A case study for the collection of economic data on commercial fishing linked to the 'Framework for Valuing Fisheries Resource Use'

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This publication provides a case study for the collection of economic data on commercial fishing linked to the "Framework for Valuing Fisheries Resource Use"

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ABBREVIATIONS AND SYMBOLS

ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
AFMA	Australian Fishery Management Authority
ATO	Australian Taxation Office
BBP	Boat Business Profit
BCI	Boat Cash Income
BEP	Boat Economic Profit
BGM	Boat Gross Margin
BOS	Boat Operating Surplus
CFISH	Licence details of all fishers with an authority to fish in Queensland waters. This database is held and managed by QFS.
DF	Days Fished
DPI	Department of Primary Industries, Queensland
FRDC	Fisheries Research and Development Corporation
GVP	Gross Value of Production
HU	Hull Units
kg	Kilograms
m	Metres
NER	Net Economic Return
PFE	Profit at Full Equity
QSIA	Queensland Seafood Industry association
QFS	Queensland Fisheries Service
QSTAT	The Office of the Queensland Statistician
RRC	Rate of return to Boat Capital
t	Tonnes
T1	East Coast Trawl Fishery Symbol
TBCC	Total Boat Cash Costs
TBCR	Total Boat Cash Receipts
TBFC	Total Boat Fixed Costs
TBVC	Total Boat Variable Costs
$M	Millions of Australian dollars in 1997-98 dollar terms
MAC	Management Advisory Committee

For extra information about several Abbreviations listed above, refer to definitions Appendix 3.

NON-TECHNICAL SUMMARY

98/137 **A Case study for the collection of economic data on commercial fishing linked to the 'Framework for valuing fisheries Resource use' (FRDC Project 98/165).**

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OBJECTIVES:

1. *Identify the most effective means of determining: the financial performance of the Queensland commercial fishing fleet including, the state, regional and port economic impacts (output, income and employment) of fishing operations; and determination of economic indicators which can be used for adjustment and management purposes.*
2. *Apply the above framework to an economic assessment of Queensland's fisheries.*
3. *Provide economic information relevant to the FRDC project 'A Framework for Valuing Fisheries Resource Use'.*

OUTCOME ACHIEVED:

The outcome of the project is a methodology underpinning the development of economic performance indicators based on the characteristics of fishing firms operating within complex multi-species/multi-gear fisheries. The collection, analysis and application of economic data to the determination of these economic performance indicators can be the basis of the input into the reporting requirements for the assessment of economic performance of fisheries under the economic component of ecological sustainable development (ESD). Economic performance is based on a set of financial and economic profit indictors.

Previous analyses of economic data have relied on the use of statistical means and/or medians. These means and or medians often provide an overview that can bias the true nature and performance of a fishery or of the firms within it. This research provides an exemplar of how a diss-aggregation methodology, based on logbook and licensing databases, provides a better picture of economic performance of a complex fishery. A methodology that is applicable to all fisheries requiring such analyses.

The challenges facing fisheries resources are complex, dynamic and viewed by stakeholders and the rest of the world as needing better management methodologies to ensure their sustainability. The search for sustainable fisheries management paradigms has occurred over the last 20 years, encouraged by international laws and conventions sponsored by the United Nations. The current paradigm underpinning the management of Australia's fisheries resources is Ecological Sustainable Development (ESD) whose guiding principles encourage a cautionary, multi-dimensional long term approach incorporating stakeholders and communities in the decision making process.

The scope of the research was to highlight the need for the inclusion of the economic dimension into the new paradigm and to provide an analytical framework for the development and application of economic performance indicators. The focus of the research is the economic performance of the fish harvesting activities of a fishing firm. Multivariate analysis was not undertaken: although interesting, it was thought to be outside the framework of the project.

The study framework emphasized the need for economic information and how it may be collected through cost and earnings surveys of Queensland fishing firms and the methodology used for developing economic performance indicators. Profit was chosen as the essential economic performance indicator and its meaning and derivation determined. Each fishing firm was allocated to a specific fishing sector of the Queensland fishery using attribution ratios applied to the total boat cash receipts earned by their Licence Package.

Attribution ratios classified individual fishing operations within specific fishing sectors as a proportion of the total boat cash receipts that the firm gained from each Fishery Symbol attached to their Licence Package. These ratios were the basis of the research methodology. The framework was tested through a cost and earnings survey of all Queensland Licence Packages and the logbook and licence information held within the Queensland Fisheries Service CFISH database. Confidentially was maintained.

The fishing firm is a business dominated by the structure of the Licence Package that determines, through the Fishery Symbol, the species taken and how the firm can operate. The measurement of the economic performance of the surveyed 478 Queensland fishing firms was determined and disaggregated based on the fishing sectors and characteristics of firms operating within these sectors.

The economic dimension of the ESD fisheries management paradigm relating to these characteristics was measured through a set of economic performance indicators. Those chosen indicators were:

- a set of *cost and earnings indicators* (capital, fixed cost, variable costs and total boat cash receipts, TBCR);
- *financial profit indicators* (boat gross margin, BGM; boat operating surplus, BOS; boat cash income, BCI; rate of return on capital, RRC; profit at full equity, PFE and boat business profit, BBP); and
- *economic profit indicators* (boat economic profit, BEP and net economic return, NER).

The economic impact indicators of fishing operations for coastal regions and their major ports and the state of Queensland were determined using the results of the economic survey. Each economic performance indicator was based on statistical means, medians, profit indices for each fishing sector and disaggregated through the sub-groups within each characteristic.

The most effective means of obtaining cost and earnings data was discussed with the Australian Bureau of Statistics (ABS) and was it agreed that the entire Queensland fishery should be surveyed because of the complex nature of the fishery and the licensing regime. The Australian Bureau of Agricultural Research Economics (ABARE) suggested that a survey based on receipts might cover the complexity of the fleet but were not opposed to a census of the fleet. The Office of the Queensland Statistician (QSTATS) was also consulted and their view was similar to that of the ABS.

During 1999, a survey of all 1,946 Queensland commercial fishers (excluding Harvest Fishery Operators such as beche-de-mer, aquarium fish etc) Licence Package holders was undertaken to gather cost and earnings data regarding their business activities for the 1997-98 financial year. In consultation with the FRDC Fisheries Economic Statistical Steering Committee and industry, survey forms were developed with professional assistance from the ABS.

The identification of the most effective means of determining the economic performance of the Queensland fishery, as a case study for the application of the theoretical framework of Hundloe (2002) was achieved through:

- the use of attribution ratios to separate each fishing firm into fishing sectors based on fishery symbols attached to a Licence Package;
- determining the characteristics of the fishing firm within each fishing sector, that are a group of determinants of economic performance, based on logbook and licence databases or questionnaires; and
- data collected from a cost and earnings survey Licence package owners.

to determine the financial performance of the Queensland fishery, fishing sectors and individual firms operating within the complex licensing regime of Queensland and to determine economic indicators that could be used for management purposes.

However, the results of the analysis indicated that a stratified random sample survey would be a more cost effective methodology if:

- based on fishing sectors such as trawl, net, line and crab; and
- the use of characteristics of the fishing firm, such as either the '*level of fishing intensity'* (days fished per annum) or '*level of fishing activity'* (total boat cash receipts) and in some cases '*fishing pattern'* (proximity to home port and number of grid squares fished) as the basis of such a stratification.

As statistical means gloss over the variations of economic performance within the fishery each fishing sector was analysed in detail. The analysis of the economic performance of specific fishing sector firms showed great variability in means and medians. A further analysis was undertaken to measure these variations based on the characteristics of the fishing firms:

- degree of specialisation (*specialisation codes*);
- size of fishing operation (*boat length or hull units*);
- level of fishing intensity (*days fished per annum*);
- location of fishing business (*ABS statistical division*);
- level of fishing activity (*total boat cash receipts*); and
- fishing pattern (*local/distant fishing activity*).

Within each fishing sector the variations of statistical means and median performance were measured through the sub-groups of each of the above characteristics. Based on the characteristics of the fishing firm, the analysis suggested that certain of these characteristics were influencing the economic performance of the fishing business as significant differences in performance related to these characteristics were found. '*Level of fishing activity'*, '*level of fishing intensity*' and '*fishing pattern'* were found to be statistically significant (ANOVA, $p<0.05$).

The surveyed Queensland fishing firms generated a financial profit from the Queensland fishery, measured by BBP of $2.24M but had NER of -$3.36M when full opportunity costs of capital were included. However, it is noted that if externalities such as habitat loss and fish stock depletion were to be included in the analyses, the net economic return and hence economic rent, would be an overestimate of the economic performance of the Queensland fishery.

Overall, the best economic performances were generally firms from the Northern Region, firms with a distant fishing pattern, firms with a size of fishing operation of 14-18 metres, firms with a fishing intensity of greater than 150 days and firms with a level of fishing activity greater than $150,000 per annum. Specifically, the results indicated that the best economic performance of fishing sectors, based on characteristics of the firm, were for example: net sector firm with a level of activity greater than $150,000, the diversified beam trawl sector for degree of specialisation, very small scale spanner crab firms, spanner crab firms with an intensity of more than 150 days and otter trawlers with a distant fishing pattern. The diss-aggregation of financial and economic data, based on the characteristics of the fishing firm, enhanced the measurement and understanding of the Queensland fishery.

Population estimates of the Queensland fishery, extrapolated from the survey statistical means of profit indicators of fishing sectors and the firm characteristic '*level of fishing intensity*', were BBP of $0.201M and NER of -$10.99M. Overall, the Queensland fishing firm had a mean TBCR of $151,830 and a median of $15,044, a mean BBP of $4,687 and median of -$4,687, mean BEP of -$7,037 and median -$11,786 and generated an RRC of 4.7%. Some 44% of the fishery had BBP>0 and 40% with BEP>0, indicating that the fishery was showing the economic signs of an open access fishery where net economic returns were dissipated.

The economic impacts of the Queensland fishery on the State of Queensland was a GVP of $210.2M and flow-on of $184.5M, employment of 2,919 and flow-on 2,189 jobs, wages of $115.7M with flow-on $88.2M and value added of 344.9M with flow-on of $207M.

The value added to coastal regions, including the main port of each region, were:

- Brisbane-Moreton regions ($131.8M) – Mooloolaba ($40.2M)
- Wide Bay region (66.7M) – Bundaberg ($36.2M)
- Fitzroy region ($56.6M) - Gladstone ($42.6M)
- Mackay region ($38.7M) - Mackay ($26.3M)
- Northern region ($44M) - Townsville ($27.9M)
- North West/Far North regions ($110.2M) – Cairns ($46.4M).

The high level of specialisation in all sectors with a profitable, diversified, small-scale fishing sector needs to be nurtured through an integrated approach to managing the various sectors and supported by regular studies, such as this project, to ensure that the difference within and between sectors are measured and applied under the ESD paradigm. If the 'hip pocket nerve' of fishers is ignored and the fleet remains without long term restructuring plans, based on a sound ESD fisheries management paradigm, then increasing conflict and decreasing profits will continue.

The economic performance indicators developed under this project, as described in Chapter 6 below, were used as input into the recent adjustment of the Queensland East Coast Otter Trawl Fishery (Taylor-Moore 2004). Results of the research could be used as part of measuring the achievement of the economic objectives of the Queensland fishery management plans developed after this study.

Through Professor Tor Hundloe being a Co Investigator of this project provided a theoretical underpinning of the research undertaken in this project through FRDC Project No.98/165. The project is a case study of the economic value of commercial resource use of fisheries resources (Hundloe 2002).

However, keeping an eye on the economic performance of the Queensland fishery is paramount, as economic overfishing will eventually lead to depletion of fish stocks and habitat damage. Therefore, future research in this area is needed.

Areas identified for such research include:

a. Regular costs earnings surveys targeted to account for the multi-dimensional aspects of ESD;
b. Economic impacts of Fishery Management Plans of one group of fishing sector firms on other groups need to be undertaken;
c. Regular economic performance indicators monitored and presented to stakeholders for improved decision making;
d. Economic behaviour of owners to understand the impacts of their characteristics on the economic performance of their firms;
e. A structural adjustment policy and methodologies be developed that include a suite of economic performance indicators; and
f. Ongoing surveys of the Queensland East Coast Otter Trawl Fishery be undertaken to evaluate the contribution of adjustment polices to the economic performance of otter trawl fishing firms and the fishery.

KEYWORDS: case study, economic survey, profit, financial profit, economic profit, profit indicators, economic performance, economic impacts, ecological sustainable development.

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SECTION 1

THE CASE STUDY

This section of the report provides the details of the project for the collection of data on commercial fishing as a case study for the FRDC Project 98/165 'Valuing of fisheries resources'.

1. *The background, need, aims of the project and the overview of the project (Chapter 1).*

2. *Methods and estimation of economic performance indicators (Chapter 2.)*

3. *The details of the Queensland fishery, fishing sectors and characteristics of the fishing firm (Chapter 3).*

4. *The economic survey and response rates (Chapter 4).*

CHAPTER 1

A CASE STUDY FOR THE COLLECTION OF ECONOMIC DATA ON COMMERCIAL FISHING

1.1 BACKGROUND

The Queensland *Fisheries Act 1994* has objectives relating to ecological sustainable use of fisheries resources, resource sharing and socio-economic and community benefits from the use of fisheries resources. However, many management and resource sharing allocations can be driven in non-optimal ways if based on limited economic information and thus understanding of the economic dimension of ecological sustainable development (ESD).

Economic assessments of Australian State/Territory fisheries have been limited to mainly input-output methodologies - Western Australia is the only State to have undertaken valuation of both recreational and commercial fishing, for the whole State, using this approach. South Australia has developed economic indicators for its commercial fisheries (EconSearch 2002) and ABARE has undertaken financial and economic reporting for commonwealth managed fisheries (ABARE 2003).

Hundloe (1997), in FRDC Scoping Paper on Fisheries Economic Data, presented at a Fisheries Economics Statistics Workshop held in Canberra February 1997, proposed that an annual economic review of the Australian fishing industry should be undertaken and that appropriate methodologies be developed. In response, FRDC Project 98/165 'A Framework for Valuing Fisheries Resource Use' was undertaken by the FRDC Fisheries Economics Statistics Steering Committee (FESSC) to build a model for the valuation of multiple-use of fisheries resources (Hundloe 2002). A Fisheries Case Study Steering Group, included members of FESSC, was involved in the process of the project. This study (Project 98/137) is linked to that project.

1.2 NEED

Fisheries managers, industry and the community have identified that there is a paucity of economic information upon which major fisheries resource management decisions are made. The need for economic data clearly exists. For example:

- *Government* decisions are required on cost recovery, multiple use of marine resources and impacts of coastal developments on fisheries;
- *Fisheries managers* make decisions on adjustment, resource sharing, and management arrangements;
- *Financial Institutions* make financial and economic decisions based on the fishing firm's ability to repay loans and the state of the fishing industry;
- *Fishers* make decisions on fishing operations, vessel maintenance, replacement and upgrades;
- *Industry* makes investment decisions i.e. seafood processors, boat builders and infrastructure providers; and
- *Community* makes political decisions on the acceptance of the above decisions.

Each State and Territory in order to meet the objectives of equity, community benefit and efficiency of the use of fisheries resources requires the following:

- a financial and economic database of commercial and recreational fisheries and processors which is current and coordinated;
- financial and economic profit indicators for fisheries management planning;
- economic information for structural adjustment of the commercial fishing fleet; and
- economic information for resource allocation decision making.

In some jurisdictions, the fishing industry, Governments and Fisheries Agencies, along with the community, understand and accept that there are too many commercial primary fishing

authorisations available for harvesting Australia's fisheries resources. Failure to reduce this excess fishing capacity, particularly in Queensland which is the focus of this study, may lead to deteriorating economics of the industry and unsustainable levels of fishing.

Most States are now beginning to consider/undertake serious adjustment programs. However, no consistent methodology has been developed to incorporate financial viability and socio-economic information into the adjustment process. Queensland in 1997-98 developed a draft policy for the adjustment of the commercial fishing fleet and set aside $4M for the implementation (Taylor-Moore 1998). Recently a major adjustment strategy, worth $20M was put in place to implement the Queensland East Coast Trawl Fishery Management Plan. However, cost-effective implementation of such adjustment strategies that meet ESD objectives requires socio-economic information on the viability of the fleet and of individual operators resulting from these and other policy changes.

The Queensland Department of Primary Industries through the Queensland Fisheries Service (QFS) partly funded a joint study with the FRDC to gain economic data on their fisheries. QFS fisheries logbooks, as is the case in all States, do not contain the financial and economic data needed to understand the profitability and economic behaviour of the fleet.

The information had to be collected independently of these logbooks. The project quantified the economic and financial aspects of the catching sectors of the fishing fleet. The information obtained can be used to achieve better decision making by industry and fisheries management.

Information used in this economic analysis was sourced from results of an economic survey of all Queensland licensed commercial fishers and their respective aggregated data from the QFS CFISH compulsory logbook and licensing databases.

Multiple-jurisdiction commercial fishers with an endorsement to harvest fish under Commonwealth managed fisheries (Torres Strait and Gulf of Carpentaria) and NSW trawlers with a Queensland (T2) concessional endorsement were excluded from the scope of this report because of the difficulty of determining their east coast fishing costs and earnings. The study was therefore based on fishing boats operating only within a Queensland managed fishery.

The logbook, licensing and survey information allowed a basic understanding of fishing firm details that could be used in categorising firms and their business operations. Analysis conducted on survey respondents determined financial indicators such as boat gross margins, boat operating surplus and gross return index, boat cash income, boat business profit, profit at full equity and rate of return to boat capital. Economic indicators such as boat economic profit and net economic return were also developed. State, regional and port economic indicators were also determined based on a separate study.

All of these indicators provide a framework for benchmarking economic performance for each category of fishing firm based on their current financial status and an overview of the economic viability of the fleet. The study was not a bio-economic one and therefore conclusions about optimum use of fisheries resources could not be attempted.

A 'National ESD Reporting Framework for Australian Fisheries: The "How to" Guide to Wild Capture Fisheries' (FRDC, 2002) provides the first comprehensive and structured approach to accommodate the requirement of ESD reporting into the management of Australia's fisheries (Table 1.1). As ESD is now the paradigm for fisheries management (Taylor-Moore, 1996), many internal and external pressures, such as from Environment Australia, are requiring fisheries management stakeholders to report on components of the ESD performance of fisheries. The key to successful assessment of ESD for fisheries depends on the linking of objectives, indicators and performance measures as a reporting package.

Table 1.1: A Model for an ESD Performance Report

Performance Reporting Heading	Description
1. Operational objective (plus justification)	What needs to be achieved?
2. Economic Indicator	What can be used to measure economic performance?
3. Performance measure or limit (justification)	What levels define acceptable and unacceptable performance and why?
4. Data requirements and availability	What monitoring programs are needed?
5. Evaluation of key issue	What is the current performance of the fishery for this issue?
6. Robustness of economic indicator	How robust is the economic indicator and in assessing performance against the objective?
7. Fisheries management Response	
(a) current	What are the management actions currently being used to achieve acceptable performance?
(b) future	What extra management is to be introduced?
(c) actions if performance limit is exceeded	What will happen if the indicator suggests performance is not acceptable?
8. Comments and Action	Summary of what actions will happen in the coming years
9. External drivers	What factors outside of the fisheries control may effect performance against the objective?

Source: FRDC 2002

There are four main elements to the FRDC ESD reporting guidelines:

1. Identifying issues relevant to the fishing through the use of *component trees* which provide the criteria for determining the appropriate indicator;
2. Prioritising the issues through risk assessment to determine the level of potential impacts of fisheries management actions;
3 Detailed reports on the performance of the fishery for each selected issue. An example of such an ESD report is given in Table 1.1; and
4 Contextual material for the ESD report to allow stakeholders to add meaning to the implications of the report and thus fisheries management responses.

What was disappointing about FRDC (2002) was the lack of emphasis on the economic dimension.

1.3 AIM OF THE STUDY

The aim of this study was to identify and quantify the economic status of the commercial fishing firm in Queensland through economic performance indicators (EPIs). Very limited data compilation and analysis of the economic status of Queensland fishers had been undertaken prior to this study which has resulted in considerable uncertainty regarding the profitability of fishing firms and the viability of various fishing sectors. Objective information reported within this study will provide base data regarding the economic status of Queensland fisheries, and will aid the assessment of potential impacts of policy options upon Queensland's fishing industry. Further, it is anticipated the results of this study will provide a benchmark against which future economic status reports can be compared; particularly given that no Queensland fishery management plans were in place prior to this study.

The main objectives of the study were:

Objective 1. *Identify the most effective means of determining: the financial performance of the Queensland commercial fishing fleet including, the state, regional and port economic impacts (output, income and employment) of fishing operations; and determination of economic indicators which can be used for adjustment and management purposes.*

Objective 2. *Apply the above framework to an economic assessment of Queensland's fisheries.*

Objective 3. *Provide economic information relevant to the FRDC project 'A Framework for Valuing Fisheries Resource Use'.*

1.4 OVERVIEW OF THE STUDY

This study examines the economic performance of fishing activity in Queensland by fishing firms licensed by the Queensland Fisheries Service to operate in a Queensland managed fishery. Each firm in-scope for this study was not licensed for any other jurisdiction.

Chapter 1 provides the context of the case study: the economic framework for developing the financial and economic indicators needed for the analysis and reporting of the economic performance of the main fishing sectors of the Queensland fishing fleet.

Chapter 2 describes the methods and definitions used to create the data required for the indicators and the analysis undertaken. It provides the efficacy of cost and earnings surveys for determining economic performance, methods of financial and economic profit estimation, estimation of economic performance indicators and to estimate the economic performance of the Queensland fishing fleet. The methods used for estimation of economic impacts of commercial fishing operations on coastal regions, their main ports and the state of Queensland are also described.

Chapter 3 presents an overview of the complex nature of licensing arrangements and the Licence Package as the basis of a fishing firm, defines and describes the otter trawl, beam trawl, line, net, general crab, spanner crab and diversified sectors as the key fishing sectors of the Queensland fishery and provides a detailed description of the characteristics of the Queensland fishing firm determined from logbook and licensing data. The characteristics and the units of measurement used in the report, include:

- degree of specialisation (specialisation code);
- size of fishing operation (boat length or hull units);
- intensity of fishing operations (days fished per annum);
- location of fishing business (ABS statistical division);
- level of fishing activity (total boat cash receipts);
- fishing pattern (local/distant fishing activity - proximity, grids fished);

Chapter 4 describes the economic survey and the questionnaire sent to all in-scope fishing firms (n=1,669), the overall response (n=478, 29%) for the survey and the representative nature of the survey results in terms of each fishing sector and the designated characteristics of the fishing firms operating within each fishing sector.

Chapter 5 provides an estimate of the gross output impacts, employment impacts, wages and salaries impacts and value added impacts of commercial fishing on the coastal regions of Brisbane-Moreton, Wide bay, Fitzroy, Mackay, Northern and North West/Far North and the fishing operation and fish processing impacts on the major ports of Mooloolaba, Bundaberg, Gladstone, Mackay, Townsville and Cairns.

Chapters 6 to 10, using data from the economic survey, estimate the economic performances of the otter trawl, beam trawl, line, net, general crab, spanner crab and diversified sectors of the Queensland fishery respectively. The economic performance is assessed through receipt and cost indicators, financial profit indicators, economic profit indicators and the economic performance of each sector firm based on the characteristics of the these firms. An economic performance report card is provided for each sector of the Queensland fleet, not each fishery.

Chapter 11 details the overall performance of the Queensland fishery and provides a report card for the Queensland fishery based on the economic performance indicators developed for each of the fishing sectors and their characteristics. The key characteristics significant for the economic performance of the fishing sector firm, based on boat business profit, boat economic profit and net economic return, were 'level of fishing intensity', 'level of fishing activity' and 'fishing pattern'.

Chapter 12 provides the industry estimates of the Queensland fishery extrapolated from the results of Chapters 6 to 10 and the details of the industry provided in Chapter 3. The extrapolation was based on the characteristic of the firm 'intensity of fishing operation' as this characteristic was found to be statistically significant (ANOVA, $p<0.05$) in discriminating the variations required within all profit indicators.

1.5 INDUSTRY AND MANAGEMENT CONSULTATION AND EXTENSION OF RESULTS

The Queensland Fishing Industry Research Advisory Committee (QFIRAC) gave the project proposal a 'Priority A Rating'. The Queensland Commercial Fishermen's' Organisation (QCFO) and Sunfish also supported the proposal. The Queensland Government had a draft fisheries adjustment policy which had the vision 'an efficient, profitable, diversified and sustainable fishing fleet' (Taylor-Moore 1998), and the previous QFMA Board had placed a high priority on an economic survey of Queensland's fisheries. The QFMA 'Research needs and priorities for the management of Queensland's fisheries' publication states 'by understanding the economic characteristics of fishing operations, greater insight can be gained on the pressure on fisheries resources. However, there is only limited economic and profitability information available on fishing operations in Queensland'. All Queensland Fishery Management Advisory Committees (MACs) indicated the need for better financial and socio-economic data as a basis of management planning in the context of the restructuring process. The FRDC Australian Fisheries Economic Statistics Workshop (1997) also stressed the same need for this type of project.

The project proposal was previewed by the FRDC December 1997 meeting in Hobart and was supported subject to linking to Project 98/165 'A Framework for Valuing Fisheries Resource Use' as reported in Hundloe (2002).

The results of this report will be made available, if required, through Industry magazines and fisheries management journals.

CHAPTER 2

METHODS

2.1 INTRODUCTION

The methods of compiling survey and other data for economic analysis and interpretation are documented within this chapter. The main sections describe the efficacy of cost and earnings surveys for determining economic performance, an overview of the methods of financial and economic profit estimation, methods for estimation of performance indicators for fishing sectors and for fishing firms based on characteristics of these firms, sensitivity analysis and extrapolation of survey results to the Queensland fleet and the methods for economic impact estimation.

2.2 THE EFFICACY OF COST AND EARNINGS SURVEYS FOR ECONOMIC PERFORMANCE

Economic information is not readily available on fishing activity as the compulsory logbooks do not require fishing firms to provide such data. As a result, users of economic information have to rely on cost and earnings data surveys of fishing firms. The attainment of data from such surveys is generally costly and thus not readily available.

Even with the best of intentions, the use of cost and earnings data cannot give any guide to the potential profits of a fishery. Unless of course bio-economic modelling is used in conjunction with the static data obtained through the surveys. However, there is generally a view that such data is useful to decision-makers because it provides a 'snapshot of the current condition of the fishery' (Whitmarsh, *et al.,* 2000). However, a precautionary approach should apply to extrapolation of such data to future years.

Whitmarsh *et al*. suggests that the cost and earning surveys of commercial fishing operations are based on an accounting framework. But various interpretations of that framework lead to confusion as to the meaning of 'profit'. For example, profit is a generic term meaning a surplus over costs, which is not helpful given the different types of costs associated with fishing (or for most firms for that matter). The difference is the conceptual basis of the term profit. Profit can be based on the concept of income flows (accounting basis) and is a surplus or reward for the owner of the fishing firm for enterprise, labour and capital invested in the business. However, profit is also based on resource usage including the real cost of inputs into the business including natural capital and indirect effects related to the use of these resources (economic basis). As a result, understanding the 'profit' performance of the fishing firm requires this distinction to be clearly stated. Financial performance is based on the accounting concept of profit whereas economic performance is based on the concept of economic efficiency: the best use of economic resources at least cost.

The use of profit as a basis of policy and management planning also requires clarification. For example, financial indicators provide a measure of the well being and living standards of the firm and the owner and provide an insight into the costs or benefits related to fisheries management decisions. If indications of directions of change of fishing activity are required for policy determination then economic indicators are needed as these measure the real cost of resource usage related to fishing activities. From a policy perspective the basic questions related to the concept of profit are (Whitmarsh et al., 2000):

- What are the variations of profits of firms and why firms continue to operate given apparent large number of firms are operating at a loss?
- What are the responses of profit indicators to changes in the main parameters of the firm's performance?
- What is the relationship between profit performance and fisheries management arrangements?

This report can provide partial answers to the first two questions but cannot fully answer the last question in that the underlying reasons were not asked during the data gathering stage.

One of the aims of this report is to clarify the concept of profit as a basis of determining the financial and economic indicators needed for eventually benchmarking the economic performance of the Queensland fishing fleet based on the economic and social objectives of fishery management plans.

Unfortunately the distinction between financial profit and economic profit is not clear in the literature, particularly in the estimation of imputed wages and whether these are part of financial profit or economic profit. The difference between financial profit and economic profit is the real cost of fishing inputs. The Hundloe (2002) report on an economic framework for valuing fisheries explains in detail the theoretical approach to determining the economic approach underpinning this report therefore that approach is not repeated in this report.

Definitions of profit types and how they were derived are presented in Table 2.1.

Table 2.1: Financial and Economic Profit Indicators

<table>
<tr><td colspan="6">Total Boat Cash Receipts</td></tr>
<tr><td>Total Boat Variable Costs</td><td colspan="5">Boat Gross Margin</td></tr>
<tr><td>Total Boat Variable Costs</td><td>Total Boat Fixed Cost (inc Interest)</td><td colspan="4">Boat Operating Surplus</td></tr>
<tr><td>Total Boat Variable Costs</td><td>Total Boat Fixed Cost (inc Interest)</td><td>Opportunity Cost of Labour</td><td colspan="3">Boat Cash Income</td></tr>
<tr><td>Total Boat Variable Costs</td><td>Total Boat Fixed Cost (inc Interest)</td><td>Opportunity Cost of Labour</td><td>Depreciation</td><td colspan="2">Boat Business Profit</td></tr>
<tr><td>Total Boat Variable Costs</td><td>Total Boat Fixed Cost (less Interest)</td><td>Opportunity Cost of Labour</td><td>Depreciation</td><td>Opportunity Cost of Capital</td><td>Boat Economic Profit</td></tr>
</table>

The fishing industry has an economic impact on a regional or local economy in a number of different ways. The industry has linkages with other regional industries through the purchases of goods and services as inputs into their operations, and through the employment of workers who will in turn spend some of their salaries and wages in the local economy. Data from the survey was used to estimate the basic information needed for the input-output analysis.

The most common way to measure these impacts is through estimation of the effects of the industry on four economic indicators. These are the *production* or *output* of local industries, *household income* earned in the form of wages and salaries, level of regional *employment*, and addition to the Gross Regional Product of the region through *value-added*.

2.3 METHODS OF FINANCIAL AND ECONOMIC PROFIT ESTIMATION

The estimation of profit was based on the framework established by ABARE over recent years for Commonwealth fisheries. However, ABARE had not undertaken an economic evaluation of fisheries as part of their regular surveys of specific fisheries until 2000. The approach of estimation of profit indicators for a complex fishery such as the Queensland fishery has not been attempted before. Since this project was established, the methods used to estimate the key economic indicators have been used by ABARE (2000) for a limited number of Commonwealth fisheries. South Australia has generated basic profit indicators since 1997/98.

2.3.1 Attribution Ratios

The key to establishing economic performance indicators for the Queensland fishery was the use of attribution ratios to break down the fishery into a series of fishing sectors. Under the Licence Package licensing scheme, each firm is able to access a range of fisheries under specific Fishery Symbols creating joint product firms thus making the determination of fishery and firm profitability difficult. The attribution process is relatively simple but it required setting

up a sector code based on the type of fisheries accessed and the level of cash receipts attributable to the group of species taken by gear specified under each Fishery Symbol. The attribution ratio is the proportion of total boat cash receipts (TBCR) generated from fish sales, based on 'beach prices', attributed to a specific group of species taken under a specific set of fishing gear by a fishing firm. For example, if the total cash receipts generated from the sale of fish species taken by line gear was the greatest proportion of the total receipts of the firm then that firm was allocated to the line sector. In other words, the line sector was made up of fishing firms with the majority of their TBCR coming from line fishing. As defined in Chapter 3 this attribution ratio was also used to determine the degree of specialisation of each firm.

In effect, this attribution process neatly placed every firm into a fishing sector that enabled the financial and economic performance of these firms and the sectors to be determined. No attempt has been made to consider the performance of a specific fishery. The Queensland fishery was therefore divided into several fishing sectors: line, net, general crab, spanner crab, otter trawl, beam trawl and the diversified sector. These sectors were used as the basis for determining financial and economic indicators. No firm belongs to more than one sector except in the case of the diversified sector which consists of the firms where the TBCR can be attributed to more than two sectors. In general, these firms are local inshore multi-species fishing operations.

The attribution ratios based on TBCR were also used to allocate costs to specific sectors to determine financial and economic profit indicators. Attribution ratios based on cash receipts provide a standardised approach to allocation of costs as the other options of proportioning, such as by days fished or by weight of species caught, do not take into account the value of fish nor the difference in the respective weights of different species. The standardisation using cash receipts comes from the weighting determined by the respective prices of each species. Although using cash receipts as the basis of proportioning costs has these problems, these ratios were the technique used for this project (an approach used by ABARE after 2000).

2.4 METHODS FOR ESTIMATION OF ECONOMIC PERFORMANCE INDICATORS FOR FISHING SECTORS

The economic performance of the Queensland fishing firm and hence the Queensland fishery, was based on the concept of 'profit'. As explained previously, profit has different meanings. The performance of the fishing firm was measured by the following set of receipt and cost indicators, and financial and economic profit indicators.

Receipt and Cost Indicators

- Total Boat Cash Receipts (TBCR)
- Total Boat Variable Costs (TBVC)
- Total Boat Fixed Costs (TBFC)
- Capital Investment (K)
- Licence Package (LP)
- Depreciation (D)
- Imputed Wages (IW).

Financial profit indicators

- Boat Gross Margin (BGM)
- Boat Operating Surplus (BOS)
- Boat Cash Income (BCI)
- Boat Business Profit (BBP)
- Rate of Return to Capital (RRC)
- Gross Return Index (GRI)

Economic profit Indicators

- Boat Economic Profit (BEP)
- Net Economic Return (NER).

Financial indicators are of interest to the fishing firm and those investing in the industry. Economic profit indicators are the basis of the assessment of resource allocation or industry policy and management when the framework for decision making is the economic dimension of ecological sustainable development (ESD).

The use of the statistical mean as the main form of a measure of central tendency is a problem in using skewed data, such as fisheries data, for the development of performance indicators. Therefore, these means has been qualified by other information such as medians, standard errors, quartiles and coefficient of variation. However, most of the findings are presented for the 'average' firm. Absolute measures such as the mean and median are enhanced in the text by the use of 'indices' based on the ratio of receipts to the varying levels of cost associated with the different concepts of profit. These indices are used for comparative purposes.

The term 'profit' was described above in terms of the types of financial and economic costs taken into account. Economic performance indicators were developed based on these different costs. Chapter 11 is an overview of the Queensland fishery and an estimate of the economic performance of the Queensland fleet based on the profit indicators determined for the Queensland fishing sectors and the characteristics of the fishing firms operating within each sector.

As measures of central tendency cover over the variations of performance between and within sectors and sub-groups the research undertook an analysis of these measures based on the characteristics of the fishing firm, as described in Chapter 3. This is a simple methodology as these characteristics of a fishing firm are easily attainable through information based on logbook and licensing databases. A methodology that is applicable to all Australian fisheries as these data are readily available under agreed conditions such as confidentiality.

2.4.1 Total Boat Cash Receipts

Total Boat Cash Receipts (TBCR) refers to the income received by an individual firm and is expressed in dollar terms. TBCR is calculated as catch (kg) multiplied by 'beach price' ($/kg). TBCR is the income of an individual Licence Package holder without taking into consideration costs associated with freight and selling charges and on-shore processing. TBCR is the contribution of an individual Licence Package holder to the GVP of a fishing sector, fishery or industry. However, TBRC can be underestimated through direct sales to interstate or overseas markets, through under-reporting or changes in prices based on exchange rate fluctuations. Variations have been assessed through sensitivity analyses (refer to Section 2.6).

TBRC = ∑(weighted catch X estimated annual price) **(1)**

2.4.2 Estimated Earnings before Taxation

The owner operator has two basic forms of earnings: imputed wages and family contribution to the running of the business and boat business profits. Both of these were calculated.

EEBT = Imputed wages and family contribution + Boat Business Profit **(2)**

2.4.3 Variable Costs of Fishing Operation

The day-to-day costs of the fishing activity of the firm are variable costs. Total Boat Variable Cost (TBVC) is dependent upon the level of fishing activity – searching, harvesting and time at sea and is the operational costs of harvesting fish. As the level of harvesting fish increases, TBVC also increases. TBVC are measured in 1997-98 dollar terms and included the following individual cost items:

- fuel, oil and grease for the boat (net of diesel fuel rebate);
- gas (LPG) for boat;
- bait;
- ice;
- chemicals;

- packaging material, paper/cardboard bags/boxes and plastic;
- food for crew;
- labour cash payments (actual);
- fishing equipment, purchase and repairs (eg, nets, pots, lines, etc);
- repairs & maintenance: ongoing (slipping, painting, overhaul motor);
- motor vehicle expenses related to fishing (fuel, oil, tyres, repairs and maintenance); and
- marketing (freight/commission etc).

TBVC = ∑(Operational costs of fishing) **(3)**

After these variable costs are taken into account the basic form of 'profit' is Boat Gross Margin (BGM). Boat Gross Margin is defined as *Total Boat Cash Receipts less Total Boat Variable Cost* (Equation 4) and based on an assumption that capital has no alternative use and that as fishing activity (days fished) varies there is no change in capital or fixed costs.

Boat Gross Margin = TBCR – TBVC **(4)**

2.4.4 Fixed Costs of Fishing Operation

Total Boat Fixed Cost (TBFC) is defined as costs that remain fixed regardless of the level of production or output of the individual licence holder. TBFC are independent of the level of production, and remain relatively constant from one year to the next. TBFC are measured in 1997-98 dollar terms. TBFC includes the following individual cost items incurred by the licence package holder within the 1997-98 year:

- leasing costs- (boat, licence, sheds/jetty/cold-room, on-board processing/packing equipment, office equipment),
- office consumables (eg. fax paper, pens, note books etc)
- electricity,
- communications (eg. telephone/fax bills, postage etc)
- motor vehicle registration fees,
- banking charges including transaction costs, etc,
- overdraft interest, interest on loan repayments
- port/jetty/harbour/permit charges including marina/mooring fees,
- licence and industry fees (eg. QFMA, QCFO),
- insurance costs "exclude workers' compensation"
- other boat fees (eg. Survey)
- meetings, conferences
- other fixed expenses (eg. accountancy fees).

The sum of variable and fixed costs is called Total Boat Cash Costs (TBCC).

Total Boat Cash Costs = TBFC + TBVC **(5)**

When these fixed and variable costs have also been taken into account the type of profit is called Boat Operating Surplus (BOS). Boat Operating Surplus (BOS) is defined *as the difference between Total Boat Cash Receipts and Total Boat Cash Costs (Equation 6 and 7)*. BOS may be used interchangeably with the term Gross Boat Profit. However, BOS does not include an imputed value of wages of the labour owner-operator of the firm, the unpaid contribution of the family to the business, or an allowance for depreciation as these are not regarded as cash items. BOS is a result of the actual transactions of the business and reflects the variations of cash receipts and cash costs.

A BOS value of zero represents a cash breakeven position where TBCC equals TBCR. When BOS is negative, the firm is operating at a cash loss. If BOS is positive the firm would be making a cash profit. BOS is a gross concept and is not an estimate of the real cost of running the fishing business because skills of the owner-operator and family are not accounted for as these are not cash payments.

Boat Operating Surplus = TBCR – (TBFC + TBVC) **(6)**
Boat Operating Surplus = BGM – TBFC **(7)**

Another measure that relates to net cash flow is the Gross Returns Index (GRI). The Gross Returns Index (GRI) is derived through dividing TBCR by TBCC multiplied by 100 (Equation 8). This index describes the relationship between cash income and cash expenditure for a firm and measures the net cash return for each $100 cash spent by the firm. GRI is used for comparative purposes.

Gross Returns Index = TBCC/TBCR X 100 (8)

2.4.5 Opportunity Costs of Labour

Opportunity costs of labour are the costs of imputed labour for owner-operator and family contribution to the firm. Total labour costs were unable to be sourced from the information provided by respondents to the questionnaire, and a method of estimating imputed labour costs for the owner/operator and for family labour was required.

The respondents of the survey were asked what amount of time was spent by the owner-operator and by family members in the fishing operations of the firm. These estimates were not based specifically on catch shares. The estimates of the wages that should have been paid to these people were based on the equivalents also given in the survey responses. However, because of the oversimplification of this process and the fact that imputed wages are an opportunity cost the problems of underemployment and unemployment across the coastal regions are different, a sensitivity analysis was undertaken varying these estimations (refer to Section 2.6).

Accounting for imputed wages and all cash costs, the type of profit is called Boat Cash Income (BCI). Boat Cash Income (BCI) is defined as *Boat Operating Surplus less imputed wages for owner-operator and family contribution to the fishing firm (Equations 9 and 10).* BCI is an important financial profit indicator as it provides an estimate of the ability of the fishing firm to cover the costs of the owner-operator and that of family wages. The imputed wages of owner-operated fishing firms (otter trawl sector - $654/week or annual wage of $34,008 and other sectors - $440/week or annual wage of $22,880) were based on boat skipper wages provided in the economic survey. An imputed value of family contribution ($406/week or annual wage of $21,112) to the fishing firm was based upon other industries and their similarities to the fishing sector. Owners surveyed were asked about their contribution(s) to the firm and estimates of imputed costs of family contribution were based on the individual's survey response and not how the wages were determined i.e. proportion of catch. Given that these weekly wages were set as a standard for the survey, the estimated level of BCI may be understated for the smaller boats. But may also be an overestimate of profit given the apparent opportunity cost of labour being lower than actual labour costs as estimated income may be a lot less outside the fishery through high levels of regional and rural unemployment. This is supported by Rose et. al. (2000). These variations were allowed for by applying sensitivity analyses for the imputed costs.

Boat Cash Income = TBCR – (TBCC + Opportunity Cost of Labour) (9)
Boat Cash Income = BOS – Opportunity Cost of Labour (10)

2.4.6 Use of Boat Capital

Boat capital includes several key capital items that are required by the Licence Package holder to operate the business. The individual components of boat capital includes: primary boat hull and permanent fixtures (without electronics or gear), electronic gear on board primary and tender boats, Licence Package and other capital items such as value of tender vessels. Other capital items such as sheds, cold-rooms, and jetty/moorings are included in the definition of boat capital used within this study. Boat capital is measured in 1997-98 dollar terms, and was estimated by individual licence holders responding to the economic survey of Queensland fishers.

However, boat capital is used up in the activity of the fishing operations and an estimate of this reduction in value needs to be taken into account. Depreciation refers to the annual reduction in the capital value of items due to general wear and tear or the reduction in value

of an item over time, and is classified as a cost item. Depreciation is estimated for two key components of boat capital: boat and electronics (eg. sonar, GPS).

Depreciation was calculated using the estimate of the 1997-98 market value of the capital item, multiplied by the appropriate prime cost depreciation percentage sourced from the Australian Taxation Office (ATO) (ATO, 1999). The appropriate depreciation percentage is dependent upon the life expectancy of the capital item. Capital items with greater life expectancy can be expected to depreciate at a reduced rate than capital items with a shorter life expectancy.

After depreciation allowances have been accounted for the type of profit is called Boat Business Profit (BBP). Boat Business Profit is defined as *BOS less depreciation and imputed owner-operated and family labour costs* (Equations 11 and 12), and is measured in 1997-98 dollar terms. BBP represents a more complete picture of the actual financial status of an individual firm, compared with BOS, which represents the cash in-cash-out situation only.

Boat Business Profit = TBCR – (TBFC + TBVC + Opportunity Cost of Labour + Depreciation) (11)

Boat Business Profit = BCI – Depreciation (12)

2.4.7 Ownership of Resources

Profit at Full Equity (PFE) represents the profitability of an individual licence holder, assuming the licence holder has full equity in the operation, that is, there is no debt outstanding associated with the investment in boat capital. PFE, expressed in 1997-98 dollar terms, is defined as *BBP plus rent, interest and lease payments* (Equation 13). PFE represents the return to economic resources expended in the business of commercial fishing and is the profit from fishing that would accrue to the owners if there were no debt outstanding on any of the capital expenditure items used in the business. PFE is a useful absolute measure of the economic performance of fishing firms.

Profit at Full Equity = BBP + Rent + Interest Payments + Lease Payments (13)

2.4.8 Return to Investment

Rate of Return to Capital (RRC) refers to the return to the investment made by firms in capital items, and is a useful relative measure of the performance of individual firms. RRC is *calculated for an individual Licence Package holder as profit at full equity divided by boat capital (excluding licence value multiplied by 100* (Equation 14). RRC is an indicator used for comparing the performance of various Licence Package holders, and with other industries. The relationship between RRC and the opportunity cost of capital is a useful indicator of economic performance of the fishing sector with the rest of the economy (Kinhill 1997).

RRC = PFE/Total Capital (excluding licence value) X 100 (14)

2.4.9 Opportunity Cost of Capital

The opportunity cost of capital is an estimate of the use of capital in other economic activities. It was estimated at 10 percent by Morison (1999). The estimation of the opportunity cost of capital for this report was based on the ten year long term Government bond rate of 6.3% and a risk premium of 3.7% inherent in the industry as suggested by the Queensland Rural Adjustment Authority (QRAA).

Boat Economic Profit (BEP) is the net economic contribution of the fishing firm to the Queensland economy and takes into account all opportunity costs. Boat Economic Profit is defined *as BBP plus interest payments less the opportunity cost of boat capital (10%)* (Equation 15). Interest payments are not real costs as these are transfer payments. Another way of considering *BEP is BGM less TBFC (excluding interest payments) less imputed wages, depreciation, and opportunity cost of capital.* BEP is the contribution of the individual firm to the producer surplus of a particular sector.

The operational costs, imputed wages, depreciation and the opportunity cost of capital are the long-term costs that should be covered by the fishing firm if it was to remain in the industry.

However, Boat Economic Profit does not account for the externalities of fishing (such as habitat damage) and not for the run-down of the natural capital of the marine resources (fish stock loss) attributable to the fishing firm.

BEP, as a long-term concept, is the indicator of the real economic performance of the fishing business under of the requirements of ESD. From the economic dimension of ESD each fishing sector should have a positive BEP.

BEP = BBP + Interest Payment – Opportunity Cost of Capital (15)

2.4.10 Economic Contribution of Fisheries to the Queensland Economy

Net Economic Return (NER) is the net economic contribution of the fishing industry to the Queensland economy and is the main measure of economic performance of a commercial fishery. Net Economic Return also contains an estimate of management costs that are not fully covered under the licence fee arrangements for Queensland. Thus the NER estimates of this research are an overestimate. Net Economic Return approximates Fishery Rent under certain assumptions (Rose and Stubbs, 1999 and 2000 and EconSearch 2003) because non-use benefits are not easily measured in monetary values and that the condition of fish stocks, changes in the capital stock owned by the fishing firms, changes in the fisheries products and resource inputs from the economy and from the impacts of fishing on natural fisheries capital need to be considered.

Net Economic Return is defined *as the sum of Boat Economic Profit for the group, sample or population of fishing firms under consideration* (Equation 16). Net Economic Return as a percentage of TBCR for each fishing sector or GVP for the fishery is the main aggregate indicator for comparing different fisheries and fishing sectors, and with other natural resource industries (Rose et al, 2000).

Net Economic Return = $\sum$(Boat Economic Profit) (16)

2.5 METHODS FOR ESTIMATION OF ECONOMIC PERFORMANCE OF FISHING SECTORS BASED ON CHARACTERISTICS OF THE FIRM

To understand the hidden variations of the above gross values for means and medians, the measurement of the economic performance of the 478 surveyed fishing firms within their various sectors was broken down through the following characteristics:

- degree of specialisation (specialisation code);
- size of fishing operation (boat length or hull units);
- intensity of fishing operations (days fished per annum);
- location of fishing business (ABS statistical division);
- level of fishing activity (total boat cash receipts); and
- fishing pattern (local/distant fishing activity).

Economic performance of each fishing sector was then evaluated based on the following criteria:

- statistical significance of the relationship between the characteristics of the firm and the levels of profit indicators using univariate ANOVA ($p<0.05$);
- overall levels of BBP and BEP;
- the means/medians of BBP and BEP for each characteristic; and
- proportion of subsets of sector firms with BBP>0 and BEP>0.

The sector results are provided in Chapters 6 to 10 with a summary of all surveyed firms in Chapter 11.

2.6 METHODS FOR ESTIMATION OF ECONOMIC PERFORMANCE OF THE QUEENSLAND FISHERY AND FISHING SECTORS

The industry estimates of the Queensland fishery were extrapolated from the results of the financial and economic profit indicators derived for each of the main Queensland fishing sectors (Chapters 6 to 10) and the details of each sector provided in Chapter 3. Each of these

indictors was tested (ANOVA, $p<0.05$) against the characteristics of the fishing firm within each sector to establish whether it was statistically significant in discriminating the variations required within all profit indicators. The extrapolation was based on the characteristic of the firm 'intensity of fishing operation' as this characteristic indicated that there were significant differences in the level of all financial and economic indictors, except RRC. The mean of each sector profit indicator was determined and disaggregated for each group of fishers according to 'intensity of fishing operation'. Each of these statistical means was used as the extrapolation factor to derive the population estimates for each sector from the population distribution of 'intensity of fishing operations' as provided in Chapter 3. The results are provided in the Report Card of each sector is provided in Chapters 6 to 10 and summarised in Chapter 12.

2.7 SENSITIVITY ANALYSIS

Three forms of sensitivity analysis were undertaken throughout the report.

- cost and receipt elasticity for main profit indicators through changes in levels of TBCR through under-reporting, price variations and exchange rates changes to fuel costs and variations of repairs and maintenance;
- changes in BBP and BEP through estimates of imputed opportunity costs of wages and family contribution combined with changes in TBCR; and
- changes in BEP through estimates of the opportunity cost of capital under variations of risk premiums.

The caution that must be exercised in interpreting the cost and receipt elasticities derived is the implication that a reduction in fuel costs, as a consequence of less fishing activity, is likely to increase profits due to the probability of catching less fish. With such an increase, it is unlikely that fishing activity would remain constant given such a dramatic change in the cost structure: less profitable fishing days would be reduced as costs increased. Of course, to gauge beforehand what is likely to be a less profitable fishing day is difficult and in some cases likely to be impossible. That stated, experience fishers do assign some form of probability to their likely success based on weather conditions, previous fishing experience and physical variables.

Changes in TBCR were part of sensitivity analysis to take account of 'under reporting', price variations, market failure, and the impacts of exchange rates. As no evidence is available to support such variations, except for anecdotal information, a variation of +/- 10% was used to test the sensitivity of the financial profit indicator BBP.

Given that the opportunity cost of capital does have a large impact on BEP and NER, a reduction in the risk factor from 3.7% to 1.5%, as suggested by the financial market during 1997-98, was used to test the sensitivity of these economic profit indicators.

2.8 METHODS OF ECONOMIC IMPACT ESTIMATION

This section provides an outline of the economic impact estimation procedures used in a study, commissioned under the project, by Jensen and West (2000). It provides a general overview of the method, describing the various steps followed in applying input-output tables to estimate the economic significance of the fishing industry. Some comment is provided on the selection and updating of input-output tables and on some of the assumptions made.

2.8.1 Overview

The fishing industry will have an economic impact on a regional or local economy in a number of different ways. The industry will have linkages with other regional industries through the purchases of goods and services as inputs into their operations, and through the employment of workers who will in turn spend some (perhaps most) of their salaries and wages in the local economy. The most common way to measure these impacts is through estimation of the effects of the industry on four economic indicators, namely the:

- *production* or *output* of local industries,
- *household income* earned in the form of wages and salaries,

- level of regional *employment*, and
- addition to the Gross Regional Product of the region through *value-added*.

The impact of the fishing industry on all four of these indicators was measured using an augmented 'conventional' input-output approach, at the state level and in each of the coastal regions. This augmentation involved the incorporation of parameters developed in the integrated IO-econometric model produced by Dr Guy West.

These impacts are measured in terms of both direct effects and flow-on effects, and in terms of the two identified components of the industry. Full details of the estimates of the effects are given in Chapter 5.

2.8.2 An Overview of Methods

This study is based on the application of a modified input-output model for the measurement of economic impact. The general method of this study involved two phases.

Phase 1 The identification of the components of the fishing industry in input-output tables which represent the economies of the state and the coastal regions of the state.

Phase 2 The calculation of the economic significance of those components of the fishing industry in the state and regions, based on a conventional input-output interregional model, augmented by data from an integrated (input-output plus econometric or IO+E) model.

The following steps were undertaken in this impact measurement.

2.8.3 Step 1 Selection of Appropriate Input-Output Tables

Input-output (IO) tables for the economies of each of the regions of Queensland were published by the Queensland Government Statisticians Office (GSO) for the year 1985/86. Tables were also available from the Regional and Urban Economics Research Unit (RUERU) at the University of Queensland, for the year 1995/6. These regional tables were based on the Statistical Divisions of the Australian Bureau of Statistics. The input-output tables for the state and coastal regions for this study were derived from the input-output tables prepared by the GSO, augmented by data from the RUERU tables and by selected superior data.

The impacts on these regions were measured for the 1997/98 year.

2.8.4 Step 2 Description of Fishing Industry Sectors

The study brief and the field survey results indicated that the fishing industry could most satisfactorily be represented by two components defined as follows.

Fishing Operations (Fishery Production) sector
This includes the harvesting of fish and transport to further processing. The value of fishing operations is effectively the value of the catch delivered for processing.

Fish Processing sector
This includes the handling, storage, transport and processing of the catch, and the delivery of the processed catch to further processing outside the region. Fish processing will include mainly *primary processing* or the first stage of processing, including cleaning and filleting. Any *secondary processing,* or further processing for consumption purposes carried out in the region or at the local level is also included in this sector

The representation of these sectors in an input-output table essentially requires that each of these two components (or sectors) of the fishing industry be represented by a column and a row in the IO table. In turn, this requires that the cost or input structure of each sector be estimated for the formation of the appropriate column, and that a row representing sector sales be estimated for each sector. The column is of particular importance since the purchases of inputs and the wages and salaries paid by each sector provides estimates of the direct economic linkages with the economy, and therefore allows estimates of direct and indirect (flow-on) impacts to be calculated.

The Queensland Department of Primary Industries undertook/sponsored a detailed survey of the fishing industry to provide the data for this industry impact measurement study. Data from this formal survey of both the Fishing Operations sector and the Fish processing sector and other sources were processed to provide the broad cost structures and appropriate estimates of output for each of the components.

Much of the data provided for the associated estimates of cost structure must be considered to be confidential and therefore cannot be detailed in this report. However the substantive results of the surveys can be identified in the rows and columns of the relevant IO tables prepared for this study.

The points of valuation of output for each of the two components or sectors of the fishing industry (eg, the value of fish production and fish processing) are consistent with the valuation methods used in input-output practice, and in the national accounts.

2.8.5 Step 3 Preparation of Columns and Rows Representing the Fisheries Products Industry

The estimates of economic structure of the sectors, from Step 2 above, were converted where possible into estimates of columns and rows for representation of these sectors in the appropriate input-output tables. This involved the allocation of cost items to input-output sectors as defined in the GSO input-output tables.

The rows and columns of the two components relied heavily on the survey data, with less emphasis on the rows and columns of the 'parent' sectors in the respective existing input-output tables. Modification, where possible, by the insertion of 'superior data', was undertaken.

This step provides 'pictures' of the economies in question, in this case the economy of the state as a whole and the coastal regions of the state, which show the fishing industry in the IO table.

2.8.6 Step 4 Multiplier Analysis of the Fishing Industry

The insertion of the columns and rows representing the sectors allowed the calculation of economic impacts. Impact studies have been carried out using a variety of analytical techniques. This section provides a summary description of these alternative methods, ranging from the least complex to the more complex methods.

The *economic base* or *export base* approach

This approach was commonly used in the 1960s and 1970s for impact measurement. It relies on the assumption that the level of economic activity in an economy (national or regional) is determined wholly by the level of exports, and the level of exports alone determines the level of activity in those domestic sectors which are not exporting sectors.

The economic base approach provides an aggregate estimate of impact of a change (in exports) on the economy as a whole, and does not allow estimates of impacts based on inter-sectoral transactions among the various sectors of the economy.

In the context of this study, an economic base approach would not allow exploration of the impact of the fishing industry on local industries and was therefore considered to be an inadequate approach to impact estimation for this study.

The *Keynesian multiplier* approach.

The economic base approach is a special and restricted case of the more generalised Keynesian multiplier which was commonly used as an impact assessment technique, particularly up to the 1970s. The Keynesian approach recognised that a number of elements in the economy, in addition to exports, could impact on the level of economic activity in the economy. In particular it recognised the role of government expenditure, investment and personal consumption as stimulants to the economy. The Keynesian multiplier arises from the so-called National Income Equation where Y (income) = C (consumption) + I (investment) + G

(government expenditure) + X (exports) - M (imports). Variations and manipulation of this equation allowed the development of several versions of the Keynesian multiplier.

In similar vein to the economic base multiplier, the Keynesian multiplier allowed only estimation of the aggregate impacts on the economy as a whole and did not allow estimates based on inter-sectoral transactions of the component sectors of the economy. For this reason, this approach was also considered inadequate for this study.

The Input-Output (IO) approach

The IO approach is based on the existence of an IO table for the economy in question. This IO table is a matrix representation of the economy, showing rows as inter-sectoral sales and columns as inter-sectoral purchases. The IO table can be represented as a picture of the production side of the economy, and is in effect a representation of the inter-sectoral linkages in the economy. Manipulation of this matrix allows the calculation of a variety of multipliers, including gross output, income, value added and employment multipliers as routine and other types of multipliers as occasion demands for *each* sector of the economy. This report does not describe the IO technique in detail. A number of texts provide a description of IO and its uses, including a more elementary coverage in Jensen and West (1986).

The IO approach is the most commonly used method of impact estimation particularly in smaller and more open economies. Once the IO table has been derived, the IO analyst has the choice of using *conventional* IO analysis which uses the IO table alone as the analytical tool, or using the IO table as a database for more complex economic models.

In the context of this study, as stated above, it was possible to derive IO tables for the state and the coastal regions of the state. The main question to be considered was whether the analysis should be conducted using 'conventional IO analysis" or some extension of conventional analysis, using the IO tables as databases. While it is still virtually the inevitable practice for conventional IO analysis to be applied to small regions, it is standard practice to consider other methods in the analysis of larger regions.

The Econometric Model approach

Econometric models essentially consist of a series of econometrically-determined equations representing the fundamental relationships in the economy. These equations will represent economic relationships such as supply and demand functions, income and expenditure functions, investment and production functions and so on. The parameters of these equations are usually calibrated from historical data and the models are 'solved' for existing and hypothetical economic circumstances by mathematical methods.

Econometric models vary in structure and the output of the models is therefore variable with most econometric models unable to specify the effect of changes in economic circumstances on individual sectors of the economy.

The development of an econometric model for an economy is a lengthy and expensive process. No econometric models have been developed for the Queensland regions defined for this study.

The Integrated IO-Econometric model

Perhaps the most flexible and common development in economic modelling is the so-called integrated model, which attempts to gain the strength of both the IO and econometric models by combining them into an integrated whole. Two types of these models exist, namely the IO+E model which essentially extends the IO model by addition of econometrically determined model closure processes, and the E+IO model which essentially adds an IO (inter-sectoral) structure to the econometric framework.

The use of an integrated IO+E model allows the incorporation of a number of economic relationships to be added to the conventional IO model and hence increases its flexibility and removes the need for some of the more restrictive assumptions of the conventional IO model. The preparation of an integrated model does, however, require also a series of econometric studies to be undertaken with respect to some of the fundamental relationships in the

economy. In particular the model is based on marginal, rather than average coefficients. An integrated model has been developed for the Queensland model by Dr Guy West with the capability to adapt this model to the larger (statistical division) regions of Queensland or to smaller local economies.

The computable general equilibrium model (CGE) model

The CGE model is designed primarily to add a new dimension to economic modelling, namely the simulation of the price mechanism by specifying equations representing the demand and supply of each commodity or commodity group in the economy, usually including labour, capital. money and foreign exchange. The CGE model therefore requires estimates of supply and demand elasticities for each commodity or commodity group included in the model, and is based on a neo-classical view of the operation of the economy.

The ideal preparation of a CGE model requires the empirical determination of the numerous parameters included in the model. Few CGE models achieve a high level of empirical validation, and this has restricted the application of CGE models in many circumstances. The general consensus of opinion would be that the use of CGE models for modelling the impact of an industry at a small local government area would be taxing the model beyond its level of credibility.

In considering the *choice of analytical model for the purposes of this study*, the considerations were basically the preference for the conventional IO model for analysis of the smaller local government area economies, and the preference for the use of the integrated IO model for the larger-region economy. However, this analysis required the use also of an interregional model to estimate the size of fishing industry flow-on effects to the "rest of the state". No integrated model was available with the capacity to handle large-scale interregional tables. Since the regional economies represented in this study were more in the nature of 'large regions' the decision was taken to use the conventional IO model, augmented by parameters from the existing regional integrated IO+E model.

Multiplier analysis presents the results of impact measurement on a 'per unit' basis, or in this case on a 'per dollar of initial impact' basis. Multipliers were developed for each of the components of the fishing industry; these are shown in the tables presented in Section 5.

The multipliers for the components of the fishing industry used in this analysis are presented in terms of *total flow-on* effects and in terms of desegregated effects which show the impact on the remaining sectors of the economies. Multiplier analysis provides a summary of the various linkages in a compact and comparable format.

2.8.7 Step 5 Calculation of Absolute (Dollar) Values of Impact

The multiplier analysis of Step 4 was enhanced to provide estimates of the economic impact of the components of the fishing industry for each region in terms of absolute dollar/number values, ie. in terms of the total level/value of output, household income, value-added and employment at the regional and state levels.

2.8.8 Comment on Methods

Economic analysis relies for its credibility on the representativeness and veracity of basic data. In this study, a formal survey of most of the components of the industry in each region was undertaken to ensure the highest possible levels of data reliability. Given the nature of the industry, however, the data collected was of variable quality and could not constitute a complete census of the industry or the highest degree of detailed accuracy in all aspects of the industry.

While some margin of error should be recognised in the data presented in this study, it should be appreciated that the data presented arises from a wealth of experience in the fishing industry, in fisheries research and analysis generally, and in professional evaluation of industry structure in difficult data situations. The data in this study represents the sum total of knowledge and experience available to the study team. In any analysis of this type, the final responsibility of the analyst is to reach the highest possible level of accuracy and integrity with the resources available, and this has been achieved in this study.

The multipliers in the following sections have been calculated in a manner that avoids the multiple counting of sector impacts. This multiple counting could occur since the fish processing industry draws major inputs from the fishing operations sector. If precautions to avoid multiple counting were not taken, and the values of the sectors were summed to represent the fishing industry, the value of the fish products used in processing would be counted in more than one estimate of output, namely the value of fishing operations and fish processing.

Two alternatives exist for the treatment of sectors to avoid multiple counting. One alternative is to consider only the multiplier and absolute value of impacts of that activity which is the furthest 'downstream' or towards the end of the production process. This approach does not reveal the diverse nature of the fishing industry in Queensland.

The second alternative, and the one adopted in this study, is the removal of the linkages between the two fishery sectors in the input-output table, and the consequent treating of each sub-sector as a separate component in the production of fish products. For example in this study the value of output of the fish processing sector or industry is simply the value of the processing, net of the value of fishing operations or production. This procedure is necessary to avoid multiple counting, and is commonly accepted in impact studies. It follows that the multipliers derived in this study refer to this concept of output.

CHAPTER 3

THE QUEENSLAND FISHERY

The Queensland fishery is made up of diverse fishing firms operating within a complex fisheries management regime. The main sections of this chapter provide a background on the management regime, the general characteristics of these firms and the fishing sectors within which these operate. This background provides essential information and a structure for analysing the financial and economic performance of these sectors in later chapters.

3.1 LICENSING AND MANAGEMENT ARRANGEMENTS OF THE QUEENSLAND FISHERY

The Queensland fishery is managed under a limited-entry-licensing regime that came into operation in 1984. Each fishery can be accessed under a Fishery Symbol which specifies the area that can be accessed, the gear that can be used and the species that can be caught and retained. The main management tool is a primary fishing vessel licence to which a range of Fishery Symbols can be attached to create a Licence Package that is the basis of the fishing business operation. The legislative framework under which these fisheries operate is a Fishery Management Plan. As of 1997-98 no management plans were in place. At the time of the research only a handful of these Plans have been promulgated; the fisheries were managed under a range of regulations except for spanner crabs (quota).

Table 3.1: Interaction Matrix of Main fishery Symbols (as at November 1998)

	C1	C2-3	C4-6	L1	L2	L3	L4-9	N1	N2	N3	K	N6	T1	T2-4	T5-9
C1	930	485	3	864	126	754	96	651	214	104	36	930	166	1	128
C2-3	485	486	4	455	63	415	42	351	111	31	18	486	68	1	71
C4-6	3	4	46	6	-	6	31	3	-	-	-	42	-	-	1
L1	864	455	6	1661	219	1348	115	743	194	103	60	1660	672	6	148
L2	126	63	-	219	241	-	16	117	54	3	1	241	25	1	21
L3	754	415	6	1348	-	1472	91	655	180	82	53	1471	671	4	132
L4-9	96	42	31	115	16	91	168	49	11	52	1	147	8	-	5
N1	651	351	3	743	117	655	49	815	217	25	61	811	139	1	136
N2	214	111	-	194	54	180	11	217	235	-	-	235	23	-	60
N3	104	31	-	103	3	82	52	25	-	106	-	106	-	-	-
K	36	18	-	60	1	53	1	61	-	-	62	62	1	-	11
N6	930	486	42	1660	241	1471	147	811	235	106	62	1860	745	6	161
T1	166	68	-	672	25	671	8	139	23	-	1	745	775	5	16
T2-4	1	1	-	6	1	4	-	1	-	-	-	6	5	40	-
T5-9	128	71	1	148	21	132	5	136	60	-	11	161	16	-	162

Table 3.1 is an interaction matrix detailing the number of main Fishery Symbols available during 1997-98 and how these relate to each other under the Licence Package regime. This matrix was derived from the 1,949 Licence Packages available during 1997-98 based on the QFS licence database. However, the matrix does not indicate how many of the symbols were active during 1997-98. As many fishers are specialists, many other Fishery Symbols also attached to the Licence Package were latent (no cash receipts from fishing under that particular symbol – Table 3.3).

The diagonal of the matrix is the total number of each type of Fishery Symbol. Each column of the matrix represents the number of the various Fishery Symbols that are attached to the boats (Licence Packages) operating under that specific Fishery Symbol.

For example, the inshore net fishery (N1) had 815 licensed boats (Licence Packages) as of November 1998. For example, the distribution of Fishery Symbols under a N1 type of Licence Package (general inshore netting) includes:

- 651 had access to the mud crab and blue swimmer crab pot fishery (C1);

- 743 had access to the east coast line fishery (L1) outside of the Great Barrier Reef Marine Park,
- 139 had access to the east coast otter trawl fishery (T1), and
- 136 had access to the estuarine and riverine beam trawl fishery (T5-9).

In other words, the matrix describes the important linkages between Licence Packages and Fishery Symbols that make up a general picture of the Queensland fishery. The Licence Package is therefore the basis of the fishing business operation of the Queensland fishing firm. For more details refer to Switala and Taylor-Moore (1999), the first report of this project, to understand the complex nature of the Queensland Fishery as a unique management regime.

The trend in the number of Licence Packages, hence fishing firms, has been steadily declining from 2,386 (1990-91) to 1,993 (1999-2000) (Figure 3.1) The decline in Licence Packages occurred through a range of management measures: amalgamated licences, reduced numbers of inactive fishers, specific licences bought out under adjustment schemes and reduced numbers in specific fisheries.

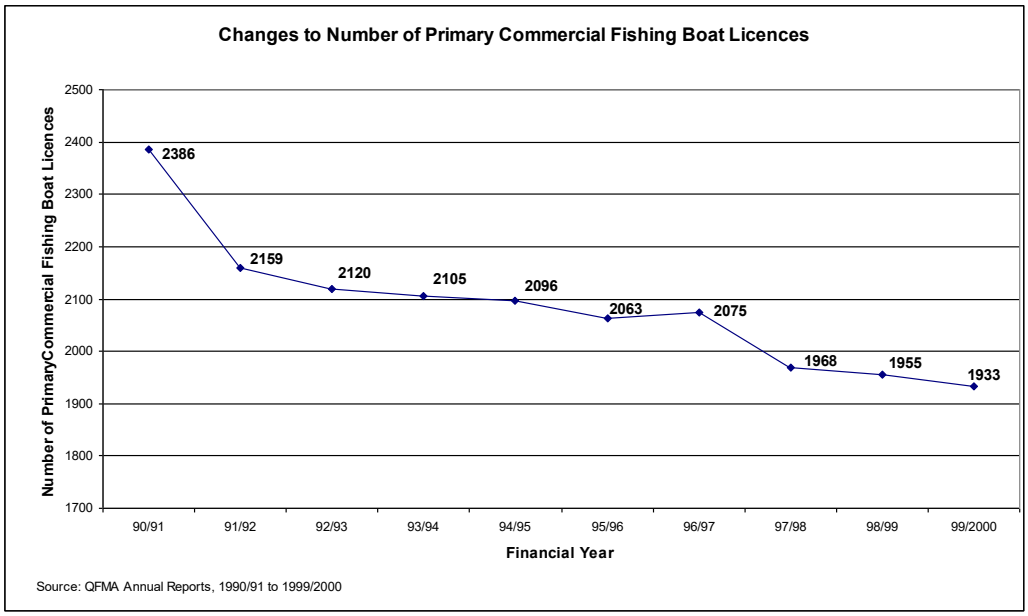

Figure 3.1: Changes in Licence Package Numbers 1990-91 to 1999-2000

The Queensland *Fisheries Act 1994* provided the head of power to regulate the Queensland fishery through a series of fisheries management advisory committees (MACs). Each MAC has the obligation to provide detailed advice to the Minister of Fisheries for promulgation of management arrangements by the Government of Queensland.

Queensland fisheries are managed based on the co-management principles of MACs as required under the *Fisheries Act 1994*. At the time of the project there were six marine fisheries MACs in place and functioning at various levels of success in developing fishery management plans:

- TrawlMAC- trawl fisheries (T Fishery Symbols)
- ReefMAC – reef line fisheries (L Fishery Symbols)
- SubTropicalMAC – inshore subtropical net fisheries (N Fishery Symbols)
- TropicalMAC – inshore tropical net fisheries (N Fishery Symbols)
- CrabMAC – general crab and spanner crab fisheries (C Fishery Symbols)
- HarvestMAC – harvest of sedentary fish (Various Fishery Symbols).

The control of overfishing and habitat destruction has been the main target of the MACs and their advice to the Queensland Government. The usual response to these important matters has been to reduce the number of firms operating under their auspices and to impose

limitations on gear and activity to protect fisheries habitats. But the management agency at the time (1997-98), the Queensland Fisheries Management Authority and currently the Queensland Fisheries Service had not been overtly concerned about the multiple impacts of fisheries management decisions on the individual firm.

The main objective of fisheries management within Queensland is ecological sustainable development (ESD) but the emphasis had always been placed on the ecological and environmental aspects. Whilst this is very important, the socio-economic effects had been basically ignored. An example may to help clarify this assertion. Assume that a Licence Package has the following Fishery Symbols attached: T1 (otter trawl), C1 (general crab), C2 (spanner crab), N1 (general net) and T5 (beam trawl), not an uncommon package. This firm had the right to access all of these fisheries subject to the management plan arrangements of each fishery. What are the impacts of future management plans on the economic viability of this Licence Package? If each MAC develops a plan on the basis of restricting fishing effort then the number of days fished or areas accessed available to that Licence Package will be reduced under each plan. At some point the fishing business, operating under the Licence Package, become unviable to the owner and thus the society which depends on the economic flow-ons from its activities unless management changes. A trade-off is therefore necessary: adjustment. But the macro-effect of these management changes on the firm had not been of major concern to the management agencies.

3.2 CHARACTERISTICS OF THE FISHING FIRM

The fishing firm is a business operating under a Licence Package. Each firm has a set of characteristics, determined for the research, which were used to describe the nature of the fishing operations undertaken within Queensland's fisheries. The general characteristics of a Queensland fishing business chosen for the study and the units used for analysing their behaviour were:

- degree of specialisation (proportion of sector revenue to total boat cash receipts)
- fishing sector (otter trawl, beam trawl, line, net, spanner crab, general crab, diversified)
- location of fishing firm (ABS Statistical Division)
- level of fishing activity (total boat cash receipts)
- size of fishing operation (boat length)
- level of fishing intensity (days fished)
- fishing pattern (% of total area fished within defined local area and number of grids fished).

Each characteristic is described in this section and based on data derived from the QFS licensing and logbook databases.

3.2.1 Characteristic 1: Degree of Specialisation

Degree of specialisation is defined in this report as a measure of the reliance, based on total boat cash receipts (TBCR), the fishing firm has on accessing a range of fisheries through a Licence Package. A specialisation code was based upon five main fisheries. These main fisheries were used to develop fishing sectors within which each fishing business operated. For example:

C = General Crab fishery
L = Line fishery
N = Net fishery
S = Spanner crab fishery.
T = Otter Trawl fishery and Beam Trawl fishery

Each of the five main fisheries listed above relates to either a particular species or species group (for instance spanner crabs) or a particular fishing method (eg. line, net, otter trawl and beam trawl). Most individual species were captured using a single fishing method: for instance barramundi catches were generally the result of net fishing, while prawns and scallops were usually caught by trawl fishing. For the purposes of this study, catches as provided through logbook data, were attributed on that basis. Where species could be caught by various methods (for example both net and line), they have been attributed to only one of the three categories L, N, and T, on the advice of Queensland fisheries biologists.

Using catch data (species and quantity) the main fisheries accessed by each Licence Package operator were identified. By multiplying the quantity harvested for each species by the estimated average beach price for 1997-98, the GVP of each fishery and Total Boat Cash Receipts (TBCR) of each Licence Package (fishing firm) could easily be determined. From these data a set of fishing sectors was developed to ensure there was no double counting or confusion in determining the major type of fishing activity a business undertook during 1997-98. Each Licence Package was assigned a capital code letter (for example L for line fishing) indicating the fishery that contributed the highest level of dollars to the TBCR of the firm. This capital code letter identified the fishing sector of the firm based on the attribution ratios. Another lower case letter was then added to that sector code letter which indicated the proportion of TBCR attributable to the number of fisheries that individually contributed to TBCR earned by the Licence Package.

For example, in the case of a fishing firm operating in the line sector (L) the following codes were developed to indicate the degree of specialisation of that firm:

- La = line fishery provided 100% of GVP.
- Lb = line fishery was the main source of GVP (no other fishery contributed greater than 10% to total GVP)
- Lc = line fishery was the main source of GVP (and one other fishery contributed greater than 10% to total GVP)
- Ld = line fishery was the main source of GVP (and two other fisheries contributed greater than 10% to total GVP)
- Le = line fishery was the main source of GVP (and three other fisheries contributed greater than 10% to total GVP).

The La to Le code represents the degree of specialisation of fishing operations of the Licence Package, where La and Lb were regarded as a *specialist line Licence Package* (reliance on one major fishery for TBCR) and Lc to Le as a *diversified line Licence Package* (reliance on several fisheries for TBCR). A full breakdown of the specialisation codes for the fleet is given in Table 3.2.

In summary, 74% of the fleet is specialised, the highly specialised fishing sectors were otter trawl fishery (98%) and line fishery (98%). The most diversified sectors were the general crab ((66%) and net sector (44%).

Table 3.2: Fishing Sector: Degree of Specialisation

Specialisation Code	Number of Boats (a) (n = 1,669)	GVP ($M)	Proportion of In-Scope Fishing Fleet (%)	Proportion of Sector (%)
General Crab Sector				
Ca	24	0.8	1	16
Cb	26	1.7	2	18
Cc	74	5.0	5	50
Cd	22	1.2	1	15
Ce	1	0.1	0	1
Total	**147**	**8.8**	**9**	
Line Sector				
La	269	27.8	16	67
Lb	46	4.4	3	11
Lc	72	5.6	4	18
Ld	11	0.6	1	3
Le	3	0.2	0	1
Total	**401**	**38.4**	**24**	
Net Sector				
Na	100	8.4	6	31
Nb	80	6.2	4	25
Nc	114	9.1	6	34
Nd	30	1.9	2	9
Ne	2	0.1	0	1
Total	**326**	**25.7**	**18**	
Spanner Crab Sector				
Sa	53	3.2	3	39
Sb	31	2.1	2	23
Sc	43	3.2	3	32
Sd	8	0.4	-	6
Se	1	0.2	-	-
Total	**136**	**9.1**	**8**	
Otter Trawl Sector				
Ta	454	89.3	27	75
Tb	127	26.5	8	21
Tc	22	2.8	1	4
Td	1	0.1	-	-
Total	**604**	**118.7**	**36**	
Beam Trawl Sector				
Ta	28	2.1	2	55
Tb	9	0.5	-	18
Tc	11	1.0	1	22
Td	3	0.1	-	5
Total	**51**	**3.7**	**3**	

Source: QFS logbook data.
Total number of Licence Packages= 1,949. However 68 boats = latent, 48 = excludes without Qld catch, Additionally there are a further 164 Licence Packages excluded, as explained in Chapter 2, because these fished in Queensland waters but were also involved in other fisheries/activities managed under other jurisdictions.

3.2.2 Characteristic 2: Fishing Sector

Each fishing firm was allocated a fishing sector based on the proportion of their receipts taken from specific fisheries as per attribution ratios. For example, a fishing firm was classified as a net fisher if the majority of the receipts of the firm were attributed to the species normally taken under gear used in the net fisheries. Table 3.3 is the basic reference table for further analysis regarding response rates to the economic survey and for comparisons of fishing sectors. The majority of boats and some two thirds of GVP relate to the trawl sectors (Table 3.3).

Table 3.3 Fishing Sector: Numbers and GVP (1997-98)

Fishing Sector	Number of Firms	GVP ($M)	GVP per Firm ($'000)	Proportion of GVP (%)
General Crab	147	8.8	60	4
Line	401	38.4	96	17
Net	326	25.6	79	11
Spanner	136	9.1	67	4
Otter	604	118.7	196	52
Beam	51	3.7	73	2
Trawl Whiting	na	na	na	na
In-Scope Total (a)	**1,669**	**210.2**	**121**	**92**
Latent Licence Packages (b)	68	-	-	-
Subtotal	1,737	210.2	121	92
Excluded (c)	212	18.5	87	8
Queensland Fishery Total (d)	**1,949**	**228.6**	**117**	**100**

(na) means less than five firms and data of this nature is not normally released as part of QFS confidentiality policy. However the data is used for the research. Source: QFS logbook data.
(a) The In-Scope Total is the basic number of Licence Packages deemed to be the relevant number of firms under taking the business of fishing in Queensland during 1997-98.
(b) Latent Licence Packages means no income was generate during 1997-98 from fishing operations.
(c) These are the multi-jurisdictional Licence Packages.
(d) This is the total number of Licence Packages (Table 3.7b) and their GVP regardless of their jurisdiction.

Table 3.4: Fishing Sector: Proportion of Boat Length Class GVP attributed to a Fishing Sector

Boat Length Class	Crab	Line	Net	Spanner	Trawl
Greater than 18m	0.0%	8.3%	6.4%	0.0%	85.2%
Between 14 and 18m	0.0%	7.5%	1.4%	0.0%	91.1%
Between 10 and 14m	1.0%	30.1%	5.8%	4.7%	58.5%
Less than 10m	16.2%	23.4%	38.4%	12.1%	9.9%

Source: QFS logbook data

Main fisheries accessed by firms deemed to be in-scope for the research (n=1,669) with different boat sizes are summarised in Table 3.4. For example, for boats greater than 18m, 85% of their GVP came from the trawl fishery. For boats 14-18m, 91% came from trawl and 8% from line fishing; for boats between 10-14m 59% from and 30% from line and for boats less than 10m the main fisheries were net fishing (38%), line fishing (23%) and spanner crab fishery (12%).

Table 3.5: Fishing Sector: Proportion of GVP attributed to Boat Length

Boat Length Class	Crab	Line	Net	Spanner	Trawl	Total
Greater than 18m	0.0%	1.0%	0.8%	0.0%	10.2%	12.0%
Between 14 and 18m	0.0%	2.5%	0.5%	0.0%	30.7%	33.7%
Between 10 and 14m	0.3%	9.1%	1.8%	1.4%	17.7%	30.3%
Less than 10m	3.9%	5.6%	9.2%	2.9%	2.4%	23.9%
Total	4.2%	18.2%	12.2%	4.3%	61.1%	100.0%

Source: QFS logbook data.

The contribution to total industry GVP from each main fishery by different classes of boat length is given in Table 3.5 (n=1,669). For example, 61.1% of total GVP can be attributed to trawl firms. Those firms with boats greater than 14m took 45.7% of all GVP and 40.9% came from trawl firms, 3.5% from line boats and 1.3% from net boats. Of firms with less than 10m boats, the major sectors were net (9.2%) and line (5.6%).

3.2.3 Characteristic 3: Location of Fishing Firm

All members of the Queensland Seafood Industry Association (QSIA) which included the vast majority of Licence Package owners and operators, belonged to one of 26 sub-branches, located along the state's coastline from Karumba in the Gulf of Carpentaria to Southport on the Gold Coast.

The QFS database of 1997-98 revealed the existence of 1,949 fishing firms. For the purposes of this report, all 1,949 firm operators were assigned to one of the 26 QSIA ports/branches. In most cases, the home-port of the commercial operator was obtained from the database. As a means of verifying home-port, catch data was examined to ensure that the home-port designated in the database was compatible with fishing undertaken under the Licence Package (by the fishing firm).

Nevertheless, errors may have existed in the identification of some home ports, particularly when fishing was undertaken at a distance from the home-port, and where the boundaries between ports (such as Sandgate and Brisbane) were uncertain. The allocation of commercial operators to individual ports should therefore be taken as a 'best' approximation based on the limited information available.

Finally, some of the 26 home-ports listed in this report actually represent a number of smaller ports within a large geographical region. For instance, for the purposes of the report the port of Gladstone also includes fishing boats located at Boyne Island, Tannum Sands, Turkey Beach, Seventeen Seventy and Agnes Water.

A total of 1,949 fishing firms were identified in the 1997-98 QFS database. However, this figure excludes those firms (117) with incomplete records or whose operators participated in harvest fisheries collecting such products as worms, bêche-de-mer, pearls, trochus, aquarium fishes, crayfish, yabbies, etc.

Each of these 1,949 firms resides within a defined statistical division (region) of the Australian Bureau of Statistics (ABS) (Table 3.6) and were allocated to these regions as a 'location of fishing firm'. Cairns (202) was the largest port in terms of fishing boat numbers, with. Other major ports include Bundaberg (160), Mooloolaba (154), Gladstone (140), Scarborough (129), Townsville (111) and Southport (105) (Switala and Taylor-Moore 1999).

The location of the fishing firm was not related to fishing activity or fishing grounds.

Table 3.6: Queensland Fishing Firms: Region and Port Location

ABS Statistical Division/Port	Number of Fishing Firms
Far North/North West Region (434)	
Karumba	85
Thursday Island	10
Port Douglas	59
Cairns	202
Innisfail	78
Northern Region (172)	
Lucinda	41
Townsville	111
Lower Burdekin	20
Mackay Region (171)	
Bowen	62
Mackay	109
Fitzroy Region (244)	
Yeppoon	73
Rockhampton	31
Gladstone	140
Wide Bay Region (196)	
Bundaberg	160
Urangan	61
Maryborough	21
Tin Can Bay	54
Moreton Region (300)	
Tewantin	41
Mooloolaba	154
Southport	105
Brisbane (315)	
Scarborough	129
Sandgate	32
Brisbane	54
Wynnum	34
Redlands	46
Jumpinpin	20

Source: QFS logbook data and QSIA records

3.2.4 Characteristic 4: Level of Fishing Activity

The level of fishing activity relates to the level of total boat cash receipts (TBCR) generated by each fishing firm during 1997-98. TBCR was calculated by multiplying quantity of each fish species caught, as per QFS logbook data, by each fisher by the average market price ('beach price') for that species in 1997-98. As no consideration was given to operating costs, TBCR does not in any way signify profit levels. Moreover, the use of an average yearly market price was a simplification as it failed to take into account the daily/weekly/monthly price fluctuations for the species concerned. The impact of price changes on economic performance are analysed in later chapters. Some fishing firms were found to have low TBCR's. However this was due to the fact that a large proportion of their income may have been derived from product harvested in Commonwealth fisheries. These firms were therefore excluded from the analysis. Using 1997-98 catch records and five classes of TBCR, the GVP of the Queensland fishing fleet (n=1669) of $228.6 million was grouped as follows:

Over one third of the fishing firms harvested more than $100,000 of fishery product (Table 3.7a). On the other hand, almost 10% of boats had a TBCR of $10,000 or less. It was expected that a large number of these operators were pursuing fishing on a part-time basis, or used fishing as a supplementary source of income to other activities or were in the low income part of a repair and maintenance cycle.

Table 3.7a: Level of Fishing Activity: GVP and Number of Firms of Queensland Fishing Fleet.

TBCR (%'000)	Number of Fishing Firms	Proportion of Queensland fleet (%)
<10	110	5.6
11 -25	185	9.5
26 -50	243	12.5
51 – 100	415	21.3
> 100	716	36.7
No reported earnings (a)	68	3.5
Excluded (b)	212	10.9
Total	1,949	

(a) Latent effort in the fishery during 1997-98.
(b) Out-of-scope firms with receipts from non Queensland managed fisheries.

The distribution of GVP across the coast of Queensland is reasonably even except for the Far North region which is much higher than average and the Mackay region which is lower (Table 3.7b). The number of firms and their contribution to GVP is evenly split north and south of Rockhampton.

Table 3.7b: Level of Fishing Activity: – GVP by Location of Fishing Firm (1997-98)

Region (a)	Number of fishing firms	GVP ($M)	GVP per Firm ($'000)	Proportion of GVP (%)
Far North	394	57.7	146	25
North	158	22.2	141	10
Mackay	155	19.6	126	9
Fitzroy	218	26.5	122	12
Wide Bay	286	37.2	130	15
Brisbane	331	29.3	89	13
Moreton	291	36.1	124	16
Total	**1,949**	**228.6**	**117**	

Source: QFS logbook data. (a) Boats are allocated according to their QSIA designated home-port and other information. Location does not relate to fishing grounds.

3.2.5 Characteristic 5: Size of Fishing Operation

The size of a fishing operation is assumed to relate to the length of the primary boat used by the firm. The most identifiable method of classifying the commercial fishery is by boat length: details of which were accurately recorded on a QFS database. Four boat length classes effectively segment the fleet into very small (less than 10m), small-medium (10–14m), medium (14-18m) and large boats (greater than 18m).

The structure of the state's fishing fleet (n=1,949) in terms of size of fishing operation (boat length of primary licence) is as follows:

Greater than 18m	132 boats	6.8%
14 to 18 m	394 boats	20.2%
10 to 14 m	540 boats	27.7%
less than 10 m	883 boats	45.3%

3.2.6 Characteristic 6: Level of Fishing Intensity

The level of fishing intensity is assumed to relate to the number of days fished by the fishing firm. Single jurisdiction firms fishing for less than 150 days make up 57.6% of the fleet that fished during 1997-98 (Table 3.8).

Table 3.8: Fishing Intensity: Days Fished per Fishing Firm.

Days Fished Class	Number of Firms	GVP ($M)	GVP per Day Fished
0 – 10	-	-	-
11 – 20	-	-	-
21 – 50	252	5.8	26.6
51 – 100	330	18.6	77.7
101 – 150	380	41.5	126.8
151 – 200	408	70.5	174.9
201 – 250	229	54.7	222.9
251 – 300	55	15.9	269.6
301+	15	3.1	325.4

(na means sample less than 5) Source: QFS logbook data.

3.2.7 Characteristic 7: Fishing Pattern

Fishing pattern relates to the ratio of days fished within the home port area of the firm to that undertaken by the fishing operation during 1997-98. Using recorded catch information for each firm, the number of days fished in each grid square near their home-port (based on grids within an average day's steaming) during 1997-98. Firms were classed according to this proportion: a low ratio meaning a *distant fishing pattern* and for a high ratio a *local fishing pattern*. For example, 30% of the fleet had a distant fishing pattern compared with 47% that had a local fishing pattern (Table 3.9). A simple approach was taken to measure fishing pattern (*proximity*): local was defined as more than 30% of days fished within the local grids. Given this rule, the sampled firms were split: 66% local and 34% distant.

Table 3.9: Fishing Pattern: Ratio of Local Days Total Days Fished (Proximity)

Ratio of Local days to Total days (%)	Number of Firms (n=1669)	Proportion of Firms (%)
<20	566	30
21-40	146	7
41-60	131	7
61-80	170	9
81-100	905	47

Source: QFS logbook data

Table 3.10: Fishing Pattern: Mobility of Fishing Operations (Grids Fished)

Number of Grids Accessed	Number of Firms (n=1669)	Proportion of Firms (%)
<5	877	46
5-9	571	30
10-14	271	14
15-19	110	6
20+	88	5

Source: QFS logbook data

Another measure of the mobility of the fleet, as an aspect of a fishing pattern, was the number of 30' grids the fishing firm accessed during 1997-98. Highly mobile firms accessed more than 15 grids (11%) whilst the less mobile accessed less than 5 grids (46%) (Table 3.10).

3.2.8 Summary of Characteristics of the Queensland Fishery

Degree of Specialisation. The majority of the fleet (76%) consists of a specialised otter trawl or line sector firm, less specialised firms belong to the general crab and net sectors.

Type of Fishing Firm. *A* large proportion of firms were otter trawlers that generated 61% of the fleet GVP and 36% of the in-scope number of firms. The line sector was the next largest sector followed by the net sector, both of which were about half the size of the otter trawl sector.

Location of Fishing Firm. The Far North region had the largest proportion of the 1,669 in-scope fishing firms with Cairns, Bundaberg and Mooloolaba the largest fishing ports based on number of firms.

Level of Fishing Activity. More than one third of the fleet had TBCR greater than $100,000, 28% earning less than $50,000 and 6% less than $10,000. The majority of GVP (54%) was taken by boats less than 14m and the trawl sector firms with boats 14-18m generated 31% of GVP.

Size of the Fishing Operation. Small scale fishing operations (<14m) made up 73% of the fleet: 45% of which were very small (<10m).

Intensity of Fishing Operation. The fleet had a range of fishing intensity: 35% fished for less than 100 days during 1997/98 but contributed only 12% of GVP, compared with 42% that had an intensity greater than 150 days and generated $144.2m (69%) of GVP.

Fishing Pattern. The fishing pattern was basically local with 47% of firms spending 80% of their time fishing within one days travelling from their home port and accessed less than five 30' grids. Some 76% of firms fished in less than 10 grids.

In effect, the Queensland fleet was mainly small scale (with part-time operators), dispersed along the Queensland coast, that harvested a range of species using multiple gears and generated relatively low levels of income from local fishing areas. The larger scale operations fished more intensively and generated the majority of Queensland's GVP. The following section disaggregates this data further.

3.3 FISHING SECTORS OF THE QUEENSLAND FISHERY

The Queensland fishery was broken down into a series of fishing sectors to enable the analysis to be carried out. These sectors were an artefact of the research and a means of simplifying the complex nature of the Queensland fishery and its management. This breakdown includes the otter trawl, beam trawl, line, net, spanner crab, general crab and diversified sectors. All data presented was derived from the QFS logbook and licensing databases.

3.3.1 The Trawl Sector

The GVP of the trawl fishery (n = 604) for 1997-98 was $145.4M or 63% of the total industry GVP of the Queensland fishery regardless of jurisdiction. Note: in-scope GVP was $122.9M

The trawl fishery through attribution ratios was split into the otter trawl sector ($118.7M) and the beam trawl sector ($3.7M). Major species included tiger and king prawns and scallops (Table 3.11). Combined, these species represented 84.2% of all trawl fishery production. Note that out of scope trawlers made up for most of the difference ($18.5M) (Refer to Table 3.3).

Table.3.11: Trawl Fishery: GVP and Production of Key Species (1997-98)

Key Species Group	GVP ($M)	Production (t)
Tiger Prawn	37.6	2,507
King Prawn	35.6	2,972
Scallop	23.0	1,162
Endeavour Prawn	15.5	1,295
Banana Prawn	9.3	1,030
Bugs	9.3	773
Trawl Whiting	5.9	1,558
Blue Swimmer Crab	2.8	346
Bay Prawn	2.7	537
Other Prawn	1.9	256
Squid	1.0	202
Other	0.7	219
Total	**145.4**	**12,856**

Source: QFS logbook data

3.3.1.1 Otter Trawl Sector

The GVP of the otter trawl sector (n=604) for 1997-98 was $118.7M or 52% of the total queensland fishery. The diversification codes Ta and Tb together, refer to the specialised trawl firm with Tc, Td and Te relating to the diversified trawl firm. Of the entire otter trawl sector, 98% of the firms were specialised (see Table 3.12 for more details).

Table 3.12: Otter Trawl Sector: Degree of Specialisation (1997-98)

Code	Description	Trawl Sector Firm (n)	Days Fished (n)	Proportion of Trawl Sector GVP (%)
Ta	100% of total GVP from trawl fishing (T1-9)	454	71,979	75.2%
Tb	One source of GVP greater than 10%, trawl being the source	127	21,852	22.3%
Tc	Two sources of GVP each greater than 10%, trawl being the main source	22	2,890	2.4%
Td	Three sources of GVP each greater than 10%, trawl being the main source	1	105	0.1%
Total		**604**	**96,826**	**100**

Source: QFS logbook data

For the otter trawl sector, the most important location regions, based on GVP and level of activity, were Far North, Wide Bay Burnett and Brisbane (Table 3.13).

Within the specialised otter trawl sector, the Far North, Wide Bay Burnett and Brisbane regions had the highest number of firms, days fished and GVP. The Far North had the best GVP per firm and GVP per day fished (Table 3.14).

Table 3.13: Otter Trawl Sector: GVP, Days Fished and GVP/day fished by Location

Location Region	Trawl Sector Firm (n)	Days Fished (n)	GVP ($M)	GVP/day fished ($)
Far North	106	19,377	29.3	1,542
Northern	83	12,868	15.1	1,161
Mackay	33	4,831	5.6	1,120
Fitzroy	58	10,059	13.7	1,370
Wide Bay Burnett	107	16,331	21.4	1,338
Moreton	79	12,806	16.6	1,277
Brisbane	138	20,554	17.1	814
Total	**604**	**96,826**	**118.7**	**1,224**

Source: QFS logbook data

Table.3.14: Specialised Otter Trawl Sector: GVP, Days Fished, GVP per Firm and GVP/day fished by Location of Fishing Firm

Location Region	Specialised Trawl Firm (n)	Days Fished (n)	GVP ($M)	GVP per Firm ($)	GVP/day fished ($)
Far North	104	19,268	29.1	279,808	1,532
Northern	73	11,555	13.7	187,671	1,142
Mackay	30	4,284	5.0	166,667	1,250
Fitzroy	58	10,059	13.7	236,207	1,370
Wide Bay Burnett	106	16,194	21.2	200,000	1,325
Moreton	77	12,620	16.4	212,987	1,262
Brisbane	133	19,851	16.6	124,812	830
Total	**581**	**93,831**	**115.7**	**199,139**	**1,231**

Source: QFS logbook data

However, firms located in the Brisbane region were more numerous than other regions and had the highest number of fishing days but had the lowest GVP per day fished. The Mackay region had the smallest proportion of the trawl sector GVP of the seven regions. GVP per day fished was highest in the Far North and Fitzroy and Wide Bay Burnett locations (Table 3.14).

Table 3.15: Otter Trawl Sector: Proportion of Total Queensland Fishery GVP by Size of Fishing Operation (Boat Length)

Boat Length Class (m)	Proportion of Total Queensland Fishery GVP taken by Otter Trawl Sector (%)	Proportion of total Queensland Fishery GVP taken by other Sectors (%)
0 – 10.0	10.2	1.8
10.1 – 14.0	30.7	3.0
14.1 – 18.0	17.7	12.6
18.1+	2.4	21.5
Total	**61.1**	**38.9**

Source: QFS logbook data

The otter trawl sector was responsible for 17.7% of the total Queensland commercial fishing GVP within the medium boat length class (14.1–18.0m) and for 2.4% of the GVP taken by the large boat class (18.1+m) (Table 3.15). In addition, the otter trawl sector realised 30.7% of the total GVP for the small-medium boats (10 to 14m) and only 10.2% for that of the small boats (0 to 10m).

Overall, the class of boat that attained the greatest proportion (54%) of total trawl GVP for the total was the medium class boat (14.1-18.0m) and the trawl sector realised 58.5% of this class's GVP (Table 3.16). The boat class least represented (2%) by the otter trawl sector was the small boats (0-10m).

Table 3.16: Otter Trawl Sector: Proportion of Otter Trawl Sector GVP taken by Size of Fishing Operation (Boat Length)

Boat Length Class (m)	Proportion of Trawl Sector GVP (%)	Proportion of Total Queensland Fishery GVP taken by all Sectors (%)
0 – 10.0	2	22
10.1 – 14.0	31	29
14.1 – 18.0	54	36
18.1+	14	13

Source: QFS logbook data

The otter trawl sector had 6% of firms with a level of fishing intensity of less than 150 days generating only 20% of the otter trawl sector GVP (Table 3.17). The most important class of days fished were 151-200 days (34% of trawl days with 35% of GVP) and 201-250 days (21% of days with 34% of GVP). Except for less than 50 day class, GVP increased as fishing intensity increased.

Table 3.17: Otter Trawl Sector: Fishing Intensity (Days Fished)

Days Fished Class	Trawl Sector (n = 604)	GVP ($M)	Mean GVP $'000
0 – 50	41	1.6	400
51 – 100	60	4.1	68
101 – 150	141	18.6	132
151 – 200	207	41.3	200
201 – 250	127	40.6	320
250+	28	12.6	450

Source: QFS logbook data

The fishing pattern of the otter trawl sector was strongly bimodal with 26% highly distant firms and 40% of the firms highly local (Table 3.18). Mean GVP highest in the distant fishing pattern group.

Table 3.18 Otter Trawl Sector: Fishing Pattern (Proximity)

Fishing Pattern (% local days fished)	Trawl Sector (% of firms)	GVP ($M)	Mean GVP $'000
<20	25.6	46.504	300
21-40	11.3	17.787	262
41-60	10.3	12.497	202
61-80	12.8	15.362	200
81-100	39.8	32.438	135

Source: QFS logbook data

However, the majority of the otter trawl fleet fished in a relatively small number of 30' grids (Table 3.19). For example, 60% of firms fished in less than 10 grids with 32% of firms fishing in less than 5. The 5-9 class of grids had the highest level of GVP attributable to the otter trawl sector.

Table 3.19 Otter Trawl Sector: Fishing Pattern (Grids Fished)

Fishing Pattern (number of grids fished)	Trawl Sector (% of firms)	GVP ($M)	Mean GVP $'000
1-4	31.7	21.290	112201
5-9	27.9	33.787	201
10-14	21.2	32.966	257
15-19	10.8	19.321	297
20+	8.2	17.224	352

Source: QFS logbook data

Summary:

The Otter Trawl Sector (GVP=$145.4M) had highly specialised firms of various sizes harvesting mainly prawns and scallops, had high levels of fishing intensity (>150 days, generating 95% of sector GVP) and were located across Queensland with the majority in Brisbane, Wide Bay and Far North which had the highest GVP ($29.3M) and highest GVP/day fished ($1,542). These firms operated locally in less than 10 grids and generated a mean TBCR of $1,224 per fishing day. However, firms with distant fishing patterns (37%) generated nearly 50% of otter trawl sector GVP.

3.3.1.2 The Beam Trawl Sector

The GVP of the beam trawl sector (n=51) for 1997-98 was $3.7M or 2% of the Queensland fishery. The diversification codes Ta and Tb, together, refer to the specialised beam trawl firm with Tc, Td and Te relating to the diversified beam trawl firm. Of the entire beam trawl sector, 73% of these firms were specialised (Table 3.20).

Table 3.20: Beam Trawl Sector: Degree of Specialisation (1997-98)

Code	Description	Beam Trawl Sector (n)	Days Fished (n)	Proportion of Beam Trawl Sector GVP (%)
Ta	100% of total GVP from trawl fishing (T1-9)	28	3,959	56.4%
Tb	One source of GVP greater than 10%, trawl being the source	9	1,445	13.3%
Tc	Two sources of GVP each greater than 10%, trawl being the main source	11	2147	27.0%
Td	Three sources of GVP each greater than 10%, trawl being the main source	3	366	3.4%
Total		**51**	**7,917**	**100**

Source: QFS logbook data

For the beam trawl sector, the most important location regions, based on GVP, were Brisbane, Wide Bay Burnett and Fitzroy (Table 3.21). Firms located in the Brisbane region were more numerous than other regions, but the Wide Bay Burnett and had the highest number of fishing days, GVP per day and GVP per Firm.

Table 3.21: Beam Trawl Sector Firm: GVP, Days Fished and GVP/day fished by Location of Fishing Firm

Location Region	Beam Trawl Firm (n)	Days Fished (n)	GVP ($M)	GVP per Firm ($)	GVP/day fished ($)
Far North	0	0	0	-	0
Northern	na	na	na	-	na
Mackay	na	na	na	-	na
Fitzroy	7	1,294	0.5	71,429	386
Wide Bay Burnett	10	1,641	1.0	100,000	609
Moreton	na	na	na	-	na
Brisbane	30	4,557	1.7	56,000	377
Total	**51**	**7,917**	**3.7**	**72,000**	**468**

Source: QFS logbook data. (na means less than 5)

The beam trawl sector was responsible for 6% of the total Queensland commercial fishing GVP (Table 3.22) with the small boats (10m) accounting for 84% of the beam trawl GVP (Table 3.23).

Table 3.22: Beam Trawl Sector: Proportion of Total Queensland Fishery GVP by Size of Fishing Operation (Boat Length)

Boat Length Class (m)	Proportion of Total Queensland Fishery GVP taken by Beam Trawl Sector (%)	Proportion of total Queensland Fishery GVP taken by other Sectors (%)
0 – 10.0	5	19
10.1 – 14.0	1	30
14.1 – 18.0	0	34
18.1+	0	12
Total	**6**	**94**

Source: QFS logbook data

The beam trawl sector had 60% of the fleet with a level of fishing intensity less than 150 days generating only 20% of the beam trawl sector GVP (Table 3.24). The most important class of days fished were 151-200 days (34% of beam trawl days with 35% of GVP) and 201-250 days (21% of days with 34% of GVP).

Table 3.23: Beam Trawl Sector: Proportion of Beam Trawl Sector GVP by Size of Fishing Operation (Boat Length)

Boat Length Class (m)	Proportion of Beam Trawl Sector GVP (%)	Proportion of Total Queensland Fishery GVP taken by all Sectors (%)
0 – 10.0	84	22
10.1 – 14.0	10	29
14.1 – 18.0	3	36
18.1+	3	13

Source: QFS logbook data

Table 3.24: Beam Trawl Sector: Fishing Intensity (Days Fished)

Days Fished Class	Beam Trawl Sector (%)	GVP ($M)	Mean GVP $'000
0 – 50	1	0.001	1
51 – 100	18	0.216	24
101 – 150	31	1.093	68
151 – 200	27	1.060	76
201 – 250	17	1.065	118
250+	6	0.295	98

Source: QFS logbook data

The level of fishing intensity between 101 and 150 days fished per year had the highest proportion of participation and the highest contribution to the beam trawl sector GVP (Table 3.24). Mean GVP generally increased with increasing level of fishing intensity.

The fishing pattern of the beam trawl sector was strongly local with 88% highly local firms (Table 3.25). However, the majority of the beam trawl sector fished in a relatively small number of 30' grids (Table 3.26). For example, 89% of firms fished in less than 5 grids with 97% of firms fishing in less than 10. The 1-4 class of grids had the highest level of GVP.

Table 3.25 Beam Trawl Sector: Fishing Pattern (Proximity)

Fishing Pattern (% local days fished)	Trawl Sector (%)	GVP ($M)
<20	3	0.178
21-40	4	0.284
41-60	2	0.382
61-80	3	0.117
81-100	88	2.769

Source: QFS logbook data

Table 3.26 Beam Trawl Sector: Fishing Pattern (Grids Fished)

Fishing Pattern (number of grids fished)	Trawl Sector (%)	GVP ($M)
1-4	89	2.580
5-9	8	0.609
10-14	3	0.542
15-19	-	-
20+	-	-

Source: QFS logbook data

Summary:
The Beam Trawl Sector (GVP=$3.7M) had highly specialised, small scale firms targeting prawns for non consumption, had a range of fishing intensities, were located mainly in the Brisbane region, operated locally in less than 5 grids and generated a mean TBCR of $468 per fishing day.

3.3.2 The Line Sector

The GVP of the entire Queensland commercial line fishery for 1997-98 was $39.9M or 17% of the total industry GVP (Table 3.27). The major species included coral trout, Spanish mackerel, red throated emperor and snapper. The line sector (n=401) represents 96.2% of the line fishery GVP, i.e. 3.8% of line fishery product is taken by other fishing sector firms (Table 3.3).

Table 3.27: Line Fishery: GVP and Production of Key Species (1997-98)

Key Species Group	GVP ($M)	Production (t)
Coral trout	11.9	1,188
Coral trout – live	7.8	314
Spanish mackerel	6.9	983
Other	6.8	1,576
Red throated emperor	3.6	712
Snapper (squire)	1.2	149
Large mouth nannygai	0.8	112
Mixed reef B	0.6	143
Mixed reef A	0.3	56
Total	**39.9**	**5,233**

Source: QFS logbook data

Table 3.28: Line Sector: Degree of Specialisation (1997-98)

Code	Description	Line Sector Firm (n)	Days Fished (n)	Proportion of Line Sector GVP (%)
La	100% of total GVP from line fishing	269	25398	72.0
Lb	One source of GVP greater than 10%, line being the source	46	4375	11.4
Lc	Two sources of GVP each greater than 10%, line being the main source	72	7412	14.5
Ld	Three sources of GVP each greater than 10%, line being the main source	11	1089	1.4
Le	Four sources of GVP each greater than 10%, line being the main source	3	488	0.7
Total		**401**	**38762**	**100**

Source: QFS logbook data

Most (72%) of line firms were classified as totally reliant on line fishing (Table 3.28). Of the entire line sector, 84% of respondents were considered a specialist line sector fishing firm.

The data presented in Tables 3.29 and 3.30 indicate there was little difference between all line firms and specialised line firms. The specialised line sector made up 75% of the total number of days fished. However, this group was responsible for 82% of the total line sector GVP.

The most important regions, in terms of GVP and days fished, are Far North, Mackay, and Fitzroy (Table 3.29). The Far North region has the greatest number of line fishing firms and recorded the greatest number of days fished and highest GVP per day fished but Mackay had the highest GVP per firm but Fitzroy and Far North had higher GVP per day fished. The specialised firms located in the Mackay region had the highest days fished and average GVP with the Northern region the highest GVP per day fished. The firms located in the southern regions had the lowest average returns (Table 3.30).

The line sector firm was responsible for 30% of the total Queensland commercial fishing GVP taken by the medium boat length class (14.1 – 18.0m), 23% of the very small boat length class (0–10m) and 13% of the total Queensland commercial fishing GVP for boats greater than 14.1m (Table 3.31).

Table 3.29: Line Sector: GVP, Days Fished and GVP/day fished by Location

Location	Firms (n)	Days Fished (n)	GVP ($M)	GVP per Firm ($)	GVP/day fished) ($)
Far North	119	11869	12.7	106,723	1,076
Northern	24	2584	2.5	104,167	962
Mackay	86	10485	10.5	122,093	1000
Fitzroy	70	6508	7.2	102,857	1108
Wide Bay Burnett	36	2830	2.1	58,333	750
Moreton	35	2613	1.9	54,286	731
Brisbane	31	1873	1.4	45,161	737
Total	**401**	**38762**	**38.4**	**95,761**	**992**

Source: QFS logbook data

Table 3.30: Specialised Line Sector: GVP, Days Fished and GVP/day fished by Location

Region	Specialised Firm (n)	Days Fished	GVP ($M)	GVP per Firm ($)	GVP/day fished ($)
Far North	94	8,428	10.4	110,638	1,238
Northern	19	1,923	2.2	115,789	1,578
Mackay	73	8,898	9.4	128,767	1,068
Fitzroy	57	5,669	6.6	115,789	1,179
Wide Bay Burnett	25	1,857	1.3	52,000	684
Moreton	26	2,091	1.5	57,923	714
Brisbane	21	907	0.6	28,571	667
Total	**315**	**29,773**	**32.0**	**101,587**	**1,077**

Source: QFS logbook data

Table 3.31: Line Sector Proportion of Total Queensland Fishery GVP by Size of Fishing Operation

Boat Length Class (m)	Proportion of total Queensland fishery GVP taken by Line sector (%)	Proportion of total Queensland fishery GVP taken by other Sectors (%)
0 – 10.0	23%	77%
10.1 – 14.0	29%	71%
14.1 – 18.0	6%	94%
18.1+	7%	93%
All	**17%**	**83%**

Source: QFS logbook data

Overall (Table 3.32), the greatest proportion (81%) of line sector GVP was caught by boats less than 14m compared to 45% by the other sectors. Therefore, the line sector utilised mostly smaller boats.

The line sector had 56% of the fleet with a level of fishing intensity of less than 100 days generating only 22% of the line sector GVP (Table 3.33). The line sector firms with a level of fishing intensity of more than 150 days generated 79% of line sector GVP. As intensity increased so did mean GVP.

Table.3.32: Line Sector: Proportion of Line Sector GVP by Size of Fishing Operation

Boat Length Class (m)	Proportion of Line Sector GVP (%)	Proportion of Total Queensland Fishery GVP taken by other Sectors (%)
0 – 10.0	31%	21%
10.1 – 14.0	50%	24%
14.1 – 18.0	14%	40%
18.1+	5%	15%
Total	**100**	**100**

Source: QFS logbook data

Table 3.33: Line Sector: Fishing Intensity (Days Fished)

Days Fished Class	Line Sector Business (n)	GVP ($)	Mean GVP $'000
0 – 50	28	2.462	22
51 – 100	28	5.816	52
101 – 150	22	11.405	130
151 – 200	17	13.374	197
201 – 250	4	4.350	272
250+	1	0.947	236

Source: QFS logbook data

The fishing pattern of the line sector was strongly distant with 48% of firms spending less than 20% of their days within the defined local area (Table 3.34). The more distant the fishing pattern, the greater the mean GVP/firm.

Table 3.34 Line Sector: Fishing Pattern (Proximity)

Fishing Pattern (% local days fished)	Line Sector (% of firms)	GVP ($M)	Mean GVP $'000
<20	48	24.759	129
21-40	10	4.374	109
41-60	7	2.489	89
61-80	8	2.296	72
81-100	27	4.436	41

Source: QFS logbook data

However, the majority of the line fleet fished in a relatively small number of 30' grids (Table 3.35). For example, 32% of firms fished in less than 5 grids with 68% of firms fishing in less than 10 but these had low mean GVP. The 10-14 class of grids had the highest level of GVP. Generally, as the number of grids increased, the mean GVP increased.

Table 3.35 Line Sector: Fishing Pattern (Grids Fished)

Fishing Pattern (number of grids fished)	Line Sector (% of firms)	GVP ($M)	Mean GVP $'000
1-4	32	4.401	34
5-9	36	11.014	76
10-14	20	12.152	151
15-19	6	4.533	188
20+	6	1.624	68

Source: QFS logbook data

Summary: The Line Sector (GVP=$39.9M) had small-medium scale (<14m) highly specialised firms located mainly in north Queensland targeting mainly coral trout, had fishing intensities of less than 150 days, operated mainly distant fishing patterns within less than 19 grids and generated a mean TBCR of $1,077 per day fished.

3.3.3 The Net Sector

The net fishery GVP was $27.2M, representing 12% of the total industry GVP for 1997/98. Major species include mullet, barramundi, shark and grey mackerel (Table 3.36). The net sector (n=326) represents 93.8% of the net fishery GVP with 6.2% taken by other fishing sector firms.

Table 3.36: Net Fishery: GVP and Production of Key Species (1997-98)

Key Species Group	GVP ($M)	Production (t)
Mullet	5.2	1,723
Barramundi	4.7	673
Shark - mixed	4.5	763
Grey Mackerel	4.0	661
Other	3.0	925
Mackerel - mixed	1.5	281
Whiting	1.3	307
King Salmon	1.2	290
Bream	0.7	162
Garfish	0.6	107
Blue Salmon	0.6	143
Total	**27.3**	**6,035**

Source: QFS logbook data

Table 3.37: Net Sector: Degree of Specialisation (1997-98)

Code	Description	Net Sector Firm (n)	Days Fished (n)	Proportion of Net Sector GVP (%)
Na	100% of total GVP from net fishing	100	8,865	33%
Nb	One source of GVP greater than 10%, net being the source	80	9,827	24%
Nc	Two sources of GVP each greater than 10%, net being the main source	114	15,349	35%
Nd	Three sources of GVP each greater than 10%, net being the main source	30	4,286	8%
Ne	Four sources of GVP each greater than 10%, net being the main source	2	268	0%
Total		**326**	**38,595**	**100%**

Source: QFS logbook data

The Far North region is responsible for the largest proportion (37%) of the net sector GVP, number of net fishing boats and number of days fished (Table 3.38). The three South-east Queensland regions together (Wide Bay Burnett, Moreton and Brisbane) produce a significant proportion (46%) of net sector GVP. The Moreton region had the highest GVP per day fished.

Table 3.38 Net Sector: GVP, Days Fished and GVP/day fished by Location

Location	Firm (n)	Days Fished (n)	GVP ($M)	GVP per Firm ($)	GVP/day fished ($)
Far North	95	13,115	9.557	100,600	728
Northern	27	3,064	1.935	71,667	585
Mackay	24	3,062	1.983	82,625	622
Fitzroy	15	1,732	0.725	48,334	492
Wide Bay Burnett	59	7,358	4.401	74,593	615
Moreton	44	4,290	2.902	65,955	1,362
Brisbane	62	5,974	4.137	66,726	1,030
Total	**331**	**38,729**	**25.7**	**77,644**	**664**

Source: QFS logbook data

Table 3.39: Specialised Net Sector: GVP, Days Fished and GVP per day fished by Location

Location	Specialised Firm (n)	Days Fished (n)	GVP ($M)	GVP per Firm ($)	GVP/day fished ($)
Far North	59	7,496	6.876	116,542	882
Northern	13	921	0.467	35,923	492
Mackay	6	742	0.381	63,500	457
Fitzroy	na	na	na	na	na
Wide Bay Burnett	33	3,901	2.749	83,303	718
Moreton	24	1,983	1.350	56,250	1,937
Brisbane	42	3,510	2.710	64,524	1,263
Total	**180**	**18,692**	**14.6**	**81,111**	**785**

Source: QFS logbook data

Little difference occurred between region proportions of GVP for the entire net sector and the specialised net sector (Tables 3.38 and 3.39). However, specialised net fishers were more prominent in the Far North than in other regions with higher average GVP per firm whereas Moreton and Brisbane had the highest average GVP per day fished.

The small boat length class (0–10m) had the highest proportion (38%) of GVP taken by the net sector boats (Table 3.40). Larger sized net sector boats contributed little to net sector GVP.

Table 3.40: Net Sector: Total GVP by Size of Fishing Operation (Boat Length)

Boat Length Class (m)	Proportion of Total Queensland Fishery GVP taken by Net Sector Firm (%)	Proportion of Total Queensland Fishery GVP taken by other Firms (%)
0 – 10.0	38	62
10.1 – 14.0	6	94
14.1 – 18.0	1	99
18.1+	6	94
All boats	12	88

Source: QFS logbook data

Overall (Table 3.41), the greatest proportion (75%) of net sector GVP was caught by boats less than 10m compared to 22% by the other sectors. Therefore, the net sector utilised mostly smaller boats.

Table.3.41: Net Sector: GVP by Size of Fishing Operation (Boat Length)

Boat Length Class (m)	Proportion of Net Sector GVP (%)	Proportion of Total Queensland fishery GVP taken by all Sectors (%)
0 – 10.0	75	22
10.1 – 14.0	14	29
14.1 – 18.0	4	36
18.1+	6	13

Source: QFS logbook data

The net sector had 42% of the fleet with a level of fishing intensity of less than 100 days generated only 19% of the net sector GVP (Table 3.42). The net firms with a level of fishing intensity of more than 150 days generated 57% of net sector GVP. As intensity increased, mean GVP increased.

Table 3.42: Net Sector: Fishing Intensity (Days Fished)

Days Fished	Net Sector Firm (%)	GVP ($M)	Mean GVP $'000
0 – 50	20	1.418	22
51 – 100	22	3.567	50
101 – 150	23	5.968	80
151 – 200	24	8.690	111
201 – 250	9	5.237	181
250+	2	0.760	109

Source: QFS logbook data

The fishing pattern of the net sector was strongly local with 65% of firms spending more than 80% of their days within the defined local area (Table 3.43). However, the majority of the net fleet fished in a relatively small number of 30' grids (Table 3.44). For example, 68% of net firms fished in less than 5 grids and 93% in less than 10 grids. The 1-4 class of grids had the highest level of GVP.

Table 3.43 Net Sector: Fishing Pattern (Proximity)

Fishing Pattern (% local days fished)	Net Sector (% of firms)	GVP ($M)	Mean GVP $'000
<20	23	9.179	122
21-40	3	0.804	80
41-60	3	0.516	52
61-80	6	1.807	90
81-100	65	13.334	110

Source: QFS logbook data

Table 3.44 Net Sector: Fishing Pattern (Grids Fished)

Fishing Pattern (number of grids fished)	Net Sector (% of firms)	GVP ($M)	Mean GVP $'000
1-4	68	12.550	57
5-9	25	8.132	99
10-14	5	1.728	108
15-19	2	na	
20+	-	na	

Source: QFS logbook data

Summary:
The Net Sector (GVP=$27.2M) had very small scale (<10m) firms, the majority of which were specialised, netting mainly mullet, barramundi, shark and grey mackerel, were located throughout Queensland but the majority in the Far North region generated 37% of net sector GVP. Fishing intensities were mostly less than 150 days within less than 5 grids with very local fishing patterns and generated a mean TBCR of $664 per fishing day.

3.3.4 The Crab sector

The GVP for the Queensland commercial general crab and spanner crab fishery for 1997-98 was around $17.9M and production was approximately 3,500 tonnes (Table 3.45).

Table 3.45: Crab Fisheries: GVP and Production of Key Species (1997-98)

Key Species Group	Gross Value of Production ($M)	Production (t)
Crab Fishery		
Mud Crab	6.4	642
Blue Swimmer Crab	2.3	332
Other	0.1	1
Spanner Crab Fishery		
Spanner Crab	9.1	2,561
Total	**17.9**	**3,536**

Source: QFS logbook data

3.3.4.1 General Crab Sector

The majority of general crab sector firms (71%) were diversified and contributed 66% of the total number of days fished and 71% of the total general crab sector GVP (Table 3.46) with a mean GVP of $59,864 and mean TBCR of $322 per day fished. The crab sector (n=147) was therefore diversified as only 28% of the sector's GVP was taken by specialised general crab firms (Tables 3.47 and 3.48).

Table 3.46: General Crab Sector: Degree of Specialisation (1997/98)

Code	Description	General Crab Sector Firm (n)	Days Fished (n)	Proportion of General Crab Sector GVP (%)
Ca	100% of total GVP from crab fishing (C1)	24	3,476	10
Cb	One source of GVP greater than 10%, crab being the source	26	5,348	19
Cc	Two sources of GVP each greater than 10%, crab being the main source	74	14,384	57
Cd	Three sources of GVP each greater than 10%, crab being the main source	22	3,986	14
Ce	Four sources of GVP each greater than 10%, crab being the main source	1	205	1
Total		**147**	**27,399**	**100**

Source: QFS logbook data

Overall (Table 3.47), the Brisbane and Fitzroy regions were responsible for the largest proportions of the general crab sector GVP, number of firms and fishing intensity (days fished). Firms based within Moreton, Far North and Brisbane had the highest mean GVPs. However, specialised fishers were more prominent in the Brisbane region than in other locations (Table 3.48).

Table 3.47: General Crab Sector: GVP, Days Fished, GVP per Firm and GVP/day fished by Location of Fishing Firm

Location	Firm (n)	Days Fished (n)	GVP ($M)	GVP per Firm ($)	GVP/day fished ($)
Far North	13	2,083	0.6	46,154	263
Northern	17	3,126	1.2	70,588	358
Mackay	na	na	na	na	na
Fitzroy	44	8,142	2.2	50,000	270
Wide Bay Burnett	21	3,777	1.0	47,619	262
Moreton	7	1,224	0.5	71,429	433
Brisbane	43	8,794	3.1	72,093	359
Total	**147**	**27,399**	**8.8**	**59,864**	**322**

Source: QFS logbook data. (na means less than 5)

Table 3.48: Specialised General Crab Sector: GVP, Number of Boats, Days Fished and GVP/day fished by Location

Region	Specialised Firm (n)	Days Fished (n)	GVP ($M)	GVP per Firm ($)	GVP/day fished ($)
Far North	7	1,022	0.2	28,561	212
Northern	5	728	0.2	40,000	327
Mackay	na	na	na	na	na
Fitzroy	8	1,258	0.4	50,000	255
Wide Bay Burnett	na	na	na	na	na
Moreton	na	na	na	na	na
Brisbane	24	4,743	1.4	58,333	292
Total	**50**	**8,824**	**2.5**	**50,000**	**284**

Source: QFS logbook data. (na means less than 5)

The small boat length class (0–10m) had the highest proportion (3.9%) of the total Queensland fishery GVP taken by the general crab sector boats (Table 3.49). Other general crab sector boats contributed nothing to crab sector GVP.

Table 3.49: General Crab Sector: Total GVP by Size of Fishing Operation

Boat Length Class (m)	Proportion of Total Queensland Fishery GVP taken by General Crab Sector (%)	Proportion of Total Queensland Fishery GVP taken by other Sectors (%)
0 – 10.0	3.9	96.1
10.1 – 14.0	0.3	99.7
14.1 – 18.0	-	100
18.1+	-	100
All firms	4.2	95.8

Source: QFS logbook data

Overall (Table 3.50), the greatest proportion (93%) of general crab sector GVP was caught by boats less than 10m compared to 21% by the other sectors. Therefore, the general crab sector utilised only smaller boats.

The general crab sector had 31% of the fleet with a level of fishing intensity of less than 150 days generating only 13% of the net sector GVP (Table 3.42). The general crab firm with a level of fishing intensity of more than 150 days generated 87% of net sector GVP. As intensity mean GVP increased.

Table 3.50: General Crab Sector: General Crab Sector GVP by Size of Fishing Operation

Boat Length Class (m)	Proportion of General Crab Sector GVP (%)	Proportion of Total Queensland Fishery GVP taken by other Sectors (%)
0 – 10.0	93	21
10.1 – 14.0	7	31
14.1 – 18.0	-	35
18.1+	-	13
All boat lengths	**100**	**100**

Source: QFS logbook data

Table 3.51: General Crab Sector: Fishing Intensity (Days Fished)

Days Fished Class	Firm (n)	GVP ($M)	Mean GVP $'000
0 – 50	7	0.046	6.5
51 – 100	11	0.368	33
101 – 150	13	0.741	57
151 – 200	18	1.525	85
201 – 250	31	3.469	112
250+	20	2.631	132

Source: QFS logbook data

Table 3.52 General Crab Sector: Fishing Pattern (Proximity)

Fishing Pattern (% local days fished)	Firms (%)	GVP ($M)	Mean GVP $'000
<20	21	1.686	54
21-40	na	na	
41-60	na	na	
61-80	na	na	
81-100	68	6.216	62

Source: QFS logbook data

Table 3.53 General Crab Sector: Fishing Pattern (Grids Fished)

Fishing Pattern (number of grids fished)	Firms (%)	GVP ($M)	Mean GVP $'000
1-4	75	5.785	53
5-9	23	2.813	112
10-14	na	na	
15-19	-	-	
20+	-	-	

Source: QFS logbook data

The fishing pattern of the general crab sector was strongly local with 68% of firms spending more than 80% of their days within the defined local area (Table 3.52). However, the majority of the general crab fleet fished in a relatively small number of 30' grids (Table 3.53). For example, 75% of firms fished in less than 5 grids and 98% in less than 10 grids. The 1-4 class of grids had the highest level of GVP.

Summary:
The General Crab Sector (GVP=$8.8M) had very small scale (<10m), highly diversified firms located mainly south of Rockhampton catching mud crabs and blue swimmer crabs with high levels of fishing intensity (69% were >150 days), operated very locally in less than 5 grids and generated an mean TBCR of $322 per fishing day.

3.3.4.2 Spanner Crab Sector

The spanner crab fishery GVP was $9.1M representing 4% of total industry GVP for 1997-98. Only species targeted was spanner crabs. The spanner crab sector (n=136) was mainly specialised (57%) and contributed 62% of the total number of days fished and 56% of the total spanner crab sector GVP (Table 3.54).

Overall (Table 3.55), the Moreton and Wide Bay Burnett regions were responsible for the largest proportions of the spanner crab sector GVP, number of firms and fishing intensity (days fished). Wide Bay Burnett firms had the best gross returns.

However, specialised firms located in the Moreton region had more than 50% of the activity but Wide Bay Burnett firms had the best gross returns (Table 3.56).

The small boat length class (0–10m) had the highest proportion (12%) of total fishery GVP taken by the spanner crab sector boats (Table 3.57). Other spanner crab sector boats contributed little to the crab sector GVP.

Table 3.54: Spanner Crab Sector: Degree of Specialisation (1997-98)

Code	Description	Spanner Crab Sector Firm (n)	Days Fished (n)	Proportion of Spanner Crab Sector GVP (%)
Sa	100% of total GVP from spanner crab fishing (C2-C6)	53	3,679	32%
Sb	One source of GVP greater than 10%, spanner crab being the source	31	2,817	24%
Sc	Two sources of GVP each greater than 10%, spanner crab being the main source	43	4,766	37%
Sd	Three sources of GVP each greater than 10%, spanner crab being the main source	8	967	5%
Se	Four sources of GVP each greater than 10%, spanner crab being the main source	1	191	2%
Total		**136**	**12,420**	**100**

Source: QFS logbook data

Table 3.55: Spanner Crab Sector: GVP, Days Fished and GVP/day fished by Location of Fishing Firm

Location Region	Firm (n)	Days Fished (n)	GVP ($M)	GVP per Firm ($)	GVP/day fished ($)
Mackay	na	na	na	na	na
Fitzroy	19	1,699	1.4	73,842	780
Wide Bay Burnett	35	3,606	3.1	88,571	850
Moreton	65	5,617	3.7	56,923	644
Brisbane	16	1,441	0.9	56,250	563
Total	**136**	**12,420**	**9.1**	**66,911**	**733**

Source: QFS logbook data

Table 3.56: Specialised Spanner Crab Sector: GVP, Days Fished and GVP/day fished by Location of Fishing Firm

Location	Specialised Firms (n)	Days Fished (n)	GVP ($M)	GVP per Firm ($)	GVP/day fished ($)
Mackay	na	na	na	Na	na
Fitzroy	11	720	0.6	54,545	787
Wide Bay Burnett	20	1,765	1.7	85,000	888
Moreton	43	3,434	2.5	58,140	699
Brisbane	9	520	0.3	33,333	513
Total	**84**	**6,496**	**5.1**	**60,714**	**785**

Source: QFS logbook data

Table 3.57: Spanner Sector: Total Fishery GVP by Size of Fishing Operation

Boat Length (m)	Proportion of Total Queensland Fishery GVP taken by Spanner Crab Sector (%)	Proportion of Total Queensland fishery GVP taken by other Sectors (%)
0 – 10.0	12	88
10.1 – 14.0	5	95
14.1 – 18.0	-	100
18.1+	-	100
All Firms	**4**	**96**

Source: QFS logbook data

Overall (Table 3.58), spanner crab sector GVP was caught by boats less than 14m compared to 52% by the contribution of other fishing sectors to Queensland's fisheries GVP.

The spanner crab sector had 57% of the fleet with a level of fishing intensity of less than 100 days generating only 45% of the spanner crab sector GVP (Table 3.59). The spanner crab sector firm that fished for more than 100 days generated 55% of spanner crab sector GVP.

The fishing pattern of the spanner crab sector was strongly local with 65% of firms spending more than 80% of their days within the defined local area (Table 3.60). However, the majority of the spanner crab fleet fished in a relatively small number of 30' grids (Table 3.61). For example, 30% of firms fished in less than 5 grids and 87% in less than 10 grids. The 5-9 class of grids had the highest level of GVP. As the number of grid squares fished increased mean GVP also increased.

Table 3.58: Spanner Crab Sector: Spanner crab GVP by Size of Fishing Operation

Boat Length Class (m)	Proportion of Spanner Crab Sector GVP (%)	Proportion of Total Queensland Fishery GVP taken by other Sectors (%)
0 – 10.0	67	22
10.1 – 14.0	33	30
14.1 – 18.0	-	35
18+	-	13
Total	**100**	**100**

Source: QFS logbook data

Table 3.59: Spanner Crab Sector: Fishing Intensity (Days Fished)

Days Fished Class	Firms (n)	GVP ($)	Mean GVP $'000
0 – 50	15	0.320	21
51 – 100	42	3.767	90
101 – 150	27	3.744	139
151 – 200	8	1.246	156
201 – 250	-	-	
250+	-	-	

Source: QFS logbook data

Table 3.60 Spanner Crab Sector: Fishing Pattern (Proximity)

Fishing Pattern (% local days fished)	Firms (%)	GVP ($M)	Mean GVP $'000
<20	13	1.073	60
21-40	na	na	
41-60	na	na	
61-80	13	1.461	81
81-100	65	5.581	63

Source: QFS logbook data

Table 3.61 Spanner Crab Sector: Fishing Pattern (Grids Fished)

Fishing Pattern (number of grids fished)	Firms (%)	GVP ($M)	Mean GVP $'000
1-4	30	1,742	43
5-9	57	5.670	73
10-14	11	1.548	103
15-19	na	na	
20+	-	-	

Source: QFS logbook data

Summary:
The Spanner Crab Sector (GVP=$9.1M) had small scale firms with mixed degrees of specialisation taking only spanner crabs, were located mainly in the Wide Bay and Moreton regions operating with low levels of fishing intensity in less than 5 grids and generated a mean TBCR of $734 per fishing day.

3.3.5 Diversified Fishing Sector

The diversified sector is the sum of all firms that have been deemed, through attribution ratios to be diversified. Therefore, these firms have already been included in the previous sector analyses. However, as these firms constitute 25% of the in-scope firms managed under Queensland jurisdiction their economic performance should be assessed.

Within the diversified sector firms (n=418), 80% had at least two sources of income from different fisheries each greater than 10% of Total Boat Cash Receipts. The general crab (66%), net (45%) and spanner crab (38%) sectors were the most diversified (Table 3.62).

Overall (Table 3.63), the Far North and Brisbane regions were responsible for the largest proportions of the diversified sector GVP, the highest number of firms and fishing intensity (days fished) were in the Far North and Fitzroy regions with the highest returns for days fished being within the Mackay region – although many regions were close to these values.

Table 3.62: Diversified Sector: Degree of Specialisation (1997/98)

Code (a)	General Crab (n)	Line (n)	Net (n)	Spanner Crab (n)	Otter Trawl (n)	Beam Trawl (n)	Diversified Sector Firm (n)
Cc	74	72	114	43	22	11	336
Cd	22	11	30	8	1	3	75
Ce	1	3	2	1	-	-	7
Total	**97**	**86**	**146**	**52**	**23**	**14**	**418**
% Fleet	66%	21%	45%	38%	4%	27%	

(a) Refer to Chapter 3 for definitions of Specialisation Codes. Source: QFS logbook data

Table 3.63: Diversified Sector: GVP, Days Fished, GVP per Firm and GVP/day fished by Location of Fishing Firm

Location	Firm (n)	Days Fished (n)	GVP ($M)	GVP/Firm ($)	GVP/day fished ($)
Far North	87	10,230	5.52	63,448	539
Northern	61	6,515	4.18	68,360	640
Mackay	36	4,454	3.302	91,722	741
Fitzroy	72	10,397	3.925	54,514	378
Wide Bay Burnett	53	6,407	4.052	76,452	632
Moreton	63	5,197	3.352	53,206	645
Brisbane	56	8,402	4.527	80,839	539
Total	**418**	**51,502**	**28.86**	**67,429**	**560**
% Fleet	25.6	23.2	13.7		

Source: QFS logbook data

The diversified sector had the highest fishing intensity (days fished) but had low return per firm and days fished. Highest returns were the otter trawl sector and the spanner crab fishery (Table 3.64).

Table 3.64: Diversified Sector: Days Fished, GVP, GVP per Firm and GVP/day fished by Fishing Sector

Indicator	General Crab (n)	Line (n)	Net (n)	Spanner Crab (n)	Otter Trawl (n)	Beam Trawl (n)	Diversified Sector Firm (n)
Number of Firms	97	86	146	52	23	14	428
Days Fished	14,394	12,970	16,060	5,893	2,292	na	51,502
GVP	4.9	7.78	9.63	4.0	2.6	na	28.86
GVP per Firm	50,515	90,465	66,007	76,923	113,043	na	67,429
GVP per day fished	340	599	600	679	1134	na	560

Source: QFS logbook data. (na) means less than 5

Summary:
The Diversified Sector (GVP=$28.9M) made up of mainly small scale firms operating across all other sectors, mainly in the net and general crab sectors and all locations and generated a mean TBCR of $560 per day fished.

3.3.6 Summary of the Characteristics of the Fishing Sector Firm

Based on the in-scope firms (Table 3.3), (activities of firms that operated outside of Queensland managed fisheries were excluded from the analysis), the following is a summary of the seven specified sectors of the Queensland fishery.

General Crab Sector ($8.8M) had very small scale (<10m), highly diversified firms located mainly south of Rockhampton catching mud crabs and blue swimmer crabs with high levels of fishing intensity (69% were >150 days fished), operated very locally in less than 5 grids and generated a mean TBCR of $322 per fishing day.

Line Sector ($39.9M) had small scale (<14m) highly specialised firms located mainly in north Queensland targeting mainly coral trout, had fishing intensities of less than 150 days, operated mainly distant fishing patterns within less than 19 grids and generated a mean TBCR of $1,077 per day fished.

Net Sector ($27.2M) had very small scale (<10m) firms, the majority of which were specialised, netting mainly mullet, barramundi, shark and grey mackerel, were located throughout Queensland but the majority in the Far North region generated 37% of net sector GVP. Fishing intensities were mostly less than 150 days within less than 5 grids with very local fishing patterns and generated a mean TBCR of $664 per fishing day.

Spanner Crab Sector ($9.1M) had small scale firms with mixed degrees of specialisation taking only spanner crabs, were located mainly in the Wide Bay and Moreton regions operating with low levels of fishing intensity in less than 5 grids and generated a mean TBCR of $734 per fishing day.

Otter Trawl Sector ($145.4M) had highly specialised firms of various sizes harvesting mainly prawns and scallops, had high levels of fishing intensity (>150 days, generating 95% of sector GVP) and were located across Queensland with the majority in Brisbane, Wide Bay and Far North which had the highest GVP ($29.3M) and highest GVP/day fished ($1,542). These firms operated locally in less than 10 grids and generated a mean TBCR of $1,224 per fishing day. However, firms with distant fishing patterns (37%) generated nearly 50% of sector GVP.

Beam Trawl Sector ($3.7M) had highly specialised, small scale firms targeting prawns for non consumption, had a range of fishing intensities, were located mainly in the Brisbane region, operated locally in less than 5 grids and generated a mean TBCR of $468 per fishing day.

Diversified Sector ($28.9M) made up of mainly small scale firms operating across all other sectors and all locations, mainly in the net and general crab sectors and generated a mean TBCR of $560 per day fished.

Overall, 75% of the Queensland fishing firms were specialised and had 76% of days fished along with 86% of GVP. As fishing intensity increased, the mean GVP of firms increased.

CHAPTER 4

ECONOMIC SURVEY

The economic survey was the basis of the collection of cost and earnings data used for the estimation of economic performance of the Queensland fishing fleet. The main sections describe the economic survey and response rates. Across fishing sectors and selected characteristics of the fishing firms.

4.1 ECONOMIC SURVEY

The means of obtaining cost and earnings data was discussed with the Australian Bureau of Statistics (ABS) and was agreed that the entire Queensland fishery should be surveyed. The reason given was based on the complexity of fishing activities as indicated by Table 3.1. The Australian Bureau of Agricultural Research Economics (ABARE) suggested that a survey based on receipts might cover the complexity of the fleet but were not opposed to a census of the fleet. The Office of the Queensland Statistician (QSTATS) was also consulted and their view was similar to that of the ABS.

During 1999, a survey of all 1,669 in-scope Queensland commercial fishers (excluding Harvest Operators) Licence Package holders was undertaken to gather cost and earnings data regarding their fishing business activities for the 1997-98 financial year. In consultation with the FRDC Fisheries Economic Statistical Steering Committee and industry, survey forms were developed with professional assistance from the ABS.

Levine and Gordon (1958) suggested that the use of mail questionnaires can be improved if experts were involved in the construction of the survey and that re-testing, telephone and personal follow-up and industry meetings, specifically designed return envelopes and interaction with respondent would contribute to maximising response rates. One of the cost effective ways of reducing non-response is through motivation of respondents: an approach built into the current research methodology through industry meetings and fishing industry magazines.

Holland (2002), suggested that the ABARE experience in cost effective surveys is through a personal interview that can minimise non-response. Follow-up reminders, through telephone and mail are effective (Freebairn, 1967) but a survey hotline can be very effective for respondents to obtain clarity of questionnaire and for seeking information on the reasons for the survey. The research, because of its social nature, has both sampling and non-sampling errors (Filion, 1979 and 1980). Holland (2002) also suggested that effective questionnaire design would reduce these errors: consultation with ABARE, ABS and QSTATS had reduced these errors and improved response rates.

Contents of the survey (Appendix 4) not only included financial information of the fishing business. including capital and types of expenditure, but also questions about general demographics, boat replacement, catch handling and disposal, boat upgrading details and fisher views about currents events and the future.

Financial information was collected for the most recent financial year, which in this case was 1997-98. Collecting information relating to the two previous years (1995/96 & 1996/97) would have improved the analysis, but discussions with industry confirmed that seeking detailed records regarding these extra years would have substantially reduced the response rate. Also, fishing licences are frequently transferred, making it difficult to track previous owners and their financial records.

Most financial information requested in the survey was obtainable from the fisher's taxation return for that year. As the tax returns for the 1997-98 financial year were not due until the end of March 1999, the initial survey form was divided into two components. Part A consisted of general information on business/fishing activities and the owner's views on the industry and Part B consisted of a spreadsheet requesting operational cost and location of cost for the

1997-98 year. This enabled a number of fishers to return a completed Form A, and retain Form B until the tax return was finalised for the year.

A pilot survey was sent to 10 randomly selected fishers throughout the state. Comments and responses to questions were received personally by a member of the economics team and an ABS Officer. Based on these comments and changes, a new survey was developed and tested with 190 fishers in the Scarborough Port (Brisbane region). These two pilots provided content, structure and question design details to be used in surveying the state. The initial mail out of the survey to all 1,669 licensed commercial fishers was followed by meetings conducted by the Principal Investigator at 17 ports along the east coast. These meetings provided fishers and skippers (representing the vessel owner) with extra information on why questions were being asked and how to fill out the survey. This also provided the opportunity for DPI staff to collect extra information about issues and concerns pertaining to individual ports.

Four DPI field officers were employed to assist fishers in filling out the survey. These field officers were trained by ABS and DPI to improve their skills in interview techniques and on current concerns about fisheries management and the importance of fisheries information prior to contact with fishers. A free call telephone line was also set up to assist fishers in remote areas and/or those who were unavailable when field officers were within their region with extra questions and concerns. Over the next few months of data collection it was noted by field officers that some fishers were not participating in the survey because some of the information requested was too personal. Because this concern was likely to reduce response rates, a second round survey (Form 2 in Appendix 4) was developed in consultation with ABS and industry representatives that could not identify individual fishers. This second round survey required extra data from fishers in order to provide us with useable information. However, most who returned Form 2 gave their boat mark which meant that the team was able to access their logbook and licence databases.

Logbook and licence databases was used to develop the following characteristics of the firm:

- the level of production (tonnes per species taken by specific gear)
- level of fishing activity (total boat cash receipts);
- degree of specialisation (specialisation code);
- location of fishing firm (ABS Statistical Division/Port);
- size of fishing operation (boat length);
- fishing intensity of the firm (days fished); and
- fishing pattern of the firm (% local area fished and grids fished).

Once the survey forms were collected, the Office of the Queensland Statistician (QSTATS) was contracted to provide an access database and data entry. This confidential database was held under security by DPI so that additional data entry and analysis could be undertaken. No negative feedback was received from industry about the management of the survey, nor on issues relating to confidentiality.

Because the fishing industry was concerned about results of analysis, consultation with industry representatives was conducted to provide additional insight into data interpretation and presentation. Industry and the FRDC Fisheries Economics Statistics Steering Committee and its Chair were informed of the process and problems throughout the analysis period.

4.2 RESPONSE RATES: CHARACTERISTICS OF THE FISHING FIRM

The population of fishing firms surveyed for 1997-98 was 1,669 and the survey sample accepted for analysis was 478. Both the population and the sample were adjusted to account for firms regarded out of scope (Table 3.3)). The overall response rate of 29%, for a census relating to a complex population such as this, was acceptable (Biometrician, DPI). Conclusions regarding the representativeness of the population by the survey sample, based on the above categories, support this statement.

This section details response rates for all surveyed fishing firms. Each firm was classified to belong to a specific fishing sector based on the fishery upon which they were most reliant for

their income (Total Boat Cash Receipts). Details of the response rate for various characteristics of the firm were also analysed.

A 'fishing sector' was defined as the group of fishing firms that had the major component of their TBCR coming from the sale of product from that sector. The number of questionnaire responses received from general crab, line, net, spanner crab, otter trawl and beam trawl fishing sector firms was 29% of the total population of in-scope fishing firms (Table 4.1).

Table 4.1: Survey Response Rates: Fishing Sector

Fishing Sector	Firm Population	Survey Responses	Response Rate (%)
General Crab	147	31	21
Line	401	118	29
Net	326	92	28
Spanner Crab	136	35	26
Otter Trawl	604	180	30
Beam Trawl	51	21	42
All Firms	**1,669**	**478**	**29**

Response rates for the main fisheries were very similar. However, responses across the various fishing sectors that accessed each of the main fisheries varied greatly (Table 4.2).

Table 4.2 Survey Response Rates: Fishing Sector by Main Fishery Accessed

Main Fishery	Fishing Sector Sample/Population Ratio per Main Fishery (%)					
	General Crab	Line	Net	Spanner Crab	Trawl	All
General Crab	21	27	27	37	45	27
Line	22	29	28	31	27	28
Net	23	30	28	21	30	27
Spanner Crab	44	33	38	26	100	29
Trawl	13	29	37	40	31	31
All Firms	**22**	**29**	**29**	**28**	**30**	**28**

Each column of Table 4.2 gives the breakdown of response rates by each fishing sector that accessed a specific fishery. For example, the response rate for the general crab fishing firms, that accessed the trawl fishery, was very low at 13%, whereas the response rate for spanner crab sector firms accessing the trawl fishery was 40%. Each row of Table 4.2 gives the response rate of a main fishery being accessed by a specific fishing sector. For example, the response rate for the spanner crab fishery was generally higher for all fishing sectors.

4.2.1 Response Rates by Location of Fishing Firm

'Location of fishing firm' relates to the ABS Statistical Division (regions) within which a fishing firm is based and not the area fished by the fishing firm. The response rate was relatively consistent across the seven regions (Table 4.3). A slightly higher response rate was received from the Wide Bay Burnett and the Moreton regions, while the Brisbane and Fitzroy regions provided much lower response rates.

The Northern, Fitzroy and Brisbane regions were below the response rate for the entire survey. Each fishing sector had varying response rates across the regions with the trawl sector being the most consistent. Further details of response rates for each fishing sector and its characteristics are presented in Section 4.3 below.

Table 4.3: Survey Response Rates: Fishing Sector by Location of Fishing Firm (ABS Statistical Division)

Location	Fishing Sector Sample/Population Ratio per Location (%)					
	Crab General	Line	Net	Spanner Crab	Trawl	All
Far North	0	29	21	-	33	**27**
Northern	24	25	19	-	26	**24**
Mackay	0	30	29	0	29	**29**
Fitzroy	20	33	20	11	23	**24**
Wide Bay Burnett	43	39	29	37	33	**34**
Moreton	57	26	39	29	38	**34**
Brisbane	12	19	37	6	29	**26**

4.2.2 Response Rates by Level of Fishing Activity

'Level of fishing activity' relates to the total boat cash receipts generated by a fishing firm. The GVP for each fishing sector is therefore the sum of all total boat cash receipts for that sector. The response rates of fishing sector firms, based on GVP gained from the main fisheries accessed, are given in Table 4.4. For example, the response rate for the line sector firms that caught product of the line fishery was 35%, from the general crab fishery 40%, net fishery 20%, spanner crab fishery 42% and from the trawl fishery it was 16%. Overall, response rates were adequate with some lower than acceptable for analytical purposes and therefore not used, such as the crab sector taking line product (13%), the line sector take of trawl product (16%), the net sector take of general crab product (17%) and trawl sector take of line product (10%). The sample GVP ratios were fairly consistent for the sectors taking their own product (diagonal cells) except for the general crab sector. In other words, good response rates from specialised fishing firms.

Table 4.4: Survey Response Rates: Sector GVP of Main Fishery Accessed

Fishery	Fishing Sector Sample/Population per Main Fishery (%)					
	Crab General	Line	Net	Spanner Crab	Trawl	All
Crab General	22	40	17	54	21	**23**
Line	13	35	33	29	10	**34**
Net	28	20	32	29	23	**31**
Spanner Crab	57	42	24	35	100	**36**
Trawl	26	16	32	26	36	**36**
All Firms	**23**	**34**	**31**	**35**	**36**	

4.2.3 Response Rates by Size of Fishing Operation

The overall response rate by 'size of fishing operation' (boat length class) was similar (Table 4.5) and for each sector the response was adequate except for lower response rates for the less than 10m class.

Table 4.5 Survey Response Rates: Size of Fishing Operation

Boat Length Class (m)	Fishing Sector Sample/Population Ratio per Boat Length Class (%)					
	Crab General	Line	Net	Spanner Crab	Trawl	All
0 – 10.0	20	30	28	21	33	**27**
10.1 – 14.0	36	27	26	39	24	**26**
14.1 – 18.0	0	29	50	-	33	**33**
18.1+	-	50	0	-	52	**51**

4.2.4 Response Rates by Intensity of Fishing Operation

The 'intensity of fishing operation' is measured by the number of days fished. Less intense fishing firms recorded lower response rates - less than 100 days (Table 4.6).

Table 4.6: Survey Response Rates: Intensity of Fishing Operation (Days Fished)

Days Fished Class	Fishing Sector Sample/Population Ratio per Days Fished Class (%)					
	Crab General	Line	Net	Spanner Crab	Trawl	All
0 – 50	20	21	19	9	12	**18**
51 – 100	6	24	33	21	23	**25**
101 – 150	26	42	27	35	24	**30**
151 – 200	33	34	33	50	31	**33**
201 – 250	22	40	31	na	43	**37**
250+	14	25	0	na	50	**25**

4.2.5 Response Rates by Degree of Specialisation

'Degree of specialisation' by a fishing sector firm is based on the proportion of TBCR attributable to the specific sector. Lower response rates were recorded for the diversified firms except for spanner crab (Table 4.7).

Table 4.7 Survey Response Rates: Degree of Specialisation

Degree of Diversification	Fishing Sector Sample/Population Ratio per Degree of Specialisation (%)					
	Crab General	Line	Net	Spanner Crab	Trawl	All
Specialised	14	31	32	25	31	**30**
Diversified	25	22	24	27	22	**24**

4.2.6 Response Rates by Fishing Pattern

'Fishing pattern' relates to the ratio of days fished within the home port area of the firm to that undertaken by the business operation during the 1997-98 year. Using recorded catch information for each fisher, the number of days fished in each grid square near their home-port (based on grids within an average day's steaming) during 1997-98. Firms were classed according to this proportion with a *distant fishing pattern* defined as a low ratio. *Local fishing pattern* defined as a high ratio. For example, 30% of the fleet had a distant fishing pattern compared with 47% that had a local fishing pattern.

Fishing pattern was also assumed to relate to the number of fishing days undertaken by a business within the 1997-98 financial year, broken into two area classes. A local fishing pattern was defined as fishing 1^0 latitude either side of the fishing firm's home-port. A distant fishing pattern was defined where a firm fished outside of the local area for more than 30% of the total fishing days in 1997-98. Response rates (Table 4.8) showed a relative balance between the two patterns and their mean responses.

Table 4.8 Survey Response Rates: Fishing Pattern (Proximity)

Fishing Pattern	Fishing Sector Business Sample/Population Ratio per Fishing Pattern (%)					
	Crab General	Line	Net	Spanner Crab	Trawl	All Sectors
Local	20	32	26	20	35	31
Distant	21	27	29	29	27	27
All Firms	**21**	**29**	**28**	**26**	**31**	**29**

To ensure that the complexity of the Queensland fishery has been accommodated by the survey means that response rates for each fishing sector and the characteristics of the firm operating in that sector have been caught within the economic survey.

4.2.7 Summary of Representativeness of the Survey

The survey was regarded as representative of the population with a response rate of 29 percent. Specifically, response rates were viewed by fishing sector and classes of location of

fishing business (region), level of fishing activity (TBCR), size of fishing operation (boat length), intensity of fishing operation (days fished), degree of diversification (diversification code) and fishing pattern (local/distant fishing activity).

Response rates were generally greater when the firms were undertaking higher levels of fishing activity and high levels of fishing intensity. This could have been due to the timing of the survey which occurred during an intense period of consultation by QFS with fishers when fishers felt threatened by changes in fisheries management arrangements: larger fishing operations needing to support the survey and less active not wanting their lower contributions to affect possible outcomes of the consultation. This view was supported through discussions with fishers by the interview team.

4.3 RESPONSE RATES: FISHING SECTORS

The response rates for each fishing sector were analysed for the three characteristics: location of the firm, size of the fishing operation and level of fishing intensity.

4.3.1 Otter Trawl Sector Response Rates

The response rate for the seven ABS coastal regions of Queensland varied (Table 4.9). A slightly higher response rate was received from the Moreton region compared with other regions. A slightly lower than average response rate from the Fitzroy and Northern regions was noted.

Table 4.9: Otter Trawl Sector: Response Rates by Location of Fishing Firm

Location	Otter Trawl Sector (n)	Survey Response (n)	Response Rate (%)
Far North	106	35	33
Northern	83	21	25
Mackay	33	9	27
Fitzroy	58	13	22
Wide Bay Burnett	107	35	33
Moreton	79	31	39
Brisbane	137	36	26
Total	**659**	**202**	**31**

Table 4.10: Otter Trawl Sector: Response Rates by Size of Fishing Operation

Boat Length Class (m)	Otter Trawl Sector (n)	Survey Response (n)	Response Rate (%)
0 – 10.0	38	10	26
10.1 – 14.0	264	61	23
14.1 – 18.0	253	84	33
18.1+	48	25	52
Total	**603**	**180**	**30**

Response rate by size of fishing operation indicated a higher response rate with increasing boat length (Table 4.10). A higher response rate occurred with increasing fishing intensity (Table 4.11).

Table 4.11: Otter Trawl Sector: Response Rates by Intensity of Fishing Operation

Level of fishing Intensity	Otter Trawl Sector (n)	Survey Response (n)	Response Rate (%)
0 – 50	41	5	12
51 – 100	60	13	22
101 – 150	140	32	23
151 – 200	207	62	30
201 – 250	127	54	43
250+	28	14	50
Total	**603**	**180**	**30**

4.3.2 Beam Trawl Sector Response Rates

The response rate for the beam trawl firms located in the seven ABS regions of Queensland was high (Table 4.12). Higher response rates were received from the Brisbane and Wide Bay Burnett regions compared with a slightly lower than average response rate from the Fitzroy region that was the survey average. Response rate by size of fishing operation showed a high response rate from the usual boat length of less than 10m (Table 4.13). Response rate by level of fishing intensity showed a higher response rate with increasing number of days fished (Table 4.14).

Table 4.12: Beam Trawl Sector: Response Rates by Location of Firm

Location Region	Beam Trawl Sector (n)	Survey Response (n)	Response Rate (%)
Far North	-	-	-
Northern	1	1	100
Mackay	2	1	50
Fitzroy	7	2	29
Wide Bay Burnett	10	4	40
Moreton	1	0	0
Brisbane	30	13	43
Total	**51**	**21**	**41**

Table 4.13: Beam Trawl Sector: Response Rates by Size of Fishing Operation

Boat Length Class (m)	Beam Trawl Sector (n)	Survey Responses (n)	Response Rate (%)
0 – 10.0	45	18	40
10.1 – 14.0	3	2	67
14.1 – 18.0	2	0	0
18.1+	1	1	100

Table 4.14: Beam Trawl Sector: Response Rates by Intensity of Fishing Operation

Level of Fishing intensity	Beam Trawl Sector (n)	Survey Response (n)	Response Rate (%)
0 – 50	1	0	0
51 – 100	8	3	38
101 – 150	16	6	38
151 – 200	14	6	43
201 – 250	9	4	44
250+	3	2	67

4.3.3 Line Sector Response Rates

Response rate by region was relatively consistent across the seven regions and all regions were represented with Brisbane and Moreton with the lowest responses (Table 4.15).

Table 4.15: Line Sector: Response Rates by Location of Firm

Location Region	Line Sector (n)	Response (n)	Response Rate (%)
Far North	125	34	27
Northern	25	6	24
Mackay	86	26	30
Fitzroy	70	23	33
Wide Bay Burnett	36	14	39
Moreton	39	9	23
Brisbane	31	6	19
Total	**412**	**118**	**29**

A higher response rate occurred with increasing size of fishing operation (Table 4.16).

Table 4.16: Line Sector: Response Rates by Size of Fishing Operation

Boat Length Class (m)	Line Sector (n)	Response (n)	Response Rate (%)
0 – 10.0	220	65	30
10.1 – 14.0	151	40	26
14.1 – 18.0	31	9	29
18.1+	10	4	40

A generally higher response rate from line sector firms was indicated with increasing fishing intensity (Table 4.17).

Table 4.17: Line Sector: Response Rates by Intensity of Fishing Operation

Days Fished Class	Line Sector (n)	Survey Response (n)	Response Rate (%)
0 – 50	114	24	21
51 – 100	111	27	24
101 – 150	89	37	42
151 – 200	68	23	34
201 – 250	15	6	40
250+	4	1	25

4.3.4 Net Sector Response Rates

The survey response rate for net fishers are higher for firms located in the southern regions with rates much lower for Northern and Far North locations (Table 4.18).

A high response rate was recorded for the usual size of fishing operation (boat length<10m) (Table 4.19). A similar response rate occurred for differing levels of fishing intensity (Table 4.20).

Table 4.18: Net Sector: Response Rates by Location of Firm

Region	Net Sector Business (n)	Response (n)	Response Rate (%)
Far North	97	20	21
Northern	27	5	19
Mackay	24	7	29
Fitzroy	15	3	20
Wide Bay Burnett	59	17	29
Moreton	47	17	36
Brisbane	62	23	37
Total	331	92	28

Table 4.19: Net Sector: Response Rates by Size of Fishing Operation

Boat Length Class (m)	Net Sector Business (n)	Response (n)	Response Rate (%)
0 – 10.0	291	81	28
10.1 – 14.0	35	9	26
14.1 – 18.0	4	2	50
18.1+	1	0	0

Table 4.20: Net Sector: Response Rates by Intensity of Fishing Operation

Days Fished Class	Net Sector Business (n)	Survey Response (n)	Response Rate (%)
0 – 50	64	12	19
51 – 100	72	24	33
101 – 150	75	20	27
151 – 200	78	26	33
201 – 250	32	10	31
250+	5	0	0

4.3.5 General Crab Sector Response Rates

A slightly higher response rate was received for the Moreton and Wide Bay Burnett regions compared with other regions, and a slightly lower than average response rate was received from the Far North, Mackay and Brisbane regions (Table 4.21).

Table 4.21: General Crab Sector: Response Rates by Location of Firm

Location	General Crab Sector (n)	Survey Response (n)	Response Rate (%)
Far North	13	0	0
Northern	17	4	24
Mackay	2	0	0
Fitzroy	44	9	20
Wide Bay Burnett	21	9	43
Moreton	7	4	57
Brisbane	43	5	12
Total	**147**	**31**	**21**

Table 4.22: General Crab Sector: Response Rates by Size of Fishing Operation

Boat Length Class (m)	General Crab Sector (n)	Survey Response (n)	Response Rate (%)
0 – 10.0	132	26	20
10.1 – 14.0	14	5	36
14.1 – 18.0	1	0	0
18.1+	0	0	0

Table 4.23: General Crab Sector: Response Rates by Intensity of Fishing Operation

Days Fished Class	General Crab Sector (n)	Survey Response (n)	Response Rate (%)
0 – 50	10	2	20
51 – 100	16	1	6
101 – 150	19	5	26
151 – 200	27	9	33
201 – 250	46	10	22
250+	29	4	14

A high response rate in the 10-14m size of fishing operation but a low 20% in the usual size of operation (boats length <10m) (Table 4.22). Response rates by level of fishing operation indicated higher response rates for intensity between 151-200 days fished (Table 4.23).

4.3.6 Spanner Crab Sector Response Rates

A slightly higher response rate was received for the Wide Bay Burnett region compared with other regions and a much lower than average response rate was received from the Fitzroy and Brisbane regions (Table 4.24).

Table 4.24: Spanner Crab Sector: Response Rates by Location of Firm

Location Region	Spanner Crab Sector Business (n)	Response (n)	Response Rate (%)
Mackay	1	0	0
Fitzroy	19	2	11
Wide Bay Burnett	39	13	33
Moreton	76	19	25
Brisbane	16	1	6
Total	**151**	**35**	**75**

Table 4.25: Spanner Crab Sector: Response Rates by Size of Fishing Operation

Boat Length Class (m)	Spanner Crab Sector (n)	Survey Response (n)	Response Rate (%)
0 – 10.0	118	22	19
10.1 – 14.0	33	13	39
14.1 – 18.0	0	0	0
18.1+	0	0	0
Total	**151**	**35**	**23**

Table 4.26: Spanner Crab Sector: Response Rates by Intensity of Fishing Operation

Days Fished Class	Spanner Crab Sector (n)	Survey Response (n)	Response Rate (%)
0 – 50	22	2	9
51 – 100	62	13	21
101 – 150	40	14	35
151 – 200	12	6	50

Response rate by size of fishing operation suggested a high response rate in the 10-14m size of fishing operation but a low 19% in the usual size of operation (boat length <10m) (Table 4.25). Higher response rates occurred for increasing fishing intensity (Table 4.26).

SECTION 2

RESULTS[1] and DISCUSSION

This section of the report provides the results and discussion of the application of the financial and economic profit indicators described in Section 2.4 to determine the economic performance of the Queensland fishery.

1. *The data from Chapter 3 and the survey are applied in input-output analysis to provide aggregate economic impacts of the Queensland fishery on the Queensland economy, regional communities and their main fishing ports (Chapter 5).*

2. *Further analyses of fishing sectors and the behaviour of individual firms within these sectors, through the characteristics of the fishing firm, provides greater insight into the variability of the aggregate means, medians and profit indices determined in Chapter 5. Estimates of economic performance of the Queensland fishing fleet are extrapolated from the survey profit indicators (Chapters 6 to 10).*

3. *Aggregate statistical means, medians and profit indices are generated for all indicators to provide the overall performance of the surveyed Queensland fishery, broken down through the key fishing sectors and characteristics of the fishing firm (Chapter 11)*

4. *Overview of the estimated economic assessment of the Queensland fishery based on the previous chapters (Chapter 12).*

[1] I am indebted to Jeff Bibby and Wez Norris of QFS for their analysis of the QFS databases and the development of two subset calculators which enabled me to undertake the research for this project.

CHAPTER 5

ECONOMIC IMPACTS OF COMMERCIAL FISHING ON THE STATE, COASTAL REGIONS AND MAJOR PORTS OF QUEENSLAND

This chapter is an edited version of commissioned reports by RC Jensen and GR West 'Economic impacts of commercial fishing on the state and coastal regions of Queensland' and 'Economic impacts of commercial fishing on the major ports of Queensland'. The chapter provides estimates of the economic significance of the fishing industry in the State of Queensland, coastal regions and their major ports.

This chapter also describes the processes followed to estimate the economic significance of the industry in the State of Queensland as a whole and on the coastal regions including the main port of each region as follows:

- Brisbane-Moreton region (combined regions) - Mooloolaba
- Wide Bay region – Bundaberg
- Fitzroy region - Gladstone
- Mackay region - Mackay
- Northern region - Townsville
- North West/Far North (combined regions) - Cairns.

The economic significance of any industry depends on the extent to which that industry interacts with, or has economic linkages with, the regional or state economy. These economic linkages exist in the form of purchases of inputs from other industries in the 'local' economy and in terms of expenditure by employees in the economy. This study is based on the identification of these linkages in the fishing industry and their estimation in both direct and indirect (flow-on) terms through the use of appropriate versions of input-output models. In this study a conventional input-output (IO) model, augmented by parameters from an integrated IO-econometric model developed at the University of Queensland by Dr Guy West, has been used for estimation of economic impacts.

The process involved the identification of two components of the industry, namely the Fishing Operations (fish catching) component, and the Fish Processing (or primary processing) component, and the estimation of the interaction of each of these components with the regional/state economies. It describes the results of the study in terms of input-output multipliers for each component and the calculation of absolute values of economic impact. Tables 5.11to 5.11 are attached at the end of this chapter.

5.1 STATE AND REGIONAL OVERVIEW OF THE FISHING INDUSTRY

An essential preliminary step in the process of estimating the economic impact of the fishing industry at the regional level was the estimation of the distribution of the industry across the regions included in the study, ie. to establish the regional location of the industry. This step was completed by the preparation of Table 5.1, which provides the empirical base or control table on which the analyses in following sections are based.

It should be noted that the collection of accurate and reliable data on the fishing industry in Australia has traditionally been very difficult, given the diverse and scattered nature of the industry and the preponderance of small firms in some sections of the industry. These difficulties are generally not fully alleviated by recourse to ABS data. In reality, it was necessary to rely on data from an industry survey, which was more in the nature of an incomplete census.

Table 5.1 provides estimates of the level of activity of the fishing industry in the State of Queensland as a whole and in the six coastal regions. These estimates are provided according to the two identified components of the industry, (fishing operations and fish processing) and in terms of industry output, employment, wages and salaries paid and local

value-added. These are measures of the *direct* economic contribution of the fishing industry at the state and regional.

5.1.1 Gross Output

Part A of Table 11.1 shows the value of *output* of *each* component of the industry in *each* of the regions defined for the study. For example, the total value of the gross output of the two components of the fishing industry in Queensland (Column 7) in year 1997/8 was $451.9M. Of this, $210.2M (46.5%) arose from fishing operations and $241.7M (53.5%) from the operations of fish processors. The actual processing operations therefore contribute the larger share of the direct economic contribution of the industry to the state economy as a whole.

Part A also shows (Rows 3 and 4) that $128.4M (or 28.3%) of the value of this output occurs in the Brisbane-Moreton region, as the largest regional contribution. This is followed by the contribution of the North West/Far North region with output to the value of $112M (22.7%), the Wide Bay region ($70.9M or 16.1%), by the Northern region ($45.5M or 13.9%), and so on.

Table 11.1 illustrates that significant contributions to the industry arise from all coastal regions of the state, with some measure of dominance from northern regions and from the Brisbane-Moreton region.

5.1.2 Employment

Part B of Table 5.1 shows the level of *employment* of each component of the industry in *each* of the regions defined for the study, measured in terms of full-time (FTE) employee equivalents. For example, the total employment in the two components of the fishing industry in the state as a whole (Column 7) was 3,760 persons. Of this, 2,919 jobs (77.7%) arose from fishery operations, and 841 jobs (22.4%) from the operations of processors. As expected, the employment contribution of the industry arises primarily from the fishing operations that are far more labour intensive than processing operations generally.

Part B also shows (Row 8) that 29.2 percent of the total state employment in the fishing industry occurs in the Brisbane-Moreton region, followed by the North West/Far North region (22.4%), the Wide Bay region (15.9%) and so on.

Table 11.1 again illustrates that significant direct employment contributions arise from all coastal regions of the state, with a degree of dominance from northern regions and from the Brisbane-Moreton region.

5.1.3 Wages and Salaries

Part C of Table 5.1 shows the value of direct *wages and salaries* (also termed household income later in this study) of each component of the industry in each of the regions of the state. For example, the total value of the wages paid by the two components of the fishing industry in Queensland (Column 7) was $115.7M. Of this, $93.7M (77.6%) arose from fishery operations and $22M (22.4%) from the operations of processors. The economic contribution of the industry arises primarily from the fishing operations, where the large proportion of wages and salaries paid in fishing operations reflects the associated high degree of labour intensity and relatively high unit labour costs.

Part C also shows (Row 11 and 12) that $33.4M or 28.8 percent of the total state industry wages and salaries, was paid in the Brisbane-Moreton region, followed by 19.2 percent in the North West/Far North region, by the Wide Bay region, (16.4%) and so on.

Table 5.1 illustrates that significant direct contributions in terms of wages and salaries or household income occur in all coastal regions of the state, with a higher degree of significance in northern regions and from the Brisbane-Moreton region.

5.1.4 Value-Added

Part D of Table 5.1 shows the amount of *value-added* by each component of the industry in each of the regions defined for the study. It should be noted that value-added in this context refers approximately to the net contribution to Gross Regional Product as defined in the

national accounts, rather than other interpretations of this term, which could suggest downstream processing. For example, the total amount of value added by the two components of the fishing industry in the state economy as a whole (Column 7) was $344.9M. Of this, $129.3M (37.5%) arose from fishery operations, and $215.7 (62.5%) from the operations of processors. It will be noted that in the case of value-added, the main contribution of the industry arises from the processing, rather than the fishing sector of the industry.

Part D also shows (Rows 15 and 16) that $100.3M or 29.1 percent of the total state value-added of the industry occurred in the Brisbane-Moreton region, followed by the North West/Far North region (24.6%), and so on.

5.1.5 Summary

The control totals in Table 5.1 appear as initial or direct output, income employment and value-added levels in the tables in following sections of this report.

The relative dominance of the Brisbane-Moreton region as defined in terms of the total activity of the fishing industry in the state (Table 5.1). There is some variation in the percentages of each indicator (gross output, employment, wages and salaries and value-added) occurred in each sub-region. This was attributable to variations in the levels of wages and salaries paid, labour productivity and industry cost structures at different locations.

The following sections build on this empirical base to describe the total (*direct-plus-flow-on*) impacts of the fishing industry on the state and coastal regional economies.

5.2 ESTIMATES OF ECONOMIC IMPACT OF THE FISHING INDUSTRY AT A STATE LEVEL

This section describes the economic significance (*direct-plus-flow-on*) of the fishing industry on the state economy and on the economy of the six regions, and their main fishing ports, defined for this study.

The direct contribution attributable to the fishing industry is presented in Table 5.2. This direct contribution is only one part of the economic activity in the region attributable to the industry. Each component of the industry purchases goods and services from sectors within the region; these firms in turn need to purchase further goods and services from other sectors in the region in 'second-round' purchases, followed, in turn by 'third-round' purchases, and so on. In addition, fishing industry employees spend their income buying consumer goods and services from local sectors. These sectors in turn purchase further goods and services from other firms in the region. These impacts are termed *indirect* or *flow-on* impacts.

In this section estimates of the total *(direct-plus-flow-on)* impacts of the components of the fishing industry at the state and regional levels are provided.

The impacts can be represented in two forms. First, they can be represented on a 'per unit' or multiplier basis. Several types of multipliers exist and are used in impact analysis. The multipliers used in this study are the ratio of the total (direct-plus-flow-on) impact to the initial impact for each parameter. These are the so-called Type II multipliers and are shown in the tables which follow.

Second, by applying the multipliers to the direct impacts of each component, the impacts can be represented in absolute values. These values are presented in Tables 5.2 to 5.8. There may be rounding errors in the totals in the multiplier and impact tables.

5.2.1 The State of Queensland

The analysis in this section provides detail of the state-wide economic impact of the fishing industry. Attention is given in turn to output, household income, employment and value-added impacts at the state level for each component of the fishing industry. Table 5.1 is the reference table, and provides the detailed estimates.

Later sections of this report provide statements (Tables 5.3 to 5.8) of the economic impact of the components of the industry on each of the six regions defined for this study. These following tables (Tables 5.3 to 5.8) are effectively a desegregation of Table 5.1 on a regional basis, and sum to the totals presented in Table 5.2.

5.2.2 Gross Output Impacts

Part A of Table 5.2 provides the detailed estimates of the economic impacts of the *gross output* impacts of the industry at the state level. Row 1 shows the direct output impacts of the different components of the industry, drawn from Table 5.1. Row 2 of Table 5.2 shows the flow-on output effects of the industry components and Row 3 shows the total (direct-plus-flow-on) output impacts. Row 4 shows the associated Type II ratios or multipliers. For example the $210.2M of output of the fishing operations sector at the state level is associated with $184.5M in flow-on output effects, adding to a total state gross output effect of $394.7M. The ratio between the initial and total impacts was 1.88.

Column 3 provides the industry total output in the state. The $451.8M of direct output is associated with about $377.9M in flow-on output effects, leading to a total output (direct-plus-flow-on) of about $829.7M. The overall industry Type II multiplier is 1.84.

5.2.3 Employment Impacts

Part B of Table 5.1 provides the estimates of the employment impacts of the industry at the state level. Row 5 shows the employment in each of the different components of the industry, drawn from Table 5.1. Row 6 of Table 5.2 shows the flow-on employment effects of the industry components and Row 7 shows the total (direct-plus-flow-on) employment impacts. Row 8 shows the associated Type II ratios or multipliers. For example the 2,919 direct employees in the fishing operations sector in the region are associated with 2,189 flow-on employees, adding to a total employment effect of 5,108 jobs. The ratio between the initial and total impacts was 1.75. the processing sector had total employment effect of 1,472.

Column 3 provides the industry total employment in the state. The 3,760 direct employees are associated with 2,820 flow-on employees, leading to total employment (direct-plus-flow-on) of 6,580 jobs. The overall industry Type II employment multiplier is 1.75.

5.2.4 Wages and Salaries Impacts

Part C. of Table 5.2 provides the detailed estimates of the income (wages and salaries) impact of the industry at the state level. Row 9 shows the direct wages and salaries paid by of the different components of the industry, drawn from Table 5.1. Row 10 of Table 5.2 shows the flow-on wages and salaries effects of the industry components and Row 11 shows the total (direct-plus-flow-on) wages and salaries impacts. Rows 12 shows the associated Type II ratios or multipliers

Column 3 provides the industry total income in the form of wages and salaries in the state. The $115.7M of direct effects is associated with $88.2M in flow-on effects, leading to a total income (direct-plus-flow-on) of about $203.9M. The overall industry Type II income multiplier was 1.80.

5.2.5 Value-Added Impacts

Part D of Table 5.2 provides the detailed estimates of the *value-added* impacts of the industry at the state level. Row 13 shows the direct value-added impacts of the different components of the industry, drawn from Table 5.1. Row 14 of Table 5.2 shows the flow-on value-added effects of the industry components and Row 15 shows the total (direct-plus-flow-on) value-added impacts. Row 16 shows the associated Type II ratios or multipliers

Column 3 provides the industry total value-added in the state. The $344.9M of direct effects is associated with about $207M in flow-on effects, leading to a total value-added (direct-plus-flow-on) of $551.9M. The overall industry Type II value-added multiplier was 1.60.

5.3 ESTIMATES OF ECONOMIC IMPACT OF THE FISHING INDUSTRY AT REGIONAL LEVEL AND SELECTED FISHING PORTS.

This section presents of the results of the impact study of the significance of the fishing industry at the local regional economies and selected fishing ports

5.3.1 Estimates of Fishing Industry Impacts at Selected Regions

The estimates are presented in six tables (5.3 to 5.8). Each table hich shows estimates of direct fisheries output at each port as a percentage of total fishery output in the associated region; estimates of direct and flow-on *fishery operations* impacts at each port on the local region and the state as a whole; estimates of direct and flow-on *fish processing* impacts at each port on the local region, and on the state as a whole. Table 5.11, shows estimates of direct and flow-on impacts for *fishery operations* and *fish processing* combined at each port on the local region and on the state as a whole.

The preceding sections of the analysis have identified the impacts of the fishing industry on the state and regional economies as a whole. This section takes the analysis further by providing some detail on the so-called *desegregated impacts* or the extent to which these flow-on impacts are spread across the remaining industries in the local economy. This provides an indication of the extent to which the local industries rely on the fishing industry.

Tables 5.9 and 5.10 provide estimates, in terms of percentages, of fishing industry output impacts on each industry, for the regions of the state. These are similar in relative magnitude to the flow-on patterns for employment, income and value-added, which are not presented here. Tables 5.9 and 5.10 are similar in structure, each referring to three regions of the state.

For example, Table 5.9 (Column 1) that, at the Brisbane-Moreton metropolitan region level, the flow-on output effects of the fishing operations component of the fishing industry occur primarily in the Finance and Business Services sector (25.9 percent) followed by the Trade (retail and wholesale) sector (22.3 percent), the Other Manufacturing Sector (8.7 percent), and the Recreation, Personal and Other Services sector (7.9 percent). In other words, these are the sectors that are primarily affected by the existence of the fishing operations in the region, and the sectors that would be impacted most by any expansion or contraction of the fishing operations in the region.

Table 5.9 (Column 2) provides similar information for the fish processing operations in the region. Column 3 provides this information for the industry as a whole, including both the fishing operations and fish processing sector. The two remaining sections of Table 5.9 provide the same information for the industry at the level of the Wide Bay region and the Fitzroy region. Table 5.10 provides the same information for the industry in the Mackay, Northern and North West/Far North regions included in this study.

5.3.2 Estimates of Fishing Industry Impacts at Selected Ports.

Reference is made in this section to Tables 5.9 and 5.10.

This direct contribution is only one part of the economic activity in the region attributable to the industry. Each component of the industry purchases goods and services from sectors within the region; these firms in turn need to purchase further goods and services from other sectors in the region in 'second-round' purchases, followed, in turn by 'third-round' purchases, and so on. In addition, fishing industry employees spend their income buying consumer goods and services from local sectors. These sectors in turn purchase further goods and services from other firms in the region. These impacts are termed *indirect* or *flow-on* impacts.

The impacts can be represented in two forms. First, they can be represented on a 'per unit' or multiplier basis. Several types of multipliers exist and are used in impact analysis. The multipliers used in this study are the ratio of the total (direct-plus-flow-on) impact to the initial impact for each parameter.

Second, by applying the multipliers to the direct impacts of each component, the impacts can be represented in absolute values.

In summary, this section focuses analysis on the fishing industry in the region in terms of:

- The two industry components, namely fishing operations and fish processing.
- The impact of the regional fishing industry at the regional and state levels, allowing the identification of the impact of the regional industry at the 'rest-of-state' level,
- The four major economic indicators, namely industry output, household income, employment and value-added impacts.

It will be noticed that there is a consistent pattern in the columns showing these desegregated impacts. Almost inevitably, the most significantly impacted sector at the regional level is the Finance and Business Services sector, which includes such expenditures as insurance, accounting and loan servicing. The Trade sector is also a major recipient of these economic impacts, benefiting primarily from the consumption-induced impacts of the employees of the industry. These figures reinforce the conclusion, reached in a number of impact studies, the it is mostly primarily the local service sectors, rather than local manufacturing sectors which are impacted by local industries and these impacts are felt significantly through the wages and salaries of employees.

5.4 THE BRISBANE-MORETON REGION

Attention is focussed first on the fishing industry in the Brisbane-Moreton region, shown in Table 5.1 as the region with the largest fishing industry in the state.

This section focuses analysis on the fishing industry in the region in terms of:

- The two industry components: fishing operations and fish processing:
- The impact of the regional fishing industry at the regional and state levels, allowing the identification of the impact of the regional industry at the 'rest-of-state' level; and
- The four major economic indicators, namely industry output, household income, employment and value-added impacts.

Table 5.2 provides the reference for the detailed estimates of the economic impact of the regional fishing industry both on the region and on the state as a whole.

5.4.1 Gross Output Impacts

Part A of Table 5.3 provides the detailed estimates of the economic impacts of the *gross output* impacts of the regional industry at the regional and state levels. Row 1 shows the *direct* output impacts of the different components of the industry, drawn from Table 5.1. Row 2 of Table 5.3 shows the *flow-on* output effects of the two industry components, for example the flow-on output effects in the regional economy were $35.2M from the fishing operations sector and $20.6M from the local fish processing sector.

Row 3 of Table 5.3 shows the total, or *direct-plus-flow-on* output impacts on the local economy. Row 4 shows the associated Type II ratios or multipliers. For example the $59.7M of output of the fishing operations sector in the region caused $35.2M in flow-on output effects, adding to a total gross output effect of $94.9M. The ratio between the initial and total impacts is 1.59.

Column 3 provides the industry total output in the region. The $128.4M of direct effects is associated with $55.8M in flow-on effects, leading to a total output (direct-plus-flow-on) of about $184.2M. The overall industry Type II multiplier is 1.434.

Columns 4-6 provide the 'rest-of-state' impact estimates, which refer to those impacts which the regional industry has *outside* the region, ie. in other regions of the state, through interregional expenditure on purchases of inputs or consumption. In this case, the 'rest of state' output effects of the fishing operations sector were estimated at $6.3M, those of the fish processing sector at $2.1M, or a total of about $8.3M.

When these rest-of-state effects are added to the regional effects, the total economic impact of the regional fishing industry on the state economy is in the vicinity of $192.5m, with an overall multiplier ratio of 1.499.

5.4.2 Employment Impacts

Part B of Table 5.3 provides the estimates of the employment impacts of the industry at the regional and state levels. Row 6 shows the employment in each of the different components of the industry, drawn from Table 5.1. Row 7 of Table 5.2 shows the flow-on employment effects of the industry components. Row 8 shows the total (direct-plus-flow-on) employment impacts of the regional industry at the local level as 1,301 jobs from the fishing operations sector and 351 in the fish processing activities.

Row 9 shows the associated Type II ratios or multipliers. For example the 860 direct employees in the fishing operations sector in the region are associated with 441 flow-on employees, adding to a total employment effect of 1,301 jobs. The ratio between the initial and total impacts is 1.513.

Column 3 provides the industry total employment in the region. The 1,099 direct employees are associated with 554 flow-on employees, leading to total employment (direct-plus-flow-on) of 1,653 jobs. The overall industry Type II employment multiplier is 1.504.

Flow-on employment in the rest of the state from the regional fishing industry as a whole is given (Columns 4-6) as 65 employees, leading to a total direct-plus-flow-on employment in the state of 1,718 employees.

5.4.3 Wages and Salaries Impacts

Part C of Table 5.3 provides the detailed estimates of the income (wages and salaries) impact of the industry at the regional and state level. Row 11 shows the direct wages and salaries paid by of the different components of the industry, drawn from Table 5.1. Row 12 of Table 5.3 shows the flow-on wages and salaries effects of the industry components and Row 13 shows the total (direct-plus-flow-on) wages and salaries impacts. Rows 14 and 15 show the associated Type II ratios or multipliers. For example the $27.1M of wages and salaries paid by the Fishing Operations sector in the region is associated with $10.7M in flow-on income effects, adding to a total wages and salaries effect of $37.8M. The ratio between the initial and total impacts is 1.394.

Column 3 provides the industry total income in the region. The $33.4M of direct income effects is associated with $14.3M in flow-on effects, leading to a total income (direct-plus-flow-on) of $47.6M. The overall industry Type II income multiplier is 1.44.

Flow-on income effects to the rest of the state from the regional industry are approximately $1.7M.

5.4.4 Value-Added Impacts

Part D of Table 5.3 provides the detailed estimates of the *value-added* impacts of the industry at the regional and state level. Row 16 shows the direct value-added impacts of the different components of the industry, drawn from Table 5.1. Row 17 of Table 5.3 shows the flow-on value-added effects of the industry components and Row 18 shows the total (direct-plus-flow-on) value-added impacts. Rows 19 and 20 show the associated Type II ratios or multipliers.

Column 3 provides the industry total value-added in the region. The $100.3M of direct effects is associated with $31.4M in flow-on effects, leading to a total value-added (direct-plus-flow-on) of $131.8M. The overall industry Type II value-added multiplier is 1.313

Flow-on value-added effects to the rest of the state from the regional industry are in the vicinity of $3.6m

5.4.5 The Mooloolaba Fishing Industry

This section of the report addresses the fishing industry centred on Mooloolaba, located in Sunshine Coast area of the Brisbane-Moreton region and accounts for 34.7 percent of the regional fishing industry.

Fishing Operations
The direct output of the sector is shown as $44.6M. Since the flow-on ratio or 'multiplier' is calculated at 1.43, the flow-on to the regional Brisbane-Moreton economy is estimated at $19.4M. Given a multiplier representing the impact of the Mooloolaba fishing industry on the state economy of 1.50 the effect on the 'rest-of-state' economy is estimated at $2.8M.

The direct income effects (mainly wages and salaries paid) were $7.9m, with an income multiplier of 1.42, leading to income flow-on effects of $3.9M to the regional economy. With a state income multiplier of 1.47, a flow-on income effect of $0.5M to the 'rest-of-state' economy is estimated.

Fish Processing
The direct output of the fish processing operations at the port was valued at $23.8m. With a flow-on multiplier of 1.3, the local flow-on output effects were estimated at $7.2m. With a state multiplier of 1.33, the rest of state flow-on effects were estimated at $0.7m.

Fishing Industry - Fishing Operations and Fish Processing
Table 5.11 shows the estimated impact of the fishing industry as a whole (both fishery operations and fish processing) at Mooloolaba.

The total direct output of the industry was $44.6m with local flow-on effects of $19.4m and rest-of-state flow-ons of $2.8m. The figures allowed the estimation of the output multipliers at 1.43 (regional) and 1.50 (state).

The direct income, in terms of wages, salaries and supplements paid was in the vicinity of $9.4m, with flow-on income effects to the region of almost $4m and to the rest-of-state of $0.47m. The associated income multipliers were estimated at 1.42 (regional) and 1.47 (state).

The direct employment effects were 292 jobs with 146 flow-on jobs to the region and 14 flow-on jobs to the rest-of-state. The direct value-added effects were $32.7M, with flow-on effects to the regional economy of $5.6m and flow-on effects to the rest of the state of $1.9M.

5.5 THE WIDE BAY REGION

Attention is now focussed on the fishing industry in the Wide Bay-Burnett, or simply the Wide Bay region.

5.5.1 Gross Output Impacts

Part A of Table 5.4 provides the detailed estimates of the *gross output* impacts of the regional industry at the regional and state levels. Row 1 shows the *direct* output impacts of the different components of the industry, drawn from Table 5.1. Row 2 shows the *flow-on* output effects of the two industry components.

Row 3 of Table 5.4 shows the total, or *direct-plus-flow-on* output impacts on the local economy. Row 4 shows the associated Type II ratios or multipliers. For example, the $32.9M of output of the fishing operations sector in the region caused $21.7M in flow-on output effects, adding to a total gross output effect of $54.7M. The ratio between the initial and total impacts is 1.659.

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Column 3 provides the industry total output in the region. The $70.9m of direct effects is associated with $31.6m in flow-on effects, leading to a total output (direct-plus-flow-on) of about $102.5M. The overall industry Type II multiplier is 1.438.

Columns 4-6 provide the 'rest-of-state' impact estimates, which refer to those impacts which the regional industry have *outside* the region, ie. in other regions of the state, through interregional expenditure on purchases of inputs or consumption. In this case, the 'rest of state' output effects of the fishing operations sector were estimated at $12.5M, those of the fish processing sector at $4.1M, or a total of about $16.6M.

When these rest-of-state effects are added to the regional effects, the total economic impact of the regional fishing industry on the state economy is in the vicinity of $119.2M, with an overall multiplier ratio of 1.680.

5.5.2 Employment Impacts

Part B. of Table 5.4 provides the estimates of the employment impacts of the industry at the regional and state levels. Row 6 shows the employment in each of the different components of the industry, drawn from Table 5.1. Row 7 of Table 5.4 shows the flow-on employment effects of the industry components. Row 8 shows the total (direct-plus-flow-on) employment impacts of the regional industry at the local level as 822 jobs from the fishing operations sector and 201 in the fish processing activities.

Row 9 shows the associated Type II ratios or multipliers. For example the 465 direct employees in the fishing operations sector in the region are associated with 357 flow-on employees, adding to a total employment effect of 822 jobs. The ratio between the initial and total impacts is 1.768.

Column 3 provides the industry total employment in the region. The 597 direct employees are associated with 426 flow-on employees, leading to total employment (direct-plus-flow-on) of 1023 jobs. The overall industry Type II employment multiplier is 1.713.

Flow-on employment in the rest of the state from the regional fishing industry as a whole is given (Columns 4-6) as 146 employees, leading to a total direct-plus-flow-on employment in the state of 1168 employees.

5.5.3 Wages and Salaries Impacts

Part C of Table 5.4 provides the detailed estimates of the income (wages and salaries) impact of the industry at the regional and state level. Row 11 shows the direct wages and salaries paid by of the different components of the industry, drawn from Table 5.1. Row 12 shows the flow-on wages and salaries effects of the industry components and Row 13 shows the total (direct-plus-flow-on) wages and salaries impacts. Rows 14 and 15 show the associated Type II ratios or multipliers

Column 3 provides the industry total income in the region. The $18.9M of direct income effects is associated with $8.2M in flow-on effects, leading to a total income (direct-plus-flow-on) of $27.2M. The overall industry Type II income multiplier is 1.433.

Flow-on income effects to the rest of the state from the regional industry are approximately $3.6M.

5.5.4 Value-Added Impacts

Part D of Table 5.4 provides the detailed estimates of the *value-added* impacts of the industry at the regional and state level. Row 16 shows the direct value-added impacts of the different components of the industry, drawn from Table 5.1. Row 17 shows the flow-on value-added effects of the industry components and Row 18 shows the total (direct-plus-flow-on) value-added impacts. Rows 19 and 20 show the associated Type II value added multipliers.

Column 3 provides the industry total value-added in the region. The $50.9M of direct effects is associated with $15.7M in flow-on effects, leading to a total value-added (direct-plus-flow-on) of $66.7M. The overall industry Type II value-added multiplier is 1.312

Flow-on value-added effects to the rest of the state from the regional industry are in the vicinity of $8.6M

5.5.5 The Bundaberg Fishing Industry

This section of the report addresses the fishing industry centred on Bundaberg, located in the Wide Bay region and accounts for 54.1 percent of the regional fishing industry.

Fishing Operations:
The direct and flow-on *output* impacts of the *fishing operations* sector of the Bundaberg industry are estimated in Table 2. The direct output of the sector is shown as $17.9m. Since the flow-on ratio or 'multiplier' is calculated at 1.70, the flow to the Wide Bay regional economy is estimated at $12.5M. Given a multiplier representing the impact of the Bundaberg fishing industry on the state economy of 2.03 the effect on the 'rest-of-state' economy is estimated at $5.9M.

The direct income effects (mainly wages and salaries paid) were $7.1M, with an income multiplier of 1.42, leading to flow-on income effects of $3.0M to the regional economy. With a state income multiplier of 1.61, a flow-on income effect of $1.3M to the 'rest-of-state' economy is estimated.

The direct employment effects were 249 jobs with 192 flow-on jobs to the region and 62 flow-on jobs to the rest-of-state. The direct value-added effects were $10.6M, with flow-on effects to the regional economy of $6.6M and flow-on effects to the rest of the state of $4.1M.

Fish Processing:
The direct output of the fish processing operations at the port was valued at $20.5M. With a flow-on multiplier of 1.26, the local flow-on output effects were estimated at $5.3M. With a state multiplier of 1.37, the rest of state flow-on effects were estimated at $2.3M.

Columns 5-16 show similar information for income, employment and value-added for fish processing associated with the port.

Fishing Industry (Fishing Operations and Fish Processing)
Table 5.11 shows the estimated impact of the fishing industry as a whole (both fishery operations and fish processing) at Bundaberg.

The total direct output of the industry was $38.4M with local flow-on effects of $17.8M and rest-of-state flow-ons of $8.2M. The figures allowed the estimation of the output multipliers at 1.46 (regional) and 1.68 (state).

The direct income, in terms of wages, salaries and supplements paid was in the vicinity of $8.5M, with flow-on income effects to the region of $3.7M and to the rest-of-state of $1.6M. The associated income multipliers were estimated at 1.43 (regional) and 1.62 (state).

The employment and value-added impacts of the total industry centred at Bundaberg are provided in columns 9-16.

5.6 THE FITZROY REGION

This Section now focuses on the fishing industry in the Fitzroy region, shown in Table 5.1 is the region with 11.0 percent of the fishing industry of the state. This section follows the common pattern of presentation established in Section 5.3. Table 5.5 provides the reference for the detailed estimates of the economic impact of the regional fishing industry both on the region and on the state as a whole.

5.6.1 Gross Output Impacts

Part A of Table 5.5 provides the detailed estimates of the *gross output* impacts of the regional industry at the regional and state levels. Row 1 shows the *direct* output impacts of the different components of the industry, drawn from Table 5.1. Row 2 shows the *flow-on* output effects of the two industry components.

Row 3 of Table 5.5 shows the total, or *direct-plus-flow-on* output impacts on the local economy. Row 4 shows the associated Type II ratios or multipliers. For example the $25.7M of output of the fishing operations sector in the region caused $18.6M in flow-on output effects, adding to a total gross output effect of $44.3M. The ratio between the initial and total impacts is 1.722.

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Column 3 provides the industry total output in the region. The $55.3M of direct effects is associated with $26.6M in flow-on effects, leading to a total output (direct-plus-flow-on) of $91.9M. The overall industry Type II multiplier is 1.48.

Columns 4-6 provide the 'rest-of-state' impact estimates, which refer to those impacts which the regional industry have *outside* the region, ie. in other regions of the state, through interregional expenditure on purchases of inputs or consumption. In this case, the 'rest of state' output effects of the fishing operations sector were estimated at $11.1M, those of the fish processing sector at $3.3M, or a total of about $14.4M.

When these rest-of-state effects are added to the regional effects, the total economic impact of the regional fishing industry on the state economy is in the vicinity of $96.3M, with an overall multiplier ratio of 1.741.

5.6.2 Employment Impacts

Part B. of Table 5.5 provides the estimates of the employment impacts of the industry at the regional and state levels. Row 6 shows the employment in each of the different components of the industry, drawn from Table 5.1. Row 7 of Table 5.5 shows the flow-on employment effects of the industry components. Row 8 shows the total (direct-plus-flow-on) employment impacts of the regional industry at the local level as 648 jobs from the fishing operations sector and 156 in the fish processing activities.

Row 9 shows the associated Type II ratios or multipliers. For example the 379 direct employees in the fishing operations sector in the region are associated with 269 flow-on employees, adding to a total employment effect of 648 jobs. The ratio between the initial and total impacts is 1.709.

Column 3 provides the industry total employment in the region. The 482 direct employees are associated with 321 flow-on employees, leading to total employment (direct-plus-flow-on) of 803 jobs. The overall industry Type II employment multiplier is 1.667.

Flow-on employment in the rest of the state from the regional fishing industry as a whole is given (Columns 4-6) as 136 mployees, leading to a total direct-plus-flow-on employment in the state of 993 employees.

5.6.3 Wages and Salaries Impacts

Part C of Table 5.5 provides the detailed estimates of the income (wages and salaries) impact of the industry at the regional and state level. Row 11 shows the direct wages and salaries paid by of the different components of the industry, drawn from Table 5.1. Row 12 shows the flow-on wages and salaries effects of the industry components and Row 13 shows the total (direct-plus-flow-on) wages and salaries impacts. Rows 14 and 15 show the associated Type II ratios or multipliers.

Column 3 provides the industry total income in the region. The $17.3M of direct income effects is associated with $8.2M in flow-on effects, leading to a total income (direct-plus-flow-on) of $25.5M. The overall industry Type II income multiplier is 1.509.

Flow-on income effects to the rest of the state from the regional industry are approximately $3.3M.

5.6.4 Value-Added Impacts

Part D of Table 5.5 provides the detailed estimates of the *value-added* impacts of the industry at the regional and state level. Row 16 shows the direct value-added impacts of the different components of the industry, drawn from Table 5.1. Row 17 shows the flow-on value-added effects of the industry components and Row 18 shows the total (direct-plus-flow-on) value-added impacts. Rows 19 and 20 show the associated Type II ratios or multipliers.

Column 3 provides the industry total value-added in the region. The $42.2M of direct effects is associated with $14.4M in flow-on effects, leading to a total value-added (direct-plus-flow-on) of $56.6M. The overall industry Type II value-added multiplier is 1.311

Flow-on value-added effects to the rest of the state from the regional industry are in the vicinity of $7.9M

5.6.5 The Gladstone Fishing Industry

This section of the report addresses the fishing industry centred on Gladstone, located in the Fitzroy region and accounts for 54.1 percent of the regional fishing industry.

Fishing Industry (Fishing Operations and Fish Processing)
Table 5.11 shows the estimated impact of the fishing industry as a whole (both fishery operations and fish processing) at Gladstone.

The total direct output of the industry was $36.5M with local flow-on effects of $17.5M. The figures allowed the estimation of the output multipliers at 1.48 (regional) and 1.74 (state).

The direct income, in terms of wages, salaries and supplements paid was in the vicinity of $8.3M with flow-on income effects of $3.9M. The associated income multipliers were estimated at 1.47 (regional) and 1.66 (state).

The employment and value-added impacts of the total industry centred at Gladstone were 497 jobs and $42.6M respectively.

5.7 THE MACKAY REGION

This Section provides a focus on the fishing industry in the Mackay region and accounts for 8.0 percent of the fishing industry of the state.

5.7.1 Gross Output Impacts

Part A of Table 5.6 provides the detailed estimates of the *gross output* impacts of the regional industry at the regional and state levels. Row 1 shows the *direct* output impacts of the different components of the industry, drawn from Table 5.1. Row 2 shows the *flow-on* output effects of the two industry components.

Row 3 of Table 5.6 shows the total, or *direct-plus-flow-on* output impacts on the local economy. Row 4 shows the associated Type II ratios or multipliers. For example the $16.1m of output of the fishing operations sector in the region caused $9.4M in flow-on output effects, adding to a total gross output effect of $27.9M. The ratio between the initial and total impacts is 1.512.

Column 3 provides the industry total output in the region. The $39.7M of direct effects is associated with $14.9M in flow-on effects, leading to a total output (direct-plus-flow-on) of about $54.7M. The overall industry Type II multiplier is 1.367.

Columns 4-6 provide the 'rest-of-state' impact estimates, which refer to those impacts which the regional industry have *outside* the region, ie. in other regions of the state, through interregional expenditure on purchases of inputs or consumption. In this case, the 'rest of state' output effects of the fishing operations sector were estimated at $5.8M, those of the fish processing sector at $2.3M, or a total of about $8.1m.

When these rest-of-state effects are added to the regional effects, the total economic impact of the regional fishing industry on the state economy is in the vicinity of $62.9M, with an overall multiplier ratio of 1.583.

5.7.2 Employment Impacts

Part B. of Table 5.6 provides the estimates of the employment impacts of the industry at the regional and state levels. Row 6 shows the employment in each of the different components of the industry, drawn from Table 5.1. Row 7 of Table 5.6 shows the flow-on employment

effects of the industry components. Row 8 shows the total (direct-plus-flow-on) employment impacts of the regional industry at the local level as 418 jobs from the fishing operations sector and 92 in the fish processing activities.

Row 9 shows the associated Type II ratios or multipliers. For example the 343 direct employees in the fishing operations sector in the region are associated with 123 flow-on employees, adding to a total employment effect of 466 jobs. The ratio between the initial and total impacts is 1.36.

Column 3 provides the industry total employment in the region. The 417 direct employees are associated with 156 flow-on employees, leading to total employment (direct-plus-flow-on) of 573 jobs. The overall industry Type II employment multiplier is 1.447.

Flow-on employment in the rest of the state from the regional fishing industry as a whole is given (Columns 4-6) as 72 employees, leading to a total direct-plus-flow-on employment in the state of 645 employees.

5.7.3 Wages and Salaries Impacts

Part C of Table 5.6 provides the detailed estimates of the income (wages and salaries) impact of the industry at the regional and state level. Row 11 shows the direct wages and salaries paid by of the different components of the industry, drawn from Table 5.1. Row 12 shows the flow-on wages and salaries effects of the industry components and Row 13 shows the total (direct-plus-flow-on) wages and salaries impacts. Rows 14 and 15 show the associated Type II ratios or multipliers

Column 3 provides the industry total income in the region. The almost $9.5M of direct income effects is associated with $5.4M in flow-on effects, leading to a total income (direct-plus-flow-on) of $14.9M. The overall industry Type II income multiplier is 1.585.

Flow-on income effects to the rest of the state from the regional industry are approximately $1.8M.

5.7.4 Value-Added Impacts

Part D of Table 5.6 provides the detailed estimates of the *value-added* impacts of the industry at the regional and state level. Row 16 shows the direct value-added impacts of the different components of the industry, drawn from Table 5.1. Row 17 shows the flow-on value-added effects of the industry components and Row 18 shows the total (direct-plus-flow-on) value-added impacts. Rows 19 and 20 show the associated Type II value added ratios or multipliers.

Column 3 provides the industry total value-added in the region. The $29.5M of direct effects is associated with $9.2M in flow-on effects, leading to a total value-added (direct-plus-flow-on) of $38.7M. The overall industry Type II value-added multiplier is 1.314.

Flow-on value-added effects to the rest of the state from the regional industry are in the vicinity of $4.6M.

5.7.5 The Mackay Fishing Industry

This section of the report addresses the fishing industry centred on Mackay, located in the Mackay region and accounts for 61.2 percent of the regional fishing industry.

Fishing Operations:
The direct output of the sector is shown as $11.3M. Since the regional flow-on ratio or 'multiplier' is calculated at 1.51, the flow to the regional economy is estimated at $5.8Mm. Given a multiplier representing the impact of the local fishing industry on the state economy of 1.83 the effect on the 'rest-of-state' economy is estimated at $3.6Mm.

The direct income effects (mainly wages and salaries paid) were $4.6M, with an income multiplier of 1.55, leading to flow-on income effects of $2.5M to the regional economy. With a

state income multiplier of 1.73, a flow-on income effect of $0.8M to the 'rest-of-state' economy is estimated.

The direct employment effects were 219 jobs with 79 flow-on jobs to the region and 35 flow-on jobs to the rest-of-state. The direct value-added effects were $6.4M, with flow-on effects to the regional economy of $3.5M and flow-on effects to the rest of the state of $2.0M.

Fish Processing:
The direct output of the fish processing operations at the port was valued at $13.0M. With a flow-on multiplier of 1.26, the local flow-on output effects were estimated at $3.4M. With a state multiplier of 1.36, the rest of state flow-on effects were estimated at $1.3M.

Fishing Industry - Fishing Operations and Fish Processing
Table 5.11 shows the estimated impact of the fishing industry as a whole (both fishery operations and fish processing) at the port.

The total direct output of the industry was $24.3M with local flow-on effects of $9.2M and rest-of-state flow-ons of $4.9M. The figures allowed the estimation of the output multipliers at 1.38 (regional) and 1.58 (state).

The direct income, in terms of wages, salaries and supplements paid was in the vicinity of $5.5M, with flow-on income effects to the region of $3.1M and to the rest-of-state of $1.0M. The associated income multipliers were estimated at 1.56 (regional) and 1.75 (state).

The employment and value-added impacts of the total industry centred at the port are 388 jobs and $26.3M respectively.

5.8 THE NORTHERN REGION

This Section provides a focus on the fishing industry in the Northern region, shown in Table 5.0 as contributing 13.9 percent of the fishing industry of the state.

5.8.1 Gross Output Impacts

Part A of Table 5.7 provides the detailed estimates of the *gross output* impacts of the regional industry at the regional and state levels. Row 1 shows the *direct* output impacts of the different components of the industry, drawn from Table 5.1. Row 2 shows the *flow-on* output effects of the two industry components.

Row 3 of Table 5.7 shows the total, or *direct-plus-flow-on* output impacts on the local economy. Row 4 shows the associated Type II ratios or multipliers.

Column 3 provides the industry total output in the region. The $45.5M of direct effects is associated with $14.4M in flow-on effects, leading to a total output (direct-plus-flow-on) of about $59.9M. The overall industry Type II multiplier is 1.317.

Columns 4-6 provide the 'rest-of-state' impact estimates. In this case, the 'rest of state' output effects of the fishing industry were estimated at about $8.1M.

When these rest-of-state effects are added to the regional effects, the total economic impact of the regional fishing industry on the state economy is in the vicinity of $68M, with an overall multiplier ratio of 1.495.

5.8.2 Employment Impacts

Part B of Table 5.7 provides the estimates of the employment impacts of the industry at the regional and state levels. Row 6 shows the employment in each of the different components of the industry, drawn from Table 5.1. Row 7 of Table 5.7 shows the flow-on employment effects of the industry components. Row 8 shows the total (direct-plus-flow-on) employment impacts of the regional industry at the local level as 419 jobs from the fishing operations sector and 161 in the fish processing activities.

Row 9 shows the associated Type II ratios or multipliers.

Column 3 provides the industry total employment in the region. The 323 direct employees are associated with 156 flow-on employees, leading to total employment (direct-plus-flow-on) of 479 jobs. The overall industry Type II employment multiplier is 1.482.

Flow-on employment in the rest of the state from the regional fishing industry as a whole is given (Columns 4-6) as 62 employees, leading to a total direct-plus-flow-on employment in the state of 548 employees.

5.8.3 Wages and Salaries Impacts

Part C of Table 5.7 provides the detailed estimates of the income (wages and salaries) impact of the industry at the regional and state level. Row 11 shows the direct wages and salaries paid by of the different components of the industry, drawn from Table 5.1. Row 12 shows the flow-on wages and salaries effects of the industry components and Row 13 shows the total (direct-plus-flow-on) wages and salaries impacts. Rows 14 and 15 show the associated Type II ratios or multipliers

Column 3 provides the industry total income in the region. The $10.9M of direct income effects is associated with $4.3M in flow-on effects, leading to a total income (direct-plus-flow-on) of $15.3M. The overall industry Type II income multiplier is 1.390.

Flow-on income effects to the rest of the state from the regional industry are approximately $1.6M.

5.8.4 Value-Added Impacts

Part D of Table 5.7 provides the detailed estimates of the *value-added* impacts of the industry at the regional and state level. Row 16 shows the direct value-added impacts of the different components of the industry, drawn from Table 5.1. Row 17 shows the flow-on value-added effects of the industry components and Row 18 shows the total (direct-plus-flow-on) value-added impacts. Rows 19 and 20 show the associated Type II value added ratios or multipliers.

Column 3 provides the industry total value-added in the region. The $37M of direct effects is associated with $6.9M in flow-on effects, leading to a total value-added (direct-plus-flow-on) of almost $44M. The overall industry Type II value-added multiplier is 1.337.

Flow-on value-added effects to the rest of the state from the regional industry are in the vicinity of $4.3M.

5.8.5 The Townsville Fishing Industry

This section of the report addresses the fishing industry centred on Townsville, located in the Northern region and accounts for 75.2 percent of the regional fishing industry.

Fishing Operations:
The direct output of the sector is shown as $15.9M. Since the regional flow-on ratio or 'multiplier' is calculated at 1.37, the flow to the regional economy is estimated at $5.9M. With a multiplier representing the impact of the local fishing industry on the state economy of 1.64 the effect on the 'rest-of-state' economy is estimated at $4.3M.

The direct income effects (mainly wages and salaries paid) were $7.9M, with an income multiplier of 1.34, leading to flow-on income effects of $2.7M to the regional economy. With a state income multiplier of 1.48, a flow-on income effect of $1.1M to the 'rest-of-state' economy is estimated.

The direct employment effects were 199 jobs with 99 flow-on jobs to the region and 46 flow-on jobs to the rest-of-state. The direct value-added effects were $6.9M, with flow-on effects to the regional economy of $1.5M and flow-on effects to the rest of the state of $1.4M.

Fish Processing:
The direct output of the fish processing operations at the port was valued at $18.3M. With a flow-on multiplier of 1.27, the local flow-on output effects were estimated at $4.9M. With a state multiplier of 1.37, the rest of state flow-on effects were estimated at $1.8M.

Fishing Industry - Fishing Operations and Fish Processing
Table 5.11 shows the total output of the industry was $34.2M with local flow-on effects of $10.8M and rest-of-state flow-ons of $6.1M. The figures allowed the estimation of the output multipliers at 1.32 (regional) and 1.50 (state).

The direct income, in terms of wages, salaries and supplements paid was in the vicinity of $9.1M, with flow-on income effects to the region of $3.4M and to the rest-of-state of $1.3M The associated income multipliers were estimated at 1.37 (regional) and 1.52 (state).

The employment and value-added impacts of the total industry centred at the port were 418 jobs and $29.9M respectively.

5.9 THE NORTH WEST/FAR NORTH REGION

This Section provides a focus on the fishing industry in the North West – Far North region, shown in Table 5.1 as on of the most significant fishing regions of the state, contributing 13.9 percent of the fishing industry of the state. This section follows the common pattern of presentation established in preceding Sections. Table 5.8 provides the reference for the detailed estimates of the economic impact of the regional fishing industry both on the region and on the state as a whole.

5.9.1 Gross Output Impacts

Part A of Table 5.8 provides the detailed estimates of the *gross output* impacts of the regional industry at the regional and state levels. Row 1 shows the *direct* output impacts of the different components of the industry, drawn from Table 5.1. Row 2 shows the *flow-on* output effects of the two industry components.

Row 3 of Table 5.8 shows the total, or *direct-plus-flow-on* output impacts on the local economy. Row 4 shows the associated Type II ratios or multipliers. For example, he $52.1M of output of the fishing operations sector in the region caused $29.6M in flow-on output effects, adding to a total gross output effect of $81.7M. The ratio between the initial and total impacts is 1.568.

Column 3 provides the industry total output in the region. The $112M of direct effects is associated with $46.4M in flow-on effects, leading to a total output (direct-plus-flow-on) of about $159M. The overall industry Type II multiplier is 1.393.

Columns 4-6 provide the 'rest-of-state' impact estimates. In this case, the 'rest of state' output effects of the fishing industry at about $14.4M.

When these rest-of-state effects are added to the regional effects, the total economic impact of the regional fishing industry on the state economy is in the vicinity of $172.8M.

5.9.2 Employment Impacts

Part B. of Table 5.8 provides the estimates of the employment impacts of the industry at the regional and state levels. Row 6 shows the employment in each of the different components of the industry, drawn from Table 5.1. Row 7 shows the flow-on employment effects of the industry components. Row 8 shows the total (direct-plus-flow-on) employment impacts of the regional industry at the local level as 1089 jobs from the fishing operations sector and 316 in the fish processing activities.

Row 9 shows the associated Type II ratios or multipliers

Column 3 provides the industry total employment in the region. The 842 direct employees are associated with 563 flow-on employees, leading to total employment (direct-plus-flow-on) of 1405 jobs.

Flow-on employment in the rest of the state from the regional fishing industry as a whole is given (Columns 4-6) as 118 employees, leading to a total direct-plus-flow-on employment in the state of 1523 employees.

5.9.3 Wages and Salaries Impacts

Part C of Table 5.8 provides the detailed estimates of the income (wages and salaries) impact of the industry at the regional and state level. Row 11 shows the direct wages and salaries paid by of the different components of the industry, drawn from Table 5.1. Row 12 shows the flow-on wages and salaries effects of the industry components and Row 13 shows the total (direct-plus-flow-on) wages and salaries impacts. Rows 14 and 15 show the associated Type II ratios or multipliers

Column 3 provides the industry total income in the region. The $25.5M of direct income effects is associated with $12.0M in flow-on effects, leading to a total income (direct-plus-flow-on) of $337.6M.

Flow-on income effects to the rest of the state from the regional industry are approximately $3.0M.

5.9.4 Value-Added Impacts

Part D of Table 5.8 provides the detailed estimates of the *value-added* impacts of the industry at the regional and state level. Row 16 shows the direct value-added impacts of the different components of the industry, drawn from Table 5.1. Row 17 shows the flow-on value-added effects of the industry components and Row 18 shows the total (direct-plus-flow-on) value-added impacts. Rows 19 and 20 show the associated Type II value added ratios or multipliers.

Column 3 provides the industry total value-added in the region. The $84.9M of direct effects is associated with $25.3M in flow-on effects, leading to a total value-added (direct-plus-flow-on) of about $110.2M.

Flow-on value-added effects to the rest of the state from the regional industry are in the vicinity of $7.6M.

5.9.5 The Cairns Fishing Industry

This section of the report addresses the fishing industry centred on Cairns, located in the Far North/North West region and accounts for 41.4 percent of the regional fishing industry.

Fishing Operations:
The direct output of the sector is shown as $21.6M. Since the regional flow-on ratio or 'multiplier' is calculated at 1.57, the flow to the regional economy is estimated at $12.3M. With a multiplier representing the impact of the local fishing industry on the state economy of 1.76 the effect on the 'rest-of-state' economy is estimated at $4.1M.

The direct income effects (mainly wages and salaries paid) were $8.3M, with an income multiplier of 1.45, leading to flow-on income effects of $3.7M to the regional economy. With a state income multiplier of 1.57, a flow-on income effect of $1M to the 'rest-of-state' economy is estimated.

The direct employment effects were 244 jobs with 176 flow-on jobs to the region and 34 flow-on jobs to the rest-of-state. The direct value-added effects were $11.5M, with flow-on effects to the regional economy of $5.7M and flow-on effects to the rest of the state of $2.1M.

Fish Processing:
Table 3 provides similar information for the *fish processing* sector at the port. The direct output of the fish processing operations at the port was valued at $24.8m. With a flow-on multiplier of 1.28, the local flow-on output effects were estimated at $7m. With a state multiplier of 1.35, the rest of state flow-on effects were estimated at $1.7M.

Fishing Industry - Fishing Operations and Fish Processing
Table 5.11 shows the total direct output of the industry was $65.7M with local flow-on effects of $19.3M and rest of the state of 45.8M which allowed the estimation of the output multipliers at 1.41 (regional) and 1.54 (state).

The direct income, in terms of wages, salaries and supplements paid was in the vicinity of $9.9M, with flow-on income effects to the region of $4.5M and to the rest-of-state of $1.2M. The associated income multipliers were estimated at 1.46 (regional) and 1.58 (state).

The employment and value-added impacts of the total industry centred at the port were 557 jobs and $46.4M respectively.

07-03-04

Table 5.1 Fishing Industry Economic Indicators, State and Regions of Queensland, 1997/98

	Direct or Initial Economic Impacts	Region: Brisbane-Moreton	Wide Bay	Fitzroy	Mackay	Northern	North West/ Far North	State of Queensland	Percentage by Component
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Part A: Net Output ($m)								
1	Fishing Operations	59.713	32.987	25.727	18.486	21.162	52.096	***210.171***	*46.5*
2	Fish Processing	68.670	37.935	29.586	21.259	24.336	59.910	***241.697***	*53.5*
3	**Total Output**	**128.383**	**70.922**	**55.313**	**39.745**	**45.498**	**112.006**	***451.868***	*100.0*
4	*Percentage by Region*	*28.4*	*15.7*	*12.2*	*8.8*	*10.1*	*24.8*	*100.0*	
	Part B: Employment (no.)								
5	Fishing Operations	860	465	379	343	238	634	***2919***	*77.6*
6	Fish Processing	239	132	103	74	85	208	***841***	*22.4*
7	**Total Employment**	**1099**	**597**	**482**	**417**	**323**	**842**	***3760***	*100.0*
8	*Percentage by Region*	*29.2*	*15.9*	*12.8*	*11.1*	*8.6*	*22.4*	*100.0*	
	Part C: Wages and Salaries ($m)								
9	Fishing Operations	27.103	15.507	14.626	7.583	8.770	20.086	***93.675***	*81.0*
10	Fish Processing	6.261	3.459	2.697	1.938	2.219	5.463	***22.037***	*19.0*
11	**Total Wages and Salaries**	**33.364**	**18.966**	**17.323**	**9.521**	**10.989**	**25.549**	***115.712***	*100.0*
12	*Percentage by Region*	*28.8*	*16.4*	*15.0*	*8.2*	*9.5*	*22.1*	*100.0*	
	Part D: Value-Added ($m)								
13	Fishing Operations	39.077	17.091	15.841	10.528	15.324	31.439	***129.300***	*37.5*
14	Fish Processing	61.271	33.847	26.398	18.968	21.714	53.456	***215.654***	*62.5*
15	**Total Value-Added**	**100.348**	**50.938**	**42.239**	**29.496**	**37.038**	**84.895**	***344.954***	*100.0*
16	*Percentage by Region*	*29.1*	*14.8*	*12.2*	*8.6*	*10.7*	*24.6*	*100.0*	

Source:
Parts A, B and C from QDPI survey data, Part D from the relevant IO table.

Table 5.2 Fishing Industry Economic Impacts by Industry Component, State of Queensland, (1997/98 Year)

	Economic Impacts:	Component Effects: Fishing Operations Component (1)	Fish Processing Component (2)	Industry Total (3)
	A. Output impacts ($m).			
1	Initial Impact(a)	210.171	241.697	451.868
2	Flow-on Impacts(b)	184.549	193.357	377.906
3	Total Impacts(c)	***394.720***	***435.054***	***829.774***
4	Total/Initial Impact Ratio(d)	*1.88*	*1.80*	
5	Overall Industry Ratio(e)			*1.84*
	B. Employment impacts (No. of full-time jobs).			
6	Initial Impact(a)	2919	841	3760
7	Flow-on Impacts(b)	2189	631	2820
8	Total Impacts(c)	***5108***	***1472***	***6580***
9	Total/Initial Impact Ratio(d)	*1.75*	*1.75*	
10	Overall Industry Ratio(e)			*1.75*
	C. Household Income (Wages and Salaries) Impacts ($m).			
11	Initial Impact(a)	93.675	22.037	115.712
12	Flow-on Impacts(b)	74.940	13.222	88.162
13	Total Impacts(c)	***168.615***	***35.259***	***203.874***
14	Total/Initial Impact Ratio(d)	*1.8*	*1.6*	
15	Overall Industry Ratio(e)			*1.8*
	D. Value-Added Impacts ($m).			
16	Initial Impact(a)	129.300	215.654	344.954
17	Flow-on Impacts(b)	12.930	194.069	207.019
18	Total Impacts(c)	***142.230***	***409.743***	***551.973***
19	Total/Initial Impact Ratio(d)	*1.10*	*1.90*	
20	Overall Industry Ratio(e)			*1.60*

Notes:

(a) Taken from Table 5.1, Column 1.
(b) Estimated from the initial impact by applying the ratio calculated in (d) below.
(c) The sum of the initial impact and the flow-on impact.
(d) Calculated from the integrated IO-econometric model for the region.
(e) Calculated as an implied multiplier by dividing the overall industry total by the industry direct effect.
(f) Calculated from the state integrated model
(g) Column (5) less column (3).

Table 5.3 Fishing Industry Economic Impacts by Industry Component, Brisbane-Moreton Region.
(1997/98 Year)

Economic Impacts:	REGIONAL IMPACTS: Fishing Operations Component (1)	Fish Processing Component (2)	Industry Total (3)	REST-OF-STATE IMPACTS(d): Fishing Operations Component (4)	Fish Processing Component (5)	Industry Total(f) (6)	TOTAL Queensland Impacts (d) (7)
A. Output Impacts ($m).							
1 Initial Impact(a)	59.713	68.670	128.383				128.383
2 Flow-on Impacts(b)	35.171	20.601	55.772	6.270	2.060	8.330	64.102
3 Total Impacts(c)	*94.884*	*89.271*	*184.155*			*8.330*	*192.485*
Ratios:							
4 Total/Initial Impact Ratio	1.589	1.300					
5 Overall Industry Ratio(e)			1.434				1.499
B. Employment Impacts (No. of full-time jobs).							
6 Initial Impact(a)	860	239	1099				1099
7 Flow-on Impacts(b)	441	112	554	51	14	65	619
8 Total Impacts(c)	*1301*	*351*	*1653*			*65*	*1718*
Ratios:							
9 Total/Initial Impact Ratio	1.513	1.471					
10 Overall Industry Ratio(e)			1.504				1.563
C. Household Income (Wages and Salaries) Impacts ($m).							
11 Initial Impact(a)	27.103	6.261	33.364				33.364
12 Flow-on Impacts(b)	10.679	3.600	14.279	1.382	0.282	1.664	15.943
13 Total Impacts(c)	*37.782*	*9.861*	*47.643*			*1.664*	*49.307*
Ratios:							
14 Total/Initial Impact Ratio	1.394	1.575					
15 Overall Industry Ratio(e)			1.428				1.478
D. Value-Added Impacts ($m).							
16 Initial Impact(a)	39.077	61.271	100.348				100.348
17 Flow-on Impacts(b)	19.187	12.254	31.441	3.009	0.613	3.622	35.063
18 Total Impacts(c)	*58.264*	*73.525*	*131.789*			*3.622*	*135.411*
Ratios:							
19 Total/Initial Impact Ratio	1.491	1.200					
20 Overall Industry Ratio(e)			1.313				1.349

Notes:

(a) Taken from Table 4.1, Column 1.
(b) Estimated from the initial impact by applying the ratio calculated in (d) below.
(c) The sum of the initial impact and the flow-on impact.
(d) Calculated from the interregional multipliers from a five-region interregional model.
(e) Calculated as an implied multiplier by dividing the overall industry total by the industry direct effect.
(f) Column (4) plus Column (5).

Table 5.4 Fishing Industry Economic Impacts by Industry Component, Wide Bay Region.
(1997/98 Year)

	Economic Impacts:	REGIONAL IMPACTS: Fishing Operations Component	Fish Processing Component	Industry Total	REST-OF-STATE IMPACTS(d): Fishing Operations Component	Fish Processing Component	Industry Total(f)	TOTAL Queensland Impacts (d)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
	A. Output Impacts ($m).							
1	Initial Impact(a)	32.987	37.935	70.922				70.922
2	Flow-on Impacts(b)	21.738	9.863	31.602	12.469	4.173	16.642	48.243
3	Total Impacts(c)	*54.725*	*47.798*	*102.524*			*16.642*	*119.166*
	Ratios:							
4	Total/Initial Impact Ratio	*1.659*	*1.260*					
5	Overall Industry Ratio(e)			*1.446*				1.680
	B. Employment Impacts (No. of full-time jobs).							
6	Initial Impact(a)	466	132	597				597
7	Flow-on Impacts(b)	357	69	426	119	27	146	571
8	Total Impacts(c)	*822*	*201*	*1023*			*146*	*1168*
	Ratios:							
9	Total/Initial Impact Ratio	*1.768*	*1.522*					
10	Overall Industry Ratio(e)			*1.713*				1.957
	C. Household Income (Wages and Salaries) Impacts ($m).							
11	Initial Impact(a)	15.507	3.459	18.966				18.966
12	Flow-on Impacts(b)	6.505	1.709	8.214	2.900	0.685	3.585	11.799
13	Total Impacts(c)	*22.012*	*5.168*	*27.180*			*3.585*	*30.765*
	Ratios:							
14	Total/Initial Impact Ratio	*1.420*	*1.494*					
15	Overall Industry Ratio(e)			*1.435*				1.622
	D. Value-Added Impacts ($m).							
16	Initial Impact(a)	17.091	33.847	50.938				50.938
17	Flow-on Impacts(b)	10.665	5.077	15.742	6.580	2.031	8.611	24.353
18	Total Impacts(c)	*27.756*	*38.924*	*66.680*			*8.611*	*75.291*
	Ratios:							
19	Total/Initial Impact Ratio	*1.624*	*1.150*					
20	Overall Industry Ratio(e)			*1.309*				*1.478*

Notes:

(a) Taken from Table 4.1, Column 1.
(b) Estimated from the initial impact by applying the ratio calculated in (d) below.
(c) The sum of the initial impact and the flow-on impact.
(d) Calculated from the interregional multipliers from a five-region interregional model.
(e) Calculated as an implied multiplier by dividing the overall industry total by the industry direct effect.
(f) Column (4) plus Column (5).

Table 6.5 Fishing Industry Economic Impacts by Industry Component, Fitzroy Region.
(1997/98 Year)

	Economic Impacts:	REGIONAL IMPACTS: Fishing Operations Component (1)	Fish Processing Component (2)	Industry Total (3)	REST-OF-STATE IMPACTS(d): Fishing Operations Component (4)	Fish Processing Component (5)	Industry Total(f) (6)	TOTAL Queensland Impacts (d) (7)
	A. Output Impacts ($m).							
1	Initial Impact(a)	25.727	29.586	55.313				55.313
2	Flow-on Impacts(b)	18.575	7.988	26.563	11.166	3.254	14.420	40.983
3	Total Impacts(c)	*44.302*	*37.574*	*81.876*			*14.420*	*96.296*
	Ratios:							
4	Total/Initial Impact Ratio	*1.722*	*1.270*					
5	Overall Industry Ratio(e)			*1.480*				*1.741*
	B. Employment Impacts (No. of full-time jobs).							
6	Initial Impact(a)	379	103	482				482
7	Flow-on Impacts(b)	269	53	321	113	23	136	457
8	Total Impacts(c)	*648*	*156*	*803*			*136*	*939*
	Ratios:							
9	Total/Initial Impact Ratio	*1.709*	*1.513*					
10	Overall Industry Ratio(e)			*1.667*				*1.948*
	C. Household Income (Wages and Salaries) Impacts ($m).							
11	Initial Impact(a)	14.626	2.697	17.323				17.323
12	Flow-on Impacts(b)	6.509	1.696	8.205	2.736	0.607	3.342	11.547
13	Total Impacts(c)	*21.135*	*4.393*	*25.528*			*3.342*	*28.870*
	Ratios:							
14	Total/Initial Impact Ratio	*1.445*	*1.629*					
15	Overall Industry Ratio(e)			*1.474*				*1.667*
	D. Value-Added Impacts ($m).							
16	Initial Impact(a)	15.841	26.398	42.239				42.239
17	Flow-on Impacts(b)	9.885	4.488	14.372	6.099	1.848	7.947	22.319
18	Total Impacts(c)	*25.726*	*30.888*	*56.611*			*7.947*	*64.558*
	Ratios:							
19	Total/Initial Impact Ratio	*1.624*	*1.170*					
20	Overall Industry Ratio(e)			*1.340*				*1.528*

Notes:

(a) Taken from Table 4.1, Column 1.
(b) Estimated from the initial impact by applying the ratio calculated in (d) below.
(c) The sum of the initial impact and the flow-on impact.
(d) Calculated from the interregional multipliers from a five-region interregional model.
(e) Calculated as an implied multiplier by dividing the overall industry level by the industry direct effect.
(f) Column (4) plus Column (5).

Table 5.6 Fishing Industry Economic Impacts by Industry Component, Mackay Region.
(1997/98 Year)

	Economic Impacts:	REGIONAL IMPACTS: Fishing Operations Component (1)	Fish Processing Component (2)	Industry Total (3)	REST-OF-STATE IMPACTS(d): Fishing Operations Component (4)	Fish Processing Component (5)	Industry Total(f) (6)	TOTAL Queensland Impacts (d) (7)
	A. Output Impacts ($m).							
1	Initial Impact(a)	18.486	21.259	39.745				39.745
2	Flow-on Impacts(b)	9.465	5.527	14.992	5.823	2.338	8.162	23.154
3	Total Impacts(c)	27.951	26.786	54.737			8.162	62.899
	Ratios:							
4	Total/Initial Impact Ratio	1.512	1.260					
5	Overall Industry Ratio(e)			1.377				1.583
	B. Employment Impacts (No. of full-time jobs).							
6	Initial Impact(a)	343	74	417				417
7	Flow-on Impacts(b)	123	53	156	55	16	72	228
8	Total Impacts(c)	466	127	573			72	645
	Ratios:							
9	Total/Initial Impact Ratio	1.360	1.445					
10	Overall Industry Ratio(e)			1.375				1.547
	C. Household Income (Wages and Salaries) Impacts ($m).							
11	Initial Impact(a)	7.593	1.938	9.521				9.521
12	Flow-on Impacts(b)	4.148	1.236	5.384	1.418	0.384	1.802	7.186
13	Total Impacts(c)	11.731	3.174	14.905			1.802	16.707
	Ratios:							
14	Total/Initial Impact Ratio	1.547	1.638					
15	Overall Industry Ratio(e)			1.566				1.755
	D. Value-Added Impacts ($m).							
16	Initial Impact(a)	10.528	18.968	29.496				29.496
17	Flow-on Impacts(b)	5.833	3.414	9.247	3.243	1.329	4.570	13.817
18	Total Impacts(c)	16.361	22.382	38.743			4.570	43.313
	Ratios:							
19	Total/Initial Impact Ratio	1.554	1.180					
20	Overall Industry Ratio(e)			1.313				1.469

Notes:

(a) Taken from Table 4.1, Column 1.
(b) Estimated from the initial impact by applying the ratio calculated in (d) below
(c) The sum of the initial impact and the flow-on impact.
(d) Calculated from the interregional multipliers from a five-region interregional model.
(e) Calculated as an implied multiplier by dividing the overall industry total by the industry direct effect.
(f) Column (4) plus Column (5).

Table 5.7 Fishing Industry Economic Impacts by Industry Component, Northern Region.
(1997/98 Year)

Economic Impacts:	REGIONAL IMPACTS: Fishing Operations Component (1)	Fish Processing Component (2)	Industry Total (3)	REST-OF-STATE IMPACTS(d): Fishing Operations Component (4)	Fish Processing Component (5)	Industry Total(f) (6)	TOTAL Queensland Impacts (g) (7)
A. Output Impacts ($m).							
1 Initial Impact(a)	21.162	24.336	45.498				45.498
2 Flow-on Impacts(b)	7.872	6.571	14.443	6.629	2.434	9.063	22.505
3 Total Impacts(c)	29.034	30.907	59.941			9.063	68.004
Ratios:							
4 Total/Initial Impact Ratio	1.372	1.270					
5 Overall Industry Ratio(e)			1.317				1.495
B. Employment Impacts (No. of full-time jobs).							
6 Initial Impact(a)	238	85	323				323
7 Flow-on Impacts(b)	120	36	156	53	17	69	225
8 Total Impacts(c)	359	121	479			69	548
Ratios:							
9 Total/Initial Impact Ratio	1.505	1.420					
10 Overall Industry Ratio(e)			1.482				1.696
C. Household Income (Wages and Salaries) Impacts ($m).							
11 Initial Impact(a)	8.770	2.219	10.989				10.989
12 Flow-on Impacts(b)	3.008	1.276	4.284	1.193	0.399	1.592	5.876
13 Total Impacts(c)	11.778	3.495	15.273			1.592	16.865
Ratios:							
14 Total/Initial Impact Ratio	1.343	1.575					
15 Overall Industry Ratio(e)			1.390				1.535
D. Value-Added Impacts ($m).							
16 Initial Impact(a)	15.324	21.714	37.038				37.038
17 Flow-on Impacts(b)	3.233	3.691	6.925	3.004	1.303	4.306	11.231
18 Total Impacts(c)	18.557	25.405	43.963			4.306	48.269
Ratios:							
19 Total/Initial Impact Ratio	1.211	1.170					
20 Overall Industry Ratio(e)			1.187				1.303

Notes:

(a) Taken from Table 4.1, Column 1.
(b) Estimated from the initial impact by applying the ratio calculated in (d) below.
(c) The sum of the initial impact and the flow-on impact.
(d) Calculated from the interregional multipliers from a five-region interregional model.
(e) Calculated as an implied multiplier by dividing the overall industry total by the industry direct effect.
(f) Column (4) plus Column (5).

Table 5.8 Fishing Industry Economic Impacts by Industry Component, North West/Far North Region.
(1997/98 Year)

		REGIONAL IMPACTS:			REST-OF-STATE IMPACTS(d):			TOTAL
	Economic Impacts:	Fishing Operations Component	Fish Processing Component	Industry Total	Fishing Operations Component	Fish Processing Component	Industry Total(f)	Queensland Impacts (d)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
	A. Output Impacts ($m).							
1	Initial Impact(a)	52.096	59.910	112.006				112.006
2	Flow-on Impacts(b)	29.591	16.775	46.365	10.211	4.194	14.405	60.770
3	Total Impacts(c)	*81.687*	*76.685*	*158.372*			*14.405*	*172.776*
	Ratios:							
4	Total/Initial Impact Ratio	1.568	1.280					
5	Overall Industry Ratio(e)			1.414				1.543
	B. Employment Impacts (No. of full-time jobs).							
6	Initial Impact(a)	634	208	842				842
7	Flow-on Impacts(b)	455	108	563	92	27	118	681
8	Total Impacts(c)	*1089*	*316*	*1405*			*118*	*1523*
	Ratios:							
9	Total/Initial Impact Ratio	1.717	1.522					
10	Overall Industry Ratio(e)			1.669				1.809
	C. Household Income (Wages and Salaries) Impacts ($m).							
11	Intial Impact(a)	20.086	5.463	25.549				25.549
12	Flow-on Impacts(b)	9.109	2.895	12.004	2.590	0.639	3.029	15.034
13	Total Impacts(c)	*29.195*	*8.358*	*37.553*			*3.029*	*40.583*
	Ratios:							
14	Total/Initial Impact Ratio	1.454	1.530					
15	Overall Industry Ratio(e)			1.470				1.588
	D. Value-Added Impacts ($m).							
16	Initial Impact(a)	31.439	53.456	84.895				84.895
17	Flow-on Impacts(b)	15.657	9.622	25.279	5.602	2.138	7.640	32.919
18	Total Impacts(c)	*47.096*	*63.078*	*110.174*			*7.640*	*117.814*
	Ratios:							
19	Total/Initial Impact Ratio	1.498	1.180					
20	Overall Industry Ratio(e)			1.298				1.388

Notes:

(a) Taken from Table 4.1, Column 1.
(b) Calculated from the initial impact by applying the ratio calculated in (d) below.
(c) The sum of the initial impact and the flow-on impact.
(d) Calculated from the inter-regional multipliers from a five-region interregional model.
(e) Calculated as an implied multiplier by dividing the overall industry total by the industry direct effect.
(f) Column (4) plus Column (5).

Table 6.9 Regional Percentages of Output Flow-on Effects by Local Impacted Sector, Three Regions, Fishing Industry, 1997/8.(a)

Regional Sector	Brisbane-Moreton			Wide Bay			Fitzroy		
	Fishing Operations	Fish Processing	Total Industry	Fishing Operations	Fish Processing	Total Industry	Fishing Operations	Fish Processing	Total Industry
	Percentages:			Percentages:			Percentages:		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. Agriculture, food and fishing	1.2	1.0	1.2	5.6	5.7	5.6	3.8	6.4	6.4
2. Mining	0.2	0.3	0.2	4.5	3.5	4.3	0.6	0.8	0.6
3. Food processing	5.9	5.2	5.6	6.7	6.7	6.7	5.4	4.7	5.3
4. Wood and paper manufacturing	3.0	6.8	3.9	2.9	6.6	3.6	1.6	5.1	2.4
5. Machinery, appliances, equipment	5.5	2.4	4.8	4.6	1.5	4.0	2.6	0.7	2.3
6. Metal products	2.8	2.2	2.7	1.1	0.8	1.0	0.8	0.7	0.8
7. Non-metallic mineral products	1.0	0.8	0.9	0.3	0.4	0.3	0.1	0.2	0.1
8. Other Manufacturing	8.7	7.6	8.4	11.7	6.9	11.2	13.2	9.2	12.5
9. Electricity, gas and water	1.3	3.3	1.7	4.3	6.3	4.7	3.2	5.3	3.6
10. Building and Construction	0.8	2.9	1.2	0.3	2.2	0.7	0.2	2.1	0.6
11. Trade - wholesale and retail	22.3	17.1	21.1	22.4	15.9	21.2	25.4	20.3	24.4
12. Transport and communication	7.1	9.2	7.6	5.5	7.6	5.9	4.9	7.2	5.3
13. Finance and business services	25.9	26.8	26.1	16.1	18.4	16.5	20.6	24.2	21.3
14. Pub. admin, defence and community services	6.5	7.2	6.7	8.9	10.5	9.2	4.8	5.9	5.1
15. Recreation, Personal and other services	7.9	7.1	7.7	5.0	5.0	5.0	7.4	7.2	7.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note:
(a) These details are provided for the remaining three regions in Table 5.9
Source: Interregional Input-Output Multipliers.

Table 5.10 Regional Percentages of Output Flow-on Effects by Local Impacted Sector, Three Regions, Fishing Industry, 1997/8.(a)

Regional Sector	Mackay			Northern			North West/Far North		
	Fishing Operations	Fish Processing	Total Industry	Fishing Operations	Fish Processing	Total Industry	Fishing Operations	Fish Processing	Total Industry
	Percentages:			Percentages:			Percentages:		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. Agriculture, food and fishing	5.9	3.4	5.4	4.0	3.3	3.8	4.2	4.8	4.3
2. Mining	0.4	0.3	0.4	0.8	1.1	0.9	0.7	0.8	0.7
3. Food processing	7.5	5.4	7.0	6.6	5.4	6.3	4.2	3.6	4.1
4. Wood and paper manufacturing	2.3	5.4	3.0	3.0	5.6	3.7	1.9	4.9	2.6
5. Machinery, appliances, equipment	3.9	1.3	3.4	3.7	1.2	3.1	4.1	1.3	3.5
6. Metal products	1.1	0.7	1.0	1.4	1.1	1.3	0.4	0.3	0.4
7. Non-metallic mineral products	0.4	0.7	0.5	0.2	0.3	0.2	0.1	0.1	0.1
8. Other Manufacturing	8.9	6.9	9.3	8.7	7.3	9.1	12.3	7.7	11.3
9. Electricity, gas and water	3.3	6.3	4.0	2.8	5.3	3.4	3.2	5.3	3.7
10. Building and Construction	0.2	2.3	0.6	0.4	2.3	0.9	0.4	2.3	0.8
11. Trade - wholesale and retail	26.1	22.6	25.4	25.8	19.7	24.3	22.9	17.9	21.8
12. Transport and communication	4.8	6.3	5.2	5.5	7.7	6.0	7.0	8.7	7.3
13. Finance and business services	20.8	23.8	21.5	21.5	25.0	22.4	25.2	27.1	25.6
14. Pub. admin, defence and community services	5.4	6.7	5.7	4.4	5.5	4.7	5.0	6.4	5.3
15. Recreation, Personal and other services	7.9	7.9	7.9	10.2	9.1	10.0	8.4	8.8	8.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note:

(a) These details are provided for the remaining three regions in Table 5.8.

Source: Interregional Input-Output Multipliers.

Table 5.11: Fishing Industry Impacts: Major Ports

Major Port	Output $M	Income $M	Employment (n)	Value Added $M
Mooloolaba	66.8	13.8	452	40.2
Bundaberg	64.8	13.8	443	36.2
Gladstone	54.0	12.0	497	42.6
Mackay	38.4	9.6	388	26.3
Townsville	51.1	13.8	418	27.9
Cairns	80.3	15.6	557	46.4

The following chapters provide an in-depth analysis of the economic performance of the main fishing sectors of the Queensland fishery and the firms operating within these sectors.

CHAPTER 6

ECONOMIC PERFORMANCE OF THE TRAWL SECTOR

The trawl fishery was the largest component of the Queensland fishery in 1997/98 in terms of gross value of production (GVP). General characteristics of the trawl fishery are presented within Chapter 3 to provide a brief overview of the level and value of production, type of species, regional data and other details. The trawl sector is made up of two parts: otter trawl sector firms (Fishery Symbol – T1) and the beam trawl sector firms (Fishery Symbols – T5-T9).

6.1 INTRODUCTION

The overall economic performance of the trawl sector is based on the trawl sector firm for 1997-98 and determined through the use of aggregate statistical means, medians and indices of financial and economic profit indicators. These aggregate measures are broken down through analyses of fishing sectors and characteristics of the fishing firm and based on the various forms of cost associated with trawl fishing activities as defined in Chapter 2. The following estimates were based on a sample of otter trawl firms (n=180 or 30% of the trawl fleet and 52% of in-scope otter trawl GVP and beam trawl firms (n=21, 42% of in-scope beam trawl firms and 2% of GVP (Table 3.3). Refer to Chapter 2 for methodology cautions.

Economic performance of the trawl sector is measured through both financial and economic profit indicators. Estimates for both trawl sector fleets are extrapolated from these survey results in the Trawl Sector Report Cards in section 6.6. Sections 6.1 to 6.5 are the results of the survey for the two trawl sectors.

6.2 TRAWL SECTOR RECEIPT AND COST INDICATORS

Receipt and cost indicators are fundamental data used for determining the financial and economic profit indicators of the trawl sector and of the individual trawl fishing firm. The key indicator of such performance is the surplus concept of 'profit'. Profit is generally regarded as financial profit based on 'total receipts less total costs' but the following analysis incorporates all opportunity costs, except externalities of fishing operations, into the determination of producer surplus or Boat Economic Profit and Net Economic Return of the trawl sectors.

6.2.1 Total Boat Cash Receipts

Total Boat Cash Receipts (TBCR) for the otter trawl sector were $44.571M (37.5% of in-scope otter trawl fleet GVP) and for the beam trawl sector $1.897M (51.3% of in-scope beam trawl fleet GVP).

Table 6.1: Trawl Sector: Total Boat Cash Receipts

Total Boat Cash Receipts ($'000)	Proportion of Otter Trawl Sector (%) (n=181)	Proportion of Beam Trawl Sector (%) (n=21)
<10	zero	zero
10 to 25	2	14
25 to 50	2	14
50 to 100	14	52
100 to 250	41	10
250 to 500	37	10
> 500	4	-

Only 18% of otter trawl firms had Total Boat Cash Receipts less than $100,000 compared with 80% of the beam trawl firms (Table 6.1). The majority of otter trawl firms (78%) realised TBCR between $100,000 and $500,000, with mean TBCR of $246,249 (se=$14,045) and a median of $219,708. Beam trawl mean TBCR was $90,320 (se=$21,564) with a median of $63,475.

In addition, mean TBCR per day for the otter trawl firm was $1,319, with a range from $154 to $11,774. The mean daily TBCR increased as hull units and the boat length class increased with relative variation less in the middle sized fishing operations (30-50HU and 14-18m) (Tables 6.2 and 6.3).

Table 6.2: Otter Trawl Sector: Total Boat Cash Receipts by Hull Units

Hull Units	Mean ($)	Median ($)	Standard Error ($)	COV (%)	Otter Trawl Firms (%)
<20	89,416	73,200	10,	62	15
20-30	216,666	184,984	25,613	74	22
30-40	248,855	230,104	18,721	43	18
40-50	277,454	288,782	21,338	37	13
50-60	326,245	306,755	41,652	51	9
60-70	444,508	431,731	35,792	109	7

(70+hull unit class was a sample less than 5)

Table 6.3: Otter Trawl: Total Boat Cash Receipts by Boat Length

Boat Length (m)	Mean ($)	Median ($)	Standard Error ($)	COV (%)	Mean TBCR per day ($)
0-10	71,144	62,708	11,450	51	$538
10.1-14.0	165,209	149,089	18,909	89	$1,016
14.1-18.0	273,777	264,981	13,119	44	$1,409
18+	414,796	372,179	60,726	75	$2,068

(na means sample less than 5)

A high proportion of the trawl sector family income was dependent upon income from their fishing activity (Table 6.4). For example, 56% of the otter trawl families were totally reliant on trawl income and 88% of the otter trawl sector firms relied on more than 80% of their family income from trawling whereas the proportion was 73% for the beam trawl sector. Trawl sector families were therefore highly reliant on their trawl fishing business to keep the family afloat.

Table 6.4: Family Reliance on Income from their Trawl Fishing Operation

Proportion of family income from fishing business (%)	Proportion of Otter Trawl Firms (%)	Proportion of Beam Trawl Firms (%)
<20	3	14
20 – 39	9	-
40 – 59	7	-
60 – 79	3	3
80 – 99	21	18
100	56	55

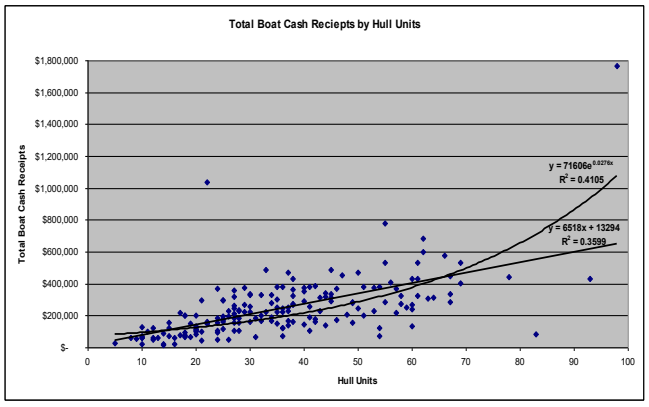

Figure 6.1: TBCR for Otter Trawl Firms by Hull Units

The distribution of TBCR for different levels of hull units showed that some 36-41% of the variation in TBCR was explained by hull units (Figure 6.1).

6.2.2 Capital Invested in the Trawl Sector

The major capital investment (Table 6.5) by the otter trawl sector was primary boat hull and permanent fixtures (52%).

Table 6.5: Otter Trawl Sector: Capital Investment

Capital Item	Mean ($)	Proportion of Total Capital (%)
Primary boat hull and permanent fixtures	235,647	52
Electronics	38,330	8
Licence Package	106,350	23
Other capital items	76,981	17
Total	454,112	100

The Licence Package, upon which the business depended, also represented a considerable capital investment of 23% of total capital. Other capital items including tender boats, sheds, cold-rooms, trailers, and fishing gear made up around 17% of the total capital investment.

Table 6.7: Beam Trawl Sector: Capital Investment

Capital Item	Mean ($)	Proportion of Total Capital (%)
Primary boat hull and permanent fixtures	54,048	28
Electronics	6,635	3
Licence Package	61,619	32
Other capital items	71,432	37
Total	192,471	100

Unlike the otter trawl sector, the beam trawl sector has a smaller level of investment (Table 6.7) in the primary boat and fixtures (28%) but higher proportion invested in the Licence Package (32%).

6.2.3 Value of Licence Packages

The mean value of an otter trawl Licence Package was $107,387 (se=$3,863), relative variability of less than 10% between 20-60HU with a median of $102,000, making up some 23% of the capital of the firm. Total value of Licence Packages was $19.143M (Table 6.8). Note that for T1 Licence Packages the value of the licence was determined by the value of each hull unit attached. For 1997-98 the value of a hull unit, determined from brokers records, was $3000. An mean beam trawl Licence Package was worth $61,619 (se=$6,135) with a median of $55,000 and worth a total sector value of $1.294M.

Table 6.8: Otter Trawl Sector: Value of Licence Packages by Hull Unit

Hull Units	Value of Licence Package			
	Mean ($)	Median ($)	Standard Error ($)	COV (%)
<20	43,962	45,000	2,131	25
21-30	76,231	75,000	1,133	9
31-40	105,818	108,000	1,125	6
41-50	133,304	132,000	1,675	6
51-60	165,000	165,000	1,796	4
61-70	264,000	264,000	13,693	10

6.2.4 Total Boat Fixed Costs

For the otter trawl sector, the major components of fixed costs were insurance (32%) and overdraft interest (26%) and communications (10%). Mean TBFC were $27,192 (se=$1,600) with a median of $20,883. The major components of TBFC for the beam trawl sector were licence and industry fees (31%), insurance (19%) and overdraft interest (12%) (Table 6.9).

Table 6.9: Trawl Sector: Total Boat Fixed Costs

Fixed Cost Item	Otter Trawl Sector		Beam Trawl Sector	
	Mean ($)	Proportion of TBFC (%)	Mean ($)	Proportion of TBFC (%)
Banking charges	984	3	508	4
Communications	2,817	10	1,110	12
Electricity	637	1	936	7
Insurance costs	9,984	32	2,579	19
Leasing costs	5,259	6	825	2
Licence & industry fees	2,453	9	2,366	31
Meetings & conferences	1,465	1	188	-
Motor vehicle registration	593	2	614	7
Office consumables	304	1	182	1
Other boat fees (survey)	525	1	231	1
Overdraft interest	10,106	26	3,695	12
Port/jetty/harbour fees	2,180	7	883	5
TBFC	25,976		7,564	

6.2.5 Total Boat Variable Costs

For the otter trawl sector, the total TBVC was $28.371M with mean TBVC of $156,750 (se = $8,212) and a median of $219,708. For the beam trawl sector the total TBVC was $0.801M with a mean TBVC of $38,183 (se=11,310) and a median of $23,820.

The major variable costs incurred by the average otter trawl firm were labour (40%), fuel (24%), and boat repairs and maintenance (22%). Together they represented 86% of the total variable costs of the trawl business operation. For the beam trawl sector, the major variable costs were labour (36%), fuel (24%) and repairs and maintenance (21%) (Table 6.10).

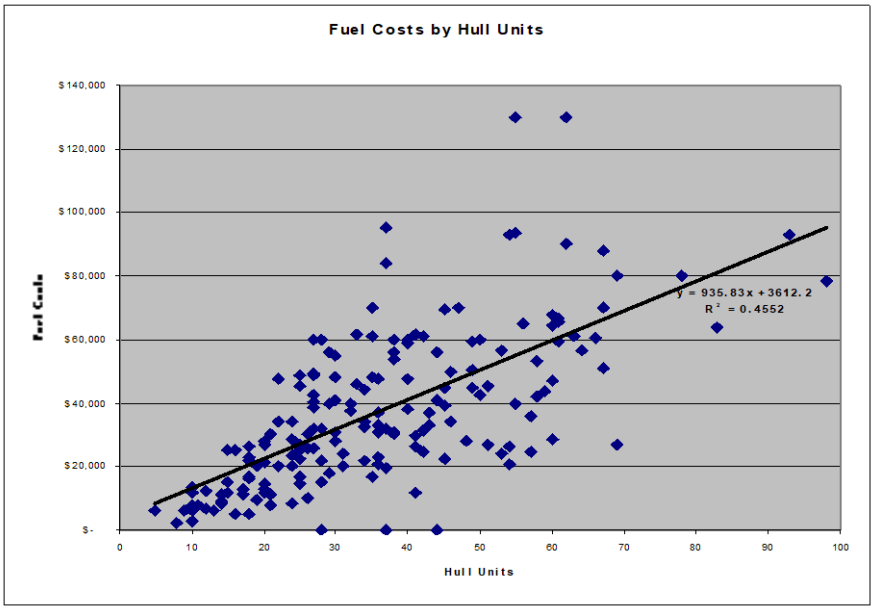

Figure 6.2: Fuel Costs for Otter Trawl Firms by Hull Units

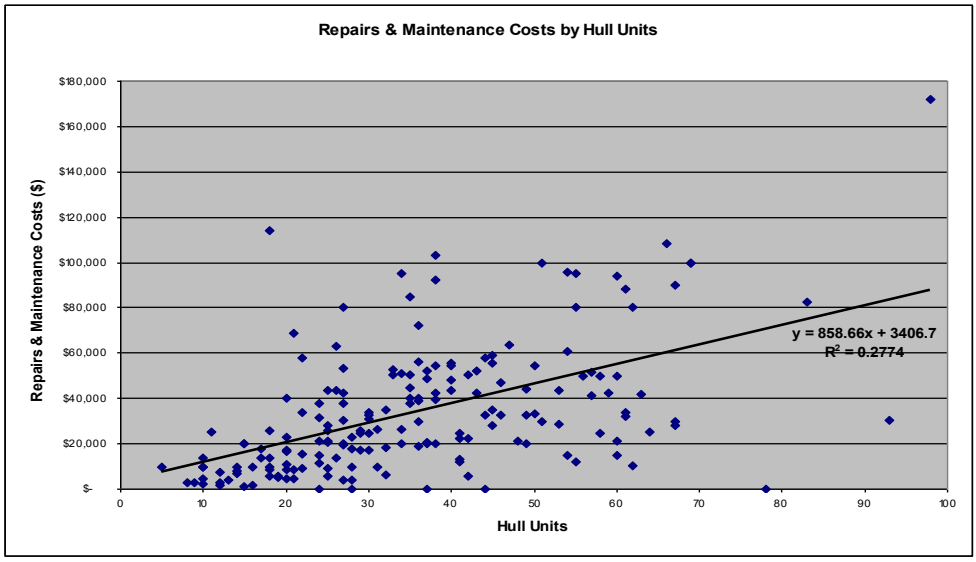

Figure 6.3: Repairs and Maintenance of Otter Trawl Firms by Hull Units

The distribution of fuel costs and repairs and maintenance across the range of hull units suggested that hull units explained 44% of the variation of fuel costs and 28% of the variation in repairs and maintenance (Figures 6.2 and 6.3).

Significant expenditure is required by the average firm every five to ten years in order to maintain their vessel in working order. Furthermore, while the fishing boat is undergoing major refits, it is unable to operate, therefore catch and receipts are likely to be below average; further exacerbating the impact of the refit on costs. The individual cost item likely to vary most over a ten year period would be "repairs and maintenance", which for the average otter trawl fishing firm, was 22% of the Total Boat Variable Costs.

Table 6.10: Trawl Sector: Total Boat Variable Costs

Variable Cost Item	Otter Trawl Sector		Beam Trawl Sector	
	Mean ($)	Proportion of TBFC (%)	Mean ($)	Proportion of TBFC (%)
Bait	774	-	350	-
Chemicals	1,234	1	260	-
Food for crew	5,493	3	1,340	1
Fuel, oil and grease (boat)	37,452	24	9,485	24
Gas (LPG) for boat	741	-	221	1
Ice	1,163	-	1,523	2
Labour costs (paid crew)	67,722	40	28,650	36
Marketing	4,729	-	1,216	1
Motor vehicle	3,427	2	3,570	9
Packaging material	5,268	3	2,595	2
Purchases fishing gear	8,993	5	1,314	3
Repairs & maintenance	34,281	22	9,379	21
Total	156,750		38,183	

Mean paid crew labour costs for the otter trawl firm were $67,722 or 40% of variable costs or 25% of TBCR. Mean imputed wages were $31,363 or mean total labour costs per firm an mean of $99,085 or the equivalent of 4 FTEs per firm (Table 6.11). Although less TBVC were paid in the beam trawl sector, the proportions were similar to that of the otter trawl sector.

Table 6.11: Otter Trawl Sector: Median Labour Costs by Hull Units

Hull Units	Crew Wages	Imputed Wages	Total Wages	Full Time Equivalent Crew (a)
<20	7,649	28,122	35,771	1.1
21-30	26,357	34,008	60,365	2.2
31-40	54,149	31,392	85,541	3.3
41-50	42,300	34,008	76,308	2.9
51-60	95,223	19,058	114,282	4.5
61-70	138,370	-	138,370	5.6

(a) FTE is based on an average skipper wage of $34,008 and crew $22,880 is therefore an estimate of the relative crew size and may not reflect actual crew numbers because of part-time and seasonal fluctuation. It is also not dependent on the definition of the number of full time weeks as this varies throughout the industry.

6.2.6 Total Boat Cash Costs

Twenty-eight percent of the otter trawl sector firms had TBCC less than $100,000, with 70% between $100,000 and $500,000 compared with beam sector firms which had 95% less than $100,000 (Table 6.12). Only 2% of otter trawler owners reported TBCC over $500,000.

Table 6.12: Trawl Sector: Total Boat Cash Costs

TBCC Class ($'000)	Proportion of Otter Trawl Firms (%)	Proportion of Beam Trawl Firms (%)
<50	9	67%
50-100	19	29%
100-250	48	0%
250-500	22	5%
500+	2	0%
Total	100	100%

6.3 TRAWL SECTOR FINANCIAL PROFIT INDICATORS

This section deals with the derivation and explanation of the following financial profit indicators: Boat Gross Margin (BGM), Boat Operating Surplus (BOS), Gross Returns Index (GRI), Boat Cash Income (BCI), Profit at Full Equity, Boat Business Profit (BBP) and Rate of Return to Capital (RRC). All of these indicators are a measure of 'profit' of the trawl sector firm. For comparison purposes a set of matching profit indices have also been calculated.

6.3.1 Boat Gross Margin

Boat Gross Margin (BGM), a residual after variable costs have been covered, for the otter trawl sector was $16.199M after variable costs (fuel, crew wages and repair and maintenance) were covered. Mean otter trawl BGM for 1997-98 was $89,499 (se=$10,552) with a median of $66,028. Mean BGM increases with hull unit class (Table 6.13).

Table 6.13: Otter Trawl Sector: Boat Gross Margin by Hull Units

Hull Unit Class	Mean ($)	Median ($)	Standard Error ($)	BGM<0 (%)	Total BGM ($M)	BGM Index (a)	COV (%)
<20	36,675	7,445	35,191	15	0.928	166	102
21-30	102,322	25,383	74,991	10	3.990	189	135
31-40	81,124	14,543	66,993	15	2.672	148	37
41-50	111,618	24,362	128,488	4	2.567	167	32
51-60	88,718	25,814	48,145	10	1.420	137	40
61-70	132,451	33,171	102,451	8	1.722	142	62

(a) Boat Gross Margin Index is ***(TBCR/TBVC)*100*** – the higher the index the more efficient the use of inputs.

Although the mean BGM for the 21-30 hull unit class was lower than that of both the 41-50 and 61-70 hull unit classes this group of firms had a much higher BGM index. The higher the

index the more efficient the use of cash inputs thus indicated a relatively lower cost structure. However, there is less relative variation (COV) in the 31-60HU classes (Table 6.12). For the beam trawl sector, only the small boats (<10m) were able to be analysed where mean BGM was $52,138 (se=$14,325) and a median of $41,261.

Overall, ANOVA testing indicated that there were no significant differences ($p<0.05$) in BGM for the size of the otter trawl fishing operation (Table 6.31).

Sensitivity Analysis

The Boat Gross Margin is sensitive to variations in key cost and receipt indicators such as:

- TBCR (price X catch) because of the uncertainties of logbook catch records, changes in exchange rates and the averaging of beach prices;
- fuel costs due to fuel prices; and
- repairs and maintenance due to differing stages of the repair and maintenance cycle the boat may be in during any particular year.

In order to appreciate these variations and their respective impacts on the BGM indicator, an estimate was made of the Type I form of elasticity (Table 6.13).

Table 6.14: Cost and Receipt Type 1 Elasticity for Boat Gross Margin (e_m)

Type of Variable	Otter Trawl Firm	Beam Trawl Firm
TBCR (e_t)	e_{mt} = +2.86	e_{mt} = +1.73
Fuel (e_f)	e_{mf} = -0.444	e_{mf} = -0.173
Repair and Maintenance(e_r)	e_{mr} = -0.401	e_{mr} = -0.154

Where $e_m = (\Delta BGM/BGM)/(\Delta X_i/X_i)$ and X_i = receipt or variable cost (Dillon 1968)
e_{mt} = the elasticity of BGM to a change in boat receipts
e_{mf} = the elasticity of BGM to a change in fuel costs
e_{mr} = the elasticity of BGM to a change in repair and maintenance costs

Otter Trawl

The elasticity of TBCR for BGM (e_{mt}), the response of BGM to a one percent change in TBCR, has been calculated as e_{mt} = +2.86 (Table 6.14). This means that a 10% increase in TBCR through an increase in beach prices, favourable exchange rates or catch leads to a 28.6% increase in BGM or increasing mean BGM by $25,597 from $89,499 to $115,096.

The elasticity of fuel for BGM (e_{mf}), the response of BGM to a one percentage change in fuel costs, has been calculated at e_{mf} = -0.444 (Table 6.14). This means that an increase in fuel costs of 10% will lead to a fall in BGM by 4.44% or decreasing the mean BGM by $3,973 from $89,499 to $85,516.

The elasticity of repair and maintenance for BGM (e_{mr}), the response of BGM to a one percent change in repair and maintenance has been calculated at e_{mr} = -0.401 (Table 6.14). This means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BGM by +or-4% or changing BGM by +or- $3,589.

Beam Trawl

The elasticity of TBCR for BGM (e_{mt}), the response of BGM to a one percent change in TBCR, has been calculated as e_{mt} = +1.73 (Table 6.14). This means that a 10% increase in TBCR through an increase in beach prices or catch leads to a 17.3% increase in BGM or increasing mean BGM by $9,020 from $52,138 to $61,158.

The elasticity of fuel for BGM (e_{mf}), the response of BGM to a one percentage change in fuel costs, has been calculated at e_{mf} = -0.173 (Table 6.14). This means that an increase in fuel costs of 10% will lead to a fall in BGM by 1.73% or decreasing the average BGM by $901 from $52,138 to $53,039.

The elasticity of repair and maintenance for BGM (e_{mr}), the response of BGM to a one percent change in repair and maintenance, has been calculated at e_{mr} = -0.154 (Table 6.14). This

means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BGM by +or-1.5% or changing BGM by +or- $802.

6.3.2 Boat Operating Surplus

Total BOS for the otter trawl sector was $11.007M after operational variable costs (fuel, crew and repairs and maintenance) and fixed costs (interest, insurance, leasing and licensing and industry fees) are covered. Mean BOS for an otter trawl sector was $60,187 (se=$10,254) and median of $41,929. Total BOS for the beam trawl sector was $0.905M, mean BOS was $43,111 (se=$14,283) and a median of $32,415.

Twenty two percent of the otter trawl sector operated at a negative BOS compared with 24% of the beam trawler sector firms (Table 6.15). A further 36% of otter trawl firms achieved a BOS up to $50,000 compared with beam trawl firms (48%).

Table 6.15: Trawl Sector: Boat Operating Surplus

Boat Operating Surplus Class ($'000)	Proportion of Otter Trawl Firms (%)	Proportion of Beam Trawl Firms (%)
< -50	6	0
-50 to 0	16	24
1 to 25	15	19
25 to 50	21	29
50 to 100	20	19
100 to 150	12	5
> 150	13	5

When all cash costs were covered, the 21-30 hull unit class for the otter trawl sector had the most efficient use of inputs, ie. a BOS Index of 155 (Table 6.16).

Table 6.16: Otter Trawl Sector: Boat Operating Surplus by Hull Units

Hull Unit Class	Mean ($)	Median ($)	Standard Error ($)	BOS<0 (%)	Total BOS ($M)	BOS Index (a)	COV (%)
<20	23,865	7,7372	18,855	27	0.62	136	76
21-30	76,648	25,529	58,080	15	2.989	155	115
31-40	44,612	14,339	43,950	27	1.472	122	36
41-50	72,480	24,799	90,441	13	1.667	135	34
51-60	54,345	24,644	18,345	31	0.870	120	36
61-70	96,531	35,907	55,671	15	1.255	128	57

(a) BOS Index is ***(TBCR/TBCC)*100*** and is equivalent to the Gross Return Index. The higher the index the more efficient the use of inputs indicating a lower cost structure.

Mean BOS for the otter trawl sector did not increase with hull unit class (Table 6.16). For example, the 31-40 and 51-60 hull unit classes differ from the apparent trend and can be further explained by their respective lower BOS indices. The relative variation was lower in the 31-60HU classes. Overall, ANOVA testing indicates that there were no significant differences ($p<0.05$) in BOS for the size of the otter trawl fishing operation (Table 6.31).

Sensitivity Analysis

Otter Trawl Sector

The elasticity of TBCR for BOS (e_{st}), the response of BOS to a one percent change in TBCR, has been calculated as e_{st} = 4.34 (Table 6.17). This means that a 10% increase in TBCR through an increase in beach prices or catch leads to a 43.4% increase in BOS or increasing mean BOS by $26,395 from $60,817 to $87,212.

Table 6.17: Cost and Receipt Elasticity for Boat Operating Surplus (e_s)

Type of Variable	Otter Trawl Firm	Beam Trawl Firm
TBCR (e_t)	e_{st} = +4.34	e_{st} = +2.09
Fuel (e_f)	e_{sf} = -0.671	e_{sf} = -0.21
Repair and Maintenance(e_r)	e_{sr} = -0.607	e_{sr} = -0.186

Where $e_s = (\Delta BOS/BOS)/(\Delta X_i/X_i)$ and X_i = receipt or variable cost (Dillon 1968)
e_{st} = the elasticity of BOS to a change in boat receipts
e_{sf} = the elasticity of BOS to a change in fuel costs
e_{sr} = the elasticity of BOS to a change in repairs and maintenance costs.

The elasticity of fuel for BOS (e_{sf}), the response of BOS to a one percentage change in fuel costs, has been calculated at e_{sf} = -0.67 (Table 6.17). This means that an increase in fuel costs of 10% will lead to a fall in BOS by 6.7% or decreasing the mean BOS from $60,817 to $64,898.

The elasticity of repair and maintenance for BOS (e_{sr}), the response of BOS to a one percent change in repair and maintenance, has been calculated at e_{sr} = -0.61 (Table 6.17). This means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BOS by +or-6.1% or changing BOS by +or-$3,692.

Beam Trawl Sector
The elasticity of TBCR for BOS (e_{st}), the response of BOS to a one percent change in TBCR, has been calculated as e_{st} = 2.1 (Table 6.17). This means that a 10% increase in TBCR through an increase in beach prices or catch leads to a 21% increase in BOS or increasing average BOS by $15,198 from $43,111 to $58,871. Type II analysis would indicate that in order to increase BOS by 10% it would require a 2.9% change in TBCR.

The elasticity of fuel for BOS (e_{sf}), the response of BOS to a one percentage change in fuel costs, has been calculated at e_{sf} = -0.21 (Table 6.17). This means that an increase in fuel costs of 10% will lead to a fall in BOS by 2.1% or decreasing the mean BOS from $43,673 to $44,016.

The elasticity of repair and maintenance for BOS (e_{sr}), the response of BOS to a one percent change in repair and maintenance, has been calculated at e_{sr} = -0.19 (Table 6.17). This means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BOS by +or-1.9% or changing BOS by +or- $819.

6.3.3 Gross Returns Index

A Gross Return Index (GRI) of less than 100 represents a cash operating loss. mean GRI for the otter trawl sector was 132 and for the beam trawl sector 189, meaning $132 and $189 cash was generated from $100 cash spent by the average otter and beam trawl firm respectively.

6.3.4 Boat Cash Income

Boat Cash Income (BCI) is an estimate of the ability of the trawl sector firm to cover all cash costs and the opportunity costs of the owner-operator and family wages. The imputed wages of owner-operated otter trawl fishing firms were estimated at $654/week or annual wage of $34,008 and beam trawl sector at $440/week or annual wage of $22,880 based on boat skipper wages provided in the economic survey. An imputed value of family contribution ($406/week or annual wage of $21,112) to the fishing firm was based upon other industries and their similarities to the fishing sector (refer to Chapter 2). Total values were based on survey estimates.

Total BCI for the otter trawl sector was $6.147M after imputed wages were also covered. Some 63% of the otter trawl sector had a positive BCI. Mean BCI was $33,959 (se=$10,267) with a median of $10,260 with 46% of otter trawl firms generating a positive BCI less than $100,000.

The larger the otter trawler, the more likely the fishing business was able to cover imputed wages for owner-operator and the family involved in the business. The small boat class had the highest incidence of negative BCI, 54% of all surveyed otter trawl firms. For the beam trawl sector group with small boats (<10m), mean BCI was $10,987 (se=$14,702) and median of -$2,433. Again the 21-30 hull unit class of the otter trawl firms had the best use of inputs (BCI Index) even though it did not have the highest mean or median BCI. The 31-60HU class had relatively less variation than the other classes (Table 6.18).

Table 6.18: Otter Trawl Sector: Boat Cash Income by Hull Units

Hull Unit Class	Mean ($)	Median ($)	Standard Error ($)	BCI<0 (%)	Total BCI ($M)	BCI Index (a)	COV (%)
<20	-70	7,883	-444	54	-0.019	99	43
21-30	40,562	25,104	19,015	31	1.582	123	84
31-40	19,333	14,247	8,685	42	0.638	108	35
41-50	44,715	24,914	56,433	17	1.028	119	36
51-60	36,037	24,342	9,814	44	0.577	112	33
61-70	73,863	38,219	31,092	15	0.960	120	56

(a) BCI Index is ***TBCR/(TBCC + Imputed Wages)*100***. The higher the index the more efficient the use of inputs indicating a lower cost structure.

By including imputed wages, the number of small otter trawl operators (0-20HU) making a loss to increased from 27% to 54% (Tables 6.16 and 6.18). This increase might arise because firms with smaller boats had a higher proportion of total cash costs (i.e. excluding depreciation) related to imputed wages – a feature of the owner-operated fishing business. For example, the imputed wages proportion of TBCC for boats less than <20HU was 38%, 21-30HU (26%), 31-40HU (12%), for 41-50HU (13.5%), 51-60HU (7%) and for the 61-70HU the proportion was 7%. For the beam trawl sector, the addition of imputed wages increased the number of firms that made a loss from 17% to 57% and the wages proportion of TBCR was 35%. Overall, ANOVA testing indicates that there were no significant differences ($p<0.05$) in BCI for the size of the otter trawl fishing operation (Table 6.31).

Sensitivity Analysis

Table 6.19: Cost and Receipt Elasticity for Boat Cash Income (e_i)

Type of Variable	Otter Trawl Firm	Beam Trawl Firm
TBCR (e_t)	e_{it} = +8.51	e_{it} = +8.14
Fuel (e_f)	e_{if} = -1.32	e_{if} = -0.82
Repair and Maintenance(e_r)	e_{ir} = -1.20	e_{ir} = -0.72

Where $e_i = (\Delta BCI/BCI)/(\Delta X_i/X_i)$ and X_I = receipt or variable cost (Dillon 1968)
e_{it} = the elasticity of BCI to a change in boat receipts
e_{it} = the elasticity of BCI to a change in fuel prices
e_{it} = the elasticity of BCI to a change in repairs and maintenance.

Otter Trawl Sector

The elasticity of TBCR for BCI (e_{it}), the response of BCI to a one percent change in TBCR, has been calculated as e_{it} = 8.5 (Table 6.19). This means that a 10% increase in TBCR through an increase in beach prices or catch leads to a 85% increase in BCI or increasing mean BCI by $28,865 from $33,959 to $62,824.

The elasticity of fuel for BCI (e_{if}), the response of BCI to a one percentage change in fuel costs, has been calculated at e_{if} = -1.32 (Table 6.19). This means that an increase in fuel costs of 10% will lead to a fall in BCI by 13.2% or decreasing the mean BCI from $33,959 to $29,476.

The elasticity of repair and maintenance for BCI (e_{ir}), the response of BCI to a one percent change in repair and maintenance, has been calculated at e_{ir} = -1.20 (Table 6.19). This means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BCI by +or-12% or changing BCI by +or-$4,041.

Beam Trawl Sector

The elasticity of TBCR for BCI (e_{it}), the response of BCI to a one percent change in TBCR, has been calculated as e_{it} = 8.14 (Table 6.19). This means that a 10% increase in TBCR through an increase in beach prices or catch leads to a 81.4% increase in BCI or increasing mean BCI by $9,053 from $11,099 to $20,134.

The elasticity of fuel for BCI (e_{if}), the response of BCI to a one percentage change in fuel costs, has been calculated at e_{if} = -0.82 (Table 6.19). This means that an increase in fuel costs of 10% will lead to a fall in BCI by 8.2% or decreasing the mean BCI from $11,099 to $9,504.

The elasticity of repair and maintenance for BCI (e_{ir}), the response of BCI to a one percent change in repair and maintenance, has been calculated at e_{ir} = -0.72 (Table 6.19). This means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BCI by +or-7.2% or changing BCI by +or- $772.

6.3.5 Boat Business Profit

Boat Business Profit (BBP) provides a more complete picture of the financial performance of each trawl firm in the short and medium term. Total BBP for the otter trawl sector was $1.470M, mean BBP was $8,122 (se=$9,947) with a median of - $6,753 compared with that of the beam trawl sector which had a total BBP of $0.109M, mean BBP of $5,191 (se=$13,653) and a median of -$6,823.

Table 6.20: Trawl Sector: Boat Business Profit

Boat Business Profit ($)	Proportion of Otter Trawl Firms (%)	Proportion of Beam Trawl Firms (%)
< -50	21	14
-50 to 0	35	43
1 to 25	11	24
25 to 50	11	5
50 to 100	12	10
> 100	10	5

Table 6.21: Otter Trawl Sector: Boat Business Profit by Hull Units

Hull Unit Class	Mean ($)	Median ($)	Standard Error ($)	BBP<0 (%)	Total BBP ($M)	BBP Index (a)	COV (%)
<20	-12,275	-11,906	7,937	73	-0.319	88	44
21-30	21,046	2,470	24,380	49	0.821	111	71
31-40	-6,961	-13,466	14,087	61	-0.230	97	34
41-50	16,528	28,569	24,727	39	0.380	106	35
51-60	2,776	-15,191	25,278	56	0.044	101	33
61-70	18,599	-1,992	36,385	46	0.242	46	58

(a) BBP Index is ***TBCR/(TBCC + Imputed Wages + Depreciation)*100***. The higher the index the more efficient the use of inputs indicating a lower cost structure. (b) 70+HU class did not have enough respondents.

The BBP for 56% of the otter trawl sector was reported to be negative compared with 57% of the beam trawl sector (Table 6.20). This indicated that for 1997-98, based upon the assumptions made regarding imputed labour and depreciation, the majority of trawl fishery firms were not making a financial profit (BBP>0).

Adding depreciation to BCI for the otter trawl sector, creating BBP, caused the number of small operators (<20HU) that made a loss to increase from 54% to 73% (Tables 6.18 and 6.21). This decrease in the number of firms where BBP<0 may be due to smaller boats that had a higher proportion of total cash costs (i.e. excluding depreciation) related to imputed wages – a feature of the owner-operated fishing business. The best financial performance

was that of the 41-50 HU class with median BBP of $28,569 and BBP Index of 106 (Table 6.21).

Overall, ANOVA testing indicates that there were no significant differences ($p<0.05$) in BBP for the size of the otter trawl fishing operation (Table 6.31).

Sensitivity Analysis

Given that imputed wages were an estimate of what owner-operator paid or should have paid themselves as opposed to what the opportunity cost actually was, dependent upon unemployment levels throughout Queensland that would depress such wages, a sensitivity analysis was undertaken (Table 6.22). The lower the imputed wage estimate and the higher the level of total boat cash receipts, the better the financial position of the sampled firms. For example, the percentage of firms with BBP>0 increased from 45% to 61% when both wages and TBCR were adjusted by 10%.

Table 6.22: Estimates of Boat Business Profit: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts for the Otter Trawl Sector

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study Estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	BBP ($M)	BBP>0 (%)	BBP ($M)	BBP>0 (%)	BBP ($M)	BBP>0 (%)
Study estimate (c)	1.470	45	3.698	50	5.927	60
Estimate less 10%	1.956	45	4.184	51	6.413	61
Estimate less 20%	2.442	49	4.671	57	6.899	63

(a) Owner-operators and family members may be willing to forego equivalent wages of paid crew and skippers for their labour in the business. 20% is an estimate of the imputed wage relating to unemployment benefits that might be appropriate for some sections of the industry as an approximate opportunity cost of labour.
(b) Increased receipts could arise from under-reporting in official logbooks, underestimate of beach prices or from a favourable change in exchange rates increasing export prices.
(c) Study estimate based on the wages paid by equivalent work paid for and reported in the survey

Otter Trawl Sector

The elasticity of TBCR for BBP (e_{bt}), the response of BBP to a one percent change in TBCR, has been calculated as e_{bt} = 98.7 (Table 6.23). This means that a 10% increase in TBCR through an increase in beach prices or catch leads to a 987% increase in BBP or increasing mean by $80,164 from $8,122 to $88,286.

Table 6.23: Cost and Receipt Elasticity for Boat Business Profit (e_b)

Type of Variable	Otter Trawl Firm	Beam Trawl Firm
TBCR (e_t)	e_{bt}= +98.7	e_{bt} = +17.4
Fuel (e_f)	e_{bf} = -15.3	e_{bf} = -1.74
Repair and Maintenance(e_r)	e_{br} = -13.8	e_{br} = -1.55

Where $e_b = (\Delta BBP/BBP)/(\Delta X_i/X_i)$ and X_I = receipt or variable cost (Dillon 1968)
e_{bt} = the elasticity of BBP to a change in boat receipts
e_{bt} = the elasticity of BBP to a change in fuel prices
e_{bt} = the elasticity of BBP to a change in repairs and maintenance.

The elasticity of fuel for BBP (e_{bf}), the response of BBP to a one percentage change in fuel costs, has been calculated at e_{bf} = -15.3 (Table 6.23). This means that an increase in fuel costs of 10% will lead to a fall in BBP by 153% or decreasing the mean from $8,122 to $4,305.

The elasticity of repair and maintenance for BBP (e_{br}), the response of BBP to a one percent change in repair and maintenance, has been calculated at e_{br} = -13.8 (Table 6.23). This means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BBP by +or-138% or changing BBP by +or-$11,208. To increase BBP by 10% would require a reduction of R&M by 2.6%.

Beam Trawl Sector

The elasticity of TBCR for BBP (e_{bt}), the response of BBP to a one percent change in TBCR, has been calculated as e_{bt} = 17.4 (Table 6.23). This means that a 10% increase in TBCR through an increase in beach prices leads to a 174% increase in BBP or increasing mean by $9,032 from $5,191 to $14,223.

The elasticity of fuel for BBP (e_{bf}), the response of BBP to a one percentage change in fuel costs, has been calculated at e_{bf} = -1.74 (Table 6.22). This means that an increase in fuel costs of 10% will lead to a fall in BBP by 174% or decreasing the mean from $5,191 to $4,288.

The elasticity of repair and maintenance for BBP (e_{br}), the response of BBP to a one percent change in repair and maintenance, has been calculated at e_{br} = -1.55 (Table 6.23. This means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BBP by +or-15.5% or changing BBP by +or- $8,046.

6.3.6 Profit at Full Equity

Profit at Full Equity (PFE) was $2.993M for the otter trawl sector. Mean PFE was $16,537 (se=$10,000) and a median of -$3,887 and the larger the boat length the larger the mean level of PFE. For example, <10m (-$11,176), for 10-14m ($11,324), for 14-18m ($20,070) and >18m ($28,010). For the beam trawl sector, the total PFE was $0.130M, mean PFE of $6,189 (se=$13,653) and a median of -$6,823.

6.3.7 Rate of Return to Boat Capital

The distribution of Rate of Return to Boat Capital (RRC) (Table 6.24) showed that 63% of the otter trawl firms generated an RRC less than zero compared with the beam trawl sector firm with 68%. The otter trawl firms had 17% of the lowest RRC (<-20%) and 21% with the highest RRC (>20%). Performance of RRC compared with the opportunity cost of capital @ 10% was poor: otter trawl and beam trawl sectors had 63% and 56% of their firms with an RRC less than 10% (Table 6.24).

Table 6.24: Trawl Sector: Rate of Return to Capital

Rate of Return to Capital Class (%)	Proportion of Otter Trawl Firms (%)	Proportion of Beam Trawl Firms (%)
< -20	17	29
-20 to -10	13	19
-10 to zero	23	10
zero to +10	13	-
+10 to +20	13	14
> +20	21	29

There was no significant difference ($p<0.05$) between size of otter trawl fishing operation and RRC (Table 6.32). However, RRC across the various fishing sectors showed some patterns. For example, the otter trawl sector had a positive RRC over 12m and the beam trawl sector firm had a positive RRC for boats between 8-10m and had an RRC greater than the opportunity costs of capital @10% (Table 6.25). However, ANOVA testing indicated that there were no significant differences ($p<0.05$) in RRC for the size of the otter trawl fishing operation (Table 6.31).

Table 6.25 Trawl Sector: Rate of Return to Capital by Boat Length

Boat Length Class (m)	RRC of Otter Trawl Firms (%)	RRC of Beam Trawl Firms (%)
0-6	na	-14.8
6.1-8	na	-7.7
8.1-10	-11.8	28.5
10.1-12	-9.8	-17.9
12.1-14	7.7	na
14.1-16	7.4	na
16.1-18	3.1	na
18.1+	4.1	na

(na means sample less than 5)

6.4 TRAWL SECTOR ECONOMIC PROFIT INDICATORS

This section deals with the derivation and explanation of the following economic indicators: Boat Economic Profit (BEP) for the two trawl sector (also known as the producer surplus) and Net Economic Return (NER) from both sectors.

6.4.1 Boat Economic Profit

Boat Economic Profit (BEP) is the net economic contribution of the trawl sector to the Queensland economy and takes into account all opportunity costs, except capital and fish stocks and ecosystem externalities. BEP is also the contribution of the individual firm to the producer surplus of the trawl sector.

Total BEP was -$2.292M for the otter trawl sector with a mean BEP of –$12,666 (se=$9,731) and a median of -$22,070. For the beam trawl sector, the total BEP was $0.003M with a mean BEP of $126 (se=$13,279) and a median of -$9,443. Variations of BEP with hull unit class are given in Table 6.26. The best performing groups of otter trawl firms appears to be the 21-30HU and 41-50HU classes with a higher BEP Index and a lower relative variation.

Overall, ANOVA testing indicates that there were no significant differences ($p<0.05$) in BEP for the size of the otter trawl fishing operation (Table 6.31).

Table 6.26: Otter Trawl Sector: Boat Economic Profit by Hull Units

Hull Unit Class	Mean ($)	Median ($)	Standard Error ($)	BEP<0 (%)	Total BEP ($M)	BEP Index (a)	COV (%)
<20	-20,264	8,622	-19,149	77	-0.527	80	55
21-30	7,938	24,026	-17,237	62	0.310	101	47
31-40	-25,461	13,438	-39,903	67	-0.840	88	60
41-50	-4,409	24,711	17,184	43	-0.101	95	34
51-60	-26,834	27,131	-25,886	63	-0.429	90	84
61-70	-42,520	33,770	-38,742	69	-0.553	89	45

(a) BBP Index is ***TBCR/(TBCC -Interest + Depreciation + Opportunity Cost of Capital)*100***. The higher the ratio the more efficient the use of inputs indicating a relatively lower cost structure.

Sensitivity Analysis

Table 6.27: Cost and Receipt Elasticity for Boat Economic Profit (e_p)

Type of Variable	Otter Trawl Sector	Beam Trawl Sector
TBCR (e_p)	e_{pt} = +13.1	na
Fuel (e_p)	e_{pf} = -2.03	na
Repair and Maintenance(e_p)	e_{pr} = -1.64	na

(na means unable to determine)

Where $e_p = (\Delta BEP/BEP)/(\Delta X_i/X_i)$ and X_I = receipt or variable cost (Dillon 1968)
e_{pt} = the elasticity of BEP to a change in boat receipts
e_{pt} = the elasticity of BEP to a change in fuel prices

e_{pt} = the elasticity of BEP to a change in repairs and maintenance.

Otter Trawl Sector
The elasticity of TBCR for BEP (e_{pt}), the response of BEP to a one percent change in TBCR, has been calculated as e_{pt} = 13.1 (Table 6.27). This means that a 10% increase in TBCR through an increase in beach prices leads to a 131% increase in BEP or increasing mean BEP by $16,585 from -$12,066 to $3,925.

The elasticity of fuel for BEP (e_{pf}), the response of BEP to a one percentage change in fuel costs, has been calculated at e_{pf} = -2.03 (Table 6.27). This means that an increase in fuel costs of 10% will lead to a fall in BEP by 20.3% or decreasing the mean BEP from -$12,660 to -$15,230.

The elasticity of repair and maintenance for BEP (e_{pr}), the response of BEP to a one percent change in repair and maintenance, has been calculated at e_{pr} = -1.84 (Table 6.27). This means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BEP by +or-16.4% or changing mean BEP by +or- $2,329.

6.4.2 Net Economic Return

For the 180 surveyed otter trawl firms, Net Economic Return (NER) was -$2.292M or –5.1% of their GVP. For the 21 surveyed beam trawl firms, NER was $0.003M or 0.1% of their GVP. In other words, Queensland contributed $2.281M of economic resources towards the catching of trawl caught product (Table 6.28). This indicated that the trawl sector was behaving as if it were operating as an open access fishery where all economic rents were dissipated with no internalisation of fishing externalities.

Each otter boat length class contributed to the Queensland economy to NER was -$0.178M or as a ratio of TBCR, –25% (<10m), -$0.280M or –2.8% (10-14m), -$1.093M or –4.8% (14-18m), and for greater than 18m -$0.741M or –6.9%. For the beam trawl sector (boats less than 10m) the NER was $0.048M or 3.4%.

Table 6.28: Trawl Fishing Sector: Net Economic Return

Fishing Sector	Net Economic Return $M	Number Surveyed (n)	Proportion of Firms Surveyed (%)
Otter Trawl	-2.292	180	30
Beam Trawl	0.003	21	41
All Sectors	-3.364	478	28

Sensitivity Analysis
Net Economic Return would increase by 13.1% for every one percent increase in TBCR. For example, NER would be -$1.992M instead of -$2.292M, an improvement of $0.3M. For each 10% increase in fuel and repairs and maintenance NER would decrease by 20% and 16% respectively.

NER is also sensitive to changes in imputed wages and TBCR. The lower the imputed wage estimate and the higher the level of cash receipts the better the economic performance of the sampled firms (Table 6.29).

For example, the percentage of firms making a economic profit increased from 37% to 47% when both imputed wages and TBCR were adjusted by 10%. The level of NER was zero at just under a 5.2% increase in TBCR.

When the risk value was reduced from 3.5% to a minimum value of 1.5% suggested by the Queensland Rural Adjustment Authority, the mean BEP and NER for both sectors were greatly increased (Table 6.30).

Table 6.29: Estimates of Otter Trawl Firm Net Economic return: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	NER $M	% firms BEP>0	NER $M	% firms BEP>0	NER $M	% firms BEP>0
Study estimate ©	-2.292	37	-0.063	40	2,164	45
Estimate less 10%	-1.806	38	0.422	43	2,650	47
Estimate less 20%	-1.320	41	0.908	45	3.317	50

(a) Owner-operators and family members may be willing to forego equivalent wages of paid crew and skippers for their labour in the business. 20% is an estimate of the imputed wage relating to unemployment benefits that might be appropriate for some sections of the industry as an approximate opportunity cost of labour.
(b) Increased receipts could arise from under-reporting in official logbooks, underestimate of beach prices or from a favourable change in exchange rates increasing export prices.
(c) Study estimate based on the wages paid by equivalent work paid for and reported in the survey.

Table 6.30: Otter Trawl Sector: Boat Economic Profit for by Opportunity Cost Sensitivity

Fishing Sector	Boat Economic Profit (a) Mean ($)		Net Economic Return (a) ($M)	
	Opportunity Cost of 6.3% plus 1.5% Risk Premium (b)	Opportunity Cost of 6.3% plus 3.7% Risk Premium (b)	Opportunity Cost of 6.3% plus 1.5% Risk Premium (b)	Opportunity Cost of 6.3% plus 3.7% Risk Premium (b)
Otter Trawl	-6,610	-12,666	-1,196	-2.242
Beam Trawl	1,436	129	0.031	0.003

(a) BEP and NER based on the 1997-98 average long term Government bond rate of 6.3% (Queensland Treasury Corporation) (refer EconSearch, 1999 for similar methodology where 5% premium was chosen and 7% was the assumed real interest rate by ABARE in Rose and Stubbs (2000)).
(b) Risk premium based on administration costs of 1%, bad debts 0.5% and a personal risk premium for the individual between 0% and 2.5% -fishing industry/rural sector regarded at the upper end of this range (Queensland Rural Adjustment Authority). Queensland Treasury suggested a risk premium of 5% as the lowest of a range of 4.99 to 9.3%.

6.5 ECONOMIC PERFORMANCE OF THE QUEENSLAND OTTER TRAWL SECTOR FIRM

The measurement of the economic performance of the otter trawl sector is further enhanced by application of the following characteristics of the 181 surveyed otter trawl sector firms:

- degree of specialisation (specialisation code);
- size of fishing operation (boat length or hull units);
- level of fishing intensity (days fished per annum);
- location of fishing business (ABS statistical division);
- level of fishing activity (total boat cash receipts); and
- fishing pattern (local/distant fishing activity: proximity).

Economic performance of the fishing sectors was evaluated based on the following criteria:

- statistical significance of the relationship between the characteristics of the otter trawl firm and the levels of financial and economic profit indicators;
- levels of BBP and BEP;
- the means/medians of BBP and BEP for each characteristic; and
- proportion of subsets of the otter trawl sector firms with BBP>0 and BEP>0.

A set of null hypotheses (H_o) were tested which related each financial and economic indicator (BGM, BOS, BCI, BBP, BEP, and RRC) against the characteristics of the otter trawl fishing firm (fishing sector, degree of diversification, size of business operation, location of fishing

business, intensity of fishing operation, level of fishing activity and fishing pattern). Refer to Chapter 3 for description of these characteristics.

For the characteristics of the otter trawl sector firm, 'level of fishing intensity' (days fished), 'level of fishing activity' (TBCR) and 'fishing pattern' (proximity) there was a significant difference for all major indicators except RRC (Table 6.31).

Table 6.31: Testing the Null Hypotheses (H_0) that there is no significant difference in the level of a financial and economic indicator and the characteristics of the Otter Trawl Fishing Firm. (Yes = reject H_0 and p<0.05) (a)

Indicator	Characteristics of the Otter Trawl Firm					
	Degree of Specialisation	Size of Fishing Operation	Location of Fishing Business	Level of Fishing Intensity	Level of Fishing activity	Fishing Pattern (Proximity)
Financial Profit Indicator						
BGM	NO	NO	NO	**YES**	**YES**	**YES**
BOS	NO	NO	NO	**YES**	**YES**	**YES**
BCI	NO	NO	NO	**YES**	**YES**	**YES**
BBP	NO	NO	NO	**YES**	**YES**	**YES**
RRC	NO	NO	NO	NO	NO	NO
Economic Profit Indicator						
BEP	NO	NO	NO	**YES**	**YES**	**YES**

(a) The results summarised in this table were based on ANOVA univariate analysis and the Yes/No meant that the results of each individual relationship met or failed to meet the ANOVA criteria of P<0.05.

6.5.1 Economic Performance by Degree of Specialisation

The surveyed otter trawl sector was divided into two main categories: specialised fishing firms where one and only one fishery attributed more than 10% of TBCR and all other firms were classed as diversified (Table 3.2).

A comparison within the characteristic 'degree of specialisation' could not be made within the otter trawl sector as not enough diversified firms responded to the survey.

Table 6.32: Mean Economic Performance of Otter Trawl Sector: Degree of Specialisation

Profit Indicator	Specialised Otter Trawl
Boat Gross Margin ($)	90,529
Boat Operating Surplus ($)	61,652
Gross return Index	133
Boat Cash Income ($)	34,845
Profit at Full Equity ($)	17,304
Rate Return to Capital (%)	4.9
Boat Business Profit ($)	8,796
% Firms BBP>0	45
Boat Economic Profit ($)	-12,167
Net Economic Return ($M)	-2.178
% Firms BEP>0	37

(na) means less than 5 firms

All otter trawl firms as a group performed poorly in their contribution to the economy (Table 6.32). For example, a high proportion of firms operated at a financial loss (55% had BBP<0) and at an economic loss (63% had BBP<0) with a net return of -$2.177M. This indicated that the otter trawl sector behaved as an open access type fishery where all economic rents are usually dissipated. Overall, ANOVA testing indicated there were no significant differences (p<0.05) in each of the major profit indicators with respect to the degree of specialisation for the otter trawl sector (Table 6.31).

Summary. The majority of the otter trawl sector was highly specialised (98%): 45% of firms with BBP>0, mean BBP of $8,796 and 37% with BEP>0 and mean BEP of - $12,167. Degree of specialisation was not significant in the economic performance of the otter trawl fishing firm.

6.5.2 Economic Performance by Size of Fishing Operation

The economic performance of otter trawl firms varied within and between the chosen four boat length classes (Table 6.33). Firms with boats greater than 14m had higher profit indicators than the otter trawl sector sample.

Although the 14-18m class had the highest proportion of firms where BBP>0, the mean financial profit indicators such as PFE generally increased as the size of the fishing operation increased.

Table 6.33: Mean Economic Performance Otter Trawl Sector: Size of Fishing Operation

Profit Indicator	Boat Length Class (m)				
	0-10.0	10.1-14.0	14.1-18.0	18.1+	All
Boat Gross Margin ($)	29,828	74,704	97,083	122,659	89,499
Boat Operating Surplus ($)	20,170	53,422	63,798	84,171	60,817
Gross returns Index	140	148	130	125	133
Boat Cash Income ($)	6,995	21,853	38,192	64,438	33,959
Profit at Full Equity ($)	-11,176	11,324	20,070	28,010	16,537
Rate of Return to Capital (%)	-11.8	5.6	5.1	4.1	4.7
Boat Business Profit ($)	-13,776	6,017	9,576	16,781	8,122
% Firms BBP>0	30	38	52	42	45
Boat Economic Profit ($)	-17,790	-4,598	-13,013	-28,500	-12,660
Net Economic Return ($M)	-0.178	-0.280	-1.093	-0.741	-2.292
% Firms BEP>0	30	30	44	31	36

However, when the size of the fishing operation was considered in terms of hull units a different performance picture emerged (Table 6.34). For example, PFE did not increase as size increased, as the 31-40 and 51-60 hull unit classes generally performed poorly compared with the 41-50 and 61-70 hull unit class where BBP>0 was 61% and 54% respectively.

Table 6.34: Mean Economic Performance Otter Trawl Sector: Size of Fishing Operation

Profit Indicator	Hull Units (a)					
	<20	21-30	31-40	41-50	51-60	61-70
BGM ($)	36,675	102,322	81,124	111,618	88,718	132,451
BOS ($)	23,865	76,648	44,612	72,480	54,345	96,531
GRI	136	155	122	135	120	128
BCI ($)	-70	40,562	19,338	44,715	36,037	73,863
PFE ($)	-9,153	28,039	5,237	27,455	11,388	30,236
RRC (%)	-6.7	12.1	1.5	6.9	2.5	3.4
BBP ($)	-121,275	21,046	-6,981	16,528	2,776	18,599
% Firms BBP>0	27	51	39	61	44	54
BEP ($)	-20,264	7,938	-25,461	-4,409	-26,834	-42,520
NER ($M)	-0.526	0.310	-0.840	-0.101	-0.429	-0.553
% Firms BEP>0	23	38	33	57	38	31

(a) The number of firms with boats greater than 70 hull units in the sample was too small to be included.

The use of absolute data as given in Table 6.34 is difficult to interpret when comparing firms within and between profit types. Table 6.35 contains the indicators recalculated as a profit index and the 21-30HU sized firms had the best performance: all profit indicators weregreater than 100.

Table 6.35: Mean Economic Performance Otter Trawl Sector: Size of Fishing Operation

Profit Index	Size of Fishing Operation (Hull Units)											
	<20		21-30		31-40		41-50		51-60		61-70	
	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)
BGM	166	102	189	135	148	37	167	32	137	40	142	35
BOS	136	76	155	115	122	36	135	34	120	36	128	37
BCI	99	43	123	84	108	35	119	36	112	33	120	40
PFE	91	45	114	71	102	34	110	34	103	33	107	31
BBP	88	44	111	71	97	34	106	35	101	33	46	31
BEP	80	52	101	81	88	39	95	40	90	38	89	37

(a) The number of firms with boats greater than 70 hull units in the sample was too small to be included.

Table 6.36: Mean Economic Performance Otter Trawl Firm: Size of Fishing Operation and Level of Fishing Activity

TBCR ($'000)	Size of Fishing Operation (Hull Units)					
	<20	21-30	31-40	41-50	51-60	61-70
Boat Business Profit ($)						
<150	-19,441	-33,906	-88,652	na	na	na
>150	na	37,532	11,168	22,231	12,354	18,599
Profit at Full Equity ($)						
<150	-16,617	-33,274	-78,504	na	na	na
>150	na	46,433	23,846	33,826	22,189	30,236
Rate of Return to Capital (%)						
<150	-12.4	-20.2	-32.7	na	na	na
>150	na	18.4	6.4	8.0	4.5	3.4
Boat Economic Profit ($)						
<150	-27,775	-47,456	-97,839	na	na	na
>150	na	24,557	-9,377	456	-19,104	-42,520
Net Economic Return ($M)						
<150	-0.611	-0.427	-0.587	na	na	na
>150	na	0.736	-0.253	0.010	-0.267	-0.553

(na means sample less than 5)

The greatest variability occurs in the firms with the smallest sized fishing operations, based on hull units, across all profit indices and specifically between cash indices of BGM and BOS, and the other indicators which included non cash items such as imputed wages, depreciation and opportunity cost of capital.

However, when economic performance was also broken down by level of fishing activity, the best performance was by the 21-30HU class and all otter trawl firms with TBCR greater than $150,000 had positive profits except for the economic profit indicators for boats with more than 50HU (Table 6.36). Overall, ANOVA testing indicated there were no significant differences ($p<0.05$) in each of the major profit indicators with respect to the size of the otter trawl fishing operation (Table 6.31)

Summary: Medium scale fishing operations (10m to18m): the 21-30HU class had the best economic performance with 51% of firms with a BBP>0 and a mean of $21,046 and the only class to make BEP>0 with a mean of $7,938. Size of fishing operation was not significant in the economic performance of the otter trawl firm.

6.5.3 Economic Performance by Level of Fishing Intensity

Otter trawl firms with fishing intensity greater than 150 days had the best mean financial and economic performance. The poorest overall average performances were the group of firms with a fishing intensity of less than 50 days: 100% made a financial loss during 1997-98. The better performing group of firms were those with a fishing intensity between 200 and 250 days with 67% where BBP>0 and 63% where BEP>0 (Table 6.37).

Table 6.37: Mean Economic Performance Otter Trawl Sector: Fishing Intensity

Profit Indicator	Days Fished					
	<50	50-100	100-150	150-200	200-250	250+
BGM	-42,153	3,977	38,541	91,443	139,659	130,181
BOS ($)	-70,340	9,860	14,349	67,119	103,136	87,850
GRI	59	87	111	144	144	123
BCI ($)	-85,901	-39,366	-12,841	35,915	79,183	68,590
PFE ($)	-108,926	-48,542	-26.365	20,259	59,700	36,594
RRC (%)	-35.2	-34.5	-10.3	6.9	13.3	5.3
BBP ($)	-116,211	-52	-32,140	13,595	48,255	21,089
% Firms BBP>0	-	-	34	41	67	57
BEP ($)	-135,272	-59,687	-46,919	-4,072	22,804	-22,402
NER ($M)	-0.676	-0.775	-1.501	-0.257	1.231	-0.314
% Firms BEP>0	-	-	19	32	63	43

Overall, ANOVA testing indicated there were significant differences ($p<0.05$) in each of the major profit indicators, except for RRC, with respect to the level of fishing activity of the otter trawl sector (Table 6.31).

Summary: The fleet had a high level of fishing intensity: firms with intensity greater than 150 days had the better performance, the best was the firms that fished for 200-250 days – 67% had a BBP>0 and a mean of $48,255, 63% had a BEP>0 and a mean of $22,804. Level of fishing intensity was significant in the performance of these otter trawl firms.

6.5.4 Economic Performance by Location of Fishing Firm

The location of a firm, however, was not necessarily related to the areas fished by that business and was therefore not an indicator of activity within fishing areas.

Based on the financial indicators for the average fishing firm, the firms located in the Far North, Northern and Moreton regions, appear to be the most profitable, with the firms located in the Fitzroy, Wide Bay and Mackay regions appearing less profitable (Table 6.38).

Table 6.38: Mean Economic Performance Otter Trawl Sector: Location of Fishing Business

Profit Indicator	Location of Fishing Business						
	Brisbane	Moreton	Wide Bay	Fitzroy	Mackay	Northern	Far North
BGM	57,476	129,956	79,043	48,381	80,884	104,331	104,493
BOS ($)	42,950	60,377	49,352	19,686	54,879	77,192	67,401
GRI	136	147	123	108	141	144	133
BCI ($)	14,963	32,623	20,755	-3,821	12,580	53,454	44,845
PFE ($)	2,756	48,593	-6,326	-22,115	zero	33,372	32,773
RRC (%)	1.30	4.40	-1.2	-6	zero	11.4	9.7
BBP ($)	-510	3,293	-15,818	-30,487	-8,009	29,202	21,674
% Firms BBP>0	36	41	34	46	56	62	54
BEP ($)	-15,249	15,514	-49,081	-51,415	-25,967	9,796	4,979
NER ($M)	-0.549	0,496	-1.718	-0.668	-0.234	0.206	0.174
% Firms BEP>0	31	31	26	38	22	52	51

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in each of the major financial and economic profit indicators with respect to the location of the otter trawl fishing firm (Table 6.31).

Summary: The otter trawl sector is located along the Queensland coast with the Northern and Far North regionally based firms performing better: Northern region had the best performance with 62% of the group with BBP>0 and a mean BBP of $29,202 whereas 52% of the group had BEP>0, mean BEP of $9,796 and NER of $0.206M. Location was not significant in the economic performance of the otter trawl firm.

6.5.5 Economic Performance by Level of Fishing Activity

Fishing firms can also be compared based on their level of fishing activity measured by TBCR. As would be expected, profit appears to increase as the level of TBCR increases for the otter trawl firms.

Table 6.39: Mean Economic Performance Otter Trawl Sector: Level of Fishing Activity

Profit Indicator	Total Boat Cash Receipts ($'000)					
	0 - 50	51 - 100	101 - 150	151 - 200	201 - 250	250+
BGM ($)	8,053	32,177	49,450	71,371	92,121	159,505
BOS ($)	1,246	22,119	32,695	50,776	63,043	120,326
GRI	116	144	135	142	139	145
BCI ($)	-19,391	-4,342	8,347	22,651	38,226	96,808
PFE ($)	-31,293	-42,836	-35,190	-13,478	15,660	68,465
RRC (%)	-25.7	-8.2	0.2	6.0	9.0	14.6
BBP ($)	-25,076	-12,513	-2,706	7,401	17,993	62,141
% Firms BBP>0	13	43	58	63	63	69
BEP ($)	-29,384	-18,196	-11,120	-3,414	2,126	32,356
NER ($M)	-3.467	-2.074	-0.734	-0.174	0.077	3.009
% Firms BEP>0	12	39	45	47	53	65

The mean BBP and mean BEP (Table 6.39) appear to be positive after a TBCR of $150,000 and $200,000 respectively. The best performance was for an otter trawl firm to have a TBCR over $250,000 where proportion of firms with BBP>0 and BEP was 69% and 65% respectively. The group of firms with less than $100,000 (n=118) performed very poorly for all profit indicators.

Table 6.40: Mean Economic Performance Otter Trawl Sector: Level of Fishing Activity

Profit Index	Total Boat Cash Receipts ($'000)									
	<50		51-100		101-150		151-200		200+	
	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)
BGM	151	99	113	147	127	54	147	41	165	102
BOS	115	102	94	102	106	50	120	39	140	84
BCI	54	61	69	42	85	40	99	31	128	56
PFE	50	52	63	41	78	40	89	28	119	49
BBP	49	53	61	41	76	41	92	28	114	49
BEP	45	57	56	47	69	45	81	32	102	57

(a) The number of firms with boats greater than 70 hull units in the sample was too small to be included.

Overall, ANOVA testing indicated there were significant differences ($p<0.05$) in each of the major financial and economic profit indicators, except for RRC, with respect to the level of fishing activity (Table 6.31).

Use of absolute data means hides variability and limits subgroup comparison. When profit indices are used (Table 6.40) all indicators basically improve with increasing levels of TBCR, except where TBCR is less than $50,000. But BGM and BOS are high even when activity is low. Even though mean BBP is positive after $150,000, the BBP Index is positive after $200,000 where mean BEP is positive after $200,000 the BEP Index is positive after $250,000.

Summary: The sector had a wide range of fishing activity: as expected as TBCR increased so did the level of economic performance but only after TBCR was greater than $200,000 where both BBP and BEP are positive. Levels of fishing activity were significant in the performance of these firms except for RRC.

6.5.6 Economic Performance by Fishing Pattern

Fishing pattern based on percentage of time spent within a defined local area (approximately nine grids adjacent to the home port of the otter trawl firm) suggests that generally the more local the fishing pattern the worse the financial and economic performance (Table 6.41). For example, firms fishing between 20-40% of time outside of their local area had the best performance: mean BBP of $45,547, RRC of 17.4% and mean BEP of $28,726. The worst performance was the otter trawl firms fishing more than 60% of their time locally.

Table 6.41: Mean Economic Performance Otter Trawl Sector: Fishing Pattern

Profit Indicator	Fishing Pattern (Proximity)				
	<20	21-40	41-60	61-80	81-100
BGM ($)	114,462	135,770	85,545	77,205	46,706
BOS ($)	81,799	102,567	50,282	42,954	27,371
GRI	133	155	129	121	123
BCI ($)	61,664	70,745	23,159	12,737	-2,443
PFE ($)	36,796	56,578	9,004	-6,739	-14,141
RRC (%)	7.5	17.4	3.4	-1.5	-6.4
BBP ($)	28,144	45,547	1,069	-40,235	-33,101
% Firms BBP>0	59	57	58	45	22
BEP ($)	-3,768	28,726	-11,768	-40,235	-33,101
NER ($M)	-0.222	0.862	-0.141	-0.805	-1.986
% Firms BEP>0	51	47	42	40	15

Based on profit indices, the best economic performance was achieved by fishing firm with a distant fishing pattern (<40%), the worst performance was by the highly local otter trawl firms (Table 6.42). Overall, ANOVA testing indicated there were significant differences ($p<0.05$) in the profit indicators, except for RRC, with respect to fishing pattern (Table 6.31).

Table 6.42: Mean Economic Performance of the Otter Trawl Sector: Fishing Pattern

Profit Index	Fishing Pattern (Proximity)									
	<20		21-40		41-60		61-80		81-100	
	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)
BGM	153	35	189	150	162	45	145	54	147	86
BOS	133	35	155	129	129	41	120	51	123	66
BCI	123	34	132	86	112	40	105	43	98	40
PFE	112	30	124	73	100	40	97	43	91	41
BBP	109	30	119	73	104	39	92	43	88	40
BEP	97	34	107	84	92	45	83	50	80	46

Fishing Pattern. The fishing pattern was highly local (52% of the sample were greater than 61% local) and fished within a relatively few grid squares (60% less than 10): as the fishing pattern became more local and within less grids the economic performance declined. The best economic performance was the distant firm (21-40%): 57% had a BBP>0 and a mean of $45,547 and 47% with a BEP>0 and mean of $28,726 – the best economic performance by a subset of the trawl sector. Fishing pattern was statistically significant in all profit indicators except RRC.

6.6 REPORT CARD OF THE QUEENSLAND TRAWL SECTOR FISHING FLEET

Economic performance of the Queensland trawl fleet was estimated by the financial and economic profit indicators of the trawl sectors, determined from the survey, being extrapolated to the total population of in-scope trawl sector firms (Table 3.3) based on the statistical means of the profit indicators for the characteristic 'level of fishing intensity' of the trawl sector firms derived in the previous sections of this chapter.

6.6.1 Estimated Economic Performance of the Otter Trawl Sector Fleet

Overall, the otter trawl sector fleet generated a total BBP of $0.233M or mean BBP of $8,122 with 45% of these firms met the financial profit criteria BBP>0. The Boat Business Profit Index of 103 (se=4) with a relative variation of 48%. Otter trawl fleet NER was estimated at -$7.648M, mean BEP of -$12,660, median of -$22,070 and where 37% of firms met the economic profit criteria BEP>0. The average otter trawl sector firm had capital valued at $460,100 invested in the fishing operation. Overall, the otter trawl firms generated a TBCR of $277.9M and had a mean TBCR of $246,249 per firm (se=$14,054) with a median of $219,708 and used a mean TBCC of $185,432 (se=$9,163), median $167,105 (Table 6.43).

For example, these firms spent:

- mean owner and family labour costs of $31,363 (se=$1,413), median of $32,610;
- mean operating fixed costs (such as interest, insurance, leasing, licence and industry fees) of $27,192 (se=$1,600), median of $20,863;
- mean operating variable costs (such as fuel, crew, repairs and maintenance) of $156,750 (se=$8,212), median of $135,600; and
- mean opportunity cost of capital of $22,788.

Table 6.43: Estimated Economic Performance of Otter Trawl Sector Fishing Fleet

Indicator	Estimated Otter Trawl Fleet Values (a) ($M)	Mean (b) ($)	Median (b) ($)
Receipt and Cost indicator			
Total Boat Cash Receipts	118.7	246,249	219,708
Total Capital Investment	277.9	460,100	393,700
Licence Package Value	64.9	107,387	102,000
Total Boat Fixed Costs	16.4	27,192	20,883
Total Boat Variable Costs	94.7	156,750	135,600
Total Boat Cash Costs	112.0	185,432	167,105
Depreciation	15.6	25,838	22,200
Imputed Labour Costs	18.9	31,363	32,610
Financial Profit Indicator			
Boat Gross Margin	44.3	89,499	16.199
Boat Operating Surplus	29.2	60,817	41,929
Gross Returns Index	132		
Boat Cash Income	9.1	33,959	10,260
Rate of Return Full Equity	3.6%		
Rate of Return to Capital	4.7%		
Profit at Full Equity	1.7%	16,537	-3,887
Boat Business Profit	0.233	8,122	-6,753
% of Firms BBP>0	56%		
Economic Profit Indicator			
Boat Economic Profit		-12,660	-22,070
Net Economic Return	-7.648		
% of Firms BEP>0	37%		

(a) Costs based on means of the survey extrapolated to the population of the otter trawl sector fleet.
(b) Taken from survey sample of 181 otter trawl firms.

These results suggested that the otter trawl sector is about breaking even and indicated that the otter trawl fleet will require structural adjustment.

Sensitivity analysis indicates that changes in all otter trawl indicators were relatively elastic (e>1) to changes in TBCR. However, BGM, BOS, were inelastic (e<1) for changes in major cost items such as fuel and repairs and maintenance. The financial indicator (BCI, BBP and RRC) and the economic indicators (BEP and NER) were elastic to changes in these cost items.

Economic performance was also based on the characteristics of the otter trawl sector firm. For example:

Degree of Specialisation: The otter trawl sector was highly specialised (98%): 45% of firms with BBP>0, mean BBP of $8,796 and 37% with BEP>0 and mean BEP of - $12,167. Degree of specialisation was not significant in the economic performance of the otter trawl fishing firm.

Size of the Fishing Operation: Mainly medium scale fishing operations (10m to18m): the 21-30HU class was the best performance with 51% of firms with a BBP>0 and a mean BBP of $21,046 and the only class to make BEP>0 with a mean of $7,938. Size of fishing operation was not significant in the economic performance of the otter trawl firm.

Level of Fishing Intensity: The otter trawl sector had a high level of fishing intensity: firms with intensity greater than 150 days had the better performance, the best was the group of firms that fished for 200-250 days – 67% had a BBP>0 and a mean BBP of $48,255, 63% had a BEP>0 and a mean BEP of $22,804. Level of fishing intensity was significant in the economic performance of these firms.

Location of Fishing Firm. The fishing firm is located along the coast with the Northern and Far North regionally based firms performing better: Northern region had the best performance with 62% with BBP>0 and a mean of $29,202 and 52% with BEP>0, mean of $9,796 and NER of $0.206M. Location was not significant in the economic performance of the otter trawl firm.

Level of Fishing Activity. The sector had a wide range of fishing activity: as expected as TBCR increased so did the level of economic performance. Best performance was for activity greater than $200,000. Level of fishing activity was significant in the economic performance of these firms.

Fishing Pattern. The fishing pattern was highly local (52% of the sample had a fishing pattern greater than 61% local) and fished within a relatively few grid squares (60% less than 10): as the fishing pattern became more local and within less grids the economic performance declined. The best economic performance was the distant firm (21-40%): 57% had a BBP>0 and a mean of $45,547 and 47% with a BEP>0 and mean of $28,726 – the best economic performance by a subset of the trawl sector. Fishing pattern was significant in the economic performance of the otter trawl firm.

In summary, the otter trawl sector had medium sized firms with part-time operators, dispersed along the Queensland coast, harvested a range of prawn species and generated relatively medium levels of income from local fishing areas. The larger scale operations fished more intensively less locally and generated the majority ($44.6M, 63%) of the survey sample's contribution to Queensland's GVP.

6.6.2 Estimated Economic Performance of the Beam Trawl Sector Fleet

Overall, the beam trawl sector fleet generated a total BBP of $0.264M or mean BBP of $5,191, median of -$6,823 with 43% of these firms met the financial criteria BBP>0. The Boat Business Profit Index of 103 with a relative variation of 48%. Beam trawl fleet NER was estimated at $0.007M, mean BEP of $126, median of -$9,443 and where 43% of firms met the economic profit criteria BEP>0. The average beam trawl sector firm had capital valued at $6.6M invested in the fishing operation. Overall, the beam trawl firms generated a TBCR of $277.9M and had a mean TBCR of $90,320 per firm with a median of $63,475 and used a mean TBCC of $47,210 and median $31,060 (Table 6.44).

For example, these firms spent:

- mean owner and family labour costs of $32,012 (se=$3,844), median of $34,008;
- mean operating fixed costs (such as interest, insurance, leasing, licence and industry fees) of $7,300 (se=$1,835), median of $44,309;
- mean operating variable costs (such as fuel, crew, repairs and maintenance) of $38,183 (se=$11,310), median of $23,820; and
- mean opportunity cost of capital of $5,062.

These results suggested that the beam trawl sector is about breaking even and has the economic signs of an open access fishery.

Table 6.44: Estimated Economic Performance of the Beam Trawl Sector Fishing Fleet

Indicator	Estimated Beam Trawl Fleet Values (a) ($M)	Mean (b) ($)	Median (b) ($)
Receipt and Cost Indicator			
Total Boat Cash Receipts	3.7	90,320	63,475
Total Capital Investment	6.6	192,471	168,500
Licence Package Value	3.1	61,619	55,000
Total Boat Fixed Costs	0.4	7,360	4,309
Total Boat Variable Costs	1.9	38,183	23,820
Total Boat Cash Costs	2.4	47,210	31,060
Depreciation	3.0	5,908	3,240
Imputed Labour Costs	1.8	35,381	34,008
Financial Profit Indicator			
Boat Gross Margin	2.7	52,138	41,261
Boat Operating Surplus	2.2	43,111	32,415
Gross Returns Index	189		
Boat Cash Income	0.6	10,987	-2,433
Rate of Return to Full Equity	3.2%		
Rate of Return to Capital	4.7%		
Profit at Full Equity	0.3	6,189	-6,823
Boat Business Profit	0.264	5,191	-6,823
% of Firms BBP>0	43%		
Economic Profit Indicator			
Net Economic Return	0.007		
Boat Economic Profit		126	-9,443
% of Firms BEP>0		43	

(a) Costs based on means of the survey factored to the population of the beam trawl sector fleet.
(b) Taken from survey sample of 21 beam trawl firms.

Sensitivity analysis indicates that changes in all beam trawl indicators were relatively elastic (e>1) to changes in TBCR. However, BGM, BOS, were inelastic (e<1) for changes in major cost items such as fuel and repairs and maintenance. The financial indicators (BCI, BBP and RRC) and the economic indicators (BEP and NER) were elastic to changes in these cost items.

CHAPTER 7

ECONOMIC PERFORMANCE OF THE LINE SECTOR

The line fishery was the second largest component of the Queensland commercial fishing industry in 1997/98 in terms of gross value of production (GVP). General characteristics of the line fishery are presented within Chapter 3 to provide a brief overview of the level and value of production, type of species, regional data and other details. The line sector represents fishing firms with specialisation codes La-Lf, as defined in Chapter 3, that have taken fish species attributable to the line fishery and which contribute significantly to the TBCR of the line firm.

Financial and economic profit indicators for the line sector are analysed in this chapter. The basis of the analysis was a cost and earnings survey of the line sector. The sample for the line sector was 118 firms or 29% of the in-scope line sector population and 34% of the in-scope line GVP (Table 3.3). Refer to Chapter 2 for methodology cautions. Economic performance of the line sector is measured through financial and economic profit indicators. Estimates for the line sector fleet are extrapolated from these survey results; Report Card in section 7.5. Sections 7.1 to 7.4 are the results of the survey for the line sector.

7.1 LINE SECTOR RECEIPT AND COST INDICATORS

Receipt and Cost indicators are fundamental data used for determining the financial and economic profit indicators of the line sector and of the individual line firm. Total Boat Cash Receipts

Total Boat Cash Receipts (TBCR) for the line sector was $13.068M or 34% of line fleet GVP.

Table 7.1: Line Sector: Total Boat Cash Receipts

Total Boat Cash Receipt Class ($'000)	Proportion of Line Firms (%) (n=118)
<10	4
10 to 25	15
25 to 50	18
50 to 100	20
100 to 250	33
>250	10

Some 37% of line firms had Total Boat Cash Receipts less than $50,000 in 1997/98 and 66% of the line firms realised TBCR between $100,000 and $500,000, with a mean TBCR of $119,749 (se=$10,061) and a median of $71,497.

Table 7.2: Line Sector: Total Boat Cash Receipts by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	COV (%)	Proportion of Line Firms (%)
0-10	70,853	47,180	9,494	108	57
10-14	135,284	128,784	14,310	67	35
14-18	211,301	168,769	52,398	74	8

(less than 5 in the 18+m class)

In addition, mean cash receipt per day for the line firm was $948, with a range from $124 to $7,305. The mean TBCR increased as the boat length class increased with relative variation less in the middle sized fishing operations (10-14m) (Table 7.2).

A moderate proportion of the line sector family income was dependent upon income from their fishing activity (Table 7.3). For example, 36% of the line sector firms totally relied on line fishing for their family income from compared with 48% of all surveyed families. Line families were therefore generally less reliant on their line fishing business operation to keep the family afloat than the average fishing firm.

Table 7.3: Family Reliance on Income from their Line Sector Fishing Operation

Proportion of family income from fishing business (%)	Proportion of Line Firms (%)	Proportion of Surveyed Firms (%)
<20	22	11
20 – 39	5	7
40 – 59	12	10
60 – 79	7	5
80 – 99	17	18
100	36	48

7.1.1 Capital Invested in the Line Sector

The major capital investment (Table 7.4a) by the line sector firm was primary boat hull and permanent fixtures (46%).

Table 7.4a: Line Sector: Capital Investment

Capital Item	Mean ($)	Proportion of Total Capital (%)
Primary boat hull and permanent fixtures	104,097	46
Electronics	15,197	6
Licence Package	58,924	27
Other capital items	45,955	21
Total	218,473	

The Licence Package, upon which the business operation depends, also represented a considerable proportion (27%) of total capital. Other capital items, included tender boats, sheds, cold-rooms, trailers, and fishing gear made up around 21% of the total capital investment.

7.1.2 Value of Line Licence Packages

The mean value of a line Licence Package was $58,924 (se=$1,443) with similar relative variability between boat length classes with a median of $50,000 (Table 7.4b).

Table 7.4b: Line Sector: Value of Licence Packages by Boat Length

Boat Length Class	Value of Licence Package			
	Mean ($)	Median ($)	Standard Error ($)	COV (%)
0-10	52,354	45,000	1,557	24
10-14	63,625	70,000	2,435	24
14-18	75,000	80,000	3,909	16

(less than 5 in the 18+m class)

7.1.3 Total Boat Fixed Costs

The major components of fixed costs were insurance (25%) and overdraft interest (21%), licence and industry fees (15%), leasing costs (10%) and communications (9%). mean TBFC were $12,864 (se=$1,600) with a median of $8,310 (Table 7.5).

Table 7.5: Line Sector: Total Boat Fixed Costs

Key Fixed Cost Items	Mean ($)	Proportion of TBFC (%)
Banking charges	683	5
Communications	1,319	9
Electricity	509	2
Insurance costs	5,010	25
Leasing costs	4,985	10
Licence & industry fees	1,887	15
Meetings & conferences	534	-
Motor vehicle registration	490	3
Office consumables	218	1
Other boat fees (survey)	560	2
Overdraft interest	6,873	21
Port/jetty/harbour fees	1,855	9
TBFC	12,864	-

7.1.4 Total Boat Variable Costs

For the line firm, the total TBVC was $7.656M with mean TBVC of $64,877 (se = $6,582) and a median of $36,537. The major variable costs incurred by the average line firm were labour (42%), fuel (16%), and boat repairs and maintenance (17%) (Table 7.6). Together these represent 75% of the total variable costs of the line business operation.

Table 7.6: Line Sector: Total Boat Variable Costs

Key Variable Cost Items	Mean ($)	Proportion of TBVC (%)
Bait	4,354	6
Chemicals	502	1
Food for crew	5,104	6
Fuel, oil and grease (boat)	10,769	16
Gas (LPG) for boat	252	-
Ice	1,764	1
Labour costs (paid crew)	43,722	42
Marketing	3,343	1
Motor vehicle	2,640	3
Packaging material	2,103	2
Purchases fishing gear	3,830	5
Repairs & maintenance	11,932	17
Total	67,154	

Table 7.7: Line Sector: Median Labour Costs by Boat Length

Boat Length (m)	Total Labour Costs ($)			
	Crew Wages	Imputed Wages	Total Wages	Full Time Equivalent Crew (a) (n)
<10	0	19,732	19,732	0.9
10-14	24,100	22,880	46,980	2.1
14-18	48,085	21,120	69,205	3.0

(a) FTE is based on $22,880 (non-trawl crew wage from survey) and is therefore an estimate of the relative crew size and may not reflect actual crew numbers because of part-time and seasonal fluctuation. It is also not dependent on the definition of the number of full time weeks as this varies throughout the industry.

Mean paid crew labour costs were $43,722 or 42% of variable costs or 25% of TBCR. Mean imputed wages were $21,453 making the total labour costs per firm a mean of $65,175 or the

equivalent of 2.8FTEs per firm median labour costs according to the size of the line firm increased with boat length (Table 7.7).

7.1.5 Total Boat Cash Costs

Sixty nine percent of the line sector firms had TBCC of less than $100,000, with a mean TBCC of $80,047 (se=$7,689) and a median of $45,127 (Table 7.8).

Table 7.8: Line Sector: Total Boat Cash Costs

TBCC Class ($'000)	Proportion of Otter Trawl Firms (%)
< 50	53
50-100	16
100-250	24
> 250	7

7.2 LINE SECTOR FINANCIAL PROFIT INDICATORS

This section deals with the derivation and explanation of the following financial indicators: Boat Gross Margin (BGM), Boat Operating Surplus (BOS), and the Gross Returns Index (GRI), Boat Cash Income (BCI), Profit at Full Equity (PFE), Boat Business Profit (BBP) and Rate of Return to Capital (RRC). All of these indicators are a different measure of 'profit' of the line sector firm based on incorporation of different costs.

7.2.1 Boat Gross Margin

Boat Gross Margin (BGM) for the line sector was $5.413M after variable costs (fuel, crew wages and repair and maintenance) were covered. Mean BGM for 1997-98 was $45,872 (se=$6,151) with a median of $34,810. Mean BGM increased with boat length class (Table 7.9).

Table 7.9: Line Sector: Boat Gross Margin by Boat Length

Boat Length Class (m)	Mean ($)	Median($)	Standard Error ($)	BGM<0 (%)	Total BGM ($)	BGM Index (a)	COV (%)
<10	37,203	27,185	6,787	11	2.418	211	190
10 – 14	46,104	40,664	8,764	18	1.844	152	120
14 - 18	83,382	81,329	26,890	Zero	0.750	165	27

(a) Boat Gross Margin Index is ***(TBCR/TBVC)*100*** – the higher the index the more efficient the use of inputs.

Boat Gross Margin Index as a profit indicator is a relative measure of the efficient use of receipts when only variable costs are covered. For example, although the mean BGM for the small boat classes is lower it has a much higher BGM index. The higher the index, the more efficient the use of cash inputs: indicating a relatively lower cost structure. However, there was less relative variation (COV) in the larger boat length classes (Table 7.9). Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BGM for the size of the line fishing operation (Table 7.20).

7.2.2 Boat Operating Surplus

Boat Operating Surplus (BOS) is a measure of the ability of the line sector firm to cover all cash costs. BOS for the line sector was $3.623M after operational variable costs (fuel, crew and repairs and maintenance) and fixed costs (interest, insurance, leasing and licensing and industry fees) are covered. Mean BOS for the line firm was $30,703 (se=$5,889) and median of $23,874.

Twenty three percent of line firms operated at a negative BOS compared with 20% of all surveyed firms (Table 7.10).

Table 7.10: Line Sector: Boat Operating Surplus

Boat Operating Surplus Class ($'000)	Proportion of Line Firms (%)	Proportion of Surveyed Firms (%)
< -50	4	4
-50 to 0	19	16
1 to 25	30	26
25 to 50	22	20
50 to 100	14	19
> 100	11	15

Table 7.11: Line Sector: Boat Operating Surplus by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BOS<0 (%)	Total BOS ($M)	BOS Index (a)	COV (%)
<10	28,535	23,734	6,826	23	1.855	167	104
10-14	26,035	24,174	7,873	23	1.041	124	72
14-18	59,078	66,544	26,272	22	0.532	139	28

(a) BOS Index is ***(TBCR/TBCC)*100*** and is equivalent to the Gross Return Index. The higher the index the more efficient the use of inputs indicating a lower cost structure.

Median BOS for the line sector increased with boat length class (Table 7.11). However, BOS for the smallest boat length classes differed markedly from that of the other classes as the BOS Index is much higher. However, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BOS for the size of the line fishing operation (Table 7.20).

7.2.3 Gross Return Index

A Gross Return Index (GRI) of less than 100 means a cash operating loss. Average GRI for the line sector was 138 meaning $138 cash was generated from $100 cash spent by the average line firm.

7.2.4 Boat Cash Income

Boat cash income (BCI) is the profit indicator that provides an estimate of the ability of the line firm to cover the all cash costs and the opportunity costs of the owner-operator and that of family wages. The imputed wages of owner-operated line firms were estimated at $440/week or annual wage of $22,880 based on wages provided in the economic survey. An imputed value of family contribution, to the fishing firm was estimated at $406/week or an annual wage of $21,112 based upon other industries and their similarities to the fishing sector.

Table 7.12: Line Sector: Boat Cash Income by Boat Length

Hull Unit Class	Mean ($)	Median ($)	Standard Error ($)	BCI<0 (%)	Total BCI ($M)	BCI Index (a)	COV (%)
<10	8,404	5,878	6,802	46	0.546	113	62
10-14	8,432	6,179	7,812	38	0.337	106	72
14-18	33,328	1,440	27,004	44	0.300	119	55

(a) BCI Index is ***TBCR/(TBCC + Imputed Wages)*100***. The higher the index the more efficient the use of inputs indicating a lower cost structure.

Total BCI for the line sector was $1.306M after imputed wages were also covered. Some 56% of the line firms had a positive BCI. Average BCI was $11,067 (se=$5,837) with a median of $5,290 (Table 7.12). The small sized firms were more able to cover imputed wages for owner-operator and the family involved in the business.

Adding imputed wages to TBCC for the line sector caused the number of small operators (0-10m) with BCI<0 to increase from 23% to 46%. An increase that occurred because firms with smaller boats had a higher proportion of total cash costs (ie. excluding depreciation) related to imputed wages – a feature of the owner-operated fishing business. The best BCI boat length class was the 14-18m group with a significantly larger mean BCI and a BCI Index of 119. Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BCI for the size of the line fishing operation (Table 7.20).

7.2.5 Boat Business Profit

Boat Business Profit (BBP) for the line sector was a negative $0.022M, mean BBP was -$184 (se=$5,962) with a median of -$2,540 compared with that of the average surveyed firm which had a mean BBP of $4,687 (se=$4,299) and a median BBP of -$4,687.

Table 7.13: Line Sector: Boat Business Profit

Boat Business Profit ($'000)	Proportion Line Firms (%)	Proportion of Surveyed Firms (%)
< -50	18	15
-50 to 0	33	39
1 to 25	26	18
25 to 50	9	10
50 to 100	9	10
100 to 150	2	12
> 150	3	6

Some 49% of the line sector had BBP>0 compared with 46% of the surveyed firms (Table 7.13). This indicated that for 1997-98, based upon the assumptions made regarding imputed labour and depreciation, the majority of line firms were not making a financial profit (i.e. BBP<0).

Adding depreciation to BCI for the line sector, creating BBP, caused the number of small operators (<10m) making a loss to increase from 46% to 49%. The best financial performance was that of the 14-18m class (Table 7.14). Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BBP for the size of the line fishing operation (Table 7.20).

Table 7.14: Line Sector: Boat Business Profit by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BBP<0 (%)	Total BBP ($)	BBP Index (a)	COV (%)
<10	716	293	6,610	49	0.047	101	70
10-14	-4,714	-4,924	8,323	53	-0.189	97	49
14-18	17,064	1,440	28,394	44	0.154	109	31

(a) BBP Index is ***TBCR/(TBCC + Imputed Wages + Depreciation)*100***. The higher the index the more efficient the use of inputs indicating a lower cost structure. (b) 70+HU class did not have enough respondents.

Sensitivity Analysis

Given that imputed wages were an estimate of what owner-operators paid or should have paid themselves as opposed to what the opportunity cost actually was, dependent upon unemployment levels throughout Queensland that would depress such wages, a sensitivity analysis was undertaken (Table 7.15). The lower the imputed wage estimate and the higher the level of cash receipts the better the financial position of the sampled firms. For example, the percentage of line firms making a financial profit increased from 40% to 50% when both wages and TBCR were adjusted by 10%. BBP of the line sector would breakeven with an increase of TBCR of less than one percent.

Table 7.15: Estimates of Boat Business Profit: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts for the Line Sector

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	BBP ($M)	% of firms BBP>0	BBP ($M)	% of firms BBP>0	BBP ($M)	% of firms BBP>0
Study estimate (c)	-0.021	40	0.632	46	1.285	50
Estimate less 10%	0.021	42	0.863	48	1.517	50
Estimate less 20%	0.441	43	1.095	48	1.749	51

(a) Owner-operators and family members may be willing to forego equivalent wages of paid crew and skippers for their labour in the business. 20% is an estimate of the imputed wage relating to unemployment benefits that might be appropriate for some sections of the industry as an approximate opportunity cost of labour.
(b) Increased receipts could arise from under-reporting in official logbooks, underestimate of beach prices or from a favourable change in exchange rates increasing export prices.
(c) Study estimate based on the wages paid by equivalent work paid for and reported in the survey

7.2.6 Profit at Full Equity

Profit at Full Equity was $0.420M for the line sector, mean PFE was $3,562 (se=$5,891) and median of $569. For different boat classes, mean PFE were $2,487 (<10m), -$848 for (10-14m) and for $24,362 (14-18m).

7.2.7 Rate of Return to Boat Capital

The distribution of RRC (Table 7.16) showed that 49% of the line firms generated an RRC less than zero compared with the average firm with 52%. The line firms had 24% of the lowest RRC (<-20%) and 29% with the highest RRC (>20%). However, 64% of line firms had an RRC less than the opportunity cost of capital @10%. There was a significant difference (ANOVA, $p<0.05$) between size of line fishing operation and RRC (Table 7.20).

Table 7.16: Line Sector: Rate of Return to Capital

Rate of Return to Capital Class (%)	Proportion of Line Trawl Firms (%)	Proportion of Surveyed Firms (%)
< -20	24	24
-20 to -10	14	12
-10 to zero	11	16
zero to +10	15	11
+10 to +20	7	10
> +20	29	27

7.3 LINE SECTOR ECONOMIC PROFIT INDICATORS

This section deals with the derivation and explanation of the following economic indicators: Boat Economic Profit (BEP) for the individual fishing business (also known as the producer surplus) and Net Economic Return (NR) from the sector, fishery or industry (also known as a qualified estimate of fishery rent as it also includes the externalities related to line fishing operations).

7.3.1 Boat Economic Profit

Boat Economic Profit (BEP) is the net economic contribution of the line sector firm to the Queensland economy and takes into account some of the opportunity costs of fishing operations. BEP is also the contribution of the individual firm to the producer surplus of the line sector.

Table 7.17: Line Sector: Boat Economic Profit by Boat Length

Hull Unit Class	Mean ($)	Median ($)	Standard Error ($)	BEP<0 (%)	Total BEP ($)	BEP Ratio (a)	COV (%)
<10	-5,630	-4,861	6,506	49	-0.366	92	77
10-14	-13,835	-10,384	8,931	53	-0.553	89	55
14-18	-1,736	16,436	30,339	44	-0.016	97	34

(a) BBP Index is ***TBCR/(TBCC -Interest + Depreciation + Opportunity Cost of Capital)*100***. The higher the ratio the more efficient the use of inputs indicating a relatively lower cost structure.

Total BEP was -$1.059M for the line sector with a mean BEP of –$8,980 (se=$6,051) and a median of -$9,489. The best performing group of line firms was the 14-18m class with a higher BEP Index and a lower relative variation (Table 7.17). Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BEP for the size of the fishing operation (Table 7.20).

Sensitivity Analysis

A reduction in risk premium from 3.7% to 1.5% indicated that the both BEP and NER would be reduced by some 28% (Table 7.18).

Table 7.18: Line Sector: Boat Economic Profit and Net Economic Return for Line Sector by Opportunity Cost of Capital Sensitivity

Fishing Sector	Mean BEP (a) ($)		NER (a) ($M)	
	Opportunity Cost of Capital @ 6.3% plus 1.5% Risk Premium (b)	Opportunity Cost of capital @ 6.3% plus 3.7% Risk Premium (b)	Opportunity Cost of Capital @ 6.3% plus 1.5% Risk Premium (b)	Opportunity Cost of Capital @ 6.3% plus 3.7% Risk Premium (b)
Line	-6,481	-8,980	-0.765	-1.060
Surveyed firms	-3,648	-7,037	-1.744	-3.364

(a) BEP and NER based on the 1997-98 average long term Government bond rate of 6.3% (Queensland Treasury Corporation) (refer Morison, 1999 for similar methodology where 5% premium was chosen and 7% was the assumed real interest rate by ABARE in Rose and Stubbs (2000)).

(b) Risk premium based on administration costs of 1%, bad debts 0.5% and a personal risk premium for the individual between 0% and 2.5% -fishing industry/rural sector regarded at the upper end of this range (Queensland Rural Adjustment Authority). Queensland Treasury suggested a risk premium of 5% as the lowest of a range of 5-9.3%.

7.3.2 Net Economic Return

Net Economic Return of the line sector was -$1.060M or –8.1% of their GVP. Queensland therefore contributed $1.060M of resources towards the catching of line caught product. This indicated that the line sector was behaving as if it were operating as an open access fishery where all economic rents were dissipated.

Sensitivity Analysis

NER was also sensitive to changes in imputed wages and TBCR. The lower the imputed wage estimate and the higher the level of cash receipts the better the economic performance of the sampled firms (Table 7.19). For example, the percentage of line firms making a economic profit increased from 49% to 55% when both imputed wages and TBCR were adjusted by 10%. The level of NER was zero at just over an 8% increase in TBCR.

Net Economic Return would increase by 13.1% for every 1% increase in TBCR. For example, NER would be -$1.992M instead of -$2.292M, an improvement of $0.3M. For each 10% increase in fuel and repairs and maintenance NER would decrease by 20% and 16% respectively.

Table 7.19: Estimates of Line Firm Net Economic Return: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	NER $M	BEP>0 (%)	NER $M	BEP>0 (%)	NER $M	BEP>0 (%)
Study estimate (c)	-1.060	49	-0.406	51	0.247	53
Estimate less 10%	-0.828	49	-0.175	52	0.478	55
Estimate less 20%	-0.596	51	0.057	53	0.711	56

(a) Owner-operators and family members may be willing to forego equivalent wages of paid crew and skippers for their labour in the business. 20% is an estimate of the imputed wage relating to unemployment benefits that might be appropriate for some sections of the industry as an approximate opportunity cost of labour.
(b) Increased receipts could arise from under-reporting in official logbooks, underestimate of beach prices or from a favourable change in exchange rates increasing export prices.
(c) Study estimate based on the wages paid by equivalent work paid for and reported in the survey

7.4 ECONOMIC PERFORMANCE OF THE QUEENSLAND LINE SECTOR FIRM

The measurement of the economic performance of the 118 surveyed line fishing firms was based on the following characteristics:

- degree of specialisation (specialisation code);
- size of fishing operation (boat length or hull units);
- level of fishing intensity (days fished per annum);
- location of fishing business (ABS statistical division);
- level of fishing activity (total boat cash receipts);
- fishing pattern (local/distant fishing activity);

Economic performance of the line sector was evaluated based on the following criteria:

- statistical significance of the relationship between the characteristics of the line firm and the levels of financial and economic profit indicators;
- Levels of BBP and BEP;
- the means/medians of BBP and BEP for each characteristic; and
- proportion of subsets of the line sector firms with BBP>0 and BEP>0.

A set of null hypotheses (H_o) were tested which related each financial and economic indicator (BGM, BOS, BCI, BBP, BEP, and RRC) against the characteristics of the line fishing firm (fishing sector, degree of diversification, size of business operation, location of fishing business, level of fishing intensity, level of fishing activity and fishing pattern).

Table 7.20: Testing the Null Hypotheses (H_0) that there is no significant difference in the level of a financial profit and economic profit indicator and the characteristics of the Line Fishing Firm. (Yes = reject H_0 and p<0.05)

Profit Indicator	Characteristics of the Line Firm					
	Degree of Specialisation	Size of Fishing Operation	Location of Fishing Business	Level of Fishing Intensity	Level of Fishing activity	Fishing Pattern
Financial Profit Indicator						
BGM	NO	NO	NO	**YES**	**YES**	**YES**
BOS	NO	NO	NO	**YES**	**YES**	NO
BCI	NO	NO	NO	**YES**	**YES**	**YES**
BBP	NO	NO	NO	**YES**	**YES**	NO
RRC	NO	**YES**	NO	NO	NO	NO
Economic Profit Indicator						
BEP	NO	NO	NO	**YES**	**YES**	NO

(a) The results summarised in this table were based on ANOVA univariate analysis and the Yes/No meant that the results of each individual relationship met or failed to meet the ANOVA criteria of P<0.05.

For 'intensity of fishing operation' (days fished) and 'level of fishing activity' (TBCR) there was a significant difference for all major indicators except RRC (Table 7.20). Other characteristics such as 'fishing pattern' and 'size of fishing operation' had a minor effect. For example, size of the fishing operation was significant for RRC.

7.4.1 Economic Performance by Degree of Specialisation

The surveyed line sector was divided into two main categories: specialised fishing firms where one and only one fishery attributed more than 10% of TBCR and all other firms were classed as diversified (Table 3.2).

As a group, diversified line firms performed poorly in their contribution to the economy (Table 7.21). For example, a high proportion of diversified firms operated at a financial loss (58% where BBP<0) and at an economic loss (74% where BEP<0). The specialised firms performed relatively better and had a higher BBP and BEP than the diversified firms. This indicated that the line fleet behaved as an open access type fishery where all economic rents are usually dissipated. Overall, ANOVA testing indicates that there were no significant differences ($p<0.05$) in any profit indicator for the degree of specialisation of the line fishing firm (Table 7.20).

Table 7.21: Mean Economic Performance of Line Sector: Degree of Specialisation

Profit Indicator	Degree of Specialisation	
	Specialised Line Firm ($)	Diversified Line Firm ($)
Boat Gross Margin ($)	50,127	23,701
Boat Operating Surplus ($)	33,904	14,023
Gross return Index	142	119
Boat Cash Income ($)	15,053	-9,699
Profit at Full Equity ($)	7,271	-15,765
Rate Return to Capital (%)	3.2	-12.2
Boat Business Profit ($)	3,193	-17,779
% Firms BBP>0	53	32
Boat Economic Profit ($)	-6,159	-23,682
Net Economic Return ($M)	-0.610	-0.450
% Firms BEP>0	42	26

Summary: The majority of the line sector firms were specialised (78%): 53% of specialised firms had BBP>0, mean of $3,193 and 42% with BEP>0 and a mean of -$6,159. Degree of specialisation was not significant in the economic performance of the line sector.

7.4.2 Economic Performance by Size of Fishing Operation

The economic performance of the line sector varied for the three boat length classes. The 14-18m class had the best economic performance where 56% had BBP>0 and BEP>0 with mean BBP of $17,064 and mean BEP of -$1,736 (Table 7.22),

The greatest variability occurred in the line firms with the smallest sized fishing operations across all profit indices and specifically between cash indices of BGM and BOS, and the other indicators which included non-cash items such as imputed wages, depreciation and opportunity cost of capital (Table 7.23). The best performance was the 14-18m group of line firms with the highest profit indices and lowest variation in the data. Overall, ANOVA testing indicates that there were no significant differences ($p<0.05$) in any economic performance indicator for the size of operation of the line fishing firm as given in Table 7.20.

Table 7.22: Mean Economic Performance of Line Sector: Size of Fishing Operation

Profit Indicator	Size of Fishing Operation (boat length)		
	<10m	10-14m	14-18m
Boat Gross Margin ($)	37,203	46,104	83,382
Boat Operating Surplus ($)	28,535	26,035	59,078
Gross returns Index	167	124	139
Boat Cash Income ($)	8,404	8,432	33,328
Profit at Full Equity ($)	2,487	-848	24,362
Rate of Return to Capital (%)	2.3	-0.5	8.2
Boat Business Profit ($)	716	-4,714	17,064
% Firms BBP>0	51	48	56
Boat Economic Profit ($)	-5,630	-13,835	-1,736
Net Economic Return ($M)	-0.366	-0.553	-0.205
% Firms BEP>0	43	33	56

Table 7.23: Mean Economic Performance of Line Sector: Size of Fishing Operation

Profit Index	Size of Operation (boat length)					
	<10m		10-14m		14-18m	
	Index	COV	Index	COV	Index	COV
Boat Gross Margin	211	190	152	101	165	27
Boat Operating Surplus	167	104	123	72	139	28
Boat Cash Income	113	72	106	55	118	27
Profit at Full Equity	103	92	99	52	113	29
Boat Business Profit	101	70	96	49	108	31
Boat Economic Profit	92	77	89	55	97	34

7.4.2.1 Economic Performance by Size of Fishing Operation and Level of Fishing Activity

However, when size of operation was linked to level of fishing activity, the best performance was the group of line firms with a TBCR greater $150,000 and specifically the less than 10m sized line firms which had a mean BBP of $94,682 and a mean BEP of $82,929. A remarkable performance compared with the industry means for the same boat length class across all sectors (Table 7.24).

Table 7.24: Economic Performance of Line Sector: Size of Fishing Operation and Level of Fishing Activity

TBCR ($'000)	Size of Fishing Operation (boat length)		
	<10m	10-14m	14-18m
Boat Business Profit ($)			
<150	-8,840	-15,090	na
>150	94,682	12,580	42,016
Profit at Full Equity ($)			
<150	-7,004	-12,094	na
>150	95,812	17,895	50,947
Rate of Return to Capital (%)			
<150	-7.1	-7.2	na
>150	49.5	9.5	14.9
Boat Economic Profit ($)			
<150	-14,636	-25,149	na
>150	82,929	5,022	22,574
Net Economic Return ($M)			
<150	-0.864	-0.629	na
>150	0.497	0.075	0.135

(na means sample less than 5)

7.4.2.2 Economic Performance by Size of Fishing Operation and Level of Fishing Intensity

When size of operation was linked to fishing intensity, the best performance was the group of line firms fishing for more than 150 days and specifically the less than 10m sized line firms which had a mean BBP of $49,575 and a BEP of $43,856 (Table 7.25). As a subset sample,

this group had a NER of $0.657M; one of the better economic performances of the Queensland fishery.

Table 7.25: Economic Performance of Line Sector: Size of Fishing Operation and Level of Fishing Intensity

Intensity (days fished)	Size of fishing operation (boat length)		
	<10m	10-14m	14-18m
Boat Business Profit ($)			
<150	-13,942	-9,917	-5,579
>150	49,575	7,426	na
Profit at Full Equity ($)			
<150	-12,179	-6,835	1,568
>150	51,373	13,123	na
Rate of Return to Capital (%)			
<150	-11.6	-4.2	0.4
>150	44.7	6.5	na
Boat Economic Profit ($)			
<150	-20,476	-18,961	-31,689
>150	43,856	-1,873	na
Net Economic Return ($M)			
<150	-1.024	-0.531	-158,446
>150	0.657	-0.022	na

Summary: Medium scale fishing operations (10m to14m): the 14-18m class had the best performance with 56% of firms with a BBP>0 and a mean of $17,064 and 56% had a BEP>0 with a mean of -$1,736. The impact of 'level of fishing activity' and 'intensity of fishing operation' further disaggregated the mean and median performance. The less than 10m sized line firms performed very well with a level of activity greater than $150,000 mean BBP was $94,682 and mean BEP of $82,929. Size of fishing operation was only significant in the economic performance of the line sector firm measured by RRC.

7.4.3 Economic Performance by Level of Fishing Intensity

Line firms with fishing intensity greater than 100 days had the best mean financial performance based on BBP: more than two thirds of this group of firms had BBP>0. The poorest overall mean BBP performance were firms with a fishing intensity of less than 50 days: 96% had BBP<0. The best performing group of firms were those with a fishing intensity between 200 and 250 days with a mean BBP of $76,544 (Table 7.26).

Table 7.26: Mean Economic Performance of the Line Sector: Level of Fishing Intensity

Profit Indicator	Fishing Intensity (days fished)				
	<50	50-100	100-150	150-200	200-250
BGM	6,119	27,917	47,482	81,343	130,393
BOS ($)	-4,340	20,598	28,868	57,026	117,181
GRI	87	167	129	142	189
BCI ($)	-19,280	-3,137	10,762	38,235	86,824
PFE ($)	-25,414	-11,918	2,626	32,511	78,153
RRC (%)	-18	-9.6	1.5	18	43.3
BBP ($)	-29,171	-13,281	-878	24,955	76,544
% Firms BBP>0	4	41	68	70	67
BEP ($)	-38,261	-21,647	-9,955	17,066	67,103
NER ($M)	-0.918	-0.584	-0.368	0.392	0.403
% Firms BEP>0	4	33	49	61	67

Line firms with fishing intensity greater than 150 days had the best mean economic performance based on BEP. The poorest overall mean BEP performance was the group of firms with a fishing intensity of less than 50 days: 96% made a loss during 1997-98. The best

performance was by the group of firms with a fishing intensity between 200 and 250 days with mean BEP of $67,103. Overall, ANOVA testing indicates that there were significant differences ($p<0.05$) in all economic performance indicators for the intensity of the line fishing operations except for RRC (Table 7.20).

Summary: The fleet had a medium level of fishing intensity with 56% fishing for less than 100 days. Firms with intensity greater than 150 days had the better performance. The best economic performance was firms that fished for 200-250 days: 67% had a BBP>0 and a mean of $76,544, and 67% had a BEP>0 and a mean of $67,103. Level of fishing intensity was significant in the performance of these line firms, except for RRC.

7.4.3 Economic Performance by Location of Fishing Firm

The location of a firm, however, was not necessarily related to the areas fished by that business and was therefore not an indicator of activity within fishing areas. Based on the financial and economic indicators for the average line firm, the firms located in the Brisbane and Moreton regions, appeared to be the most profitable, with the firms located in the Fitzroy and Wide Bay regions appearing less profitable (Table 7.27). However, the Northern region had a much higher proportion of firms with BBP>0 and BEP>0. However, ANOVA testing indicated that there were no significant differences ($p<0.05$) in the profit indicators with respect to the location of line fishing firm (Table 7.20).

Table 7.27: Mean Economic Performance of Line Sector: Location of Fishing Firm

Profit Indicator	Location of Fishing Firm						
	Brisbane	Moreton	Wide Bay	Fitzroy	Mackay	Northern	Far North
BGM	54,000	58,882	8,869	39,844	53,424	32,880	56,826
BOS ($)	31,606	42,126	106	27,095	35,460	24,364	40,039
GRI	152	169	100	139	129	130	155
BCI ($)	20,698	25,368	-14,071	1,922	16,155	9,631	18,482
PFE ($)	25,318	13,680	-21,516	-6,511	9,787	3,820	9.379
RRC (%)	20.5	7.3	-18.3	-4.1	5.8	3.5	5.3
BBP ($)	13,368	12,258	-23,321	-10,000	5,339	2,411	5,617
% Firms BBP>0	33	44	29	39	69	67	50
BEP ($)	12,406	419	-31,788	-18,428	-3,569	-2,852	-4,680
NER ($M)	0.074	0.004	-0.445	-0.423	-0.093	-0.017	-0.159
% Firms BEP>0	33	44	14	39	42	67	44

Summary: The line sector firm was located all along the coast but concentrated in the northern regions. The Brisbane and Moreton regionally based groups of firms performing better: Mackay region had the best overall group performance with 69% with BBP>0 but the Brisbane region's mean performance was better with a mean BBP of $13,368, a mean BEP of $12,406 and NER of $0.074M. Location was not significant in the economic performance of the line sector firm.

7.4.4 Economic Performance by Level of Fishing Activity

Profit indicators appeared to increase as the level of TBCR increased. The mean BBP (Table 7.27) appeared to be positive after a TBCR of $100,000. Within the sector, firms with a TBCR less than $50,000 performed very poorly, 84% had BBP<0 with 86% that had BEP<0. The best performing firms were those generating between $100,000 and $200,000 and over $250,000 with 82% of firms with BBP>0 and BEP>0. Overall, the $151,000 to $200,000 class of line firms had the best economic performance with the highest profit indices and low variation in the data (Table 7.28).

Overall, ANOVA testing indicated there were significant differences ($p<0.05$) in each of the major profit indicators, except for RRC with respect to the level of line fishing activity (Table 7.20).

Table 7.28: Mean Economic Performance of the Line Sector: Level of Fishing Activity

Profit Indicator	**Level of Fishing Activity** (TBCR $'000)					
	0 - 50	**51 - 100**	**101 - 150**	**151 - 200**	**201 - 250**	**250+**
BGM ($)	8,077	31,876	56,975	73,376	58,119	170,991
BOS ($)	-346	23,724	42,321	61,745	9,433	133,428
GRI	99	150	151	159	104	156
BCI ($)	-19,191	3,925	22,722	36,907	-5,611	112,784
PFE ($)	-25,238	-4,105	15,548	29,024	-19,178	104,775
RRC (%)	-22.9	-3.1	10.1	18.7	-6.6	31
BBP ($)	-27,454	-5,647	12,455	26,314	-28,745	92,111
% Firms BBP>0	16	58	75	82	50	82
BEP ($)	-34,311	-14,305	4,182	19,629	-43,940	76,844
NER ($M)	-1.510	-0.343	0.084	0.216	-0.351	0.845
% Firms BEP>0	14	42	50	73	50	82

Table 7.29: Mean Economic Performance of the Line Sector: Level of Fishing Activity

Profit Index	**Level of Fishing Activity** (TBCR $'000)									
	<50		**51-100**		**101-150**		**151-200**		**200+**	
	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)
BGM	147	323	182	113	183	127	178	67	134	36
BOS	99	185	150	91	151	97	159	60	104	40
BCI	57	90	106	82	122	58	128	44	98	32
PFE	50	88	95	84	114	49	121	38	92	29
BBP	48	84	93	137	111	47	118	39	89	32
BEP	42	88	83	94	102	51	111	41	81	33

(a) The number of firms with boats greater than 70 hull units in the sample was too small to be included.

Summary: The sector had a wide range of fishing activity: as expected, as TBCR increased so did the level of economic performance. The best performance were firms with TBCR between $150,000 and 200,000 with 82% with BBP>0 mean of $26,314, 73% had BEP>0 with a mean of $19,629. Levels of fishing activity were significant in the performance of these firms, except for RRC.

7.4.5 Economic Performance by Fishing Pattern

The most distant of fishing patterns (<20% local) had the best economic performance. For example, this group of firms had a mean BBP of $6,563 and mean BEP -$4,028. Local firms (81-100% local) did not perform well. However, the worst group of line firms were those with the greatest variety of fishing patterns (41-60% local) where 33% had BBP>0 and BEP>0 (Table 30). Based on profit indices, the best performance was the group of line firms with a highly distant fishing pattern.

However, when the number of 30' grids fished was considered as a basis of a fishing pattern a different picture emerged (Table 7.32). For example, as the number of grids increased the better the financial and economic performance, except that for line firms fishing greater than 20 grids, the proportion of that sample making a profit fell. The best financial indices were for the very distant fishing operations (<20%) and the 61-80% local and for the group fishing between 15-19 grids, however, no BEP Index was greater than 100 for any pattern of fishing (Table 7.33).

Table 7.30: Mean Economic Performance of the Line Sector: Fishing Pattern

Profit Indicator	Fishing Pattern (proximity)				
	<20%	21-40%	41-60%	61-80%	81-100%
BGM ($)	59,949	47,049	30,642	39,118	27,259
BOS ($)	37,637	30,523	20,791	31,779	20,966
GRI	133	131	130	165	174
BCI ($)	19,469	9,191	5,555	11,604	1,703
PFE ($)	12,119	-1,921	-8,041	2.764	-5,846
RRC (%)	6.2	-1.0	-4.7	2.0	-7.1
BBP ($)	6,563	-7,786	-8,858	1,380	-7,247
% Firms BBP>0	55	50	33	55	42
BEP ($)	-4,028	-17,828	-21,664	-6,461	-11,554
NER ($M)	-0.222	-0.214	-0.195	-0.071	-0.358
% Firms BEP>0	42	42	33	36	39

Table 7.31: Mean Economic Performance of the Line Sector: Fishing Pattern

Profit Index	Fishing Pattern (proximity)									
	<20		21-40		41-60		61-80		81-100	
	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)
BGM	166	237	157	61	151	138	194	185	223	108
BOS	133	78	130	63	130	136	165	156	174	93
BCI	114	65	108	65	107	47	116	49	97	79
PFE	109	89	99	59	92	52	103	50	89	67
BBP	105	64	94	63	91	51	101	51	87	67
BEP	95	71	85	69	80	59	91	56	80	74

Table 7.32: Mean Economic Performance of the Line Sector: Fishing Pattern

Profit Indicator	Fishing Pattern (grids fished)				
	1-4	5-9	10-14	15-19	20+
BGM ($)	19,736	37,605	48,778	76,268	115,448
BOS ($)	10,055	26,650	35,591	61,723	66,724
GRI	128	148	135	156	131
BCI ($)	5,614	3,003	17,552	37,965	51,438
PFE ($)	-10,266	-5,216	6,836	32,025	44,795
RRC (%)	-8.2	-4.0	3.8	19.5	14.6
BBP ($)	-13,875	-6,912	4,788	27,825	30,098
% Firms BBP>0	33	50	50	88	58
BEP ($)	-20,952	-14,748	-6,224	20,262	17,087
NER ($M)	-0.629	-0.649	-0.149	0.162	0.205
% Firms BEP>0	27	36	42	75	58

The proportion of firms using 15-19 grids making a financial profit and an economic profit was extremely high at 88% and 75% respectively. This was supported by the profit indices given in Table 7.33 where the COV for the 15-19 grids was lower than usual in the sample data.

Overall, ANOVA testing indicated there were significant differences ($p<0.05$) for the major profit indicators BGM and BCI with respect to fishing pattern based on number of grids fished (Table 7.20).

Table 7.33: Mean Economic Performance of the Line Sector: Fishing Pattern

Profit Index	Fishing Pattern (grids fished)									
	1-4		5-9		10-14		15-19		20+	
	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)
BGM	176	289	183	135	154	96	180	75	169	116
BOS	128	127	148	112	135	90	156	68	131	79
BCI	89	76	103	68	115	49	128	44	122	82
PFE	82	68	94	64	103	46	122	30	119	148
BBP	77	67	92	62	105	46	119	33	112	89
BEP	67	78	84	69	95	51	111	34	102	97

Summary: The fishing pattern was highly distant (58% were less than 40% local) and fished within a relatively few grid squares (68% less than 10): as the fishing pattern became more local the performance was poorer. The best performance were the very distant line firms (<20%): 55% had a BBP>0 and a mean BBP of $6,563 and 42% had a BEP>0 and mean BEP of -$4,028.

7.5 REPORT CARD FOR THE QUEENSLAND LINE SECTOR FLEET

Economic performance of the Queensland line sector fleet was estimated by the financial and economic profit indicators of the line sector, determined from the survey, being extrapolated to the total population of in-scope line sector firms (Table 3.3, 3.17 and 3.24) based on the statistical means of the profit indicators for the characteristic 'level of fishing intensity' of the line sector firms derived in the previous sections of this chapter.

Overall, the line sector fleet generated a total BBP of -$1.507M with a mean BBP of -$184, median of -$4,687 where 51% of these firms met the financial profit criteria BBP>0. The Boat Business Profit Index was 100. Line fleet NER was estimated at -$3.598M, with a mean BEP of -$8,980, median of -$9,489 and where 49% of firms met the economic profit criteria BEP>0. The average line sector firm had capital valued at $218,473 invested in the fishing operation. Overall, the line firms generated a TBCR of $38.4M and had a mean TBCR of $110,749 per firm with a median of $71,497 and used a mean TBCC of $80,047 with median $46,127 (Table 7.34).

For example, these firms spent:

- mean owner and family labour costs of $21,453 (se=$1,451), median of $21,116;
- mean operating fixed costs (such as interest, insurance, leasing, licence and industry fees) of $12,864 (se=$1,402), median of $8,310;
- mean operating variable costs (such as fuel, crew, repairs and maintenance) of $64,877 (se=$6,582), median of $36,537; and
- mean opportunity cost of capital of $9,164.

Table 7.34: Estimated Economic Performance of Line Sector Fleet

Indicator	Estimated Line Sector Fleet Values (a) ($M)	Mean (b) ($)	Median (b) ($)
Receipt and Cost Indicator			
Total Boat Cash Receipts	38.40	110,749	71,497
Total Capital Investment	87.608	218,473	182,400
Licence Package Value	23.629	58,924	50,000
Total Boat Fixed Costs	5.158	12,864	8,310
Total Boat Variable Costs	26.016	64,877	36,537
Total Boat Cash Costs	3.281	80,047	46,127
Depreciation	4.670	11,646	8,940
Imputed labour costs	8.602	21,453	21,116
Financial Profit Indicator			
Boat Gross Margin	16.480	45,872	34,810
Boat Operating Surplus	11.818	30,703	23,874
Gross Return Index	138		
Boat Cash Income	5.560	11,067	5,290
Boat Business Profit	-1.507	-184	-4,687
Profit at Full Equity	2.749	3,562	569
% Firms BBP>0	51%		
Rate of Return to Capital	2.2%		
Economic Profit indicator			
Boat Economic Profit ($)		-8,980	-9,489
Net Economic Return ($M)	-3.598		
% Firms BEP>0	49%		

(a) Costs based on means of the survey extrapolated to the population of the line sector fleet.
(b) Taken from survey sample of 118 line firms.

These results suggested that the line sector is not breaking even and indicated that the line fleet is acting as an open access fishery that will require structural adjustment at some time in the future.

Economic performance was also based on characteristics of the line sector firm. For example:

Degree of Specialisation. The majority of the line sector firms were specialised (78%): 53% of specialised firms had BBP>0, mean of $3,193 and 42% with BEP>0 and a mean of -$6,159. Degree of specialisation was not significant in the economic performance of the line sector.

Size of the Fishing Operation. Medium scale fishing operations (10m to14m): the 14-18m class had the best performance with 56% of firms with a BBP>0 and a mean of $17,064 and 56% had a BEP>0 with a mean of -$1,736. Size of fishing operation was only significant in the performance of the line sector firm measured by RRC.

Level of Fishing Intensity. The fleet had a medium level of fishing intensity with 56% with less than 100 days. Firms with intensity greater than 150 days had the better performance. The best economic performance was firms that fished for 200-250 days: 67% had a BBP>0 and a mean of $76,544, and 67% had a BEP>0 and a mean of $67,103. Levels of fishing intensity were significant in the performance of these line firms, except for RRC.

Location of Fishing Firm. The line sector firm was located all along the coast but concentrated in the northern regions. The Northern and Mackay regionally based groups of firms performing better: Mackay region had the best performance with 69% with BBP>0 and a mean of $5,339 and 42% with BEP>0 and a mean of -$3,569 and NER of $0.093M. Location was not significant in the economic performance of the line sector firm.

Level of Fishing Activity. The sector had a wide range of fishing activity: as expected as TBCR increased so did the level of economic performance. The best performance were firms with TBCR between $150,000 and 200,000 with 82% with BBP>0 mean of $26,314, 73% had BEP>0 with a mean of $19,629. Levels of fishing activity were significant in the performance of these firms, except for RRC.

Fishing Pattern. The fishing pattern was highly distant (58% were less than 40% local) and fished within a relatively few grid squares (68% less than 10): as the fishing pattern became more local the performance was poor. The best performance were the very distant line firms (<20%): 55% had a BBP>0 and a mean of $6,563 and 42% had a BEP>0 and mean of -$4,028.

CHAPTER 8

ECONOMIC PERFORMANCE OF THE NET SECTOR

The net fishery was the third largest component of the Queensland commercial fishing industry in 1997/98 in terms of gross value of production (GVP). General characteristics of the net fishery are presented within Chapter 3 to provide a brief overview of the level and value of production, type of species, regional data and other details. The net sector represents fishing firms with specialisation codes Na to Nf, as given in Table 3.2, that have taken fish species attributable to the net fishery which contributed significantly to the TBCR of the net firm. The sample for the net sector was 92 firms or 28% of the in-scope net population and 31% of the in-scope net GVP (Table 3.3). The analysis is of the net sector and net sector firms. Refer to chapter 2 for methodology cautions.

Economic performance of the net sector is measured through both the financial and economic profit indictors. Estimates for the net sector fleet are extrapolated from these survey results in the Net Sector Report Card in section 8.5. Sections 8.1 to 8.4 are the results of survey the survey for the net sector.

8.1 NET SECTOR RECEIPT AND COST INDICATORS

Receipt and Cost indicators are fundamental data used for determining the financial and economic profit indicators of the net sector and of the individual net firm.

8.1.1 Total Boat Cash Receipts

Total Boat Cash Receipts (TBCR) for the net sector was $7.829M or 30.6% of net fleet GVP.

Table 8.1: Net Sector: Total Boat Cash Receipts

Total Boat Cash Receipt Class ($'000)	Proportion of Net Firms (%) (n=92)	Proportion of Surveyed Firms (%) (n=478)
< 10	9	3
10 to 25	22	11
25 to 50	15	11
50 to 100	27	24
100 to 250	22	32
> 250	5	19

Some 46% of net firms had Total Boat Cash Receipts less than $50,000 in 1997/98 and 27% of the net firms realised TBCR between $100,000 and $500,000 (Table 8.1), with a mean TBCR of $85,108 (se=$8,968) and a median of $55,007.

Mean TBCR per day for the net firm was $687, with a range from $48 to $3,814. The mean daily cash receipts increased as the boat length class increased with relative variation less in the middle sized fishing operations (10-14m) (Table 8.2). No analysis was undertaken for the larger boat size as the sample was less than 5.

A high proportion of the net sector family income was dependent upon income from their fishing activity (Table 8.3). For example, 46% of the net sector firms totally relied on net fishing for their family income compared with 31% of the surveyed families with a reliance less than 60%, indicating life style or part time participation.

Table 8.2: Net Sector: Total Boat Cash Receipts by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	COV (%)	Proportion of Net Firms (%)
0-10	76,476	52,039	8,544	101	88
10-14	104,737	87,950	27,250	78	10
14-18	na	na	na	na	na

(na means less than 5 in the sample)

Table 8.3: Family Reliance on Income from their Net Fishing Operation

Proportion of Family Income from Fishing Business (%)	Proportion of Net Firms (%)	Proportion of Surveyed Firms (%)
< 20	10	11
20 – 39	4	7
40 – 59	17	10
60 – 79	3	5
80 – 99	19	18
100	46	48

8.1.2 Capital Invested in the Net Sector

The major capital investment (Table 8.4) by the net sector was primary boat hull and permanent fixtures (28%). The Licence Package, upon which the net business operations depended, also represents a considerable capital investment of 30% of total capital. Other capital items included tender boats, sheds, cold-rooms, trailers, and fishing gear make up around 39% of the total capital investment.

Table 8.4: Net Sector: Capital Investment

Capital Item	Mean ($)	Proportion of Total Capital (%)
Primary boat hull and permanent fixtures	54,432	28
Electronics	9,226	4
Licence Package	57,011	30
Other capital items	74,392	39
Total	191,271	

8.1.3 Value of Net Licence Packages

The mean value of a net Licence Package was $57,011 (se=$1,275) with similar relative variability between boat length classes with a median of $50,000. Little difference of Licence Packages between boat length classes was apparent (Table 8.5).

Table 8.5: Net Sector: Value of Licence Packages by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	COV (%)
0-10	57,840	55,000	1,383	22
10-14	48,333	50,000	1,179	7

8.1.4 Total Boat Fixed Costs

For the net firm, the major components of fixed costs were licence and industry fees (23%) insurance (17%) and overdraft interest (15%), communications (12%), leasing costs (8%) (Table 8.6). Total TBFC was $0.818M, mean TBFC was $8,364 (se=$893) with a median of $5,943.

Table 8.6: Net Sector: Total Boat Fixed Costs

Key Fixed Cost Items	Mean ($)	Proportion of TBFC (%)
Banking charges	589	5
Communications	1,098	12
Electricity	728	4
Insurance costs	3,074	17
Leasing costs	3,970	8
Licence & industry fees	1,951	23
Meetings & conferences	554	1
Motor vehicle registration	676	7
Office consumables	319	2
Other boat fees (survey)	417	1
Overdraft interest	3.472	15
Port/jetty/harbour fees	1,264	4
TBFC	8,364	

8.1.5 Total Boat Variable Costs

Total TBVC was $3.752M, mean TBVC of $40,783 (se = $6,006) and a median of $22,625. The major variable costs incurred by the average net firm were labour (39%), fuel (16%), and boat repairs and maintenance (12%) and fishing gear (11%) (Table 8.7) Together these costs represent 78% of the total variable costs of the net business operation.

Table 8.7: Net Sector: Total Boat Variable Costs

Key Variable Cost Items	Mean ($)	Proportion of TBVC (%)
Bait	881	1
Chemicals	259	-
Food for crew	2,713	3
Fuel, oil and grease (boat)	6,747	16
Gas (LPG) for boat	177	-
Ice	1,259	2
Labour costs (paid crew)	31,451	39
Marketing	4,844	5
Motor vehicle	3,254	7
Packaging material	2,642	3
Purchases fishing gear	4,778	11
Repairs & maintenance	5,503	12
Total	40,783	

Table 8.8: Net Sector: Median Labour Costs by Boat Length

Boat Length (m)	Crew Wages	Imputed Wages	Total Wages	Full Time Equivalent Crew (a) (n)
<10	0	22,880	22,880	1
10-14	12,200	30,188	42,388	1.9

(a) FTE is based on $22,880 (non-trawl crew wage from survey) and is therefore an estimate of the relative crew size and may not reflect actual crew numbers because of part-time and seasonal fluctuation. It is also not dependent on the definition of the number of full time weeks as this varies throughout the industry.

The median labour costs for the larger boat size reflect the need for an extra crew member (Table 8.8). However, mean paid crew labour costs were $31,451 or 39% of variable costs or 18% of TBCR. Mean imputed wages were $22,880 making the mean total labour costs of $54,331 or the equivalent of 2.4 FTEs per firm.

8.1.6 Total Boat Cash Costs

Ninety two percent of the net sector firms had TBCC of less than $100,000, with a mean of $49,669 (se=$6,702) and a median of $29,763 (Table 8.9).

Table 8.9: Net Sector: Total Boat Cash Costs

TBCC Class ($'000)	Proportion of Net Firms (%)
<50	66
50-100	26
100-250	4
>250	3

8.2 NET SECTOR FINANCIAL PROFIT INDICATORS

This section deals with the derivation and explanation of the following financial indicators: Boat Gross Margin (BGM), Boat Operating Surplus (BOS), Gross Returns Index (GRI), Boat Cash Income (BCI), Profit at Full Equity (PFE), Boat Business Profit (BBP) and Rate of Return to Capital (RRC).

8.2.1 Boat Gross Margin

Boat Gross Margin for the net sector was $4.077M after variable costs (fuel, crew wages and repair and maintenance) were covered. BGM is an indicator that measures performance without considering the importance of capital. Mean BGM for 1997-98 was $44,324 (se=$6,189) with a median of $26,128. Mean BGM increased with boat length class but variation in the data is high (Table 8.10).

Boat Gross Margin Index as a profit indicator is a relative measure of the efficient use of cash receipts when only variable costs are covered. For example, although the mean BGM for the small boat classes is lower it has a much higher BGM index. The higher the BGM index the more efficient the use of cash inputs, indicating a relatively lower cost structure.

Table 8.10: Net Sector: Boat Gross Margin by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BGM<0 (%)	Total BGM ($)	BGM Index ($) (a)	COV (%)
<10	40,848	21,677	6,228	9	3.309	214	143
10 – 14	58,245	55,498	27,222	22	0.524	225	159

(a) Boat Gross Margin Index is ***(TBCR/TBVC)*100*** – the higher the index the more efficient the use of inputs.

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BGM for the size of the net fishing operation (Table 8.21).

8.2.2 Boat Operating Surplus

Boat Operating Surplus (BOS) is a measure of the ability of the net firm to cover all cash costs. Total BOS for the net sector was $3.260M after operational variable costs (fuel, crew and repairs and maintenance) and fixed costs (interest, insurance, leasing and licensing and industry fees) are covered. Mean BOS for the net firm was $35,438 (se=$5,913) with a median of $21,427.

Table 8.11: Net Sector: Boat Operating Surplus

Boat Operating Surplus Class ($'000)	Proportion of Net Firms (%)	Proportion of Surveyed Firms (%)
< -50	2	4
-50 to 0	15	16
1 to 25	36	26
25 to 50	12	20
50 to 100	22	19
> 100	13	15

Table 8.12: Net Sector: Boat Operating Surplus by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BOS<0 (%)	Total BOS ($M)	BOS Index (a)	COV (%)
<10	33,095	17,886	5,953	16	2.681	176	94
10-14	45,919	40,650	27,903	33	0.413	178	168

(a) BOS Index is ***(TBCR/TBCC)*100*** and is equivalent to the Gross Return Index. The higher the index the more efficient the use of inputs indicating a lower cost structure.

Seventeen percent of net firms operated at a negative BOS compared with 20% of the surveyed firms and had a similar distribution of BOS (Table 8.11). When all cash costs were covered, the boat length classes had similar efficient use of inputs (i.e. BOS Index of 176-178) and mean BOS for the net sector increased with boat length class but there was some variation in the data (Table 8.12).

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BOS for the size of the net fishing operation (Table 8.21).

8.2.3 Gross Returns Index

A Gross Return Index (GRI) less than 100 is a cash operating loss. Mean GRI for the net sector was 171 meaning $171 cash was generated from $100 cash spent by the average net firm.

8.2.4 Boat Cash Income

Boat Cash Income (BCI) is an estimate of the ability of the net firm to cover the all cash costs, the costs of the owner-operator and family wages. The imputed wages of owner-operated net fishing firms were estimated at $440/week or annual wage of $22,880 and based on wages provided in the economic survey. An imputed value of family contribution was estimated at $406/week or annual wage of $21,112 to the fishing firm was based upon other industries and their similarities to the fishing sector.

Total BCI for the net sector was $1.072M after imputed wages were covered. Some 52% of the net firms had a positive BCI. Mean BCI was $11,650 (se=$5,969) and a median of -$760.

The level of BCI related to boat length class was difficult to interpret as the variation in the data is high (Table 8.13). The 10-14m class owners were more able to cover imputed wages for owner-operator and the family involved in the business.

Adding imputed wages to BOS for the net sector, creating BCI, caused the number of small operators (0-10m) making a loss, to increase from 16% to 54% (Tables 8.12 and 8.13). This increase might arise because the net firms with smaller boats had a higher proportion of total cash costs (i.e. excluding depreciation) related to imputed wages – a feature of the owner-operated fishing business.

Table 8.13: Net Sector: Boat Cash Income by Boat Length

Boat Length Class	Mean ($)	Median ($)	Standard Error ($)	BCI<0 (%)	Total BCI ($M)	BCI Index (a)	COV (%)
<10	9,900	-2,156	5,996	54	0.802	115	74
10-14	14,045	4,214	28,075	44	0,126	115	117

(a) BCI Index is ***TBCR/(TBCC + Imputed Wages)*100***. The higher the index the more efficient the use of inputs indicating a lower cost structure.

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BCI for the size of the net fishing operation (Table 8.21).

8.2.5 Boat Business Profit

BBP is the main financial indicator that provides a more complete picture of the financial performance of each net firm in the short to medium term. Total BBP for the net sector was $0.550M, mean BBP was $5,978 (se=$5,937) with a median of -$4,003.

Table 8.14: Net Sector: Boat Business Profit

Boat Business Profit ($)	Proportion of Net Firms (%)	Proportion of Surveyed Firms (%)
< -50	7	15
-50 to 0	49	39
1 to 25	14	18
25 to 50	8	10
50 to 100	17	10
> 100	5	18

The BBP for 56% of the net sector was reported to be negative compared with 54% of the surveyed firms (Table 8.14). This indicated that in 1997-98, based upon the assumptions made regarding imputed labour and depreciation, the majority of line firms were not making a financial profit.

Adding depreciation to BCI for the net sector, creating BBP, caused the number of small operators (<10m) making a loss to increase from 54% to 56% (Tables 8.13 and 8.15). Financial performance, based on BCI, was difficult to interpret because of the high variation in the data (Table 8.15).

Table 8.15: Net Sector: Boat Business Profit by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BBP<0 (%)	Total BBP ($)	BBP Index (a)	COV (%)
<10	5,974	-3,552	5,886	56	0.483	108	71
10-14	699	-6,106	30,023	56	0.006	101	118

(a) BBP Index is ***TBCR/(TBCC + Imputed Wages + Depreciation)*100***. The higher the index the more efficient the use of inputs indicating a lower cost structure. (b) 70+HU class did not have enough respondents.

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BBP for the size of the net fishing operation (Table 8.21).

Sensitivity Analysis

Given that imputed wages were an estimate of what the net owner-operator paid or should have paid themselves as opposed to what the opportunity cost actually was, dependent upon unemployment levels throughout Queensland that would depress such wages, a sensitivity analysis was undertaken (Table 8.16). TBCR was also varied to illustrate changes in BBP through under reporting, price or exchange rate variations.

The lower the imputed wage estimate and the higher the level of cash receipts the better the financial position of the sampled firms. For example, the percentage of net firms making a financial profit increased from 45% to 51% when both wages and TBCR were adjusted by 10% (Table 8.16). BBP would breakeven with a decrease of seven percent of TBCR.

Table 8.16: Estimates of Boat Business Profit: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts for the Net Sector

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	BBP ($M)	% of firms BBP>0	BBP ($M)	% of firms BBP>0	BBP ($M)	% of firms BBP>0
Study estimate (c)	0.549	45	0.941	47	1.333	50
Estimate less 10%	0.769	46	1.160	49	1.552	51
Estimate less 20%	0.988	47	1.379	51	1.771	52

(a) Owner-operators and family members may be willing to forego equivalent wages of paid crew and skippers for their labour in the business. 20% is an estimate of the imputed wage relating to unemployment benefits that might be appropriate for some sections of the industry as an approximate opportunity cost of labour.
(b) Increased receipts could arise from under-reporting in official logbooks, underestimate of beach prices or from a favourable change in exchange rates increasing export prices.
(c) Study estimate based on the wages paid by equivalent work paid for and reported in the survey

8.2.6 Profit at Full Equity

Profit at Full Equity (PFE) was $0.731M for the net sector. Mean PFE for the net firm was $7,951 (se=$5,980) and a median of -$3,837.

8.2.7 Rate of Return to Boat Capital

The distribution of RRC (Table 8.17) indicated that 56% of the net firms generated an RRC less than zero compared with the average surveyed firm with 52%. The net firms had 34% of the lowest RRC (<-20%) and 30% with the highest RRC (>20%). Sixty one percent of net firms had an RRC less than the opportunity cost of capital @ 10%. There was not a significant difference ($p<0.05$) in RRC for the size of net fishing operation (Table 8.21).

Table 8.17: Net Sector: Rate of Return to Capital

Rate of Return to Capital Class (%)	Proportion of Net Firms (%)	Proportion of Surveyed Firms (%)
< -20	34	24
-20 to -10	8	12
-10 to zero	14	16
zero to 10	5	11
10 to 20	9	10
> 20	30	27

8.3 NET SECTOR ECONOMIC PROFIT INDICATORS

This section deals with the derivation and explanation of the following economic indicators: Boat Economic Profit (BEP) for the individual fishing business (also known as the producer surplus) and Net Economic Return (NER) from the net sector.

8.3.2 Boat Economic Profit

Boat Economic Profit (BEP) is the net economic contribution of the fishing firm to the Queensland economy and takes into account all opportunity costs except for the externalities associated with net fishing operations.

Total BEP was $0.117M, mean BEP of $1,274 (se=$6,021) and a median of -$5,336. The best performing group of net firms was the less than 10m class with a higher BEP Index and a lower relative variation (Table 8.18). Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BEP for the size of the net fishing operation (Table 8.21).

Table 8.18: Net Sector: Boat Economic Profit by Boat Length

Boat Length Class	Mean ($)	Median ($)	Standard Error ($)	BEP<0 (%)	Total BEP ($)	BEP Index (a)	COV (%)
<10	3,107	-5,120	5,800	56	0.252	103	77
10-14	-9,053	-19,406	-30,258	56	-0.081	90	132

(a) BBP Index is ***TBCR/(TBCC -Interest + Depreciation + Opportunity Cost of Capital)*100***. The higher the ratio the more efficient the use of inputs indicating a relatively lower cost structure.

Sensitivity Analysis

Economic performance was sensitive to the opportunity cost of capital and Table 8.19 highlights this sensitivity. For example, if the risk premium is reduced from 3.7% (the risk chosen for the study) to that of the lowest suggested by the experts to 1.5%, the mean BEP increased by $1,317 and NER by $0.121M.

Table 8.19: Net Sector: Boat Economic Profit by Opportunity Cost Sensitivity

Fishing Sector	Boat Economic Profit (a) Mean ($)		Net Economic Return (a) ($M)	
	Opportunity Cost of 6.3% plus 1.5% Risk Premium (b)	Opportunity Cost of 6.3% plus 3.7% Risk Premium (b)	Opportunity Cost of 6.3% plus 1.5% Risk Premium (b)	Opportunity Cost of 6.3% plus 3.7% Risk Premium (b)
Line	2,591	1,274	0.238	0.117

(a) BEP and Net Return based on the 1997-98 average long term Government bond rate of 6.3% (Queensland Treasury Corporation) (refer Morison, 1999 for similar methodology where 5% premium was chosen and 7% was the assumed real interest rate by ABARE in Rose and Stubbs (2000)).
(b) Risk premium based on administration costs of 1%, bad debts 0.5% and a personal risk premium for the individual between 0% and 2.5% -fishing industry/rural sector regarded at the upper end of this range (Queensland Rural Adjustment Authority). Queensland Treasury suggested a risk premium of 5% as the lowest of a range of 5-9.3%.

8.3.3 Net Economic Return

For the 92 surveyed net firms, NER was $0.117M or 1.5% of their GVP. Queensland therefore gained $0.117M from the use of fisheries resources for net caught product: a marginal return. This indicated that the net sector was behaving as if it was operating as an open access fishery where economic rent was marginal.

Sensitivity Analysis

Net Economic Return would increase by 32% for every 1% increase in TBCR. For example, NER would be $0.154M instead of $0.117M, an improvement of $0.037M. For each 10% increase in fuel and repairs and maintenance NER would decrease by 52% and 39% respectively.

For example, the percentage of firms that had BEP>0 increased from 45% to 47% when both imputed wages and TBCR were adjusted by 10% (Table 8.20). NER was zero at just under a 1.5% decrease in TBCR.

Table 8.20: Estimates of Net Sector Net Economic Return: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	NER $M	% firms BEP>0	NER $M	% firms BEP>0	NER $M	% firms BEP>0
Study estimate (c)	0.117	45	0.508	45	0.900	46
Estimate less 10%	0.336	45	0.728	46	1.119	47
Estimate less 20%	0.555	46	0.946	46	1.338	47

(a) Owner-operators and family members may be willing to forego equivalent wages of paid crew and skippers for their labour in the business. 20% is an estimate of the imputed wage relating to unemployment benefits that might be appropriate for some sections of the industry as an approximate opportunity cost of labour.
(b) Increased receipts could arise from under-reporting in official logbooks, underestimate of beach prices or from a favourable change in exchange rates increasing export prices.
(c) Study estimate based on the wages paid by equivalent work paid for and reported in the survey.

8.4 ECONOMIC PERFORMANCE OF THE QUEENSLAND NET SECTOR FIRM

The measurement of the economic performance of the net fishing firm was based on the following characteristics:

- degree of specialisation (specialisation code);
- size of fishing operation (boat length or hull units);
- level of fishing intensity (days fished per annum);
- location of fishing business (ABS statistical division);
- level of fishing activity (total boat cash receipts);
- fishing pattern (local/distant fishing activity);

Economic performance of the line sector was evaluated based on the following criteria:

- statistical significance of the relationship between the characteristics of the net firm and the levels of financial and economic profit indicators;
- levels of BBP and BEP;
- the means/medians of BBP and BEP for each characteristics; and
- proportion of subsets of the line sector firms with BBP>0 and BEP>0.

8.4.1 Characteristics of the Net Fishing Firm

A set of null hypotheses (H_o) were tested which related each financial and economic indicator (BGM, BOS, BCI, BBP, BEP, and RRC) against the characteristics of the net fishing business (fishing sector, degree of diversification, size of business operation, location of fishing business, fishing intensity, level of fishing activity and fishing pattern). Refer to Chapter 3 for description of these characteristics.

For 'level of fishing intensity' (days fished) there was a significant difference for the major indicators BGM, BOS and BCI and for the 'level of fishing activity' (TBCR) there was a significant difference for all major indicators. However, for 'fishing pattern' based on grids fished, there was a significant difference for financial indicators BGM, BOS, and BCI (Table 8.21).

Table 8.21: Testing the Null Hypotheses (H_0) that there is no significant difference in the level of a financial and economic indicator and the characteristics of the Net Fishing Firm. (Yes = reject H_0 and $p<0.05$)

Indicator	Characteristics of the Net Firm					
	Degree of Specialisation	Size of Fishing Operation	Location of Fishing Firm	Level of Fishing Intensity	Level of Fishing activity	Fishing Pattern (Grids Fished)
Financial Profit Indicator						
BGM	NO	NO	NO	**YES**	**YES**	**YES**
BOS	NO	NO	NO	**YES**	**YES**	**YES**
BCI	NO	NO	NO	**YES**	**YES**	**YES**
BBP	NO	NO	NO	NO	**YES**	NO
RRC	NO	NO	NO	NO	**YES**	NO
Economic Profit Indicator						
BEP	NO	NO	NO	NO	**YES**	NO

(a) The results summarised in this table were based on ANOVA univariate analysis and the YES/NO meant that the results of each individual relationship met or failed to meet the ANOVA criteria of $p<0.05$.

8.4.2 Economic Performance by Degree of Specialisation

The surveyed net sector was divided into two main categories: specialised fishing firms (Na and Nb) where one and only one fishery attributed more than 10% of TBCR and all other firms were classed as diversified (Tables 3.2).

As a group, the diversified net sector firms performed better than most other sectors in their contribution to the economy (Table 8.22). For example, 49% of the diversified net firms operated at a financial profit and economic profit with NER of $0.174M, mean BBP of $8,072 and a mean BEP of $4,976. The specialised firms performed marginally worse. Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in any economic performance indicator for the size of the net fishing operation (Table 8.21).

Table 8.22: Mean Economic Performance of Net Sector: Degree of Specialisation

Profit Indicator	Degree of Specialisation			
	Specialised		Diversified	
	Mean	Profit Index COV (%)	Mean	Profit Index COV (%)
Boat Gross Margin ($)	41,343	79	49,179	79
Boat Operating Surplus ($)	32,351	65	40,465	65
Gross Return Index	160	65	194	65
Boat Cash Income ($)	10,614	62	13,337	62
Profit at Full Equity ($)	6,952	59	9,578	59
Rate Return to Capital (%)	5.1	-	7.3	-
Boat Business Profit ($)	4,691	59	8,072	59
% Firms BBP>0	42	-	49	-
Boat Economic Profit ($)	-999	93	4,976	64
Net Economic Return ($M)	-0.057	-	0.174	-
% Firms BEP>0	42	-	49	-

Summary: The majority of the net sector firms were specialised (56%): 42% of firms with BBP>0, mean of $4,691 and 42% with BEP>0, mean of - $999. However, the average diversified net firm performed better: 49% with BBP>0 and a mean of $8.072, 49% with BEP>o and mean of $4,976. Degree of specialisation was not significant in the economic performance of the net sector firm.

8.4.3 Economic Performance by Size of Fishing Operation

The economic performance of net firms varied for the two main boat length classes (Table 8.23). The average boat length was 12m (COV of 11%). The less than 10m class had the best economic performance measured with mean BBP, with positive mean BEP and NER. But both groups had 44% with BBP>0 and BEP>0.

Table 8.23: Mean Economic Performance of Net Sector: Size of Fishing Operation

Profit Indicator	Size of Fishing Operation (boat length)	
	<10m	10-14m
Boat Gross Margin ($)	40,848	58,254
Boat Operating Surplus ($)	33,095	45,919
Gross Returns Index	176	178
Boat Cash Income ($)	9,900	14,054
Profit at Full Equity ($)	7,767	2,973
Rate of Return to Capital (%)	6.8	1.6
Boat Business Profit ($)	5,974	699
% Firms BBP>0	44	44
Boat Economic Profit ($)	3,107	-9,053
Net Economic Return ($M)	0.252	-0.081
% Firms BEP>0	44	44

The greatest variability occurs in the net firms across all profit indices and specifically between cash indices of BGM and BOS, and the other indicators which include non cash items such as imputed wages, depreciation and opportunity cost of capital. The economic performance was the similar for both boat sized group of net firms (Table 8.24).

Table 8.24: Mean Economic Performance of the Net Sector: Size of Fishing Operation

Profit Indicator	Size of Fishing Operation (boat length)			
	<10m		10-14m	
	Profit Index	Index COV	Profit Index	Index COV
Boat Gross Margin	214	143	225	159
Boat Operating Surplus	176	94	178	168
Boat Cash Income	114	74	115	117
Profit at Full Equity	111	72	102	116
Boat Business Profit	108	71	101	118
Boat Economic Profit	103	77	90	132

8.4.3.1 Economic Performance by Size of Fishing Operation and Level of Fishing Activity

However, when size of fishing operation was linked to level of fishing activity the best economic performance was the group of firms with a TBCR greater $150,000. Specifically, the less than 10m net firms with a TBCR greater than $150,000, had a mean BEP of $68,594 (Table 8.25). A high performance compared with the overall survey mean BEP of -$1,393 for the same boat length class. The NER was $0.755M

Table 8.25: Financial and Economic Performance of Net Firm by Size of Fishing Operation and Level of Fishing Activity

Level of Fishing Activity TBCR ($'000)	Size of Fishing Operation	
	<10m	10-14m
Boat Business Profit ($)		
<150	-5,177	-47,461
>150	76,929	na
Profit at Full Equity ($)		
<150	-3,909	-44,794
>150	82,067	na
Rate of Return to Capital (%)		
<150	-4	-23.9
>150	37.7	na
Boat Economic Profit ($)		
<150	-7,184	-56,961
>150	68,594	na
Net Economic Return ($M)		
<150	-0.503	-0.342
>150	0.755	na

Summary: Mainly small scale fishing operations where firms with less than 10m size of fishing operation had the best performance: 44% had a BBP>0 and a mean of $5,974 and a mean BEP of $3,107. Size of fishing operation was not significant in the performance of the net sector firm.

8.4.4 Economic Performance by Level of Fishing Intensity

Net firms with fishing intensity greater than 100 days had the best mean economic performance based on both BBP and BEP.

The poorest overall average BBP performance were the group of net firms with a fishing intensity of less than 50 days: 75% had BBP>0 during 1997-98. The better performing firms within the group of 80% with BBP>0 were those with a fishing intensity 200-250 days: 80% making a mean BBP of $27,927 (Table 8.26).

Table 8.26: Mean Economic Performance of the Net Sector: Fishing Intensity

Profit Indicator	**Intensity of fishing Operations** (days fished)				
	<50	**50-100**	**100-150**	**150-200**	**200-250**
BGM	3,332	18,947	45,094	75,770	71,123
BOS ($)	-1,391	13,126	38,295	61,831	58,848
GRI	92	136	226	173	189
BCI ($)	-13,011	-10,645	14,663	32,880	33,523
PFE ($)	-16,519	-12,977	12,811	25,693	31,694
RRC (%)	-22	-12	14.5	11.7	23.2
BBP ($)	-17,461	-14,158	10,592	23,391	27,927
Total BBP ($M)	-0.209	-0.339	0.212	0.608	0.279
% Firms BBP>0	25	33	45	50	80
BEP ($)	-20,023	-17,021	7,972	13,864	24,610
NER ($M)	-0.240	-0.408	0.159	0.360	0.246
% Firms BEP>0	25	33	45	50	80

(na means less than 5 in the sample)

As the intensity of fishing operation increased, the profit indices increased and the relative variation in the data decreased. For example, PFE Index was a very high 133 with a low COV of 42% for intensity 200-250 days (Table 8.27).

Table 8.27: Economic Performance of the Net Sector: Fishing Intensity

Profit Index	Intensity of Fishing Operation (a)									
	<50		51-100		101-150		151-200		200-250	
	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)
BGM	127	353	160	191	290	99	206	115	232	156
BOS	92	202	136	109	225	97	173	84	189	132
BCI	55	198	82	105	127	87	129	56	136	43
PFE	49	210	78	96	123	83	121	59	133	42
BBP	47	210	78	94	118	83	119	57	129	46
BEP	43	238	74	101	111	89	108	66	123	48

(a) The number of firms with boats greater than 250 days fished was less than 5).

Summary: The net fishing sector had a relatively low level of fishing intensity (68% less than 150 days): firms with intensity greater than 100 days had the better performance, the best being firms that fished for 200-250 days of which 80% had a BBP>0 and a mean of $27,927, a BEP mean of $24,610. Levels of fishing intensity were significant for only the financial profit indicators BGM, BOS and BCI in the performance of net firms.

8.4.5 Economic Performance by Location of Fishing Firm

The location of a firm, however, was not necessarily related to the areas fished by that business and was therefore not an indicator of activity within fishing areas.

Based on the financial indicators, net firms located in the Brisbane and Wide Bay regions appear to be the most profitable with the firms located in the Moreton and Far North regions appearing less profitable even though within the Moreton Region, 53% of the net sector firms had BBP>0 indicated skewed data (Table 8.28).

There appears to be major differences between the economic profit indicators for net firms between the various statistical divisions in Queensland. However, ANOVA testing indicates that there are no significant differences ($p<0.05$) in the all profits indicators with respect to the location of the net fishing firm (Table 8.21).

Table 8.28: Mean Economic Performance of Net Sector: Location of Fishing Firm

Profit Indicator	Location of Fishing Firm						
	Brisbane	Moreton	Wide Bay	Fitzroy	Mackay	Northern	Far North
BGM	54,191	29,361	49,779	na	46,518	38,372	47,343
BOS ($)	47,576	22,873	43,073	na	36,333	30,965	31,408
GRI	241	148	243	na	180	175	133
BCI ($)	20,577	-2,508	20,876	na	6,074	10,721	12,868
PFE ($)	18,000	-3,501	17,961	na	4,692	6,887	3,977
RRC (%)	17.2	-3.6	12.6	na	4.6	5.7	1.8
BBP ($)	16,386	-4,601	16,609	na	2,525	5,939	-146
% Firms BBP>0	48	53	53	na	43	40	35
BEP ($)	12,771	-5,799	14,091	na	1,107	1,880	-12,661
NER ($M)	0.293	-0.099	0.239	na	0.008	0.009	-0.253
% Firms BEP>0	48	53	53	na	43	40	35

(na means less than 5 in sample)

Based on BEP for the average net firm during 1997/98, firms located in the Wide Bay and Brisbane regions appear the most profitable, with the Moreton and Far North regions appearing the more unprofitable locations which is supported by the data in Table 8.29. For

example, all regions had profit indices greater than 100, except for the Moreton Region, and the profit indices were higher for Wide Bay and Brisbane than for all other regions that performed poorly across all indicators except for BGM and BOS.

Table 8.29: Mean Economic Performance of Net Sector: Location of Fishing Firm

Profit Index	Location of Fishing Firm											
	Brisbane		Moreton		Wide Bay		Mackay		Northern		Far North	
	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)
BGM	299	142	172	180	313	95	231	66	212	47	160	96
BOS	241	105	148	106	243	78	180	52	175	37	133	65
BCI	134	81	97	84	139	79	108	36	117	36	111	63
PFE	128	80	95	81	132	79	106	40	110	37	103	59
BBP	125	77	93	82	129	76	103	37	108	36	100	59
BEP	118	83	91	84	121	86	99	43	102	39	89	69

Summary. The fishing firm was located all along the Queensland coast with the Brisbane, Wide Bay and Northern regionally based firms performing better: Wide Bay region had the best performance with 53% with BBP>0 and a mean of $16,609 and a mean BEP of $14,091 and NER of $0.239M. Net firms located within the Moreton region performed poorly when opportunity costs of labour and capital were internalised. Location was not significant in the economic performance of the net sector firm.

8.4.6 Economic Performance by Level of Fishing Activity

Net firms can also be compared based on their level of fishing activity measured by TBCR, and as expected, profit appears to increase as the level of TBCR increases. The mean BBP and mean BEP (Table 8.30) appear to be positive after a TBCR of $100,000. The best performing business was likely to have a TBCR between $101,00 and $200,000 with very high proportions of firms making a profit. A net firm with a TBCR less than $50,000 performed very poorly.

Overall, ANOVA testing indicated there were significant differences ($p<0.05$) in each of the major financial profit indicators with respect to the level of net fishing activity (Table 8.21).

Table 8.30: Mean Economic Performance of the Net Sector: Level of Fishing Activity

Profit Indicator	Total Cash Receipts ($'000)					
	0 - 50	51 - 100	101 - 150	151 - 200	201 - 250	250+
BGM ($)	7,471	40,695	60,178	126,008	na	147,359
BOS ($)	2,621	32,295	51,398	113,000	na	112,606
GRI	114	171	163	282	na	150
BCI ($)	-16,138	5,324	21,910	78,114	na	92,883
PFE ($)	-18,159	1,462	20,415	75,870	na	73,083
RRC (%)	-27	1.0	10.9	46.2	na	15.5
BBP ($)	-19,423	-151	19,155	71,913	na	66,747
% Firms BBP>0	17	48	89	86	na	80
BEP ($)	-21,268	-4,319	17,399	67,266	na	34,443
NER ($M)	-0.893	-0.108	0.156	0.470	na	0.172
% Firms BEP>0	17	48	89	86	na	80

(na means sample less than 5)

Although the firms with TBCR between $151,000 and $200,000 had the best profit indices there was a high level of variability in the data. BBP and BEP were very high for this group of firms.

Table 8.31: Economic Performance of the Net Sector: Level of Fishing Activity

Profit Index	Level of Fishing Activity ($'000)									
	<50		51-100		101-150		151-200		250+	
	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)
BGM	154	216	210	144	182	113	357	117	176	84
BOS	114	116	171	119	163	88	282	112	149	73
BCI	57	130	107	68	120	56	181	74	137	24
PFE	54	123	102	64	118	52	176	72	127	28
BBP	52	124	100	65	117	52	170	70	124	29
BEP	49	135	94	71	114	54	160	77	109	33

(a) The number of firms with TBCR between $200,000 to $250,000 in the sample was less than 5).

Summary: The sector had a wide range of fishing activity: as expected TBCR increased with the level of economic performance. Firms with TBCR greater than $100,000 had positive profit indicators and between $150,000 and $200,000 had the best performance: 86% had BBP>0 and mean of $71,013 and a mean BEP of $67,266 - a very good economic performance by a surveyed subset of the fishing fleet. Levels of fishing activity were significant for all profit indicators for the net sector.

8.4.7 Economic Performance by Fishing Pattern

The net sector fishing pattern was only local. Net firms that did not entirely fish locally (81-100%) performed the better. For example, 80% of firms with a 61-80% fishing pattern had BBP>0 with a mean BBP of $31,405 and mean BEP of $29,925 (Table 8.32) compared to the group of firms with the very local pattern (81-100%) with 44% (Table 8.33): a good result by any group within this study.

Table 8.32: Mean Economic Performance of the Net Sector: Fishing Pattern

Profit Indicator	Fishing Pattern (Proximity)	
	61-80%	81-100%
BGM ($)	61,458	40,661
BOS ($)	55,735	33,607
GRI	231	194
BCI ($)	34,279	7,957
PFE ($)	32,025	5,952
RRC (%)	33.2	5.4
BBP ($)	31,405	4,248
% Firms BBP>0	80	44
BEP ($)	29,295	1,846
NER ($M)	0.146	0.118
% Firms BEP>0	80	44

Overall, ANOVA testing indicated there were significant differences ($p<0.05$) in the profit indicators BGM, BOS and BCI with respect to net fishing patterns (Table 8.21).

Table 8.33: Economic Performance of the Net Sector: Fishing Pattern

Profit Index	**Fishing Pattern** (Proximity)			
	61-80%		**81-100%**	
	Index	**COV (%)**	**Index**	**COV (%)**
BGM	266	29	241	142
BOS	231	31	194	104
BCI	154	31	112	87
PFE	148	36	109	85
BBP	147	36	107	83
BEP	141	38	101	90

Summary: The fishing pattern was highly local (65% were greater than 80% local) and fished within a relatively few grid squares (68% less than 5): as the fishing pattern became more local and within less grids, the performance became worse. The best performance was generally the local firm (61-80%): 80% had a BBP>0 and a mean BBP of $31,405 and mean BEP of $29,295 - a relatively good economic performance by a subset of the surveyed fishing fleet. Fishing pattern was significant for the profit indicators BGM, BOS and BCI for these firms.

8.5 REPORT CARD FOR THE QUEENSLAND NET SECTOR FLEET

Economic performance of the Queensland line sector fleet was estimated by the financial and economic profit indicators of the line sector, determined from the survey, being extrapolated to the total population of in-scope line sector firms (Table 3.3, 3.17 and 3.24) based on the statistical means of the profit indicators for the characteristic 'level of fishing intensity' of the net sector firms derived in the previous sections of this chapter.

Overall, the net sector fleet generated a total BBP of $0.678M with a mean BBP of $5,978, median of -$4,003 where 45% of these firms met the financial profit criteria BBP>0. The Boat Business Profit Index was 106. Net fleet NER was positive, estimated at $0.415M, mean BEP of $1,274, median of -$5,336 and where 45% of firms met the economic profit criteria BEP>0. The average net sector firm had capital valued at $62.4M invested in the fishing operation. Overall, the net firms generated a TBCR of $25.6M and had a mean TBCR of $85,108 per firm with a median of $55,007 and used a mean TBCC of $49,669 with median $29,763 (Table 8.30).

For example, these net firms spent:

- mean owner and family labour costs of $24,870 (se=$1,649) and median of $22,880;
- mean operating fixed costs (such as interest, insurance, leasing, licence and industry fees) of $8,886 (se=$893) and a median of $5,943;
- mean operating variable costs (such as fuel, crew, repairs and maintenance) of $40,783 (se=$6,006) and a median of $22,625; and
- mean opportunity cost of capital of $4,704.

These results suggested that the net sector is more than breaking even and indicated that the line fleet but is acting as an open access fishery with a positive NER that will require structural adjustment at some time in the future.

Table 8.34: Estimated Economic Performance of Net Sector Fleet

Indicator	Estimated Net Sector Fleet Values (a) ($M)	Mean (b) ($)	Median (b) ($)
Receipt and Cost Indicator			
Total Boat Cash Receipts	25.6	85,108	55,007
Total Capital Investment	62.354	191,271	157,300
Licence Package Value	18.585	57,011	50,000
Total Boat Fixed Costs	2.897	8,886	5,943
Total Boat Variable Costs	13.295	40,783	22,625
Total Boat Cash Costs	16.192	49,669	29,763
Depreciation	1.890	5,798	2,760
Imputed labour costs	8.107	24,870	22,880
Financial Profit indicator			
Boat Gross Margin	15.991	44,324	26,128
Boat Operating Surplus	11.115	35,438	21,427
Boat Cash Income	4.368	11,650	-760
Boat Business Profit	0.678	5,978	-4,003
Profit at Full Equity	1.756	7,951	-3,837
% Firms BBP>0	45%		
Rate of Return to Capital	5.9%		
Economic Profit indicator			
Boat Economic Profit		1,274	-5,336
Net Economic Return ($M)	0.415		
% Firms BEP>0	45%		

(a) Costs based on means of the survey extrapolated to the population of the net sector fleet.
(b) Taken from survey sample of 92 net firms.

Economic performance was also based on the characteristics of the net sector firm. For example:

Degree of Specialisation. The majority of the net sector firms were specialised (56%): 42% of firms with BBP>0, mean of $4,691 and 42% with BEP>0, mean of - $999. However, the average diversified net firm performed better: 49% with BBP>0 and a mean of $8.072, 49% with BEP>o and mean of $4,976. Degree of specialisation was not significant in the economic performance of the net sector firm.

Size of the Fishing Operation. Mainly small scale fishing operations where firms with less than 10m size of fishing operation had the best performance: 44% had a BBP>0 and a mean of $5,974 and a mean BEP of $3,107. Size of fishing operation was not significant in the economic performance of the net sector firm.

Level of Fishing Intensity. The net fishing fleet had a relatively low level of fishing intensity (68% less than 150 days): firms with intensity greater than 150 days had the better performance, the best being firms that fished for 200-250 days of which 80% had a BBP>0 and a mean of $27,927, a BEP mean of $24,610. Levels of fishing intensity were significant for BGM, BOS and BCI in the economic performance of net firms.

Location of Fishing Firm. The fishing firm was located along the coast with the Brisbane, Wide Bay and Northern regionally based firms performing better: Wide Bay region had the best performance with 53% with BBP>0 and a mean of $16,609 and a mean BEP of $14,091 and NER of $0.239M. Location was not significant in the economic performance of the net sector firm.

Level of Fishing Activity. The sector had a wide range of fishing activity: as expected as TBCR increased so did the level of economic performance. Firms with TBCR between $150,000 and $200,000 had the best performance: 86% had BBP>0 and mean of $71,013 and a mean BEP of $67,266 - a very good economic performance by a surveyed subset of the fishing fleet. Levels of fishing activity were significant for all profit indicators for these firms.

Fishing Pattern. The fishing pattern was highly local (65% were greater than 80% local) and fished within a relatively few grid squares (68% less than 5): as the fishing pattern became more local and within less grids, the performance became worse. The best performance was generally the local firm (61-80%): 80% had a BBP>0 and a mean BBP of $31,405 and mean BEP of $29,295 - a relatively good economic performance by a subset of the surveyed fishing fleet. Fishing pattern was significant for the economic performance indicators BGM, BOS and BCI for these firms.

The net sector had small sized firms with part-time operators, dispersed along the Queensland coast, harvested mainly mullet, barramundi, shark and mackerel species, generated relatively small levels of income from local fishing areas and contributed $7.83m or 11% of the net fishing fleet's contribution to Queensland's GVP.

CHAPTER 9

ECONOMIC PERFORMANCE OF THE CRAB SECTOR

Chapter 3 introduced the crab fishery as the smallest component of the Queensland commercial fishing industry in 1997/98 in terms of gross value of production (GVP). General characteristics of the crab fishery are presented within Chapter 3 to provide a brief overview of the level and value of production, type of species, regional data and other details. The crab sector is made up of two parts: general crab sector firms (Fishery Symbol–C1) and the spanner crab sector firms (Fishery Symbols–C2 to C4), both of which are presented in this chapter.

The general crab sector represents firms with specialisation codes Ca-Cf, as defined in Chapter 3, that have taken fish species (mud crab and blue swimmer crabs) attributable to the crab fishery which contribute significantly to the TBCR of the general crab firm. The spanner crab sector represents firms with specialisation codes Sa-Sf, as defined in Chapter 3, that have taken fish species (spanner crabs) attributable to the spanner crab fishery which contributed significantly to the TBCR of the spanner crab firm. Sample size was 31 general crab or 21% of the in-scope general crab sector and 4% of GVP. There were 35 spanner crab firms which were 26% of in-scope spanner crab firms and 45 of GVP. See Chapter 2 for methodology cautions.

Economic performance of the crab sector is measured through both financial and economic profit indicators. Estimates for the crab sector fleet were extrapolated from these survey results in the Crab Sector Report Cards in section 9.5. Sections 9.1 to 9.4 are the results of the survey of the two crab sectors.

9.1 CRAB SECTOR RECEIPT AND COST INDICATORS

Receipt and Cost indicators are fundamental data used for determining the financial and economic profit indicators of the crab sector and of the individual crab firm.

9.1.1 Total Boat Cash Receipts

Total Boat Cash Receipts (TBCR) for the general crab sector was $2.015M or 22.9% of the general crab sector fleet GVP and for the spanner crab sector $3.194M or 35.1% of the spanner crab fleet GVP

Table 9.1: Crab Sector: Total Boat Cash Receipts

Total Boat Cash Receipt Class ($'000)	Proportion of General Crab Firms (%) (n=181)	Proportion of Spanner Crab Firms (%) (n=21)
<10	6	-
10 to 25	16	3
25 to 50	23	9
50 to 100	35	51
> 100	19	37

Some 45% of general crab firms had TBCR less than $50,000 in 1997/98 compared with the spanner crab firms of 12% (Table 9.1). The spanner crab firms (51%) realised TBCR between $50,000 and $100,000, with a mean TBCR of $91,243 (se=$7,054) and a median of $80,498. On the other hand, the average general crab firm had a TBCR of $64,997 (se=$9,254) with a median of $54,403.

In addition, mean TBCR per day for the spanner crab sector was $805 with a range from $408 to $1,384. The mean daily cash receipts of the crab sector increased as the boat length class increased with relative variation in TBCR was less for the middle sized fishing firm (10-14m) (Table 9.2).

Table 9.2: Crab Sector: Total Boat Cash Receipts by Boat Length

Boat Length Class	Mean ($)	Median ($)	Standard Error ($)	COV (%)	Mean TBCR per day ($)
General Crab					
0-10	69,699	59,753	10,498	77	340
10.1-14.0	40,545	31,191	14,912	82	314
Spanner Crab					
0-10	69,235	65,010	5,840	40	670
10.1-14.0	128,488	131,545	9,679	27	1,034

(na means sample less than 5)

A low proportion of the crab sector family income was dependent upon income from their fishing activity compared to the trawl sector (Table 9.3). For example, 56% of the otter trawl families were totally reliant on trawl income compared with 56% of the otter trawl sector firms relied on more than 80% of their family income from trawling. Whereas the proportion for totally reliant (100%) and highly reliant (>80%) was 45% and 58% respectively for the general crab sector and 40% and 54% for the spanner crab sector. The crab fishing families were moderately reliant on their crab fishing business to keep the family afloat. In other words many crab firms were probably part time or life-style operations.

Table 9.3: Family reliance on Income from their Crab Fishing Operations

Proportion of family income from fishing business (%)	Proportion General Crab Firms (%)	Proportion of Spanner Crab Firms (%)	Proportion of Otter Trawl Firms (%)
<20	10	20	3
20 – 39	7	9	9
40 – 59	10	9	7
60 – 79	16	9	3
80 – 99	13	14	21
100	45	40	56

9.1.2 Capital Invested in the Crab Sector

The major capital investment by the spanner crab firm was primary boat hull and permanent fixtures (43%) compared with that of the general crab firm of 20% (Table 9.4).

Table 9.4: Crab Sector: Capital Investment

Capital Item	General Crab		Spanner Crab	
	Mean ($)	Proportion of Total Capital ($M)	Mean ($)	Proportion of Total Capital ($M)
Primary hull and fixtures	30,197	20	66,118	43
Electronics	6,034	3	10,147	7
Licence Package	57,989	38	45,286	30
Other capital items	59,658	39	31,612	20
Total	152,494		150,984	

The Licence Package, upon which the business operation of the crab firm depends, also represents a considerable capital investment. For example, 38% for general crab and 30% for spanner crab firms: both of which were of a relatively higher proportion than the other sectors. Other capital items including tender boats, sheds, cold-rooms, trailers, and fishing gear make up around 20% (spanner crab) to 39% (general crab) of the total capital investment.

9.1.3 Value of Licence Packages

Total value of Licence Packages for general crab was $1.797M and spanner crab $1.585M. An average general crab Licence Package was worth $57,968 (se=$2,542) with a median of $60,000. The mean value of a spanner crab Licence Package was $45,286 (se=$1,103) and a median of $45,000. There was less relative variability in the value of spanner crab Licence Packages than the general crab ones (Table 9.5).

Table 9.5: Crab Sector: Licence Packages by Boat Length

Boat Length (m)	Value of Licence Package			
	Mean ($)	Median ($)	Standard Error ($)	COV (%)
General Crab				
0-10	58,846	65,000	2,501	22
10.1-14.0	53,400	45,000	9,543	40
Spanner Crab				
0-10	44,773	45,000	1,628	17
10.1-14.0	46,154	45,000	1,154	9

9.1.4 Total Boat Fixed Costs

For the spanner crab firm the major components of fixed costs were insurance (21%), licence and industry fees (21%) and overdraft interest (16%) with average TBFC of $9,796 (se=$1,079) with a median of $9,089. The major components of TBFC for the general crab firm were licence and industry fees (24%), overdraft interest (22%) and insurance (14%) (Table 9.6).

Table 9.6: Crab Sector: Total Boat Fixed Costs (a)

Fixed Cost Item	General Crab Firm		Spanner Crab Firm	
	Mean ($)	Proportion of TBFC (%)	Mean ($)	Proportion of TBFC (%)
Banking charges	273	3	512	4
Communications	638	8	983	8
Electricity	1116	11	369	1
Insurance costs	1908	14	2,569	21
Leasing costs	1902	6	5,616	12
Licence & industry fees	1764	24	2,191	21
Meetings & conferences	370	1	405	1
Motor vehicle registration	630	8	673	5
Office consumables	91	1	126	1
Other boat fees (survey)	292	1	310	1
Overdraft interest	4,576	22	3,488	16
Port/jetty/harbour fees	659	3	2,307	10
TBFC	7,572		9,796	

(a) Not additive because not all of sample had the item

9.1.5 Total Boat Variable Costs

For the spanner crab firm the total TBVC was $1.533M with mean TBVC of $43,804 (se = $5,593) and a median of $31,681. For the general crab firm, TBVC was $0.788M with a mean TBVC of $21,414 (se=$3,175) and a median of $20,624.

The major variable costs (Table 9.7) incurred by the average spanner crab firm were labour (45%), fuel (21%), and boat repairs and maintenance (16%). Together they represent 82% of the total variable costs of crabbing. For the general crab firm, the major variable costs were fuel (27%), labour (11%), and repairs and maintenance (18%).

Table 9.7: Crab Sector: Total Boat Variable Costs (a)

Variable Cost Item	General Crab Firm		Spanner Crab Firm	
	Mean ($)	Proportion of TBVC (%)	Mean ($)	Proportion of TBVC (%)
Bait	2,308	9	2,177	5
Chemicals	189	-	206	-
Food for crew	2,163	3	1,350	1
Fuel, oil and grease (boat)	6,751	27	10,216	21
Gas (LPG) for boat	310	1	145	-
Ice	580	2	655	1
Labour costs (paid crew)	10,438	11	34,299	45
Marketing	1,839	4	946	-
Motor vehicle	3,414	13	2,987	5
Packaging material	727	2	227	-
Purchases fishing gear	3,939	15	3,663	6
Repairs & maintenance	4,287	16	7,715	16
Total	25,414		45,093	

(a) Not additive because not all of the sample had the item.

Expenditure required by the average crab firm every five to ten years in order to maintain their boat in working order is relatively low by industry standards. But, if the fishing boat is undergoing major refits, it is unable to operate, therefore catch and receipts are likely to be below average; further exacerbating the impact of the refit on costs. The individual cost item likely to vary most over a ten year period would be "repairs and maintenance", which for the average crab firm, makes up 16% of the TBVC.

Table 9.8: Crab Sector: Median Labour Costs by Boat Length

Boat Length (m)	Total Labour Costs ($)			
	Crew Wages ($)	Imputed Wages ($)	Total Wages ($)	Full Time Equivalent Crew (a)
General Crab				
0-10	-	22,880	22,880	1.0
10.1-14.0	-	15,060	15,060	0.7
Spanner Crab				
0-10	-	22,880	22,880	1.0
10.1-14.0	48,000	4,060	52,060	2.3

(a) FTE is based on skipper Average $34,008 and crew $22,880 is therefore an estimate of the relative crew size and may not reflect actual crew numbers because of part-time and seasonal fluctuation. It is also not dependent on the definition of the number of full time weeks as this varies throughout the industry.

Median paid crew labour costs were zero for both crab sectors in the small boat class but the 10-14m class of spanner crab boats had an average of $48,000. Mean imputed wages were also low as FTEs were very low at one person per year except for the 10-14m class of spanner crab firms with 2.3 persons (Table 9.8).

9.1.6 Total Boat Cash Costs

Eighty four percent of the general crab sector firms had TBCC less than $50,000, with 97% between $50,000 and $100,000 compared with general crab firms which had 51% less than $50,000 (Table 9.9). Only 23% of spanner crab firm owners reported TBCC over $100,000.

Table 9.9: Crab Sector: Total Boat Cash Costs

TBCC Class ($'000)	Proportion of General Crab Firms (%)	Proportion of Spanner Crab Firms (%)
<50	84	51
50-100	13	26
100-250	3	23

9.2 CRAB SECTOR FINANCIAL PROFIT INDICATORS

This section deals with the derivation and explanation of the following financial profit indicators: Boat Gross Margin (BGM), Boat Operating Surplus (BOS), Gross Returns Index (GRI), Boat Cash Income (BCI), Profit at Full Equity (PFE), Boat Business Profit (BBP) and Rate of Return to Capital (RRC.

9.2.1 Boat Gross Margin

Boat Gross Margin for the general crab sector and the spanner crab sector was $1.227M and $1.660M respectively after variable costs (fuel, crew wages and repair and maintenance) were covered. Mean spanner crab BGM was $47,439 (se=$4,301) with a median of $43,571 and for general crab firms were mean BGM of $39,583 (se=$8,863) and a median of $24,470. Mean BGM increases with boat length class for spanner crabs but not for the general crab firm (Table 9.10). BGM Index was very high for the smaller sized firms.

Table 9.10: Crab Sector: Boat Gross Margin by Boat Length

Hull Unit Class	Mean ($)	Median ($)	Standard Error ($)	BGM<0 (%)	Total BGM ($M)	BGM Index ($) (a)	COV (%)
General Crab							
0-10	46,237	34,766	9,397	12	1.202	297	63
10.1-14.0	4,981	2,154	20,639	40	0.024	114	117
Spanner Crab							
0-10	39,184	38,664	4,161	-	0.862	230	60
10.1-14.0	61,409	56,978	7,999	-	0.798	192	65

(a) Boat Gross Margin Index is ***(TBCR/TBVC)*100*** – the higher the index the more efficient the use of inputs.

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BGM for the size of the crab sector fishing operation (Table 9.24) but BGM was significant for the size of spanner crab fishing operation (Table 9.25).

9.2.2 Boat Operating Surplus

Boat Operating Surplus (BOS) is a measure of the ability of the fishing firm to cover all cash costs. Total BOS for the spanner crab and general crab sector was $1.807M and $0.992M respectively after operational variable costs (fuel, crew and repairs and maintenance) and fixed costs (interest, insurance, leasing and licensing and industry fees) are covered. Mean BOS for the spanner crab firm was $31,060 (se=$5,032) and median of $29,248 whereas for the general crab sector had a mean BOS of $32,011 (se=$9,189) and a median of $17,759.

Twenty three percent of general crab firms operated at a negative BOS compared with 6% of the spanner crab firms (Table 9.11). A further 48% of general crab firms achieved a BOS within the range of $1 to $50,000 compared with 71% of spanner crab firms. The crab sector performed poorer in the higher income group compared with the other sectors.

When all cash costs were covered, the less than 10m class had the most efficient use of inputs, i.e. a BOS Index of 228 (COV=60) for general crab and 165 (COV=57) for spanner crab (Table 9.12).

Table 9.11: Crab Sector: Boat Operating Surplus

Boat Operating Surplus Class ($'000)	Proportion of General Crab Firms (%)	Proportion of Spanner Crab Firms (%)	Proportion of Surveyed Firms (%)
< -50	4	-	4
-50 to 0	19	6	16
1 to 25	29	40	26
25 to 50	19	31	20
50 to 100	23	23	19
> 100	6	-	15

Table 9.12: Crab Sector: Boat Operating Surplus by Boat Length

Hull Unit Class	Mean ($)	Median ($)	Standard Error ($)	BOS<0 (%)	Total BOS ($M)	BOS Index ($)	COV (%)
General Crab							
0-10	39,102	25,745	9,378	15	1.017	228	60
10.1-14.0	-4,862	-126	25,753	40	-0.024	89	141
Spanner Crab							
0-10	27,302	22,814	4,167	-	0.600	165	57
10.1-14.0	37,420	40,297	11,678	15	0.486	141	45

(a) BOS Index is ***(TBCR/TBCC)*100*** and is equivalent to the Gross Return Index. The higher the index the more efficient the use of inputs indicating a lower cost structure.

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BOS for the size of either the general crab or spanner crab fishing operation (Tables 9.24 and 9.25).

9.2.3 Gross Returns Index

A GRI of less than 100 is a cash operating loss. Average GRI for the general crab sector was 197 and 151 for spanner crab sector: meaning $197 and $151 cash was generated from $100 cash spent by the average general crab and spanner crab firm respectively.

9.2.4 Boat Cash Income

Boat Cash Income (BCI) provides an estimate of the ability of the fishing business to cover the all cash costs and the opportunity costs of the owner-operator and family wages. The imputed wages of owner-operated crab fishing firms were estimated at $440/week or annual wage of $22,880 and based on boat skipper wages provided in the economic survey. Imputed value of family contribution were estimated at $406/week or annual wage of $21,112 for the crab firm was based upon other industries and their similarities to the fishing sector.

Total BCI for the general crab sector was $0.141M after imputed wages were also covered. Overall, some 42% of the general crab firms had a positive BCI, mean BCI was $4,543 (se=$9,256) with a median of -$10,590. Total BCI for the spanner crab sector was $0.404M after imputed wages were also covered. Some 64% of the spanner crab firms had a positive BCI with a mean BCI was $11,546 (se=$5,496) with a median of $8,516.

The level of BCI was strongly related to boat-length class (Table 9.14). For the spanner crab firms, the larger the boat the more likely the fishing business was able to cover imputed wages for owner-operator and the family involved in the business. The small boat class had the highest incidence of negative BCI: 50% of all surveyed crab firms. For the general crab firm with small boats (<10m), the more likely the fishing business was able to cover imputed wages for owner-operator and the family involved in the business (Table 9.13).

Adding imputed wages to TBCC for the spanner crab sector, creating BCI, caused the number of small operators (0-10m) making a loss to increase from zero % to 50% (Tables 9.12 and 9.13). This proportional change maybe because firms with smaller boats had a higher proportion of total cash costs (i.e. excluding depreciation) related to imputed wages – a

feature of the owner-operated fishing business. For the general crab sector, the addition of imputed wages increased the number of firms with BCI<0 from 15% to 54% (Table 9.12 and 9.13).

Table 9.13: Crab Sector: Boat Cash Income by Boat Length

Boat Length Class	Mean ($)	Median ($)	Standard Error ($)	BCI<0 (%)	Total BCI ($M)	BCI Index ($)	COV (%)
General Crab							
0-10	10,846	-6,076	9,868	54	0.273	118	70
10.1-14.0	-26,358	-23,006	23,115	80	-0.132	89	141
Spanner Crab							
0-10	1,868	717	4,648	50	0.041	103	36
10.1-14.0	27,923	21,945	11,441	15	0.363	128	41

(a) BCI Index is ***TBCR/(TBCC + Imputed Wages)*100***. The higher the index the more efficient the use of inputs indicating a lower cost structure.

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BCI for the size of the general crab fishing operation (Table 9.24) but there was a significant difference for the spanner crab size of fishing operation (Table 9.25).

9.2.5 Boat Business Profit

Boat Business profit (BBP) provides a more complete picture of the financial performance of each fishing firm in the short to medium term. BBP also represents earnings before taxation. Total BBP for the general crab sector was $0.018M, mean BBP of $582 (se=$9,511) with a median of - $11,844 compared with that of the spanner crab firm which had a total BBP of $0.115M, a mean BBP of $3,287 (se=$5,459) and a median of $1,701.

The incidence of negative BBP is very high in the general crab sector compared with that of spanner crab and the other sectors (Table 9.14). This indicated that for 1997-98, based upon the assumptions made regarding imputed labour and depreciation, the majority of general crab firms were not making a financial profit.

Table 9.14: Crab Sector: Boat Business Profit

BBP Class ($'000)	Proportion of General Crab Firms (%)	Proportion of Spanner Crab Firms (%)	Proportion of Surveyed Firms (%)
< -50	10	3	15
-50 to 0	52	43	39
1 to 25	13	31	18
25 to 50	12	14	10
50 to 100	13	9	12
> 100	12	-	7

Adding depreciation to BCI for the general crab sector, creating BBP, caused the number of small operators (<10m) making a loss to increase from 54% to 58% and from 50% to 59% for the spanner crab sector (Tables 9.13 and 9.15). This maybe because firms with smaller boats had a higher proportion of total cash costs (I,e. excluding depreciation) related to imputed wages – a feature of the owner-operated fishing business. The best financial performance was that of the 10-14m class of spanner crab firms (Table 9.15).

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BBP for the size of the general crab fishing operation (boat length), but there was for the size of the spanner crab fishing operation (Tables 9.24 and 9.25).

Table 9.15: Crab Sector: Boat Business Profit by Boat Length

Hull Unit Class	Mean ($)	Median ($)	Standard Error ($)	BBP<0 (%)	Total BBP ($M)	BBP Index ($)	COV (%)
General Crab							
0-10	6,983	-7,032	10,041	58	0.182	111	72
10.1-14.0	-32,701	-27,620	24,480	80	-0.164	55	122
Spanner Crab							
0-10	-5,057	-5,691	4,855	59	-0.111	93	34
10.1-14.0	17,407	11,145	11,448	23	0.226	116	39

(a) BBP Index is ***TBCR/(TBCC + Imputed Wages + Depreciation)*100***. The higher the index the more efficient the use of inputs indicating a lower cost structure. (b) 70+HU class did not have enough respondents.

Sensitivity Analysis

Given that imputed wages were an estimate of what the crab owner-operator paid or should have been paid as opposed to what the opportunity cost actually was, dependent upon unemployment levels throughout Queensland that would depress such wages, a sensitivity analysis was undertaken.

The lower the imputed wage estimate and the higher the level of cash receipts the better the financial position of the sampled firms. For example, the percentage of general crab sector making a financial profit increased from 39% to 42% when both wages and TBCR were adjusted by 10% compared with 54% to 64% for the spanner crab sector (Table 9.16 and 9.17).

Table 9.16: Estimates of Boat Business Profit: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts for the General Crab Sector

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	BBP ($M)	% of firms BBP>0	BBP ($M)	% of firms BBP>0	BBP ($M)	% of firms BBP>0
Study estimate (c)	0.018	39	0.118	42	0.220	42
Estimate less 10%	0.103	39	0.204	42	0.305	42
Estimate less 20%	0.188	42	0.289	45	0.390	49

(a) Owner-operators and family members may be willing to forego equivalent wages of paid crew and skippers for their labour in the business. 20% is an estimate of the imputed wage relating to unemployment benefits that might be appropriate for some sections of the industry as an approximate opportunity cost of labour.
(b) Increased receipts could arise from under-reporting in official logbooks, underestimate of beach prices or from a favourable change in exchange rates increasing export prices.
(c) Study estimate based on the wages paid by equivalent work paid for and reported in the survey

Table 9.17: Estimates of Boat Business Profit: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts for the Spanner Crab Sector

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	BBP ($M)	% of firms BBP>0	BBP ($M)	% of firms BBP>0	BBP ($M)	% of firms BBP>0
Study estimate (c)	0.115	54	0.275	60	0.434	63
Estimate less 10%	0.183	54	0.343	63	0.502	63
Estimate less 20%	0.252	57	0.411	63	0.571	69

(a,b,c) as per Table 9.17a above

9.2.6 Rate of Return to Boat Capital

The distribution of RRC (Table 9.18) shows that 59% of the general crab firms generated an RRC less than zero compared with the spanner crab firms with 45%. The general crab firms had 39% of the lowest RRC (<-20%) and 32% with the highest RRC (>20%): a greater variation than that of spanner crab firms or of the surveyed firms in general. Both sectors had some 56-65% of firms with an RRC less than an opportunity cost of capital @ 10%. There was no significant difference ($p<0.05$) between size of fishing operation and RRC for either sector (Table 9.24 and 9.25).

Table 9.18: Crab Sector: Rate of Return to Capital

RRC Class (%)	Proportion of General Crab Firms (%)	Proportion of Spanner Crab Firms (%)	Proportion of Surveyed Firms (%)
< 20	39	20	24
-20 to -10	10	11	12
-10 to zero	10	14	16
zero to +10	6	11	11
+10 to +20	3	9	10
> 20	32	34	27

9.3 CRAB SECTOR ECONOMIC PROFIT INDICATORS

This section deals with the derivation and explanation of the following economic indicators: Boat Economic Profit (BEP) for the individual fishing business (also known as the producer surplus) and Net Economic Return (NER) from the crab sector.

9.3.1 Boat Economic Profit

Total BEP was -$0.040M for the general crab sector with a mean BEP of –$1,281 (se=$9,529) and a median of -$12,444compared with the spanner crab sector that had the total BEP was -$0.92M with a mean BEP of $2,627 (se=$5,442) and a median of -$1,121. The best performing groups of crab firms appears to be the less than 10m general crab class with a mean BEP of $5,264 and BEP Index of 106. On the other hand, the 10-14m class of spanner crab boats with a mean BEP of $8,424, BEP index of 106 and a COV of 45, performed the best (Table 9.19).

Table 9.19: Crab Sector: Boat Economic Profit by Boat Length

Hull Unit Class	Mean ($)	Median ($)	Standard Error ($)	BEP<0 (%)	Total BEP ($M)	BEP Index ($)	COV (%)
General Crab							
0-10	5,264	-9,325	10,070	58	0.136	106	75
10.1-14.0	-35,312	-35,190	24,110	80	-0.177	51	131
Spanner Crab							
0-10	-9,157	-9,154	5,030	59	-0.201	87	38
10.1-14.0	8,424	13,277	11,582	23	0.110	106	45

(a) BEP Index is ***TBCR/(TBCC -Interest + Depreciation + Opportunity Cost of Capital)*100***. The higher the ratio the more efficient the use of inputs indicating a relatively lower cost structure.

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BEP for the size of the both general crab and spanner crab fishing operations (Tables 9.24 and 9.25).

Sensitivity Analysis

Boat Economic profit was sensitive to the estimation of opportunity cost of capital. This project assumed a conservative economic opportunity cost of capital of 10% that is supported by Queensland Treasury and the Queensland Rural Adjustment Authority (see footnote to Table

9.20). However, for comparative purposes a lower rate of 7.8% has been used to estimate BEP and net returns to the crab sectors. Under both scenarios the crab sectors have performed at less than breakeven. For example, the average BEP for the crab sector improves by 140% if the economic opportunity cost of capital is 7.8% (Table 9.20).

Table 9.20: Boat Economic Profit for Crab Sector: Opportunity Cost Sensitivity

Fishing Sector	Boat Economic Profit (a) Mean ($)		Net Economic Return (a) ($M)	
	Opportunity Cost of 6.3% plus 1.5% Risk Premium (b)	Opportunity Cost of 6.3% plus 3.7% Risk Premium (b)	Opportunity Cost of 6.3% plus 1.5% Risk Premium (b)	Opportunity Cost of 6.3% plus 3.7% Risk Premium (b)
General Crab	-514	-1,281	-0.015	-0.040
Spanner Crab	-997	-2,627	-0.035	-0.91

(a) BEP and Net Return based on the 1997-98 average long term Government bond rate of 6.3% (Queensland Treasury Corporation) (refer Morison, 1999 for similar methodology where 5% premium was chosen and 7% was the assumed real interest rate by ABARE in Rose and Stubbs (2000)).
(b) Risk premium based on administration costs of 1%, bad debts 0.5% and a personal risk premium for the individual between 0% and 2.5% -fishing industry/rural sector regarded at the upper end of this range (Queensland Rural Adjustment Authority). Queensland Treasury suggested a risk premium of 5% as the lowest of a range of 4.99 to 9.3%.

9.3.2 Net Economic Return

For the 66 surveyed crab firms, NER was -$0.132M or –2.5% of their TBCR. In other words, Queensland contributed $0.132M of resources towards the harvest of crab product (Table 9.21). This indicated that the limited entry crab sector was behaving as if it were operating as an open access fishery where all economic rents were dissipated.

Table 9.21: Crab Sector: Net Economic Return

Fishing Sector	Net Economic Return $M	Number Surveyed (n)	Proportion of Firms Surveyed (%)
General Crab	-0.040	32	21
Spanner Crab	-0.092	35	23
All Sectors	-3.364	478	29

Given that imputed wages are an estimate of what crab owner-operators paid themselves as opposed to what the opportunity cost of capital actually was, dependent upon unemployment levels throughout Queensland that would depress such wages, a sensitivity analysis was undertaken (Table 9.22). The paid wages are assumed to reflect opportunity costs.

Table 9.22: Estimates of General Crab Sector Net Economic Return: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	NER $M	% firms BEP>0	NER $M	% firms BEP>0	NER $M	% firms BEP>0
Study estimate (c)	-0.039	39	0.061	39	0.162	39
Estimate less 10%	0.045	39	0.146	39	0.247	42
Estimate less 20%	0.131	39	0.231	39	0.332	45

(a) Owner-operators and family members may be willing to forego equivalent wages of paid crew and skippers for their labour in the business. 20% is an estimate of the imputed wage relating to unemployment benefits that might be appropriate for some sections of the industry as an approximate opportunity cost of labour.
(b) Increased receipts could arise from under-reporting in official logbooks, underestimate of beach prices or from a favourable change in exchange rates increasing export prices.
(c) Study estimate based on the wages paid by equivalent work paid for and reported in the survey

Table 9.23: Estimates of Spanner Crab Sector Net Economic Return: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	BEP $M	% firms making a profit	BEP $M	% firms making a profit	BEP $M	% firms making a profit
Study estimate (c)	-0.091	46	0.067	52	0.227	54
Estimate less 10%	-0.024	49	0.136	54	0.296	54
Estimate less 20%	0.044	51	0.204	54	0.364	60

(a, b, c) As per Table 9.22.

9.4 ECONOMIC PERFORMANCE OF THE QUEENSLAND CRAB SECTOR

The measurement of the financial and economic performance of the crab fishing firm was based on the following characteristics:

- degree of specialisation (specialisation code);
- size of fishing operation (boat length or hull units);
- level of fishing intensity (days fished per annum);
- location of fishing business (ABS statistical division);
- level of fishing activity (total boat cash receipts); and
- fishing pattern (local/distant fishing activity).

The 66 surveyed crab firms were grouped according to the above characteristics. Each characteristic provides the basis of a one-off bench marking performance of the Queensland commercial fishing firm.

Economic performance of the crab sector was evaluated based on the following criteria:

- statistical significance of the relationship between the characteristics of the crab firm and the levels of financial and economic profit indicators;
- levels of BBP and BEP;
- the means/medians of BBP and BEP of each characteristic; and
- proportion of subsets of the crab sector firms with BBP>0 and BEP>0.

9.4.1 Characteristics of the General Crab Fishing Firm

A set of null hypotheses (H_o) were tested which related each profit indicators against the characteristics of the fishing firm.

Table 9.24: Testing the Null Hypotheses (H_0) that there is no significant difference in the level of a financial and economic indicator and the characteristics of the General Crab Fishing Firm. (Yes = reject H_0 and p<0.05) (a)

Indicator	Characteristics of the General Crab Firm					
	Degree of Specialisation	Size of Fishing Operation	Location of Fishing Business	Level of Fishing Intensity	Level of Fishing activity	Fishing Pattern (Proximity
Financial Indicator						
BGM	NO	NO	NO	**YES**	**YES**	NO
BOS	NO	NO	NO	**YES**	**YES**	NO
BCI	NO	NO	NO	**YES**	**YES**	NO
BBP	NO	NO	NO	**YES**	**YES**	NO
RRC	NO	NO	NO	**YES**	**YES**	NO
Economic Indicator						
BEP	NO	NO	NO	**YES**	**YES**	NO

(a) The results summarised in this table were based on ANOVA univariate analysis and the YES/NO meant that the results of each individual relationship met or failed to meet the ANOVA criteria of p<0.05.

For 'level of fishing intensity operation' (days fished) and 'level of fishing activity' (TBCR) there were significant differences for all major indicators for the general crab sector (Table 9.24).

9.4.2 Characteristics of the Spanner Crab Fishing Firm

A set of null hypotheses (H_o) were tested which related each financial and economic indicator (BGM, BCI, BBP, BEP, and RRC) against the characteristics of the fishing business (fishing sector, degree of diversification, size of business operation, location of fishing business, fishing intensity, level of fishing activity and fishing pattern.

All profit indicators, except RRC, were influenced by two characteristics. For example, fishing pattern (proximity to local area) had the most effect for all indicators except BGM, fishing intensity (days fished) for BGM, BCI and BEP, for level of fishing activity (TBCR) there was significant difference for BGM and BCI indicators. For size of fishing operation there was a significant difference for BGM, BCI and BBP (Table 9.25).

Table 9.25: Testing the Null Hypotheses (H_0) that there is no significant difference in the level of a financial and economic indicator and the characteristics of the Spanner Crab Fishing Firm. (Yes = reject H_0 and $p<0.05$)

Indicator	Characteristics of the Spanner Crab Firm					
	Degree of Specialisation	Size of Fishing Operation	Location of Fishing Business	Level of Fishing Intensity	Level of Fishing activity	Fishing Pattern (Proximity
Financial Indicator						
BGM	NO	**YES**	**YES**	**YES**	**YES**	NO
BOS	**YES**	NO	NO	**YES**	NO	**YES**
BCI	NO	**YES**	NO	NO	**YES**	**YES**
BBP	NO	**YES**	NO	NO	NO	**YES**
RRC	NO	NO	NO	NO	NO	**YES**
Economic Indicator						
BEP	NO	NO	NO	**YES**	NO	**YES**

(a) The results summarised in this table were based on ANOVA univariate analysis and the YES/NO meant that the results of each individual relationship met or failed to meet the ANOVA criteria of $p<0.05$.

9.4.3 Economic Performance by Degree of Specialisation

The surveyed crab sector was divided into two main categories: specialised fishing firms where one and only one fishery attributed more than 10% of TBCR and all other firms were classed as diversified (Table 3.2).

Table 9.26: Mean Economic Performance of Crab Sector: Degree of Specialisation

Profit Indicator	Degree of Specialisation			
	General Crab Sector		Spanner Crab Sector	
	Specialised	Diversified	Specialised	Diversified
Boat Gross Margin ($)	21,094	44,975	42,555	54,765
Boat Operating Surplus ($)	13,574	37,388	22,885	43,322
Gross Return Index	139	215	134	187
Boat Cash Income ($)	-13,819	9,899	7,581	17,493
Profit at Full Equity ($)	-11,221	6,677	467	14,063
Rate Return to Capital (%)	-20.9	6.3	0.5	12.4
Boat Business Profit ($)	-15,122	5,163	-1,263	10,111
% Firms BBP>0	29	42	43	71
Boat Economic Profit ($)	-13,199	2,195	-8,397	6,027
Net Economic Return ($M)	-0.092	0.053	-0.176	0.084
% Firms BEP>0	29	42	33	64

(na) means less than 5 firms

As a group, specialised crab firms performed poorly in their economic contribution to the economy (Table 9.26). For example, a high proportion of general crab firms operated at a loss (71% where BBP<0 and BEP<0) and a mean BEP of -$13,199 compared with the diversified

general crab firms where 42% had BEP>0 with a mean BEP of $2,195. Also, 64% of the diversified spanner crab firms had BEP>0 where mean BEP was $6,027 compared with 33% the specialised spanner crab sector firm where BEP>0 with a mean BEP of -$8,397. Generally, the diversified crab sector performed better than their specialised counterparts and the average of the surveyed firms.

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in all profit indicators, except for BOS for the spanner crab firm, for the degree of specialisation for the crab sector firms (Table 9.24 and 9.25).

9.4.4 Economic Performance by Size of Fishing Operation

The financial and economic performance of the crab sector firms varied for boat length classes (Table 9.27).

Table 9.27: Mean Economic Performance of Crab Sector: Size of Fishing Operation

Profit Indicator	**Size of Fishing Operation** (boat length)			
	General Crab		**Spanner Crab**	
	<10m	**10-14m**	**<10**	**10-14**
Boat Gross Margin ($)	46,237	4,981	39,184	61,409
Boat Operating Surplus ($)	39,102	-4,862	27,302	37,420
Gross Return Index	229	89	165	141
Boat Cash Income ($)	10,486	-26,358	1,868	27,923
Profit at Full Equity ($)	8,736	-29,088	-2,235	19,680
Rate of Return to Capital (%)	9.3	-29.1	-2.4	15.8
Boat Business Profit ($)	6,893	-32,701	-5,057	17,407
% Firms BBP>0	42	20	41	77
Boat Economic Profit ($)	5,264	-35,312	-9,157	8,424
Net Economic Return ($M)	0.137	-0.177	-0.201	0.110
% Firms BEP>0	42	20	36	62

General crab firms with boats less than 10m performed better on average than the large sized firms and generally better than the 478 surveyed firms. For example, RRC was 9.3%, BBP was $6,893 compared to –29.1% and -$32,701 for the larger boats, respectively. The 10-14m spanner crab sector performed even better with an RRC of 15.8 and some 77% firms with BBP>0 and a mean BBP of $17,407. Economic performance was well above average: 62% of the spanner crab firms with 10-14m boats had BEP>0 and a mean of BEP of $8,424 and NER of $0.110M – one of the better performances of any group within the survey.

All of the profit indices were greater than 100 for general crab firms with smaller boats and for the 10-14m spanner crab firms. The relative variation was much lower for the spanner crab firms (Table 9.28). The worst performance being that of the 10-14m general crab firm and the best the 10-14m spanner crab firm.

Table 9.28: Mean Economic Performance of the Crab Sector: Size of Fishing Operation

Profit Indicator	**Size of Fishing Operation** (boat length)							
	General Crab				**Spanner Crab**			
	<10m		**10-14m**		**<10m**		**10-14m**	
	Index	**COV (%)**	**Index**	**COV (%)**	**Index**	**COV (%)**	**Index**	**COV (%)**
BGM	297	63	114	117	230	60	191	65
BOS	229	60	89	141	165	57	141	45
BCI	118	70	61	112	103	36	128	41
PFE	114	71	58	115	97	34	118	41
BBP	111	72	55	122	93	37	116	39
BEP	106	75	51	131	87	38	105	45

ANOVA testing indicated that there were significant differences ($p<0.05$) in the profit indicators BGM, BCI and BBP for the size of the spanner crab sector but not determined for the general crab sector (Tables 9.24 and 9.25).

9.4.4.1 Economic Performance by Size of Fishing Operation and Intensity of Fishing Operation

The financial and economic performance of both crab sectors was very positive for intensity of fishing activity greater than 100 days (Table 9.29) and depended on the size of the fishing operation.

Table 9.29: Economic Performance of Crab Firm: Size of Fishing Operation and Fishing Intensity

Fishing Intensity (days fished)	**Size of fishing Operation** (boat length)			
	General Crab		**Spanner Crab**	
	<10m	**10-14m**	**<10m**	**10-14m**
Boat Business Profit ($)				
<100	na	na	-6,772	na
>100	9,409	na	-3,343	35,235
Profit at Full Equity ($)				
<100	na	na	-5,037	na
>100	11,217	na	567	38,517
Rate of Return to Capital (%)				
<100	na	na	-5.4	na
>100	12.3	na	0.6	29.6
Boat Economic Profit ($)				
<100	na	na	-11,977	na
>100	7,901	na	-6,338	26,703
Net Economic Return ($M)				
<100	na	na	-0.131	na
>100	0.198	na	-0.070	0.240

(na) Means sample less than 5.

The spanner crab 10-14m group of firms, with a fishing intensity greater than 100 days, had one of the better performances of the survey (mean BBP of 38,517 and mean BEP of $26,703) with one of the lowest relative variations of 33% and 37% respectively. Overall, the general crab firms with greater than 100 days intensity of fishing operation and a size of operation of less than 10m performed well (Table 9.29).

9.4.5 Economic Performance by Level of Fishing Intensity

Spanner crab firms with fishing intensity greater than 150 days have the best mean economic performance (Table 9.30).

Table 9.30: Mean Economic Performance of the Crab Sector: Fishing Intensity

Profit Indicator	**Fishing Intensity** (days fished)			
	General Crab		**Spanner Crab**	
	<150days	**>150days**	**<150days**	**>150days**
BGM	1,046	52,986	41,436	76,450
BOS ($)	-8,713	46,176	24,866	60,995
GRI	77	249	142	196
BCI ($)	-29,162	16,267	6,501	35,930
PFE ($)	-34,021	15,385	509	31,984
RRC (%)	-28.1	18	0.5	26.2
BBP ($)	-36,644	13,530	-1,637	27,085
% Firms BBP>0	zero	52	48	83
BEP ($)	-40,816	12,471	-7,632	21,562
NER ($M)	-0.327	0.287	-0.221	0.129
% Firms BEP>0	zero	52	41	67

For example, 83% of the spanner crab sector that for greater than 150 days had BBP>0 with a mean BBP of $27,085. The poorest overall mean BBP performance was the general crab sector with a fishing intensity of less than 150 days: 100% of that sector had BEP>0.

9.4.6 Financial and Economic Performance by Location of Fishing Firm

The location of a firm, however, was not necessarily related to the areas fished by that business and was therefore not an indicator of activity within fishing areas. Based on the financial indicators for the average fishing firm, the general crab firms located in the Brisbane region and the spanner crab firms located in the Wide Bay region appear to be the most profitable. General crab firms located in the Fitzroy region appear to be less profitable (Table 9.31).

Table 9.31: Mean Economic Performance of Crab Sector: Location of Fishing Firm

Financial Profit Indicator	Location of Fishing Firm				
	General Crab			Spanner Crab	
	Brisbane	Wide Bay	Fitzroy	Moreton	Wide Bay
BGM ($)	56,795	31,105	23,128	46,577	45,401
BOS ($)	51,078	26,530	15,349	24,506	35,659
GRI	300	196	144	150	146
BCI ($)	19,294	-3,830	-14,537	4,557	14,546
PFE ($)	20,103	-6,064	16,361	-570	7,564
RRC (%)	26.2	-7.5	-14.8	-0.6	4.9
BBP ($)	17,903	-6,783	-18,484	-3,281	5,020
% Firms BBP>0	40	44	11	42	62
BEP ($)	17,429	-8,704	-20,695	-8,567	-2,525
NER ($M)	0.087	-0.078	-0.186	-0.163	-0.033
% Firms BEP>0	40	44	11	42	38

Based on BEP (Table 9.31), the Brisbane region appears to be the most profitable, with firms located in the Fitzroy region appearing the more unprofitable. The spanner crab sector was less profitable with the best returns being the firms located in the Wide Bay region.

Overall, ANOVA testing indicated that there are no significant differences ($p<0.05$) in each of the major profit indicators for the both crab sectors except for BGM for the respect to the location of spanner crab fishing firm (Tables 9.24 and 9.25).

9.4.6 Economic Performance by Level of Fishing Activity

Crab sector fishing firms can also be compared based on their level of fishing activity measured by TBCR. As would be expected, profit appears to increase as the level of TBCR increases. The mean BBP and mean BEP (Table 9.32) appear to be positive for the spanner crab firms with a TBCR greater than $100,000. A general crab firm with less than $50,000 performed very poorly.

The profit indices greater than 100 indicate a positive performance (Table 9.33). The spanner crab firms with levels of TBCR greater than $100,000 had the best financial and economic performance whereas the indices for the general crab sector with TBCR less than $50,000 had extremely low indices.

Overall, ANOVA testing indicated there were significant differences ($p<0.05$) in all of the profit indicators with respect to the level of fishing activity by general crab firms (Table 9.24). However there were only significant differences related to BGM and BCI for spanner crab firms with respect to the level of fishing activity (Table 9.25).

Table 9.32: Mean Economic Performance of the Crab Sector: Level of Fishing Activity

Profit Indicator	**Level of Fishing Activity** (TBCR $'000)			
	General Crab		**Spanner Crab**	
	<50	**50-100**	**50-100**	**100-150**
BGM	3,708	42,990	41,510	58,706
BOS ($)	-3,251	34,853	28,103	31,132
GRI	89	199	167	132
BCI ($)	-27,739	2,147	3,958	17,934
PFE ($)	-29,650	-39	686	9,910
RRC (%)	-32.3	0.0	0.5	5.8
BBP ($)	-31,877	-2,173	-2,556	8,034
% Firms BBP>0	zero	55	50	60
BEP ($)	-34,064	-3,484	-5,486	-1,463
NER ($M)	-0.477	-0.038	-0.099	-0.015
% Firms BEP>0	zero	55	44	40

Table 9.33: Mean Economic Performance of the Crab Sector: Level of Fishing Activity

Profit Indicator	**Level of Fishing Activity** (TBCR $'000)							
	General Crab				**Spanner Crab**			
	<50		**50-100**		**50-100**		**100-150**	
	Index	**COV (%)**	**Index**	**COV (%)**	**Index**	**COV (%)**	**Index**	**COV (%)**
BGM	117	84	258	66	245	58	185	81
BOS	89	82	198	53	167	57	132	66
BCI	48	56	103	42	106	30	116	56
PFE	46	60	100	42	96	31	108	54
BBP	44	60	97	43	101	28	107	52
BEP	41	64	93	45	90	31	98	59

9.4.7 Economic Performance by Fishing Pattern

Crab sectors with a local fishing pattern had the better profit performance (Table 9.34). For example, local general crab firms had a mean BBP of $9,236 and mean BEP of $7,128 compared with the spanner crab firms BBP of $7,907 and mean BEP of $2,346. The general crab had better profit indices than that of the spanner crabs and performed better (Table 9.35).

Table 9.34: Mean Economic Performance of the Crab Sector: Fishing Pattern

Financial Profit Indicator	**Fishing Pattern** (proximity) **(a)**		
	General Crab		**Spanner Crab**
	Local	**Distant**	**Local**
BGM ($)	46,245	11,823	47,816
BOS ($)	40,215	-2,171	36,823
GRI	12,805	-29,875	16,101
BCI ($)	12,804	-35,475	7,907
PFE ($)	10,330	-29,425	10,863
RRC (%)	7.1	-24.5	10.3
BBP ($)	9,236	-35,475	7,907
% Firms BBP>0	44	17	61
BEP ($)	7,128	-36,317	2,346
NER ($M)	0.178	-0.218	0.073
% Firms BEP>0	44	17	52

(a) Sample less than 5 for distant fishing pattern of the spanner crab sector

ANOVA testing indicated there were significant differences ($p<0.05$) in each of the major profit indicators, except for BGM with respect to fishing pattern for spanner crab sector firms (Table 9.25) but no differences for that of the fishing pattern of the general crab sector firm (Table 9.24).

Table 9.35: Mean Economic Performance of the Crab Sector: Fishing Pattern

Profit Indicator	**Fishing Pattern** (Proximity)					
	General Crab				**Spanner Crab (a)**	
	Local		**Distant**		**Local**	
	Index	**CV**	**Index**	**CV**	**Index**	**CV**
BGM	325	58	124	103	193	73
BOS	255	57	95	127	159	55
BCI	127	70	68	94	115	37
PFE	122	74	64	90	108	37
BBP	119	74	69	98	105	35
BEP	113	78	60	102	97	40

(a) Sample less than 5 for distant fishing pattern of the spanner crab sector

9.5 REPORT CARD FOR THE QUEENSLAND CRAB SECTOR FLEET

Economic performance of the Queensland general crab sector fleet was estimated by the financial and economic profit indicators of the line sector, determined from the survey, being extrapolated to the total population of in-scope line sector firms (Table 3.3) based on the statistical means of the profit indicators for the characteristic 'level of fishing intensity' of the general sector firms derived in the previous sections of this chapter.

9.5.1 Estimated Economic Performance of the General Crab Sector Fleet

Overall, the general crab sector fleet generated a total BBP of $0.086M with a mean BBP of $582, median of -$11,844 where 39% of these firms met the financial profit criteria BBP>0. General grab sector fleet NER was estimated at $0.191M, mean BEP of -$1,281, median of -$12,444 and where 39% of firms met the economic profit criteria BEP>0.

The general crab sector had capital valued at $22.4M invested in the fishing operations. Overall, the net firms generated a GRI of 197, TBCR of $8.8M and had a mean TBCR of $64,997 per firm with a median of $54,403 and used a mean TBCC of $32,986 with median $25,285 (Table 9.36).

The BBP Index of 101, NER of $0.191M and median PFE of -$11,626 suggested that the general crab sector was just breaking even and acting as an open access fishery that will require structural adjustment at some time in the future.

The general crab sector spent:

- mean owner and family labour costs of $23,551 and median of $22,880;
- mean operating fixed costs (such as interest, insurance, leasing, licence and industry fees) of $9,796 and median of 5,685;
- mean operating variable costs (such as fuel, crew, repairs and maintenance) of $43,804 and median of $20,624; and
- mean opportunity cost of capital of $1,863.

Table 9.36: Estimated Economic Performance of the General Crab Sector Fleet

Indicator	Estimated General Sector Crab Fleet Values (a) ($M)	Mean (b) ($)	Median (b) ($)
Receipts and Cost Indicator			
Total Boat Cash Receipts	8.8	64,997	54,403
Total Capital Investment	22.416	152,494	130,800
Licence Package Value	8.452	57,968	60,000
Total Boat Fixed Costs	1.113	7,572	5,685
Total Boat Variable Costs	3.737	25,414	20,624
Total Boat Cash Costs	4.848	32,986	25,285
Depreciation	0.582	3,961	2,100
Imputed labour	4.038	27,468	22,880
Financial Profit Indicator			
Boat Gross Margin	5.818	39,583	24,470
Boat Operating Surplus	4.705	32,011	17,759
Gross Return Index	197		
Boat Cash Income	0.667	4,543	-10,590
Boat Business Profit	0.086	582	-11,844
% Firms BBP>0	39%		
Profit at Full Equity	0.387	2,635	-11,626
Rate of Return to Capital	2.8%		
Economic Profit Indicator			
Boat Economic Profit		-1,281	-12,444
Net Economic Return $M	0.191		
% Firms BEP>0	39%		

(a) Costs based on means of the survey extrapolated to the population of the general crab sector fleet.
(b) Taken from survey sample of 31 general crab firms.

Economic Performance of the General Crab Sector based on the Characteristics of its firms is summarized as:

Degree of Specialisation. The majority of the general crab sector firms were diversified (66%): 29% of firms with BBP>0, mean BBP of -$15,122 and mean BEP of -$13,199. However, the average diversified general crab firm performed better: 42% with BBP>0 and BEP>0, mean BBP of $5,163 and a mean BEP of $2,195. Degree of specialisation was not significant in the economic performance of the general crab sector firm.

Size of the Fishing Operation. Mainly small scale fishing operations where firms with less than 10m size of fishing operation had the best performance: 42% had a BBP>0 and BEP>0, a mean BBP of $6,892 and a mean BEP of $5,264. Size of fishing operation was not significant in the performance of this sector.

Level of Fishing Intensity. The fleet had a very high level of fishing intensity (51% less than 200 days): firms with intensity greater than 150 days had the better performance: 52% had a BBP>0 and BEP>0, a mean BBP of $13,530 and a mean BEP of $12,471. Levels of fishing intensity were significant for all economic performance indictors for general crab sector firms.

Location of Fishing Firm. The general crab fishing firm is mainly located in the southern regions with the Brisbane regionally based firms performing better: 40% with BBP>0 and a mean of $17,903 and a mean BEP of $17,429 and NER of $0.087M. Location was not significant in the economic performance of general crab sector firms.

Level of Fishing Activity. The sector had a limited range of fishing activity, but as expected as TBCR increased so did the level of economic performance. Firms with TBCR between $50,000 and $100,000 had the best performance: 55% had BBP>0 and BEP>0, mean BBP of -$2,173 and a mean BEP of -$3,484 - a very poor economic performance by a surveyed subset of the fishing fleet. Levels of fishing activity were significant for all economic performance indicators for these firms.

Fishing Pattern. The fishing pattern was highly local (68% were greater than 80% local) and fished within a relatively few grid squares (75% less than 5 grids): as the fishing pattern became more local and within less grids the performance improved. The best performance was the local firm (81-100%): 44% had a BBP>0 and BEP>0, a mean BBP of $9,236 and mean BEP of $7,128 - a marginal economic performance by a subset of the surveyed fishing fleet. Fishing pattern was not significant for all of the economic performance indicators for these firms.

9.5.2 Estimated Economic Performance of the Spanner Crab Sector Fleet

Overall, the spanner crab sector fleet generated a total BBP of $0.447M with a mean BBP of $3,287, median of $1,701 where 54% of these firms met the financial profit criteria BBP>0. Spanner grab sector fleet NER was estimated at -$0.400M, mean BEP of $2,627, median of -$1,121 and where 39% of firms met the economic profit criteria BEP>0. The average spanner crab sector firm had capital valued at $22.4M invested in the fishing operation. Overall, the spanner firms generated a GRI of 151, TBCR of $8.184M and had a mean TBCR of $91,243 per firm with a median of $80,498 and used a mean TBCC of $60,183 with median $46,427 (Table 9.37).

The spanner crab sector spent:

- mean owner and family labour costs of $23,551 and median of $22,744;
- mean operating fixed costs (such as interest, insurance, leasing, licence and industry fees) of $9,796 and median of $9,089;
- mean operating variable costs (such as fuel, crew, repairs and maintenance) of $43,804 and median of $31,681; and
- mean opportunity cost of capital of $660.

Table 9.37: Estimated Economic Performance of Spanner Crab Fleet

Indicator	Estimated Spanner Crab Sector Fleet Values (a) ($M)	Mean (b) ($)	Median (b) ($)
Receipt and Cost Indicator			
Total Boat Cash Receipts	9.1	91,243	80,498
Total Capital Investment	20.411	150,084	156,000
Licence Package Value	6.159	45,286	45,000
Total Boat Fixed Costs	1.332	9,796	9,089
Total Boat Variable Costs	5.957	43,804	31,681
Total Boat Cash Costs	8.184	60,183	46,427
Depreciation	1.123	8,259	8,400
Imputed labour	3.203	23,551	22,744
Financial Profit Indicator			
Boat Gross Margin ($)	6.452	47,439	43,571
Boat Operating Surplus ($)	4.224	31,060	29,248
Gross Return Index	151		
Boat Cash Income ($)	1.570	11,546	8,516
Rate of Return to Capital (%)	5.6%		
Profit at Full Equity ($)	0.803	5,905	1,701
Boat Business Profit ($)	0.447	3,287	1,701
% Firms BBP>0	54%		
Economic Profit Indicator			
Boat Economic Profit		2,627	-1,121
Net Economic Return ($M)	-0.400	0.92	
% Firms BEP>0	39%		

(a) Costs based on means of the survey extrapolated to the population of the spanner crab sector fleet.
(b) Taken from survey sample of 31 general crab firms (21% o general crab fleet).

The BBP Index of 104, NER of $0.04M and median PFE of $1,701 suggested that the spanner crab sector was just breaking even and thus acting as an open access fishery.

Economic performance of the spanner crab sector based on characteristics of its firm is summarized as:

Degree of Specialisation. The majority of the spanner crab sector was specialised (62%): 43% of firms with BBP>0 and BEP>0, mean BBP of -$1,263 and mean BEP of - $8,897. However, the average diversified spanner crab firm performed better: 71% with BBP>0 and BEP>0, a mean BBP of $10,111 with mean BEP of $6,027. Degree of specialisation was significant for only BOS in the economic performance of the spanner crab sector firm.

Size of the Fishing Operation. Mainly small to medium scale fishing operations. Firms with less than 10m size of fishing operation had the best performance: 77% had a BBP>0 and BEP>0, a mean BBP of $17,407 and a mean BEP of $8,424. Size of fishing operation was significant for BGM, BCI and BEP in the performance of the spanner crab sector firm.

Level of Fishing Intensity. The spanner crab fleet had a relatively low level of fishing intensity (59% less than 100 days): firms with intensity greater than 150 days had the better performance: 83% had a BBP>0 and BEP>0, a mean BBP of $27,085, a mean BEP of $21,562. Levels of fishing intensity were significant for BGM, BOS and BEP in the performance of these firms.

Location of Fishing Firm. The spanner crab sector firm is located in southern Queensland with the Wide Bay regionally based firms performing better: 62% with BBP>0 and BEP>0, a mean BBP of $5,020 and a mean BEP of -$2,526. Location of the fishing firm was significant for only BGM in the economic performance of these firms.

Level of Fishing Activity. The sector had a limited range of fishing activity and as expected as TBCR increased so did the level of economic performance. Firms with TBCR between $100,000 and $150,000 had the best performance: 60% had BBP>0 and BEP>0, a mean BBP of $8,034 and a mean BEP of -$1,463. Level of fishing activity was significant for BGM and BCI economic performance for these firms.

Fishing Pattern. The fishing pattern was local (78% of firms were greater than 61% local) and fished within a relatively few grid squares (87% less than 10). The best performance was the local firm: 61% had a BBP>0 and BEP>0, a mean BBP of $7,907 and mean BEP of $2,346. Fishing pattern was significant for all economic performance indicators except BGM for these firms.

Overall, the crab sector had small sized firms with part-time operators, dispersed along the southern coast of Queensland, harvested mainly mud crab, spanner crab and blue swimmer crab species, generated relatively small levels of income from local fishing areas and contributed $5.2M or 7% of the total sampled fishing fleet's contribution to Queensland's GVP. The general crab sector performed poorly whilst the spanner crab sector was moderately profitable.

CHAPTER 10

ECONOMIC PERFORMANCE OF THE DIVERSIFIED SECTOR

The diversified fishery was a major component of the Queensland commercial fishing industry in 1997/98 in terms of gross value of production (GVP). General characteristics of the diversified fishery are presented within Chapter 3 to provide a brief overview of the level and value of production, type of species, regional data and other details. The diversified sector represents fishing firms with specialisation codes c to f, as defined in Chapter 3, that have taken fish species attributable to all fisheries which contribute significantly to the TBCR of the diversified firm. Sample size was 100 fishing firms representing 26% of in-scope firms and 14% of in-scope GVP. The analysis is of the diversified sector and the firms within that sector.

Economic performance of the diversified sector is measured through financial and economic profit indicators. Estimates for the diversified sector fleet are extrapolated from these survey results in the Diversified Sector Report Card in section 10.5. Sections 10.1 to 10.4 are the results of the survey for the diversified sector. Although this sector is part of the analysis of all sectors, its significance warrants further analysis.

10.1 DIVERSIFIED SECTOR RECEIPT AND COST INDICATORS

Receipt and Cost indicators are fundamental data used for determining the financial and economic performance of the diversified fishing fleet and of the individual diversified firm

10.1.1 Total Boat Cash Receipts

Total Boat Cash Receipts (TBCR) for the diversified sector was $8.317M or 23.95 of the in-scope diversified GVP.

Table 10.1: Diversified Sector: Total Boat Cash Receipts

Total Boat Cash Receipt Class ($'000)	Proportion of Net Firms (%) (n=92)	Proportion of Surveyed Firms (%) (n=478)
<10	7	3
10 to 25	14	11
25 to 50	16	11
50 to 100	31	24
100 to 250	30	32
>250	2	19

Some 37% of diversified firms had Total Boat Cash Receipts less than $50,000 in 1997/98 and 32% of these firms realised TBCR between $100,000 and $500,000, with a mean TBCR of $83,167 (se=$6,772) and a median of $65,894.

In addition, mean cash receipts per day for the diversified firm were $572 with a range from $49 to $1,765. The mean daily cash receipts increased as the boat length class increased with relative variation less in the middle sized fishing operations (10-14m) (Tables 10.2). No analysis was undertaken for the larger sized firm as the sample was less than 5.
Variations in TBCR for the different fishing sectors that contributed to the operation of the diversified firm are shown in Table 10.3: the largest contributor being the net sector.

Table 10.2: Diversified Sector: Total Boat Cash Receipts by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	COV (%)	Proportion of Diversified Firms (%)
0-10	77,916	60,089	7,641	86	77
10-14	100,802	82,648	15,180	69	21

Table 10.3: Diversified Sector: Total Boat Cash Receipts by Fishing Sector

Fishing sector	TBCR ($M)	Mean ($)	Median ($)	Standard Error ($)	COV (%)	Proportion of Diversified Firms (%)
General Crab	1.679	69,950	56,910	11,417	80	24
Line	1.689	88,884	75,250	14,335	70	19
Net	2.920	83,421	59,977	12,791	91	35
Spanner Crab	1.307	93,377	87,908	10,035	40	14
Otter Trawl	na	na	na	na	na	na
Beam Trawl	0.685	114,084	69,416	51,109	110	6

(na means less than 5 in the sample)

A high proportion of the diversified sector family income was dependent upon income from their fishing activity (Table 10.4). For example, 65% of the diversified sector firms relied on fishing for at least 80% their family income compared with 66% of the surveyed families.

Table 10.4: Family reliance on Income from their Diversified Fishing Operation

Proportion of family income from fishing business (%)	Proportion of Diversified Firms (%)	Proportion of Surveyed Firms (%)
<20	12	11
20 – 39	5	7
40 – 59	11	10
60 – 79	6	5
80 – 99	19	18
100	46	48

10.1.2 Capital Invested by the Diversified Sector

The major capital investment (Table 10.5) by the diversified sector was the Licence Package (32%).

Table 10.5: Diversified Sector: Capital Investment

Capital Item	Mean ($)	Proportion of Total Capital (%)
Primary boat hull and permanent fixtures	45,635	25
Electronics	9,252	5
Licence Package	56,720	32
Other capital items	69,032	38
Total	177,975	

The primary boat hull and permanent fixtures, upon which the diversified business depends, also represents a considerable capital investment of 25% of total capital. Other capital items included tender boats, sheds and cold-rooms, trailers, and fishing gear make up around 39% of the total capital investment.

10.1.3 Value of Licence Packages

The mean value of a diversified Licence Package was $56,720 (se=$1,394) with similar relative variability between boat length classes with a median of $55,000, making up some 32% of the capital of the firm (Table 10.5). A difference in the value of Licence Packages between boat length classes was apparent: the smaller firms had the highest mean value of Licence Package (Table 10.6).

Table 10.6: Diversified Sector: Value of Licence Packages by Boat Length

Boat Length Class	Value of Licence Package			
	Average ($)	Median ($)	Standard Error ($)	COV (%)
0-10	57,831	60,000	1,576	24
10-14	50,667	45,000	2,654	24

10.1.4 Total Boat Fixed Costs

For the diversified firm the major components of fixed costs were licence and industry fees (23%) insurance (16%) and overdraft interest (17%), communications (11%), (Table 10.7). Total TBFC was $0.90M, mean TBFC was $9,000 (se=$647) with a median of $7,076.

Table 10.7: Diversified Sector: Total Boat Fixed Costs

Key Fixed Cost Items	Mean ($)	Proportion of TBFC (%) (a)
Banking charges	571	5
Communications	997	11
Electricity	1,012	7
Insurance costs	2,629	16
Leasing costs	2,368	5
Licence & industry fees	2,009	23
Meetings & conferences	393	1
Motor vehicle registration	625	6
Office consumables	221	2
Other boat fees (survey)	376	1
Overdraft interest	3,886	17
Port/jetty/harbour fees	1,517	6
TBFC	9,000	

(a) not all firms had the item and thus data not additive

10.1.5 Total Boat Variable Costs

The TBVC for the diversified firm was $3.752M with average TBVC of $40,783 (se = $6,006) and a median of $22,625. The major variable costs incurred were labour (30%), fuel (24%), and boat repairs and maintenance (16%) and fishing gear (10%) (Table 10.8) Together these represent 80% of the total variable costs of the diversified fishing operation.

Mean paid crew labour costs were $24,038 or 30% of variable costs or 14% of TBCR. Mean imputed wages were $27,272 making the total labour costs per diversified firm an average of $53,310 or the equivalent of 2.2 FTEs per firm (Table 10.9 provides a median breakdown by boat length class).

Table 10.8: Diversified Sector: Total Boat Variable Costs

Key Variable Cost Items	Average per Firm ($)	Proportion of TBVC (%)
Bait	1,785	3
Chemicals	236	-
Food for crew	2,197	3
Fuel, oil and grease (boat)	9,101	24
Gas (LPG) for boat	253	-
Ice	1,382	3
Labour costs (paid crew)	24,038	30
Marketing	1,645	2
Motor vehicle	3,434	8
Packaging material	997	1
Purchases fishing gear	4,182	10
Repairs & maintenance	6,507	16
Total	38,375	

(a) not all firms had the item and thus data not additive

Table 10.9: Diversified Sector: Median Labour Costs by Boat Length

Boat Length (m)	Total Labour Costs ($)			
	Crew Wages	Imputed Wages	Total Wages	Full Time Equivalent Crew (a) (n)
<10	zero	23,620	23,620	1
10-14	12,553	22,880	35,433	1.6

(a) FTE is based on $22,880 (non-trawl crew wage from survey) and is therefore an estimate of the relative crew size and may not reflect actual crew numbers because of part-time and seasonal fluctuation. It is also not dependent on the definition of the number of full time weeks as this varies throughout the industry.

10.1.6 Total Boat Cash Costs

Ninety two percent of the diversified sector firms had TBCC of less than $100,000 (Table 10.10), with mean TBCC of $47,375 (se=$4,369) and median of $35,429.

Table 10.10: Diversified Sector: Total Boat Cash Costs

TBCC Class ($'000)	Proportion of Diversified Firms (%)
< 50	62
50-100	30
100-250	7
250-500	1
> 500	-

10.2 DIVERSIFIED SECTOR FINANCIAL PROFIT INDICATORS

This section deals with the derivation and explanation of the following financial indicators: Boat Gross Margin (BGM), Boat Operating Surplus (BOS), and the Gross Returns Index (GRI), Boat Cash Income (BCI), Profit at Full Equity (PFE), Boat Business Profit (BBP) and Rate of Return to Capital (RRC.

10.2.1 Boat Gross Margin

Boat Gross Margin for the diversified sector was $4.479M after variable costs (fuel, crew wages and repair and maintenance) were covered. BGM is a measure of performance without considering the importance of capital. Mean diversified BGM for 1997-98 was $44,792

(se=$5,661) with a median of $32,936. Mean BGM increases with boat length class but variation in the data is high (Table 10.11).

Table 10.11: Diversified Sector: Boat Gross Margin by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BGM<0 (%)	Total BGM ($M)	BGM Index (a) ($)	COV (%)
<10	48,776	33,384	6,207	5	3.756	267	75
10 – 14	30,071	14,381	14,103	38	0.631	143	97

(a) Boat Gross Margin Index is ***(TBCR/TBVC)*100*** – the higher the index the more efficient the use of inputs.

BGM Index as a profit indicator is a relative measure of the efficient use of receipts when only variable costs are covered. For example, the mean BGM for the small boat classes is higher and had a much higher BGM index and only 5% of that group had BGM<0. The higher the BGM index, the more efficient the use of cash inputs indicating a relatively lower cost structure. However, there was a large relative variation (COV) in the data (Table 10.11).

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BGM for the size of the diversified fishing operation (Table 10.22).

10.2.4 Boat Operating Surplus

Boat Operating Surplus (BOS) is a measure of the ability of the diversified firm to cover all cash costs. Total BOS for the sector was $3.579M after operational variable costs (fuel, crew and repairs and maintenance) and fixed costs (interest, insurance, leasing and licensing and industry fees) are covered. Mean BOS for the diversified firm was $35,792 (se=$5,614) with a median of $24,632.

Table 10.12: Diversified Sector: Boat Operating Surplus

Boat Operating Surplus Class ($'000)	Proportion of Diversified Firms (%)	Proportion of Surveyed Firms (%)
< -50	3	4
-50 to 0	15	16
1 to 25	32	26
25 to 50	19	20
50 to 100	21	19
> 100	10	15

Table 10.13: Diversified Sector: Boat Operating Surplus by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BOS<0 (%)	Total BOS ($M)	BOS Index (a)	COV (%)
<10	41,377	25,227	6,029	12	3.186	213	66
10-14	15,116	8,928	14,301	43	0.317	118	79

(a) BOS Index is ***(TBCR/TBCC)*100*** and is equivalent to the Gross Return Index. The higher the index the more efficient the use of inputs indicating a lower cost structure.

Eighteen percent of diversified firms operated at a negative BOS compared with 20% of the surveyed firms and had a similar distribution of BOS (Table 10.12). When all cash costs were covered, the smaller boat length classes had very different use of inputs, i.e. a BOS Index of 213. Mean BOS for the diversified sector does falls with boat length class (Table 10.13).

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BOS for the size of the diversified fishing operation (Table 10.22).

10.2.5 Gross Returns Index

A GRI less than 100 is a cash operating loss. Mean GRI for the diversified sector was 175 meaning $175 cash was generated from $100 cash spent by the average diversified firm.

10.2.6 Boat Cash Income

BCI is an important profit indicator as it provides an estimate of the ability of the diversified firm to cover the all cash costs, the costs of the owner-operator, family wages. The imputed wages of owner-operated diversified fishing diversified firms were estimate at $440/week or annual wage of $22,880 and were based on wages provided in the economic survey. An imputed value of family contribution was estimated at $406/week or annual wage of $21,112 to the diversified firm was based upon other industries and their similarities to the fishing sector.

Total BCI for the diversified sector was $0.851M after imputed wages were also covered. Some 47% of the net firms had a positive BCI. Mean BCI was $8,520 (se=$5,423) with a median of -$3,816.

The level of BCI related to boat length class was difficult to interpret as the variation in the data is high (Table 10.14). However, the <10m class owners were more able to cover imputed wages for owner-operator and the family involved in the business.

Table 10.14: Diversified Sector: Boat Cash Income by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BCI<0 (%)	Total BCI ($M)	BCI Index (a)	COV (%)
<10	13,180	-580	5,835	52	1.015	120	62
10-14	-9,541	-14,444	13,920	57	-0.200	91	76

(a) BCI Index is ***TBCR/(TBCC + Imputed Wages)*100***. The higher the index the more efficient the use of inputs indicating a lower cost structure.

Adding imputed wages to BOS for the diversified sector, creating BCI, caused the number of small operators (0-10m) making a loss to increase from 12% to 52% (Tables 10.13 and 10.14). This maybe because firms with smaller boats had a higher proportion of total cash costs (ie. excluding depreciation) related to imputed wages – a feature of the owner-operated fishing business.

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BCI for the size of the net fishing operation (Table 10.22).

10.2.7 Boat Business Profit

BBP is the main financial indicator that provides a more complete picture of the financial performance of each net firm in the short to medium term.

Table 10.15: Diversified Sector: Boat Business Profit

Boat Business Profit ($)	Proportion of Diversified Firms (%)	Proportion of Surveyed Firms (%)
Less than -50	14	15
-50 to 0	41	39
1 to 25	16	18
25 to 50	10	10
50 to 100	15	10
Greater than 100	4	18

Total BBP for the diversified sector was $0.261M, mean BBP was $2,612 (se=$5,568) with a median of -$5,923 compared with that of the average surveyed firm which had a mean BBP of $4,687 (se=$4,299) and a median of -$4,687.

Results of the analysis of the diversified sector indicated that 55% of firms had BBP<0 compared with 54% of the surveyed firms (Table 10.15). This indicated that in the 1997-98 financial year, based upon the assumptions made regarding imputed labour and depreciation, the majority of diversified firms were not making a financial profit.

Table 10.16: Diversified Sector: Boat Business Profit by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BBP<0 (%)	Total BBP ($)	BBP Index (a)	BBPI CV (%)
<10	8,715	-2,773	5,857	53	0.671	113	62
10-14	-20,092	-27,620	14,652	62	-0.422	83	75

(a) BBP Index is ***TBCR/(TBCC + Imputed Wages + Depreciation)*100***. The higher the index the more efficient the use of inputs indicating a lower cost structure. (b) 70+HU class did not have enough respondents.

Adding depreciation to BCI for the diversified sector costs, creating BBP, caused the number of small operators (<10m) making a loss to increase from 52% to 53%. Financial performance was difficult to interpret because of the high variation in the data (Table 10.16). However, the smaller sized firms had better BBP results.

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BBP for the size of the diversified fishing operation (Table 10.22).

Sensitivity Analysis

Given that imputed wages were an estimate of what the diversified owner-operator paid or should have paid themselves as opposed to what the opportunity cost actually was, dependent upon unemployment levels throughout Queensland that would depress such wages, a sensitivity analysis was undertaken (Table 10.17). The lower the imputed wage estimate and the higher the level of TBCR the better the financial position of the sampled firms. For example, the percentage of diversified firms making a financial profit increased from 45% to 49% when both wages and TBCR were adjusted by 10%. BBP would breakeven with a decrease of five percent in TBCR.

Table 10.17: Estimates of Boat Business Profit: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts for the Diversified Sector

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	BBP ($M)	% of firms BBP>0	BBP ($M)	% of firms BBP>0	BBP ($M)	% of firms BBP>0
Study estimate (c)	0.261	45	0.667	47	1.093	48
Estimate less 10%	0.534	45	0.950	47	1.365	49
Estimate less 20%	0.807	47	1.222	50	1.638	51

(a) Owner-operators and family members may be willing to forego equivalent wages of paid crew and skippers for their labour in the business. 20% is an estimate of the imputed wage relating to unemployment benefits that might be appropriate for some sections of the industry as an approximate opportunity cost of labour.
(b) Increased receipts could arise from under-reporting in official logbooks, underestimate of beach prices or from a favourable change in exchange rates increasing export prices.
(c) Study estimate based on the wages paid by equivalent work paid for and reported in the survey

10.2.8 Profit at Full Equity

Profit at Full Equity was $0.450M for the diversified sector. Mean PFE for the diversified firm was $4,500 (se=$5,541) and a median of -$5,923.

10.2.9 Rate of Return to Boat Capital

The distribution of RRC (Table 10.18) showed that 54% of the diversified firms generated an RRC less than zero compared with the average firm with 52%. The best returns were from the less than 10m sized firms. The diversified firms had 29% of the lowest RRC (<-20%) and 31% with the highest RRC (>20%). However, 63% of firms had a RRC less than the opportunity cost of capital @ 10%.

There was not a significant difference ($p<0.05$) within RRC related to the size of fishing operation of the diversified sector and RRC (Table 10.22).

Table 10.18: Diversified Sector: Rate of Return to Capital

Rate of Return to Capital Class (%)	Proportion of Diversified Firms (%)	
	<10m	10-14m
< -20	29	52
-20 to -10	16	5
-10 to zero	8	5
zero to +10	10	5
+10 to +20	6	-
> +20	31	33

10.3 DIVERSIFIED SECTOR ECONOMIC PROFIT INDICATORS

This section deals with the derivation and explanation of the following economic indicators: Boat Economic Profit (BEP) for the individual fishing firm and Net Economic Return (NER) from the diversified sector.

10.3.4 Boat Economic Profit

Boat Economic Profit (BEP) is the net economic contribution of the diversified fishing firm to the Queensland economy and takes into account all opportunity costs, except those cost relating to natural capital and the externalities of fishing activities.

Table 10.19: Diversified Sector: Boat Economic Profit by Boat Length

Boat Length Class	Mean ($)	Median ($)	Standard Error ($)	(%) firms BEP>0	Total BEP ($)	BEP Index (a)	COV (%)
<10	5,770	-4,955	5,874	55	0.444	107	66
10-14	-25,993	-35,190	14,851	67	-0.546	77	84

(a) BBP Index is ***TBCR/(TBCC -Interest + Depreciation + Opportunity Cost of Capital)*100***. The higher the ratio the more efficient the use of inputs indicating a relatively lower cost structure.

Total BEP was $0.117M for the diversified sector with a mean of $1,172 (se=$5,626) and a median of -$9,129 (Table 10.19). The best performing groups of diversified firms was the less than 10m class with a higher BEP Index and a lower relative variation.

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in BEP for the size of the diversified fishing operation (Table 10.22).

Sensitivity Analysis

Economic performance was sensitive to the opportunity cost of capital (Table 10.20). For example, if the risk premium is reduced from 3.7% (the risk chosen for the study) to that of the lowest suggested by the experts of 1.5%, the mean BEP increased by -$1,149 and NER by $0.115M for the diversified firm.

Table 10.20: Diversified Sector: Boat Economic Profit by Opportunity Cost Sensitivity

Fishing Sector	Boat Economic Profit (a) Average per firm ($)		Net Economic Return (a) ($M)	
	Opportunity Cost of 6.3% plus 1.5% Risk Premium (b)	Opportunity Cost of 6.3% plus 3.7% Risk Premium (b)	Opportunity Cost of 6.3% plus 1.5% Risk Premium (b)	Opportunity Cost of 6.3% plus 3.7% Risk Premium (b)
Diversified	-23	-1,172	-0.002	-0.117

(a) BEP and Net Return based on the 1997-98 average long term Government bond rate of 6.3% (Queensland Treasury Corporation) (refer Morison, 1999 for similar methodology where 5% premium was chosen and 7% was the assumed real interest rate by ABARE in Rose and Stubbs (2000)).
(b) Risk premium based on administration costs of 1%, bad debts 0.5% and a personal risk premium for the individual between 0% and 2.5% -fishing industry/rural sector regarded at the upper end of this range (Queensland Rural Adjustment Authority). Queensland Treasury suggested a risk premium of 5% as the lowest of a range of 5-9.3%.

10.3.5 Net Economic Return

For the 100 surveyed diversified firms, NER was -$0.117M or 1.4% of their GVP. Queensland therefore provided $0.117M of resources towards the catching of product caught by diversified firms from all sectors except that of the otter trawl sector. This indicated that the diversified sector was behaving as if it were operating as a limited access fishery but where economic rent was marginal: impacts of changes in fish resources and environmental impacts notwithstanding.

Sensitivity Analysis

BEP and therefore NER are also sensitive to changes in imputed wages and TBCR. The lower the imputed wage estimate and the higher the level of cash receipts the better the economic performance of the diversified firms (Table 10.21). For example, the percentage of diversified firms making a economic profit increased from 43% to 49% when both imputed wages and TBCR were adjusted by 10%. The level of NER was zero at just under a 2% increase in TBCR.

Table 10.21: Estimates of Diversified Firm Boat Economic Profit and Net Economic Return: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	NER $M	% firms BEP>0	NER $M	% firms BEP>0	NER $M	% firms BEP>0
Study estimate (c)	-0.117	43	0.299	44	0.714	48
Estimate less 10%	0.115	45	0.572	46	0.987	49
Estimate less 20%	0.428	45	0.844	46	1.260	51

(a) Owner-operators and family members may be willing to forego equivalent wages of paid crew and skippers for their labour in the business. 20% is an estimate of the imputed wage relating to unemployment benefits that might be appropriate for some sections of the industry as an approximate opportunity cost of labour.
(b) Increased receipts could arise from under-reporting in official logbooks, underestimate of beach prices or from a favourable change in exchange rates increasing export prices.
(c) Study estimate based on the wages paid by equivalent work paid for and reported in the survey

10.4 ECONOMIC PERFORMANCE OF THE QUEENSLAND DIVERSIFIED SECTOR FIRM

The measurement of the financial and economic performance of the 100 surveyed diversified fishing firm was based on the following characteristics:

- degree of specialisation (specialisation code);
- size of fishing operation (boat length or hull units);
- level of fishing intensity (days fished per annum);
- location of fishing business (ABS statistical division);
- level of fishing activity (total boat cash receipts);
- fishing pattern (local/distant fishing activity);

The use of averages is a problem with this kind of economic data. Therefore, in the following sections, the use of average (mean) has been qualified by other information such as medians, standard error, profit indices and relative dispersion.

Economic performance of the line sector was evaluated based on the following criteria:

- statistical significance of the relationship between the characteristics of the diversified firm and the levels of financial and economic profit indicators;
- levels of BBP and BEP;
- the means/medians of BBP and BEP of each characteristic; and
- proportion of subsets of the diversified sector firms with BBP>0 and BEP>0.

10.4.4 Characteristics of the Diversified Fishing Firm

A set of null hypotheses (H_o) were tested which related each financial and economic indicator (BGM, BOS BCI, BBP, BEP, and RRC) against the characteristics of the diversified firm (fishing sector, degree of diversification, size of business operation, location of fishing business, fishing intensity, level of fishing activity and fishing pattern). Refer to Chapter 3 for description of these characteristics.

For 'level of fishing intensity' (days fished) and 'level of fishing activity' (TBCR) there was a significant difference for all major indicators and for fishing pattern based on number of grids fished except RRC (Table 10.22).

Table 10.22: Testing the Null Hypotheses (H_0) that there is no significant difference in the level of a financial and economic profit indicator and the characteristics of the Diversified Fishing Firm. (Yes = reject H_0 and $p<0.05$)

Indicator	Characteristics of the Diversified Firm					
	Degree of Diversification	Size of Fishing Operation	Location of Fishing Business	Level of Fishing Intensity	Level of Fishing activity	Fishing Pattern (Grids Fished)
Financial Indicator						
BGM	NO	NO	NO	**YES**	**YES**	**YES**
BOS	NO	NO	NO	**YES**	**YES**	**YES**
BCI	NO	NO	NO	**YES**	**YES**	**YES**
BBP	NO	NO	NO	**YES**	**YES**	**YES**
RRC	NO	NO	NO	**YES**	**YES**	NO
Economic Indicator						
BEP	NO	NO	NO	**YES**	**YES**	**YES**

(a) The results summarised in this table were based on ANOVA univariate analysis and the YES/NO meant that the results of each individual relationship met or failed to meet the ANOVA criteria of $p<0.05$.

10.4.5 Economic Performance by Size of Fishing Operation

The economic performance of diversified firms varied for the boat length classes (Tables 10.23 and 10.24). The average boat length was 12m (COV 11%). The less than 10m class had the best economic performance.

Table 10.23: Mean Economic Performance of Diversified Sector: Size of Fishing Operation

Financial Profit Indicator	Size of Fishing Operation (boat length)	
	<10m	10-14m
Boat Gross Margin ($)	48,776	30,071
Boat Operating Surplus ($)	41,377	15,116
Gross Returns Index	213	118
Boat Cash Income ($)	13,180	-9,541
Profit at Full Equity ($)	10,158	-16,442
Rate of Return to Capital (%)	9.1	-11.3
Boat Business Profit ($)	8,715	-20,092
% Firms BBP>0	47	38
Boat Economic Profit ($)	5,770	-25,993
Net Economic Return ($M)	0.444	-0.546
% Firms BEP>0	45	33

The use of absolute data as given in Table 10.23 is difficult to interpret when comparing diversified firms within and between profit types. Table 10.24 contains the indicators recalculated as a profit ratio.

Table 10.24: Mean Economic Performance of Diversified Sector: Size of Fishing Operation

Profit Indicator	Size of Fishing Operation (boat length)			
	<10m		10-14m	
	Profit Index	COV (%)	Profit Index	COV (%)
Boat Gross Margin	267	75	143	97
Boat Operating Surplus	213	66	117	79
Boat Cash Income	120	62	91	76
Profit at Full Equity	115	62	85	75
Boat Business Profit	113	62	83	76
Boat Economic Profit	107	66	77	84

The greatest variability occurs in the diversified firms with the larger sized fishing operations across all profit indices and specifically between cash indices of BGM and BOS, and the others which include non-cash items such as imputed wages, depreciation and opportunity cost of capital. The best economic performance was the smaller boat sized diversified firm.

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in each of the major financial profit indicators with respect to the size of the diversified fishing firm (Table 10.22).

10.4.5.1 Economic Performance by Size of Fishing Operation and Level of Fishing Activity

When size of operation is linked to level of fishing activity the best performance was the group of firms with a TBCR greater $150,000 and specifically the less than 10m sized net firms which had an mean BEP of $68,594 and RRC of 88.3% (Table 10.25). A remarkable performance compared with the industry average of -$1,393 for the same boat length class.

10.4.5.2 Economic Performance by Size of Fishing Operation and Fishing Intensity

However, when size of the fishing operation is linked to intensity of fishing the best performance was the small diversified firm (<10m) fishing for more than 150 days (Table 10.26). For example, RRC of 23%, mean BBP of $26,404 and a mean BEP of $23,821 – a very good result compared to the full survey results.

Table 10.25: Economic Performance of Diversified Firm: Size of Fishing Operation and Level of Fishing Activity

Level of Fishing Activity TBCR ($'000)	Size of Fishing Operation (boat length)	
	<10m	10-14m
Boat Business Profit ($)		
<150	-2,517	-26,210,
>150	116,829	5,959
Profit at Full Equity ($)		
<150	-1,172	-22,585
>150	123,458	8,629
Rate of Return to Capital (%)		
<150	-1.1	-16.1
>150	88.3	4.5
Boat Economic Profit ($)		
<150	-5,336	-32,181
>150	116,829	-2,410
Net Economic Return ($M)		
<150	-0.374	-0.547
>150	0.818	-14,462

Table 10.26: Economic Performance of Diversified Firm: Size of Fishing Operation and Fishing Intensity

Fishing Intensity (days fished)	Size of Fishing Operation	
	<10m	10-14m
Boat Business Profit ($)		
<150	-11,432	-41,891
>150	26,404	13,476
Profit at Full Equity ($)		
<150	-10,098	-37,678
>150	27,943	15,764
Rate of Return to Capital (%)		
<150	-10	-21.6
>150	23	12.6
Boat Economic Profit ($)		
<150	-14,788	-49,456
>150	23,821	8,139
Net Economic Return ($M)		
<150	-0.532	-0.643
>150	0.977	0.081

10.4.6 Economic Performance by Level of Fishing Intensity

Diversified firms with fishing intensity greater than 100 days had the best mean economic performance (Table 10.27). The poorest overall average performance was diversified firms with a fishing intensity of less than 50 days: 95% of firms had BBP<0. The better performing group of firms were those with a fishing intensity greater than 100 days.

As the intensity of fishing operation increased the profit indices increased as did the relative variation in the data. For example, PFE Index was a very high 145 with a COV of 38 for the diversified firms with 100-150 days fishing intensity (Table 10.28).

Overall, ANOVA testing indicates that there were significant differences ($p<0.05$) in each of the major financial and economic profit indicators with respect to the intensity of fishing operation of the diversified sector firm (Table 10.22).

Table 10.27: Mean Economic Performance of the Diversified Sector: Intensity of Fishing Operation

Profit Indicator	**Fishing Intensity** (days fished)			
	0-50	**51-100**	**101-150**	**201-250**
BGM	4,650	39,364	79,325	122,994
BOS ($)	-2,019	30,703	69,107	108,636
GRI	92	174	218	202
BCI ($)	-26,732	957	43,245	83,998
PFE ($)	-31,335	-1,911	39,613	77,608
RRC (%)	-31.7	-1.7	25.8	53.2
BBP ($)	-32,489	-4,102	37,237	74,928
Total BBP ($M)	-1.202	-0.127	0.707	0.450
% Firms BBP>0	5	52	84	83
BEP ($)	-36,232	-6,600	32,874	67,818
NER ($M)	-1,341	-0.205	0.624	0.407
% Firms BEP>0	5	52	74	83

(na means less than 5 in the sample)

Table 10.28: Mean Economic Performance of the Diversified Sector: Fishing Intensity

Profit index	**Fishing Intensity** (days fished)							
	<50		**51-100**		**101-150**		**200-250**	
	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)
BGM	125	156	221	82	264	70	233	82
BOS	92	128	174	69	218	59	202	87
BCI	47	106	101	43	151	40	164	59
PFE	43	90	97	44	145	38	156	64
BBP	42	92	95	43	141	38	153	63
BEP	39	99	90	46	132	41	144	67

(a) The number of firms with boats greater than 250 days fished was less than 5.

10.4.7 Economic Performance by Location of Fishing Firm

The location of a diversified firm, however, was not necessarily related to the areas fished by that business and was therefore not an indicator of activity within those locations.

Table 10.29: Mean Economic Performance of Diversified Sector: Location of Fishing Firm

Indicator	**Location of Fishing Firm**						
	Brisbane	**Moreton**	**Wide Bay**	**Fitzroy**	**Mackay**	**Northern**	**Far North**
BGM	50,887	52,056	45,875	24,421	56,124	59,415	31,645
BOS ($)	41,709	39,831	37,726	17,977	45,500	52,698	21,726
GRI	180	179	179	144	203	219	145
BCI ($)	10,084	18,200	8,981	-9,651	17,264	28,670	-7,575
PFE ($)	7,916	15,359	4,506	-14,402	18,865	23,837	-16,509
RRC (%)	8.5	11.1	3.4	-12.5	24.6	20.8	-11.9
BBP ($)	5,982	11,617	2,723	-15,099	15,032	22,963	-16,780
% Firms BBP>0	54	61	41	27	71	56	18
BEP ($)	4,149	9,668	-1,304	-19,094	15,472	18,892	-24,988
NER ($M)	0.054	0.174	-0.035	-0.286	0.108	0.170	-0.274
% Firms BEP>0	54	61	33	27	71	56	18

Based on the financial and economic indicators for the average fishing firm, the diversified firms located in the Northern, Mackay and Moreton regions appear to be the most profitable, with the firms located in the Far North, Fitzroy and Wide Bay regions appearing less profitable

(Table 10.29). This supported by the indices given in Table 10.30. For example, the profit indices are higher for Northern than for Mackay. The poor performance of firms located in the Fitzroy region is supported by the low profit indices i.e. less than 100. There appears to be major differences between the economic indicators for diversified firms from the various statistical divisions in Queensland. However, ANOVA testing indicates that there are no significant differences ($p<0.05$) in the profit indicators with respect to the location of fishing firm (Table 10.22).

Table 10.30: Mean Economic Performance of Diversified Sector: Location of Fishing Firm

Profit Indicator	Location of Fishing Firm (ABS Statistical Division)													
	Brisbane		Moreton		Wide Bay		Fitzroy		Mackay		Northern		Far North	
	Index		Index	COV	Index	COV	Index	COV	Index	COV	Index	COV	Index	COV
BGM	218	68	236	70	215	106	170	140	267	52	258	87	181	51
BOS	180	65	179	60	179	85	144	115	202	44	219	89	145	45
BCI	112	60	125	50	111	76	86	79	123	34	142	75	90	51
PFE	109	62	120	49	106	73	80	80	126	36	132	81	81	51
BBP	107	61	115	51	103	71	80	77	120	33	131	81	80	51
BEP	103	63	108	54	97	77	75	85	117	37	123	87	74	56

10.4.8 Economic Performance by Level of Fishing Activity

Diversified firms can be compared based on their level of fishing activity measured by TBCR. As would be expected, profit appears to increase as the level of TBCR increases. The mean BBP and mean BEP (Table 10.31) appear to be positive after a TBCR of $100,000. The best performing business was likely to have a TBCR between $201,00 and $250,000 with very high proportions of firms making a profit. A firm with a TBCR less than $50,000 performed very poorly.

Although the firms with TBCR from $201,000 to $250,000 and $101,000 to $150,000 had the best profit indices these was a less variability in the latter group of diversified firms. The poorer performing firms had very low indices. For example, diversified sector firms with a TBCR of less than $50,000, had all indices less than 100 except for BGM (Table 10.32).

Overall, ANOVA testing indicated there were significant differences ($p<0.05$) in each of the major financial and economic profit indicators with respect to the level of fishing activity (Table 10.22).

Table 10.31: Mean Financial Performance of the Diversified Sector: Level of Fishing Activity

Profit Indicator	Total Boat Cash Receipts ($'000)			
	0-50	51-100	101-150	210-250
BGM ($)	4,650	39,364	79,325	122,994
BOS ($)	-2,019	30,703	69,107	108,636
GRI	92	174	218	202
BCI ($)	-26,732	957	43,245	83,998
PFE ($)	-31,335	-1,911	39,613	77,608
RRC (%)	-31.7	-1.7	25.8	53.2
BBP ($)	-32,489	-4,102	37,237	74,928
% Firms BBP>0	5	52	84	83
BEP ($)	-36,232	-6,600	32,874	67,818
NER ($M)	-1.341	-0.205	0.625	0.407
% Firms BEP>0	5	52	74	83

(na means sample less than 5)

Table 10.32: Mean Economic Performance of the Diversified Sector: Level of Fishing Activity

Profit Index	Level of Fishing Activity									
	<50		51-100		101-150		151-200		201-250	
	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)	Index	COV (%)
BGM	124	156	220	82	264	70	na	na	233	83
BOS	92	128	174	69	218	59	na	na	202	87
BCI	47	106	101	43	151	40	na	na	164	59
PFE	43	92	97	44	145	38	na	na	156	63
BBP	42	90	94	43	141	38	na	na	154	64
BEP	39	99	90	46	132	41	na	na	145	67

(a) The number of firms with TBCR between $200,000 to $250,000 in the sample was less than 5).

10.4.9 Economic Performance by Fishing Pattern

Diversified firms that did not entirely fish locally had a better economic performance.

For example, 80% of firms with a 61-80% fishing pattern made a financial profit of $31,405 compared to the very local with 44% and a similar proportion made a mean BEP of $29,295 (Table 10.33) and supported by profit indices (Table10.34): high by any standards established by this study.

Table 10.33: Mean Economic Performance of the Diversified Sector: Fishing Pattern

Financial Profit Indicator	Fishing Pattern (Proximity)	
	<20%	80-100%
BGM ($)	32,928	47,727
BOS ($)	19,042	39,900
GRI	122	203
BCI ($)	-9,651	11,957
PFE ($)	-15,532	8,727
RRC (%)	-9.6	7.9
BBP ($)	-19,034	6,867
% Firms BBP>0	36	47
BEP ($)	-24,998	3,864
NER ($M)	-0.349	0.278
% Firms BEP>0	36	44

Table 10.34 Economic Performance of the Diversified Sector: Fishing Pattern

Profit Index	Fishing Pattern (proximity)			
	<20%		81-100%	
	Index	COV	Index	COV
BGM	145	74	254	81
BOS	122	71	202	72
BCI	91	60	117	66
PFE	87	60	112	66
BBP	85	61	109	66
BEP	79	66	103	71

Overall, ANOVA testing indicated there were significant differences ($p<0.05$) in the financial and economic profit indicators, except for RRC, with respect to fishing pattern based on the number of grids fished (Table 10.22).

10.5 REPORT CARD OF QUEENSLAND DIVERSIFIED SECTOR FLEET

Economic performance of the Queensland line sector fleet was estimated by the financial and economic profit indicators of the line sector, determined from the survey, being extrapolated to the total population of in-scope diversified sector firms (Table 3.3) based on the statistical means of the profit indicators for the characteristic 'level of fishing intensity' of the diversified sector firms derived in the previous sections of this chapter. This sector is a subset of the main sectors already analysed. However because of the significance of this sector (25% of the entire Queensland fleet by number of firms, its performance has been included.

Overall, the diversified sector fleet generated a total BBP of $1.12M with a mean BBP of $2,617, median of -$4,687 where 46% of these firms met the financial profit criteria BBP>0. The Boat Business Profit Index was 105. Diversified fleet NER was estimated at $0.467M, mean BEP of $1,172, median of -$9,129 and where 43% of firms met the economic profit criteria BEP>0. The average diversified sector firm had capital valued at $177,975M invested in the fishing operation. Overall, the diversified firms generated a TBCR of $34.8M and had a mean TBCR of $83,167 per firm with a median of $65,894 and used a mean TBCC of $47,375 with median $35,429 (Table 10.35). Overall, the diversified sector fleet was just breaking even.

For example, these diversified firms spent:

- mean owner and family labour costs of $27,272 and median of $22,930;
- mean operating fixed costs (such as interest, insurance, leasing, licence and industry fees) of $9,000 and a median of $7,076;
- mean operating variable costs (such as fuel, crew, repairs and maintenance) of $38,375 and a median of $27,373; and
- mean opportunity cost of capital of $1,445.

Table 10.35: Estimated Economic Performance of the Diversified Sector Fishing Fleet

Indicator	Estimated Diversified Sector Fleet Values (a) ($M)	Mean (b) ($)	Median (b) ($)
Receipt and Cost Indicator			
Total Boat Cash Receipts	34.8	83,167	65,894
Total Capital Investment	743.194	177,975	161,950
Licence Package Value	23.708	56,720	55,000
Total Boat Fixed Costs	3.762	9,000	7,076
Total Boat Variable Costs	16.041	38,375	27,373
Total Boat Cash Costs	19.803	47,375	35,429
Depreciation	2.520	6,028	4,380
Imputed Labour Costs	11.399	27,272	22,930
Financial Profit Indicator			
Boat Gross Margin	19.173	44,792	32,936
Gross Return Index	175		
Boat Operating Surplus	15.318	35,792	24,632
Boat Cash Income	3.646	8,520	-3,816
Boat Business Profit	1.120	2,617	-4,687
% Firms BBP>0	46%		
Profit at Full Equity		4,500	-5,923
Rate of Return to Capital	3.7%		
Economic Profit Indicator			
Boat Economic Profit		1,172	9,129
Net Economic Return ($M)	0.467		
% Firms BEP>0	43%		

(a) Costs based on means of the survey extrapolated to the population of the diversified sector fleet.
(b) Taken from survey sample of 31 general crab firms (21% o general crab fleet).

Economic performance based on characteristics of the diversified Sector Firm is summarized as:

Degree of Specialisation: The majority of the diversified sector obtained most of its product from the crab and net sectors: 45% of firms had BBP>0, mean BBP of -$2.612 and mean BEP of $1.172. Degree of specialisation was not relevant.

Size of the Fishing Operation: Relatively small to medium scale fishing operations. Firms with less than 10m size of fishing operation had the best performance: 47% had a BBP>0 and a mean BBP of $8,715 whereas 45% had a BEP>0 and a mean BEP of $5,770. Size of fishing operation was not significant for the performance of the diversified sector firm.

Level of Fishing Intensity: The diversified fleet had a range of fishing intensity where firms with intensity greater than 200 days had the best performance: 83% had a BBP>0 and BEP>0, a mean BBP of $74,928, a mean BEP of $67,818. Levels of fishing intensity were significant for all economic indicators in the performance of these firms.

Location of Fishing Firm: The diversified sector firm was evenly located along the Queensland coast with the Northern and Moreton regionally based firms performing better. Northern region had the best performance: 56% with BBP>0 and BEP>0, a mean BBP of $22,963 and a mean BEP of $18,892. Location of the fishing firm was significant for the economic performance of these firms.

Level of Fishing Activity: The sector had a wide range of fishing activity: as expected as TBCR increased so did the level of economic performance. Firms with TBCR between $201,000 and $250,000 had the best performance: 83% had BBP>0 and BEP>0, mean BBP of $74,928 and a mean BEP of $67,818 – a very good performance by a surveyed subset of the fishing fleet. Levels of fishing activity were significant all economic performance indicators for these firms.

Fishing Pattern: The fishing pattern was either highly local or very distant. The best performance was the very local firm (80-100% local): 47% had a BBP>0 and a mean BBP of $6,867 whereas 445 had a BEP>0 and mean BEP of $3,864. Fishing pattern was significant for all economic performance indicators except RRC for these firms.

Overall, the diversified sector had smaller sized firms taking crab and net product with part-time operators, dispersed along the coast of Queensland and generated relatively small levels of income from local fishing areas and contributed $8.32M and 11.4% of the surveyed fishing fleet's contribution to Queensland's GVP and were moderately profitable relative to the rest of the surveyed firms.

CHAPTER 11

THE ECONOMIC PERFORMANCE OF THE QUEENLAND FISHERY

The methods of estimation of economic performance of the Queensland fishery were described in Chapter 2. The chapter provides a detailed summary of the results of the application of those methods to the Queensland fishery and fishing firms based on survey results. This chapter is a summary of the results of the 478 surveyed firms and estimates of the economic performance of the Queensland fleet based on the results of sector analyses in Chapters 6 to 10.

The Queensland fishery consists of defined fishing sectors based on attribution ratios as described in Chapter 3 and the fishing firms operating within those sectors. The overall economic performance of the Queensland fishery is based on the fishing firm for the 1997-98 financial year and is determined through the use of aggregate statistical means, medians and indices of financial and economic profit indicators. These aggregate measures are broken down through analyses of fishing sectors and characteristics of the fishing firm. Refer to Chapter 2 for methodology cautions.

11.1 QUEENSLAND FISHERY RECEIPT AND COST INDICATORS

11.1.1 Total Boat Cash Receipts

The Gross Value of Production (GVP) for the entire Queensland fishery was $228.6M. However, the GVP or the sum of TBCR of all surveyed 478 fishing firms, was valued at $72.57M for the survey sample (n=478) and $210.2M for the fishing firms in scope for the study (Table 3.3). The sample represented 35% of total GVP or 29% of the fleet fishing firms. The distribution of TBCR is skewed towards the lower end with 49% receiving less than $100,000 (Table 11.1) and the same proportion as the fleet (Table 3.7a)

Table 11.1: Total Boat Cash Receipts

TBCR ($'000)	All Sectors (%)
<50	25
50-100	24
100-150	13
150-200	11
200-250	8
250+	19

Further analysis indicates that the level of TBCR generally increased with boat length class (Table 11.2).

Table 11.2: Total Boat Cash Receipts: Size of Fishing Operation

Boat Length Class (m)	Mean ($)	Median ($)	Mean TBCR/ day fished ($)
0-10	73,272	59,150	608
10.1-14	141,535	125,583	968
14.1-18	269,386	254,526	1,469
18.1+	397,320	371,787	2,313

The importance of TBCR to the performance of the firm is emphasised by the reliance of most fishing families on that income. For example, some 48% of families were totally reliant on the income from their fishing business and only 11% suggested a contribution of less than 20% (Table 11.3). In other words, the respondents were highly reliant on their fishing business to keep the family afloat. The least reliant families were within the line sector and the most reliant within the otter trawl sector.

Table 11.3: Family Reliance on Income from their Fishing Firm

Family Reliance on Fishing Income (%)	Proportion of firms (%)
Up to 19	11
20 – 39	7
40 – 59	10
60 – 79	6
80 – 99	18
100	48

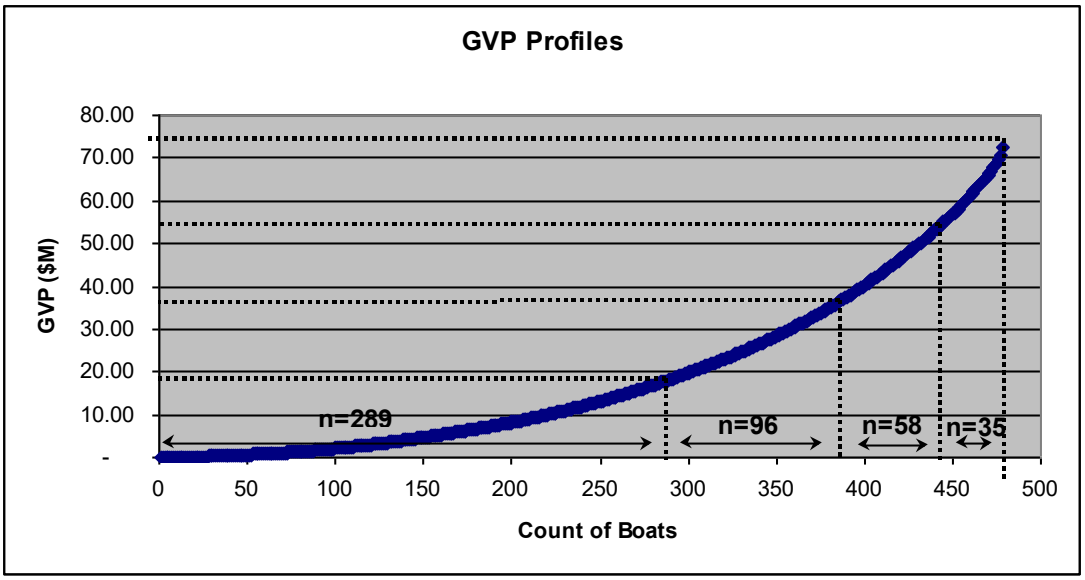

Figure 11.1: GVP Quartiles of Surveyed Fishing Firms (n=478)

The sample GVP distribution of the Queensland fishery, based on the count of boats, is extremely skewed. For example, the lowest quartile of GVP was taken by 61% of surveyed firms with the top quartile taken by only 7% of the firms (Figure 11.1). Another example of the skewed income distribution was the lowest quartile of firms captured only $2.9M or 4% of GVP, with each subsequent quartile the proportion increased, the last quartile capturing 59% of GVP (Figure 11.2).

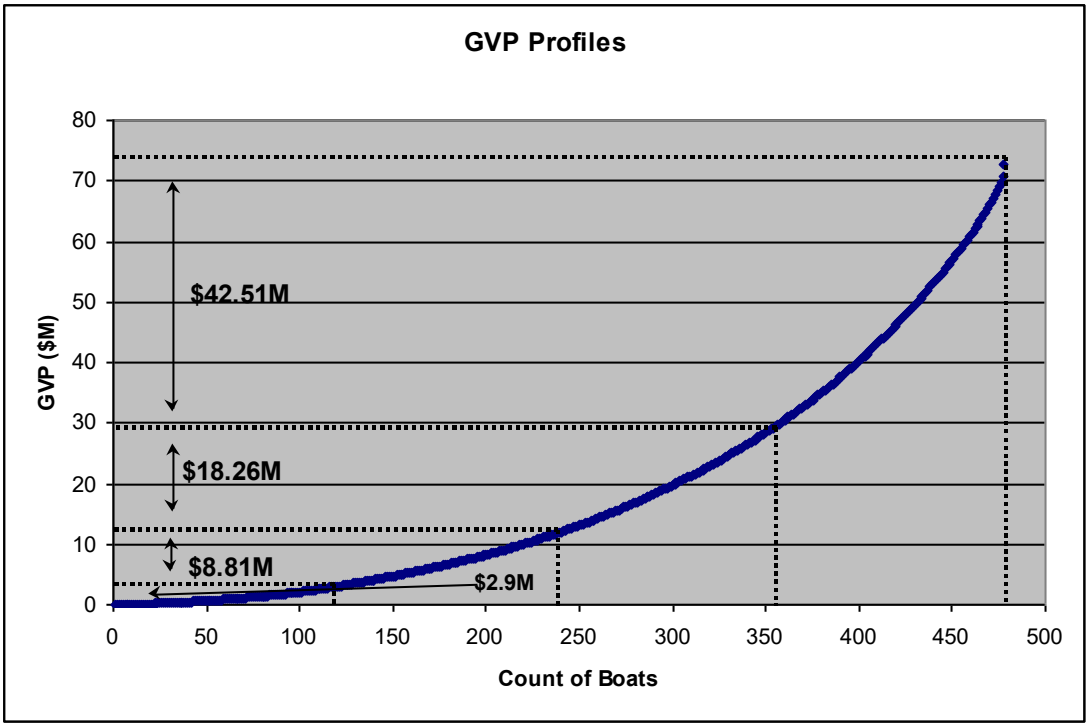

Figure 11.2: Fishing Firm Quartiles (n=478)

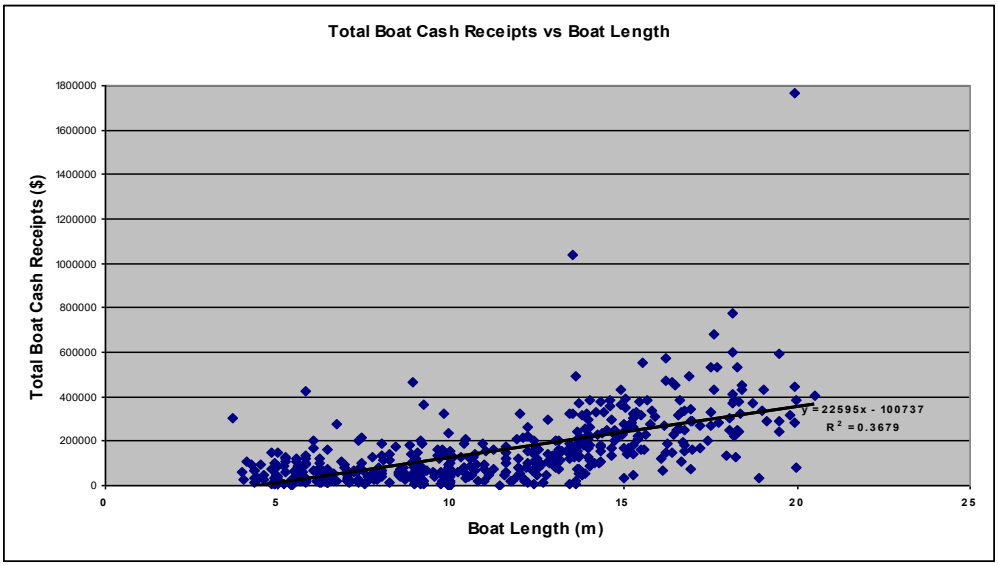

Figure 11.3: Regression of TBCR by Boat Length

The relationship between TBCR and boat length (Figure 11.3) was significant (ANOVA, $P<0.05$. $R^2 = 0.37$). However, boat length only accounted for 37% of the variation in TBCR. Other characteristics affecting the TBCR are discussed later in the chapter but no multivariate analysis was undertaken.

11.1.2 Capital Invested in the Fishing Firm

The average capital investment in the fishing firm was $294,400 (se=$11,507) with a median of $206,801. Major capital items were boat ($134,513), making up 46% of total investment, followed by the Licence Package and other items such as electronic equipment (Table 11.4). Capital investment appears to increase with the size of the operation.

Table 11.4: Major Capital Items

Capital Item	Total ($M)	Mean ($)	Median ($)	Standard Error	Average proportion of Total Capital (%)
Primary Boat Hull	64.3	134,513	80,000	7,669	46
Licence Package	36.3	75,964	66,000	1,925	26
Electronic Equipment	9.4	22,432	10,000	1,020	8
Total Capital of Firm	140.0	294,369	206,801	11,507	100

The mean value of boat and electronic equipment was $50,000 for boats less than 10m, $130,000 for boats between 10m and 14m, $300,000 for boats between 14 m and 18m and $483,000 for boats greater than 18m. The mean value of a Licence Package was $75,954 (se=$1,925) with a median of $66,000, making up some 26% of the capital of the firm. Total value of Licence packages for the survey sample was $36.3M. For T1 Licence Packages, the value of the licence was determined by the value of each hull unit attached. For 1997-98 the value of a Hull Unit, determined from brokers records, was $3000. Licence costs represent the discounted value of expected future rent but may exaggerate the social costs of fishing unless cost figures are adjusted for these licence values (Flaaten et. al. 1995).

11.1.3 Total Boat Variable Costs

Total Boat Variable Cost (TBVC) was $42.9M, mean TBVC of $89,754 (se=$4,473) and a median of $52,243. Labour, fuel, and repairs and maintenance averaged 40%, 22% and 20% of TBVC respectively (Table 11.5). Labour costs are actual costs and do not include either imputed owner-operator wages or the contribution of unpaid family members.

Table 11.5: Major Variable Cost Items

Key Variable Cost Item	Mean ($)	Mean Proportion of TBVC (%)
Labour Costs (paid crew only)	52,712	40
Fuel, Oil and Grease (Boat)	19,943	22
Repairs and Maintenance (Boat)	18,925	20

The operating costs varied across fishing firms. For example, fuel costs are significantly related to boat-length, particularly those greater than 14m and above 120 days fished but the relationship between days fished and fuel costs are not as significant as boat length and fuel costs (Figures 11.4 and 11.5).

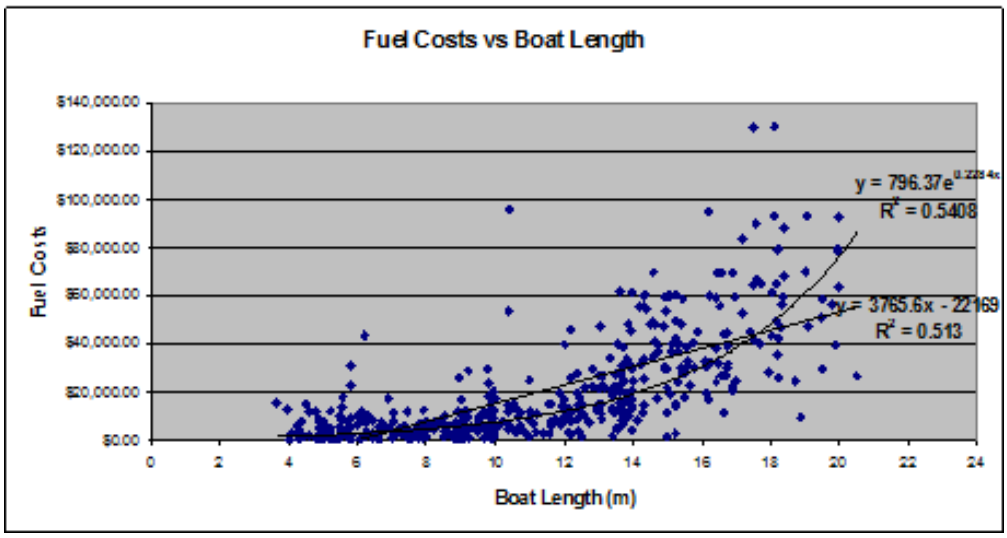

Figure 11.4: Regression of Fuel Costs by Boat Length

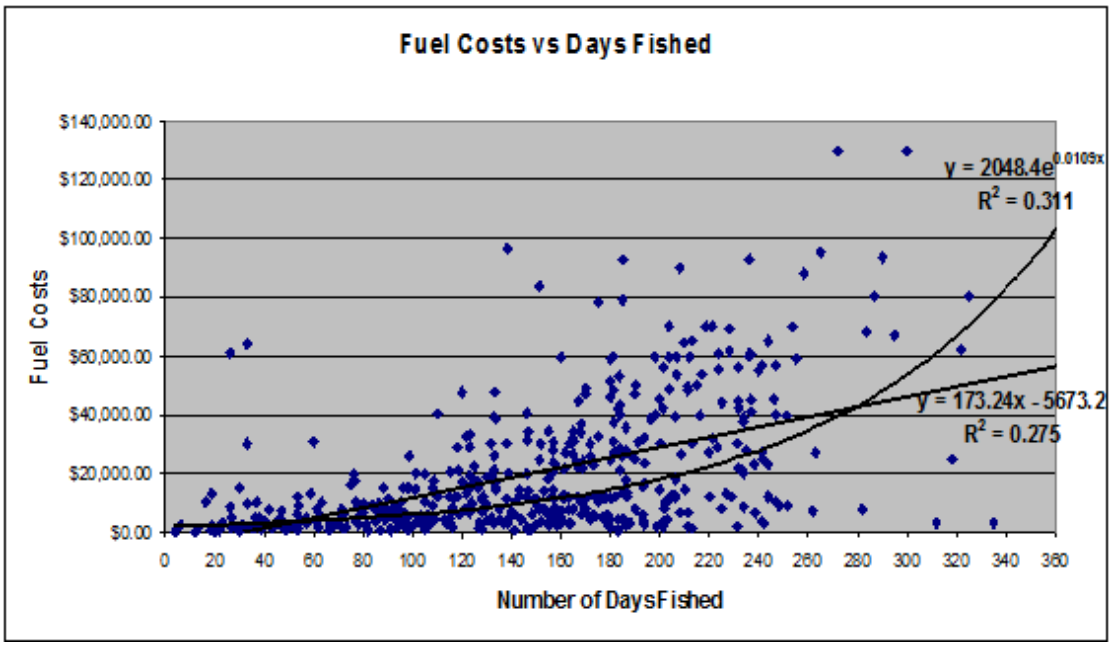

Figure 11.5: Regression by Fuel Costs and Days Fished

11.1.4 Total Boat Fixed Costs

Key fixed costs (Table 11.6) are insurance (28%) and interest payments (23%). TBFC was $7.99M. Mean TBFC was $16,714 (se=$827) with a median of $10,953. Interest payments of $7,757 are driven by the higher overdraft payments accrued by the otter trawl sector. These costs were relatively lower in the non-trawl sectors. For example, in the less than 10m class, representing 46% of the sample, the non-trawl sector overdraft payments were an average of $2,805 which matches the low capital intensity of these sectors and the extent that fishers had fully paid for their boat.

The uncertainty of future management arrangements, as a result of no fishery management plans being promulgated or implemented by 1997-98, may have led to this lower level of investment.

Table 11.6 Major Fixed Cost Items

Key Fixed Cost Item	Mean ($)	Proportion of TBFC (%)
Overdraft Interest	7,757	23
Insurance	6,678	28
Leasing Costs	4,763	7
Licence and Industry Fees	2,163	13

11.1.5 Total Boat Cash Costs

Total Boat Cash Cost (TBCC) was $51.7M, mean TBCC was $108,156 (se=$5,076) and a median of $65,397. These costs do not include any opportunity cost payment for the contribution of the labour, capital, or entrepreneurial skills of the business operation: accounted for under financial profit indicators.

11.2 QUEENSLAND FISHERY FINANCIAL PROFIT INDICATORS

This section deals with the derivation and explanation of the following financial indicators: Boat Gross Margin (BGM), Boat Operating Surplus (BOS) and the Gross Returns Index (GRI), Boat Cash Income (BCI), Profit at Full Equity, Boat Business Profit (BBP) and Rate of Return to Capital (RRC). All of these indicators are a financial measure of 'profit' and are an integral part of the measurement of economic performance.

These types of 'profit' are sensitive to variations in the key receipt and cost indicators which can be measured through two basic types of elasticity:

Type I: the percentage change in 'profit' given a one percent change in a key indicator such as price of fuel, and

Type II: the percentage change in a key indicator, such as fuel prices, required to change 'profit' by one percent.

Although this simple form of elasticity does not take into account inter-relationships between various costs it is appropriate for this project report as the elasticity measure used gives a general magnitude of the impact of a change in the input parameter on the various forms of 'profit'. The above measures are reciprocals of each other.

Note the caution made in Section 2.6 about these elasticities.

11.2.1 Boat Gross Margin

After variable cash costs (such as fuel, crew, repairs and maintenance) were covered, the surveyed firms made a total BGM of $29.672M, mean BGM for 1997-98 was $62,076 (se=$4,623) with a median of $42,662.

Mean BGM increases with boat class length. But the BGM Index falls with the increase in boat length class indicating a relative increase in the cost of doing business or an increasing proportionate cost structure (Table 11.7). For example, for every $100 spent on variable costs, the return to boats less than 10m ($224) compared to boats between 14-18m ($155) even though the mean and median BGM per firm of the larger boat class was much larger than that of the smaller boat class. The data was highly skewed for the 18+m class which also had the highest proportion of boats with a negative BGM.

A proportion of firms showed a negative BGM but it is expected that fishers would aim to cover, at least, their variable cost. There are at least two plausible explanations for this result. One is that there was under-reporting of catch and therefore these firms do not make a negative BGM. The second is that for the period in question, notwithstanding their goal of coving variable costs, they were not successful in doing so through 'bad luck' regarding catches. Before each trip it is expected that variable costs would at least be covered as an incentive to go fishing– a rational decision.

Table 11.7: Boat Gross Margin by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BGM<0 (%)	BGM Index (%) (a)
0 –10	40,565	29,031	3,493	9	224
10.1 – 14	59,981	45,634	8,940	15	174
14.1 – 18	96,319	89,130	9,595	8	155
18.1+	119,968	80,605	43,915	23	143

(a) The BGM Index is ***(TBCR/TBVC)*100***. The higher the index, the more efficient the use of inputs, i.e. a lower cost structure.

Sensitivity Analysis

The Boat Gross Margin is sensitive to variations in key cost and receipt indicators such as:

- TBCR (price X catch) because of the uncertainties of logbook catch records, averaging of beach prices and exchange rate fluctuations;
- fuel costs due to fuel prices; and
- repairs and maintenance due to differing stages of the repair and maintenance cycle the boat may be in during any particular year.

In order to appreciate these variations and their respective impacts on BGM an estimate was made of the Type I and II forms of elasticity (Table 11.8).

Table 11.8: Cost and Receipt Elasticity for Boat Gross Margin (e_m)

Type of variable	Type I elasticity	Type II elasticity
TBCR (e_t)	e_{mt} = +2.45	e_{mt} = +0.4
Fuel (e_f)	e_{mf} = -0.312	e_{mf} = -3.21
Repair and Maintenance(e_r)	e_{mr} = -0.286	e_{mr} = -3.50

Where $e_m = (\Delta BGM/BGM)/(\Delta X_i/X_i)$ and X_i= receipt or variable cost (Dillon 1968).
e_{mt} = the response of BGM to a change in boat receipts
e_{mf} = the response of BGM to a change in fuel costs
e_{mr} = the response of BGM to a change in repair and maintenance costs.

The elasticity of TBCR for BGM (e_{mt}), the response of BGM to a one percent change in TBCR, has been calculated as e_{mt} = +2.45 (Table 11.8). This means that a 10% increase in TBCR through an increase in beach prices, lower exchange rates or catch leads to a 24.5% increase in BGM or increasing average BGM by $15,209 from $62,076 to $77,272. Type II analysis would indicate that in order to increase BGM by 10% it would require a 4% increase in TBCR.

The elasticity of fuel for BGM (e_{mf}), the response of BGM to a one percentage change in fuel costs, has been calculated at e_{mf} = -0.312 (Table 11.8). This means that an increase in fuel costs of 10% will lead to a fall in BGM by 3.12% or decreasing the average BGM by $1,937 from $62,076 to $60,139. Type II analysis would indicate that in order to increase BGM by 10% it would require a 32.1% decrease in fuel costs.

The elasticity of repair and maintenance for BGM (e_{mr}), the response of BGM to a one percent change in repair and maintenance has been calculated at e_{mr} = -2.86 (Table 11.8). This means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BGM by +or-28.6% or changing BGM by +or- $17,754. To increase BGM by 10% would require a reduction of R&M by 35%. This relationship may explain the poor condition of fishing boats and the fact that as the fleet ages there is an increase in repair and maintenance costs.

11.2.2 Boat Operating Surplus

After all cash costs were covered, the firms made a total BOS of $20.876M, mean BOS was $43,673 (se=$4,433) with a median of $30,470. However, twenty percent of respondents did not cover cash costs during 1997-98 (Table 11.9). At least 46% of the sample fishing firms operated at marginal positive levels with a BOS of less than $25,000. An estimate of imputed owner-operator and family contribution costs of $26,915 was generally larger than this amount. A large number of firms (46%) achieved a BOS within the range of $1 to $50,000, with only 15% of firms achieving a BOS greater than $100,000.

The need for the fishing firm to expend funds, in particular years, on major high-cost refits may explain a proportion of firms operating at a negative BOS. However, whether the data on refits for 1997-98 provided by firms is representative of an average year is not known. Other reasons for low levels of TBCR were not asked for in the survey. But it was clear that for the Queensland fishery some 15% of firms with a fishing intensity of less than 50 days and 35% of firms fished for less than 100 days (Table 3.8), indicating a significant proportion of the fleet were part time, life style or 'on the hard' fishing firms.

Table 11.9: Boat Operating Surplus

Boat Operating Surplus ($'000)	Proportion of Firms (%)
Less than -50	4
-50 to Zero	16
1 to 25	26
25 to 50	20
50 to 100	19
Greater than 100	15

The level of BOS was related to boat-length class (Tables 11.10). In general, the larger the boat length, the more likely the fishing firm was able to cover cash costs. All boat length classes had a similar proportion with a negative BOS except for the smaller boats which faired slightly better: BOS Index fell as boat length increased.

Adding fixed costs to BGM caused the number of small operators (0-10m), some 46% of all firms, making a loss to increase from 9% to 17% (Tables 11.7 and 11.10).

Table 11.10: Boat Operating Surplus by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BOS<0 (%)	BOS Index
0 –10	32,294	22,641	3,433	17	179
10.1 – 14	39,629	32,456	8,889	24	139
14.1 – 18	63,758	59,958	9,715	20	131
18.1+	80,570	36,329	41,778	26	125

(a) The BOS Index is ***(TBCR/(TBVC + TBFC)*100***. This ratio is the same as the GRI. The higher the BOS Index the more efficient the use of inputs indicating a lower cost structure.

The relationship between repairs and maintenance and boat length (Figure 11.6) was significant (ANOVA, $p<0.05$, $R^2 = 0.54$).

Significant expenditure is required by the average firm every five to ten years in order to maintain their vessel in working order. Furthermore, while the fishing boat is undergoing major refits, it is unable to operate, therefore catch and receipts are likely to be below average: further exacerbating the impact of the refit on BOS. The individual cost item likely to vary most over a ten year period would be "repairs and maintenance", which for the average fishing firm, makes up 20% of the Total Boat Variable Costs. Other potential reasons for firms operating at a negative BOS may include unfavourable fishing conditions in 1997-98 or that firms may have made a "lifestyle" decision with the level of economic performance traded-off against factors other than the profit motive.

The matter of a 'lifestyle' decision warrants further research in terms of the Queensland fishery. It would be expected that 'lifestyle' fishers would be forced eventually out of the industry by bankruptcy particularly if licence fees were set on the principles of cost recovery. Much would depend on the scale of the operation of the fisher and the extent of involvement. As stated before, the analysis reported here is based on an assumption that there was no under-reporting. Rational economic behaviour assumes that fishers would also try to cover as much of the fixed costs as possible.

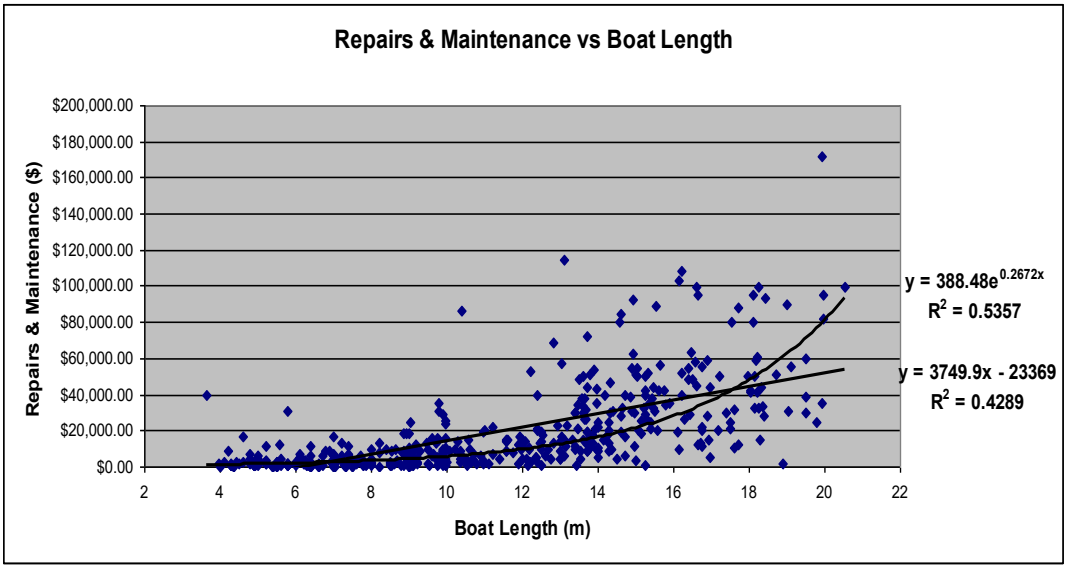

Figure 11.6: Regression of Repairs and Maintenance Costs by Boat Length

Sensitivity Analysis

The elasticity of TBCR for BOS (e_{st}), the response of BOS to a one percent change in TBCR, has been calculated as e_{st} = 3.48 (Table 11.11). This means that a 10% increase in TBCR through an increase in beach prices, lower exchange rates or catch leads to a 34.8% increase in BOS or increasing average BOS by $15,198 from $43,673 to $58,871. Type II analysis would indicate that in order to increase BOS by 10% it would require a 2.9% change in TBCR.

Table 11.11: Cost and Receipt Elasticity for Boat Operating Surplus (e_s)

Type of variable	Type I elasticity	Type II elasticity
TBCR (e_t)	e_{st} = +3.48	e_{st} = +0.29
Fuel (e_f)	e_{sf} = -0.44	e_{sf} = -2.26
Repair and Maintenance(e_r)	e_{sr} = -0.41	e_{sr} = -2.46

Where $e_s = (\Delta BOS/BOS)/(\Delta X_i/X_i)$ and X_i = variable cost (Dillon 1968)
e_{st} = the elasticity of BOS to a change in boat receipts
e_{sf} = the elasticity of BOS to a change in fuel costs
e_{sr} = the elasticity of BOS to a change in repairs and maintenance costs.

The elasticity of fuel for BOS (e_{sf}), the response of BOS to a one percentage change in fuel costs, has been calculated at e_{sf} = -0.44 (Table 11.11). This means that an increase in fuel costs of 10% will lead to a fall in BOS by 4.4% or decreasing the average BOS from $43,673 to $41,751. Type II analysis would indicate that in order to increase BOS by 10% it would require a 22.6% reduction in fuel costs.

The elasticity of repair and maintenance for BOS (e_{sr}), the response of BOS to a one percent change in repair and maintenance, has been calculated at e_{sr} = -0.41 (Table 11.11). This means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BOS by +or-4.1% or changing BOS by +or-$1,791. To increase BOS by 10% would require a reduction of R&M by 24.6%.

11.2.3 Gross Returns Index

Mean GRI for 1997-98 was 140, (se= 6.3) with a median of 147, meaning that, on average, $140 cash was generated from each $100 cash spent by the Queensland fishing firm.

However, the above financial indicators do not take into account any of the opportunity costs relating to the use of capital, labour, entrepreneurial skills or the resultant externalities of fishing operations on natural resources.

11.2.4 Boat Cash Income

After imputed wages for owner-operator and family contributions such as a wife's bookkeeping, purchasing foodstuff and other items, the total BCI was $9,302M. The average BCI was $19,461 (se=$4,425) with a median of $4,856. However, 44% of all fishers surveyed had a negative BCI suggesting that a large proportion of the fleet sample would have not earned sufficient income during 1997-98 to cover the cost of the contribution of the owner and family to the firm, let alone cover the costs of capital (Table 11.7). The reason for this was not sought in the survey. Another 32% had a positive income less than $50,000, leaving 24% with a BCI greater than $50,000.

The imputed wages of owner-operated fishing firms (trawl sector - $654/week or annual wage of $34,008 and non-trawl sector - $440/week or annual wage of $22,880) were based on boat skipper wages, or share of TBCR, provided in the economic survey. An imputed value of family contribution ($406/week or annual wage of $21,112) to the fishing firm was based upon other industries and their similarities to that of the fishing sector for 1997-98.

Owners surveyed were asked about their contribution(s) to the firm and estimates of imputed costs of family contribution were based on the individual's survey response and not how the wages were determined i.e. proportion of catch. Given that these weekly wages were set as a standard for the survey, the estimated level of BCI may be understated for the smaller boats. But may also be an overestimate of profit given the apparent opportunity cost of labour being lower than actual labour costs as estimated income may be a lot less outside the fishery through high levels of regional and rural unemployment. This is supported by Rose et. al. (2000). These variations were allowed for by applying sensitivity analyses for the imputed costs.

Owners are well aware of the day to day importance of these imputed wages. But this aspect is often hidden as the family underpays itself when times are tough: suggesting that BCI may underestimate of the real financial position of the business.

The level of BCI was strongly related to boat-length class (Table 11.12). The larger the boat, the more likely the fishing firm was able to cover imputed wages. The small boat class had the highest incidence of negative BCI: 52% of all surveyed firms.

Adding imputed wages to BOS caused the number of small operators (0-10m) making a loss to increase from 17% to 52% (Tables 11.10 and 11.12). This can be explained: firms with smaller boats had a higher proportion of total costs (excluding depreciation) related to imputed wages – a feature of the owner-operated fishing business. For example, for boats less than 10m the imputed wages proportion of TBCR was 37%, for 10-14m boats 19%, for 14-18m boats 11% and for boats greater than 18m the proportion was 6%. This is clearly demonstrated by the similar values of the BCI ratio (Table 11.12).

Table 11.12: Boat Cash Income by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BCI<0 (%)	BCI Index (%)
0-10	8,062	- 866	3,440	52	112
10.1 – 14	14,992	4,748	8,666	42	112
14.1 – 18	38,437	31,849	9,908	31	116
18.1+	61,679	16,281	41,821	35	118

(a) The BCI Index is ***(TBCR/(TBVC + TBFC + Imputed Wages)*100***. The higher the BCI Index, the more efficient the use of inputs indicating a lower cost structure.

Sensitivity Analysis

The elasticity of TBCR for BCI (e_{it}), the response of BCI to a one percent change in TBCR, has been calculated as e_{it} = 7.8 (Table 11.13). This means that a 10% increase in TBCR through an increase in beach prices, lower exchange rates or catch leads to a 78% increase

in BCI or increasing average BCI by $15,179 from $19,461 to $34,640. Type II analysis would indicate that in order to increase BCI by 10% it would require a 1.3% increase in TBCR.

Table 11.13: Cost and Receipt Elasticity for Boat Cash Income (e_i)

Type of variable	Type I elasticity	Type II elasticity
TBCR (e_t)	e_{it} = +7.8	e_{it} = +0.13
Fuel (e_f)	e_{if} = -0.99	e_{if} = -1.01
Repair and Maintenance(e_r)	e_{ir} = -0.91	e_{ir} = -1.10

Where $e_i = (\Delta BCI/BCI)/(\Delta X_i/X_i)$ and X_i = receipt or variable cost (Dillon 1968)
e_{it} = the elasticity of BCI to a change in boat receipts
E_{if} = the elasticity of BCI to a change in fuel prices
E_{ir} = the elasticity of BCI to a change in repair and maintenance.

The elasticity of fuel for BCI (e_{if}), the response of BCI to a one percentage change in fuel costs, has been calculated at e_{if} = -0.99 (Table 11.13). This means that an increase in fuel costs of 10% will lead to a fall in BCI by 9.9% or decreasing the average BCI from $19,461 to $17,535. Type II analysis would indicate that in order to increase BCI by 10% it would require a 10.1% decrease in fuel costs.

The elasticity of repair and maintenance for BCI (e_{ir}), the response of BCI to a one percent change in repair and maintenance, has been calculated at e_{ir} = -0.91 (Table 11.13). This means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BCI by +or-9.1% or changing BCI by +or-$1,770. To increase BCI by 10% would require a reduction of R&M by 11%.

11.2.5 Boat Business Profit

Total BBP for the 478 firms was estimated at $2.4.2M, mean BBP was $4,687 (se=$4,299) with a median of -$4,687.

Depreciation is an estimate of the non-cash cost of capital used up through fishing operations and was calculated according to Brown (1997) based on the Australian Taxation Office guide to depreciation 1998-99. Mean depreciation estimate per firm was $14,774 (se=$699) with a median of $10,650. Depreciation estimates increase with boat length (Table 11.14).

Fifty-four percent of firms generated a negative BBP, with a further 28% attaining between $0 and $50,000 and only 7% achieved a BBP value greater than $100,000 (Table 11.15). In other words, a large number of the fishing firms surveyed were operating where BBP<0 and thus would not have the capacity to cover all of their economic costs.

Table 11.14: Depreciation Allowance Estimates

Boat Length Class (m)	Mean ($)	Median ($)
0 - 10	3,878	5,420
10.1 - 14	13,935	13,038
14.1 – 18.0	27,724	24,002
18.1 +	45,597	44,400

As depreciation allowance was added to other costs, the proportion of small boats (less than 10m) operating where BBP<0, decreased from 55 to 48 percent (Tables 11.12 and 11.16). This is due to the lower depreciation allowance of the smaller boats. The incidence of loss declines with boat length class as BBP increases with boat length (Table 11.16).

Table 11.15: Boat Business Profit

Boat Business Profit Class ($'000)	Proportion of Firms (%)
Less than -50	15
-50 to 0	39
1 to 25	18
25 to 50	10
50 to 100	12
Greater than 100	7

The BBP Index is very similar for all boat length classes suggesting relatively similar financial efficiency. For example, the financial return is about $104 for each $100 costs allocated to all boat length classes even though the average BBP per firm increases with boat length class (Table 11.16).

Table 11.16: Boat Business Profit by Boat Length

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BBP<0 (%)	BBP Index (%)
0 –10	2,642	- 3,988	3,393	48	104
10.1 – 14	1,058	- 5,703	8,510	28	101
14.1 – 18	10,714	1,440	9,614	17	104
18.1+	16,081	- 22,922	41,474	7	104

(a) The BBP Index is ***(TBCR/(TBVC + TBFC + Imputed Wages + Depreciation)*100***. The higher the BBP Index, the more efficient the use of inputs thus indicating a lower cost structure.

The relationship between boat length and depreciation (Figure 11.7) is significant where ($p<0.05$, $R^2 = 0.55$) as expected.

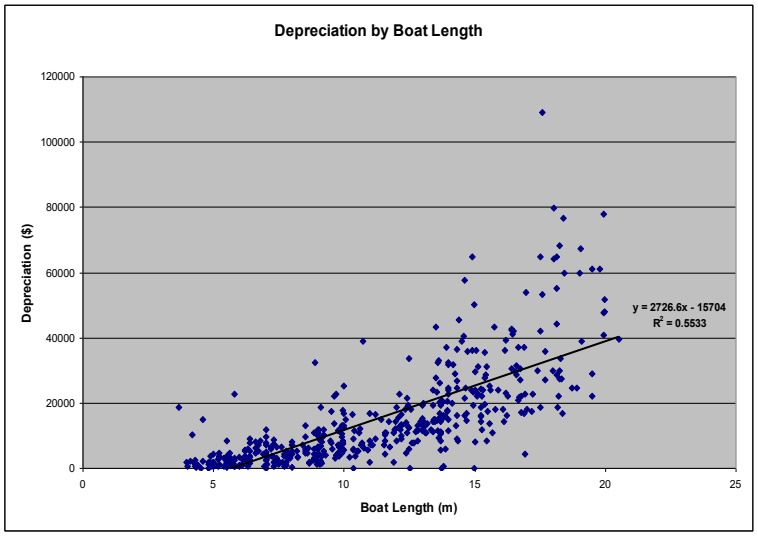

Figure 11.7: Regression of Depreciation Allowance by Boat Length

Sensitivity Analysis

The elasticity of TBCR for BBP (e_{bt}), the response of BBP to a one percent change in TBCR, has been calculated as $e_{bt} = 32.4$ (Table 11.17). This means that a 10% increase in TBCR through an increase in beach prices leads to a 324% increase in BBP or increasing average BBP by $15,092 from $4,687 to $19,779. Type II analysis would indicate that in order to increase BBP by 10% it would require a 3% increase in TBCR.

Table 11.17: Cost and Receipt Elasticity for Boat Business Profit (e_b)

Type of variable	Type I elasticity	Type II elasticity
TBCR (e_t)	e_{bt}= +32.4	e_{bt} = +0.03
Fuel (e_f)	e_{bf} = -4.13	e_{bf} = -0.24
Repair and Maintenance(e_r)	e_{br} = -3.78	e_{br} = -0.26

Where $e_b = (\Delta BBP/BBP)/(\Delta X_i/X_i)$ and X_i = receipt or variable cost (Dillon 1968)
e_{bt} = the elasticity of BBP to a change in boat receipts
e_{bf} = the elasticity of BBP to a change in fuel prices
e_{br} = the elasticity of BBP to a change in repairs and maintenance.

The elasticity of fuel for BBP (e_{bf}), the response of BBP to a one percentage change in fuel costs, has been calculated at e_{bf} = -4.13 (Table 11.17). This means that an increase in fuel costs of 10% will lead to a fall in BBP by 41.3% or decreasing the average BBP from $4,687 to $2,751. To increase BBP by 10% would require a reduction in fuel costs by 2.4%.

The elasticity of repair and maintenance for BBP (e_{br}), the response of BBP to a one percent change in repair and maintenance, has been calculated at e_{br} = -3.78 (Table 11.17). This means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BBP by +or-37.8% or changing BBP by +or-$1,771. To increase BBP by 10% would require a reduction of R&M by 2.6%.

Given that imputed wages are an estimate of what owner-operator paid themselves as opposed to what the opportunity cost actually was, dependent upon unemployment levels throughout Queensland that would depress such wages, a sensitivity analysis was undertaken (Table 11.18).

The lower the imputed wage estimate and the higher the level of cash receipts, the better the financial position of the sampled firms. For example, the percentage of firms where BBP>0 increased from 46% to 56% when both wages and TBCR were adjusted by 10% to allow for 'under-reporting' and other factors affecting the level of TBCR.

Table 11.18: Estimates of Boat Business Profit: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	BBP $M	BBP>0 (%)	BBP $M	BBP>0 (%)	BBP $M	BBP>0 (%)
Study estimate (c)	2.242	46	5.869	50	9.497	55
Estimate less 10%	3.398	46	7.026	53	10.655	56
Estimate less 20%	4.555	49	8.184	55	11.813	59

(a) Owner-operators and family members may be willing to forego equivalent wages of paid crew and skippers for their labour in the business. (b) Increased receipts could arise from under-reporting in the official logbooks, underestimate of beach prices or from a favourable change in exchange rates increasing export prices. (c) Study estimate based on the wages paid by equivalent work paid for and reported in the survey.

11.2.6 Profit at Full Equity

Total Profit at Full Equity (PFE) was $4,563M, mean PFE was $9,547 (se=4,316) with a median of $4,316. Variations also occurred between boat length classes (Table 11.19). For example, the larger boat classes were earning the larger average levels of PFE but there was a little increase in the PFE Index across boat length classes, indicating similar performances.

Table 11.19: Profit at Full Equity by Boat Length

Boat Length Class (m)	Profit at Full Equity			
	Mean ($)	Standard Error ($)	Median ($)	PFE Index (%)
0-10	4,448	3,382	-2,696	106
10.1-14	5,369	8,861	-3,623	104
14.1-18	20,850	9,489	11,634	108
18+	28,937	42,114	-13,112	108

(a) The PFE Index is ***(TBCR/(TBCC + TBFC + Imputed Wages + Depreciation + Rent + Interest + leasing costs)*100***. The higher the PFE index the more efficient the use of inputs thus indicating a lower cost structure.

11.2.7 Rate of Return to Boat Capital

Rate of return on Boat Capital (RRC) for the 478 firms surveyed was an average of 4.4%.

RRC is a key financial indicator for comparing the economic performance of fishing operations on the same basis. Brown (1997) also suggests that RRC can be used as an indicator of the effects of management on the fisheries within which the firm operates. The relationship between RRC and the opportunity cost of capital is a useful indicator of economic performance (Kinhill, 1997). Given that the opportunity cost has been chosen at 10% then Table 11.20 shows that 525 had a negative RRC and only 37% of the fleet had a RRC greater than the opportunity cost of capital. The opportunity cost of capital was estimated at 10 percent (EconSearch, 1999) and accepted for this report based on the ten year long term Government bond rate of 6.3% and a risk premium of 3.7% inherent in the industry (Queensland Rural Adjustment Authority - personal communication).

Table 11.20: Rate of Return to Capital

Rate of Return to Capital (%)	Proportion of Firms (%)
Less than -20	24
-20 to -10	12
-10 to zero	16
zero to +10	11
+10 to +20	10
Greater than +20	27

11.3 QUEENSLAND FISHERY ECONOMIC PROFIT INDICATORS

This section deals with the derivation and explanation of the following economic indicators: Boat Economic Profit (BEP) for the individual fishing business (also known as the producer surplus); Net Economic Return (NR) from the sector, fishery or industry (also known as a measure of Fishery Rent). However, no attempt was made estimate the opportunity costs of externalities related to fishing operations.

11.3.1 Boat Economic Profit

Total BEP for the sampled firms was -$3.364M, mean BEP was -$7,037 (se=$4,242) with a median of -$11,786. Based on sensitivity analysis with a risk premium of 1.5%, the mean BEP was -$3,648.

Mean and median BEP increases with boat length class (Table 11.21) however the relative return from covering economic costs of the fishing operation, the BEP Index, is very similar for all boat length classes. When the interest payments and opportunity costs are accounted for the proportion of small boats (<10m) operating at a loss changed from 48% to 45% (Table 5.16 and 5.21). For example, the boat economic profit is about $94 for $100 of all economic costs allocated to all boat length classes compared with $104 for BBP. However, there was no significant difference (ANOVA, $p<0.05$) between boat length and the level of BEP (refer Table 11.41).

Table 11.21 Boat Economic Profit by Size of Fishing Operation

Boat Length Class (m)	Mean ($)	Median ($)	Standard Error ($)	BEP<0 (%)	BEP Index (%)
0 –10	-1,393	- 8,565	3,361	45	97
10.1 – 14	-8,476	- 15,121	8,394	30	92
14.1 – 18	-12,228	-12,008	9,332	18	93
18.1+	-25,520	- 56,803	41,084	7	92

(a) The BEP Index is ***(TBCR/(TBVC + (TBFC – Interest Payments)+ Imputed Wages + Depreciation + Opportunity Cost of Capital)*100***. The higher the BEP index the more efficient the use of inputs thus indicating a lower cost structure.

Sensitivity Analysis

The elasticity of TBCR for BEP (e_{pt}), the response of BEP to a one percent change in TBCR, has been calculated as e_{pt} = 21.6 (Table 11.22). This means that a 10% increase in TBCR through an increase in beach prices leads to a 216% increase in BEP or increasing average BEP by $15,200 from -$7,037 to $7,163. Type II analysis would indicate that in order to increase BEP by 10% it would require a 5% increase in TBCR.

Table 11.22: Cost and Receipt Elasticity for Boat Economic Profit (e_p)

Type of variable	Type I elasticity	Type II elasticity
TBCR (e_t)	e_{pt} = +21.6	e_{pt} = +0.05
Fuel (e_f)	e_{pf} = -2.75	e_{pf} = -0.36
Repair and Maintenance(e_r)	e_{pr} = -2.52	e_{pr} = -0.40

Where $e_p = (\Delta BEP/BEP)/(\Delta X_i/X_i)$ and X_I = receipt or variable cost (Dillon 1968)
e_{pt} = the elasticity of BEP to a change in boat receipts
e_{pf} = the elasticity of BEP to a change in fuel prices
e_{pr} = the elasticity of BEP to a change in repairs and maintenance.

The elasticity of fuel for BEP (e_{pf}), the response of BEP to a one percentage change in fuel costs, has been calculated at e_{pf} = -2.75 (Table 11.22). This means that an increase in fuel costs of 10% will lead to a fall in BEP by 27.5% or decreasing the average BEP from -$7,037 to -$8,972. Type II analysis would indicate that in order to increase BEP by 10% it would require a 3.6% reduction in fuel costs.

The elasticity of repair and maintenance for BEP (e_{pr}), the response of BEP to a one percent change in repair and maintenance, has been calculated at e_{pr} = -2.52 (Table 11.22). This means that a variation in the cycle of repair and maintenance of 10% will lead to a change in BEP by +or-25.2% or changing BEP by +or-$1,173. To increase BEP by 10% would require a reduction of R&M by 4.0%: a relatively small change in the average cycle of R&M.

11.3.2 Net Economic Return

Net Economic Return (NER) is the net economic contribution of the fishing industry to the Queensland economy and is the main measure of economic performance of a commercial fishery. Net Economic Return also contains an estimate of management costs that are not fully covered under the licence fee arrangements for Queensland. Thus the NER estimates of this research are an overestimate. Although NER approximates Fishery Rent under certain assumptions (Rose et. al., 1999 and 2000) is an overestimate of the real resource rent due to non-use benefits that are not easily measured in monetary values and that the condition of fish stocks, changes in the capital stock owned by the fishing firms, changes in the fisheries products and resource inputs from the economy and from the impacts of fishing on natural fisheries capital.

However, if the Queensland fishery is overfished then the estimates of NER (Table 5.32) will overestimate actual net economic returns. But, if natural capital is maintained, an assumption under NER, then the fishery may be sustainable. To take these externalities into account, other factors must be built into BEP and NER (Rose et. al., 2000).

The economic contribution of each boat class of NER to the Queensland economy as a ratio of TBCR, was: -$0.31M or –1.9% (< 10m), -$1.10M or –6.0% (10 - 14m), -$1.16M or –4.9% (14 - 18m), and -$0.79M or –6.42% (> 18m)

On the other hand NER may have been underestimated as a result of under reporting, market failure and exchange rates that had reduced TBCR. For example, the percentage of firms making an economic profit increased from 40% to 48% when both imputed wages and TBCR were adjusted by 10% to simulate this 'under-valuing' of TBCR. The level of NER was zero at just under 4.7% increase in TBCR (Table 11.23).

Table 11.23: Estimates of Net Economic Return: Sensitivity Analysis of Imputed Wages and Total Boat Cash Receipts

Imputed Wages (a)	Total Boat Cash Receipts (b)					
	Study estimate (c)		Reported TBCR plus 5%		Reported TBCR plus 10%	
	NER ($M)	(%) firms BEP>0	NER ($M)	(%) firms BEP>0	NER ($M)	(%) firms BEP>0
Study estimate (c)	-3.364	40	0.264	43	3.894	47
Estimate less 10%	-2.206	41	1.422	45	5.050	48
Estimate less 20%	-1.049	43	2.579	46	6.208	50

(a) Owner-operators and family members may be willing to forego equivalent wages of paid crew and skippers for their labour in the business. 20% is an estimate of the imputed wage relating to unemployment benefits that might be appropriate for some sections of the industry as an approximate opportunity cost of labour.
(b) Increased receipts could arise from under-reporting in official logbooks, underestimate of beach prices or from a favourable change in exchange rates increasing export prices.
(c) Study estimate based on the wages paid by equivalent work paid for and reported in the survey.

11.4 OVERVIEW OF FINANCIAL AND ECONOMIC PROFIT INDICATORS

The overall performance of the surveyed fishing firms was analysed by separating firms on the basis of their contribution to GVP and RRC using quartiles. Median performance of profit indicators and responsiveness to changes in cost and receipts follows.

11.4.1 Gross Value Production

GVP quartiles are constructed by ranking and summing the TBCR of all surveyed firms in ascending order (Table 11.24 and Figure 11.1). For 1997-98, 60% of the fleet generated the lowest GVP quartile (289 firms) compared with 75 of firms that generated the top quartile. The performance of the lowest quartile contains 66% of all firms where BBP<0 and 71% where BEP<0.

For all firms in other quartiles (40% of all firms), the overall mean performance was positive. The nature of the sample distribution was similar to that of the Queensland fishery, providing an explanation of why the data was skewed and why there were wide differences between statistical means and medians.

The nature of the group of low income fishing firms needs further analysis. Of the firms in the lowest quartile making a BBP profit were general crab (34%), line (41%), net (35%), spanner crab (48%), otter trawl (28%) and beam trawl (18%). With respect to boat length class, the proportion of firms making a BBP profit was 40% for less than 10m, (25%) between 10m and 14m, and zero percentage for those greater than 14m.

However, the incidence of loss within the boat length class and the key fishing sector making a loss were:

- less than 10m (62%) with net sector (36%) and line sector (27%),
- between 10m and 14m (29%) with trawl sector (52%) and line sector (27%),
- between 14m and 18m (7%) with trawl sector (77%), and greater than 18m (2%) with trawl sector (67%).

Predominantly, the fishing firms where BBP<0 were located at: Brisbane region (23%), Wide Bay region (19%), Moreton region (17%) and Far North region (16%).

Table 11.24: Mean Economic Performance of Fishing Firms by GVP Quartile

Profit Indicator	Lowest 25% (n=289)	Second Quartile (n=96)	Third Quartile (n=58)	Highest 25% (n=35)	Survey average (n=478)
TBCR ($)	62,670	188,950	309,935	523,474	151,830
TBCC ($)	46,385	137,355	233,754	329,992	108,156
BGM ($)	25,717	75,219	115,739	232,033	61,127
BOS ($)	16,375	51,595	76,181	193,481	43,673
BCI ($)	-7,375	25,317	47,599	178,354	19,461
RRC (%)	-10.8	6.0	7.5	22.0	4.4
BBP ($)	-15,025	8,382	17,913	135,435	4,687
% Firms BBP>0	34	60	64	77	46
BEP ($)	-20,670	-4,159	-4,265	93,044	-7,037
NER ($M)	-5.974	--0.399	+-0.247	+3.257	-3.364
% Firms BEP>0	29	49	59	74	40

11.4.2 Rate of Return to Capital

The majority of firms (67%) fell within the second quartile (Table 11.25) of fishing firms ranked on their RRC performance where also 42% had BBP<0. For these firms, the proportions within each fishing sector where BBP>0 were: general crab (21%), line (44%), net (39%), spanner crab (52%), otter trawl (100%) and beam trawl (100%). With respect to boat length-class, the proportions of firms where BBP>0 was: less than 10m (40%), between 10m - 14m (38%), 14m - 18m (51%), and for greater than 18m (32%).

The incidence of loss within the boat length class and the key fishing sector making a BBP loss were:

- less than 10m (41%) with net sector (34%) and line sector (26%)
- between 10m and 14m (29%) with trawl sector (58%) and line sector (32%),
- between 14m and 18m (21%) with trawl sector (87%), and
- greater than 18m (9%) with trawl sector (82%).

Table 11.25: Mean Economic Performance of Fishing Firm by RRC Quartile

Profit Indicator	Lowest 25% (n=72)	Second Quartile (n=319)	Third Quartile (n=76)	Highest 25% (n=11)
TBCR ($)	54,148	154,778	220,736	229,610
TBCC ($)	84,916	117,926	97,298	51,966
BGM ($)	-15,744	55,214	140,311	190,123
BOS ($)	-30,768	36,852	123,439	177,645
BCI ($)	-60,747	13,407	101,383	154,026
RRC (%)	-57%	1%	56%	226%
BBP ($)	-69,472	3,993	90,574	148,390
% Firms BBP>0	zero	42	100	100
BEP ($)	-74,149	-18,534	82,363	147,973
NER ($M)	-5.339	-5.912	+6.260	+1.628
% Firms BEP>0	zero	33	100	100

The lowest performing firms were mainly located within the Wide Bay region (21%), Moreton region (18%), Brisbane region (17%) and Far North region (17%).

11.4.3 Responsiveness of Financial and Economic Indicators to Changes in Receipts and Costs Incurred by the Fishing Firm

The profit indicators vary in their response to a change in key cost indicators such as cash receipts, fuel and repairs and maintenance (Table 11.3). For example a 10% change such as, the impact of changes in under-reporting, higher prices through value adding or favourable exchange rates has a very high response to BBP (324%) and BEP (216%). Whereas the impacts of a 10% increase of fuel (BBP, 41.3% and BEP, 27.5%), and repairs and maintenance (BBP, 37.8% and BEP 25.2%) on the financial or economic outcome is ten times less than that of TBCR. It is clear that the largest impact on the profitability of the Queensland fishing firm is the ability of the firm to catch more or gain better prices for their product.

Table 11.26: Response in Profit Indicators to a Change in Key Receipts and Key Costs

Indicator	10% change in TBCR (% change in indicator)	10% change in Fuel Costs (% change in indicator)	10% change in Repairs and Maintenance (% change in indicator)
BGM	24.5	3.1	28.6
BOS	34.8	4.4	4.1
BCI	78	9.9	9.1
PFE	159	20.3	18.6
BBP	324	41.3	37.8
RRC	159	20.3	18.6
BEP	216	27.5	25.2

5.4.4 Median Performance of the Queensland Fishery

The medians of the lowest ten percent indicated that only BGM had a positive performance (i.e. an Index>100) compared with the median of the total survey sample where BGM, BOS and BCI had a positive performance. For the top ten percent, the medians for all performance indicators were greater than 100.

Table 11.27: Comparison of Median Economic Performance Indicators

Economic Performance Indicator	Median of Bottom 10%		Median of Survey Sample		Median of Top 10%	
	($)	Index	($)	Index	($)	Index
BGM	4,523	112	42,662	184	177,254	167
BOS	1,328	75	30,470	146	121,728	145
BCI	-14,179	37	4,856	105	116,630	142
BBP	-17,894	31	-4,687	95	87,249	126
RRC	-14.3%		-1.6%		16.6%	
BEP	-20,744	28	-11,786	96	60,216	133

11.5 QUEENSLAND FISHING SECTOR RECEIPT AND COST INDICATORS

11.5.1 Total Boat Cash Receipts

The level of receipts varies within and between fishing sectors. The proportion of Queensland fishing firms within various categories of TBCR and the distribution of receipts within various sectors is a useful indicator of the scale of operation of the surveyed fishing fleet (Table 11.28). For example, 25% of the firms obtained TBCR of less than $50,000, general crab and net fishing sectors with 45% less than $50,000 and approximately 50% of all firms generating less than $100,000: which indicated lifestyle or part time participation.

The otter trawl and line sectors had the higher gross returns. The average TBCR was $151,830 (se=$7,101) with a median of $105,044 ranging from $1.76M to $758.

Table 11.28: Total Boat Cash Receipts by Fishing Sector

TBCR ($'000)	General Crab (%)	Line (%)	Net (%)	Spanner (%)	Otter Trawl (%)	Beam Trawl (%)	All Sectors (%)
<50	45	37	45	20	7	29	25
50-100	35	20	27	50	21	51	24
100-150	13	17	11	15	19	5	13
150-200	-	9	8	15	25	5	11
200-250	7	8	4	-	19	10	8
250+	-	9	5	-	64	-	19

11.5.2 Earnings before Taxation

Another performance consideration was the level of earnings before taxation for the owner-operator fishing firm. Earnings before taxation can be estimated as the sum of imputed wages plus the BBP. Results indicated that the trawl sectors performed better (Table 11.29).

Table 11.29: Mean Earnings before Taxation by Fishing Sector

Fishing Sector	Imputed Wages ($)	Mean BBP ($)	Earnings before Taxation ($)
General Crab	27,468	582	28,050
Line	21,453	-184	21,269
Net	24,870	5,987	30,848
Spanner Crab	23,551	3,287	26,838
Otter Trawl	31,448	8,122	39,570
Beam Trawl	35,381	5,191	40,572
Diversified	27,272	2,612	29,884

11.5.3 Cost Ratios

There were significant variations in the cost ratios of the Queensland fishing sector firm (Table 11.30). Fishing sector cost ratio comparisons were:

- capital cost ratios, highest ratio was boats for otter trawl (51.9%). Line (45.6%) and spanner crabs (42.5%);
- fixed cost ratios, highest ratios include insurance (otter trawl 31.7%), licence fees (beam trawl, 31.3% and general crab, 24.3%), overdraft interest (otter trawl, 25.7% and general crab (22.4%);
- variable cost ratios, highest ratios include paid labour costs (spanner crab, 44.7%, line (42.3%) and otter trawl, 39.9%), fuel (general crab, 26.6%, otter trawl, 23.8% and beam trawl, 23.7%) and repairs and maintenance (otter trawl, (21.5%), beam trawl (21.1%) and line (17.1%).

The variations in the mean values of Licence Packages are shown in Table 11.31. The otter trawl and line sectors had the greatest value of Licence Packages with most sectors having a similar 'average value' of around $58,000.

However, some of these values are relatively high: a surprise given the estimated 'poor' performance of many of the sectors. Economic theory expects a fishing licence or other type of transferable access right, given free market forces, to reflect the net present value of expected profits in the fishery. Flaaten et al (1995) supports this expectation but also found that the relationship between licence values and profit levels depended on whether the owner had purchased the licence and thus had the higher capital costs: an aspect not tested in this analysis.

The Queensland fishery has been managed as a limited entry fishery since 1984, but seems to have behaved as an open access fishery in that profits are low and economic rents apparently dissipated as indicated by negative or marginal NER. There appears to be little relationship between the value of Licence Package values and PFE, BBP or BEP (Tables 11.31, 11.34, 11.35 and 11.39).

Table 11.30: Cost Ratios of the Queensland Fishing Sectors

Cost Items	Cost Ratios per Sector (%)						
	General Crab	**Line**	**Net**	**Spanner Crab**	**Otter Trawl**	**Beam Trawl**	**All**
Capital							
Primary Hull/Fixtures	19.8	45.6	27.8	42.5	51.9	28.1	45.7
Electronics	3.1	6.4	3.5	6.5	7.8	2.8	6.6
Licence package	38.0	27.0	29.8	30.0	23.4	32.0	25.8
Other capital items	39.1	21.0	38.9	20.9	16.9	37.1	21.9
Fixed Costs							
Banking charges	2.7	4.5	4.7	3.6	3.3	3.7	3.7
Communications	7.7	9.3	11.7	7.8	10.3	11.7	10.0
Electricity	10.9	2.0	4.3	1.3	1.1	6.8	2.0
Insurance costs	13.6	24.5	16.8	21.1	31.7	18.8	27.5
Leasing costs	5.9	9.6	8.3	12.0	6.4	1.6	7.4
Licence & industry fees	24.3	14.7	23.3	21.3	9.4	31.3	13.2
Meetings & conferences	0.8	0.6	1.3	1.1	0.9	0.3	0.9
Vehicle registration	7.6	2.6	7.0	4.7	1.9	7.3	2.9
Office consumables	0.7	1.1	2.4	0.8	0.9	1.2	1.1
Other boat fees (survey)	0.6	1.6	0.9	0.6	1.2	0.5	1.2
Overdraft Interest	22.4	20.8	15.3	15.9	25.7	12.2	23.1
Port/jetty/harbour fees	2.9	8.8	3.9	9.8	7.2	4.7	7.2
Variable Costs							
Bait	8.2	5.5	0.5	4.5	-	0.1	1.4
Chemicals	0.4	0.5	0.3	0.1	0.6	0.3	0.6
Food for crew	3.3	5.6	3.4	1.4	2.7	1.5	3.2
Fuel, oil and grease (boat)	26.6	15.8	16.4	21.3	23.8	23.7	21.6
Gas (LPG) for boat	0.7	0.2	0.2	0.1	0.3	0.4	0.3
Ice	1.5	1.2	1.8	1.0	0.2	3.2	0.6
Labour costs (paid crew)	10.6	42.3	38.6	44.7	39.9	35.7	39.7
Marketing	3.7	1.2	5.2	0.2	1.1	1.1	1.5
Motor vehicle	13.0	3.2	7.4	4.7	2.0	8.5	3.1
Packaging material	1.8	2.2	2.8	-	2.6	1.6	2.4
Purchases fishing gear	14.5	5.2	11.2	6.2	5.3	3.0	6.0
Repairs & maintenance (boat)	15.8	17.1	12.3	15.6	21.5	21.1	19.8

Table 11.31: Value of Licence Packages by Fishing Sector

Fishing Sector	Mean ($)	Median ($)	Standard Error ($)	Total ($M)
General Crab	57,968	60,000	2.542	1.797
Line	58,924	50,000	1,445	8.953
Net	57,011	50,000	1,275	5.245
Spanner Crab	45,286	45,000	1,103	1.585
Otter Trawl	107,387	102,000	3,863	19.437
Beam Trawl	61,619	55,000	6,135	1.294
Diversified	56,720	55,000	1,394	5.672
All Sectors	75,964	66,000	1,925	5.672

11.5.4 Labour Ratios

Actual to imputed labour ratios for general crab (0.38) and beam trawl (0.81) suggest that these sectors were the most reliant on owner-operator and family contributions to the operation of their firm (Table 11.32). Beam trawl, otter trawl and general crab firms had the highest mean imputed labour costs. The higher actual cost figure for the otter trawl firm was due by higher crew payments.

Table 11.32: Actual/Imputed Labour Ratios by Fishing Sector

Fishing Sector	Labour (mean-actual) ($)	Labour (mean-imputed) ($)	Proportion of Actual Labour to Total Labour Costs (%)	Actual/imputed Labour Ratio
General Crab	10,438	27,468	27.5	0.38
Line	43,722	21,453	67.1	2.04
Net	31,451	24,870	55.8	1.26
Spanner Crab	34,299	23,551	59.3	1.45
Otter Trawl	67,722	31,448	68.3	2.15
Beam Trawl	28,650	35,381	44.7	0.81

Table 11.33: Labour/Capital Ratios for Fishing Sector (average per firm)

Fishing Sector	Labour (actual) Capital Ratio 1 (%)	Labour (total) Capital Ratio 2 (%) (a)	RRC (%)
General Crab	11.0	40.1	2.8
Line	27.4	40.9	2.2
Net	23.4	41.9	5.9
Spanner Crab	32.4	54.7	5.6
Otter Trawl	19.2	28.1	4.7
Beam Trawl	21.9	48.9	4.7

(a) Labour (total) = labour actual + labour imputed.

The labour/capital ratio for a fishing firm is an indicator of the relative importance of labour and capital (excluding value of licence package) to the fishing firm. This ratio is also a means of comparing the capital or labour intensity of fishing firms operating in different fishing sectors (Table 11.33). RRC does not appear to be related to these ratios.

Two ratios were calculated: Ratio 1, which relates to actual labour costs and Ratio 2, which includes imputed wages. The real cost of labour has therefore been included in Ratio 2. The highest labour intensity ratios (Ratio 2) are spanner crab and beam trawl, followed by net, line and general crab with similar ratios. Otter trawl sector had the lowest ratio as these firms are more capital intensive with larger sized boats.

11.5.5 Ownership of Firm's Resources

There were differences in the performance of the various sectors when full ownership of resources was taken into account (Table 11.34). For example, the otter trawl firms performed

best on average but the net sector performed better than other sectors when PFE was viewed as a proportion of TBCR (PFE Ratio).

Table 11.34: Profit at Full Equity by Fishing Sector

Fishing Sector	Mean ($)	Standard Error ($)	Median ($)	PFE Ratio (%)
General Crab	2,635	9,316	-11,626	109
Line	3,562	5,891	569	103
Net	7,951	5,980	-3,837	110
Spanner Crab	5,905	5,509	1,701	107
Otter Trawl	16,537	10,000	-3,887	107
Beam Trawl	6,189	13,653	-6,832	107

11.5.6 Depreciation Allowances

All sectors were profitable (BBP>0), except for the line sector. The spanner crab sector firm was the most profitable based on a median BBP of $1,701 and a BBP Index>100 (Table 11.35). The other sectors had more skewed data: positive means and negative medians.

Table 11.35: Boat Business Profit by Fishing Sector

Fishing Sector	Mean ($)	Median ($)	BBP Index	Total BBP ($M)
General Crab	582	-11,844	78.4	0.018
Line	-184	-2,540	96.6	-0.021
Net	5,976	-4,003	90.7	0.549
Spanner Crab	3,287	1,701	101.3	0.115
Otter Trawl	8,122	-6,753	95.3	1.470
Beam Trawl	5,191	-6,823	91.2	0.109
Diversified	2,612	-5,923	83.7	0.261
All Sectors	4,688	-4,687	95.1	2.240

The depreciation allowance estimates increased with boat length but varied between fishing sectors: the otter trawl firm had the highest values because of the larger boats (Table 11.36).

Table 11.36: Depreciation Estimates by Fishing Sector and Boat Length

Fishing Sector	Boat Length Class (m)				
	0 - 10	10.1 - 14	14.1 – 18	18.1+	All
Mean depreciation estimates per firm ($)					
Crab	3,503	6,343	-	-	3,961
Line	7,688	13,146	16,263	38,925	11,251
Net	3,927	13,347	41,820	-	5,672
Spanner	6,926	10,516	-	-	8,259
Otter Trawl	6,781	15,835	28,616	47,657	25,838
Beam Trawl	4,119	15,600	-	-	5,908
All Sectors	*5,420*	*13,935*	*27,724*	*45,597*	*14,774*
Median depreciation estimates per firm ($)					
Crab	2,070	3,600	-	-	2,100
Line	5,400	13,050	14,400	36,150	8,940
Net	2,400	11,220	41,820	-	2,760
Spanner	7,320	10,800	-	-	8,400
Otter Trawl	6,075	14,400	24,900	44,400	22,200
Beam Trawl	2,769	15,600	-	48,360	3,240
All Sectors	*3,897*	*13,038*	*24,000*	*44,400*	*10,650*

11.5.7 Use of Capital

The variation of mean RRC across all fishing sectors is not large (Table 11.37) and no strong conclusion can be drawn between Ratio 2 and RRC (Table 11.33). The distribution of RRC is evenly split, with 52% of the sample firms earning less than zero percent. The main fishing sectors with the lowest RRC (<-20%) were general crab and net and with highest RRC

(>20%) were the net, general crab and line sectors. However, there was no significant difference ($p<0.05$) between fishing sectors and RRC (Table 11.41).

However, RRC across the various sized fishing sector firms showed some patterns. For example, some groups within sectors had positive RRC, general crab sector less than 8m, net sector less than 14m, otter trawl sector greater than 12m, line sector greater than 14m and beam trawl sector 8-10m (Table 11.38). All sectors performed poorly as RRC was less than opportunity cost of capital @ 10% for more than 85% of each sector: which indicated that the Queensland fleet is overcapitalised.

Table 11.37: Rate of Return to Capital by Fishing sector

RRC (%)	Proportion of Sector Firms (%)					
	General Crab	Line	Net	Spanner Crab	Otter Trawl	Beam Trawl
Less than -20	30	24	34	20	17	29
-20 to -10	10	14	8	11	13	19
-10 to zero	10	11	14	14	23	10
zero to +10	6	15	5	11	13	-
+10 to +20	3	7	9	9	13	14
Greater than +20	32	29	30	34	21	29

Table 11.38: Rate of Return to Capital by Fishing Sector and Boat Length

Boat Length Class (m)	Rate of Return to Capital (%)					
	General Crab	Line	Net	Spanner Crab	Otter Trawl	Beam Trawl
0-6	18.6	-10.1	6.9	13.8	na	-14.8
6.1-8	21.7	-12.7	11.6	5.3	na	-7.7
8.1-10	-12.4	10.0	2.8	-16.5	-11.8	28.5
10.1-12	-13.1	2.5	18.2	31.6	-9.8	-17.9
12.1-14	-39.2	-1.9	-8.4	-0.8	7.7	na
14.1-16	na	7.4	5.3	na	7.4	na
16.1-18	na	17.4	na	na	3.1	na
18.1+	na	3.4	na	na	4.1	na

(na means sample less than 5)

11.5.8 Opportunity Cost of Capital

Sensitivity analysis was also used to illustrate the effects of altering the risk premium.

The opportunity cost of capital was varied by changing the degree of acceptable risk premium (Table 11.39) from 10%, the most likely level during 1997-98, to that of 7.8%, based on the individual component of the risk premium changing from 3.7% to 1.5%.

The following changes to the major economic indicators occurred:

- BEP and NER increased by 48% for the sampled firms;
- General crab, net, spanner crab and beam trawl all increased by greater than 50%; and
- Line and otter trawl sectors increased by 28% and 48% respectively.

Table 11.39: Boat Economic Profit: Sensitivity of Opportunity Cost of Capital

Fishing Sector	Mean BEP (a) ($)		NER (a) ($M)	
	Opportunity Cost of 6.3% plus 1.5% Risk Premium (b)	Opportunity Cost of 6.3% plus 3.7% Risk Premium (b)	Opportunity Cost of 6.3% plus 1.5% Risk Premium (b)	Opportunity Cost of 6.3% plus 3.7% Risk Premium (b)
General Crab	-514	-1,281	-0.015	-0.039
Line	-6,481	-8,980	-0.764	-1.059
Net	2,591	1,274	0.238	0.117
Spanner Crab	-997	-2,627	-0.035	-0.92
Otter Trawl	-6,610	-12,666	-1,196	-2.292
Beam Trawl	1,436	129	0.030	0.003
Diversified	-23	-1,172	-0.002	-0,117
All Sectors	-3,648	-7,037	-1.743	-3.364

(a) BEP and Net Return based on the 1997-98 average long term Government bond rate of 6.3% (Queensland Treasury Corporation) (refer Morison, 1999 for similar methodology where 5% premium was chosen, 7% was the assumed real interest rate by ABARE in Rose and Stubbs (2000)) and 6% for the Kinhill (1997) study. Risk premium based on administration costs of 1%, bad debts 0.5% and a personal risk premium for the individual between 0% and 2.5% - fishing industry/rural sector regarded at the upper end of this range (Queensland Rural Adjustment Authority).

11.5.9 Comparison of Queensland Fishing Sectors with Selected Australian Fisheries

Compared with fisheries from other Australian jurisdictions (Table 11.40), the economic performance of the Queensland fishing sectors was poor. There were very little comparative data for other Australian fisheries.

Table 11.40: Mean Economic Performance of Selected Sectors/Fisheries: 1997/98

Sector/Fishery	TBCR ($'000)	BCI ($'000)	BBP ($'000)	PFE ($'000)	RRC (%)
Queensland Fishing Sectors					
General Crab	64.9	4.54	0.6	2.6	2.8
Line	110.8	11.1	-0.2	3.6	2.2
Net	85.182	11.7	5.9	7.9	5.9
Spanner Crab	91.284	11.6	3.3	5.9	5.6
Otter Trawl	246.2	33.9	9.1	16.5	4.7
Beam Trawl	90.382	11.1	5.2	6.2	4.7
South Australian Fisheries					
Spencer Gulf and West Coast Trawl	701.1	259.1	195.5	na	8.4
Gulf St Vincent Trawl	408.7	143.3	95.4	na	8.5
Abalone	751.3	395.2	377.2	na	10.1
Southern Zone Rock Lobster	282.3	88	60.9	na	4.4
Northern Zone Rock Lobster	373.8	108.4	63.0	na	4.5
Blue Crab Pot Sector	382.2	76.7	52.4	na	7.2
Marine Scale-fish	35.7	-7.4	-15.5	na	-13.9
Commonwealth Fisheries					
South East Trawl	666.3	93.8	65.9	124.6	25
Northern Prawn	1,120	310.7	255.6	289.1	27
Torres Strait Prawn	661.2	87.2	77.2	89.8	30
South East Non-Trawl	280.2	42.4	28.9	47.2	19.1
Average for all Fisheries	373.4	98.8	75.2	59.5	10.0

Source: EconSearch (1999) and Holland (2000).

The following sections are the results of the economic performance of the fishing sector firm analysed according to the characteristics of the firm: degree of specialisation, size of fishing operation, intensity of fishing operation, location of fishing business, level of fishing activity and fishing pattern.

11.6 ECONOMIC PERFORMANCE AND CHARACTERISTICS OF THE QUEENSLAND FISHING SECTOR FIRM

In previous chapters, aggregate economic performance indicators were developed for the Queensland fishery and fishing sectors. However, the economic performance of the fishing sectors requires a more detailed analysis based on the characteristics of a sector fishing firm.

The Characteristics of the fishing firm chosen for the research were:

2. *type of fishing sector* (crab-general, line, net, spanner crab, trawl);
3. *degree of specialisation* (specialisation code);
4. *size of fishing operation* (boat length or hull units);
5. *intensity of fishing operations* (days fished per annum);
6. *location of fishing business* (ABS statistical division);
7. *level of fishing activity* (total boat cash receipts); and
8. *fishing pattern* (local/distant fishing activity).

Economic performance of the fishing sectors was evaluated based on the following criteria:

- statistical significance of the relationship between the characteristics of the firm and the levels of financial and economic profit indicators;
- levels of BBP and BEP;
- the means/medians of BBP and BEP for each characteristic; and
- proportion of subsets of sector firms with BBP>0 and BEP>0.

A set of null hypotheses (H_o) were tested which related each financial and economic indicator (BGM, BCI, RRC, BBP and BEP) against the characteristics of the fishing business (fishing sector, degree of specialisation, size of business operation, location of fishing firm, fishing intensity, level of fishing activity and fishing pattern) (Table 11.41).

Table 11.41: Testing the Null Hypotheses (H_0): *there is No Significant Difference in the Level of a Financial and Economic Profit Indicator and the Characteristics of the Queensland Fishing Firm.* (Yes = reject H_0 and $p<0.05$)

Indicator	Characteristics of the Fishing Firm						
	Fishing Sector	Degree of Specialisation	Size of Fishing Operation	Location of Fishing Firm	Intensity of Fishing Operation	Level of Fishing activity	Fishing Pattern (proximity)
Financial Indicator							
BGM	**YES**	NO	**YES**	NO	**YES**	**YES**	**YES**
BOS	NO	NO	**YES**	NO	**YES**	**YES**	**YES**
BCI	NO	NO	**YES**	NO	**YES**	**YES**	**YES**
BBP	NO	NO	NO	NO	**YES**	**YES**	**YES**
RRC	NO	NO	NO	NO	NO	NO	**YES**
Economic Indicator							
BEP	NO	NO	NO	NO	**YES**	**YES**	NO

(a) The results summarised in this table were based on ANOVA univariate analysis and the YES/NO meant that the results of each individual relationship met or failed to meet the ANOVA criteria of $p<0.05$.

Overall, ANOVA testing indicates that there are no significant differences ($p<0.05$) in each of the major financial profit indicators, except for BGM, with respect to fishing sectors within which the fishing firm operated and that there are no significant differences ($p<0.05$) in each of the major economic profit indicators with respect to fishing sectors within which the fishing firm operated (Table 11.41).

For 'intensity of fishing operation' (days fished) and 'level of fishing activity' (TBCR) there was a significant difference for all major indicators except RRC and for 'fishing pattern' (proximity of days fished to home port) except BEP. 'Fishing sector' was significant for BGM and 'size of fishing operation' significant for BGM, BOS and BCI.

The key characteristics significant for the economic performance of the fishing firm, based on BBP were therefore:

- Intensity of fishing operation;
- Level of fishing activity;
- Fishing pattern (proximity to home port); and
- Size of fishing operation.

Further analysis, based on BBP, BEP, RRC and NER, using mainly these characteristics, are described in the following sections of this chapter. The fishing sector, as a characteristic of the fishing firm, was significant only at the very basic profit level of performance: BGM, where only variable costs were taken into account. The Queensland fleet estimates of the financial and profit indicators were derived from the statistical means related to the characteristic 'intensity of fishing operation'.

11.6.1 Economic Performance by Type of Fishing Sector

The economic performance of individual fishing sectors varies (Table 11.42). The net sector is the only sector with a positive economic performance across all profit indicators. At a cash flow level (i.e. GRI), the general crab and beam trawl had the best performance.

After opportunity costs of labour, the ownership of resources and depreciation allowances were deducted from profits, the otter trawl sector had the best performance. However, after the opportunity cost of capital was taken into account the best performance was the net sector. Overall, the economic performance of fishing sectors was such that less than 50% of firms within each sector (except for the net sector) had a BBP>0 whilst no sectors had firms with a BEP>0. The opportunity cost of capital @ 10% had a strong impact on economic performance. No allowance of the opportunity cost of the externalities of fishing operations was incorporated into BEP or NER.

Table 11.42: Mean Economic Performance: Fishing Sector Firms

Profit Indicator	Type of Fishing Sector ($)						
	General Crab	Line	Net	Spanner	Otter Trawl	Beam Trawl	Diversified
BGM	39,583	45,872	44,324	47,439	89,499	52,138	44,792
BOS	32,011	30,703	35,436	31,060	60,817	43,111	35,792
GRI	197	138	171	152	133	191	176
BCI	4,543	11,067	11,650	11,546	33,959	11,099	8,520
PFE	2,635	3,562	7,951	5,905	16,537	6,189	4,500
RRC (%)	2.8	2.2	5.9	5.6	4.7	4.7	3.7
BBP	582	-184	5,978	3,287	8,122	5,191	2,612
Total BBP ($M)	0.018	-0.022	0.732	0.115	1.47	0.109	0.261
% firms BBP>0	39	49	45	54	45	43	45
NER ($M)	-0.04	-1.060	0.117	-0.092	-2.29	0.003	-0.117
BEP	-1,281	-8,980	1,274	-2,627	-12,666	129	-1,172
% firms BEP>0	39	40	45	46	36	43	43

Summary: At a cash level, general crab and beam trawl sectors had the best result. After allowance for major opportunity costs, the otter trawl sector with a mean BBP of $8,122 and the net sector with mean BEP of $41,274 had the best performance. However, the net sector had greater than 50% of firms with BBP>0 whilst all sectors had low proportions of firms with BEP>0. Only the financial profit indicator BGM was statistically significant in the economic performance of any type of fishing sector.

11.6.2 Economic Performance by Degree of Specialisation

The surveyed fleet was divided into two main categories: specialised fishing firms where one and only one fishery contributed more than 10% of TBCR and all other firms were classified as diversified. Specialised fishing firms performed better for all types of financial profit

indicators. The Gross Returns Index was higher for the diversified firms suggesting that diversified operations were better at generating cash receipts per unit of cash costs. The two groups were similar in terms of RRC (Table 11.43).

Table 11.43: Mean Economic Performance: Degree of Specialisation

Profit Indicator	Degree of Specialisation		
	Specialised (n=378)	Diversified (n=100)	All (n=478)
Boat Gross Margin ($)	66,649	44,792	62,076
Boat Operating Surplus ($)	45,758	35,792	43,673
Gross Return Index	137	176	140
Boat Cash Income ($)	22,356	8,520	19,461
Rate of Return to Capital (%)	4.5	3.7	4.4
Profit at Full Equity ($)	10,882	4,500	9,546
Boat Business Profit ($)	5,236	2,612	4,687
Total Boat Business Profit ($M)	1.979	0.449	2.240
% Firms BBP>0	46	45	46
Net Economic Return ($M)	-3.247	-0.117	-3.364
Boat Economic Profit ($)	-8,589	-1,172	-7,037
% Firms BEP>0	39	43	40

BEP for specialised firms was more strongly affected by the size of the business operation and the weighting of trawl boat numbers than the diversified ones. All fishing firms performed poorly in their contribution to the economy, as determined by the high proportion of those that operated at a loss and a NER of -$3.364M. This indicates that the sample and probably the fleet, was behaving as an open access type fishery where economic rents were being dissipated. The diversified firms performed better than the mean industry BEP. Ninety seven percent of the NER was generated by these specialised firms.

Overall, ANOVA testing indicated there were no significant differences ($p<0.05$) in each of the major financial profit indicators with respect to the degree of specialisation (Table 11.41).

11.6.2.1 Economic Performance by Degree of Specialisation and Type of Fishing Sector

Fishing activity and associated cost structure varied whether the firm targeted species specific to a sector (specialised) or species relevant to a number of sectors (diversified). On average, the diversified general crab, spanner crab, net and beam trawl fishing sector firms performed better than their counter parts (Table 11.44). Whereas, the specialised line, and otter trawl fishing sector firms performed better than their counter parts. Overall, the diversified firms, except the line sector firms, performed better. The best economic performance was the average diversified beam trawl sector firm.

Table 11.44: Mean Economic Performance of Fishing Sector: Degree of Specialisation

Degree of Specialisation	Fishing Sector Firm						
	General Crab	Line	Net	Spanner Crab	Otter trawl	Beam Trawl	All
Boat Business profit ($)							
Specialised	-15,122	3,193	4,691	-1,263	3,022	-3,093	5,236
Diversified	5,163	-17,779	8,072	10,111	na	25,903	2,612
Rate of Return to Capital (%)							
Specialised	-20.9	4.4	5.1	0.5	3.2	-1.6	4.5
Diversified	6.3	-12.2	7.3	12.4	na	21.0	3.7
Boat Economic Profit ($)							
Specialised	-13,199	-12,703	-982	-3,093	-17,704	-8,896	-8,589
Diversified	2,195	-23,682	4,976	6,027	na	22,692	-1,172
Net Economic Return ($M)							
Specialised	-0.092	-0.610	-0.057	na	-2.178	-0.133	-3.247
Diversified	0.053	-0.450	0.174	0.084	na	0.136	-0.117

(na: sample less than 5)

Much debate has occurred in Queensland, in recent years within the fishing industry, about the licensing arrangements of the Queensland fishery centred on the impacts of restructuring of the fishing fleet under fishery management plans. In other words: specialisation verses diversification. As of 1997-98, the ratio of firms, within scope (n=1,669, Table 4.3) operating using a specialised Licence Package compared with those using a diversified Licence package was 1241:428 (2.9:1). However, what was the relative economic performance of these different groups of firms?

Table 11.45: Economic Performance: Degree of Specialisation by BBP<0 or BBP>0

Profit Indicator Index	Overall Survey Performance (n=478)		Performance of Firms with BBP>0		Performance of Firms with BBP<0	
	Specialised (n=378)	Diversified (n=100)	Specialised (n=175)	Diversified (n=45)	Specialised (n=203)	Diversified (n=55)
GMI	165	216	220	321	120	124
GRI	137	176	186	259	99	102
BCI	115	111	156	170	81	63
BBPI	103	103	141	160	72	57
PFEI	107	105	145	165	75	59
RRC	4.5	3.7	28.4	40	-16.5	-28
BEPI	93	97	127	152	66	54

Overall (Table 11.45), the specialised and diversification groups had similar patterns of performance. For example: Profit at Full Equity Index (107 and 105), Rate of Return of Capital (4.5 and 3.7), Boat Business Profit Index (103 and 103) and Boat Economic Profit Index (93 and 97) respectively. The diversified firms performed better at the lower level forms of profit: Gross Margins Index (220 and 321), Boat Operating Surplus Index (186 and 259) and Boat Cash Income Index (156 and 170) respectively. In other words, the diversified firms were much better in generating cash returns than the specialised firms. However, when the performance of both groups was broken down to the level of BBP achieved (i.e. BBP<0 or BBP>0) a different pattern emerged.

Firstly, for the group of firms where BBP>0, the specialised firms performed worse than the diversified firms. For example: Gross Returns Index (145 and 165), PFE Index (145 and 165), BBP Index (141 and 160), RRC (28.4 and 40) and BEP Index (127 and 152). Secondly, for the group of firms where BBP<0, the specialised firms performed marginally better than the diversified firms.

The general picture that emerged from the analysis was that the diversified firm has a place in the Queensland fishery. The only question to be considered is how many: a question that cannot be answered by this research, but one that must be answered by the fisheries management agencies.

Summary: Specialised fishing firms performed better for all types of financial profit indicators but not for economic profit. However, the GRI was much higher for the diversified firms. For the firms where BBP>0 the diversified firms as a group performed best, but for the BBP<0 group of firms, the specialised firms performed best. Of the specialised firms, the net sector performed better with mean BBP of $4,691 and mean BEP of -$982 whereas for the diversified group of firms, the beam trawl sector performed better with mean BBP of$25,903 and mean BEP of $22,692. Degree of specialisation was not statistically significant for any profit indicator.

11.6.4 Economic Performance by Size of Fishing Operation

The financial and economic performance of Queensland fishing firms varied for the four boat length classes. For example, all types of financial indicators of larger sized boats (>14m) were greater than that of smaller sized boats (<14m) except for GRI which decreased with increased boat length class and on average, BEP decreased with the size of the fishing firm (Table 11.46). However, overall, the ANOVA testing indicated there were no significant differences ($p<0.05$) in BBP or BEP with respect to the size of the fishing operation (Table 11.41).

Table 11.46: Mean Economic Performance: Size of Business Operation

Profit Indicator	Boat Length Class				
	0-10.0	10.1-14.0	14.1-18.0	18.1+	All
Boat Gross Margin ($)	40,565	59,981	96,319	119,968	62,076
Boat Operating Surplus ($)	32,294	39,629	63,758	80,570	43,673
Gross Returns Index	179	139	131	125	140
Boat Cash Income ($)	8,062	14,992	38,437	61,679	19,461
Rate of Return to Capital (%)	4.2%	3.0%	5.4%	4.4%	4.4%
Profit at Full Equity ($)	4,448	5,369	20,850	28,937	9,547
Boat Business Profit ($)	2,642	1,058	10,714	16,081	4,687
Total Business Profit ($M)	0.586	0.137	1.017	0.498	2.240
% Firms BBP>0	45%	44%	53%	42%	46%
Net Economic Return ($M)	-0.309	-1.102	-1.162	-0.791	-3.364
Boat Economic Profit ($)	-1,393	-8,476	-12,228	-25,520	-7,037
% Firms BEP>0	42	34	45	32	40

On average, the fishing firm with the bigger boats (<14m) performed better. The smaller sized fishing operations such as general crab, net and beam trawl fishing sectors had a positive economic performance compared with those firms with the larger spanner crab boats (>10m) (Table 11.47).

Table 11.47: Economic Performance: Size of Fishing Operation by Fishing Sector

Size of Fishing Operation (boat length)	Fishing Sector						
	General Crab	Line	Net	Spanner Crab	Otter trawl	Beam Trawl	All
Boat Business Profit ($)							
<10m	6,983	716	5,974	-5,057	-13,776	6,868	2,642
>10m	-32,701	1,287	6,007	17,407	9,402	na	6,460
Rate of Return to Capital (%)							
<10m	9.3	2.3	6.8	-2.4	-11.8	6.7	4.2
>10m	-29.1	2.2	3.3	15.8	4.9	na	4.4
Boat Economic Profit ($)							
<10m	5,264	-5,630	3,107	-9,157	-17,790	2,642	-1,393
>10m	-35,312	-13,090	-12,222	8,424	-12,366	na	-11,932
Net Economic Return ($M)							
<10m	0.14	-0.37	0.25	-0.20	-2.11	0.048	-0.31
>10m	-0.18	-0.70	-0.14	0.11	-0.18	na	-3.05

(na: sample less than 5)

Overall, the smaller sized firms with the higher fishing intensity performed better. Less intensive fishing operations (less than 150 days) with the small boats (<10m) performed better than larger sized boats (Table 11.48). On the other hand, the firms with less than 14m and a more intensive fishing operation (more than 150 days) performed better than firms with the larger boats.

Small fishing firms (boat length <10m) with a local fishing pattern performed better than the firms with similar sized boats and had a distant fishing pattern (Table 11.49). Firms with larger boats and distant patterns performed better than the rest of the firms. The best economic performing firms were the firms with 14-18m boats with a distant fishing pattern.

Table 11.48: Economic Performance: Size and Intensity of Fishing Operation

Intensity of Fishing Operation	**Size of Fishing Operation** (Boat Length)			
	< 10m	**10 – 14m**	**14 – 18m**	**> 18m**
Boat Business Profit ($)				
<150 days	-10,770	-18,122	-32,282	-142,954
>150 days	24,150	25,835	23,671	46,665
Rate of Return to Capital (%)				
<150 days	-9.4	-8.6	-9.0	-23.4
>150 days	21.2	15.0	8.6	8.8
Boat Economic profit ($)				
<150 days	-15,039	-26,888	-53,557	-173,788
>150 days	20,505	15,272	227	2,994
Net Economic Return ($M)				
<150 days	-2.075	-1.936	-1.178	-0.869
>150 days	1.681	0.871	0.017	0.078

(na means sample less than 5)

Table 11.49: Economic Performance: Size of Fishing Operation and Fishing Pattern

Fishing Pattern	**Size of fishing Operation** (boat length)			
	< 10m	**10 – 14m**	**14 – 18m**	**> 18m**
Boat Business Profit ($)				
Local	4,187	-11,761	-13,432	3,605
Distant	-3,978	21,567	29,848	23,961
Rate of Return to Capital (%)				
Local	5.6	-4.7	-1.3	2.9
Distant	-0.9	12.4	9.1	5.5
Boat Economic profit ($)				
Local	610	-20,345	-30,514	-37,227
Distant	-9,978	-20,345	2,262	-18,125
Net Economic Return ($M)				
Local	0.110	-1.628	-1.282	-0.446
Distant	-0.419	0.525	0.119	-0.344

(na means sample less than 5)

Summary: Generally, the larger the size of the fishing firm, the better the financial profit indicators. However, the economic profit indicators were better with the smaller firms – due to a proportionally smaller opportunity cost of capital and higher cash returns. The best economic performance was the middle sized spanner crab sector firms with mean BBP of $17,407 and mean BEP of $8,424. Size of fishing operation was statistically significant for the financial profit indicators BGM, BOS and BCI – forms of profit where depreciation and opportunity cost of capital were not relevant.

11.6.5 Economic Performance by Intensity of Fishing Operation

Fishing firms with fishing intensity greater than 150 days had the best mean financial performance. The poorest overall average performance were fishing firms with a fishing intensity of less than 50 days: 91% had both BBP<0 and BEP<0 during 1997-98. The better performing group of firms were those with a fishing intensity between 200 and 250 days (Table 11.50).

On average, the firms in the spanner crab and net fishing sectors with lower fishing intensity (<150 days) performed better compared with other sectors, however for these groups of firms, all key profit indicators were negative (Table 11.51).

Of the firms with higher fishing intensity (>150 days), all sectors had a positive performance across all profit indicators except for the trawl sectors (Table 11.51). Note that the sample was split evenly between under and over 150 fishing days. The significant difference between these two levels of fishing intensity was the high negative NER result of -$6.058M of the less

intensity fishing firms. The best overall economic performance was the average spanner crab sector firm that fished for greater than 150 days where mean BEP was $27,085.

Table 11.50: Mean Economic Performance: Intensity of Fishing Operation

Profit Indicator	**Intensity of Fishing Operation** (days fished)					
	<50	**50-100**	**100-150**	**150-200**	**200-250**	**250+**
BGM ($)	-312	21,886	42,167	80,572	118,465	116,161
BOS ($)	-10,709	10,502	26,429	60,526	91,379	84,211
GRI	74	123	131	150	153	131
BCI ($)	-25,404	-11,788	3,428	31,707	65,633	60,919
RRC (%)	-23.3	-15.5	-2.6	9.4	15.6	7.4
PFE	-33,041	-18,159	-4,415	21,448	51,967	38,406
BBP ($)	-36,118	-19,990	-7.976	16,151	43,770	27,112
Total BBP ($M)	-1.625	-1.619	-0.909	2.148	3.676	0.569
% Firms BBP>0	9	32	48	49	67	67
NER ($M)	-2.001	-2.113	-1.896	0.527	2.182	-0.063
BEP ($)	-44,472	-26,087	-16,631	3,069	25,970	-3,006
% Firms BEP>0	9	27	38	42	64	57

Table 11.51: Economic Performance: Intensity of Fishing Operation by Fishing Sector

Intensity of Fishing Operation	**Fishing Sector Firm**						
	General Crab	**Line**	**Net**	**Spanner Crab**	**Otter trawl**	**Beam Trawl**	**All**
Boat Business Profit ($)							
<150 days	-36,644	-12,399	-6,026	-1,637	-14,5750	-10,783	-17,308
>150 days	13,530	35,648	24,650	13,062	20,931	-17,172	26,866
Rate of Return to Capital (%)							
<150 days	-28.1	-6.3	-4.8	-0.5	-17.5	-9.5	-9.9
>150 days	18.0	22.4	13.9	26.2	7.7	13.0	11.6
Boat Economic Profit ($)							
<150 days	-52,152	-30,938	-20,261	-15,153	-72,886	-27,315	-35,850
>150 days	559	14,177	1,192	27,085	-22,414	-2,573	-6,158
Net Economic Return ($M)							
<150 days	-0.327	-0.919	-0.489	-0.221	-2.954	-0.148	-6.058
>150 days	0.287	0.811	0.607	0.129	0.661	0.151	2.646

(na: sample less than 5)

Overall, ANOVA testing indicated there were significant differences ($p<0.05$) in each of the major financial and economic profit indicators, except for RRC, with respect to the intensity of the fishing operation (Table 11.41).

Summary: The firms with a fishing intensity of greater than 150 days had the best performance; the best sector for BBP was the line sector with mean BBP of $24,650 and the spanner crab sector for mean BEP of $27,085. Firms with less than 50 days fishing intensity performed very poorly: 91% had BBP<0 and were most likely part time operations or were firms in a costly part of their repairs and maintenance cycle. All firms that fished for less than 150 days had negative BBP, BEP and RRC. Fishing intensity was statistically significant for all profit indicators except for RRC.

11.6.6 Economic Performance by Level of Fishing Activity

Fishing firms can also be compared based on their level of fishing activity as measured by TBCR. This characteristic is important because the catch is weighted by the price of the species taken as it removes comparisons based on species only which vary both in quality and demand in the market place. Using beach prices reduced these biases.

Table 11.52: Mean Economic Performance: Level of Fishing Activity

Profit Indicator	Total Cash Receipts ($)					
	0 - 50	51 - 100	101 - 150	151 - 200	201 - 250	250+
BGM ($)	8,053	32,177	49,450	71,371	92,121	159,505
BOS ($)	1,246	22,119	32,695	50,776	63,043	120,326
GRI	105	144	135	142	139	145
BCI ($)	-19,391	-4,342	8,347	22,651	38,226	96,808
RRC (%)	-25.7	-8.2	0.2	6.0	9.0	14.6
PFE ($)	-23,421	-10,263	263	12,898	23,556	74,987
BBP ($)	-25,076	-12,513	-2,706	7,401	17,993	62,141
Total BBP ($M)	-2.958	-1.426	-0.179	0.377	0.647	5.779
% Firms BBP>0	13	43	58	63	63	69
NER ($M)	-3.467	-2.074	-0.734	-0.174	0.077	3.009
BEP ($)	-29,384	-18,196	-11,120	-3,414	2,126	32,356
% Firms BEP>0	12	39	45	47	53	65

Table 11.53: Economic Performance: Level of Fishing Activity by Fishing Sector

Level of Fishing Activity	Fishing Sector Firm						
	General Crab	Line	Net	Spanner Crab	Otter trawl	Beam Trawl	All
Boat Business Profit							
<$150,000	-8,844	-12,437	-8,515	-640	-41,543	-4,481	-15,316
>$150,000	na	37,757	74,817	na	29,801	na	37,802
Rate of Return to Capital							
<$150,000	-7.1	-8.1	-6.8	1.8	-23	-11.4	-10.8
>$150,000	na	17.0	29.2	na	9.3	na	12.5
Boat Economic Profit							
<$150,000	-10,646	-20,107	-11,114	-6,111	-51,433	-18,245	-21,059
>$150,000	na	23,656	60,116	na	4,257	na	16,176
Net Return							
<$150,000	-0.308	-1.769	-0.845	-0.196	-2.829	-0.328	-6.276
>$150,000	na	0.709	0.962	na	0.536	na	2.911

(na: sample less than 5)

As would be expected, financial profit appeared to increase as the level of TBCR increased with those above $150,000 being the better performing firms (Table 11.52).

The mean BEP appears to be positive after a TBCR of $150,000 (Table 11.53). The best performing firms were more likely to have a TBCR over $200,000 and a firm with less than $50,000 likely to have performed very poorly.

Overall, ANOVA testing indicated there were significant differences ($p<0.05$) in each of the major financial profit indicators, except for RRC, with respect to the level of fishing activity and there were significant differences ($p<0.05$) in the BEP profit indicator with respect to the level of fishing activity (Table 11.41).

On average, the firms with lower level of fishing activity (<$150,000) performed better in both crab sectors compared with other similar firms. However, the line, net and otter trawl sectors firms, with higher level of fishing activity (>$150,000), performed better (Table 5.53) than their counter parts. The best economic performance was the average net firm with a fishing level of

activity of greater than $150,000 with mean BBP of $74,817 and mean BEP of $60,116; one of the best sub-group performances found during the study.

Summary: Firms that generated more than $150,000 had positive profit indictors and the higher the level of activity the better the performance – greater ability to cover all costs. The net sector had the best performance with mean BBP of $74,817 and mean BEP of $60,116. Level of fishing activity was statistically significant for all profit indicators except for RRC.

11.6.7 Economic Performance by Fishing Pattern

Fishing pattern is the ratio of days fished in a defined local area to that of total days fished by the fishing firm.

Economic performance across fishing patterns was dissimilar (Table 11.54). For example, the 21-40% class had all positive indicators, with BEP of $12,778 and a net return of $0.6M. Firms that played with some degree of distant fishing (61-80% of days fished locally) had the poorest performance.

Table 11.54: Mean Economic Performance: Fishing Pattern

Profit Indicator	Fishing Pattern: Ratio of local days/total days fished					
	<20%	21-40%	41-60%	61-80%	81-100%	All
BGM ($)	80,374	102,529	62,783	60,566	42,083	62,076
BOS ($)	53,563	76,387	41,767	39,868	31,401	43,673
GRI	132	152	136	132	153	140
BCI ($)	34,118	48,221	21,346	14,915	4,673	19,461
RRC (%)	6.1	12.9	4.4	0.8	-0.6	4.4%
PFE	19,471	35,449	9,300	2,220	-857	9,547
BBP ($)	12,949	26,897	5,325	-5,043	-3,544	4,687
Total BBP ($M)	1.826	0.600	-0.164	0.736	-2.152	-3.364
% Firms BBP>0	52	51	52	54	39	46
NER ($M)	-0.911	0.600	0.164	-0.736	-2.152	-3.364
BEP ($)	-6,462	12,778	-6,093	-17,960	-9,696	-7,037
% Firms BEP>0	44	43	44	46	35	40

Overall, ANOVA testing indicated there were significant differences ($p<0.05$) in each of the major profit indicators, except for BEP, with respect to fishing pattern (Table 11.41).

Table 11.55: Economic Performance: Fishing Pattern by Fishing Sector

Fishing Pattern	Fishing Sector Firm						
	General Crab	Line	Net	Spanner Crab	Otter trawl	Beam Trawl	All
Boat Business Profit ($)							
Local	9,236	-2,316	6,639	7,907	-15,420	5,191	-2,255
Distant	-35,475	1,948	3,596	na	41,394	na	17,978
Rate of Return to Capital (%$)							
Local	11.7	-0.6	7.4	10.3	-2.7	4.7	0.9
Distant	-24.5	4.0	3.2	na	11.1	na	8.0
Boat Economic Profit ($)							
Local	7,128	-9,681	4,133	2,346	-30,435	129	-10,338
Distant	-36,317	-8,280	-9,071	na	12,448	na	-719
Net Economic Return ($M)							
Local	0.178	-0.571	0.298	0.072	-3.226	0.003	-3.246
Distant	-0.218	-0.489	-0.180	na	0.934	na	-0.118

(na: sample less than 5)

On average, the firms with local fishing patterns performed better in all sectors except for the otter trawl sector. Firms with distant fishing patterns that had positive profit indicators was the otter trawl sector (Table 11.55).

Table 11.56: Economic Performance: Fishing Pattern and Fishing Intensity

Fishing Intensity	Fishing Pattern (Ratio of local days/total days fished)				
	0-20%	21-40%	41-60%	61-80%	81-100%
Boat Business Profit ($)					
<150 days	-16,208	-41,029	-20,176	-20,713	-14,862
>150 days	31,209	61,956	28,831	14,980	12,516
Rate of Return to Capital (%)					
<150 days	-5.7	-21.7	-8.2	-9.0	-12.0
>150 days	10.1	21.9	14.5	6.4	9.8
Boat Economic Profit ($)					
<150 days	-28,165	-49,568	-31,324	-29,107	-20,424
>150 days	7,104	44,956	16,622	-3,716	5,454
Net Economic Return ($M)					
<150 days	-1.493	-0.793	0.216	-0.669	-2.696
>150 days	0.618	1.394	-0.407	-0.067	0.485

The more distant the fishing pattern (<40% local) combined with a higher level of intensity of fishing, the better the financial and economic performance of the fishing firm (Table 11.56). For example, firms with a distant fishing pattern of 21-40% and a fishing intensity greater than 150 days had one of the best profit performance of any subset of firms of the entire survey: BBP of $61,956, BEP of $44,956 and an RRC of 21.9%.

All firms with a fishing intensity of less than 150 days had a poor economic performance regardless of their fishing pattern. The better firms were those that were either specifically distant or specifically local. The worst performing firms had mainly a distant fishing pattern (between 20 and 60%) with lower intensity of fishing (less than 150 days). The best economic performance was the average firm with a fishing intensity greater than 150 days fishing between 21-40% outside their local fishing area.

Fishing Pattern; Firms with a distant fishing pattern had the better economic performance where the majority of firms had BBP>0. The best performance was the 21-40% distance group of firms, mean BBP of $26,897 and mean BEP of $12,778. The general crab sector had the best overall local performance with mean BBP of $9,236 and mean BEP of $7,128, whereas the otter trawl sector firms had the best distance performance with a mean BBP of $41,394 and mean BEP of $12.448. When combined with fishing intensity, firms with the 21-40% fishing pattern and greater than 150 days fishing intensity had mean BBP of $61,956, mean BEP of $44,956 and RRC of 21.9%. Fishing pattern was statistically significant for all profit indicators except BEP.

11.6.8 Economic Performance by Location of the Firm

The location of a fishing firm, however, was not necessarily related to the areas fished by that firm and was therefore not an indicator of fishing areas. Based on the financial and economic profit indicators for the average fishing firm, those located in the Northern, Moreton and Far North regions, appear to be the most profitable based on BBP whereas firms located in the Fitzroy and Wide Bay regions appearing less profitable (Tables 11.57). As a group, firms located Mackay and further north had the highest proportion of profitable firms. Overall, ANOVA testing indicated there were no significant differences ($p<0.05$) in the financial and economic profit indicators with respect to the location of the fishing firm (Table 11.41).

Table 11.57: Mean Economic Performance: Location of the Firm

Indicator	Location of Fishing Firm						
	Brisbane	Moreton	Wide Bay	Fitzroy	Mackay	Northern	Far North
BGM ($)	52,364	76,737	54,224	39,376	57,302	81,675	73,440
BOS ($)	$41,542	$53,248	$37,887	$23,679	$39,224	$62,735	$48,860
GRI	158	148	138	121	135	149	137
BCI ($)	14,379	29,708	13,259	2,151	13,399	41,899	27,588
RRC (%)	5.5%	9.0%	-0.1%	-5.6%	3.6%	13.2%	7.0%
PFE	8,175	19,743	-183	-11,183	6,632	28,250	17,365
BBP ($)	$5,321	$13,326	-$4,798	-$15,602	$1,913	$25,345	$10,637
Total BBP ($M)	0.446	1.079	-0.441	-0.811	0.082	0.938	0.947
% Firms BBP>0	42	44	41	36	60	62	48
NER ($M)	-0.234	0.195	-1.906	-1.312	-0.322	0.454	-0.238
BEP ($)	-$2,792	$2,411	-$20,721	-$25,232	-$7,492	$12,269	-$2,675
% Firms BEP>0	39	41	33	35	37	57	45

Summary: Locations north of Mackay had the highest proportion of firms where BBP>0. The better locations for economic performance were Northern and Moreton regions. Location of the fishing firm was not statistically significant for any profit indicator.

CHAPTER 12

REPORT CARD OF THE QUEENSLAND FISHERY

Economic performance of the Queensland fishery was estimated from the financial and economic profit indicators of each fishing sector, determined from the survey. The survey population of in-scope sector firms was extrapolated to the total Queensland fishery (Table 3.3) from the statistical means of the profit indicators for the characteristic 'level of fishing intensity' of each sector's firms derived in Chapter 6 to 10.

12.1 Estimated Economic Performance of the Queensland Fishery

The Report Card (Table 12.1) showed that the estimates of the entire Queensland fishery were TBCR of $210.2M with a mean TBCR of $151,830 and median of $105,044. Use of cash funds was $140 cash receipts for every $100 cash outlay.

For the Queensland fishery (made up of only in-scope firms, n=1,669), BBP was estimated at $0.201M and NER was estimated at -$10.99M. The mean BGM for the average fishing firm was $62,076 and median of $44,662; mean BBP of $4,687 and median $-$4,687; mean BEP of -$7,037 and median of -$11,786; an NER to GVP ratio of –5.2%; and a RRC of 4.4%.

Overall, the Queensland fishery had the following costs:

- mean owner and family labour costs of $26,915 (se=$757) and median of $25,614;
- mean operating fixed costs (such as interest, insurance, leasing, licence and industry fees) of $16,379 (se=$837) and median of $10,953;
- mean operating variable costs (such as fuel, crew, repairs and maintenance) of $90,702 (se=$8,212) and median of $52,243;
- mean depreciation allowance of $14,774 and median $10,605; and
- mean opportunity cost of capital of $11,724.

Finally, some 63% of firms had an RRC less than the opportunity cost of capital (10%) and 44% of firms had BBP>0 along with 40% with a BEP>0.

Table 12.1: Report Card of the Queensland Fleet

Economic Performance Indicators	Estimated Queensland Fleet Values ($M) (a)	Mean ($)	Median ($)
Receipts and Costs Indicator			
Total Boat Cash Receipts	210.2	151,830	105,044
Total Capital Investment	477.3	294,369	206,801
Licence Package Value	124.9	75,964	66,000
Total Boat Fixed Costs	27.3	16,379	10,953
Total Boat Variable Costs	142.6	90,702	52,243
Total Boat Cash Costs	169.9	108,156	65,397
Depreciation Allowance	26.9	14,774	10,605
Opportunity Cost of labour	44.6	26,915	25,614
Financial Profit Indicator			
Boat Gross Margin	91.655	62,076	44,662
Boat Operating Surplus	63.243	43,673	30,470
Gross Returns Index	140		
Boat Cash Income	21.825	19,461	4,856
Rate of Return to Capital	4.4%		
Profit at Full Equity	7.715	9,547	4,316
Rate of Return to Full Equity	3.2%		
Boat Business Profit	0.201	4,687	-4,687
% Firms BBP>0	44%		
Economic Profit Indicator			
Net Economic Return ($M)	-10.99		
Boat Economic Profit		-7,037	-11,786
NER as a Ratio of TBCR	-5.2%		
% Firms BEP>0	40%		

(a) For only in-scope firms.

In all cases, the median values of the profit indicators were lower than the mean. To understand the differing performances of the firms within the Queensland fishery, subgroup analyses were undertaken and summarised in the following sections.

12.2 Estimated Economic Performance of the Queensland Sectors

Based on the characteristic 'level of fishing intensity' that was shown to be statistically significant for all profit indicators except for RRC and that the survey was regarded as representative of the Queensland fishery, the above survey results for each sector have been extrapolated to determine the estimates of economic performance for the entire Queensland fishery (Table 12.2).

Table 12.2 Estimates of the Economic Performance of the Queensland Fishing Sectors

Fishing Sector	TBCR ($M)	BGM ($M)	BOS ($M)	BCI ($M)	PFE ($M)	BBP ($M)	NER ($M)
General Crab	8.8	5.818	4.705	0.667	0.387	0.086	0.191
Line	38.4	16.480	11.818	5.560	2.749	-1.507	-3.598
Net	25.6	15.991	11.115	4.368	1.756	0.678	0.415
Spanner Crab	9.1	6.452	4.224	1.570	0.803	0.447	-0.357
Otter Trawl	118.7	44.255	29.182	9.094	1.704	0.233	-7.648
Beam Trawl	3.7	2.659	2.199	0.566	0.316	0.264	0.007
Diversified (a)	34.8	19.173	15,318	3.646	1.926	1.120	0.467

(a) The Diversified sector is already a component of each other sector.

The following is a summary of the economic performance of the Queensland fishing sectors:

General Crab Sector ($8.8M) had very small scale (<10m), highly diversified firms located mainly south of Rockhampton catching mud crabs and blue swimmer crabs with high levels of fishing intensity (69% were >150 days), operated very locally in less than 5 grids and generated mean TBCR of $322 per fishing day. BBP was estimated at $0.086M and NER estimated at -$0.368M.

Line Sector ($38.4M) had small to medium scale (<14m) highly specialised firms located mainly in north Queensland targeting mainly coral trout, had fishing intensities of less than 150 days, operated mainly distant fishing patterns within less than 19 grids and generated a CR of $1,077 per day fished. BBP was estimated at $1.507M and NER at -$3.598M.

Net Sector ($25.6M) had very small scale (<10m) firms, the majority of which were specialised, netting mainly mullet, barramundi, shark and grey mackerel, were located throughout Queensland but the majority in the Far North region that generated 37% of net sector GVP. Fishing intensities were mostly less than 150 days within less than 5 grids with very local fishing patterns and generated $664 per fishing day. BBP was estimated at $0.678M and NER at -$1.059M.

Spanner Crab Sector ($9.1M) had mostly small scale firms (<10m) with mixed degrees of specialisation taking only spanner crabs, located mainly in the Wide Bay and Moreton regions operating with low levels of fishing intensity in less than 5 grids and generated a mean TBCR of $734 per fishing day. BBP was estimated at $0.678M and NER at $0.415M.

Otter Trawl Sector ($145.4M) had highly specialised firms of various sizes harvesting mainly prawns and scallops, had high levels of fishing intensity (>150 days, generating 95% of sector GVP) and were located across Queensland with the majority in Brisbane, Wide Bay and Far North which had the highest GVP ($29.3M) and highest GVP/day fished ($1,542). These firms operated locally in less than 10 grids and generated a mean TBCR of $1,224 per fishing day. However, firms with distant fishing patterns (37%) generated nearly 50% of sector GVP. BBP was estimated at $0.233M and NER at -$7.648M.

Beam Trawl Sector ($3.7M) had highly specialised, small scale firms (<10m) targeting prawns for non consumption, had a range of fishing intensities, were located mainly in the Brisbane region, operated locally in less than 5 grids and generated a mean TBCR of $468 per fishing day. BBP was estimated at $0.264M and NER at $0.007M.

Diversified Sector ($34.8M) made up of mainly small to medium scale firms (<14m) operating across all other sectors, mainly in the net and general crab sectors and all locations and generated a mean TBCR of $560 per day fished. BBP was estimated $1.120M and NER was estimated at $0.467M.

12.3 Overall Performance of the Queensland Fishing Firm

The following is a summary of the economic performance of the Queensland fishing firm based on the six characteristics of firms operating within each sector.

Type of Fishing Sector: At a cash level, general crab and beam trawl firms had the best result. After allowance for major opportunity costs, the otter trawl firms with a mean BBP of $8,122 and the net firms with mean BEP of $41,274 had the best performance. However, the net firms had greater than 50% of firms with BBP>0 whilst all sectors had low proportions of firms with BEP>0. Only the financial profit indicator BGM was statistically significant in the economic performance of any type of fishing sector.

Degree of Specialisation: Specialised fishing firms performed better for all types of financial profit indicators but not for economic profit. However, the GRI was much higher for the diversified firms. For the firms where BBP>0 the diversified firms as a group performed best, but for the BBP<0 group of firms, the specialised firms performed best. Of the specialised firms, the net firms performed better with mean BBP of $4,691 and mean BEP of -$982 whereas for the diversified group of firms, the beam trawl firms performed better with mean

BBP of $25,903 and mean BEP of $22,692. Degree of specialisation was not statistically significant for any profit indicator.

Size of Fishing Operation: Generally, the larger the size of the fishing firm, the better the financial profit indicators. However, the economic profit indicators were better with the smaller firms – due to a proportionally smaller opportunity cost of capital and higher cash returns. The best economic performance was the middle sized spanner crab firms with mean BBP of $17,407 and mean BEP of $8,424. Size of fishing operation was statistically significant for the financial profit indicators BGM, BOS and BCI – forms of profit where depreciation and opportunity cost of capital were not relevant.

Intensity of Fishing Operation: The firms with a fishing intensity of greater than 150 days had the best performance. The line firms had the best BBP with mean BBP of $24,650 and the spanner crab firms for mean BEP of $27,085. Firms with less than 50 days fishing intensity performed very poorly: 91% had BBP<0 and were most likely part time operations or were firms in a costly part of their repairs and maintenance cycle. All firms that fished for less than 150 days had negative BBP, BEP and RRC. Fishing intensity was statistically significant for all profit indicators except for RRC.

Level of Fishing Activity: Firms that generated more than $150.000 had positive profit indictors and the higher the level of activity the better the performance – greater ability to cover all costs. The net firms had the best performance with mean BBP of $74,817 and mean BEP of $60,116. Level of fishing activity was statistically significant for all profit indicators except for RRC.

Fishing Pattern: Firms with a distant fishing patter had the better performance where the majority of firms had BBP>0. The best performance was the 21-40% distance group of firms, mean BBP of $26,897 and mean BEP of $12,778. The general crab firms had the best overall local performance with mean BBP of $9,236 and mean BEP of $7,128, whereas the otter trawl sector firms had the best distance performance with a mean BBP of $41,394 and mean BEP of $12.448. When combined with fishing intensity, firms with the 21-40% fishing pattern and greater than 150 days fishing intensity had mean BBP of $61,956, mean BEP of $44,956 and RRC of 21.9%. Fishing pattern was statistically significant for all profit indicators except BEP.

Location of Firm: Locations north of Mackay had the highest proportion of firms where BBP>0. The better locations for economic performance were Northern where mean BBP was $25,345 and 62% met the criteria BBP>0 and where mean BEP of $12,269 and 57% met the criteria BEP>0 and the Moreton region that had positive profit indicators. Location of the fishing firm was not statistically significant for any profit indicator.

BENEFITS AND BENEFICIARIES

All fishing agencies, Management Advisory Committees and Fishery Management Committees in Australia can use the above methodology as a model for considering the economic dimension of the ESD requirements in the management of their fisheries. The fishing industry can use the information to support their input into participative decision making.

FURTHER DEVELOPMENTS

Over the course of the project and in meetings with managers, researchers and industry a number of direction or areas for further work became evident, including:

- Regular costs earnings surveys targeted to account for the multi-dimensional aspects of ESD;
- Economic impacts of Fishery Management Plans of one group of fishing sector firms on other groups need to be undertaken;
- Regular economic performance indicators monitored and presented to stakeholders for improved decision making;
- Economic behaviour of owners to understand the impacts of their characteristics on the economic performance of their firms;
- A structural adjustment policy and methodologies be developed that include a suite of economic performance indicators; and
- Ongoing surveys of the Queensland fishing sectors and specifically the East Coast Otter Trawl Fishery, be undertaken to evaluate the contribution of adjustment polices to the economic performance of otter trawl fishing firms and the fishery.

PLANNED OUTCOMES

1. An effective methodology to determine the financial and economic profit indicators for reporting on the economic performance of fisheries.

The research showed that an effective methodology was achieved based on the fishing firm. It also illustrated that this approach should not be used for prediction purposes but an excellent retrospective snapshot of the performance of any fishery. The weakness of some Australian analyses is the lack of differentiation of performance within and between components of fisheries and fishing firms. The model developed can improve this by using logbook and licensing data to subgroup fisheries so that the 'average performance' can be meaningful through estimation of variability within and between components of a fishery. The lessons learned were:

- economic surveys will provide the appropriate data provided industry is fully involved in the process;
- using a census approach has a high demand for resources and is not timely;
- by using logbook and licensing data to determine a stratified sampling approach would be more effective.

2. Application of the model to the complex Queensland fishery.

The model proved effective in being able to estimate the performance of the Queensland fishery. A complexity was the jurisdictional arrangements of the Queensland fishing firms. To clearly identify the Queensland fishery, only firms operating within Queensland managed fisheries could be in-scope for the analyses. Using logbook and licensing databases, the complexities could be minimised to allow for the estimation of economic performance of firms, sectors and the entire fishery.

3. Commercial sector economic information can be determined that is suitable to the concepts and models for the appropriate valuing of fisheries resources.

The research provided the data necessary for the requirements of FRDC Project 98/165 as determined by Hundloe (2002).

CONCLUSIONS

Objective 1:
Identify the most effective means of determining: the financial performance of the Queensland commercial fishing fleet including, the state, regional and port economic impacts (output, income and employment) of fishing operations; and determination of economic indicators which can be used for adjustment and management purposes.

The economic dimension of the ESD fisheries management paradigm relating to these characteristics was measured through a set of economic performance indicators. Those indicators chosen were: a set of *cost and earnings indicators* (capital, fixed cost, variable costs, total boat cash receipts (TBCR)); *financial profit indicators* (boat gross margin (BGM), boat operating surplus (BOS), boat cash income (BCI), rate of return on capital (RRC), profit at full equity (PFE) and boat business profit (BBP)); *economic profit indicators* (boat economic profit (BEP) and net economic return (NER)). Each economic performance indicator was based on statistical means, medians, profit indices for each fishing sector and disaggregated through the sub-groups within each characteristic.

The economic impact indicators of fishing operations for coastal regions and their major ports and the state of Queensland were determined using the results of the economic survey.

The most effective means of obtaining cost and earnings data was discussed with the Australian Bureau of Statistics (ABS) and was it agreed that the entire Queensland fishery should be surveyed because of the complex nature of the fishery and the licensing regime. The Australian Bureau of Agricultural Research Economics (ABARE) suggested that a survey based on receipts might cover the complexity of the fleet but were not opposed to a census of the fleet. The Office of the Queensland Statistician (QSTATS) was also consulted and their view was similar to that of the ABS.

A survey of all 1,669 Queensland commercial fishers (excluding Harvest Fishery Operators such as beche-de-mer, aquarium fish etc) Licence Package holders operating within Queensland managed fisheries, was undertaken to gather cost and earnings data regarding their business activities for the 1997-98 financial year. In consultation with the FRDC Fisheries Economic Statistical Steering Committee and industry, survey forms were developed with professional assistance from the ABS.

The findings of the research are that through:

- the use of attribution ratios to separate each fishing firm into fishing sectors based on fishery symbols attached to a Licence Package;
- determining the characteristics of the fishing firm within each fishing sector, that are a group of determinants of economic performance, based on logbook and licence databases or questionnaires; and
- based on a cost and earnings survey,

the economic performance of the Queensland fishery, fishing sectors and individual firms operating within the complex licensing regime of Queensland, was determined.

However, the results of the analysis indicated that a stratified survey would be a more cost effective methodology if based on fishing sectors and the use of either the '*level of fishing intensity'* (days fished per annum) or the '*level of fishing activity*' (total boat cash receipts) and in some cases *'fishing pattern'* (proximity to home port and number of grid squares fished) as the basis of stratification.

Economic performance indicators that can be used for structural adjustment and management purposes are BBP, BEP and NER. The efficacy of such indicators was illustrated by their use in the background information provided for the structural adjustment of the Queensland East Coast Otter Trawl Fishery and discussed in full in Taylor-Moore (2004).

Objective 2:
Apply the above framework to an economic assessment of Queensland's fisheries.

An economic assessment of Queensland's fisheries occurred through assuming the sum of all fishing activities could be based on fishing sectors, and their respective fishing firms, determined through attribution ratios. The economic assessment of each fishing sector was analysed using the economic performance indicators derived for objective 1 and used for an ESD Report Card on the Queensland fishery, each of the Queensland fishing sectors and overall for the impacts of the Queensland fishery on the State, coastal regions and ports of Queensland.

The major findings of the report as an example of the application of the research methodology are:

1. Estimated Economic performance of the Queensland fishery
The surveyed Queensland fishing firms generated a financial profit from the Queensland fishery, measured by BBP of $3.215M but had a NER of -$4.342M when full opportunity costs of capital were included. However, it is noted that if externalities such as habitat loss and fish stock depletion were to be included in the analyses, the net economic return and hence economic rent, would be an overestimate of the economic performance of the Queensland fishery.

2. Economic performance of the Queensland fishing firm
Overall, the Queensland fishing firm had an annual gross earnings mean of $151,830 and a median of $15,044, a mean BBP of $4,687 and median of -$4,687, mean BEP of -$7,037 and median -$11,786 and generated an RRC of 4.7%. Some 44% of the fishery had BBP>0 and 40% with BEP>0, indicating that the fishery was indicating the traditional signs of an open access fishery where net economic returns (fishery rent) were dissipated.

3. Economic performance of the Queensland fishing sector
Each fishing sector was also analysed as a further breakdown of means as these gloss over the variations of economic performance within the fishery. The analysis of the economic performance of specific fishing sector firms showed great variability in means and medians.

For example, the mean BBP varied from -$184 of the line sector fishing firms to $8,122 of the otter trawl sector fishing firms and the proportion of firms in each sector where BBP>0 varied from 39% for the general crab sector to 54% in the spanner crab sector. The median BBP varied from $1,701 for the spanner crab fishery to –$11,844 for the general crab sector firms.

Likewise, the mean BEP varied from $129 for the beam trawl sector to -$12,666 for the otter trawl sector and the proportion of firms in each sector where BEP>0 varied from 36% in the otter trawl sector to 46% in the spanner crab sector. The median BEP varied from -$1,121 for the spanner crab fishing sector to -$22,070 for the otter trawl sector.

4. Economic performance of the Queensland fishing firm based on characteristics of the firm.
The statistical means and medians determined in 1 to 3 above glossed over the variations in economic performance within and between these fishing sectors. A further analysis was undertaken to measure these variations based on the characteristics of the fishing firms:

- degree of specialisation (*specialisation codes*);
- size of fishing operation (*boat length or hull units*);
- intensity of fishing operations (*days fished per annum*);
- location of fishing business (*ABS statistical division*);
- level of fishing activity (*total boat cash receipts*);
- fishing pattern (*local/distant fishing activity*); and
- degree of reliance on fishing activity (*% of family income from fishing*).

Within each fishing sector the variations of statistical means and median performance were measured through the sub-groups of each of the above characteristics. Based on the characteristics of the fishing firm, the analysis suggested that certain of these characteristics

were influencing the economic performance of the fishing business as significant differences in performance related to these characteristics were found. Level of fishing activity, intensity of fishing operation and fishing patterns were found to be statistically significant.

Overall, the best economic performances were generally firms from the Northern Region, firms with a distant fishing pattern, firms with a size of fishing operation of 14-18 metres, firms with a fishing intensity of greater than 150 days and firms with a level of fishing activity greater than $250,000 per annum.

Specifically, the results indicated that the best economic performance of fishing sectors, based on characteristics of the firm, were for example: net sector firm with a level of activity greater than $150,000, the diversified beam trawl sector for degree of specialisation, very small scale spanner crab firms, spanner crab firms with an intensity of more than 150 days and otter trawlers with a distant fishing pattern.

The diss-aggregation of financial and economic data, based on the characteristics of the fishing firm, enhanced the measurement and understanding of the Queensland fishery.

5. Economic impacts of the Queensland fishery on the State, coastal regions and ports of Queensland.

The economic significance of the Queensland fishery was a GVP of $210.2M and flow-on of $184.5M, employment of 2,919 and flow-on 2,189 jobs, wages of $115.7M with flow-on $88.2M and value added of 344.9M with flow-on of $207M.

The value added to coastal regions, including the main port of each region were:

- Brisbane-Moreton regions ($131.8M) - Mooloolaba ($40.2M)
- Wide Bay region ($66.7M) - Bundaberg ($36.2M)
- Fitzroy region ($56.6M) - Gladstone ($42.6M)
- Mackay region ($38.7M) - Mackay ($26.3M)
- Northern region ($44M) - Townsville ($27.9M)
- North West/Far North regions ($110.2M) - Cairns ($46.4M).

6. Overall findings of the economic performance of the Queensland fishery

Based on the above findings, an overall assessment of the Queensland fishery limited entry fishery is that it is mature and showing signs of being an open access fishery with over fishing, over capitalisation, stagnant catch rates, low levels of 'profit' and low rates of return to capital well below the opportunity cost of capital @ 10%. If the 'hip pocket nerve' of fishers is ignored and the fleet remains without long term restructuring plans, based on a sound ESD fisheries management paradigm, then increasing conflict and decreasing profits will continue.

The high level of specialisation in all sectors with a profitable, diversified, small-scale fishing sector needs to be nurtured through an integrated approach to managing the various sectors and supported by regular studies, such as this project, to ensure that the difference within and between sectors are measured and applied under the ESD paradigm.

The economic performance indicators developed under this project, as described in Chapter 6 below, were used as input into the recent adjustment of the Queensland East Coast Otter Trawl Fishery (Taylor-Moore 2004). Results of the research could be used as part of measuring the achievement of the economic objectives of the Queensland fishery management plans developed after this study.

Objective 3:
Provide economic information relevant to the FRDC project 'A Framework for Valuing Fisheries Resource Use'.

This objective was achieved through Professor Tor Hundloe being Co investigator of this project who provided a theoretical underpinning of the research undertaken in this project through FRDC Project No.98/165. The project is a case study of the economic value of commercial resource use (Hundloe 2002).

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APPENDEX I: INTELLECTUAL PRPERTY

Not Applicable

APPENDIX 2: STAFF INVOLVED

The Economic Survey Project Team includes individuals with expertise in survey techniques, data analysis, economics, policy and extensive knowledge about current fisheries issues and practices, from within the DPI Queensland Fisheries Service

Principal Investigator
Dr Noel Taylor-Moore

Co-Investigators
Professor Tor Hundloe
Professor Rod Jensen

Data Analyst and Project Officers
Jeff Bibby
Wez Norris
Elisa Burger
John Dexter
Graeme Duckworth

Economists
Dr John Switala
Tracy Henderson

Field Officers
Amanda Hamilton
Rachel Mackenzie
George Sacagio

APPENDIX 3 DEFINITIONS

Information regarding the characteristics of the each boat was obtained from the QFS CFISH database and completed survey forms. The QFS CFISH database comprises base level information provided by commercial fishers via the compulsory logbooks system and their initial licence registration. Key data recorded in the CFISH database includes total catch (kg or basket numbers for scallops) per species on a daily basis for each individual boat. This database also details characteristics of each licensed boat (dimensions, licensed fishery type, etc). A number of technical terms, which are defined below, are used throughout this report to assist in describing and grouping key characteristics of fisher's and their fishing vessel/activities.

Beach Price
Beach price refers to the price received by commercial fishers at the "port level" for their catch, and is expressed in terms of $/kg or $/scallop basket. Processing costs are not accommodated within the beach price, as processing operations are assumed to occur further along the value chain. The use of beach prices also removes the effect of transfer pricing by the firm if it is vertically integrated into the value chain. Beach prices also value fish at the same stage in the value chain as recreational fishers: landed fish.

Boat
This is the primary fishing vessel assigned to a Licence Package, which is used for harvesting product. Some Licence Packages may have a specific number of tender vessels however these are not used as a primary vessel for fishing.

Boat Age
Boat age is the number of years since the initial construction of the primary boat hull (as recorded in the licence database). This number of years does not take into consideration any modifications which may have occurred at the will of the owner since the time of its construction (these modifications could be as major as a new wheel-house, motor, hull preservation or a major overhaul). Therefore the expected life of a boat could dramatically differ between fishers, fishery type, location of fishing activity, level of usage during the year and initial material used to build the primary hull. This report records boat age during 1997-98.

Boat Business Profit
Boat Business Profit (BBP) is defined as Boat Operating Surplus (BOS) less depreciation and imputed owner-operated and family labour costs, and is measured in 1997-98 dollar terms. BBP represents a more complete picture of the actual financial status of an individual firm, compared with BOS, which represents the cash in-cash out situation only.

Boat Capital
Boat capital includes several key capital items that are required by the licence package holder to achieving the TBCR. The individual components of boat capital includes: primary boat hull and permanent fixtures (without electronics or gear), electronics on board primary and tender boats, licence Package and other capital items such as value of tender vessels. Other capital items such as sheds, cold-rooms, and jetty/moorings are included in the definition of boat capital used within this study. Boat capital is measured in 1997-98 dollar terms, and was estimated by individual licence holders responding to the economic survey of Queensland fishers.

Boat Cash Income
Boat Cash Income (BCI) is defined as *Boat Operating Surplus less imputed wages for owner-operator and family contribution to the fishing firm*. BCI is an important profit indicator as it provides an estimate of the ability of the fishing firm to cover the costs of the owner-operator and that of family wages and the need for further finance.

Boat Economic Profit
Boat Economic Profit (BEP) is the net economic contribution of the fishing firm to the Queensland economy and takes into account all opportunity costs. Economic profit is defined *as BBP plus interest payments less the opportunity cost of boat capital (determined at 10%).*

Interest payments are not real costs as these are transfer payments. Another way of considering *BEP is BGM less TBFC (excluding interest payments) less imputed wages, depreciation, and opportunity cost of capital.* BEP is the contribution of the individual firm to the producer surplus of a particular sector and is also known as the net economic value (NEV) of the firm.

Boat Gross Margin
Boat Gross Margin (BGM) is defined as *Total Boat Cash Receipts less Total Boat Variable Cost* and is regarded as a basic form of profit which assumes that capital has no alternative use and that as fishing activity (days fished) varies there is no change in capital or fixed costs. BGM is the simplest form of 'profit' measure.

Boat Length
Boat length refers to the length of the primary vessel in metres. Categories that were used to represent the fleet by way of storage of catch and level of expenditure include: 0 to 10m; 10.1 to 14m; 14.1 to 18m; and 18.1m and over.

Boat Operating Surplus
Boat Operating Surplus (BOS) is defined as the difference between TBCR and TBCC and is expressed in 1997-98 dollar terms. BOS may be used interchangeably with the term Gross Boat Profit. A BOS value of zero represents a breakeven position for the firm, where TBCC equals TBCR. If BOS is a negative value the firm is operating at a cash loss and if positive the firm is making a cash profit. BOS does not include a value for owner/operator wages, unpaid family work, or depreciation.

Characteristics of a Fishing Firm
The fishing firm has a set of defining characteristics determined from licensing and logbook data. These include:

- Fishing sector (line, otter and beam trawl, net, general and spanner crab);
- the level of production (tonnes per species taken by trawl gear);
- level of fishing activity (total boat cash receipts);
- degree of specialisation (specialisation code);
- location of fishing firm (ABS Statistical Division/Port);
- size of fishing operation (boat length);
- fishing intensity (days fished); and
- fishing pattern (local/distant fishing activity).

Days Fished
Days fished (DF) refers to the sum of days fished for the 1997-98 year, as recorded in each individual fisher's compulsory logbook (CFISH). Days fished is an important variable influencing the scale or intensity of operations.

Depreciation
Depreciation refers to the annual reduction in the capital value of items due to general wear and tear or the reduction in value of an item over time, and is classified as a cost item. Depreciation is estimated for two key components of boat capital: boat and electronics (eg. sonar, GPS). Depreciation is calculated using the estimate of the 1997-98 market value of the capital item, multiplied by the appropriate prime cost depreciation percentage sourced from the Australian Taxation Office (ATO) (ATO, 1999). The appropriate depreciation percentage is dependent upon the life expectancy of the capital item. Capital items with greater life expectancy can be expected to depreciate at a reduced rate that capital items with a shorter life expectancy.

Fisher
A fisher is a person who owns a Licence Package and a boat. This person does not have to manage/operate the fishing boat.

Fishery

A fishery is the amalgamation of boats, area fished and product taken by gear specified in the fishing regulations. For example, the trawl fishery relates to trawlers using specified gear to take mainly prawns, scallops and other regulated product such as squid and bugs.

Fishery Symbol
A fishery symbol is an endorsement attached to the Licence Package detailing legal operations for each individual boat. These symbols detail which fishery and their different limitations, as defined in fisheries legislation, the owner of the Licence Package is legally allowed to operate within.

Fishing Firm
A fishing firm is the business entity that uses a Licence Package attached to a primary fishing boat to take wild fisheries resources from the fisheries managed under Queensland jurisdiction.

Fishing Sector
Fishing sector is different to a fishery. A sector is an artefact of the project. Fishing firms were allocated to a sector so that double counting did not arise as a result of the multiple fishing activities allowed under the Queensland Licence Package. For example, a net firm belongs to the net sector because under specialisation codes, derived by Taylor-Moore (1998), the firm was allocated to the net sector because the portion of TBCR was attributable to the use of net gear. Therefore the net sector comprises of firms that have taken most of the net product and have different levels of specialisation (Chapter 3).

Gross Returns Index
The Gross Returns Index (GRI) is derived through dividing TBCC by TBCR multiplied by 100. This index describes the relationship between Income and Expenditure for a firm and measures the cash return for $100 cash spent by the firm.

Gross Value of Production
Gross Value of Production (GVP) refers to the value of the total annual catch for the individual fisheries, fishing sectors or the fishing industry as a whole, and is measured in dollar ($) terms. GVP is the quantity of catch (kg or baskets) as sourced from the QFMA CFISH database for the 1997-98 year multiplied by the 1997-98 average monthly landed beach prices ($/kg or $/basket) sourced from both fishers and processors.

Home ports
All members of the Queensland Seafood Industry Association (QSIA) belong to one of 26 sub-branches, located along the coastline of Queensland. Firms not neatly fitting into the QSIA branch structure because the were located in other states were allocated a branch on a range of information taken from logbook data, licence data and from the survey forms (refer to Switala and Taylor-Moore 1999).

Hull Units
Hull units (HU) is a measurement of the size of each trawl fishing vessel, and is expressed in terms of "units". Under Section 29 (1) of the (Queensland) Fisheries Act 1994, Hull units are calculated through the following formula: HU = (L x B x D x 0.6)/2.83
Where:
HU means the number of hull units for the boat;
L means the length of the boat;
B means the beam of the boat;
D means the depth of the boat.[30]
[The figure of 0.6 represents a block coefficient to standardise variations in boat design and the figure of 2.83 represents a constant which converts cubic metres to units of 100 cubic feet.]

Latent Effort
Latent effort is defined as the opportunity cost of unused or under-utilised Fishery Symbols or Licence Packages and is measured as unrealised GVP (Taylor-Moore, 1998).

Licence Package
A Licence Package is an authority for a firm to fish in a specific fishery type and area with specific gear restrictions throughout Queensland waters, as issued by QFS. These Licence Package restrictions vary due to each package containing different Fishery Symbols. A Licence Package can have up to 10 different Fishery Symbols, thus allowing access to 10 different fisheries or fishery areas, the average is about 5).

Location of Fishing Firm
The location of a fishing firm is based on statistical regions as defined by the Australian Bureau of Statistics (ABS). These regions include several major fishing ports as identified by QSIA. Location codes do not mean areas fished but the ABS region within which the home town of the firm is located. The key statistical regions included in this report are listed in Table 2.2 and can be seen in Figure 2.1.

Table 2.2: Ports allocated to ABS Statistical Regions

Region	Fishing Ports Include
Far North	Karumba, Thursday Island, Port Douglas and Cairns
Northern	Innisfail, Lucinda, Townsville and Lower Burdekin.
Mackay	Bowen and Mackay
Fitzroy	Yeppoon, Rockhampton and Gladstone
Wide Bay Burnett	Bundaberg, Urangan, Maryborough and Tin Can Bay
Moreton	Tewantin, Mooloolaba and Southport
Brisbane	Scarborough, Sandgate, Brisbane, Wynnum, Redlands and Jumpinpin

Net Economic Return
Net Economic Return (NER) is the net economic contribution of the fishing industry to the Queensland economy and is the main measure of economic performance of a commercial fishery. Net Economic Return approximates Fishery Rent under certain assumptions (Rose and Stubbs, 1999 and 2000). Net Economic Return is defined *as the sum of Boat Economic Profit for the group, sample or population of businesses under consideration.* NER as a percentage of TBCR for each fishing sector or GVP for the fishery, is the main indicator for comparing different fisheries and other natural resource industries.

Opportunity Cost of Boat Capital
The opportunity cost of boat capital is the estimate of the alternative use of these resources in other economic activities. For this project it was 10% based on the long term bond rate (6.3%) plus a risk premium for fishing (3.7%) for 1997/98.

Opportunity Cost of Labour for Owner-operator and Family contribution to the Firm
Total labour costs were unable to be sourced from the information provided by respondents to the questionnaire, and a method of estimating imputed labour costs for the owner/operator and for family labour was required. The respondents of the survey were asked the amount of time was spent by the owner-operator and by family members in the fishing operations of the firm. The estimates of the wages that should have been paid to these people were based on the equivalents also given in the survey responses. However, because of the oversimplification of this process and the fact that imputed wages are an opportunity cost, and the problems of underemployment and unemployment across the coastal regions are different, a sensitivity analysis was undertaken varying these estimations.

Profit at Full Equity
Profit at Full Equity (PFE) represents the profitability of an individual licence holder, assuming the licence holder has full equity in the operation. In other words, there is no debt outstanding associated with the investment in boat capital. PFE is expressed in 1997-98 dollar terms and is calculated as BBP plus rent, interest and lease payments. PFE represents the return to economic resources expended in the business of commercial fishing and is the profit from fishing that would accrue to the owners if there were no debt outstanding on any of the capital expenditure items used in the business. PFE is a useful absolute measure of the economic performance of fishing firms.

Rate of Return to Capital

Rate of return to capital refers to the economic return to the investment made by firms in capital items, and is a useful relative measure of the performance of individual firms. The rate of return to capital is expressed in percentage terms, and is calculated for an individual licence package holder as profit at full equity divided by boat capital multiplied by 100. Rate of return to capital is useful to compare the performance of various licence package holders, and to compare the performance of trawl operators with other types of operators, and with other industries.

Rate of Return to Full Equity
Rate of Return to Capital is calculated on capital (catching operation only) as if all fishing assets were wholly owned by the owner so that the financial performance of all sample boats can be compared, regardless of the owner's equity in the fishing business. Rate of Return to Boat Capital is determined by expressing Profit at Full Equity as a percentage of Boat Capital (excluding licence value).

Specialisation
Specialisation is defined as the degree of dependence of a fishing operation (Licence Package) on the use of a number of Fishery Symbols (fisheries), and is broadly measured by the relationship between GVP earned by a Licence Package and a number of fisheries accessed by that Licence Package (Taylor-Moore, 1998).

Total Boat Cash Costs
Total Boat Cash Costs (TBCC) is the sum of TBFC and TBVC, expressed in 1997-98 dollar terms. TBCC represents the total cash expenditure incurred by individual licence holders in 1997-98.

Total Boat Cash Receipts
Total Boat Cash Receipts (TBCR) refers to the income received by an individual firm and is expressed in dollar terms. TBCR is calculated as catch (kg) multiplied by 'beach price' ($/kg). TBCR is the income of an individual licence package holder without taking into consideration costs associated with freight and selling charges and on-shore processing. TBCR is the contribution of an individual licence package holder to the GVP of a fishing sector, fishery or industry.

Total Boat Fixed Costs
Total Boat Fixed Costs (TBFC) is defined as costs that remain fixed regardless of the level of production or output of the individual licence holder. TBFC are independent of the level of production, and remain relatively constant from one year to the next. TBFC are measured in 1997-98 dollar terms. TBFC includes the following individual cost items incurred by the licence package holder within the 1997-98 year:

- leasing costs- (boat, licence, sheds/jetty/cold-room, on-board processing/packing equipment, office equipment),
- office consumables (eg. fax paper, pens, note books etc)
- electricity,
- communications (eg. telephone/fax bills, postage etc)
- motor vehicle registration fees,
- banking charges including transaction costs, etc,
- overdraft interest, interest on loan repayments
- port/jetty/harbour/permit charges including marina/mooring fees,
- licence and industry fees (eg. QFMA, QCFO),
- insurance costs "exclude workers' compensation"
- other boat fees (eg. Survey)
- meetings, conferences
- other fixed expenses (eg. accountancy fees).

Total Boat Variable Costs
Total Boat Variable Costs (TBVC) are dependent upon the level of production. As production increases, TBVC also increases. TBVC are measured in 1997-98 dollar terms and include the following individual cost items:

- fuel, oil and grease for the boat (net of diesel fuel rebate),
- gas (LPG) for boat,
- bait,
- ice,
- chemicals,
- packaging material, paper/cardboard bags/boxes and plastic,
- food for crew,
- labour cash payments (actual)
- fishing equipment, purchase and repairs (eg, nets, pots, lines, etc)
- repairs & maintenance: ongoing (slipping, painting, overhaul motor)
- motor vehicle expenses related to fishing (fuel, oil, tyres, repairs and maintenance)
- marketing (freight/commission etc).

QUEENSLAND GOVERNMENT

DPI QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES

Economic Survey of Commercial Fishers Queensland 1997/98

Survey Form No. 2

This survey is voluntary

Your cooperation in completing this questionnaire is sought so that decisions made will be based on reliable information.

Confidentiality

This version of the survey will ensure that you cannot be identified. The changes were made following requests from a large number of commercial fishers. No individual or business will be able to be identified in any reports based on this survey. All questionnaires will be destroyed.

Due Date

Please return the completed questionnaire in the reply paid envelope by **17 May 1999**.

Reporting Period

If the period covered by this form is not for the full 12 months of 1997/98, please indicate the period covered and explain why.

. . . . . .

Notes

- The questions in this survey relate to all fishing activities that occurred on the boat (excluding on-shore processing activities) for the financial year 1997/98.
- This survey form relates only to one Licence Package/Boat Mark. If you have more than one Licence Package/Boat Mark, then you need to fill in a separate survey form for each (if you have not received enough survey forms, please contact us).
- If exact figures are not available, please provide careful estimates.

Help Available

If you have problems in completing this form, please contact the Economic Survey Team by:

Telephone – 1800 501518 **Email - switalj@dpi.qld.gov.au**
Facsimile – (07) 3229 8146
Mail – GPO Box 3129, Brisbane, Qld, 4001

PART A General Information

General information regarding the owner of the Licence Package.

1 Is the Licence Package owned by: (*Please tick one box.*)

Sole Proprietor ☐ Inc. Private Company ☐ Trust ☐

Business Partnership ☐ Inc. Public Company ☐ ▶ Go to 7 Other (*please specify*) ☐

. . . . . .

In the case of partnerships, please complete this section in relation to the senior or active partner.

2 Age (in years) of Licence Package owner? (*Please tick one box.*)

Under 20 ☐
20 - 29 ☐
30 - 39 ☐
40 - 49 ☐
50 - 59 ☐
60 - 69 ☐
70 and over ☐

3 Number of years owner involved in the commercial fishing industry?

In total ☐☐ years As a skipper (if applicable) ☐☐ years

4 In 1997/98, approximately how many months/weeks (including time spent on repairs, maintenance, office work, etc.) did the owner personally spend on <u>this</u> commercial fishing operation?

☐☐ months ☐☐ weeks

5 In 1997/98, did the owner spend any time working on any other commercial fishing operations?

Yes ☐ No ☐ ▶ Go to 7

6 In 1997/98, approximately how many months/weeks did the owner personally spend working on other commercial fishing operations?

☐☐ months ☐☐ weeks

General details regarding the fishing boat, main fisheries and the Licence Package.

7 What is the length (in metres) of your primary boat? (*Please tick one box.*)

0 - 10 ☐
10.1 - 14 ☐
14.1 - 18 ☐
18.1 + ☐

8 What is the age (in years) of your primary boat? (*Please tick one box.*)

- 0 - 5 ☐
- 6 - 10 ☐
- 11 - 15 ☐
- 16 - 20 ☐
- 21 - 25 ☐
- 26+ ☐

9 What are the main fisheries on your Licence Package? (*Please tick appropriate boxes.*)

- Trawl ☐
- Crab ☐
- Line ☐
- Net ☐
- Spanner crab ☐
- Harvest species ☐

10 Please tick one box to indicate in which region your home port is located

- Far North (QCFO Branches 1-4) ☐
- Northern (QCFO Branches 5-8) ☐
- Mackay (QCFO Branches 9-10) ☐
- Fitzroy (QCFO Branches 11-13) ☐
- Wide Bay Burnett (QCFO Branches 14-17) ☐
- Moreton (QCFO Branches 18,19,26) ☐
- Brisbane (QCFO Branches 20-25) ☐

11 What is your home port ☐ . . . . . .

12 How many fisheries (trawl, crab, line, harvest, etc.) did you participate in during 1997/98? (*Please tick one box.*)

- 1 ☐
- 2 ☐
- 3 ☐
- 4 or more ☐

13 Over the last 10 years, has the number of fisheries you have been fishing in: (*Please tick one box.*) *(If you have owned this Licence Package for less than 10 years, please comment for the time you have owned it.)*

- Increased ☐
- Stayed the same ☐
- Decreased ☐

14 Please enter the number of years that you have owned this Licence Package

☐☐ years

15 What is the number of days fished in all fisheries during 1997/98? (*Please tick one box.*)

0 - 10 ☐
11 - 20 ☐
21 - 50 ☐
51 - 100 ☐
101 - 150 ☐
151 - 200 ☐
201 - 250 ☐
251+ ☐
Not applicable ☐

The importance of fishing to your livelihood.

16 What percentage of the total gross income for 1997/98 for you and your spouse/defacto/partner is earned from the fishing operations of this Licence Package (excluding on-shore processing)? (*Please tick one box.*)

Up to 20% ☐
20 to 39% ☐
40 to 59% ☐
60 to 79% ☐
80 to 99% ☐
100% ☐

17 What is the approximate 'beach price' value of the sale of your catch from the operation of this Licence Package during 1997/98?

$ _____

18 Over the last 10 years, has the 'beach price' value of the sale of your catch: (*Please tick one box.*) *(If you have owned this Licence Package for less than 10 years, please comment for the time you have owned it.)*

Increased? ☐
Stayed the same? ☐
Decreased? ☐

General information regarding family participation in the fishing operation.

19 Please provide details of unpaid assistance supplied by family members during 1997/98.

	Amount of assistance in weeks
Family member 1	
Family member 2	
Family member 3	

Disposal of catch.

20 For each relevant main fishery, please write the town of the buyer and tick the box/boxes to indicate the type of buyer.

Finfish

Town of buyer	Type of buyer: Processor	Type of buyer: Other buyer
	☐	☐
	☐	☐
	☐	☐
	☐	☐

Prawns

Town of buyer	Type of buyer: Processor	Type of buyer: Other buyer
	☐	☐
	☐	☐
	☐	☐
	☐	☐

Crabs

Town of buyer	Type of buyer: Processor	Type of buyer: Other buyer
	☐	☐
	☐	☐
	☐	☐
	☐	☐

Scallops

Town of buyer	Type of buyer: Processor	Type of buyer: Other buyer
	☐	☐
	☐	☐
	☐	☐
	☐	☐

Harvest species (e.g. Trochus, bait worms, marine aquarium fish, etc.)

Town of buyer	Type of buyer: Processor	Type of buyer: Other buyer
	☐	☐
	☐	☐
	☐	☐
	☐	☐

21 To what extent do you process your catch <u>on board</u>? (*Please tick relevant boxes.)*

	Finfish	Prawns	Crabs	Scallops	Harvest species
Chill/ice … … … …	☐	☐	☐	☐	☐
Freeze … … … …	☐	☐	☐	☐	☐
Clean … … … … …	☐	☐	☐	☐	☐
Fillet … … … … …	☐	☐	☐	☐	☐
Grade … … … …	☐	☐	☐	☐	☐
Pack … … … … …	☐	☐	☐	☐	☐
Cook … … … … …	☐	☐	☐	☐	☐
Not processed (live)	☐	☐	☐	☐	☐
Not processed at all	☐	☐	☐	☐	☐

22 Do you process your catch <u>on shore</u>?

Yes ☐
No ☐▶ Go to **24**

23 To what extent do you process your catch <u>on shore</u>? (*Please tick relevant boxes.*)

	Finfish	Prawns	Crabs	Scallops	Harvest species
Chill/ice … … … …	☐	☐	☐	☐	☐
Freeze … … … …	☐	☐	☐	☐	☐
Clean … … … … …	☐	☐	☐	☐	☐
Fillet … … … … …	☐	☐	☐	☐	☐
Grade … … … …	☐	☐	☐	☐	☐
Pack … … … … …	☐	☐	☐	☐	☐
Cook … … … … …	☐	☐	☐	☐	☐
Shuck … … … …	☐	☐	☐	☐	☐
Not processed (live)	☐	☐	☐	☐	☐

Capital invested in your fishing business as at 30 June 1998.

24 For each of the following components of your fishing business, please indicate your estimated market values or insurance valuations in the spaces provided:

Licence Package (broker's estimate) ... $

Primary boat hull and permanent fixtures including motors (without electronics or gear) ... $

Electronics on board primary and tender boats ... $

Number of tender boats ...

Total value of tender boats ... $

Jetty/berth/mooring ... $

Sheds ... $

Coldrooms/freezers/ice boxes and packaging equipment on boat ... $

Coldrooms/freezers - on shore ... $

Packaging equipment - on shore ... $

Trailers ... $

Tractors ... $

Trawl gear ... $

Net gear ... $

Crab gear ... $

Line gear ... $

Other (*please specify*) ... $

Vehicle 1 Model and year (e.g. 4WD ute/truck/station wagon 1995) .....

Estimated market value ... $

Percentage of use in your fishing business (use approximate mileage attributable to that business) %

Vehicle 2 Model and year (e.g. 4WD ute/truck/station wagon 1995) .....

Estimated market value ... $

Percentage of use in your fishing business (use approximate mileage attributable to that business) %

25 What is the estimated level of debt at 30 June 1998 associated with the fishing operations of this licence package? ***If no debt, please write "Nil" in the box.***

$ ☐

26 What is the estimated number of working years left for the primary boat as a commercial fishing boat?

☐☐ years

Licence Packages and/or Fishery Symbols issued in Queensland

27 Would you offer your Licence Package to a voluntary buy back scheme? ***(Please tick box/boxes.)***

Yes ☐ **Why?**
No ☐

- Financial reasons ☐
- Fishery stock reasons ☐
- Fishery management reasons ☐
- Lifestyle matters ☐
- Other (*please specify*) ☐

28 Is the number of Licence Packages issued in Queensland? ***(Please tick box.)***

Not enough ☐ Enough ☐ Too many ☐

29 For a voluntary buy back scheme, what set price would you accept for any of the following symbols for which you are endorsed and would be prepared to sell?

Symbol	
N1	$
N2	$
N3	$
K1-8	$
L1	$
L2	$
L3	$
T1	$ per hull unit
T2	$
T5-9	$
C1	$
C2-6	$

Upgrading or replacing your boat.

30 What is the most important factor that would influence you to upgrade or replace your boat if you had the opportunity. (*Please tick <u>one</u> box.*)

- Improve efficiency (reduce input costs) ☐
- Increase capacity (catch and storage) ☐
- Allow for on-board processing/packaging ☐
- Allow for access to other fisheries ☐
- Safety and comfort ☐
- No need to upgrade ☐
- Other (*please specify*). . . . . ☐

31 What is the most important factor that would deter you in upgrading or replacing your boat if you had the opportunity. (*Please tick <u>one</u> box.*)

- Financial reasons ☐
- Current boat replacement policy ☐
- Restrictions on boat length ☐
- Perceived future fishery stock ☐
- Current and/or perceived future fishery management ☐
- Lifestyle ☐
- No need to upgrade ☐
- Other (*please specify*). . . . . ☐

32 Please indicate when you intend upgrading or replacing your boat. (*Please tick <u>one</u> box.*)

- Less than 4 years ☐
- In 4 - 6 years ☐
- In 7 - 10 years ☐
- Greater than 10 years ☐
- Never ☐

Your view on matters which could affect the long term viability of your fishing business.

33 Could you please indicate your view on each of the following statements by circling a number between 1 and 5

Statement	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Queensland's Fisheries are well managed.	1	2	3	4	5
The current system of multiple Fishery Symbols (endorsements) is in the best interests of my fishing operation.	1	2	3	4	5
Industry should contribute to an industry agreed voluntary buy-back scheme.	1	2	3	4	5
Conservationists and/or conservation agencies have too much influence in the management of Queensland fisheries.	1	2	3	4	5
Protection of breeding grounds will benefit my fishing operation.	1	2	3	4	5
Marine parks are an essential part of managing marine resources.	1	2	3	4	5
Conservation of marine fisheries resources will benefit the fishing industry.	1	2	3	4	5
The fishing industry is seen as important to the Queensland community.	1	2	3	4	5
Fishing is seen by the community as friendly to the environment.	1	2	3	4	5
The way Native Title issue is being handled is a benefit to my fishing operation.	1	2	3	4	5
Information from other fishers is critical to improve my fishing operation.	1	2	3	4	5
The management planning process is too slow.	1	2	3	4	5
The current fisheries management planning process (discussion papers, option papers and draft management plans) will lead to better opportunities for my fishing operation.	1	2	3	4	5
Management Advisory Committees (eg TRAWLMAC, CRABMAC, REEFMAC, etc) will lead to the long-term survival of my fishing operation.	1	2	3	4	5
The current system of fishing rights gives me the long-term security I need for my fishing operation.	1	2	3	4	5
My views about managing Queensland fisheries are being heard.	1	2	3	4	5
Feedback I obtain from buyers about my product is adequate.	1	2	3	4	5

Your view on factors which influence your fishing activities.

34 Please indicate whether the following statements apply to your fishing activities by ticking the box. For this question, a fishery is for example, a barramundi fishery, banana prawn fishery, mud crab fishery, mullet fishery, live coral trout fishery, etc.

Statement	
I switch from one fishery to another based on my knowledge of the availability of the fish.	Yes ☐ No ☐
I switch from one fishery to another based on the price I can get for the fish.	Yes ☐ No ☐
I switch from one fishery to another based on the need for a given level of income for each day fished.	Yes ☐ No ☐
I switch from one location (site) to another because I need to get a given level of catch.	Yes ☐ No ☐
I switch from one fishery to another based on my daily fishing costs.	Yes ☐ No ☐
I switch from one fishery to another based on profits.	Yes ☐ No ☐

Your view on the Queensland Fishing Industry.

35 What would increase your earning potential the most? (*Please tick <u>one</u> box.*)

Increased 'beach prices' ... ☐
Expanding markets for your catch ... ☐
Value adding to product caught ... ☐
Diversifying into other fisheries ... ☐
Upgrading your boat ... ☐
Upgrading your electronics ... ☐
A voluntary buy back scheme ... ☐
Other (*please specify*) ... ☐

36 What best describes your outlook on commercial fishing in the future? (*Please tick <u>one</u> box.*)

Very positive ... ☐
Positive ... ☐
Neutral ... ☐
Fearful ... ☐
Very fearful ... ☐

37 Since you have been fishing with this Licence Package, has your number of crew

Increased? ... ☐
Stayed the same? ... ☐
Decreased? ... ☐

38 How many more years do you see yourself staying in the commercial fishing industry?

0 - 5 ... ☐
6 - 10 ... ☐
11 - 15 ... ☐
16 - 20 ... ☐
21+ ... ☐

39 Who/What do you consider the greatest threat to your staying in commercial fishing? (*Please tick <u>one</u> box.*)

I see no great threats ... ☐
Environmental impacts ... ☐
Recreational fishers ... ☐
Over fishing/over capitalisation of fleet ☐
Competition in the market ... ☐
Fisheries management ... ☐
Other (*please specify*)
. . . . . ☐

40 Do you intend to pass this Licence Package onto your children?

Yes ☐ No ☐ Not applicable ☐

Labour costs 1997/98

Show costs for 1997/98 of employing crew and other workers engaged in the fishing operation.

41 Employee payments 1997/98

Show gross payments before tax. Include salaries, wages, profit sharing, bonuses, etc.

Note: Home town refers to the town in which the employee lives. For those who have no fixed residence, enter the town in which they spend most of their time or money.

Employee	Gross Payments	No of weeks employed	Home town of employee
Employee 1	$		
Employee 2	$		
Employee 3	$		
Employee 4	$		
Employee 5	$		
Employee 6	$		
Employee 7	$		
Employee 8	$		
Employee 9	$		
Employee 10	$		
Employee 11	$		
Employee 12	$		
Employee 13	$		
Employee 14	$		

42 Total other labour costs 1997/98

Payroll tax	$
Workers' compensation	$
Employer contributions to superannuation funds	$
Fringe benefits tax	$
Employee transportation costs	$
Employee training	$
Other *(please specify)*	$

Estimated expenditure for t e catching operation of your ishing business - 1997/98

43 Please provide the <u>estimated total expenses</u> for each of the listed types of expenditure. Indicate the town in which the expense was incurred (if you purchase from a mothership at sea, indicate the town in which the mothership is based). If more than one place, please <u>estimate</u> the approximate proportion of expenses incurred in each place as a percentage of total expenses for that item.

Type of expenditure	Estimated Total Expenses 1997/98	The town and the approximate proportion of expenses incurred in each town.			
		e.g. Cairns	e.g. Port Douglas		
Fuel, oil and grease for boat (net of diesel fuel rebate)	$	%	%	%	%
Gas (LPG) for boat	$	%	%	%	%
Bait	$	%	%	%	%
Ice	$	%	%	%	%
Chemicals (e.g. meta, chlorine, bleach, acids, etc.)	$	%	%	%	%
Electricity	$	%	%	%	%
Packaging material - paper/cardboard bags/boxes	$	%	%	%	%
- plastic bags	$	%	%	%	%
Food for crew	$	%	%	%	%
Repairs & maintenance to vessel - ongoing (e.g. slipping, painting, overhaul motor)	$	%	%	%	%
- one-off major capital items (e.g new wheelhouse)	$	%	%	%	%
Purchase major items boat - electronic (e.g. sonar, etc.)	$	%	%	%	%
- mechanical (e.g. winches, engines)	$	%	%	%	%
Fishing equipment, purchase and repairs (e.g. nets, pots, lines, etc.)	$	%	%	%	%

43 Continued

Leasing costs - boat	$	%	%	%	%
- licence	$	%	%	%	%
- sheds/jetty/coldroom	$	%	%	%	%
- on-board processing/packing equipment	$	%	%	%	%
- office equipment	$	%	%	%	%
Office consumables (e.g. fax paper, pens, note books, etc.)	$	%	%	%	%
Communications (e.g. telephone/fax bills, postage etc.)	$	%	%	%	%
Motor vehicle running expenses related to fishing - fuel, oil, tyres	$	%	%	%	%
- repairs and maintenance	$	%	%	%	%
- registration	$	%	%	%	%
Marketing (freight/commission, etc.)	$	%	%	%	%
Banking charges including transactions costs, etc	$	%	%	%	%
Overdraft interest, interest on loan repayments	$	%	%	%	%
Port/jetty/harbour/permit charges including marina/mooring fees	$	%	%	%	%
Licence and industry fees (e.g. QFMA, QCFO)	$				
Insurance costs (exclude workers' compensation)	$	%	%	%	%
Other boat fees (e.g. Survey)	$	%	%	%	%
Meetings, conferences, etc.	$	%	%	%	%
Other expenses (please specify)	$	%	%	%	%

Catch details - Trawl Operators

44 **Trawl Operators: Please provide details of your catch (in kg) during 1997/98.**

Species	Month											
	July	August	September	October	November	December	January	February	March	April	May	June
Prawn - Banana												
Prawn - Bay												
Prawn - Endeavour												
Prawn - Greasy												
Prawn - King												
Prawn - Tiger												
Scallops (*please specify whether baskets or kg*).												
Squid												
Whiting - Stout												
Whiting - Winter												
Coral Trout												
Reef Fish A												
Red Throat Emperor												
Crab - Blue Swimmer												
All other species												

Catch details - Net, Line, Crab Operators

45 Net, Line, Crab Operators: **Please provide details of your catch (in kg) during 1997/98.**

Species	Month											
	July	August	September	October	November	December	January	February	March	April	May	June
Barrumundi												
Bream - Silver & Pikey												
Coral Trout - Live												
- Dead												
Red Emperor - Live												
- Dead												
Red Throat Emperor												
Flathead												
Garfish												
Mackerel - Grey												
Mackerel - Spanish												
Mackerel - Spotted												
Mackerel - School												
Mullet												
Reef Fish A												
Reef Fish B												
Shark												

45 Continued

Species	Month											
	July	August	September	October	November	December	January	February	March	April	May	June
Snapper												
Tailor												
Threadfin - Blue Salmon												
Threadfin - King Salmon												
Whiting - Summer												
Whiting - Winter												
Crab - Blue Swimmer												
Crab - Mud												
Crab - Spanner												
All other species												

46 What are the <u>three</u> most important changes required to ensure the long term viability of your fishing business.

1 . . . . . .

2 . . . . . .

3 . . . . . .

Thank you for your assistance

Appendix 2. Fishery symbols issued to primary boats

Symbol	Fishery
C1	Crab Fishery (Other than spanner crab)
C2	Spanner Crab (Area A and B)
C3	Spanner Crab (Area B)
C4	Spanner Crab (Area A) South 25°
C5	Spanner Crab (Area A) South 25°
C6	Spanner Crab (Area B and Area A north of 25° south)
L1	Line Fishery (Outside GBR)
L2	Line Fishery (GBR) (use more than 1 tender vessel if licensed before 1993)
L3	Line Fishery (GBR) (1 tender vessel)
L4	Line Fishery (QFJA - 25nm out from shore in GOC)
L5	Line Fishery (QFJA - 3nm out from shore in GOC)
L6	Line Fishery (South Queensland)
L7	Line Fishery (South Queensland)
L8	Line Fishery Multiple-hook (East Coast) (developmental)
L9	Line Fishery (Multiple Hook - QFJA)
N1	Net Fishery East Coast (everything other than barra; seine and ring)
N2	Net Fishery East Coast Set Mesh Net (Barra)
N3	Net Fishery Gulf of Carpentaria
K1	Net Fishery (Ocean Beach- Area 1) NSW boarder bottom South Stradbroke
K2	Net Fishery (Ocean Beach- Area 2) to north South Stradbroke
K3	Net Fishery (Ocean Beach- Area 3) to north Stradbroke
K4	Net Fishery (Ocean Beach- Area 4) to northern tip Moreton Island
K5	Net Fishery (Ocean Beach- Area 5) western side of Bribie Island
K6	Net Fishery (Ocean Beach- Area 6) Caloundra to Point Cartright
K7	Net Fishery (Ocean Beach- Area 7) to eastern tip of Noosa Heads
K8	Net Fishery (Ocean Beach- Area 8) to northern tip of Fraser Island
N5	Net Fishery (Baffle Creek to Kauri Creek)
N6	Net Fishery (Bait – GOC and East Coast) cast, mesh, seine
N7	Net Fishery (Bait – GOC and East Coast) any fish other than barra (mesh, seine)
N8	Net Fishery East Coast
T1	East Coast Trawl (Prawn/Scallop)
T2	East Coast Trawl (Prawn/Scallop concessional zone)
T3	East Coast Trawl (Offshore beam -Prawn)
T4	Trawl Fishery (Fin Fish-red spot and stout whiting)
T5	Beam Trawl (River and Inshore-area 1 prawn) Double Is. Point South
T6	Beam Trawl (River and Inshore-area 2 prawn) Double Is. to Burrum River
T7	Beam Trawl (River and Inshore-area 3 prawn) Burrum River to Richards Point
T8	Beam Trawl (River and Inshore-area 4 prawn) Richards Point to Reef Point
T9	Beam Trawl (River and Inshore-area 5 prawn) Reef Point and Cape York