST	2261	BERKELEY VALE/OTHERS	19	32,623	14.1	935	200-299	0
4	CENTRAL COAST	2259	MANNERING PARK/TACOMA/OTHERS	40	46,846	10.6	972	200-299	0
5	HAWKESBURY	2083	MOONEY MOONEY	12	1,450	5.7	1042	300-399	0
5	HAWKESBURY	2775	SPENCER	18	930	9.2	967	200-299	0
5	SYDNEY	171400	SYDNEY NORTH & SOUTH	189	3,276,207	7.3	1047	300-399	0
6	ILLAWARRA	2500	WOLLONGONG	10	32,326	12.6	998	200-299	0.1
6	ILLAWARRA	2502	PRIMBEE/OTHERS	10	13,000	18.9	847	160-199	0.1
6	ILLAWARRA	2506	BERKELEY	18	6,653	19.0	827	160-199	0.1
6	ILLAWARRA	2533	KIAMA	12	13,553	7.6	1067	200-299	0.23
6	SHOALHAVEN	2540	GREENWELL POINT/OTHERS	59	24,208	18.2	933	160-199	0.81
6	SHOALHAVEN	2541	NOWRA/OTHERS	16	29,663	12.0	957	200-299	0.81
7	BATEMANS BAY	2536	BATEMANS BAY/OTHERS	32	14,335	15.5	970	200-299	1.175
7	BATEMANS BAY	2537	MORUYA/OTHERS	10	9,002	18.2	960	200-299	1.54
7	BATEMANS BAY	2539	ULLADULLA/OTHERS	63	11,499	17.4	942	160-199	0.81
7	MONTAGUE	2546	NAROOMA/OTHERS	53	8,135	15.9	955	160-199	1.54
7	FAR SOUTH COAST	2551	EDEN	61	3,726	12.1	916	200-299	2.56
			Total	**1615**					

Explanation of Relevant Social Data for NSW Fishing Postcode Areas

The data contained within Appendix Table 5 has been acquired from the Australian Bureau of Statistics (ABS) Housing and Population census 2001. The data on zones, districts, postcodes and fishers numbers is from NSWF records.

Population

The total population is for the postcodes as in the 1996 census data (ABS, 1996).

Unemployment

Unemployment is the proportion of the labour force seeking either part-time or full-time employment, expressed as a percentage at postcode level available from the 2001 census data (ABS, 2003).

SEIFA Index of Disadvantage

The Australian Bureau of Statistics (ABS) developed the Socio-Economic Index for Areas (SEIFA) of relative disadvantage from the 1996 population census. Areas with the greatest disadvantage have high proportions of low income families, unemployed people, people without educational qualifications, households renting public housing and people in low-skilled occupations. The SEIFA score for Australia as a whole is standardised at 1,000. Australia's non-metropolitan average is 972, so, a SEIFA[8] score of 941 (as is the case with Woy Woy/others), which is 31 points lower than Australia's non-metropolitan average, would indicate the town's residents are more disadvantaged than most of non-metropolitan Australia.

Weekly Median Individual Income

[8] "The ABS does not supply SEIFA values at the post code level. Supply options are at the level of the Statistical Local Area (SLA) or census Collection District (CD). To present SEIFA values at the postcode level it was necessary to calculate a mean score from all SLAs that intersected the post code in question. While this method results in an estimated SEIFA value for postcodes, it can be regarded as a fairly accurate estimation because SEIFA scores are strongly correlated with local geography" (BRS, 2001).

The ABS' 2001 housing and population census derives information about individual income from income categories. The median income is that income category that splits the population, i.e. it refers to the category where 50 percent of the population from an area selected area has income categories either above or of the same category as the median. For example, in Spencer, 50 percent of the population earned between $0 and $299 per week and 50 percent earned $200 or more per week. Central coasts median individual income ($550) is one of the highest in this sample, compared to other districts' individual income ($250).

Employment in Fishing - Employment[9] in the fishing industry has been expressed as a percentage of the Total Labour Force (TLF) for available 1995 census data. For example, 2.78 percent of Forster/Tuncurry's labour force is employed in commercial fishing. The commercial fishing category includes all of the following possible sub-categories: Rock lobster fishing; Prawn fishing; Finfish fishing; Squid jigging; Line fishing; Marine fishing; Marine fishing undefined; Aquaculture; and Commercial fishing undefined.

The data in Appendix Table 5 is for postcodes with more than 10 NSW commercial fishers. This means that 1,615 fishers from a total of 1,920 are included in the analysis. The other 305 live in postcodes areas with less than 10 fishers are omitted. This should be borne in mind in the analysis of results.

[9] "The BRS do not have a NSW data set on employment in commercial fishing at the postcode level. Data is at the SLA level. For consistency, the data is again presented at the postcode level by calculating a mean score from all SLAs that intersected the post codes. Again, it is considered that this is fairly accurate estimation given the circumstances of local geography" (BRS, 2001).

NSW Fisheries

Ocean Trawl Fishery Management Strategy – Assessment of Indigenous issues and Historic Heritage issues

June 2004

Umwelt
Environmental Consultants

NSW Fisheries

Ocean Trawl Fishery Management Strategy – Assessment of Indigenous issues and Historic Heritage issues

June 2004

TABLE OF CONTENTS

PART 1

APPENDICES

Foreword

This report addresses potential interactions between the ocean trawl commercial fishery and the cultural heritage values of marine waters.

Part 1 of the report addresses Aboriginal cultural heritage and community values.

Part 2 of the report deals with historic heritage, and particularly with the interaction of ocean trawling activities with shipwrecks that are distributed along the NSW coast.

Each Part provides background information to describe the nature of relevant cultural resources and values, considers the management objectives and actions that are identified in the draft Ocean Trawl Fishery Management Strategy, and provides recommendations for the future sustainable management of the ocean trawl fishery in relation to these values.

Executive Summary: Indigenous Issues

This assessment addresses six issues as required by the DIPNR Environmental Assessment Guideline.

1. The interests of Aboriginal people in the resources and habitats targeted by the Ocean Trawl Fishery

Many Aboriginal people in regional coastal communities of NSW express the view that ocean fishing is part of their cultural identity. Most often, the fishing that is described is inshore fishing, based on beaches or rock platforms, although there is no doubt that some people also fished the ocean from canoes in traditional times and continued this tradition as ocean fishing from small boats in contemporary times. This fishing is for subsistence and socio-cultural purposes. People fish to feed their families, but also to meet obligations for looking after other people in their community, either as part of daily routines, or for special events such as funerals. Aboriginal Elders still pass on stories and information about places and species of traditional importance to their children and grandchildren.

During consultation that has been conducted for this project and other recent research on Indigenous fishing, Aboriginal people have consistently reported:

- strong interests in rights to access ocean resources (including a sense of 'ownership' of the seas and their products);
- strong interests in the sustainability of ocean fisheries, drawing on a belief that in the past, Aboriginal people fished for what their families needed, but always left some to ensure that they could come back again in the future;
- that transfer of traditional ecological knowledge from one generation to another is culturally important and is dependent on access to fishery resources extending beyond the concept of recreational fishing; and
- interests in the well being of particular species.

When discussing commercial fishery management, Aboriginal community respondents did not differentiate clearly between one commercial fishery and another, and there was a tendency to bundle all commercial fishery issues up together (eg people commented on pipi restrictions, oysters, abalone and estuarine fishery species as well as ocean species).

2. Sites and Places of value to Aboriginal communities

The physical evidence of past ocean fishing practices is (poorly) preserved in midden sites on headlands and behind ocean beaches along the NSW coast. There is minimal risk that the operation of the commercial ocean trawl fishery will impact on these archaeological sites. Some Aboriginal communities (such as Yarrawarra) have documented places of contemporary value, where social activities associated with fishing have occurred within memory and continue to occur. The documentation of these places helps to understand the relationship of local communities to the natural

landscape. As with archaeological sites, there is minimal risk that these places of value will be impacted by the operation of the commercial Ocean Trawl Fishery.

There are stories from communities right along the coast of Aboriginal people having a special relationship with dolphins; of women and men calling to (sometimes singing) dolphins from beaches and headlands. On the south coast, this extends to historical accounts of collaboration of Aboriginal people and dolphins in whale hunting and driving fish species close to shore where they could be caught. The operation of the Ocean Trawl fishery will not impact on these values.

3. Potential impacts on traditional fishing practices and access

Schnierer and Faulkner (2002) document the results of consultation with Aboriginal people in coastal communities in NSW, about species targeted by Aboriginal fishers, and the ways in which they utilise aquatic resources for food, medicines and other parts of their daily lives. The research also provides information about the reasons for fishing. It is these reasons, and particularly the cultural identity of Aboriginal fishing, which separate the fishing activities reported by Indigenous people from other fishing in the general community.

Eighty-one per cent of respondents noted that they fished either to supplement their family's diet or to share with their extended family (especially Elders). However, whilst these subsistence/dietary reasons for fishing are clearly important and continue traditional practices, other reasons for fishing indicate particular characteristics of Indigenous fishing that distinguish it from fishing by other groups in the community. These reasons are directly linked to community ties to the land and water 'country' and the passing on of traditional cultural knowledge. No other groups have the cultural ties to the land and water that Aboriginal people express.

The existence of commercial ocean fisheries does not in itself detract from Aboriginal access to traditional fisheries. Community members believe, however, that the low representation of Aboriginal people in the commercial sector, the regulation of the commercial fishery and the imposition of strict bag limits for non commercial fishers disadvantages them and conflicts with traditional fishing customs.

4. Aboriginal participation in the commercial Ocean Trawl Fishery

Only one Aboriginal person is currently known to hold a commercial licence in the Ocean Trawl Fishery and there appears to be little direct engagement between Aboriginal people and the commercial Ocean Trawl sector. People state that they do not participate because they do not have the capital to invest in commercial vessels and equipment and traditional skills have been lost over generations of disadvantage.

During consultation, Aboriginal people have expressed strong views that the wealth generated from use of marine resources (including, but not restricted to the Ocean Trawl Fishery) does not accrue fairly and that Aboriginal people have been disadvantaged in their participation in the commercial sector. Some people argue that there has been a cumulative loss of rights as licensing requirements have changed.

5. Interaction of the Ocean Trawl Fishery and the Indigenous Fisheries Strategy

The Indigenous Fisheries Strategy (IFS) was released in 2002 after consultation with Aboriginal communities at several regional meetings. The Implementation Plan that accompanies the Strategy identified actions for 2003 and 2004, and the progress towards priority actions is monitored by the Indigenous Fisheries Advisory Committee.

The development of mechanisms to maintain and enhance Indigenous participation in the commercial fishing sector generally is a very high priority for the Indigenous Fisheries Advisory Committee, and was the subject of a workshop to develop an action plan during 2003 (see Callaghan and Associates 2003).

Whilst it should not be anticipated that the issue of Aboriginal employment and Aboriginal ownership in the commercial sector can be resolved through the Ocean Trawl FMS alone, Ocean Trawl fishers and the Indigenous community should both participate in discussions about potential changes to the *Fisheries Management Act* and the potential introduction of programs to enhance Indigenous capacity to enjoy their rights to economic independence.

Potential actions that are still being refined through further consultation within and by the Indigenous Fisheries Advisory Group include:

- filling a number of positions for Indigenous people on Fishery Management Advisory Committees (note for instance that there is currently no Aboriginal person on the Ocean Trawl Management Advisory Committee);

- consultation with Aboriginal people about the concept of identification of Indigenous commercial fishers on their licences (and whether Indigenous fishing licences could have special conditions attached to them);

- endorse the goal of retaining Indigenous people in commercial fishing and demonstrate this through investigating options for licence transfers, sub-leasing of licences, and assistance with gaining new licences;

- training for Aboriginal fishers, both to enhance employment prospects as crew and to support operations as licensed fishers; and

- consider new structures and any special training for involving Aboriginal people in Management Advisory Committees, potentially using the models described in the Boomanulla Statement.

6. Overall risks to Indigenous values associated with the operation of the commercial Ocean Trawl Fishery

Table 1 presents a simple qualitative assessment and ranking of risks to Aboriginal values that are associated with the continued operation of the Ocean Trawl Fishery.

Table 1 - Summary of Risks to Indigenous Values, with FMS Strategies in place

Broad issue/value	Risk – existing management	Risk – FMS strategies implemented
Aboriginal sites – the physical evidence of past Aboriginal land use	Low (low probability and low consequence)	Very low/minimal (very low probability and low consequence). It is most unlikely that the ocean trawl fishery will impact on Aboriginal sites on the deep sea floor.
Aboriginal places – the locations that are associated with stories about the landscape or with personal and community totemic associations with the natural world	Low	Low. Whilst some headlands and islands are known to be places of cultural value, often associated with stories, there is limited potential for ocean trawling to impact on these places. Further involvement of Aboriginal people in the fishery MAC will minimise this risk.

Table 1 - Summary of Risks to Indigenous Values, with FMS Strategies in place (cont)

Broad issue/value	Risk – existing management	Risk – FMS strategies implemented
Aboriginal marine totem species	Moderate	There is limited detailed documentation about Indigenous totem species in the NSW marine environment and the significance of impacts on/risks to these values is therefore difficult to determine. Whilst there can be no doubt that some totem species are target species in the commercial fishery, the extent of concern to Aboriginal people needs further clarification. Initial steps to reduce risk involve further consultation with Aboriginal people, particularly Elders.
Aboriginal cultural landscapes – the places and species in the landscape that are important to Aboriginal people. As a separate issue from Aboriginal places, this refers to the presence and distribution of Aboriginal foods and medicines in the marine landscape	Low to moderate	Low – risk will be reduced as better information about species of concern to communities along the whole coast become better documented and Indigenous participation in fishery management is enhanced.
Aboriginal socio-economic participation in the commercial fishing sector	Moderate – currently very low participation	Low to moderate – the strategy may facilitate enhanced opportunities for economic participation and skill development, in association with the actions that are priorities in the Indigenous Fisheries Strategy and are further explored in the Indigenous Commercial fishing opportunities action plan. Adoption of key recommendations of the Indigenous Fisheries Advisory Committee will help to open up opportunities and reduce the risk that commercial fishing strategies present to Indigenous rights.

Executive Summary: Historic Heritage

This assessment addresses two specific issues, as required by the DIPNR Environmental Assessment Guidelines:

(a) Identify any shipwreck sites or other sites of historic heritage that are affected by fishing activities and outline existing (and proposed) protocols/measures to minimise impacts to these sites.

(b) Summarise the overall risk to European heritage sites from the current and proposed operational arrangements taking into consideration the likelihood/frequency of impacts and the consequence of the impacts occurring.

The Nature of Historic Heritage Evidence

Approximately 1100 shipwrecks appear to be located within New South Wales non-estuarine coastal waters. Of these approximately 260 are recorded offshore of the coastlines of the Northern Rivers, Mid North Coast, Illawarra and South East regions of the total New South Wales coastline.

A key constraint to the accurate assessment of risk is that details about the locations and condition of many shipwrecks are poor. It is difficult to pinpoint the locations of these wrecks, or the amount of wreckage that may still remain, with any certainty. For many wrecks, only limited, broadly descriptive information is available, and the extent to which parts of the wreck may be exposed to snagging on nets etc is difficult to determine. The condition of a shipwreck will depend on the nature of the vessel (size and type of construction), depth of water, circumstances that caused the wreck, subsequent disturbance, and marine processes such as waves, currents and sediment transport. For many shipwrecks, little of this information is known directly.

Almost all the shipwrecks along the NSW coast are protected by either the Commonwealth heritage legislation (*Historic Shipwrecks Act*) or by the *NSW Heritage Act*. For example, of the 260 or so shipwrecks identified in the Northern Rivers, Mid North Coast, Illawarra and South East regions of the coast, less than twenty shipwrecks do not have protection under either the Historic Shipwrecks or NSW Heritage Acts.

Potential Risks to Historic Heritage

In broad terms, the potential risks to historic heritage derive from the following aspects of the operation of the fishery:

- direct impacts by vessels on shipwrecks; and
- trawl nets becoming snared or entangled on parts of shipwrecks and affecting the integrity of the heritage structure. In this case, there is also a risk to the safety of licensed fishers and their crew if nets are not easily disentangled from the shipwreck. There are a number of instances of damage to or sinking of trawl vessels after nets became snared on shipwrecks.

These risks are qualitatively assessed in **Table 2**.

Table 2 - Qualitative Risk Assessment Considerations

Aspect	Likelihood	Consequence	Risk
Trawler navigation – collision with shipwrecks	Unlikely to rare	Moderate	Low
Entanglement of trawl nets in shipwrecks	Possible	Moderate	Low to medium

The risk presented to historic shipwrecks by the activities of the ocean trawl fishery is generally low, extending to medium for snagging in some cases. In this context, the types of response that are appropriate in the Fishery Management Strategy relate to procedures for monitoring (for instance locations, frequency and consequence) and reporting incidents.

The draft Fishery Management Strategy requires that fishers respond to new information about heritage resources. Ocean Trawl fishers may from time to time encounter shipwreck remains on the sea floor. Although the risk that ocean trawl activities will detrimentally impact on historic heritage resources is generally low, the operation of the ocean trawl fishery does present an opportunity to further reduce risks in the long term by contributing to improved spatial data about the locations of shipwrecks.

Fishers will report location (GPS co-ordinates, water depth) and any other information they detect about the structure to the NSW Heritage Office and NSW Fisheries. This information will add to the data base, so that fishers can be alerted about potential obstacles on the sea floor (with heritage and safety implications), and the Heritage Office will have more accurate information about the location of shipwrecks.

A second appropriate management response is to provide licence holders with basic information about their responsibilities under the *Heritage Act*, including the provisions relating to damage to structures, exclusion zones and collection of any historic artefacts that may be observed.

The *Heritage Act* requires that relics not be disturbed without obtaining a permit. In rare cases, this would mean that trawling in the vicinity of a structure that has been reported to the Heritage Office should cease until the nature and significance of a relic has been investigated and confirmed.

PART 1

introduction

NSW Fisheries is currently preparing a Fishery Management Strategy for the Ocean Trawl sector of the commercial fisheries of NSW. Concurrent with the preparation of the Fishery Management Strategy, NSW Fisheries is required to prepare an environmental impact statement to accompany a Part 5 development application for the continuation of the fisheries.

The Ocean Trawl fishery operates in ocean waters along the entire NSW coast, extending seaward to the margin of the continental shelf. Ocean Trawl operators work in diverse marine habitats, including sandy, rocky and mud substrates and a variety of water depths. The fishery targets many different species of fish and prawns, including cuttlefish, octopus, school whiting, silver trevally, king prawns, school prawns, redfish and gemfish. Several of the species that are targeted by the Ocean Trawl fishery are also important in other commercial fisheries, such as Estuary General, Estuary Prawn Trawl and Ocean Haul. A number of the species targeted by the commercial fishery are also important recreational species or species of cultural or subsistence importance to the Indigenous community. It would appear that only one person currently holding licences in the Ocean Trawl fishery is an Indigenous person, but further research is warranted to confirm the full extent of Indigenous participation in this commercial sector.

scope and requirements of the Indigenous issues assessment

This assessment has been conducted to address the requirements of the Department of Infrastructure, Planning and Natural Resources (DIPNR) as set out in Part B, Section 5.3 and Part E, Section 4.3 of the EIS Guideline for the Environmental Assessment of the fishery.

Part B, Section 5.3 requires:

(a) identify the interests of Indigenous people in the resources harvested by the fisheries and in the habitats that may be impacted by the fisheries;

(b) identify any important Aboriginal heritage sites/places likely to be affected by fishers operating within the fisheries and outline any existing protocols/measures that aim to minimise risk of harm to these sites;

(c) outline whether the fisheries affect traditional fishing and access to fisheries resources, and if so, how this occurs;

(d) identify the involvement of Indigenous people in the existing commercial fisheries;

(e) describe NSW government policies and strategies on Indigenous fishing, including the NSW Indigenous Fisheries Strategy; and

(f) summarise the overall risk to Indigenous people from the current operational arrangements taking into consideration the likelihood/frequency of impacts and the consequence of the impacts.

Part E, Section 4.3 requires:

Identify the impacts of the draft Fishery Management Strategy on:

(a) the interests of Indigenous people in the resource harvested by the fisheries and in habitats that may be impacted by the fisheries;

(b) any important Aboriginal heritage sites/places likely to be affected by fishers operating within the fisheries;

(c) traditional fishing and access to fisheries resources;

(d) involvement of Indigenous people in the existing commercial fisheries;

(e) government policies and strategies on Indigenous fishing, including the NSW Indigenous Fisheries Strategy; and

(f) summarise the overall risk to Indigenous people from the management measures in the draft FMS, taking into consideration the likelihood/frequency of impacts and the consequence of the impacts occurring.

assessment method - Indigenous cultural heritage and community issues

The aim of this assessment is to identify the ways in which the operation of the ocean trawl fishery in NSW interacts with the values of Indigenous people, and to determine the extent to which the draft Ocean Trawl Fishery Management Strategy (FMS) addresses any significant impacts or issues that arise from that interaction.

The Indigenous values that are taken into consideration include:

- Aboriginal sites – the physical evidence of past Aboriginal land use;
- Aboriginal places – the locations that are associated with stories about the landscape or with personal and community totemic associations with the natural world. Aboriginal places may also be associated with historic settlements or events;
- Aboriginal cultural landscapes – the places and species in the landscape that are important to Aboriginal people. As a separate issue from Aboriginal places, this refers to the presence and distribution of Aboriginal foods and medicines in the coastal and marine landscape;
- Aboriginal cultural practices and the maintenance of Traditional Fishing knowledge (TFK); and
- Aboriginal socioeconomic participation in the commercial fishing sector.

The assessment draws on two principal types of information:

- a review of literature that describes historical and contemporary Indigenous community marine fishing practices, the cultural importance of marine/coastal landscapes and their resources, and Indigenous involvement in the commercial fishery sector; and

- conversations with Indigenous people, including members of coastal Aboriginal communities. Local Aboriginal Land Councils and members of the NSW Fisheries Indigenous Advisory Group about community fishing practices and issues.

Although there have now been several detailed local studies of cultural resources in coastal areas of NSW, the information about the relative and absolute cultural value of Indigenous community fishing is still patchy. The study process commenced with invitations to all Aboriginal communities along the NSW coast to contribute their stories, experience and suggestions for improved management of these ocean fisheries.

Introductory information about the Ocean Trawl Fishery was forwarded to each Local Aboriginal Land Council along the coast, together with the invitation to contribute to the project, either as individuals or as a group. A copy of the background information is included in **Appendix 1**. This background information and invitation resulted in minimal community response.

After two follow up phone calls to most Land Councils, the response from Land Councils continued to be minimal.

The members of the Indigenous Fisheries Strategy (IFS) Advisory Committee, including the Chairperson, who come from coastal areas were also contacted. As a result of conversations with the IFS Working Group Chairperson, additional conversations were held with a small number of Indigenous commercial fishers on the north coast. It should be noted that Indigenous people appear to be very poorly represented in the Ocean Trawl sector, and the experience of most Indigenous commercial fishers is in the Estuary General, Estuary Prawn Trawl or Beach Haul fishery sectors.

The consultation process used in this project has drawn some important information from Indigenous people with knowledge of the fishing practices and participation. This information confirms that Aboriginal communities value marine habitats and individual fish, bird, whale and dolphin species. However, it appears that community access to marine resources has traditionally and historically been restricted to the beach, rock platforms and nearshore areas (sandy and rocky reefs), with limited experience of offshore areas.

Whilst it is tempting to suggest that the low response rate from Aboriginal communities reflects their focus on nearshore rather than offshore marine resources, this is unlikely to be the full or even the main reason. Other factors that need to be taken into account and that should be addressed in future consultation between NSW Fisheries and the Indigenous community about the management of coastal fishery resources include:

- a strong community preference for face to face discussion (i.e. verbal presentations and discussion opportunities), where people can share ideas and feedback rather than a more remote, written consultation process. Regional face to face meetings with culturally defined groups should be the minimum level of consultation;

- an ongoing distrust of NSW Fisheries in relation to the management of broader aspects of Indigenous community fishing practices, involvement and exclusion;

- confusion about the different fishery sectors – for instance the difference between the beach haul and ocean trawl sectors. The experience of individuals who did respond was largely of the nearshore fishery areas; and

- the (as yet) poorly developed feedback mechanisms for input to the assessment process for Fishery Management Strategies generally, so that representatives of local Aboriginal communities can see how the information or ideas that they have provided have been used or adapted in the assessment and management process. Clearer feedback will give communities confidence that their effort in providing input is worthwhile. It is anticipated that the activities of the Indigenous Fisheries Strategy Advisory Committee will greatly improve two way communication and networking about Indigenous issues in fishery management. Nonetheless, a participation program for each Fishery Management Strategy and EIS that allows regional communities to see the outcomes of their input (before the FMS is approved) is desirable.

structure of this report

The assessment report has four main sections:

Section 1 outlines the requirements of the brief and the approach to the assessment process.

Section 2 reviews the literature and community information about Indigenous community fishing in ocean waters, and the values that local Aboriginal communities attribute to places and species. This information is relevant to Part B, Section 5.3 (a), (b), (c) and (d) of the DIPNR Guideline for Environmental Assessment of the Fishery. The information in this section highlights the importance of inshore fishing as part of the seasonal round of subsistence and cultural activities within coastal Aboriginal communities. This section also documents the very low level of current Indigenous community participation in the Ocean Trawl fishery.

Section 3 considers the existing and proposed frameworks for managing Indigenous community participation in the management of the Ocean Trawl fishery, with particular reference to the actions that are proposed in the Indigenous Fisheries Strategy Implementation Plan (NSW Fisheries 2002a) and the Indigenous Fisheries Advisory Group workshop report on 'Developing the Participation of Indigenous People in Commercial Fishing' (2003). This information is relevant to Part B, Section 5.3 (e) and Part E, Section 4.3 (a), (c), (d) and (e) of the DIPNR Guideline for Environmental Assessment of the Fishery. This section reviews the objectives

and actions proposed in the FMS with those set out in the IFS (and developed in consultation with regional Aboriginal communities). It also considers the relevance of actions from the Draft Plan for Engagement and Retention of Indigenous People in NSW Commercial Fishing Ventures (Indigenous Fisheries Advisory Committee 2003).

Section 4 assesses the risks to Indigenous values associated with the implementation of the Ocean Trawl Fishery Management Strategy. The information in this section is relevant to Part B, Section 5.3 (f) and Part E, Section 4.3 (f) of the DIPNR Guideline for Environmental Assessment of the Fishery. This section suggests measures both to further reduce risks to Indigenous community values and to support progress towards the achievement of Indigenous community objectives for further skill development and participation in commercial fisheries.

It is important to note that many of the issues raised by Aboriginal people will be resolved by further implementation of the IFS and further refinement of NSW Fisheries policies for Indigenous participation in the management of commercial fisheries. The Ocean Trawl FMS can support and implement measures to address Indigenous community concerns about fishery management generally, but is not the primary policy tool for managing Indigenous participation.

Indigenous perspectives on the management of the resources and habitats used by the commercial ocean trawl fishery

This section relates to Part B, Section 5.3 (a) and Part E, Section 4.3 (a) of the DIPNR Environmental Assessment Guideline.

Section 2 reviews the background information about diverse aspects of Indigenous associations with and rights to marine fishery resources. The review considers archaeological, historical and contemporary data about the utilisation of fishery resources, as well as considering the history of commercial Indigenous fishing in NSW and Indigenous community views about the impact of recent new fishery regulations on their traditional cultural fishing rights and practices. Aboriginal people express strong views about the sustainable management of Aboriginal cultural landscapes. They also express concerns about the loss of traditional fishing rights, in terms of regulation and restriction of access to resources, and the loss, lack or recognition or degrading of traditional skills.

Some of the fishery management issues that have been raised by the Aboriginal community in relation to significant changes to fishery structure have been strategically addressed in the Indigenous Fisheries Strategy (NSW Fisheries 2002a). The IFS recognises the economic and skill disadvantage of many Aboriginal communities and proposes measures to reduce the participation imbalance with other sections of the community.

Section 2.1 reviews some key sources of research information about contemporary Indigenous fishing practices and values.

contemporary indigenous fishing practices and preferences

Survey of Recreational Fishing in NSW

Documentation of the contemporary fishing practices, catches etc (whether commercial or cultural) of Indigenous people in NSW is patchy, and many questions remain unanswered. Some information is available from the results of a survey of recreational fishing (NSW Fisheries 2002b), in which data about Indigenous fishing practices was analysed separately from the general population. Fishing households were first contacted by telephone (i.e. a phone survey) and then encouraged to participate in a diary program where monthly information was collected about fish catches, fishing effort and fishing expenditure. Basic information about each household included household structure and demographic character (including ethnicity).

Of 10,300 households who were sampled by the phone survey in NSW (containing 19,600 people over 5 years of age), 1.4% were Indigenous people. Of 1836 households who participated in the diary program, 1.3% of households (1400 households), with 1.7% of people (approximately 3300 adults and children), were Indigenous. This is a relatively small sample, given the Indigenous population in NSW and the importance of fishing to Indigenous communities. However, the sample does provide a preliminary indication of some of the characteristics of

Aboriginal fishing that distinguish it from other groups. Although this was a recreational fishing survey, it should be noted that most Aboriginal fishers who participated would not have considered that they were fishing for recreational purposes. Rather, Indigenous people consistently report that they are fishing for cultural purposes or subsistence purposes, such as for the reasons noted below and in **Sections 2.1.2, 2.2** and **2.3**.

> eg '*Grandfather told me that 2-3 hunters used to go out and take some young to teach and they would catch enough for the full tribe. In amongst that group there would be up to 30 people'*.
>
> (Uncle Doug Pearce, Indigenous Fisheries Forum Group, Yamba)
>
> '*Indigenous fishing is cultural. It's about being a part of the land and water to get back to your roots. We don't look at size of bag limits, we look at what needs to be taken home. If an 8 year old goes and gets a feed and doesn't bring enough back for everyone at home, they are going to get their arse kicked*.'
>
> (Aboriginal interviewee (south coast), quoted in Cozens 2003)

Table 2.1 indicates the results of diary records kept by Aboriginal fishing households as part of the Recreational Fishing Survey.

Table 2.1 - Recreational Fishing Survey, Aboriginal Households

Species Common Name	**Kept**	**Released**	**Total**
Bream – unspecified	*32*	*66*	*98*
Carp	37	1	38
Catfish – freshwater	1	2	3
Catfish – unspecified		6	6
Cod - Murray/Murray perch	4	20	24
Cod - red rock/red scorpion/coral perch		2	2
Cod – unspecified		1	1
Fish – other		12	12
Flathead – unspecified	43	79	122
Flounder/sole/flatfish – unspecified		6	6
Garfish – unspecified	30		30
Gurnard	3		3
Leatherjacket	6		6
Lobster – unspecified	12	11	23
Morwong – blue	0		0
Mullet – unspecified	4	7	11
Mulloway/jewfish/kingfish	3		3
Non-Fish – other	1		1
Perch - golden/yellowbelly/callop	42		42
Perch – pearl	1		1
Perch - redfin/English		1	1
Pike – unspecified		1	1

Salmon - Australian east/ west/ kahawai		1	1
Shark – unspecified	1		1
Snapper - pink/southern/squire	2	13	15
Tailor/chopper/jumbo	9	7	15
Trout – brown		1	1

Table 2.1 - Recreational Fishing Survey, Aboriginal Households (cont)

Species Common Name	**Kept**	**Released**	**Total**
Trout – rainbow	10		10
Whiting -unspecified	10	39	49
Yabbies	7		7
Yabbies/nippers/bass yabbies	40		40
Grand Total	**298**	**276**	**574**

The fishing effort by these fishers over the period of the survey is greater than the average across the state, hinting at the broader Aboriginal community consumption of the catches of Aboriginal fishers. Also of interest is the high proportion of fish that are reported to have been released (close to 50%, and in some cases the majority of the reported catch). The reason for this is not clear from the preliminary statistics, and the high release rate is not consistent with the results of the more detailed surveys of Indigenous fishers in northern Australia (see below), where negligible amounts of the catch were not retained by Indigenous fishers. It is of note that some Indigenous people in NSW report that they have a clear cultural practice of returning small fish.

'*We know when a fish is too small to eat, chuck him back grow up bigger*'.

(Uncle Doug Pearce, Indigenous Fisheries Forum Group, Yamba.)

This view is not however, expressed consistently across the community, as evidenced by the following comment:

'Aboriginal people do not go recreational fishing. When the Wallaga Lads go fishing they go fishing to get a feed. Aboriginal people do not catch fish and kiss them and throw them back, they catch them to eat them.'

(Aboriginal interviewee (south coast), quoted in Cozens 2003)

A Description of Aboriginal Fisheries in NSW

This section is relevant to the requirements of Part B, Section 5.3 (c) and Part E, Section 4.3 (c) of the DIPNR Environmental Assessment Guideline.

Schnierer and Faulkner (2002) document the results of consultation with Aboriginal people in coastal communities in NSW, about the ways in which they utilise aquatic resources for food, medicines and other parts of their daily lives. The research draws on the results of 150 questionnaires and multiple interviews with individuals, families and communities. Some of the consultation was conducted during the development of the NSW Indigenous Fisheries Strategy.

The results of the consultation enhance the information available from the Recreational Fishing Survey and provide strong community views not only about which species are targeted, when and how, but also the reasons for fishing. It is these reasons, and particularly the cultural identity of Aboriginal fishing, which separate

the fishing activities reported by Indigenous people from other fishing in the general community.

Schnierer and Faulkner (2002) also report on comments by Indigenous people about their current participation in the commercial fishery sector, their concerns about the trends that are evident in participation rates, constraints to improved participation and ideas for how the specific cultural character of Indigenous fishing could be incorporated into commercial fishery management. Whilst these issues and suggested solutions generally relate to the broad concepts of commercial and indigenous fishing, some are directly relevant to the Ocean Trawl fishery.

Schnierer and Faulkner provide a comprehensive list of invertebrate and finfish species that are targeted by contemporary indigenous fishers, demonstrating the diversity of species of interest. Their Tables 1 and 2 are reproduced below as **Tables 2.2** and **2.3**.

Table 2.2 - Aquatic Invertebrates Targeted by Indigenous Communities in Coastal NSW (Schnierer and Faulkner 2002)

(N = Northern, C = Central, S = Southern, M = Marine, E = Estuarine, F = Freshwater, C = Commercial, R = Recreational)

Common name	Scientific name	Region	Habitat	Fishery
Abalone	*Haliotis ruber*	C,S	M	C, R
Beach worm spp.	*various*	All	M	C, R
Bearded mussel	*Trichomya hirsuta*	All	M	
Bimbla cockles spp.	*various*	C,S	E	
Blue swimmer crab	*Portunus pelagicus*	All	M,E	C, R
Cobra	*Teredo navalis*	N	E	
Eastern king prawn	*Penaeus plebejus*	N,C	E	C
Edible mussel	*Mytilus planulatus*	All	M,E	
Freshwater mussel	*various*	All	F	
Greasy back prawn	*Metapenaeus bennettae*	All	E	C, R
Lobster spp.	*various*	All	M	C, R
Mud crab	*Scylla serrata*	All	E	C, R
Mud oysters	*Ostrea angasi*	All	E	
Octopus spp.	*various*	All	M,E	
Pacific oyster	*Crassostrea gigas*	All	M,E	
Periwinkle spp.	*various*	All	M, E	
Pipi	*Donax deltoides*	All	M	C, R
School prawn	*Metapenaeus macleayi*	All	E	C, R
Sea urchin	*various*	All	M	
Shrimp	*Machrobrachium sp*	All	E,F	
Squid spp.	*various*	All	M,E	C, R
Sydney cockle	*Anadara trapezia*	All	E	
Sydney rock oyster	*Saccostrea commercialis*	All	M,E	C, R
Tapestry cockle	*Tapes watlingi*		E	
Yabby	*Cherax destructor*		F	

Table 2.3 - Fish Species Targeted in Indigenous Coastal Fisheries in NSW (Schnierer and Faulkner 2002)

(N = Northern, C = Central, S = Southern, M = Marine, E = Estuarine, F = Freshwater, C = Commercial, R = Recreational)

Common Name	Scientific Name	Region	Habitat	Fishery
Blue groper	*Achoerodus gouldi*		E	
Dusky flathead	*Platycephalus fuscus*	All	E	C, R
Estuary cod	*Epinephelus coioides*	All	E	
Estuary perch	*Macquaria colonorum*	All	E	R
Flat tail mullet	*Liza argentea*	All	E	C, R
Groper	*Epinephelus lanceolatus*	All	E	
River garfish	*Hyporhamphus regularis*	All	E	C, R
Sand mullet	*Myxus elongatus*	All	E	C, R
Pike eel	*Muraenesox bagio*	S	E	
Fork tail catfish	*Arius graffei*	All	E,F	
Longfin river eel	*Anguilla reinhardtii*	C,S	E,F	C
Shortfin river eel	*Anguilla australis*	C,S	E,F	C
Australian bass	*Macquaria novemaculeatus*	All	F	R
Eel tail catfish	*Tandanus tandanus*	All	F	C, R
Freshwater herring	*Potamalosa richmondia*	N	F	
Pink-eye mullet	*Myxus petardi*	N	F	
Rainbow trout	*Salmo gairdnerii*	N	F	R
Dart	*Trachinotus coppingeri*	All	M	R
Sand flathead	*Platycephalus caeruleopunctatus*	All	M	C, R
Sea garfish	*Hyporhamphus australis*	All	M	C, R
Shark spp.	various	All	M	C, R
Tailor	*Pomatomus saltatrix*	All	M	R
Yellow-tail kingfish	*Seriola lalandi*	All	M	C, R
Australian salmon	*Arripis trutta*	C,S	M	C, R
Drummer spp.	various	C,S	M	R
Samson fish	*Seriola hippos*	C,S	M	
Black bream	*Acanthopagrus butcheri*	All	M,E	C, R
Flounder spp.	various	All	M,E	C, R
Leatherjacket spp.	various	All	M,E	C, R
Luderick	*Girella tricuspidata*	All	M,E	C, R
Mulloway	*Argyrosomus hololepidotus*	All	M,E	C, R
Parrot fish	*Labridae*	All	M,E	
Shovel-nose ray	*Aptychotrema rostrata*	All	M,E	
Silver trevally	*Pseudocaranx dentex*	All	M,E	R
Snapper	*Pagrus auratus*	All	M,E	C, R
Sole spp.	various	All	M,E	C, R
Tarwhine	*Rhabdosargus sarba*	All	M,E	C, R

Table 2.3 - Fish Species Targeted in Indigenous Coastal Fisheries in NSW (Schnierer and Faulkner 2002) (cont)

(N = Northern, C = Central, S = Southern, M = Marine, E = Estuarine, F = Freshwater, C = Commercial, R = Recreational)

Common Name	Scientific Name	Region	Habitat	Fishery
Whiting spp.	various	All	M,E	C, R
Yellow fin bream	*Acanthopagrus australis*	All	M,E	C, R
Butter fish	*Monodactylus argenteus*	N,C	M,E	
Pig fish	*Bodianus sp.*	S	M,E	
Sea mullet	*Mugil cephalus*	All	M,E,F	C, R

The species listed are primarily estuarine and near shore species, many of which are also targeted by recreational fishers and commercial fishers (Estuary General, Estuary Prawn Trawl and Beach Haul). The fishing methods documented by Schnierer and Faulkner (2002) highlight both the importance of estuarine species and the ongoing use of 'traditional' methods, albeit sometimes adapted to use more modern technology (eg modern nets rather than traditional small handmade nets).

Responses to survey questions about the frequency of fishing events and the destination of the catch both reinforce views expressed in other discussions about the reliance of Indigenous people on fish and shellfish catches as a significant part of their diet, and the importance of sharing catches with the extended family. Eighty-one percent of respondents noted that they fished either to supplement their family's diet or to share with their extended family (especially Elders). However, whilst these subsistence/dietary reasons for fishing are clearly important and continue traditional practices, other reasons for fishing indicate particular characteristics of Indigenous fishing that distinguish it from fishing by other groups in the community. For instance, many fishers from lower income families fish to supplement their family diet, and several ethnic groups are known to target particular species for food or income or to fish seasonally to take advantage of fish breeding or migratory behaviours.

None of these other groups have the cultural ties to the land and water that Aboriginal people express. The quotes noted below reflect both the subsistence/dietary values of fishing and the cultural values of fishing for Aboriginal people.

> *'Fishing has always been in our family and will continue because it is a main meal for us.'*
>
> *'We catch fish for our Elders and for children to help them with their health.'*
>
> *'Limits set by Fisheries don't take into account how we fish and collect for our communities as well as for ourselves.'*
>
> *'Fishing is for relaxation; family outings; getting a feed of fish.'*

'It's our birthright to collect seafood and freshwater fish even though we eat white fella food, we still eat our traditional foods (kangaroo, possum, spiny ant eater, salt water and fresh water foods).'

'I feel it's important that we keep fishing regardless of whether we do it traditional or not, we need to pass our methods down to our children so as we can keep the culture going…. Not forget who we are.'
'Fishing is a tradition and a culture throughout Aboriginal people today – letting the younger generation know of what Aboriginal bush food is.'

'How can we continue on with our cultural right of families visiting, camping and sharing stories, obtaining fish and pipis when we have no access to the special place. These are concerns. The fishing co-ops continue to mine pipis, all sizes are collected, not just like Goories only take what is needed.'

'Recognition of Goorie culture which includes fishing as a means of keeping families.'

Schnierer and Faulkner (2002) highlight two important issues associated with Indigenous involvement in the commercial fishery sector.

They note the competition for resources and emerging conflicts that have been present since the early days of European settlement along the NSW coast. Historical records of nineteenth century resource exploitation (eg Thompson 1993) highlight the depletion of stocks and environmental degradation brought about as European settlement expanded. An example is the harvesting/mining of oyster beds in estuaries such as the Hunter, Port Stephens, Camden Haven and Clarence where extensive natural oyster reefs were removed during the nineteenth century and have never recovered. Apart from the ecological implications of this change to estuary morphology and species abundance, such practices would clearly have had a dramatic impact on the resources available to Indigenous people. Schnierer and Faulkner (2002) argue that despite the evidence of failed management of fishery resources by European fishers, they have maintained control of the resource, largely to the exclusion or 'marginalization' of Indigenous people.

The second key issue is the recognition of distinctive Indigenous commercial fishing practices that do not necessarily fit with the general commercial fisher concept. It is argued that failure to recognise these practices as valid commercial activities has led to a decrease in the participation of Indigenous people in the commercial sector generally and created barriers to continuing commercial participation (including fee structures, return requirements, licence transfers and access to training to update skills).

The final quote from an Indigenous commercial fisher (in Schnierer and Faulkner (2002)) highlights the frustrations felt by Indigenous fishers about the management of the commercial sector generally. It is important to note however, that the issues raised link back to the focus of Indigenous fishing on estuarine and beach/nearshore species and are not made in the context of the Ocean Trawl Strategy in particular.

'I want to continue supplying the community and the elders with pipis and seafood when I can. Pipis and fish have kept the Aboriginal community in this area going for generations since non-Aboriginal people came here and now it's getting harder for Aboriginal people to get licences to fish these days. Fishing is something that is very important to Aboriginal people and their culture and I would like to stay in business so that the community can at least maintain some involvement in the fishing industry.'

National Recreational and Indigenous Fisheries Survey

Henry and Lyle (2003) report the full results of the National Recreational and Indigenous Fishing Survey. This research report provides a separate analysis of the fishing practices of Indigenous people in northern Australia. Whilst it cannot be assumed that northern Australian communities (across Western Australia, Northern Territory and Queensland) would have the same fishing practices or specific cultural values as those in southern Australia, the survey results do indicate some very clear distinctions in the focus of fishing effort, particularly between offshore and inshore waters in northern Australia.

It is understood and acknowledged that some Indigenous communities have expressed dissatisfaction with the research methods used in this survey (Schnierer pers. comm.). The study does provide useful baseline statistical data, and highlights areas for further consultation with communities to ensure culturally acceptable processes and outcomes.

Table 2.4 shows the relative fishing effort by water type of Indigenous households across the northern Australia survey area, for 370,000 fishing events that were reported in diary records.

Table 2.4 - Annual fishing effort (events) for Indigenous households in northern Australia (fishers aged 5 years and over)

Type of Waters	% of Fishing Events
Offshore	1%
Inshore	55%
Estuary	15%
Rivers	19%
Lakes/dams	9%

These figures show a very strong focus on marine fish resources, but particularly on those marine resources that can be obtained from land or from small boats close to shore. Although there were reported to be regional variations, it is apparent that very little Indigenous fishing in this survey area is conducted in offshore marine waters. This is reinforced by statistics about whether fishing took place from shore or boat. Overall, some 93% of Indigenous fishing in the study area was conducted from the shore, although 21% of fishing households in Queensland reported fishing from boats.

The survey also provided some information about the method of fishing (i.e. the equipment used). The results show that line fishing is by far the most important

(53% of all fishing effort), followed by hand collection (26%) (note that the statistics include shellfish), nets (12%), spear (9%) traps (0.5%) and diving (0.1%). The amount of hand gathering by Indigenous fishers is substantially more than the general recreational fishing population. Hand collection was particularly important in the Northern Territory.

Henry and Lyle (2003) also report the species targeted by Indigenous fishers in northern Australia (see **Table 2.5**).

Table 2.5 - Annual harvest of major fishery groupings by Indigenous people in northern Australia

Fishery grouping	Number harvested (x1000)
Finfish	914
Small baitfish	98
Crabs/lobsters	181
Prawns/yabbies	655
Molluscs	1149
Miscellaneous	93

Within the finfish category, the most frequently caught fish were mullet (almost twice as much as the next most numerous catch), catfish, perch/snapper, bream and barramundi. Seventy-eight per cent of mullet were reported to be taken from inshore waters.

As noted above, these results are not necessarily transferable to southern Australia and there are risks in assuming that cultural practices are the same or that Aboriginal people's fishing activities in southern Australia cannot be adequately explained in cultural terms. However, if the results are considered to be *broadly* indicative of Indigenous community fishing behaviour, then several features emerge that are relevant to the current assessment of the impact of the commercial Ocean Trawl fishery in NSW. These include:

- Aboriginal fishers who are not commercial licence holders tend to access marine fish and shellfish species almost entirely in inshore areas, and most often from the beach rather than from boats. The deep water areas (3 kilometres offshore) that are the focus of the Ocean Trawl fishery are rarely visited by Aboriginal fishers who are not part of the commercial industry.

  Note that the extent of offshore fishing and its relationship to long documented cultural fishing in estuaries, bays and along beaches and headlands, is not well documented in NSW, and informed management would benefit from further consultation/research in this regard.

- The species most often reported to be caught by Indigenous fishers in northern Australia reflect the habitats in which they most frequently fish. The dominance of mullet in northern Australian catches can be linked to the importance of beach and estuary fishing. Similarly, bream is a nearshore family of fish, accessible to people fishing from beaches and in estuaries, rather than deep water trawlers.

- Indigenous fishers target a wider variety of fish types and other marine species (particularly shellfish) than other 'recreational' fishers (see also Schnierer and Faulkner 2002). Shellfish are not part of the Ocean Trawl fishery.

- There is some overlap in species targeted by the Ocean Trawl fishery and those nominated by Indigenous fishers in northern Australia, principally amongst those species whose habitat ranges from the nearshore (including estuaries) to offshore. This includes, snapper (including sea perch), salmon and tuna.

traditional fishing and access to fisheries resources

This section describes the observations of Indigenous fishing made by early European settlers and the results of several studies that have sought to document wild resource use by Aboriginal communities in coastal areas. The information is relevant to Part B, Section 5.3 (c) and Part E, Section 4.3 (c) of the DIPNR Environmental Assessment Guidelines.

These studies described below relate to practices in the twentieth century, although there is also less well documented continuity back to the late nineteenth century in most cases. The studies provide some insight into the nature of Indigenous ocean fishing and the species targeted. This information is critical to understanding firstly the extent of interactions between Indigenous cultural and subsistence fishing and the Ocean Trawl commercial fishery and secondly the extent of impacts of the Ocean Trawl fishery on Indigenous community values and practices.

Nineteenth Century Ethnographic Descriptions

There are many nineteenth century references to Aboriginal people fishing in north and south coast estuaries, at estuary mouths, around headlands and along ocean beaches. There are also a few references to people fishing in open ocean waters from canoes. Although there are many references, they tend to be patchy both in terms of their geographic location and temporal continuity. Also, because the observations are reported by European settlers, the description may often involve a degree of personal interpretation of the rationale for the activity, rather than reflecting directly the contextual understanding of the Aboriginal participants.

Some examples of reports from nineteenth century observers, relating particularly (where possible) to fishing in marine waters, are noted below. It is interesting to note that by far the largest number of observations relate to Aboriginal people using estuarine waters for fishing and shellfishing, rather than coastal beaches and offshore waters.

Collins 1798 (quoted in Attenbrow 2002): *'the natives of the sea coast are those with whom we happened to be the most acquainted. Fish is their chief support…. In addition to fish they indulge themselves with a delicacy which I have seen them eager to procure. In the body of a dwarf gum tree are several large works and grubs….'*

Tench 1788 (quoted in Attenbrow 2002): '(they)… *wholly depend for food on the few fruits they gather; the roots they dig up in the swamps; and the fish they pick up along the shore, or contrive to strike from their canoes with spears. Fishing indeed seems to engross nearly the whole of their time, probably from its forming the chief part of their subsistence.*'

Ainsworth (1922): *'the seasons were known to them by the foliage and flowers. They could tell by the natural signs of flowers and fruit when the salmon and mullet were due on the beaches and in the rivers; also when game was likely to be in evidence in particular localities.'*

Ainsworth also describes groups of people moving to the coast in September to take advantage of the huge shoals of salmon (*Arripis trutta*) in the surf (on the NSW north coast) at that time of year. These fish were caught by spearing. Ainsworth also noted the importance of sea mullet in his observations. Although some mullet can be obtained throughout the year, they migrate north along the coast in enormous shoals from late April to early September, and would have been easily obtained by spearing and netting.

Hodgkinson (1845): '*The* (Aboriginal people) *at the Macleay and Nambucca Rivers spear in a few minutes sufficient fish for the whole tribe, on the shallow sand banks and mud flats on that part of the river which rises and falls with the tide.'*

Crown Lands Commissioner (Fry 1843:653): '*the subsistence of the natives of this portion of the colony being determined in a great manner from fishing, the localities which they inhabit are consequently the immediate banks of the rivers Clarence and Richmond*.' Of the coastal Aborigines, Fry says '*their diet is composed almost entirely of fish and honey*.'

Mackaness (1941) – '*fish are abundant and the Aborigines may be termed Icthyophagist…. Their mode of taking fish is by net, spearing and line and hook, the latter ingeniously made from bone. Their canoe a sheet of bark from the straight part of a tree folded at the end*." When fishing, Aboriginal people were noted to '*occupy a kneeling position in the Mudjerre or canoes and may be seen like floating specks off the coast spearing salmon; they are expert fishers*.'

Anderson (1890) also describes canoes and wooden implements used by Aboriginal people on the south coast. The canoes were made of bark strips and were found along beaches as well as estuaries.

There is also some historical evidence that people ate large marine mammals when they were available (Tench 1793, quoted in Attenbrow 2002):

> *'September 1790. On the 7th instant, captain Nepean of the New South Wales corps and Mr White accompanied by little Nanbaree, and a party of men, went in a boat to Manly Cove, intending to land there and walk on to Broken Bay. On drawing near the shore, a dead whale, in the most disgusting state of putrefaction, was seen lying on the beach and at least 200 indians (sic) surrounding it, broiling the flesh on different fires, and feasting on it with the most extravagant marks of greediness and rapture.'*

There is a widespread view in the ethnographic reports that Aboriginal people were generally on the coast through late spring, summer and autumn, living in the hinterland in winter. This view is not wholly supported by the availability of resources, nor is the evidence consistent along the whole coast. Some of the fish species that are known to have been targeted by Aboriginal fishers are far more common (in schools) in winter than in summer. It is possible that early European observers did not note short visits to the coast during winter to access these resources. Sullivan (1982) refers to the observations of Robinson (1844) of the apparently healthy appearance of Aboriginal people both on the uplands (of the Monaro) and right along the south coast between Goalan Head and Gippsland Lakes in mid winter, during late June and July. These observations do not suggest a strongly seasonal pattern of coast and hinterland occupation, and Sullivan suggests that coastal wintering may have been more common in the south than the north.

Studies of wild resource use by Indigenous Communities in Coastal Areas

As part of the liaison with Aboriginal fishers and community groups about the Ocean Trawl FMS, and on the advice of the Chair of the NSW Indigenous Fisheries Advisory Group, discussions were held with John Jarrett. John is the only Aboriginal person currently holding a licence in the ocean trawl sector. John has been at sea since the age of 12 years. During these discussions with John, he also talked about local cultural fishing with his family. As a child, he gathered shellfish with his mother and grandmother, and they also got prawns at Arrawarra. His mother also gathered lobsters at Woody Head, as well as sea urchin eggs and pipi. Every species was targeted at different times and people knew what would be available at different locations throughout the year. This is the same 'circle fishing' concept that was described by south coast communities (Egloff 1981 and Cozens 2003). In addition to the collecting activities of women, John described catching fish in the surf (mullet?). The process involved lots of people, who also shared the catch.

People would walk into the surf to surround a large shoal of fish and then gradually walk them into shore.

John Jarrett thought that even though most traditional fishing on the north coast would have been from the beach and close to land, people had canoes and they could have fished further offshore on calm days, both historically and before European settlement. Elsewhere along the NSW coast there is abundant evidence that people took canoes to islands close to the shore (eg Broughton Island in Myall Lakes National Park), so canoes were certainly seaworthy on calm days.

Schnierer and Robinson (1993) in Zann (1996) described the historical and contemporary uses of marine resources, particularly fin-fish and invertebrates in northern NSW. They found that local communities continued to utilise seafood as a food source (for instance, making up 30% of the diet in the lower Clarence valley). They also noted the desire of Indigenous peoples to become more involved in commercial fishing industries based on the assertion that they were the original owners of the coast and its resources, which were never ceded to anyone.

English (2002) reports the results and implications of a detailed study of Aboriginal wild resource use on the NSW mid north coast. The study was conducted with the Gumbaingirr people, based at the Yarrawarra Aboriginal Corporation at Corindi Beach. Gumbaingirr people have lived in camps and villages near Corindi Beach since the 1890s. The project reported by English sought to map the patterns of natural resource use described by the current Indigenous residents of the area. The patterns that are described reflect the changing lifestyles of Aboriginal communities from the 1940s to the present. Whilst these patterns, which draw on the experience of current community elders, do not necessarily represent activities extending to the late nineteenth century or earlier, they do highlight the importance of different types of resources to this community. The study also clearly demonstrates the continuity of attachment to the land. Even though young people in the Yarrawarra community do not use all of the places that were once important for community subsistence, they continue to express an interest in and connection to these places.

With regard to the current assessment, the key issue is the extent to which this coastal community nominates marine resources and marine places as being an important part of their subsistence and cultural activities. The wild resource use that is reported by English clearly demonstrates the diversity of resources that were important, but it also suggests a strong focus on the nearshore, estuary (Corindi Creek and Lake) and terrestrial resources, rather than offshore. This partly reflects the social importance of subsistence activities, with Gumbaingirr Elders reporting how important it was that everyone took their turn and worked together to provide the food and medicines needed for the community.

The places mapped in this project that related to marine or estuarine resources are noted below, (drawing directly on Appendix 2 of English 2002) (**Table 2.6**).

Table 2.6 - Aboriginal Fishing Places, Corindi Area

Place	Activities
Corindi Lake crab spot	Good location for finding crabs in 1950s and 1960s, later became polluted

Headland near old camp	Used from early 1900s to present for abalone and other shellfish
Corindi beach and rock platform	Used '*for thousands of years. Has been the main spot to obtain shellfish for decades and remains important. There is living memory of people singing to whales and dolphins at or near this location.*'
Fishing area on Corindi Beach	Used from 1950s to 1990s, regarded as the best spot to catch Jew Fish. Now within the Marine Park.
Tuny's camp	Aboriginal people lived here in huts. Others used to visit regularly and spend Christmas (good fishing)
Wash away camp	Used by many families throughout the year. Good camp at Christmas time with fresh water, bush tucker and good fishing
Massacre place and sea cave	A plaque at this location commemorates the mid to late nineteenth century killing of Aboriginal people. Some were shot and others jumped off the cliff into the sea. It is believed that some people escaped by going into the sea cave and emerging at another cave. This place is avoided by Gumbaingirr people.
Arrawarra Camp	Used from 1920s as a permanent camp. Freshwater swamp with turtles, eels, good fishing and various plants.

Table 2.6 - Aboriginal Fishing Places, Corindi Area (cont)

Place	Activities
Arrawarra headland and fish trap	Used from distant past to present (although now within Marine Park Sanctuary Zone which inhibits fishing). Headland was a men's area and rain increase site.
Oyster place	Accessed by walking up the beach from the old camp
Corindi Beach	Used by the community for decades and still the main fishing spot for elders and young people. Rock platform is a good place to get shellfish
Fishing spot on Corindi Creek	Used in 1950s. Currently no access and the creek is also polluted
Eel spot on Corindi Creek	As above.

The list of places identified by the Gumbaingirr people provides a great deal of local detail about and differentiation of Corindi Beach, with quite specific locations nominated as the preferred sites along the beach for fishing or other marine resources. Conspicuously absent in this account is any reference to offshore fishing. All the fishing references are to activities conducted from the beach or in the estuarine creek system.

Considerable detail about late nineteenth to mid twentieth century Aboriginal community fishing practices is provided in Egloff (1981) who researched the history of the Aboriginal community at Wreck Bay on the NSW South Coast. These observations clearly indicate that Aboriginal fishers at this time were accessing offshore resources, although the focus of their activities was generally in inshore waters.

Egloff (1981) refers to abundant archaeological evidence of Aboriginal fishing and shellfish gathering along the shorelines at Wreck Bay, with extensive middens containing shellfish, fish hooks (using shell), edge ground axes, bone points and flaked stone implements. Axe grinding grooves, open campsites, bora rings and burial sites are also reported from the Beecroft Peninsula, indicating a well established population with tools and strategies to work with diverse local marine and terrestrial resources.

Egloff describes fishing by men using spears that had hard wood prongs tipped with bone points. These spears were used in Jervis Bay and in the shallow coastal waters over rocky reefs. Women also fished using hook and line. Species represented in the midden sites include snapper and bream, as well as pipi and cockle.

The Aboriginal population on this part of the south coast was decimated after European settlement. Eventually the remaining Aboriginal people were settled at reserves at Roseby Park and Jervis Bay, although a few people had continued to live in these areas throughout the nineteenth century. Egloff (1981) reports that the Office of the Protector of Aborigines provided a boat and fishing gear to Aborigines at Broughton Creek in 1882 and that a boat was also provided to the Jervis Bay people (at Currumbene Creek) the following year.

When the Commonwealth took over the administration of Jervis Bay in 1922, there were 25 Aboriginal people living in a fishing village at Wreck Bay and Aboriginal

crews had fished this part of the coast throughout the latter part of the nineteenth century. Egloff's description of the fishing activities at Wreck Bay highlights the following features, which are relevant to the current assessment:

- Net fishing from small boats for mullet, blackfish, jewfish, kingfish, whiting and bream. Two hundred to 300 cases of fish could be caught at a single shot. Aboriginal fishers operated predominantly in Jervis Bay, but as much as 13 kilometres out to sea.

- Snapper were caught off the reefs with hand lines.

- Spotters were stationed at vantage points, including high trees along the beach.

- Fish were carted to the railway station at Bomaderry for transport to markets.

- Each catch was divided into five parts – one part for each crew member and one for the boat and gear which needed constant repair.

- In the 1940s and 1950s there were seven to eight crews of Aboriginal fishermen operating in Wreck Bay, and a rotation system was used to provide equitable access. Each crew had rights for 24 hours in turn.

- Most fishing was done between Christmas and Easter, and at other times men worked at local timber mills or picking vegetables.

- During the Depression, families camped on the southern beaches of the bays and collected pipis, mussels and oysters. People also gathered abalone at this time. It was sun-dried on wire racks and sold to traders in Sydney.

Egloff (1981) also reports that the Office of the Protector of Aborigines also provided fishing boats to reserves and camps along the south coast:

> '*In the Bodalla district, Aborigines were considered by ME Mort to be destitute without a boat. These Aborigines had sold fish for a living until their boat was wrecked while going to the assistance of a sinking vessel… While most white Australians do not realise the extent to which coastal Aborigines quickly adopted European maritime technology and became net fishermen capable of making their own gear and surprisingly enough also pursued large whales. Recently buried at Wreck Bay is one of the great whalers of Twofold Bay, Aden Thomas. Before him were Hadgadi and Adgeree, two coastal Aborigines famous for their whaling exploits.*' (p 23)

These two detailed studies reveal information about two different aspects of Aboriginal community involvement in fishing in marine waters, although it is clear from both studies that coastal Aboriginal people were skilled fishers, with extensive community knowledge of the resources that were available and how to best access them for community needs. From these two examples it could be concluded that the nature of fishing depended somewhat on the access that the community had to European style fishing boats and also to transport (for marketing of fish). The Corindi example shows long continuity of subsistence and cultural fishing from

coastal beaches (as well as the estuary) by a community outside the institutional system of missions. In general, this was not commercial fishing, and the community did not refer to the use of ocean going boats.

The Jervis Bay/Wreck Bay example illustrates the adaptation of traditional fishing to the small scale commercial sector, although clearly local subsistence and cultural fishing continued to be practiced. The Wreck Bay case study reinforces comments from the NSW Aboriginal Land Council (pers. comm. 2002) who note that many of the missions (and other government sponsored settlements) established in the late nineteenth and early twentieth centuries were on estuaries or coastal headlands. Aboriginal people who were placed in these institutions would have been expected to provide a substantial proportion of their food supply by fishing and shellfish gathering, utilising existing skills and traditional practices, augmented by other equipment where it was available.

Aboriginal marine 'totems'

This section describes places and species that are of significance to Aboriginal people, providing further information that is relevant to the requirements of Part B, Section 5.3 (b) and Part E, Section 4.3 (b) of the DIPNR Environmental Assessment Guideline.

The traditional social structure of Aboriginal communities includes familial or totemic relationships to natural features, plants and animals. Faulkner (2000) notes that a '*general characteristic of Aboriginal totemic relationships was the basic tenant of not consuming one's totem, and taking some degree of responsibility for its survival*.' (p3). In some cases, the relationship was expressed in terms of ceremonies at particular sites (Increase sites) to ensure the continuation of the species. For example, Radcliffe-Brown, in Schnierer and Faulkner (2002), recorded a bream increase site on the lower Clarence River, for the Yaegal people.

Some totems were marine species and many were coastal species, but the full range of totems from the NSW coast, and the variations between groups along the coast, has not been documented. Notwithstanding this, it is apparent that the values associated with totems would have encouraged Aboriginal people to manage their marine resources carefully, to protect both economic and spiritual values.

Rose, James and Watson (2003) discuss Indigenous kinship with natural features in NSW, drawing on case studies from Wallaga Lake (Yuin people) on the south coast, and from the Ngiyampaa people in western NSW. The Yuin people's stories provide some guidance about the spiritual associations and values that Aboriginal people may have with marine species. The black duck is a very important totem species for the Yuin people and many of the other species that are noted as having totem value are terrestrial species from the mountains and forests of the south coast. More relevant to the current assessment of ocean trawl fishery impacts are stories from the Yuin people about their relationship with dolphins and whales and of the sanctuary value of Little Dromedary Island (Najanuga) and Montague Island (Barunguba). Both islands are off the NSW Far South Coast and are passed by commercial fishing vessels (as well as recreational vessels and other commercial vessels) on a regular basis.

'*Gulaga was and still is a protection area for all sorts of plants, animals and birds. ….in the video "Sites we want to Keep" the late Guboo Thomas stated that the name Najanuga means "powerful home". The significance of Najanuga as a resource site for birds eggs is documented there as well as by Kelly (1975:4). According to the late Guboo Ted Thomas, birds were protected in the area around Najanuga; only old people gathered eggs from Najanuga and they always took a limited number. Najanuga is thus one of the original bird sanctuaries on the continent*.'

(Rose, James and Watson (2003:47)

The killer whale (Yeerimbine) is identified as a totem south of Twofold Bay. The relationship between some Yuin people and killer whales at Twofold Bay has been widely reported because of the importance of the collaboration to the whaling industry.

'*A number of Yuin people participated in the industry by calling killer whales to herd smaller whales in toward shore so that they could be harpooned by the ships stationed there. The killer whales were rewarded by being fed the tongues of the harpooned whales. Three people with whom Christine (*Watson*) spoke added that Yuin involvement in the whaling industry was an adaptation to the presence of white people as whales are an important animal in Yuin culture which traditionally should not be killed*.'

(Rose, James and Watson (2003:48))
'There was also collaboration with dolphins. The late Guboo Ted Thomas, on his tape The Dreamers, recounted an early memory of his grandfather singing songs, hitting the water with a stick and dancing on a beach down on the south coast, calling the dolphin to bring fish in to shore for them to eat.……Guboo said that he could still sing the songs and described another time when a dolphin brought a big bream to shore for him.'

(Rose, James and Watson (2003:48))

'Yuin women were also able to communicate with dolphins. There is a story that women from Brou Lake would hit on the water, and speak to the dolphins when they swam up, giving them messages to transmit to men on Montague Island.'

(Rose, James and Watson (2003:48))

This relationship or partnership with dolphins appears to have been quite widespread along the coast. Faulkner (2000) refers to a documented tradition of dolphins assisting Aboriginal people to fish on the beaches in the Yaegl territory at Yamba. Mick Leon (pers.comm.2003), from the mid north coast, noted that dolphins and turtles are considered as 'brothers' at that part of the coast, but whales are not.

The Gumbaingirr people on the mid north coast (English 2003) also tell of people calling to the dolphins from the headland at Corindi. Faulkner (2000) refers to a similar relationship in the Moreton Bay region, at Bribie and North Stradbroke Islands.

the archaeological record – known Aboriginal sites

This section addresses the concept of heritage (archaeological) places along the NSW coast, as required by Part B, Section 5.3 (b) and Part E, Section 4.3 (b) of the DIPNR Environmental Assessment Guidelines.

Archaeological sites preserve the physical evidence of past Aboriginal land use and culture. They can be expected to provide some indications of the activities that people were carrying out and how they went about those activities. This information can be interpreted from the organic content of the sites (eg species composite of shell, bone, plant seeds or other remains, presence of charcoal etc), from the implements that are present (different types of flaked or ground stone implements, bone implements etc known to have been used for specific purposes), artefact frequency etc and patterns of site distribution in the landscape (eg continuity, density, spatial and temporal relationship to resources). Unfortunately, for most sites, much of the context and content that would facilitate interpretation has been differentially lost by weathering, decay, erosion or disturbance. For coastal sites, the harsh marine interface environment together with the extent of development, means that many sites have disappeared completely. Where some archaeological evidence or economic and social activity remains, it is frequently very difficult to determine the extent of information that has been lost – ie how indicative of the full record the remaining evidence is likely to be.

In relation to fishing practices, the equipment used by traditional Aboriginal fishers included tools made using a range of plant materials, none of which are preserved in open campsites or middens. These implements include nets, fish traps made of matted brush barriers (rather than stone), look out trees, canoes, fishing lines, spear shafts etc. In this context, much past Indigenous fishing activity is archaeologically invisible.

Some broad observations of archaeological evidence of coastal fishing activity are noted below.

- In excess of 1500 midden sites and similar large numbers of open campsites without shell material have been recorded along the NSW coast, mostly in open contexts, although in some regions (eg the Sydney region), rock shelter sites containing midden deposits are relatively abundant.

- Very large estuarine middens have been recorded from north coast valleys such as the Macleay, Richmond and Clarence, and ethnographic reports link some of these to substantial village settlements at the mouths of estuaries. Middens of equivalent size in open coastal contexts are relatively rare. This is likely to reflect preservation issues in coastal dune fields (aeolian impacts) and back beach areas (wave impacts). Very large middens (dominated by pipi shell) are known to have formerly occurred along Stockton Bight, north of Newcastle, at Dark Point in Myall Lakes National Park, and some mounded coastal sites are also known from the south coast (eg at Pambula).

- Many coastal midden sites are located in close proximity to other resources such as fresh water (creeks or springs) and terrestrial plants and animal resources. This is consistent with the strongly expressed view by the Aboriginal community that fishing and shellfishing were parts of a broader resource access strategy in which stocks of all resources were carefully managed.

- Fish that are reported from coastal midden sites (from bone and ootoliths) include snapper, bream (black and silver), leatherjacket, wrasse, mullet, flathead and mulloway.

- There is a tendency towards increasing variety of fish species in the upper layers of sites. Several authors suggest that this is due to the introduction of new fishing technologies (particularly line fishing) over time. Dates for fish hooks are all less than 1000 years and appear to have been more common on the south coast. In terms of shell species, on the south coast there is a clear change towards hairy mussel and edible mussel over the last 1000 years.

- In addition to economic materials (foods, medicines and tools), some midden sites contain human burials (eg the Dark Point midden in Myall Lakes National Park). Sullivan (1982) suggests that many of these burials, which include males and females (adults) and children, are relatively recent (last 200 years). Wherever they occur and whatever their age, the presence of a burial in a midden deposit is highly significant to the Aboriginal community.

aboriginal places and community stories

This section provides further information about places that are valued by the Aboriginal community along the coast, as required by Part B, Section 5.3 (b) and Part E, Section 4.3 (b) of the DIPNR Environmental Assessment Guideline. There is a very low risk that the continued operation of the commercial Ocean Trawl Fishery

will have a detrimental impact on Aboriginal places (archaeological or associated with community stories) along the coast.

English (2002) discusses the reasons that places associated with 'wild resources' are valued by Aboriginal communities and highlights eight primary factors (based on experience with the Yarrawarra community on the north coast). He notes that these places may be associated with:

1. *'past family, group or individual activities that are remembered by the participants or because they feature in stories passed down through generations;*

2. *a highly valued type of food or medicine that is still highly sought by people today or else remembered as an integral part of people's life and knowledge systems;*

3. *a species that has totemic significance or which features in a story or tradition;*

4. *independence and self reliance in the face of economic and social hardship;*

5. *the concept of past of continuing interaction with the landscape in a way that affirms cultural identity;*

6. *physical remains such as middens, scarred trees, or tin huts that bear witness to people's long term and continuing association with the land;*

7. *enjoyment of the land gained through having access to personal and group space in which to reflect and carry out enjoyable activities such as fishing;*

8. *people's custodial interests in land that are maintained by continuing use and the opportunity to observe change in the landscape's condition.'*

These eight factors highlight the complexity of Indigenous community relationships to fishery resources and their views about appropriate sustainable management practices. Similar patterns of resource relationship are repeated right along the coast, although details clearly change from one social grouping to another and with the specific environmental resources that may be available in different areas (eg the differences between the long sandy beach coasts of the north and the rocky embayments of the south).

Aboriginal people attribute cultural value on some coastal features because of their spiritual associations. Some of these features are listed as Aboriginal Places and have status under the NPW Act (an example of this type of feature is Goanna Headland at Evans Head), but many are not well documented and are not formally identified as Aboriginal Places.

For example Mick Leon (pers. comm. 2003), from the mid north coast of NSW, noted that there was a story that Julian Rocks near Byron Bay were thought to be

connected in a spiritual way to Seal Rocks. People could travel spiritually between the two places and come out at either end.

indigenous participation in the commercial ocean fisheries

This section relates to the requirements of Part B, Section 5.3 (d) and Part E, Section 4.3 (e) of the DIPNR Environmental Assessment Guideline.

Aboriginal participation in the ocean trawl fisheries is very limited and has been exacerbated by a range of historical circumstances. The removal of many Indigenous people from their traditional territories and lifestyles reduced their capacity to adopt new fishing technologies and methods gradually as they were introduced through the twentieth century. In addition, the low economic status of many Aboriginal families also tended to reduce the financial capacity of Indigenous fishers to subsequently catch up with new technologies (Schnierer pers. comm. 2004). More importantly, the lack of provisions in the NSW legislation to protect Indigenous fishing rights has discounted the ability of Indigenous people to enter newly developing fisheries or to stay in ones where management strategies squeezed out so called 'inefficient fishers' (Schnierer pers. comm. 2004).

During a discussion with John Jarrett who owns and operates an ocean prawn trawler on the NSW north coast (December 2003 pers. comm.), John noted that he is the only Aboriginal person on the east coast with a prawn trawl licence (king prawns) for offshore waters (more than 3 nautical miles offshore). John also holds an Estuary General Fishery Licence, which he chooses not to use, as the estuary resources are the basic income for other Indigenous commercial fishers. John noted several important constraints to young Aboriginal people getting involved in the offshore commercial sector, including:

- Licences are expensive and are linked to the boat. So to enter the industry you need the capital to buy the boat and the business.

- People entering the commercial industry need multiple skills. They must not just be skilled fishermen, but be up to date on all the regulations etc, know about mechanics and maintenance, be able to cook etc. Many young Aboriginal people do not have the right mix of skills. As noted in the Indigenous Fishery Strategy (IFS) (see **Section 3.1**) improved skills for Indigenous people to facilitate their entry into the commercial sector is a priority for the IFS Working Group. John Jarrett suggested that the capital needed to buy multiple licences as a commercial venture for the Indigenous community could be as much as $10 million. He suggested that one possibility that could be considered would be a scheme like the CDEP, seeking to provide the right mix of skills and capital to assist Aboriginal employment and business development.

Indigenous fishers comment that over the last twenty years or so, the restructuring of the commercial fisheries to enhance efficiency and provide controls to protect biodiversity has tended to reduce the involvement of Indigenous fishers in the commercial sector. It appears that very few Aboriginal people have been licence holders in the offshore ocean trawl sector, so these factors would have affected this

fishery less than the estuary general or beach haul fisheries. However, the general concepts are transferable, and fishers describe Indigenous approaches to commercial fishing in ways that depict an extension of traditional cultural fishing (mixed sectors and diverse species, seasonally opportunistic but also conservationist in approach, community oriented).

At a workshop held in June 2003 to address low participation of Indigenous fishers in commercial fisheries generally, participants identified significant constraints to the commercial viability of Indigenous fishing. In particular, the workshop group, which included licensed Indigenous commercial fishers, and members of the Indigenous Fisheries Advisory Committee, noted five key constraints (Callaghan and Associates 2003, for the IFAG, page 4):

- closures of ocean, beach and estuary fisheries have excluded Aboriginal fishers from traditional fishing areas (commercial and non commercial);

- difficulty in the passing on of licences within families;

- costs of licences, particularly restricted licences, can exclude Aboriginal fishers by making their activity uneconomic;

- the gradual and continuing decline of Aboriginal commercial fishers in the industry means loss of an accessible and appealing employment base for Aboriginal communities. Aboriginal commercial fishers who fish within cultural frameworks as well as for employment and income, may be more successful with additional flexibility in licensing arrangements, such as nominating crew members, subleasing of licences, and assistance with licence fees. In addition, gaps in fishing work due to licence losses etc make it more difficult to maintain or enhance skills – and therefore more difficult to return to commercial fishing; and

- exclusion zones, restructuring more fishers into smaller areas, make commercial survival for Indigenous fishers very difficult.

indigenous views about sustainable natural resource management

This section provides information to illustrate Aboriginal community views about the sustainability of fishing practices – ie further information about the interests of Aboriginal people in the species and habitats that are targeted by the commercial sector. This information is relevant to Part B, Section 5.3 (a) and Part E, Section 4.3 (a) of the DIPNR Environmental Assessment Guideline.

During interviews about fishery management on the NSW south coast (see Cozens 2003), Aboriginal people referred to ‘sea country’ – generally encompassing estuary and near shore waters, but rarely offshore waters, to which people were attached and for which they had some responsibility to ‘look after’. The Indigenous fishers who were involved in these interviews were licensed Estuary General fishers, and Indigenous representatives on various Fishery Advisory Committees, plus some ‘advocates’ for Indigenous rights.

Cozens' interviews clearly reveal the nature of Aboriginal fishing (whether or not conducted with a commercial licence) and the intent and framework of that fishing. For instance (p56), she quotes:

> '*Aboriginal fishing is a sustainable fishing practice. We practiced circular fishing. We fished for what was around. We fished for mullet in April and May, prawns in spring and summer and salmon from March to November (as) it's a winter fish. We fished for abalone and lobster in the summer when the water was warmer. We didn't fish them one step to extinction – we didn't have to. We didn't just fish for one species.*'

The views expressed by this interviewee are similar to those noted by Faulkner (2000) that Aboriginal people had specialised ecological knowledge of their local landscape, and that they used this local understanding to guide their fishing practices throughout the year. Traditional ecological knowledge includes knowing when and where a particular species will be present, the most favourable time in its lifecycle for consumption, breeding cycles, relationships between lunar cycles, species mobility in its habitat and favoured fishing and collecting opportunities, medicinal values (Faulkner 2000:6). Faulkner suggests that this traditional ecological knowledge is the feature that makes Indigenous fishing ecologically sustainable and distinguishes Indigenous fishing from other fishing. The teaching and transfer of traditional knowledge is an important aspect of Indigenous fishing.

Whilst the views expressed about the restrained, conservation oriented management of fishery resources by traditional indigenous fishers need to be seen in the context of the relatively small population that was being fed, and the less invasive technologies that were used, there is no doubt that the intent of fishing strategies was not only to feed the community this year, but to ensure they could be fed and meet their obligations next year too.

A broader perspective of the Indigenous concept of sustainable natural resource management is discussed in the 'Boomanulla Statement', which presents the outcomes of the Boomanulla Conference for Country (March 2002). The Conference involved natural resource representatives from Aboriginal communities across NSW. In terms of natural resources, the focus of this conference was the management of terrestrial catchments (land, rivers and vegetation). However, the principles and recommendations endorsed by the Conference are very similar to less formal statements that have been made in relation to Indigenous involvement in the management of coastal fishery resources over the last few years. Some important principles, noted in the Boomanulla Statement and stressed frequently by representatives of Indigenous communities, include:

- *The health and livelihood of Aboriginal communities is related to the health of the river systems and the land* (and in the current case, the coast, estuaries and beaches).

- *Cultural and biological diversity are two sides of the same issue for people who relate to the land and the rivers spiritually*.

- *Consultation with Aboriginal communities means negotiation with them about the meaning of land* (and sea) *management and about what must be done.* Aboriginal representatives must be linked to the community and Elders Councils.

- *The economic future of Aboriginal communities will be tied to natural resources. There must be benefit sharing as a principle for any planning approach*. Aboriginal communities will expect employment, education, and training outcomes from natural resource management plans. Aboriginal people have a traditional custodian's right in relation to natural resources which they have never given up.

Indigenous rights to Coastal Waters and Marine Resources – Implications for participation in Commercial Fishing

This section provides information about the views of Aboriginal people on their level of participation in the commercial sector, and how enhanced participation would be justified (in terms of Indigenous rights). This information relates to the requirements of Part B, Section 5.3 (d), (e) and (f) and Part E, Section 4.3 (d), (e) and (f).

Two of the key issues of concern to Indigenous people about the management of commercial fisheries in marine waters is the extent to which commercial fishing activities impact on the conservation of traditional resources and 'country' and also the extent to which Aboriginal people have been able to actively participate in the wealth generating activities of commercial fisheries that operate in waters that they consider to be 'country'.

The Lingiari report on Indigenous Rights to Offshore Waters (2002), and Tsamenyi and Mfodwo (2000), both argue that much of the focus about Indigenous rights to waters so far has focused on customary or cultural rights (i.e. the right to practice cultural fishing), with little real attention to commercial fishing rights for Indigenous peoples. Tsamenyi and Mfodwo (2000) argue that commercial fishing rights for Indigenous people are an important part of the right to self determination. In Australia, there is no legal recognition (and little policy recognition) of the right of Indigenous people to participate in commercial fishing as a specific group, differentiated from other commercial fishers, although there is clear recognition of the customary rights of Aboriginal people to marine resources. There is also recognition that commercial fishing activities should minimise their impact on customary fishing practices.

Lingiari (2002) and Tsamenyi and Mfodwo (2000) suggest that outcomes of the lack of positive legislation in regard to Indigenous rights to participation in commercial fisheries include:

- Aboriginal people having little direct say in the management of fishery resources (eg in setting policy about target species and harvest rates, about appropriate fishing technology and about the management of waste); and

- restricted Aboriginal participation and benefit from the economic values of the commercial sector, either as owners of the resource, or as owners of licences (rather than as employees).

Clearly these are major issues for State and National policy on the management of Australia's coast and seas and their resolution extends well beyond the scope of the NSW Ocean Trawl Fishery Management Strategy. However, the apparent low participation of Indigenous people in the ocean trawl fishery is consistent with the noted National situation, and the issues that have been raised in NSW about access to the commercial sector generally are consistent with those put forward on the national agenda.

In terms of the assessment of the Ocean Trawl FMS, a key question is whether the FMS adequately recognises these Indigenous rights to customary fishing and self determination. To a large extent this will depend on broader NSW Fisheries policy development, in consultation with the Indigenous Fisheries Advisory Committee. As a minimum, the Ocean Trawl FMS can note the ongoing need to enhance Indigenous participation and foreshadow progressive reviews of actions within the strategy as new positive initiatives are introduced at the broader policy level.

summary – indigenous community objectives, values and issues for the resources of the ocean trawl fishery

From the above information, the following key values and objectives can be deduced. These values can be used to assess the overall risk to Aboriginal people as required by Part B, Section 5.3 (f) and Part E, Section 4.3 (f) of the DIPNR Environmental Assessment Guidelines.

The information is considered to be indicative of the views of the Indigenous community at the state level. As noted in **Section 1**, these conclusions are based on a small sample of opinion from the Indigenous community in coastal NSW and should not be taken as representing the views of all members of the Indigenous community who participate in fishing. It is anticipated that there will be local and regional differences in emphasis and in detail.

The key values that have been taken forward into the assessment in relation to Indigenous marine fishing are:

1. Communities value access to marine resources close to the beaches and headlands of the NSW coast. The species that occur on rocky headlands, nearshore reefs and islands, along beaches and in the shallow marine waters

close to shore are an important part of contemporary Indigenous community diet. Different species are targeted at different times of the year with the aim of providing food for the whole community (or at least an extended family group). Fishing in these areas continues a long tradition of Indigenous dependence on and conservation of marine resources.

2. Fishing by Indigenous people targets some of the species that are also targeted by the commercial ocean trawl sector, but many of the preferred species are more common in shallower inshore waters (and are also preferred by recreational fishers). However, Indigenous fishers tend to seek a wider range of species than other groups.

3. Communities value access to fish species or to places for the purpose of teaching younger members of the community about traditional values, particularly respect. In general, these places and species are those that occur on or near to the shore.

4. Indigenous people in coastal areas have 'totems' that include marine species. Whilst these vary from one tribal area to another, they are known to include some marine birds, whales, dolphins, turtles and some fish species. The relationship to these totem species may include beliefs about protection, mutual support, environmental or other information. It is not known whether totems include the species targeted by the ocean trawl fishery as deep ocean species (i.e. king prawn, silver trevally, whiting, octopus, cuttlefish, gemfish etc).

5. Active participation in the protection of places and habitats that are or have been used by the community as part of the social activity of food gathering.

6. Active participation (ie real influence or control) in the management of any aspect of the fishery that impinges on Indigenous community socio-cultural values (this is distinguished from consultation).

7. Employment or other economic advantage from participation in the activity that will help to support the social and cultural values of the community. Employment and economic gain from marine commercial fisheries is seen as an important pathway to economic self determination.

With these values in mind, the objectives of the Indigenous community in relation to the management of the Ocean Trawl fishery could be considered to be as follows:

1. To continue to document the species and places of traditional cultural or spiritual value to the Indigenous community along the coast, so that any potential impacts can be better defined and reversed.

2. To ensure that there is clear and open communication between fishery managers and the Indigenous community about catches, methods, impacts, benefits and opportunities to be involved in management.

3. To enhance the skills and capacity of the Indigenous community to participate in the fishery sector, both as fishers (owners, operators and crew) and in terms of active involvement in the Management Advisory Committee.

4. To provide opportunities for active participation in the Ocean Trawl Fishery.

5. To ensure that the commercial Ocean Trawl Fishery is managed in a manner that is consistent with sustainable resource use – ie that does not result in irreversible damage to habitats, or irreversible decline in the numbers or diversity of fish species.

draft ocean trawl fishery management strategy – actions to manage indigenous issues

This section reviews the existing policy framework for Indigenous fisheries and considers the extent to which the draft Ocean Trawl Fishery Management Strategy is consistent with this framework and supports the management concepts and direction that have been agreed. This information is relevant to Part B, Section 5.3 (e) and (f) and to Part E, Section 4.3 (e) and (f).

indigenous fisheries strategy and implementation – interaction and implications with the ocean trawl fishery

The Indigenous Fisheries Strategy was released in 2002 after consultation with Aboriginal communities at several regional meetings. The Implementation Plan that accompanies the Strategy identifies actions for 2003 and 2004, and the progress towards priority actions is monitored by the Indigenous Fisheries Advisory Committee. Although there continues to be some regional criticism of the structure and operations of the IFS Advisory Committee (see for instance Cozens 2003), it is a major step forward in terms of Indigenous community involvement in fishery management in NSW. The advisory role of the IFS Advisory Committee extends well beyond the Indigenous Fisheries Strategy itself and includes advice on the development, consultation process and implementation of fishery management strategies in all sectors. It can be anticipated that as the IFS Advisory Committee develops, it will able to provide strong support to Indigenous community representatives on other Fishery Management Committees (eg the Ocean Trawl FMAC) and also enhance feedback of information about fishery management to and from regional Indigenous communities.

The management of Indigenous involvement in assessment and ongoing management of the Ocean Trawl FMS is not noted as a high priority for the IFS Working Group in implementing the Indigenous Fisheries Strategy, although other priority actions will indirectly benefit Indigenous involvement in the management of ocean resources. For instance, the development of mechanisms to enhance Indigenous participation in the commercial fishing sector generally is a very high priority for the Indigenous fisheries advisory Committee, and has been the subject of a workshop to develop an action plan during 2003 (see Callaghan and Associates 2003).

Relevant actions from the IFS Implementation Plan, that will help to promote ecologically sustainable and culturally appropriate practices in the ocean trawl fishery include:

- develop and facilitate a model for community input to fishery management planning (and marine park management) and progressive involvement in fishery management strategies (to be completed in 2004);

- review current Indigenous cultural access to fisheries, review options with IFWG and prepare advice after reviewing input from communities;

- cultural awareness training completed for all existing NSW Fisheries staff, all management advisory committees and new NSW Fisheries staff (as part of Induction);

- project manager to identify strategies to maintain levels of Indigenous involvement in commercial fishing;

- develop an employment strategy for NSW Fisheries in consultation with the IFS Working Group (completed June 2003); and

- review aquaculture and commercial fishing opportunities, consult with IFWG and prepare advice to communities on the skills required to sustain these businesses.

The interaction between these actions and the Ocean Trawl FMS is discussed in **Section 3.2**.

As noted in **Section 2.6**, the workshop on developing the participation of Indigenous people in commercial fishing resulted in several recommendations that have implications for the Ocean Trawl FMS (Callaghan and Associates 2003). These include:

- consultation with Aboriginal people about the concept of identification of Indigenous commercial fishers on their licences (and whether Indigenous fishing licences could have special conditions attached to them);

- endorse the goal of retaining Indigenous people in commercial fishing and demonstrate this through investigating options for licence transfers, sub leasing of licences, and assistance with gaining new licences;

- training for Aboriginal fishers, both to enhance employment prospects as crew and to support operations as licensed fishers; and

- consider new structures and any special training for involving Aboriginal people in Management Advisory Committees, potentially using the models described in the Boomanulla Statement.

objectives of the draft ocean trawl strategy

The draft Ocean Trawl Fishery Management Strategy includes a range of goals and objectives that are intended to respect and protect the interests of Indigenous people in the management and resources of the fishery. In addition to the objectives that are directly relevant to the interests of Indigenous people, a number of objectives also address issues that are of interest to Indigenous people, in relation to sustainable management of the natural resources that are targeted by the fishery, and the sharing of information about the condition of those natural resources.

The directly and indirectly relevant goals and objectives are noted and discussed below. **Table 3.1** summarises the relationship of Indigenous community values and

objectives, IFS Implementation Plan priorities and Ocean Trawl FMS objectives/management responses, based on the matters addressed by Goal 4 of the Fishery Management Strategy. Further information about the objectives under Goal 4 is provided in **Sections 3.3** and **3.4**.

Table 3.1 - Key Aspects of Management Issues, Goals and Objectives

Ocean Trawl FMS objective	IFS Implementation Plan Priority actions	Indigenous community values and objectives (Section 2.8)	Recommended Action
Objective 4.1: Provide for appropriate access to the fisheries resource by other stakeholders (eg recreational, Indigenous), acknowledging the need for seafood consumers to access quality shellfish and finfish. **4.1(i) Estimate the total catch of primary and secondary species, taking into account the recorded commercial catch and estimates of recreational, Indigenous and illegal catches.**	Review current Indigenous cultural access to fisheries, review options with IFAC and prepare advice after reviewing input from communities. Note this action is supported by other NSW Fisheries projects to better define Indigenous cultural fishing practices and preferred species (eg through research flowing from the Recreational Fishing Survey) As an example, NSW Fisheries and the Centre for Indigenous Fisheries at SCU have submitted an application to the FRDC for a three year research project aimed at developing a better understanding of all facets of Indigenous fisheries. Current estimates of Indigenous catches are patchy and often qualitative.	Communities value access to marine resources close to the beaches and headlands of the NSW coast for customary or traditional fishing and for community subsistence. The species that occur on rocky headlands, nearshore reefs and islands, along beaches and in the shallow marine waters close to shore are an important part of contemporary Indigenous community diet. Different species are targeted at different times of year with the aim of providing food for the whole community (or at least an extended family group). The Indigenous community fishing targets some of the species that are also targeted by the commercial ocean trawl sector, but many of the preferred species are more common in shallower inshore waters. Access to fish species or to places for the purpose of teaching younger members of the community about traditional values, particularly respect. In general, these places and species are those that occur on or near to the shore. The Aboriginal community has expressed clear aspirations for developing opportunities for greater direct participation in the commercial sector	Ensure that funds are available to support projects that will clarify and document Indigenous community fishing practices and contexts. The design and implementation of these projects should be culturally appropriate and should be developed in association with the Indigenous Fisheries Strategy Working Group. Although the interaction between Indigenous cultural fishing and the ocean trawl commercial sector appears to be restricted, this information will help to clarify the extent to which commercial offshore species are also targeted by Indigenous fishers working from the beach or rocky headlands. To enhance access to the resources of the ocean trawl fishery by commercial Indigenous fishers, a series of actions would be required, including amendments to the Fisheries Management Act to recognise Indigenous rights, changes to licensing arrangements, training etc. None of these actions will happen in relation to the Ocean Trawl fishery in isolation. Therefore the key action at this stage in relation to access to the Ocean Trawl Fishery is to progress consideration of Indigenous fishing rights generally within NSW Fisheries, initially in consultation with the Indigenous Fisheries Advisory Committee.

Table 3.1 - Key Aspects of Management Issues, Goals and Objectives (cont)

Ocean Trawl FMS objective	IFS Implementation Plan Priority actions	Indigenous community values and objectives (Section 2.8)	Recommended Action
Objective 4.4: Identify and mitigate any negative impacts of the Ocean Trawl Fishery on Aboriginal, cultural or other heritage. **4.4(i) Manage the Ocean Trawl fishery in a manner consistent with the Indigenous Fisheries Strategy and Implementation Plan**	Develop and facilitate a model for community input to fishery management planning (and marine park management) and progressive involvement in fishery management strategies (to be completed in 2004); Cultural awareness training completed for all existing NSW Fisheries staff, all management advisory committees and new NSW Fisheries staff (as part of Induction); Project manager to identify strategies to maintain levels of Indigenous involvement in commercial fishing; Develop an employment strategy for NSW Fisheries in consultation with the IFS Working Group (completed June 2003); Review aquaculture and commercial fishing opportunities, consult with IFWG and prepare advice to communities on the skills required to sustain these businesses.	To ensure that there is clear and open communication between fishery managers and the Indigenous community about catches, methods, impacts, benefits and opportunities to be involved in management; To enhance the skills and capacity of the Indigenous community to participate in the fishery sector, both as fishers and in terms of active involvement in the Management Advisory Committee. To ensure that the commercial Ocean Trawl Fishery is managed in a manner that is consistent with sustainable resource use – ie that does not result in irreversible damage to habitats, or irreversible decline in the numbers or diversity of fish species	Provide awareness training for ocean Trawl licence holders (and other commercial fishers) and encourage discussion about Indigenous rights and how they can be accommodated in the commercial sector. Maintain liaison with the IFAC about the community input model for ongoing management of the fishery (eg in terms of support for an Indigenous community representative on the Ocean Trawl MAC). Consider whether the Boomanulla model or other models would enhance Indigenous input to fishery planning In overall fishery management planning (not restricted to the Ocean Trawl FMS) identify the most appropriate opportunities for community capacity building and investment support, in terms of generating employment and income. Further progress the actions identified in the Discussion Document and Action Plan for Enhancing the Participation of Indigenous People in Commercial Fishing (2003), with particular attention to additional consultation requirements and review of Fisheries policy.

Table 3.1 - Key Aspects of Management Issues, Goals and Objectives (cont)

Ocean Trawl FMS objective	IFS Implementation Plan Priority actions	Indigenous community values and objectives (Section 2.8)	Recommended Action
4.4(ii) Respond where relevant to new information about areas or objects of cultural significance in order to minimise the risk from fishing or fishing activities.	Cultural awareness training completed for all existing NSW Fisheries staff, all management advisory committees and new NSW Fisheries staff (as part of Induction);	To ensure that there is clear and open communication between fishery managers and the Indigenous community about catches, methods, impacts, benefits and opportunities to be involved in management	Further consultation with elders in all regions along the coast to clarify how any impacts that have been identified can be managed to minimise risks to Indigenous community values

goal 4, objective 4.1

GOAL 4:

'Appropriately share the resource and carry out fishing in a manner that minimises negative social impacts.'

Objective 4.1:

'Provide for appropriate access to the fisheries resource by other stakeholders (eg recreational, Indigenous), acknowledging the need for seafood consumers to access quality shellfish and finfish'.

4.1(i):

'Estimate the total catch of primary and secondary species, taking into account the recorded commercial catch and estimates of recreational, Indigenous and illegal catches.'

These objectives and actions are relevant to Values 1, 2 and 3, and Objective 1 noted above (in **Section 2.8**).

A fundamental precursor to FMS Objective 4.1 is a sound understanding of the harvesting rates and trends in harvesting rates for fishing effort by all sectors – commercial, Indigenous, recreational and other. In relation to Indigenous catch of the species that are targeted by the Ocean Trawl fishery, some information is currently available from the results of the National Recreational and Indigenous Fishing Survey and work by Schnierer and Faulkner in NSW.

Although the National survey has provided valuable baseline data on Indigenous fishing in northern Australia, as noted above the detail of the statistics available for NSW is not great, and the sample size reported in the Interim Report is small. The work by Schnierer and Faulkner demonstrates that there is a great deal of community information available on species, methods and on fishing purpose and value.

One of the priority actions of the Indigenous Fisheries Strategy is to improve the documentation of Indigenous fishery practices, including species, locations, methods, effort and community socio-cultural associations. This is essential information if Objective 4.1 of the Ocean Trawl FMS is to be realised.

Action: Ensure that funds are available to support projects that will clarify and document Indigenous community fishing practices and contexts. The design and implementation of these projects should be culturally appropriate and should be developed in association with the Indigenous Fisheries Strategy Working Group. Although the interaction between Indigenous cultural fishing and the ocean trawl commercial sector appears to be restricted, this information will help to clarify the extent to which commercial offshore species are also targeted by Indigenous fishers working from the beach or rocky headlands.

Sharing the fishery resource requires consideration of commercial fishery participation as well as minimising impacts on traditional or cultural fishing

practices. As noted in **Section 2** and **Table 3.1**, the NSW Fisheries legislation does not provide for 'affirmative action' type strategies or regulations in relation to Indigenous access to and participation in the Ocean Trawl or any other commercial fishery. This situation cannot be remedied only in relation to Ocean Trawl fishing.

The recommendations arising from the 2003 workshop on enhancing Indigenous participation in commercial fishing (Indigenous Fisheries Advisory Committee) provide a basis for continuing research, consultation and advice about how opportunities for Aboriginal people to participate in commercial fishing, generating employment and economic benefits for regional communities, can be enhanced. It is appropriate that representatives of the Ocean Trawl Fishery sector are involved in these ongoing discussions and that the Ocean Trawl FMS is reviewed as new initiatives are adopted. It is likely that the first step in the process would be consideration of changes to the *Fisheries Management Act* to specifically identify Indigenous fishing rights and practices.

Action: Ocean Trawl fishers and Indigenous community representatives (from the Indigenous Fisheries Advisory Committee) contribute to further research and consultation about options for amending the *Fisheries Management Act* and other affirmative action strategies to enhance opportunities for successful Indigenous participation in the commercial fishery sector.

Goal 4, Objective 4.4

Objective 4.4:

'*Identify and mitigate any negative impacts of the Ocean Trawl Fishery on Aboriginal, cultural or other heritage.'*

4.4(i):

'Manage the Ocean Trawl fishery in a manner consistent with the Indigenous Fisheries Strategy and Implementation Plan.'

4.4(ii):

'Respond where relevant to new information about areas or objects of cultural significance in order to minimise the risk from fishing or fishing activities.'

This objective and actions are relevant to Values 1 to 7 and Objectives 2, 3 and 4 noted above in **Section 2.8**.

The Indigenous Fisheries Strategy and Implementation Plan were released in December 2002, and NSW Fisheries consider that there will be limited opportunities for the Ocean Trawling activities to impact detrimentally on the implementation of the Indigenous Fisheries Strategy. This appears to be a reasonable conclusion in relation to traditional fishing rights, where most fishing that is part of community culture takes place in estuaries, nearshore bays and along beaches and headlands. As noted above, there appears to be limited overlap in the species targeted by the commercial ocean trawl sector and Indigenous cultural fishers. Any potential

negative impacts in terms of species access for Indigenous fishers can be resolved using the results of studies with regional communities described in relation to **Objective 4.1**. In this sense, there is also a relatively limited scope for ocean trawl fish catches to seriously reduce stocks of species that are targeted by Indigenous cultural fishers.

At this stage, the Ocean Trawl FMS does not provide particular benefits or opportunities for Indigenous commercial fishers. There is potential for the FMS to encourage greater participation of Indigenous fishers in commercial fishing. The key actions to achieve this objective are outside the scope of individual FMS. They are a primary focus of discussions between the Indigenous Fisheries Advisory Committee and NSW Fisheries. As agreement on new initiatives is reached, the Ocean Trawl FMS and other commercial FMS should be reviewed to ensure that they reflect emerging policy and statutory positions.

Although it is possible that some Aboriginal sites (i.e. physical evidence of past Aboriginal occupation) remain in deep water on the continental shelf, perhaps associated with the remnants of former late Pleistocene shorelines, it is most probable that any artefactual material has either been reworked by ocean waves/currents or has been buried by sedimentation since the post glacial sea level rise 6000 years ago. Ocean Trawl nets do sometimes disturb sea bed sediments, and have the potential to snag on submerged rocks etc. However, overall there is a very low potential for ocean trawl fishing to directly impact on Aboriginal sites.

It is more possible that ocean trawling activities could occur in areas that are the habitat of totem species or could involve catches of totem species. There is very limited published information about totem species for all Aboriginal people along the coast (noting as an exception the importance of dolphins that has been stated by a number of people). Given the poor documentation of the species, it is difficult to assess the extent of potential risks and impacts.

Objective 4.4(i) provides an opportunity to clarify these spiritual aspects of cultural values of marine species and marine places for the entire coast. The task would involve consultation with elders groups in all regional communities, to document the species that are important and any places that are linked to stories about those species. This information would form the basis for any negotiation about the management of critical species or places in any region. These negotiations are the focus of **Objective 4.4(ii**). The action noted in **Table 3.1** in relation to improved documentation of Aboriginal cultural practices and values along the coast (as proposed in the NSW Fisheries and Schnierer/SCU research project) will provide information to underpin refined management of the Ocean Trawl fishery, to respect important Indigenous community values.

other relevant goals and objectives

As noted in **Section 3.1**, the Indigenous Fisheries Strategy Implementation Plan includes two actions relating to capacity building and skill development in the Indigenous community to enhance their ability to participate as licensed fishers in the commercial sector. This issue was also raised by John Jarrett in discussions about the Ocean Trawl FMS.

The Indigenous community objectives noted in **Section 2.8** relate to sharing of cultural and resource management information, but also to Indigenous community participation in the management of conservation issues and in the economic benefits accruing from the fishery, by enhancing the community's capacity to be constructively involved.

The draft FMS does include some objectives outside Goal 4 that relate to these matters, although they are not worded to highlight the Indigenous community as a specific stakeholder. Additional goals, objectives and actions that have relevance to the values and objectives expressed by the Indigenous community are noted in **Table 3.2**.

Table 3.2 - Indirect Management Objectives and Measures

Indigenous community objective	IFS Implementation priority	Ocean Trawl FMS objective
To ensure that there is clear and open communication between fishery managers and the Indigenous community about catches, methods, impacts, benefits and opportunities to be involved in management and fishing	Develop and facilitate a model for community input to fishery management planning (and marine park management) and progressive involvement in fishery management strategies (to be completed in 2004).	Apart from the Objectives listed under **Goal 4**, there are several objectives relating to monitoring information, consultation about specific issues and notification of stakeholders about management decisions that have been made for the fishery (eg **Objective 2.1**, **Objective 5.2**). These may be of indirect relevance to Indigenous stakeholders.
To enhance the skills and capacity of the Indigenous community to participate in the fishery sector, both as fishers and in terms of active involvement in the Management Advisory Committee	Project manager to identify strategies to encourage and maintain levels of Indigenous involvement in commercial fishing, following up the recommendations of the June 2003 workshop on measures to enhance Indigenous participation in the commercial sector. Develop an employment strategy for NSW Fisheries in consultation with the IFS Working Group (completed June 2003). Review aquaculture and commercial fishing opportunities, consult with IFWG and prepare advice to communities on the skills required to sustain these businesses.	None of the objectives in the FMS deal specifically with these issues. However, some of the objectives noted under **Goal 7**, which relate to surveys, research and improved fishery data collection and management systems may assist with the identification of opportunities for Indigenous participation and appropriate skill development programs.
To ensure that the commercial Ocean Trawl Fishery is managed in a manner that is consistent with sustainable resource use – i.e. that does not result in irreversible damage to habitats, or irreversible decline in the numbers or diversity of fish species		Apart from the Objectives listed under **Goal 4**, the Objectives under **Goal 1** (eg Objective 1.3- Mitigate the impact of the ocean trawl fishery on ocean habitats) and **Goal 2** (Prevent overfishing of the stocks of primary and key secondary species by ocean trawl fishers), will help to address this community aspiration. Some objectives under **Goal 3** will also be of relevance to Aboriginal community values eg **Objective 3.1 (iv)** and **3.1 (v)** which deal with the management of protected and threatened species. **Objective 6.5** also deals with broader resource sustainability issues.

impact evaluation and recommendations

This section summarises the risks to Indigenous community values associated with the implementation of the Ocean Trawl Fishery Management Strategy, as required by Part B, Section 5.3 (f) and Part E, Section 4.3 (f) of the DIPNR Environmental Assessment Guideline.

Although Indigenous communities along the NSW coast have a long standing and important relationship with marine resources, the currently available information suggests that the most important habitats and species are those along the beaches and rocky headlands and in shallow nearshore waters. Some species that are targeted by commercial ocean trawl fishers also use these habitats. Certainly, some non fishery species that appear to have important cultural associations for the Indigenous community (such as dolphins, whales and turtles) occur both in inshore and offshore waters. The Fishery Management Strategy includes measures to ensure that these species are not impacted by commercial ocean trawling.

The Planning guidelines for this assessment require that the **risks** to Indigenous people's values are noted, both for the current situation and with the strategies nominated in the FMS in place. The impact assessment has addressed four key issues about the relationship of commercial ocean trawl fishing and the fishery practices and values of the Indigenous community. These issues are noted in **Table 4.1**, together with a summary statement about the anticipated risk to Indigenous values with current management and with the strategies noted in the FMS in place.

The concept of risk incorporates both a probability factor (how likely an impact is to occur) and a consequence or magnitude factor (how severe the impact would be). A standard risk assessment approach is difficult to apply with the type of information that is available about Indigenous fishery and marine habitat values. **Table 4.1** therefore presents a simple qualitative assessment and ranking of risk, based on the information that is provided in **Sections 1** to **3** of this report.

Table 4.1 - Summary of Risks to Indigenous Values, with FMS Strategies in place

Broad issue/value	Risk – existing management	Risk – FMS strategies implemented
Aboriginal sites – the physical evidence of past Aboriginal land use	Low (low probability and low consequence)	Very low/minimal (very low probability and low consequence). It is most unlikely that the ocean trawl fishery will impact on Aboriginal sites on the deep sea floor.
Aboriginal places – the locations that are associated with stories about the landscape or with personal and community totemic associations with the natural world	Low	Low. Whilst some headlands and islands are known to be places of cultural value, often associated with stories, there is limited potential for ocean trawling to impact on these places. Further involvement of Aboriginal people in the fishery MAC will minimise this risk.

Table 4.1 - Summary of Risks to Indigenous Values, with FMS Strategies in place (cont)

Broad issue/value	Risk – existing management	Risk – FMS strategies implemented
Aboriginal marine totem species	Moderate	There is limited detailed documentation about Indigenous totem species in the NSW marine environment and the significance of impacts on/risks to these values is therefore difficult to determine. Whilst there can be no doubt that some totem species are target species in the commercial fishery, the extent of concern to Aboriginal people needs further clarification. Initial steps to reduce risk involve further consultation with Aboriginal people, particularly elders.
Aboriginal cultural landscapes – the places and species in the landscape that are important to Aboriginal people. As a separate issue from Aboriginal places, this refers to the presence and distribution of Aboriginal foods and medicines in the marine landscape	Low to moderate	Low – risk will be reduced as better information about species of concern to communities along the whole coast become better documented and Indigenous participation in fishery management is enhanced.
Aboriginal socioeconomic participation in the commercial fishing sector.	Moderate – currently very low participation	Low to moderate – the strategy may facilitate enhanced opportunities for economic participation and skill development, in association with the actions that are priorities in the Indigenous Fisheries Strategy and are further explored in the Indigenous Commercial fishing opportunities action plan. Adoption of key recommendations of the Indigenous Fisheries Advisory Committee will help to open up opportunities and reduce the risk that commercial fishing strategies present to Indigenous rights.

Table 4.1 indicates the objectives and actions proposed in the Ocean Trawl FMS present generally low risks to Indigenous values. The FMS will not result in additional impacts on Aboriginal sites or places, and the measures proposed are expected to further reduce any small existing impacts. Two areas would benefit from further research and consultation and the information arising from these studies would greatly enhance the certainty that risks are being effectively managed.

The first key issue for further research is to obtain more information about traditional cultural fishing practices in all regions of the NSW coast. This should include fishing practices, fishing purpose, participation, locations, links to totems, places and other objects of value to local Aboriginal communities.

The second issue is to further explore measures to encourage and maintain Aboriginal participation in the commercial sector, including the Ocean Trawl fishery. It should not be anticipated that this issue can be resolved through the Ocean Trawl FMS alone. However, Ocean Trawl fishers and the Indigenous community should both participate in discussions about potential changes to the *Fisheries Management Act* and the potential introduction of affirmative action programs to enhance Indigenous capacity to enjoy their rights to economic independence.

The implementation and review of the Ocean Trawl FMS, in association with the Indigenous Fisheries Strategy, is likely to have some benefits for Indigenous stakeholders.

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PART 2

historic heritage

This part of the assessment addresses the issues identified in Part B 5.4 (a) and (b) and Part E 4.4 (a) and (b) of the EIS Guidelines for the Ocean Trawl Fishery, issued by DIPNR in February 2003. These requirements are noted below:

Part B 5.4

(c) Identify any shipwreck sites or other sites of historic heritage that are affected by fishing activities and outline existing protocols/measures to minimize impacts to these sites.

(d) Summarise the overall risk to European heritage sites from the current operational arrangements taking into consideration the likelihood/frequency of impacts and the consequence of the impacts occurring.

Part E 4.4

Identify the impacts of the draft FMS on:

(a) Any shipwreck sites or other sites of historic heritage that are/were affected by fishing activities;

(b) Summarise the overall risk to European heritage sites from the management measures identified in the Draft FMS taking into consideration the likelihood/frequency of impacts and the consequence of the impact occurring.

The key issue arising from these requirements is an assessment of the relative risks presented to historic heritage sites and values (but principally shipwreck sites) by the current management strategies for the ocean trawl fishery and by the proposed management of the fishery.

In broad terms, the potential risks to historic heritage derive from the following aspects of the operation of the fishery:

- direct impacts by vessels on shipwrecks; and
- trawl nets becoming snared or entangled on parts of shipwrecks and affecting the integrity of the heritage structure. In this case, there is also a risk to the safety of licensed fishers and their crew if nets are not easily disentangled from the shipwreck. There are a number of instances of damage to or sinking of trawl vessels after nets became snared on shipwrecks.

As noted in the DIPNR Director's Requirements, risk comprises a combination of probability and consequence. Risk assessment concepts and methods are defined in Australian Standard (AS) 4360:1990. Risk assessment processes can vary from

qualitative preliminary considerations which use broad consequences and likelihoods to give an understanding of comparative risk, to highly quantified assessments that provide detailed ranking of the risks associated with all aspects of a proposal or operation. For the purposes of this assessment, detailed quantification and ranking of risks is not considered necessary and risk has been considered in qualitative terms.

Structure of this assessment

The assessment reports the results of a review of the historic heritage that is located off the NSW coastline. The review of historic heritage has defined those elements of the resource that are, or appear to be, located in such a position that either ocean trawl fishing commercial operation might have some impact on an element or vice versa.

For the purposes of this report, historic heritage has been confined to the transport context having regard to the location of the study area. It is considered highly unlikely that other types of historic heritage (buildings, wharves etc) will have any interaction with the deep water ocean trawl fishery. The transport context is specifically represented in the record of shipwrecks.

This assessment therefore addresses shipwrecks that have been recorded in offshore NSW and Australian waters. It is heavily based on data contained in the 'Maritime Heritage Online – NSW' database (the database), which is maintained by the NSW Heritage Office. Only a sample of the information from the database has been analysed, for the waters off the coastlines of the Northern Rivers, Mid North Coast, Illawarra and South East regions. These areas have a strong maritime history and high concentration of offshore shipwrecks and are recognised ocean trawl fishing grounds. The analysis that is presented demonstrates that shipwrecks are common right along the NSW coast in waters used by ocean trawl fishers.

Section 2 of the assessment identifies the sources of information that have been used to provide guidance on the nature and location of shipwrecks in NSW coastal waters. This section also reviews the statutory controls that must be taken into account by fishery managers where there is potential for trawling activities to interact with shipwreck sites.

Section 3 of the assessment describes the results of data base searches, with particular reference to the accuracy and reliability of entries. This section also provides information about the concept of significance. The significance of a site is an important factor when considering the risks associated with the interaction of the fishery and the cultural heritage resource.

Section 4 reviews the objectives and actions that are identified in the draft Fishery Management Strategy, and considers whether these actions adequately reduce or manage the potential risks to heritage values.

Method – data compilation and assessment

For this component of the study, the sources of data were the database with additional source material obtained from:

- The Register of British Shipping;
- Annual reports of government departments, particularly in the latter quarter of the 19th Century;
- The Register of the National Estate, maintained by Environment Australia;
- The (NSW) State Heritage Register, maintained by the NSW Heritage Office;
- The (NSW) State Heritage Inventory, maintained by the NSW Heritage Office;
- *Bar Dangerous: A Maritime History of Newcastle* (Callan 1986) and *Bar Safe* (Callan 1994);
- Index of shipwrecks on the NSW Coast Between the Hawkesbury and Manning Rivers, 1788-1970 (Fletcher nd);
- *Australian Shipwrecks* (Loney 1980);
- *Wrecks on the New South Wales Coast* (Loney 1993);
- *Shipwreck Atlas of New South Wales* (NSW Heritage Office 1996);
- *Centenary: NSW Steamship Wrecks* (Parsons 1995);
- *Scuttled and Abandoned Ships in Australian Waters* (Parsons & Plunkett 1998);
- Navigational charts of the coastline and estuaries; and
- Information from statewide and local newspapers.

The sources of data are collectively referred to as 'the marine archaeological record'.

Search of the marine archaeological record indicated that more than 250 shipwrecks have been recorded within the sectors of the study area that have been examined in detail. Within the Hunter, Central Coast and Sydney sectors of the study area, at least that number again of shipwrecks has been recorded offshore. One of the difficulties posed by the database, and by the marine archaeological record generally, was that the location of many shipwrecks could not be specified with any degree of accuracy, particularly regarding shipwrecks of the 19th Century. The judgment involved in differentiating offshore from onshore and estuarine shipwrecks was guided by the following criteria:

1. Detail of the geographical location of the wreck and/or precision in description of geographical features relevant to the wreck. For example, while a wreck described as located east of Green Cape is relatively definitive, one that refers to the wreck location as being simply 'Port Stephens' may refer to the estuary, or offshore or inshore but a reference to 'Hannah ([sic: Anna] Bay' will probably place the wreck in inshore waters.

2. The nature of the vessel's voyage, eg international, inter-colonial, coastal intra-state, or port service. Thus, a vessel described only as having been wrecked 'east of Green Cape' in transit from Clarence River to Melbourne with sawn hardwood will have been unlikely to have been inshore at that stage of the voyage.

3. The circumstances of the loss, eg navigation error, failure of equipment, condition of wind and/or weather. The examples of such causes are boundless and need to be read in conjunction with criteria 1 and 2 above.

Greater precision in describing the disposition of shipwrecks might only be achieved by an exhaustive research of primary sources and is not considered necessary at this stage.

Appendix 2 tabulates the shipwrecks that are recorded in the marine archaeological record for the regions studied.

Statutory framework

This section outlines the historic heritage protection that is required by State, Federal and local legislation and indicates specific statutory constraints that may affect proper management of heritage resources in the context of the use of NSW offshore waters for commercial fishing.

The seventh column, headed 'Protection', in the data base presented in **Appendix 2**, indicates against each shipwreck recorded, the level at which protection is/or is not afforded by Commonwealth or State legislation. The level of protection is explained in the following **Sections 7.1.1** and **7.1.2**.

National Constraints

Apart from general heritage and planning legislation at Commonwealth and State levels, shipwrecks may be protected under the *Historic Shipwrecks Act* 1976. The Act applies within Commonwealth waters and, upon the declaration by a State that the Commonwealth Act so applies, to the waters of a State. New South Wales has made such a declaration. The seventh column of **Appendix 2** indicates to which shipwrecks the *Historic Shipwrecks Act* 1976 applies**.** The *Historic Shipwrecks Act*, s4A, sets out the base criteria for consideration of a shipwreck as historic as being that the shipwreck be:

(a) situated in Australian waters, or waters above the continental shelf of Australia, adjacent to the coast of a Territory; and

(b) at least 75 years old.

The Act further provides that:

- the Minister may declare historic the remains of disturbed or fragmented shipwrecks and artefacts related to shipwrecks (s4A(5), –(6), –(7));

- whether or not within the base criteria, the Minister may declare historic individual shipwrecks, the individual remains of disturbed or fragmented shipwrecks and individual artefacts related to shipwrecks (s5);

- whether or not within the base criteria, the Minister may make a provisional declaration of a shipwreck or of artefacts associated with a shipwreck pending determination (s6);

- the Minister may declare a 'protected zone' not exceeding 200 hectares as the curtilage of a shipwreck (s7);
- upon publication in the Gazette of a notice declaration a shipwreck and/or site and/or article historic, a person holding an artefact related to the declaration must give it to the Minister (s9) and the minister is empowered to demand the surrender of such an article by notice (s10);

- the Minister may give directions as to the custody of material the subject of declaration (s11);

- it is an offence to destroy, damage, disturb or interfere with an historic shipwreck or artefact or to attempt to dispose of any material to which a declaration applies (s13);

- it is an offence to enter a protected zone with tools, explosives, equipment for diving and/or conducting any prohibited activities; to trawl, dive or undertake any other underwater activity; or to moor (s14);

- the Minister is empowered to issue permits to allow the exploration or recovery of a shipwreck or artefacts associated with a shipwreck (s15); and

- any person discovering a shipwreck or artefacts from a shipwreck must report the find to the Minister (s17).

The Act also provides penalties for offenders against its provisions.

State Constraints

The seventh column of **Appendix 2** indicates shipwrecks that are listed on the NSW State heritage registers. The requirements of the (NSW) *Heritage Act* 1977 must therefore be taken into account by any management planning that affects those resources. The *Heritage Act* established measures for the protection of heritage resources. Heritage sensitivity may be indicated by historical research and/or by various on-site archaeological surface surveys. The basic unit for the assessment of

heritage significance pursuant to the *Heritage Act* is the 'relic'. The *Heritage Act* defines a relic as:

> *Any deposit, object or material evidence –*
>
> *(a) which relates to the settlement of the area that comprises NSW, not being Aboriginal settlements; and*
>
> *(b) which is 50 or more years old.*

The Act further provides that:

- sites and relics in a range of descriptions are protected from disturbance and damage (ss. 24-34, 35A-55B, 130, 136-7, 139) and ss. 47-52 inclusive apply specifically to 'Protection of Historic Shipwrecks';
- relics may be the subject of conservation orders (ss. 26(2)(b), 35A,36,37, 44, 48);
- relics in shipwrecks are protected in situ on all sites (ss. 26(2)(a), 35A36, 37, 44, 51);
- if a site or relic is listed on the NSW Heritage Register no activity may proceed that will disturb, or for the discovery of, relics except with an Excavation Permit (ss. 57, 60);
- no activity may proceed that will disturb, or for the discovery of, relics (not subject to a conservation instrument) except with an Excavation Permit (ss. 47, 139, 140);
- location of relics must be reported to the Heritage Council (s. 146); and
- recovery of relics from excavation must be reported to the Heritage Council (s. 146A).

The Act provides penalties for offenders against its provisions (s. 157).

Results

By an application of the judgment criteria to the raw results of researching the marine archaeological record, approximately 1100 shipwrecks appear to be located within New South Wales non-estuarine coastal waters. Of these approximately 260 are recorded offshore of the coastlines of the Northern Rivers, Mid North Coast, Illawarra and South East regions of the total New South Wales coastline.

It is clear from **Appendix 2** that it is difficult to pinpoint the locations of these wrecks, or the amount of wreckage that may still remain, with any certainty. For many wrecks, only limited, broadly descriptive information is available, and the extent to which parts of the wreck may be exposed to snagging on nets etc is difficult to determine. The condition of a shipwreck will depend on the nature of the vessel (size and type of construction), depth of water, the circumstances that caused the wreck, subsequent disturbance, and marine processes such as waves, currents and sediment transport. For many shipwrecks, little of this information is known directly.

As discussed in **Section 2** and noted in **Appendix 2**, almost all the shipwrecks along the NSW coast are protected by either the Commonwealth heritage legislation (*Historic Shipwrecks Act*) or by the *NSW Heritage Act*. For example, of the 260 or so shipwrecks identified in the Northern Rivers, Mid North Coast, Illawarra and South East regions of the coast, less than twenty shipwrecks do not have protection under either the Historic Shipwrecks or NSW Heritage Acts.

the concept of significance

The extent to which an item of historic heritage may be a constraint to the operation of the Ocean Trawl fishery is strongly influenced by the assessment of its significance. This section explains the concept of cultural significance and the following section notes the significance that has been attributed to various heritage resources. The protection afforded by Commonwealth and State heritage and planning legislation is also noted.

The *Heritage Act* 1977 (NSW) defines items of environmental heritage to be:

> *Those buildings, works, relics or places of historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance for the state of New South Wales.*

In the context of this report, significance is the measure of the value and importance of elements of the archaeological record to cultural heritage. While the fabric of the archaeological record is the subject of the assessment of heritage significance, the assessment itself is conditioned by the environmental and historic context of the site. Furthermore, an evaluation of heritage

significance is not static but evolutionary, as a function of evolving community perspectives and cultural values.

The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter) classifies the *nature* of cultural significance in terms of historical, aesthetic, scientific and social criteria. The implications of these classifications are as follows:

- Aesthetic significance addresses the scenic and architectural values of an item and/or the creative achievement that it evidences. Thus, an item achieves aesthetic significance if it has visual or sensory appeal and/or landmark qualities and/or creative or technical excellence.

- Historical significance considers the evolutionary or associative qualities of an item with aesthetics, science and society, identifying significance in the connection between an item and cultural development and change.

- Scientific significance involves the evaluation of an item in technical and/or research terms, considering the archaeological, industrial, educational and/or research potential. Within this classification, items have significance value in terms of their ability to contribute to the better understanding of cultural history or environment and their ability to communicate, particularly to a broad audience within a community.

- Social significance is perhaps the most overtly evolutionary of all classifications in that it rests upon the contemporary community appreciation of the cultural record. Evaluation within this classification depends upon the social spiritual or cultural relationship of the item with a recognisable community. (Marquis-Kyle & Walker 1992, 21-23).

Historical study looks to the documentary record of human development and achievement, as interpreted by the authors of the documents that comprise the primary and secondary resources. In parallel, historical archaeology is concerned not only with the documentary record but also with material evidence. The archaeological record may provide information not available from historical sources. An archaeological study focuses on the identification and interpretation of material evidence to explain how and where people lived, what they did and the events that influenced their lives. Considerations material to archaeological study include:

- whether a site, or the fabric contained within a site, contributes knowledge or has the potential to do so (perhaps, whether the archaeological record validates or contradicts the historical). If a site can contribute knowledge within the *nature* criteria above, the availability of comparative sites and the extent of the historical record should be considered in assessing the strategies that are appropriate for the management of the site; and

- the level at which material evidence contributes knowledge in terms of current research themes in historical archaeology and related disciplines.

The 'level of contribution' is thus a critical determinant and is assessed according to the same protocols as is cultural significance, that is, in terms of representativeness/rarity and local/regional/state associations.

In relation to "research themes and historical archaeology and related disciplines", the direction of historical archaeology implies, and is conditioned by, consideration of historic, scientific, cultural, social, architectural, aesthetic and natural values. It is a convenient method of classifying the values of material evidence, within the Nature criteria above, in terms of the following broad model:

- *Historical* value lies at the root of many of the other values by providing a temporal context and continuity, thereby providing an integrating medium for the assessment of social, cultural and archaeological significance;

- *Scientific* value depends upon the ability of an item to provide knowledge contributing to research in a particular subject or a range of different subjects;

- *Cultural* value attaches to artefacts which embody or reflect the beliefs, customs and values of a society or a component of a society and/or have the potential to contribute to an understanding of the nature and process of change and its motivation;
- *Social* value derives from the way people work(ed) and live(d) and from an ability to understand the nature, process of change and its motivation. Social significance is closely related to cultural significance, in its concern with the practicalities of socio-cultural identification;

- *Architectural* value depends on considerations of technical design (architectural style, age, layout, interior design and detail), the personal consideration (i.e. the work of a particular architect, engineer, designer or builder) and technical achievement (construction material, construction technique, finish);

- *Aesthetic* value addresses the manner in which an item comprises or represents creative achievement, epitomising or challenging accepted concepts or standards; and

- *Natural* value attaches to items that either support or manifest existing natural processes and/or systems or which provide insights into natural processes and/or systems.

Within this general framework, the assessment of significance is made in the light of two distinct measures: the degree of significance and the level of significance.

- The *degree of significance* of heritage material is evaluated as being either representative or *rare*. *Representative* items are those which are fine distinctive, characteristic and/or illustrative examples of an important class of significant item or a significant aspect of the environment. *Rare* items are those which singularly represent or represent an endangered, discrete, or uncommon aspect of,

history or cultural environment. By derivation, items considered within the context of broader investigation as being insignificant may be dismissed by an evaluation of *little or none.*

- The *level of significance* of heritage material is assessable in five classifications depending upon the breadth of its identifiable contemporary community or historical or geographical context. Thus –

  - a *local* classification recognises an item as being significant within a local historical/geographical context or to an identifiable contemporary local community;

  - a *regional* level of significance recognises the item as significant within a similar regional historical/geographical context or identifiable contemporary regional community; and

  - a *state* level of significance identifies that item as significant in a statewide historical/geographical context or to an identifiable contemporary statewide community (Heritage Office 1996, 4-7).

  and by derivation:

  - a *national* level of significance attaches to an item that is significant in a nationwide historical/geographical context or to an identifiable contemporary nationwide community; and

  - an *international* level of significance has the appropriate connection to international context or the international community.

Risks to historic heritage values

The Interaction of Commercial Fishing with Historic Heritage Resources

The activities associated with commercial ocean trawl fishing are limited to associated boating, boat management, and the use of a variety of nets.

The physical and spatial presence of heritage resources along ocean floors and associated submarine landforms is likely to have only a marginal effect on commercial fishing operations. It is possible for wreckage to pose a hazard to navigation and to fishing activities by representing a potential snag for nets and/or trawl lines.

While navigation of boats is unlikely to pose a significant threat to shipwrecks and associated maritime relics, snagging of nets on the ocean floor has the potential to cause disturbance, damage or destruction to submarine relics. Submarine relics are by their nature fragile while their *in situ* preservation is most frequently either precarious or on/or within a horizon of fine silt or sand. Disturbance of a relic in either of these environments can not only modify, damage or destroy a relic but alternatively or concurrently modify the environment in which it is located by moving, exposing or burying the relic.

Management objectives of the draft Ocean trawl fishery management strategy

Goal 4 of the draft FMS incorporates broad direction for the management of historic heritage:

'Appropriately share the resource and carry out fishing in a manner that minimizes negative social impacts.'

Objective 4.4(ii) refers directly to historic heritage values.

'*Respond, where relevant, to new information about objects of cultural significance in order to minimize the risk from fishing or fishing activities.*'

The background provided to this objective notes particularly the lists of historic shipwrecks and the role of the Heritage Office in relation to approvals for damage to these shipwrecks.

Objective 4.5 can also be considered to refer indirectly to the protection of historic heritage sites, by noting the intent of the FMS to resolve conflicts between ocean trawlers and the interests of other members of the community. The background to this objective mentions resolution of some conflicts by small temporal or spatial closures to trawling. Whilst this strategy will address conflicts with other waterway users in confined spaces (the example given is for Coffs Harbour), small closures is unlikely to be a practical response to potential conflicts with the protection of historic shipwrecks whose location and condition is not well defined.

risk considerations

Guidance on concepts for a qualitative risk assessment is provided in AS 4360. **Tables 9.1** and **9.2** summarise qualitative descriptions of likelihood and consequence. These concepts have been used in considering potential risks to

historic heritage associated with the operation of the ocean trawl fishery. It is stressed that the assessment presented here is preliminary and qualitative in scope.

Table 9.1 - Qualitative Description of Likelihood

Almost certain	May occur at least several times a year
Likely	May arise about once a year
Possible	May arise at least once in a ten year period
Unlikely	Likely to occur at some time during the next ten to twenty five years
Rare	Very unlikely to occur within the next twenty five years

Table 9.2 – Indicative Consequence Scales

Catastrophic	Long term harm – significant, extensive and irreparable damage to highly valued structures or locations of cultural significance
Major	Major damage to highly valued locations or structures of cultural significance
Moderate	Damage to valued structures or places of cultural significance (not likely to be permanent or irreparable)
Minor	Minor damage to places or structures of cultural value
Insignificant	Negligible damage to structures or locations of cultural value

Even with a qualitative risk assessment, it is possible to grade the risk that results, in terms of the urgency of action to reduce risk to the environment, cultural places or safety. Descriptors and indicative responses are noted in **Table 9.3**.

Table 9.3 - Qualitative Risk Descriptors

Extreme risk	Immediate action required to reduce risk
High	Urgent action required to reduce risk
Medium	Manage risk by monitoring or improving procedural guidelines etc
Low	Manage by routine procedures, unlikely to need specific additional resources

Table 9.4 presents consideration of two aspects of ocean trawl fishing that have the potential to interact with historic heritage places (shipwrecks), and provides a preliminary evaluation of risks to historic heritage values. In an assessment conducted strictly in accordance with the National Standard, this assessment process would be conducted by a panel of people involved in the activities in question. The use of a panel ensures that all aspects of activities and risks are taken into consideration. For this process, which is intended only to provide an indication of the scope of risks to historic heritage items/sites, the assessment has referred to the data base information rather than an expert panel.

Table 9.4 - Qualitative Risk Assessment Considerations

Aspect	Likelihood	Consequence	Risk
Trawler navigation – collision with shipwrecks	Unlikely to rare	Moderate	Low
Entanglement of trawl nets in shipwrecks	Possible	Moderate	Low to medium

The risk presented to historic shipwrecks by the activities of the ocean trawl fishery is generally low, extending to medium for snagging in some cases. In this context, the types of response that would be appropriate in the Fishery Management Strategy relate to procedures for monitoring (for instance locations, frequency and consequence) and reporting incidents.

The draft Fishery Management Strategy requires that fishers respond to new information about heritage resources. Although the risk that ocean trawl activities will detrimentally impact on historic heritage resources is generally low, the operation of the ocean trawl fishery does present an opportunity to further reduce risks in the long term by contributing to improved spatial data about the locations of shipwrecks.

A key constraint to the accurate assessment of risk is that details about the locations and condition of many shipwrecks are poor. Ocean Trawl fishers may from time to time encounter shipwreck remains on the sea floor. When this occurs, fishers could report location (GPS co-ordinates, water depth) and any other information they detect about the structure to the NSW Heritage Office and NSW Fisheries. This information will add to the data base, so that fishers can be alerted about potential obstacles on the sea floor (with heritage and safety implications), and the Heritage Office will have more accurate information about the location of shipwrecks.

Implementation of routine reporting of potential shipwreck sites to the Heritage Office will contribute to the demonstration of due diligence (by showing that fishers are aware of potential risks and are taking steps to reduce them), as well as refining the available information.

A second appropriate management response is to provide licence holders with basic information about their responsibilities under the *Heritage Act*, including the provisions relating to damage to structures, exclusion zones and collection of any historic artefacts that may be observed.

Note that the *Heritage Act* requires notification of the Heritage Office if a relic is found (or suspected) and also requires that relics not be disturbed without obtaining a permit. In rare cases, this would mean that trawling in the vicinity of a structure that has been reported to the Heritage Office should cease until the nature and significance of a relic has been investigated and confirmed.

Recommendations

These recommendations are made on the basis of:

- the review of the heritage assets in offshore precincts of the study area contained in this report in **Appendix 2**;
- the limited descriptions of the fabric and the precise locations of some of the material evidence offshore relating to shipwrecks;
- synthesis of the archaeological and historical contexts that is available from the review;
- the appreciation of the significance of the heritage resources; and
- consideration of the management issues and potential impacts of the proposed use.

It is recommended that in general in connection with the operation of the commercial ocean trawl fishery, the attention of all authorities and agencies has been, and that of all commercial fishers, their contractors and employees will be, directed to:

a) the provisions of the Commonwealth *Historic Shipwrecks Act* 1976 and in particular to:

   i) the definition of shipwreck under that Act (s.4A);

   ii) the provisions of ss.4A, 5, 7, 9, 10, 11, 13, 14, 15 and 17 of that Act;

b) the provisions of the NSW *Heritage Act* 1977:

   i) the definition of relic under the Act (s.4);

   ii) the provisions of sections 24-34, 35A-55B, 57, 60, 130, 136-7, 139 and 140 of that Act;

c) submarine shipwrecks and/or relics may be exposed or covered from time to time as the result of current fluctuations and movement of ocean floor sediments. If an item suspected of being part of an historic shipwreck or other shipwreck becomes visible as a result of water conditions or inadvertent disturbance it should be reported in the first instance to the Minister pursuant to the *Historic Shipwrecks Act* 1976 and/or to the NSW Heritage Office pursuant to the *Heritage Act* 1977;

d) if any activity is proposed that will, or may, cause the disturbance of a shipwreck/relic that is registered on the SHR, an application should be made pursuant to s.57 of the *Heritage Act* for issue of an excavation permit pursuant to s.60 of the Act;

e) if any activity is proposed that will, or may, cause the disturbance of a shipwreck/relic that is not registered on the SHR, an application should be made pursuant to s.139 of the *Heritage Act* for issue of an excavation permit pursuant to s.140 of the Act;

f) the basic requirements that, in relation to any commercial fishing activity, if:

- a shipwreck or relic is suspected or if there are reasonable grounds to suspect a relic that is likely to be disturbed, damaged or destroyed by commercial fishing activity; and/or

- any relic is discovered in the course of commercial fishing activity that will be disturbed, damaged or destroyed by further such activity;

the NSW Heritage Office must be informed forthwith and commercial fishing activities suspended that might have the effect of disturbing, damaging or destroying such relic, until the requirements of the Heritage Office have been satisfied.

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