Fisheries Economic Data

A draft scoping paper prepared by Professor Tor Hundloe
for the Fisheries Research & Development Corporation
Project No. 95/132

FISHERIES
RESEARCH &
DEVELOPMENT
CORPORATION

VALUE OF FISH PRODUCTION BY MAJOR CATEGORY

	1992-93 $million	1993-94 $million	1994-95 $million
Rock lobster	348	429	435
Other fish	325	354	363
Prawns	282	315	329
Abalone	122	178	149
Pearls	120	130	206
Tuna	119	114	116
Scallops	96	71	51
Oysters	47	50	42
Other crustaceans	26	37	37
Other molluscs	16	16	17
Total fish	**1501**	**1694**	**1745**

DRAFT SCOPING PAPER

For discussion

Fisheries Economic Data

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List of Contents

Foreword

At present, the fishing industry is very poorly served in terms of the availability of reliable economic data.

If managers are going to get management decisions right (on such matters as restructuring, resource-sharing and cost-recovery), they need current economic information. And fishers have to be convinced it is accurate.

If fishers (and/or their financiers) are going to continue to invest in the industry, and feel confident about the industry's future, they are going to need good and timely economic information. The same applies to aquaculturists.

If processors, boat-builders and a range of other people and industries reliant on the health and wealth of the industry are to make sound investments, they need access to good economic data.

If national decisions are to be made on resource-sharing between commercial and recreational fisheries, or on coastal developments which could adversely impact on fishing, data which allows "apples to apples" comparisons are needed.

The need for better, timely and cost-effective economic data clearly exists.

At the moment a statistical series is published (*Australian Fisheries Statistics*). The concept of the series is good but serious questions have been asked about the accuracy of some of the information. Furthermore, much of the data are too aggregated to be used on a fishery or regional level. Work is presently underway to suggest how the data can be improved, particularly with regard to price data.

For the Commonwealth fisheries there is a program of cost and earnings surveys. They have the potential to be the basis for a worthwhile time-series by which certain changes can be benchmarked. However, this series only gathers particular types of economic information and a greater scope of information is required.

There are no regularly-gathered data on costs and earnings for State/Territory fisheries. This is a major gap in our knowledge of the performance of the nation's fisheries.

Except for the occasional *ad hoc* study, there is no information on the regional (or home port) economic impact of fishing and its flow-on to other industries. These flow-ons in terms of jobs, wages, salaries and profits to other industries can be significant. And they can be influenced by what managers do in restructuring the catching sector.

There is very little in the way of comprehensive data on aquaculture. Comprehensive information on seafood consumption only becomes available on an *ad hoc* basis.

Overall, the gaps are numerous. They are important. And they are a obstacle to the successful future of fishing. This report is a *scoping study* aimed to facilitate informed discussions - and decisions - on how to work to improve the position. Reaction to this report, and follow-up action, needs to be immediate.

About This Scoping Paper

The Fisheries Research and Development Corporation has requested that Professor Tor Hundloe (concurrently the Director of the Technology Management Centre, The University of Queensland and Commissioner, Industry Commissioner) prepare a *scoping paper* on options to gather, analyse and present *economic data of relevance to the fishing industry.*

In formulating options, the author has been asked to consider the usefulness of economic data, the feasibility of gathering it, the cost involved and who should pay for certain types of data.

This is the *draft report* - covering the *first phase* - of the scoping study. It is being forwarded to all stakeholders for comment and detailed responses (see ***How to Respond to This Scoping Paper***).

A final report will be presented to the Fisheries Research and Development Corporation at the end of July, 1996.

This *draft report* has been prepared on the basis of discussions, interviews and visits by Professor Hundloe. Over the past few weeks Professor Hundloe has met with representatives of: ABARE, AFMA, ASIC, and a number of State/Territory commercial fishing organisations, a number of State/Territory fisheries managers; the National Executive Director of The Australian Recreational and Sport Fishing Confederation Inc., other recreational fishing experts, and the Executive Director of FRDC and some Board Members. A range of stakeholders in the States/Territories have been contacted by telephone and/or facsimile. However, in the time available it has not been possible to contact all stakeholders. They, of course, will be involved from this point on.

How to Respond to This Scoping Paper

This *scoping paper* is being provided to all stakeholders, including fishing industry organisations, managers at Commonwealth and State/Territory levels, relevant research institutions, representatives of recreational fishers, aquaculturists and processors.

Section Three of the paper presents *options* - for discussions, refinement and decisions. Stakeholders are asked to assess the options and, if need be, suggest modifications. But, ultimately, they need to indicate what options (or modified options) they agree with *in principle.*

Stakeholders are requested to respond with sufficient detail (which could cover such matters as the type of economic information needed and the means of obtaining it, how should it be gathered and who should pay) to allow this scoping study to be developed further.

Your response should be directed to Mr Peter Dundas-Smith, Executive Director, Fisheries Research and Development Corporation, PO Box 222, Deakin West, ACT 2600.

Your response needs to be received by the end of June 1996, if it is to be taken into account for the preparation of the final report.

After the receipt of responses to this scoping paper, there will be a **national workshop** in Canberra, involving representatives of stakeholders. Following the workshop Professor Tor Hundloe will prepare a *final report* for consideration by the Fisheries Research and Development Corporation. This will be provided by the end of July, 1996.

While it is necessary that responses be in writing, stakeholders are certainly free to contact Professor Hundloe by telephone on one or the other of the following numbers: 07 3365 3922 or 06 240 3204.

Professor Hundloe is concurrently Director of the Technology Management Centre, The University of Queensland and Commissioner, Industry Commission, Canberra. He is also an Adjunct Professor in the Faculty of Resource Science and Management, Southern Cross University.

SECTION 1: THE FISHING INDUSTRY'S NEED FOR ECONOMIC DATA

Background

The objective of this preliminary review is to make recommendations as to the usefulness, feasibility, cost and payment for an Annual Economic Review of the Fishing Industry[1], and for other regular economic updates (eg. quarterly reports).

To comprehend the need for economic data and reports, the starting point is an analogy with every-day life. At the very basic level, sensible housekeeping requires that a house-owner keeps an up-to-date record of the value of the house and land, the cost of repairs and maintenance, and money spent on food etc. each week. A home-owner is, obviously, just as much interested in the income coming into the household. The analogy for the fisher is the sale of product and changes in demand and price.

Just as the home-owner needs certain economic information so that sensible decisions can be made, so do governments which supply services to the home-owner. For a range of reasons, such as the need to provide and maintain roads, power, etc, governments need up-to-date information on housing commencements and values, spending on electricity and water, etc.

What house-owners and relevant public bodies do in keeping good economic records is what fishers and management agencies should do for similar essential house-keeping functions, as well as for long term planning.

Individual fishers, fishing companies and aquaculture producers do keep good records of their catches/harvests and of the costs associated with taking fish. They do this for two reasons. The first is to ensure they can make sound business decisions. The second is that profit and loss (or cost and earnings) data are required for taxation purposes; and log-book data are required by management agencies. Log-book data are also a useful historical record for fishers.

Given that very large numbers of individual economic records are kept (mainly by fishers, fishing companies and processing firms), the major task involving in providing a source of economic information which is a benefit to *all* parties is to bring this available information together and present it in forms which best suit the needs of the various groups.

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1 The term *fishing industry* includes any industry or activity carried on in or from Australia concerned with: taking, culturing, processing, preserving, storing, transporting, marketing, or selling fish or fish products. The fishing industry comprises the recreational, commercial and Aboriginal and Torres Strait Island sectors. The *commercial sector* - which for practical reasons includes the pearling sector - is also referred to as the seafood industry (FRDC). By confining the industry to these groups/activities does not mean that the large range of associated industries are neglected in an economic description and analysis of the industry. The interdependencies, whether with boat-builders, restaurants or insurance agents is captured as "flow-ons" in certain types of analyses in which multipliers are calculated.

The way such information is gathered from fishers and other relevant parties, how much of it is gathered and how it is aggregated are matters that can be best answered by thinking about who is going to use the information and for what purposes.

What Economic Information Does the Individual Commercial Fisher Need and Record?

A commercial fisher will record all the information needed to run the business successfully. Even though some of the information (log-book data and profit and loss statements) are required by governments, the fisher is likely to have a private financial incentive to gather and keep such information.

A fisher's annual profit and loss statement is likely to contain information on the items listed in Table 1. There will be slight differences, depending on the individual circumstances of the fisher or his/her accountant.

Table 1: Types of Economic Information in a Profit and Loss Statement

Earnings/Revenue/Receipts	Costs/Expenditure
• sales of fish	• fuel
• other income (eg. charters)	• boat repairs and maintenance
	• gear replacement and repairs
	• boat insurance
	• harbour dues and licences
	• commissions
	• freight and cartage
	• crew payments
	• food
	• bait
	• vehicle cost
	• accounting fees
	• banking fees
	• travel
	• subscriptions
	• rates and local gov. taxes
	• rental and hire
	• packing
	• depreciation
	• miscellaneous

In addition to the flow of earnings and costs per year (as illustrated in Table 1), fishers will keep a detailed depreciation schedule – if for no other reason than it is required for taxation purposes. This will record the date of purchase of the boat, its purchase price, new capital additions and depreciated value. A fisher is also likely to have a reasonable idea of the present market value of his/her boat; and he/she is likely to have some idea of

what it would cost to replace it. All these types of data are needed by the fisher if he/she is to fish as a *business*.

There is one other valuable item a fisher will own and that is either a government issued quota, a limited entry licence or other authority which is a statutory right to fish in a certain fishery. Fishers will know what the historic cost of such as well as its present price/value. If tradeable there will be a market value for the fishing right.

The other useful information individual fishers have is on employment of skippers and crew. They will know how many crew are engaged and for what period of the year.

The economic information recorded in a profit and loss statement and depreciation schedule is aggregated data for the last financial year's operation. Due to its aggregation much potentially useful or interesting information is not recorded in these once-a-year statements. Nevertheless, individual fishers or fishing companies have the detailed data on which the aggregates are built. For example, the detailed data are likely to include quantity of fish and prices received per trip per species; and who supplied items such as fuel or did boat repairs (which means the location of the supplier is known). From an individual fisher's perspective some – maybe all – of this detailed information is relevant in making *future* decisions on such matters as where to fish, what species to target, or who to get to supply fuel. Detailed records would be held. In the case of log-book data, copies go to management agencies. With regard to outgoings (expenditure), receipts would be kept for some years, in case a need to verify such to the tax authority arises. The relevance of this detailed information base will be made clear later.

While the above discussion has been in terms of capture (wild) fisheries, much the same applies to aquaculture (except of course, there is no need for traditional log-books). However, it should be noted that certain types of aquaculture are basically farming activities and are discussed under a separate heading.

Clearly, fishers gather and keep a wealth of valuable economic information. An issue which is sometimes raised is whether or not the data are reliable, particular data supplied to the taxation authorities. If there is any question of the accuracy of data, this is a universal matter – there is no *prima facie* reason to believe fishers are different from the rest of the community in regards to information provided to the taxation authorities. Furthermore, attempting to obtain the same types and amounts of data by other means (that is from other sources) would be prohibitively costly, if not an impossible task. Other than scrutinising the detailed documentation (such as receipts and invoices) held by fishers, access to taxation profit and loss statements provide the best available economic data. The accuracy or otherwise of tax information is discussed in more detail later.

What Economic Information Does on Individual Aquaculture Producer Need and Record?

An existing aquaculture producer will require the types of economic information that a fisher or farmer does to run his/her business. There will also be the normal requirements to provide profit and loss data to the taxation officials. In some jurisdiction, fisheries management agencies will require certain data (as discussed elsewhere in this report).

Someone contemplating starting up an aquaculture business will require somewhat different information. Such a person, or his/her financier, is involved in the assessment of market prospects and expected returns from the investment. The key question is whether or not such an investment will meet an internal rate of return criterion (or other measure of the opportunity cost of capital), taking into account the other uses of any land involved, environmental and planning regulatory issues, etc. on the supply side and any potential price effects (resulting from increased production) on the demand scale.

In the not too distant past ABARE published two reports which aimed to address the investment issue: *Profitability of Selected Aquaculture Species,* 1991 and *Potential for Australian Aquaculture,* 1992. Since then there has been an increase in aquaculture production, changes in technology and the release of the *National Aquaculture Strategy* in 1994.

Some of the States have addressed the investment issue in specific studies and there is ongoing research in some other States.

It is important to make a distinction between a comprehensive economic description of the aquaculture sector and very specific proposals for future investment. The former fit neatly into an Annual Economic Review of the Fishing Industry, while the latter tend to be of concern to the individuals involved (a *private good*). That is not to say a *farm model* approach (as applied in the 1991 ABARE publication) would not be useful to a wider range of people.

What Economic Information Does a Processor Need and Record?

A seafood processor (and wholesaler or retailer, or what might be termed "a receiver") will have both a duty and an incentive to record profit and loss information, just as the fisher does. In some jurisdictions (if not all) processors are required to submit data on quantities and values to government authorities. If product is exported, Customs officials obtain relevant data from processors if they are also exporters (however, see below).

The most significant differences between fishers and processors are that the latter obviously do not collect log-book data and the price of the unprocessed seafood is a cost to the processor – as opposed to income to the fishers.

Other than the raw material (seafood), a processor's major cost items are likely to be fuel, wages and salaries, repairs, depreciation and interest payments. As with fishers, these data will be aggregated on a yearly basis for taxation and annual report purposes. However detailed accounts would be kept by the business, documenting such things as suppliers and where they are located.

In addition to the cost information, the business would record its sales and value of assets (buildings, machinery, etc). It would also have employment data.

As with fishers, processors keep a large amount of valuable economic data which could be accessed for the purpose of describing and understanding the industry.

What Economic Information Does a Fisheries Manager Need and Record?

The economic information needed by a management agency is clearly a function of its statutory role. This is something which is not necessarily uniform across the nation. There is a spectrum ranging from having an emphasis on biological outcomes, such as maximum sustainable yields (MSY), habitat protection, etc, to an emphasis on the economic efficiency of the catching sector, constrained by an ecologically sustainable development (ESD) objective. At Commonwealth level, the Australian Fisheries Management Authority (AFMA) has to work to achieve economic efficiency within an ESD constraint. Among other things, it needs to do, or have done, bio-economic modelling. Not all State/Territory management agencies have a statutory responsibility for economic outcomes, but are limited to managing to achieve sustainable catches.

Management objectives determine the type of information required. Clearly if sustained yields are the objective there is a requirement to have a scientifically-based stock assessment and an understanding of stock dynamics (per species), and reliable log-book data (from a register of boats and/or gear permitted in a fishery). The need for log-books is recognised throughout the country.

If a management agency is responsible for economic efficiency in a fishery, it is likely to have to set about "restructuring" mature fisheries. It is likely that mature fisheries would have developed in an era of open access and too many boats (more precisely, too much effort) would be in a fishery. If a fishery is in the "developmental" stage, the management agency can attempt to limit effort from the onset.

The approach (or method) adopted for restructuring a fishery will have a significant bearing on the need for economic data to be used to achieve this objective. If the fishery is to be managed by setting a total allowable catch (TAC) and fishers allowed entry by holding individual transferable quotas (ITQs), then the major management task is to establish the TAC, monitor the catch, and alter the TAC if the original proves to have been wrong. If the TAC is set purely on biological grounds, it will be established at the MSY level. Fishing beyond that level would be prohibited. It could be argued that the

MSY would not only sustain yields indefinitely but simultaneously provide the maximum economic yield (MEY); or, at least, MEY would come to equate with the MSY. If the MEY level of effort is less than the MSY level (for whatever reason), this is not a concern of the managers. Their ideal might be to have both measures equate. Whether or not that results is, in part, a function of the discount rate – a matter we need not enter into here.

Because an ITQ-managed fishery will restructure itself by fishers buying and selling (or leasing) quota, there is not necessarily a need for the managers to gather and analyse economic information. However, managers are likely to require economic data before making a decision on restructuring and they might wish to assess the success of restructuring (for example, has the allocation of ITQs in a multi-species fisheries resulted in the desired outcome?).

If a fishery is managed by input controls, automatic restructuring to achieve MEY will not occur. If there is too much effort (too many boats and/or gear), there will need to be an effort reduction program (a voluntary or enforced buy-back) and the economic efficient level of effort (at any point in time) can only be achieved by detailed analysis based on profit and loss data and the calculation of rates of return on capital invested.

Fishery managers *might* be interested in the *socio-economic* impacts of restructuring; for example, what is likely to happen at a local (say, port) level if a percentage of the fleet is required to exit the fishery? What will be the flow-on effects to processors, gear suppliers and other industries. What of the viability of communities heavily dependent on fishing? Not only management concerns, but political reality suggests that data should be available to answer such questions. This indicates the need for regional socio-economic studies, probably best based on input-output techniques. Such studies require certain key economic data, including that which comes from fishers' (and processors') profit and loss statements, supplemented by data which identifies where (in what location) fishers spend money on such matters as repairs and fuel, as well as data on the linkages between industry sectors. This concept is discussed in more detail later.

Fisheries managers might also have another task which requires economic information, that task being *resource-sharing* (or resource allocation) between commercial and recreational fishers.

In economic *theory* the principle would be to allocate access to a fishery (if it is subject to competition) so that at the margin it is not possible to make one group better off without making the other group worse off. Put in other words, the value of the extra (or last) fish caught (or more generally access to an extra fish) would be the same for both

groups[2]. However, to do this requires that the *net* benefit of both types of fishing can be measured accurately – and consistently.

Whereas the net benefits of commercial fishing can be determined by analyses based on market data, most recreational fishing is not a market-oriented activity. The difference has led in the past to some erroneous attempts at comparison. It follows that future studies need to make sure that "apples to apples" comparisons can be made between the two types of fishing.

It is possible to use "surrogate" markets to obtain an estimate of the value of recreational fishing. A number of such studies have been done in north America and small number in Australia. To be a useful guide to policy formulation, such studies have to be done on a fishery by fishery – or species by species – basis, and a number of methodological issues have to be dealt with. However, this task is not beyond the skills of competent analysts although one should not claim that precise measures of economic value will be generated. The results from various studies done so far suggest that more work has to be put into methodological issues before public policy decisions are made on the basis of these studies. Recreational fishing is dealt with in more detail below.

What Economic Information Does a Fishing Industry Organisation Need?

A commercial fishing industry association exists to promote the financial and general well-being of its members. By and large, such an association will take a long term view; that is, it will be just as interested in the next generation of fishers (who could be the sons and daughters of to-day's fishers) as in this generation. Hence, the organisation will have regard to ESD principles, and share this objective with managers.

Through representation on management agencies and direct involvement in management advisory committees, fishers's representatives will be vitally interested in both economic efficient and equitable outcomes from management decisions. The types of economic data and analyses that the managers *should* have (as discussed above) is therefore the same as what the fishers' representatives need.

However, it is likely that industry associations will have particular needs for information on a regional, home port or fisheries basis – rather than for a whole State. It is the effects of restructuring, closures or changes in resource-sharing *at a local or fishery level* where most difficulties arise. Consequently, the socio-economic flow-on impacts at that geographical level (discussed previously) are likely to be the most useful types of information.

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[2] It should be noted that this simplifies the reasons recreational fishers come to value their activity. The evidence from a range of studies indicates that only some fishers are concerned about the expected success rate. Relaxing and numerous other attributes are valued components of the "fishing" experience.

At a much more general level, an industry association will want to see fishing (and processing, and aquaculture) *recognised* by society and governments (at Commonwealth, State/Territory and local level) for the economic contribution fishing makes. It will want to be able to refer to aggregate figures on such matters as value of production, jobs, export earnings, competitiveness – and allow comparisons with other industries. An industry association might want to refer to such data on a regular (say, quarterly) basis.

A national government is likely to have an interest in much of this information, therefore the matter is considered again below under a separate heading.

What Economic Information Does a Recreational Fishing Organisation Need?

The presently available data (which in many respects is of limited value) show that recreational fishing is a major outdoor activity in Australia. The data on participation is used to emphasise the significance of the activity. Data on expenditure by recreational fishers (but not necessarily for recreational *fishing*) is used in the same way.

In many situations data of the kind just mentioned are used where there is friction between recreational and commercial fishers. Too often the comparisons are of an "apples and oranges" kind – like is not being compared with like.

A major investigation of the socio-economic characteristics of recreational fishing in Australia was undertaken in 1984 by PA Management Consultants. Information was collected on: participation; motivation (why people fish); expenditure on a vast range of goods and services, and; employment flowing on from recreational fishing activities.

The Australian Recreational and Sport Fishing Confederation Inc. wants a new comprehensive study of recreational fishing undertaken. At present there is some economic information available from *ad hoc* surveys, but nothing comprehensive or necessarily consistent for the nation as a whole. The Confederation, amongst others, argues that a major "baseline" survey be done and updated every, say, 5 years. It would cover: participation, catch, effort, and economic matters. With regard to the latter, the Confederation and other interested parties agree that the methodology used has to be one which allows a direct ("apples to apples") comparison with commercial fishing.

The Confederation also sees the need for specific, one-off economic surveys for particular fisheries where resource-sharing has become an issue.

In contrast to commercial fishing, there is no source of reliable economic information on recreational fishing. That is, there is nothing equivalent to log-books and profit and loss statements. Individual fishers have no incentive to keep records of expenditure or catches. There is an exception with regard to the latter if club competitions are the reason for fishing. This means that gathering economic information on recreational

fishing requires a radically different approach to that used for commercial fishing and aquaculture.

In March 1995, the Commonwealth Government in co-operation with the States and the Northern Territory called for expressions of interest from interested parties to undertake planning work (feasibility studies) for the conduct of a national recreational fishing survey. While the methods of data collection and types of data to be collected are yet to be determined – although the broad parameters are established – there is an expectation that the Northern Territory's "fish count method" will be the major instrument. This technique is discussed later, however, it should be noted that so far it has not been fully adapted to obtaining economic data.

What Information Does Government Need and Collect?

"Government" as used here is distinguished from fisheries management agencies which are, of course, government agencies. What is being considered is government in the general, overall sense, at the national level and the State/Territory level.

Most of the economic information of interest and value to government has already been identified in the section on industry association information.

A starting point is to consider what information governments gather and report for other sectors of the economy. The national government provides on an annual basis economic data on a range of industries for example, gross value of agricultural production; output by manufacturing and mining; tourist arrivals. Furthermore, it provides on a regular basis information on: consumer price and other indexes; balance of payments; exchange rates; and, of course, national accounts.

While fishing is not a "heavy-weight" industry in Australia, it is important, ranking ahead of many prominent agricultural industries. This might suggest that there is justification for the provision of certain data on a regular basis. In fact, certain data are provided.

Australian Fisheries Statistics (discussed in more detail later) is a annual publication with data for each major State/Territory and Commonwealth fishery. It covers production, exports and imports.

For this publication, data on prices are gathered from a range of sources. For production statistics (both volume and value) the sources tend to be State/Territory government agencies and marketing authorities. ABARE adjusts the data where necessary, so that it is uniform and is reliable as possible — given the manner of its collection. Export prices are obtained by the Australian Bureau of Statistics from Customs officials. There are serious reservations as to the accuracy of the export prices, and there are some lesser concerns – but nevertheless important ones – as to the reliability of the production statistics. *It should be noted here that (as discussed above) production volumes and*

values are presently available from individual fishers, in log-books and profit and loss statements. This point is highlighted because it means that *value of production* data can be sourced directly from fishers and could be used to cross-reference the information provided by the sources presently relied upon. (This issue is discussed further below.)

By and large, the type of information governments want is of a descriptive nature. The existing model is *Australian Fisheries Statistics.* An alternative, more comprehensive model is the *New Zealand Seafood Industry Economic Review.* It is published annually.

The New Zealand report is, in part, akin to a combination of ABARE's *Outlook* and *Australian Fisheries Statistics*; however, it is more than that. For example, it is a relatively forward-looking document and it covers aquaculture, Maori customary fishing rights, environmental issues, a range of management issues (such as allocation of ITQs, cost recovery, taxation), training and industry competitiveness.

To discuss all such matters in a annual national review is an easier task in New Zealand than in Australia, given that in the former responsibilities are not shared between many governments. Some of the issues dealt with in the New Zealand review are presently dealt with in Australia by a range of responsible agencies; for example, AFMA at Commonwealth level and its counterparts in the States/Territories.

In the first instance an annual national economic review in Australia would probably not be as wide-reaching as the New Zealand review. An Australian report would present various data in aggregate, also by State/Territory and by fishery, where appropriate. It would cover the items listed in Table 2.

Table 2: Subject Matter for an Annual Economic Review

1.	Number of boats/units and a measure of capital value
2.	Number of fishers (owners, skippers, crew – full-time and part-time)
3.	Volume of catch/harvest
4.	Value of catch (to fishers)
5.	Volume and value of exports
6.	Volume and value of imports
7.	Aquaculture producers (capital value, employment, production)
8.	Household consumption of seafood
9.	Processors (capital value, employment, production)
10.	Cost and earning profiles (profitability, industry competitiveness indicators – cost indexes and terms of trade)
11.	Flow-on impacts to other sectors
12.	Recreational fishing (volume, appropriate economic measures)

Items 1 to 7 inclusive in Table 2 are covered at a national or State/Territory level in *Australian Fisheries Statistics*; *however, not in the detail that is useful on a fishery basis*. Item 10 (cost and earnings studies which can be used to determine the economic health of a fishery and utilised to construct economic indicators) is the subject for ABAREs series titled *Fisheries Survey Reports*, and, *ad hoc* State/Territory cost and earnings surveys.

Item 8 (seafood consumption) data are available through ABS household surveys, but comprehensive data are only available in one-off studies.

The other items, if dealt with at all, are done on an *ad hoc* basis.

In addition to an annual economic review, there would be value in having regular reports (say, quarterly) on some key indicators and trade data (for example, product prices in major markets). Some of these kinds of data, in particular real time prices, are collected by exporters and the larger fishing companies. However, quarterly reports on production, exports and terms of trade are not available.

To better understand what could – and should – be done, it is useful to outline in some detail the present situation with regard to economic data. That is done in Section Two.

SECTION 2: THE PRESENT SITUATION

Introduction

Before formulating proposals to achieve the objectives discussed in the previous section, it is necessary to illustrate what the present situation is. It is not necessary to present an encyclopaedic account of what data gathering is done in every State, Territory and the Commonwealth to assess where the gaps are and what needs to be done. For this reason not each State or Territory will be given equal treatment.

Much of the economic data gathering and analysis is presently done – either directly or indirectly – by the Commonwealth, in particularly ABARE. As would be expected, much of the focus is on fisheries for which the Commonwealth has responsibility; however, State/Territory fisheries are covered in the national statistics.

ABARE publishes two types of reports which are directly related to the preparation of an *Annual Economic Review* and *related reports*. They are cost and earnings surveys published as *Fisheries Surveys Reports*, and production, exports and imports data published as *Australian Fisheries Statistics* (already discussed in some detail).

These ABARE publications are discussed next. They are followed by State/Territory overviews, recreational fishing, aquaculture and, finally, seafood consumption.

ABARE's *Fisheries Surveys Reports*

These publications report on the economic and financial performance of certain fisheries, as well as providing limited information on their biological status and some comment on management. The 1994 report covers the years 1991-92 to 1993-94 for the south east fishery and the east coast tuna fishery. The 1995 report covers the northern prawn fishery, the south east fishery, the southern shark fishery and the Torres Strait prawn fishery.

The present series commenced in 1992 although its historical roots can be traced back 15 years to BAE surveys, or even further to (the then) AFS surveys. The reports are based on survey data. The surveys are intended to track changes through time in the economic performance of key Commonwealth fisheries which are undergoing changes in management. Hence, they *can* assist AFMA in its decision-making. Regular surveys are essential to provide time series data and to allow "benchmarking" of the success or otherwise of management decisions.

It would be possible to use the data gathered in these surveys as the "raw material" for various other types of analysis which could assist AFMA (for example, development of economic indicators).

ABARE (previously the BAE) has a long history in undertaking surveys of certain fisheries. Prior to the two most recent years mentioned above, the following surveys

were undertaken: northern prawn, 1980-81 to 1981-82, 1986-87 to 1987-88, 1989-90 to 1991-92; south-east fishery, 1978-79 to 1980-81, 1985-86 to 1987-88, 1989-90 to 1990-91, 1991-92 to 1992-93; east coast prawn, 1980-81 to 1982-83; southern bluefin tuna, 1980-81 to 1981-82; east coast tuna, 1989-90 to 1990-91; southern shark, 1988-89, 1990-91 to 1991-92; southern rock lobster, 1981-82 to 1982-83; Torres Strait prawn, 1989-90.

To undertake the surveys ABARE relies on the voluntary co-operation of fishing operators, their accountants and selling agents and marketing bodies. The relevant population of fishers (the basis for sample selection) is provided by AFMA, as is log-book information. AFMA is supportive of the surveys in this direct sense, but also relies on them in fulfilling its management functions. The data collection for the recent surveys of the east coast tuna and south-east fisheries (published in 1994) was funded by the Fisheries Resources Research Fund. The surveys published in 1995 were paid for in part by that fund and in part by ABARE.

The cost per surveyed fishery varies depending on the number of interviews, the geographical spread of fishers, etc. The major cost is in the personal contact with fishers. The size of the sample of fishers to be interviewed is, therefore, a very important influence on cost. The sample needs to be the minimum possible to permit statistical valid estimates for the whole fishery. Over the years, ABARE has refined its data analysis and reporting and these costs are not that significant.

It is useful to outline the procedures and methods for the data collection which underpins the surveys. AFMA collects information on catch, effort and boat characteristics from all commercial fishing operators in Commonwealth fisheries. ABARE utilises this information to select samples of fishers to be interviewed. The population (of fishing boats) is obtained from log-books and boat register data held by AFMA. A sample weight is allocated to each boat in the sample. The sample weight aims to reflect the boat's representativeness in the population.

Once the sample is selected, the procedure is one that has been followed for virtually as long as economic data on fishing has been gathered in Australia. The procedure (to be described below) was used by the Australian Fisheries Service in the 1970s, Hundloe used it in the 1980s, as did BAE and some State agencies, and it has been used by ABARE since that organisation was formed. The procedure is as follows.

The owner of each selected boat (where companies are involved a number of boats would be represented) is visited by an ABARE officer and interviewed in person. In some cases the boat's skipper is also interviewed. As illustrations of the number of operators interviewed, for the surveys of the east coast tuna fishing and the south east fishery reported in 1994, approximately 150 operators were interviewed in each fishery. In the 1995 surveys the sample sizes were: south east fishery, 41 from a total population of 117 boats; southern shark fishery, 34 from a total population of 113 boats; northern

prawn fishery 48 from a total population of 132 boats. These relatively small, but nonetheless statistically appropriate, samples reduce the cost of data gathering.

Information on boat characteristics and the financial details of the fishing operation is sought from the operator. Further information is subsequently obtained from the operator's accountant and selling agents/marketing organisations. The fisher is asked to sign a document authorising the interviewer (or his/her agent) to obtain data from these other people. The type of information obtained is as outlined in Table 1, and discussed in some detail below.

For some reports ABARE has estimated *expected* receipts and costs for the current year (tax information is only available for past years) based on recent market, log-book information and input price indexes.

The data collected include cash receipts (earnings). These include revenue from the sale of fish plus any revenues from non-fishing uses of the boat (such as charters) and other revenue (eg. insurance payouts, government assistance). For fish sales the data relate to the year of sale, not when fish were caught (as in a previous year).

Cash costs data include crew payments, fuel, freight and marketing, materials, interest, licence fees, payments on capital items subject to leasing, and (where appropriate) aerial spotting. In addition to crew payments there are other labour costs which include wages, salaries and share of the catch paid to owner operators, partners and their families. If any of these are unpaid, a value is imputed. While unpaid labour is not a cash cost, all operations need to be treated equally, and hence there is the need to impute a value.

In addition there are non-cash costs such as depreciation. This is a cost representing wear and tear on capital items during the survey year. To the extent possible, depreciation is estimated so that it reflects the economic life of the item. ABARE has changed the actual method of estimating depreciation for its 1995 survey, but that does not change the general principle.

To estimate profits (on full equity) or *rates of return*, the capital value of the boat (and other capital items) is required. In recent surveys ABARE has confined this to the *capital value of the boat.* This is the total *gross* value of capital items, but excludes the value of licences and quota. An objective measure of licences and quotas can be difficult to obtain if few are traded.

Profit on full equity is calculated by adding back interest and other relevant costs to the profit figure for the boat. This assumes full equity in the boat by the operator; that is, boats are treated as if wholly owned.

ABARE's *Australian Fisheries Statistics*

The 1995 publication is the fourth in the series. It provides data for each major State/Territory and Commonwealth fishery. The 1993-94 data collection was funded by the Fisheries Resources Research Fund.

The reports summarise the fisheries, presenting information on main species caught, main fishing method and number of boats/units (eg. pots). Furthermore, there is a brief discussion of trends in production and trade. An essential component of the statistics is the information on gross value of production. This information is used to set Commonwealth Government contributions to FRDC and FRRF and used by AFMA to set R&D levies. Value of production data can also be used by State/Territory managers to establish various charges on fishers. For these reasons, amongst others, it is essential the data are as accurate as possible - and that fishers are, or can be, convinced of this.

For production, the volume data are taken from log-books, while the price data (which together give the GVP) come from a variety of sources (the notes to the tables list the State/Territory fisheries agencies, ABARE and other relevant bodies). The source for exports and imports is the ABS. As discussed previously, there is concern from the industry that export data in particular are not accurate. There is also some querying by fishers and others of the GVP data. The sources of data for *Australian Fisheries Statistics* are discussed in more detail next, on a State-by-State basis. In addition, to illustrate what other types of economic studies are done by the States/Territories (generally on an *ad hoc* basis) some examples of these are presented. This does not aim to be a comprehensive coverage.

Overview of Present Situation in States/Territories

As stated above, the following descriptions are not meant to be comprehensive, rather they illustrate the types and detail of data gathered. Only some States/Territories have been selected for comment on *fisheries-specific* studies, again to illustrate what is done or is planned to be done.

Victoria

Monthly log-book data (on volume only) are gathered from all licensed fishers. The Victorian authorities conduct their own monthly survey of prices, although this is not comprehensive and consequently could be improved. In Victoria, processors do not have to provide returns to government.

At present, aquacultural producers do not submit returns, but this is likely to change in the future with a requirement for the provision of annual volume and value information being required.

ABARE receives the available catch data plus a price list (on a monthly basis) from the Melbourne Wholesale Fish Markets. From these sources ABARE produces the statistics for inclusion in *Australian Fisheries Statistics*.

A number of ad hoc economic studies have been done of Victorian fisheries in the past. With regard to more detailed, fishery-specific economic information, the Victoria Department of Conservation and Natural Resources is proposing to undertake a series of economic studies. It believes it is necessary to standardise the collection of economic information. For the commercial sector the studies will include cost and earning data and flow-on effects (through the calculation of multipliers). Fisheries will be selected according to the priority of management issues. The first study will be on recreational fishing, a major activity in Victoria and resource-sharing is a political issue. The next study will be of the scallop fishery, as a precursor to restructuring. Others will follow until all fisheries have been covered. Recently a consultant prepared a study of the rock lobster fishery for the government.

An amount in the order of $40,000 per survey has been suggested. This amount is to cover data gathering and logging-in of data, both to be done by a consultant. A mail survey will be used. Analysis and report preparation will be done in-house and is not included in the figure quoted above.

New South Wales

The N.S.W. fisheries bureaucracy is presently undergoing significant restructuring and new legislation has been enacted. Very little in the way of economic data are collected.

For use in *Australian Fisheries Statistics* average prices per species are obtained by government officers from the Sydney Fish Market and refined before forwarding to ABARE, where further adjustments, if necessary, are made.

The New South Wales Research Institute collects monthly log-book returns from all licensed fishers. Data pertain to volume. Returns from processors and fish co-operatives, on quantity and value, are provided monthly. Aquaculture producers provide annual data on both quantity and value. The price data obtained from the services is not necessarily "beach price". As noted above, the Fisheries Research Institute uses prices from the Sydney Fish Markets (and processors) to estimate gross value of production (GVP). That is a considerable exercise, given that a variety of seafood product needs to be converted to a standard, whole-fish price.

Cost and earnings studies are not been done at present, although there is anecdotal evidence that they would be welcomed. Under the new legislation "receivers" of fish (for example, processors) are required to provide certain information to the authorities. This would include data on volume by species. It might be feasible to extend this to include price-paid information.

In the past, economic impact studies (based on input-output multipliers) have been done for fisheries off the N.S.W. coast (Eden and the northern rivers being two centres studied).

Queensland

Monthly log-book data on volumes are collected by the Queensland Fisheries Management Authority (QFMA) from licensed fishers. Some processors provide monthly returns. In Queensland, aquaculturalists (with some exceptions) provide log-book data, on both price and quantity, to the Queensland Department of Primary Industries (QDPI). In addition to the log-book data, a departmental officer conducts an annual survey of certain types of aquaculturalists, collecting price and quantity information. This survey excludes pearl oyster producers and clam harvesters.

The data from both QFMA and QDPI are forwarded to ABARE for any necessary refinement before inclusion in its annual statistics.

There is anecdotal evidence that a "comprehensive" economic study of aquaculture is going to be attempted. A survey of recreational fisheries is planned, based on log-book data from charter-boat operators, fishing club data, creel surveys, a telephone survey and diaries (see below for a discussion of recreational fishing surveys). In the past, a number of economic studies have been done for Queensland commercial and recreational fisheries (see discussion later).

Western Australia

Monthly log-book data on volumes are collected by the Fisheries Department. Some processors' returns containing both quantity and price data are provided to the department. These data are forwarded to ABARE annually for its production of *Australian Fisheries Statistics.*

In recent years the Western Australian Fisheries Department has been to the forefront in commissioning major economic studies. In 1991 it published the report *The Economic Impact of Recreational Fishing in Western Australia.* In 1994 it published the study titled *Economic Impact Study : Commercial Fishing in Western Australia.* The department is supportive of researchers who want to extend a cost-benefit analysis approach to determining the relative net benefits of recreational and commercial fishing (and other uses of the marine environment).

The economic impact studies are similar to ones done in Queensland in the early 1980s by Hundloe and the one by Bishop in 1988.

South Australia

The South Australian Research and Development Institute obtains monthly log-book returns from all licensed fishers. Only volume data are gathered. Monthly processors' returns are provided and contain both price and quantity data; but as with processors' price data generally there is a need to convert such to "beach prices". The available data are sent to ABARE for refinement and use in its annual statistics.

As with the other states, South Australia has had a number of ad hoc economic studies done in the past; in fact, some of the very early and more comprehensive ones were done in this State.

Tasmania

Monthly log-book data, on volume only, are collected by the Department of Primary Industry and Fisheries. All licensed processors complete monthly returns containing both price and quantity data. Some aquaculturalists are required to produce data; for example, aquaculture farmers record volume but not price; processors' returns contain prices for oysters and mussels but not for salmon or trout. Available data are forwarded to ABARE for use in its annual statistics.

The Tasmania Department of Primary Industry and Fisheries is keen to see an economic impact analysis undertaken of the Tasmanian industry. If the study is undertaken a major component will be an input-output flow-on analysis, similar to the earlier Queensland work and the recent Western Australian studies.

Northern Territory

The Department of Primary Industry and Fisheries provides ABARE annually with a range of data based on monthly log-book returns (volume only), "traders" returns (volume only) and aquaculturalists' returns (price and volume). It is interesting to note that price data had been collected from fishers (in the capture fisheries) in the past but this practice has been discontinued due to industry pressure.

The Northern Territory has a relatively long history in having *ad hoc* economic studies of fisheries undertaken, covering both commercial and recreational fisheries. In recent times the majority of the studies have been on modelling of individual boat enterprises. A number have analysed the expected profitability of new fisheries or new methods/gear. An input-output (flow-on) type analysis was undertaken in the past.

Recreational Fishing

Recreational fishing has come to be of increasing interest to a range of people (obviously those representing recreational and sports fishers and those supplying gear, boats etc., but also fisheries managers and commercial fishing organisations).

While there have been a large number of one-off, fishery-specific economic studies across the nation in the past, there has been only been one relatively recent national survey (done in 1984). It provides some aggregated economic information, but the study was not suitable to allow an "apples to apples" comparison with commercial fishing or, for that matter, to accurately estimate the "dollar value" of recreational fishing.

In March 1996, the Commonwealth Government in cooperation with the States and the Northern Territory called for expressions of interest for the design of a national recreational fishing survey. The expectation is that, on the completion of the design stage, funding will be made available to undertake the survey. A good quality national survey is likely to be a very costly undertaking. As noted previously, some of the States are relatively advanced *in planning* for their components of a national study.

Various survey methods have been suggested by the overseeing committee and it is obvious that good information on the size of catch (the number of fish caught and kept) is key information being sought. It is also obvious that such information (and other data) are wanted according to where fishing is undertaken and, by what methods and according to season. While the call for expressions of interest refers to "economic description", it is going to be crucial that those responding address the need to obtain reliable economic data, of various levels, to allow genuine comparisons to be made with commercial fishing.

The information gathering techniques which have been suggested for consideration (which tend to draw on the "fish count method" applied in the Northern Territory) could be modified to fulfil the objective of obtaining economic data, even though the method's focus has been on improving the accuracy of volume data.

Aquaculture

As noted in Section 1, aquaculture is covered in broad terms in *Australian Fisheries Statistics* and has been subject to two *ad hoc* studies by ABARE and studies for some of the States/Territories. Other States are proposing new assessments of aquaculture potential.

It was noted previously that there is an important distinction between a comprehensive economic description of aquaculture (including its flow-on impacts) and assessment of individual investment decisions. The distinction rests, in part at least, on who is the beneficiary of the two types of studies. The latter are of much more interest to an

individual investor than the wider community; however, a range of land use planning and environmental matters could be of general interest.

It is difficult to generalise about aquaculture because the methods of operation are vastly different (for example, from tuna cage farming, to clam nurseries and ocean grow-out, to prawn farming on land). The *farm model* approach in past studies and as proposed for a Victorian study are generally applicable. However, care is needed in valuing land which has alternative uses, and in taking into account any off-site impacts.

Seafood Consumption

While some aggregated data on exports and imports of seafood is included in *Australian Fisheries Statistics*, there have only been irregular detailed surveys of the domestic market. In 1978 a nation-wide survey of seafood consumption was published. It covered 1976-77. Other regional surveys followed, for example by Bandaranaike and Hundloe for Queensland (in the late 1970s-early 1980s).

In 1990, the then Fishery Industry Research and Development Council initiated a nation-wide survey. It was the most extensive study of the chain of distribution of seafood ever undertaken in Australia (and possibly the world). Given the change in life-styles (which are quite noticeable in Australia in terms of eating-out, dietary shifts, etc.), it is important that comprehensive surveys be undertaken every 5 or so years. The methodologies used in the various earlier studies would be appropriate. The author is not aware of a major study being planned at present.

Summary

As is obvious from the above, there are *significant variations* in the method of data collection across the States/Territories. The quality of the data – particularly *price* data – will vary to a large extent. Some price data are likely to be "guesstimates".

While log-books, containing volume data, are used throughout the nation, the use of log-books to collect price information has only been done on an experimental basis in some situations. The requirements for data from processors – and the definition of processors and others who receive product from fishers/harvesters – are quite varied. Some are required to provide price data. Due to the different nature of various seafoods, considerable effort is required to standardise the data.

The most reliable data would appear to be log-book data on quantities caught/harvested. *However, as is generally recognised, there will be some inaccuracies – deliberate or unintentional – in log-book data. Log-book data are likely to continue to improve. They provide the best available information on catches.*

The short-comings outlined above (as well as others) and *how* to improve the data used in *Australian Fisheries Statistics* are presently being reviewed by ABARE (Perry Smith and Anne Purtill) under a Fisheries Research and Development Corporation grant. A vast array of information on suitable sources of information (particularly price information) has been gathered in their study. It appears that very considerable co-operation, in terms of providing regular data, will be forthcoming from processors and others receiving product. When a system is put in place to formalise the recommendations of that study, the outcome should be an *improved* system for estimating price data and an improved *Australian Fisheries Statistics*.

That stated, this is addressing only one element of the economic data requirements if comprehensive annual and (less-comprehensive) quarterly economic reviews are to be produced.

There is some anecdotal evidence that *Australian Fisheries Statistics* is not used by the "average" fisher. On the other hand, the publication is of significant interest to the industry. The real value of this publication, once its accuracy is improved, will be in presenting aggregated information. That *aggregated* data will be but a small part of the information base fishers, bankers, managers and governments need.

The next Section of this Scoping Paper considers options for the compilation of comprehensive economic data. It will consider cost and earnings studies (which provide key elements of the data for bio-economic modelling) and impact (flow-on) studies as well as other types of analysis that go beyond value and production statistics. Some examples of such studies - which have been undertaken generally on an *ad hoc* approach in the past - have been given above.

SECTION 3: OPTIONS

Introduction

Section One of this Scoping Paper outlined the rationale for gathering and presenting more comprehensive economic data than presently is the case. Section Two summarised the present situation, and referred to improvements which are being pursued and also to some possible new studies. This Section considers how to fill the gaps in data/analysis that exist between the desired and the existing situations.

To summarise the present situation, it is clear that, while *Australian Fisheries Statistics* is a useful *aggregate* overview of particular economic data, it does not present data in anywhere enough detail for most users. Furthermore, as an *annual* series it cannot be used for timely (say, quarterly) comment on the performance of the industry. The issue of the accuracy of the data in this statistical compilation has already been discussed and it has been noted that considerable effort is going into improving data reliability.

It is also clear that, with few *ad hoc* exceptions, only the Commonwealth (through ABARE) is undertaking detailed cost and earnings studies of (Commonwealth) fisheries. The majority of State/Territory fisheries are neglected. While the "rolling" surveys of Commonwealth fisheries are obviously useful in their present form, they do not address a wider range of issues which are of significant interest to industry, managers and government.

As discussed in Section One there are two major shortcomings with the present data collections. First, data and analysis have to be available on a much more disaggregated level. In some cases this will be by species, in others it might be according to where the economic impacts and flow-ons occur (say, a major port or statistical division/s), and in others it might be by fishery.

The second short-coming is that cost and earnings surveys do not – in themselves – show how important fishing/harvesting is in local communities as a consequence of flow-on impacts, both upstream and downstream. In this regard, the Fisheries Department of Western Australia has had impact studies done recently, and one is planned for Tasmania. It is possible that the proposed Victorian cost and earnings studies could be extended into impact studies. In the past, certain fisheries in all the other States and the Northern Territory have been subject to such studies. Studies of this kind have, undoubtedly, been of use to industry and managers, and have probably helped local governments and businesses in making decisions at the local level.

The options to address the needs of industry, managers and government range across the spectrum from the *status quo* to the *optimal*. There could be debate about what is *optimal*; however, it is used here to suggest something less than a "gold-plated Rolls Royce" set of data, which some might like to have but which would, overall, not be worth the cost. *Optimal* is about getting the right balance between the costs of obtaining

and presenting the data and the benefits to users. Determining what is optimal *in a practical sense* is part science, part art, primarily because the benefits in a number of cases are virtually impossible to measure.

The notion of a status quo is somewhat misleading. For example, it is likely that *Australian Fisheries Statistics* will be improved as a result of the work presently being done by ABARE and some States/Territories are working to improve their economic data bases. Furthermore, even without changes to its present surveys program, ABARE will come to build up a better understanding of the Commonwealth fisheries. Furthermore, a national survey of recreational fishing might occur, or some States might do their own. *Ad hoc* studies, of a variety of kinds are likely to continue to be undertaken in any event.

The Minimalist Option

The marginal changes to the status quo as described above could be termed the *minimalist option*. It entails extending the sources of price information to be used in estimating GVP for publication in *Australian Fisheries Statistics* – a worthwhile undertaking. It furthermore entails the continuation of ABARE's cost and earnings surveys, likewise a worthwhile task. What is unsure is the extent to which the State/Territories will undertake economic studies of their fisheries and, if so, of what kind and how regularly. However, as there is no obvious commitment at this stage for a comprehensive coverage of the nation's fisheries, the *minimalist option will not meet the objectives established in Section One.*

An Intermediate Option

An intermediate option would be a more comprehensive *extension* of current processes. Considerable progress could be made in providing a more detailed understanding of the Commonwealth fisheries which are presently analysed in ABARE's surveys. This plus the improvement in accuracy in *Australian Fisheries Statistics* foreshadowed above are the key features of this so-called *intermediate option.*

With not a great deal of additional cost it would be possible to enhance ABARE's cost and earnings surveys. That is, data of the kind gathered in these surveys (income and expenditure), if gathered for a sufficient number of years, could be used to analyse a number of questions – in addition to simply monitoring the economic performance of the fishery. For example, analyses could focus on: (i) the economic impacts of changes in catch levels; (ii) economic impact of changes in management arrangements; (iii) development of performance indicators. These matters (discussed previously in Section One) have been identified in Draft Strategic Research Plans for some Commonwealth

fisheries. This illustrates the value managers and operators in these fisheries place on such analyses.

If existing ABARE surveys are augmented by these types of analyses, this will be clearly worthwhile. However, at not a great deal of additional cost even more could be done in these surveys. If, when fishers and/or their accountants are interviewed to obtain cost and earnings data, information is sought on where money is spent on cost items and where product is sold for processing, the basis to model the flow-on impacts exists. There is more to estimating the multiplier effects than this, but that is discussed below. The point here is that because these fishers are already being interviewed there is only a *marginal cost* involved in obtaining this extra information.

However, it should be recognised that gathering this supplementary (input-output) data in conjunction with traditional cost and earnings surveys can "overload" fishers. If this happens, the value (or integrity) of cost and earnings data could be diminished. While there are examples of *joint* cost and earnings/input-output studies in which the issue of overload has not occurred (eg. the W.A. study in 1994), there are benefits in having the supplementary (input-output) data gathered only every few years (say, on a five yearly basis). This would lessen the cost and is likely to gain greater acceptance from those being interviewed.

To estimate flow-on impacts the approach is to use place-of-expenditure/sales data to augment existing regional and state input-output tables and construct a new "sector" – fishing. Multipliers are derived from these input-output (or transactions) tables.

As mentioned previously, this has been done in the past for a small number of fisheries. The first comprehensive analysis of this type was that done by Hundloe et al in the early 1980s and published in 1985. The fisheries covered were the Queensland east coast fisheries (excluding Moreton Bay and Torres Strait). In the same study recreational and charter-boat fishery were subject to similar analysis. That is, all types of fisheries were analysed using the same technique and the findings presented under one cover. This study was followed up by one covering all the Queensland commercial fisheries, undertaken by Bishop in 1988. Some years ago, Taylor-Moore prepared an impact study of recreational fishing in Moreton Bay.

As noted previously, impact studies have recently been prepared for Western Australia fisheries, other States/Territories have had them done and a study is planned for Tasmania.

However, to limit this type of analysis to those (Commonwealth) fisheries which are studied by ABARE and not include adjacent State/Territory fisheries – and not to subject all the nation's fisheries to the same approach – is not a rational option from the perspective of gaining a better understanding of the nation's seafood industry.

It is recognised that some other States/Territories might decide to undertake similar comprehensive analyses. However, unless there is a national decision to proceed with such studies – *and an uniform approach adopted* – the *ad hoc* nature of the studies is likely to lead to confusion and, probably, professional criticism.

Crucial factors in any economic analysis of fisheries are: (i) the integrity of the data; (ii) the uniformity of approach, and (iii) replicability of the studies. With these concepts in mind we can consider an *optimal* option.

The optimal option

Put in simple terms, the optimal option is based on a survey of a sample of *all* the nation's fisheries, and updated on a regular basis. For the moment recreational fisheries will not be discussed. It needs to be emphasised here - and discussed in more detail later - that virtually all important economic questions can be answered by obtaining (statistically valid) data from fishers.

That is, not only is it possible to measure the economic well-being of a fishery and what happens to that as a consequence of management decisions, but by aggregating data from all the nation's fisheries, total volume and value of production data can be determined. In other words, much of the information published in *Australian Fisheries Statistics* can come from cost and earnings surveys, rather than being compiled by the present methods. It is recognised that data on *value-adding* will have to come from separate sources (eg. processors, exporters).

A number of crucial issues arise with this proposal and only the more important are discussed here, and then only in summary form. Considerably more work would have to be done in refining both theoretical and practical aspects of the approach before it was put into practice. This would be a task for a representative group of experts, and would follow *in principle* agreement to take the necessary steps to improve economic data of relevance to the fishing industry.

Here, two fundamental points must be emphasised. The first is that in *the first instance* a sample of *all* fisheries would have to be surveyed (and this would be a major exercise, and costly) but this large survey would suffice for some time (a point made above with regard to supplementary input-output data). A series of "rolling", much smaller surveys could be used to update the data between major surveys. The second fundamental point is a reiteration of what has been stated above, but adding to it. The point is that the cost and earnings data are a prerequisite for *all* types of economic analysis; that is, there is not an important economic question which could not be answered without these data; and as already stated, by collecting supplementary data on location of expenditure/sales it is possible to undertake a type of economic analysis of interest to many, and that is the flow-on (multiplier) impact of fishing.

Given that not all are necessarily familiar with the concept of flow-ons an example is presented in Box 1 (which is extracted from Hundloe, 1985).

Box 1: Employment Multipliers for Commercial Fishing, Cairns Section of Queensland East Coast in the early 1980s

Impact Area	Initial Impact	First Round	Industrial Support	Consumption Induced	Total	Flow-on
Cairns region	0.040	0.010	0.002	0.017	0.069	0.029
Qld	0.040	0.008	0.003	0.023	0.073	0.033

The multipliers in the table relate to $1000 of output (catch) by fishers. For example, if there was a $1 million increase in catch in this fishery there would be an increase in employment (skippers and crew) of 40 persons (full-time equivalents), then there would be a chain of flow-on employment impacts. The *first round* impacts result from the new expenditure by the catching sector of the fishing industry. This impact itself causes *industrial support impacts*. These impacts do not include any increases occurring because of increased *consumption expenditure* by households who have benefited from increases in income.

Added together, total impacts are 73 jobs, or 33 flow-on jobs in Queensland. These data are very old now and are used solely for illustrative purposes. The recent Western Australian impact study found much higher flow-ons, however the major fisheries are quite different in that State and so are linkages with associated industries.

It is worthwhile to say a little about how multipliers are derived and the limitations of the approach. A considerable amount of data are required. The need for cost and earning data from fishers has already been stated. In addition, input-output tables for the region or State/Territory are needed. These exist for all Australian States, and the Northern Territory and regional tables are obtainable. The existing tables have to be augmented by constructing a new sector (commercial fishing) or sectors (if other types of fisheries, including aquaculture, are going to be included; or if processing is going to be included as a new sector). The type of survey data discussed previously will be the basis of this augmentation. If recreational fishing or processing are to be included, survey data have to be obtained for these activities.

It is essential to obtain information on where fishers spend money on all operating-costs as well as where fish are sold, because not all money stays in regional (or State) economies, rather it "leaks" out. The data gathered from fishers' profit and loss statements will be in what are called "purchasers' prices", which include commodity taxes, delivery and distribution charges. These have to be converted to "basic values" by reallocating these charges.

A number of important assumptions are made in constructing input-output (or transactions) tables. While these are not discussed here, it is very important to recognise them — *and it is very important to not abuse the use of multipliers, something too frequently* done. The value of this type of analysis to both fishers, managers and governments has been discussed in Section One.

Having digressed to elaborate on the derivation of flow-on effects, it is necessary to return to the issue of data resources which would be used in undertaking any *comprehensive* study of the fishing industry. Recall a comprehensive analysis will entail: the *direct* cost and earnings effects at fishery or regional level; the aggregation of income (catch) to State/Territory and national levels; the flow-on impacts at various levels; separate but consistent treatment of recreational fishing and aquaculture (and processing if separated from the catching/harvesting sector); the development of performance indicators, such as changes in terms of trade; and quarterly updates of key performance indicators. Because the accuracy of any of these measures is going to depend on the reliability of data, this issue is worth discussing in greater detail than has been the case so far. This is done in Box 2.

Box 2: Sources of Reliable Data

There are two sources of data on the value of product landed/harvested: (i) the payments by "receivers" of seafood which are made to fishers/harvesters; and (ii) the annual income reported by fishers/harvesters for taxation purposes. In theory both would be the same. At this point in time the best available source of income data is taxation profit and loss statements, that is, cost and earning records kept by fishers. It has been pointed out earlier that there is no reason to suggest fishers are more or less reliable than anyone else in the community when reporting income to the tax officials. Even if some were inclined to under-report income, they would (or should) be aware that the tax officials have a legal right to demand evidence of income received. The tax officials can seek this information from both the fishers and the "receivers". The same principle applies to fishers's tax deductions. Records of operating expenses can be demanded and their authenticity checked.

The general honesty of most fishers and the ability of tax officials to verify what is reported to them might not convince all and sundry that the information from the catching (or aquaculture) sector is reliable. However, the same doubts could be expressed with regard to receivers of fish or, say, gear and fuel suppliers. Admittedly, the tax office might have difficulty in tracing sales of fish to, say, hotels, but the tax people have the legal right to all types of data and have more sophisticated techniques these days than in the past.

These points are made to highlight two points: (i) fishers' reported income for tax purposes is the best income data readily available and (ii) the price paid by "receivers" (that is, their outlays for seafood products) can be used as a check on the reliability of the former. If this point is accepted, the *least cost* method of obtaining data on fishers' income is to survey them.

Economic data from "receivers" (including processors, merchants, exporters) should be collected — where it presently is not — not for the purpose of estimating a "beach price" value of fisheries but for the more important objective of showing the *value-added.* Comprehensive income *and* expenditure data relating to these businesses "up the chain" from fishers/harvesters can be used to model flow-on benefits to other sectors of the economy. Only as a by-product would economic data from "receivers" be used to check on the accuracy of income reported by fishers/harvesters.

It should be noted that by relying on fishers/harvesters for income data the need to adjust "receivers" prices to reflect "beach prices" does not arise; and those who concern themselves with "which price" do not have to worry. It is recognised that where a product goes through the whole production chain, as is the case with pearls, within the same business, the problem of estimating a "beach price" is exacerbated and is not resolved by what is proposed here. However, pearl production and much aquaculture (if it is a vertically-integrated process) could be analysed as a sector in its own right.

However, the arguments above should not be taken to rule out the desirability of obtaining — on a regular basis — real time prices from selected "receivers" so that a quarterly update can be published for, say, each major fishery.

Furthermore, the suggestion that fishers' profit and loss statements be relied on for income data does not rule out the need to continually improve catch data via log-books. While there remain those in the industry (and outside) who, either rightly or wrongly, believe — and state — that the official data (for example, in ABARE surveys) under-estimate catches, more must be done in either correcting the data or the perceptions.

Implementation of the Optimal Strategy

If the optimal strategy — or variations to it — are accepted, two issues are crucial: cost and credibility of results.

With regard to costs a number of factors are relevant. Obviously the more fishers that have to be interviewed, the greater the cost. On the other hand, a statistically appropriate sample has to be interviewed so that, for example, the economics of relatively small fisheries and their flow-ons to *regions* (rather than States/Territories) can be described. The issue of sample size cannot be discussed here. It would be best done on the basis of local knowledge and local needs.

Given the vast size of Australia, it could be cost-effective to have local teams (that is, State/Territory based teams) responsible for data gathering in their part of the nation.

There is also likely to be cost savings where the expertise is already available; for example, ABARE has considerable experience in gathering cost and earnings data, and doing certain types of analyses, for Commonwealth fisheries. Similarly, there exist considerable expertise in the universities in doing both cost and earning and input-output studies (for example, in Western Australia; University of Queensland; University of Tasmania). And there is relevant expertise in some of State/Territory management agencies.

Considerations such as these suggest the cost-effectiveness of a co-ordinated and co-operative approach across the nation. The key participants would be ABARE, one university from each jurisdiction, and the relevant State/Territory agencies. For certain functions ABS would continue to play a major role (collection of export and import data).

Probably the best known example of a co-operative approach was that applied in the joint cost and earnings/economic impact study of the Great Barrier Reef commercial and recreational fisheries undertaken between 1979 and mid 1982. The parties involved in the data gathering were: the then Australian Fisheries Service; Queensland Department of Primary Industries; the Great Barrier Reef Marine Park Authority; and Griffith University. The separate parties did their own specialised analyses according to their needs. The author of this report was the co-ordinator and leader of the research. One product of the research was the book *Great Barrier Reef Fisheries* (Hundloe, 1985).

The credibility of the data and analysis would also be enhanced if a co-operative (and co-ordinated approach) was taken. *Clearly creditability would be enhanced if certain universities (and certain university personnel) were involved — and seen to be involved.*

Institutional Arrangements

While the details of institutional arrangements would need to be the subject of serious consideration, one possible model would have: a lead agency, or joint lead agencies; a national steering committee; and State/Territory advisory committees.

The options for a lead agency/agencies include: ABARE; a particular university centre; ABARE in conjunction with a university centre. The latter option is suggested as the most appropriate. The national steering committee would need representatives from a range of interests, but it would be important that persons with economics backgrounds were strongly represented. For example, the steering committee could have representatives from ABARE, AFMA, the lead university, industry, and the

State/Territories. The State/Territory advisory committees would have representatives from the local management agency, industry (catching, processing, aquaculture), and universities.

Who would do particular parts of the work would need detailed consideration. However, there would need to be an editor for the *Annual Economic Review*. He/she would draw on the various studies which might be done by different organisations. There could be another person responsible for the quarterly updates. What would be crucial is that a uniform data gathering approach be used throughout the nation, and that the same analytical tools/methodology be used. The attainment of uniformity would be the responsibility of the lead agency or agencies.

Because some agencies (such as ABARE) have ongoing programs and because the States/Northern Territory are at different stages in implementing their economic research programs (some have had comprehensive studies done recently, others are planning studies - although not necessarily comprehensive ones), it will be necessary to *integrate* these into the proposal for a *national* program.

As argued above, there is a need to: (i) obtain reliable gross value of production for all of the nation's fisheries; (ii) to be able to present value of production data at State/Territory and local (home port) level; (iii) to be able to present evidence of the economic health of a fishery, given existing or proposed management changes; (iv) to be able to describe in quantitative terms the flow-on impact from catching/harvesting to other industries - at various levels of aggregation/disaggregation, such as by State/Territory, by home port, by fishery; (v) to describe recreational and sports fishing in similar economic terms (generally at fishery or home port level) to commercial fishing; (vi) to analyse and describe the value-adding sectors (processing); (vii) to analyse and describe aquaculture in similar terms as for the other fisheries; (viii) track changes in seafood consumption.

How to mesh the existing, ongoing or proposed one-off studies into the national program is a crucial matter for the *national lead agency/ies*. Successful meshing will have a bearing on costs in the first year. The first year of the national program will be the most costly as many neglected fisheries will have to be surveyed (both for cost and earnings data and impact data); there will need to be a survey of aquaculturists and processors and of recreational fisheries; preliminary work should commence on a seafood consumption survey; and the *system* for a common, coordinated approach will need to be put in place. In subsequent years the cost will be dramatically reduced; however, every 5 years (or thereabouts) the impact studies and the recreational fishing surveys and, possibly, seafood consumption surveys will need to be repeated and this will add to the cost in the fifth year of the ongoing program.

In the first year of the program many fishers (and others) who have not been involved in the past (or, at least, recent past) in economic surveys will be selected for interviewing. It is highly desirable that these be face-to-face interviews (similar to ABARE's present

approach) - and this is a costly exercise. As indicated above, cost-minimisation suggests that State/Territory-based teams (managed by a local university or *possibly* an expert consulting firm) might be best placed to gather the necessary data, particularly from the non-Commonwealth fisheries. However, there could be cost advantages *in certain circumstances, for certain fisheries* to link this new work in with ABARE's ongoing cost and earnings studies. Such matters need further consideration by stakeholders before finalisation of this scoping report.

The importance of face-to-face interviews, in the first instance, cannot be over-emphasised. First, it is a means of gaining fishers' participation. Second, it allows scope to explain the benefits of the studies. Third, much higher response rates are achieved than with the alternative of mail surveys.

It is expected that for subsequent years (except possible for the five-yearly comprehensive studies, discussed above) a mixture of mail surveys and face-to-face surveys would be used. This would result in major cost reduction for those years.

The Cost and Who Should Pay

Much of the detail on cost and who should pay can only be presented after stakeholders respond to this *Draft Scoping Paper*. This means that the detail will be presented in the *Final Report.*

To present an illustration of what needs to be done and crude cost estimates Table 3 has been prepared. Some crucial points about the table must be noted. *First, the indicative cost estimates will be lower if, for example, ABARE's ongoing, rolling program of cost and earnings studies for Commonwealth fisheries are excluded - on the basis that they are funded separately. This also applies to any State/Territory studies which have already been allocated funding, or will be funded separately. Likewise, if the national recreational study is funded separately its cost would be excluded. A seafood consumption survey is excluded at this stage. It is envisaged the planning for such could commence in the first year of the national program.*

Second, the number of interviews are a rough guide based on the number of commercial fishers in each fishery as recorded in Australian Fisheries Statistics. To obtain statistical valid results on, say, a home port basis, it could be necessary to increase the number of interviews in some circumstances. Alternatively, it might be found that a reduction in numbers is possible. Unless otherwise stated the numbers related to commercial fishers - who might own more than one boat or licensed gear.

Third, it might be found that in the case where recent comprehensive studies have been done (Western Australia) or are being proposed (Tasmania) that the fisheries in question do not have to be researched in the first year - that is, the results form these studies can be meshed in.

Fourth, the cost estimates are presented as ranges and are "order of magnitude" estimates only. They are based on having efficient research bodies doing most of the work, with overheads kept to a minimum and do not allow for high-priced consulting fees as such.

Fifth, while research bodies are identified as potential suppliers, the general principle should be that the work should be open to public tender. The lead agency/ies would provide the guidance for the national program but, in case of potential conflict of interest, others should provide the referees' reports to the funding agency/ies.

Finally, it must be noted that the table is a summary - not a comprehensive statement - and, while it is based on recent investigations and advice, it is possible that any very recent changes have not been recorded.

Excluding the proposed study of recreational fishing and any costs associated with planning a seafood consumption survey, the total cost for the initial year, comprehensive study would be at least about $1 million ($1 million to $1.5 million based on Table 3). In subsequent years, the program of rolling surveys are estimated to cost between $400,000 and $500,000. It has been pointed out that the cost in these subsequent years could be reduced - and substantially - if a reliable mail survey approach could be put in place.

The actual cost of preparing the *Annual Economic Review* and quarterly updates has not been estimated. A competent author could write these publications on a part-time basis, hence the cost of writing would not be substantial. Some printing costs could be recovered by sales.

In theory, who pays should be based on a principle, such as "beneficiary pays". As indicated in Section One of this Scoping Paper there are a number of "beneficiaries" or "users", and it could be both efficient and equitably if all paid a share. However, management agencies would be the major users. The obvious source of joint industry-government research funding is FRDC.

Table 3

Fishery/Activity	Present Situation	Comment	Action Required	No. of interviews	Indicative Cost	Research Body
Commonwealth fisheries	Program of cost and earnings studies for major fisheries, done by ABARE	ABARE's program is a proposed ongoing series. Fisheries subject to management changes to be surveyed each year. The regularity of surveys for other fisheries should be re-assessed. The possibility of making use of mail surveys (of known, reliable respondents) should be considered as a cost-minimisation measure.	All Commonwealth fisheries need to be included. Cost and earnings surveys need to be supplemented by impact studies done every 5 years. Data for impact studies could be gathered at the same time as the cost and earnings studies. AFMA would have a major role in the design of the studies.	In first year, approximately 300. Similar number every 5 years. In other years approximately 150.	In the first year, $200,000 to $400,000. Similar order of magnitude every 5 years, but expect declining real costs. In other years, $150,000 initially but expected to decline.	ABARE presently does cost and earnings surveys and is well suited to continue this work. The five-yearly impact studies could be done by universities, ABARE, private consultants, or as a joint venture.
N.S.W. fisheries	Very little data gathered.	Fisheries bureaucracy is undergoing substantial change and new directions have to be set.	As for Commonwealth fisheries above. The State advisory committee would have a major role in study design.	In first year, approximately 200 and similarly every 5 years. In other years 50-100 interviews, relating to 1 to 2 fisheries on a rolling basis.	In the first year, $100,000 to $200,000 and likewise every 5 years. Otherwise $50,000 to $75,000 per year. In both cases, the costs should decline over time.	N.S.W.-based universities and ABARE are likely contenders, but other universities and consultants could also be interested.
Victorian fisheries	History of cost and earnings studies. A number of major ones are planned. A recreational fishing study also planned.	Fisheries to be studied are being selected according to government priorities. Impact studies might be done. These studies need to mesh with the national program.	As immediately above.	In first year, approximately 250 and same number every 5 years. In other years 50 on the basis of one fishery per year.	In the first year, $80,000 to $120,000. In other years $45,000 to $60,000. Cost should decline over time.	Proposed studies to be done jointly by consultants and department. This model is attractive where local consultants have developed expertise and the department has - or is willing to acquire - in-house expertise. However, a range of bodies could be interested.
Queensland fisheries	Cost and earnings and impact studies were done in the relatively distant past. However, a history of fishery-specific studies.	The statutory responsibility of the fisheries managers is first and foremost sustainable catches, with economics a secondary matter.	As immediately above.	In first year, approximately 300. Similar numbers every 5 years. In other years 100, covering 2 fisheries per year on a rolling basis.	In the first year, $150,000 to $250,000 and likewise every 5 years but with lower costs in the future. In other years, $50,000 to $75,000 reducing over time.	Queensland-based universities are likely contenders. Queensland departmental staff, ABARE and a range of other bodies might be interested.
W.A. fisheries	Comprehensive impact study done recently and one for recreational fishing earlier. Commonwealth licence holders having refits done in W.A. were included (eg. Northern prawn boats).	The recent studies were comprehensive, covering cost and earnings data and impact data. It might be possible to disaggregate the results according to region/port.	Assess whether results of recent studies can be meshed into national program. If so, modify the W.A. model to reflect this; otherwise as for other States/Territories.	If it is assumed that there was not a recent comprehensive study, 150 interviews in first year., and the same in 5 years . In every second year 50 interviews to cover 2 to 3 small fisheries and/or the rock lobster fishery.	If 150 interviews required in first year, $100,000 and similar for every 5 years. Every second year, $45,000 to $60,000. Costs should reduce over time.	Western Australian-based academics and the Fisheries Department have built up considerable expertise and are likely to be interested in continuation of their work. Others might be interested.

Fishery/Activity	Present Situation	Comment	Action Required	No. of interviews	Indicative Cost	Research Body
S.A. fisheries	History of *ad hoc* economic studies, eg. impact of quota buy-back. Resource-sharing study underway.	Departmental officer will be formulating strategic plan and there will be emphasis on economic studies.	As for other States/Territories.	In first year, 120 interviews and same every 5 years. In other years 25 covering one major fishery.	In first year, $60,000 to $80,000. In other years $20,000.	South Australian academics would be likely contenders. Others could be interested.
N.T. fisheries	There is a history of fishery-specific cost and earnings studies. In recent years much emphasis has been on feasibility studies and modelling individual boat enterprises. Surveys are proposed for the future.	Comprehensive cost and earnings/impact studies are needed as recent studies have not had this focus.	As for other States/Territories.	In first year, 80 interviews and the same every 5 years. Every second year, 40 interviews.	In first year, $40,000 and the same every 5 years. Every 2 years $20,000. Costs should reduce over time.	The department in cooperation with university, private consultants or ABARE are likely contenders.
Tasmania	A comprehensive study has been proposed.	It is possible that the proposed study would mesh with a national approach.	Assess whether the proposed study can be meshed. If so, no need for a first year major study.	Assuming proposed study suffices for the initial comprehensive study, only need interviews in following years. However, in 5 years time a repeat of the comprehensive study required. In years between comprehensive study, 40 interviews per year, covering one major fishery.	Every 5 years cost $50,000. In other years $25,000. Costs should decline over time.	Academics from the University of Tasmania would be likely contenders. Other bodies might be interested.
Recreational fishing.	National survey proposed. Expressions of interest called for.	Important that this study takes place.	Ensure methodology appropriate, so that commercial and recreational fisheries can be compared.	Will be determined in feasibility studies.	Not known.	Numerous possibilities.
Processing	Very little comprehensive data gathered.		Major study relating to value-added and impacts ,and repeated every 5 years.	To be determined.	$120,000 each 5 years. Cost should reduce in future.	Universities and private consultants likely to be interested.
Aquaculture	Very little comprehensive data gathered.		Comprehensive, nation-wide study required. More limited studies done every two years.	To be determined.	For first year, $100,000, then $20,000 every 2 years. Costs should reduce in future.	As above. State/Territory agencies could also be interested.