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**THE ECONOMIC OUTLOOK FOR FISHERIES  
IN THE  
GREAT BARRIER REEF REGION:  
A PRELIMINARY REVIEW**

**A DISCUSSION PAPER COMMISSIONED BY THE  
GREAT BARRIER REEF CONSULTATIVE COMMITTEE**

**PREPARED ON BEHALF OF THE WORKING GROUP ON  
THE ECONOMIC OUTLOOK FOR FISHING IN THE  
GREAT BARRIER REEF MARINE PARK**

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## PREFACE

Following a decision by the Great Barrier Reef Consultative Committee (GBRCC) to establish a Working Group to study and report on the economic outlook of tourism in the Great Barrier Reef Marine Park (GBRMP) in the short to medium term (1 to 5 years), GBRCC 42 (October 1990) agreed to establish another Working Group to similarly study and report on the economic outlook of fishing (both recreational and commercial) in the GBRMP.

The Terms of Reference for the Working Group on Economic Outlook for Fishing in the GBRMP were:

- *Examine the economic outlook for the fishing industry (both recreational and commercial) in the short to medium term in the Great Barrier Reef Marine Park.*
- *Identify deficiencies in data available to monitor fishery production and effort for sustainable development.*

The former Convenor of the Working Group, Mr R. Bygott, submitted a brief report to GBRCC 43 (February 1991).

GBRCC 45 (September 1991) agreed that the Working Group maintain a watching brief on matters pertaining to the economic outlook of the Reef fishery, and noted that the Working Group was intending to prepare a more detailed report, having regard to the outcome of the reviews of several fisheries being undertaken at that time by the Queensland Fish Management Authority.

GBRCC 46 (March 1992) requested the Working Group to present a near-final report to the meeting of the GBRCC to be held in June 1992.

The Working Group, presently comprised of Dr Juffs (Queensland Department of Primary Industries, Convenor), Mr Kehoe (Queensland Commercial Fishermen's Organisation) and Mr Griffith (Queensland Sport & Recreational Fishing Council), together with co-opted members Mr Loveday (Queensland Commercial Fishermen's Organisation),

Mr Densley (Queensland Fish Management Authority) and Mr Neville (Queensland Department of Primary Industries), met in December 1991 and agreed to commission Mr Colin Bishop, Fisheries Economist, Division of Fisheries, Queensland Department of Primary Industries to draft a report on its behalf. The present report, which was compiled from a desk study of the best available information, represents the output from this process.

The Working Group is grateful to Mr Bishop for his considerable assistance with the preparation of the report.

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## 1 EXECUTIVE SUMMARY

The harvesting of fisheries products within the Great Barrier Reef Region can be divided into four discrete categories; commercial (wild harvest), commercial (aquaculture), recreational, and traditional fisheries. Within each of these categories there is a wide range of fisheries, defined primarily on the basis of species targeted and the fishing apparatus used.

In reviewing the economic outlook for these fisheries, a wide range of economic factors were identified and discussed. Those factors identified as having had a significant adverse impact on the fishing industry over the last decade include; fluctuations in currency exchange rates, the growth in international aquaculture production, the recent period of very high interest rates, growth in unemployment, and a general lack of investment and consumer confidence. Those factors identified as having a significant positive impact on the industry include; increased public awareness in the health advantages of seafood, growth in per capita seafood consumption, the expected upturn in economic activity, and an expected growth in tourism in Australia and the related restaurant trade. It is likely that many of the above factors will continue to influence the economic outlook of the fishing industry over the short to medium-term, particularly world aquaculture and the more recent positive impacts.

Of significance here is that the economic outlook for the industry in general is not necessarily the same as that faced by each individual fisherman. This is because Queensland's commercial and recreational fishing sectors are strongly individualistic, consisting of a large number of small enterprises and individuals each of which faces a wide variety of differing socio-economic circumstances. In addition, each of the Great Barrier Reef Region's fisheries has been, and will continue to be, affected differently by socio-economic trends. This is compounded by the inherent annual variability in production that occurs both within and between the various fishing grounds. As a result, the recent period of economic downturn is likely to force some notable degree of rationalisation in the form of industry restructuring, although each individual

fisherman is affected differently depending on their skills and the particular economic circumstances they face.

#### The Trawl Fishery

Total annual production from the east coast trawl fishery varies between 7 000 and 9 000 tonnes of prawns and 800 to 1 500 tonnes of scallop meat. Annual production is valued at between \$90 million and \$105 million. It is estimated that between 85-90 per cent of this product is taken in the Great Barrier Reef Region.

The volume of production is unlikely to increase over the short to medium-term as known resources are currently fully exploited. There is also unlikely to be any increase in the value of production in real terms over the short-term as a result an oversupply of prawns on world markets due to growth in world aquaculture production.

Factors such as world aquaculture production and trends in the domestic economy are likely to be major constraints in this sector's economic recovery. Australian prawn producers should not dismiss the possibility of cheap aquaculture prawns from South East Asia being targeted at domestic markets.

The current level of fishing activity in terms of vessel numbers and employment are unlikely to be sustainable over the medium to long-term. There are more vessels in the fleet than are required to land the annual production. Which fishermen leave the fishery will depend largely on the individual's economic circumstances and entrepreneurial skill.

#### The Commercial Line Fishery

Total annual commercial production from the east coast line fishery is between 4 000 and 5 000 tonnes with an estimated value of between \$25 and \$30 million. It is estimated that some 90 per cent of this product is taken in the Great Barrier Reef Region.

While potential exists to increase commercial production from this fishery over the short-term, no medium to long-term increase is

expected due to increased recreational fishing pressure in the more inshore areas.

Short-term price benefits are likely as a result of expected increased economic activity in the local tourism and restaurant sectors. These price benefits are unlikely to be sustainable over the medium to long-term as a result of increased price competition from imported fish product.

This sector of the fishing industry is expected to benefit significantly over the short to medium-term due to increased per capita consumption of fish products as a result of increasing public awareness of the benefits to human health attributed to consumption of these products.

Of significant concern is the high level of latent effort that exists within this fishery. The current downturn in the trawl fishery has created an environment in which a shift of effort into the line fishery may offer the potential for greater financial returns at the cost of those already dependent on this fishery.

#### The Commercial Inshore Fisheries

Total annual commercial production from the combined inshore crab and net fisheries is yet to be calculated for the Reef Region. The annual production from the east coast crab fishery is between 375 tonnes and 400 tonnes, with an estimated value of \$6.5 million to 7.5 million. Approximately 70 per cent of total mud crab production is landed within the Reef Region.

The relatively low level of capital investment and variable costs required to operate in this fishery have buffered it significantly from the current economic downturn. This is assisted by the high degree of diversification of fishermen across the various inshore fisheries.

Without more comprehensive information on the impact of the recreational sector on the inshore fisheries it is difficult to make any prediction on the short to medium-term outlook of the commercial sector.



However, increasing effort from the recreational sector and the loss of habitat from coastal development are likely to be the most important factors influencing the economic viability of the inshore crab and net fisheries of the Reef Region over the medium to long-term.

#### Aquaculture

While interest in aquaculture in the Reef Region has grown rapidly in the last decade this has been significantly reduced as a result of the recent economic downturn. At this stage the majority of aquaculture interest is in areas adjacent to the Reef Region (eg. terrestrial or estuarine), although some interest in the culture of clams, pearl oysters and caged fish has been expressed. There is also growing interest in the development of platform and cage culture of estuarine and marine fishes in bay and offshore areas.

The outlook for these industries was not assessed as they were only at the experimental stage. However, it is difficult to envisage the development of any large scale aquaculture ventures over the short-term considering the current domestic economic climate and trends in world production, particularly in South East Asia.

#### Recreational Fisheries

Current annual production from recreational fisheries within the Reef Region is estimated at between 4 000 and 9 000 tonnes. It is estimated that currently, over 50 per cent of the coastal population adjacent to the Reef Region participate in recreational fishing. Production from this sector is likely to remain relatively static over the short-term, though some increase is expected over the medium-term as a result of population increases and tourism.

The expected improvement in economic activity and growth in tourism are likely to result in moderate but steady growth in the number of anglers participating in the recreational fishing sector over the short to medium-term. However, increasing angler numbers will result in a congestion effect over the medium to long-term, with catch rates declining as a result of competition between anglers

over relatively finite fish stocks. This is likely to reflect positively for charter boat operators as keen anglers venture further afield in search of better quality fishing.

#### Data Requirements

Current deficiencies in the availability of detailed time series data is identified as a major constraint in analysing the short to medium-term economic outlook for fisheries within the Great Barrier Reef Region. This problem is partly being addressed through the commercial fisheries logbook program of the Queensland Fish Management Authority and administered by the Department of Primary Industries, though this has only been operational for four years. However, within the Reef Region, trends within the commercial fisheries cannot be addressed in isolation from the recreational fisheries. A recreational fisheries database is now being developed which may partially address this problem, although cost is a major constraint and is significantly hampering the collection of recreational fisheries data on an ongoing basis. In addition, the introduction of a logbook program for the charter fishing industry is currently being proposed. These programs will need to run continuously and over a significant period if medium to long-term trends in Queensland's fisheries resources are to be clearly identified.

#### Future Considerations

As highlighted above, one of the main difficulties encountered in the preparation of this report was a lack of long-term time series data on the Reef Region's Fisheries stocks, especially in the recreational area. Accordingly, it would be appropriate for the various agencies involved in the management of the Reef Region's resources to give further consideration to collection of data on fisheries stocks and their utilisation.

Another issue is the diversity of the fisheries in the Reef Region and the complexity of the economic factors involved. A more detailed study than the present study will require a dedicated allocation of significant resources over the medium to long-term.

## 2 INTRODUCTION

The purpose of this paper is to provide a broad overview of the short to medium-term economic outlook for recreational and commercial fishing within the Great Barrier Reef Region. Recognising the diversity of fishing activities that occur within the Reef Region and the differing economic circumstances they face, separate assessments are provided for each fishery. Detailed assessments of the east coast trawl fishery, the commercial line fishery, and the commercial crab and inshore net fishery are provided in separate sections of the report. The minor and the developing commercial fisheries including aquaculture, aquarium fish collecting and the trochus fishery are also briefly discussed. A broad assessment of recreational fishing within the Reef Region is also provided in a separate section of the report.

In addressing the economic outlook for each of the Reef Region's fisheries, characteristics such as the volume and value of production, the status of fish stocks, numbers of vessels, employment, and participation rates in recreational fisheries are discussed. Recent trends and developments in these fisheries are analysed in relation to the current and expected economic climate to provide an indication of the short to medium-term outlook for each of the fisheries. The potential impact of wider economic factors which impose on the fishing industry is also discussed. For the purpose of this report, the short-term is defined as one year; the medium-term, five years; and the long-term, ten years.

Where possible fisheries data specific to the Great Barrier Reef Region is presented in the report. However, in many instances there is either little in the way of current data or the data that is available relates to the entire east coast of Queensland. In such cases historical information and available knowledge of the fisheries has been used to make assumptions and provide approximate figures.

On a cautionary note it must be recognised that economic forecasts that stem from general overviews of industry sectors at the macro level are by no means an indicator of the economic situation at the

micro level. That is, the economic scenario faced by the industry in general does not represent the scenario faced by each individual fisherman. This situation arises because Queensland's fishing industry (commercial and recreational) is strongly individualistic, consisting of a large number of small enterprises and individuals each of which faces a wide variety of differing socio-economic circumstances.

### 3 FISHERIES OF THE GREAT BARRIER REEF REGION

The Great Barrier Reef Region stretches along the east coast of Queensland from Lady Elliot Island in the south to the tip of Cape York in the north. The western boundary approximates the low water mark on the Queensland coast and the eastern boundary lies well within the Australian Fishing Zone (320 kilometre limit). The coast of Queensland adjacent to the Reef Region stretches for some 4 300 kilometres and accounts for about 85 per cent of the total east coast of Queensland.

In this regard, the fisheries of the Great Barrier Reef Region include all recreational and commercial fisheries that occur along the east coast of Queensland except those in the Torres Strait, those south of Breaksea Spit on the northern tip of Fraser Island, inshore estuarine and lake fisheries and, all foreign fishing that occurs beyond the outer Reef Region boundary.

Except for the state capital, Brisbane, and the Gold and Sunshine Coast all other major Queensland coastal cities and towns act as ports for the Reef Region's fisheries. They include; Cooktown, Port Douglas, Cairns, Innisfail, Lucinda, Townsville, Bowen, Mackay, Yeppoon (Roslyn Bay), Gladstone and Bundaberg and Hervey Bay.

While none of the above cities or towns could be characterised as primarily fishing ports, recreational and commercial fishing is an important component of the economy. This is because fisheries, when viewed from an economic context, are not just the product landed but also the direct and indirect economic activity that occurs as a result of fishing. This includes investment in boats and fishing gear, maintenance of vessels and gear, the support services provided by other industries and businesses, the processing of commercial product and, the direct and indirect employment this economic activity generates.

The harvesting of fisheries products within the Great Barrier Reef Region can be divided into four broad categories. They are:

- . Commercial (wild harvest) fisheries;
- . Commercial (aquaculture) fisheries;

- . Recreational fisheries (including chartering);
- . Traditional fisheries.

For the purposes of this report the principal commercial fisheries of the Great Barrier Reef Region have been grouped into the following categories:

- . the east coast trawl fishery - targeting a variety of prawn species, saucer scallops, bugs and other marine products;
- . the reef line fishery - targeting a variety of pelagic and demersal reef fishes, including spanish mackerel, coral trout, red throat emperor (sweetlip) and cod;
- . the inshore fisheries - includes the crab fishery and a range of net fisheries targeting species such as mud crab, barramundi, threadfin salmon, grey mackerel, shark, mullet and a variety of estuarine fishes; and
- . the other commercial fisheries - includes the culture of prawns and barramundi, and the wild harvesting of bait fish, aquarium fish, oysters, trochus, pearl, and beche-de-mer.

Within the Great Barrier Reef Region recreational fishing can be divided into four distinct categories based on means of access to the resource and the species targeted:

- . Shore based angling - estuarine and foreshore fisheries where the principal species targeted are; barramundi, salmon, mackerel and a variety of estuarine species;
- . Reef line fishing - primarily an offshore fishery targeting spanish mackerel and demersal reef fish including coral trout, sweetlip, emperor and cod;
- . The game fishery - confined to Cairns and areas north targeting billfish, tunas, mackerels and sharks; and
- . Collecting fisheries - includes the recreational collecting of bait fish, aquarium fish, corals, shells and shell-grit.

Possibly the most notable characteristic of fisheries in the Great Barrier Reef Region is that except for the species targeted by the trawl fisheries, almost all other species are targeted by both the

commercial and recreational sectors. The resulting competition between and within these two user groups has obvious implications for the management of the Reef Region's fish stocks. An overview of the economic outlook for recreational fishing in general is provided in a separate section of this report.

#### 4 FACTORS INFLUENCING QUEENSLAND FISHERIES

##### Management Arrangements

When making predictions regarding the economic outlook for fishing in any area it is important to recognise that fisheries management arrangements are constantly in a state of flux. Consideration must be given to the fact that management arrangements take time to implement and the end result of these changes often have very long time horizons.

In this regard the impact of previous changes to fisheries management arrangements may not have fully taken affect. In addition, changes to fisheries management arrangements that are currently being canvassed by management agencies can have the effect of altering fishing behaviour based on a perceived impact that such arrangements would have should they be introduced.

In this regard it should be recognised that management arrangements for all of Queensland's commercial and recreational fisheries are continuously monitored by the Queensland Fish Management Authority. As a result, major reviews of management arrangements for the commercial and recreational aspects of the reef line fishery, barramundi fishery, crab fishery, and commercial otter trawl fishery are currently in progress. The outcome of these reviews is most likely to have a positive impact on the economic outlook of these fisheries over the medium to long-term.

##### Macro-economic Policies

Similarly, changes to government policies and other socio-economic factors that are often seen as divorced from the arena of fisheries management can have short-term and long-term impacts on the future economic viability of the recreational and commercial fishing industries. General examples of this include:

- changes to Commonwealth Government policies regarding fuel



excise, capital depreciation and other tax incentives for primary producers;

- fluctuations in currency exchange rates which have had a significant impact on prices paid to commercial fishermen over the past decade; and
- recent changes in the general economy including the current economic downturn, a period of high interest rates, increasing unemployment, and a general lack of confidence in the market place.

Many of the above socio-economic factors have had relatively significant impacts on the commercial and recreational fishing sectors over the last decade. This applies in particular to the more recent developments in the general economy which have resulted in a reduction in the demand for fisheries products from the commercial sector, a reduction in the flow of disposable income into the recreational fishing sector, and a reduction in investment into the aquaculture sector. As these trends are relatively recent, it is difficult to quantify their full impact on each sector of the industry at this stage. What can be said, however, is that the full negative effect of these trends is yet to flow through to the fishing industry. However, a shift towards economic recovery is expected over the short to medium-term, although the benefits of this may take some time to flow through due to the lag that is often associated with such changes.

#### Marine Park Zoning

More specific to the Great Barrier Reef Region, it must be recognised the management policies of the Great Barrier Reef Marine Park Authority have, and will continue to have, direct and indirect impacts on all aspects of fishing activities in areas under their jurisdiction. A similar outcome applies to Queensland Marine Park management policies for those areas adjacent to the Great Barrier Reef. For example, changes to marine park zoning arrangements have the potential to expand or contract the availability of fisheries resources over the short-term and long-term. In 'wild harvest' recreational and commercial fisheries this has the affect of suddenly increasing or decreasing the availability of supply of fisheries product to industry. More importantly, however,

individual recreational and commercial fishermen and collectors are affected by these policy changes in different ways and to varying degrees.

### Conclusion

All of the factors previously mentioned have the potential to impact on the economic viability of recreational and commercial fishing and collecting in the Great Barrier Reef Region over the medium, short and long-term. More importantly though, decision makers must recognise that the direction of that impact, its magnitude and the degree by which it affects each fishing sector and each individual fisherman is extremely difficult to predict when so many variables must be considered.

## 5 FISHERIES MANAGEMENT IN QUEENSLAND

### Management Structure

The principal agencies involved in fisheries management in Queensland are the Queensland Fish Management Authority (QFMA) and the Queensland Department of Primary Industries (QDPI). The QFMA was established in 1982 and is responsible for management and licensing arrangements in the commercial and recreational fishing sectors and aquaculture. The QDPI is primarily responsible for providing research, extension and enforcement capabilities in all aspects of fisheries managed by the QFMA and is also responsible for the management of fisheries habitat and wetlands.

The individual commercial fishermen of Queensland are formally represented by the Queensland Commercial Fishermen's Organisation (QCFO) while the individual recreational fishermen are formally represented by the Queensland Sport and Recreational Fishing Council (QS&RFC). Both of these bodies are represented on the Board of Management of the Queensland Fish Management Authority thereby providing them with a direct role in the development and establishment of management arrangements for the State's recreational and commercial fisheries. The Queensland Sport and Recreational Fishing Council also has direct representation to the Minister for Primary Industries through the Ministerial Advisory Council on Recreational Fishing.

It should be acknowledged that from a management point of view the fisheries of Queensland consist of the fish stocks themselves, the overall environment on which those stocks depend, and also the users of the fisheries resources within the whole community.

More recently, the growth in aquaculture and the protection of the marine environment have assumed greater importance in the management of Queensland's fisheries.

### Management of Commercial Fisheries

By far the most stringent and comprehensive management arrangements in Queensland apply to the commercial fishing sector. The principal objective of management arrangements applying to this sector is the containment or reduction of fishing effort. This is achieved primarily through a range of restrictive management policies aimed at controlling the level of inputs that can be applied to the resource by the commercial catching sector.

The overriding input control is that all of Queensland's commercial fisheries are managed under a limited entry criteria and that since 1984 there has been a total 'freeze' on the issue of any new Commercial Fishing Vessel Licenses. In addition, the fishing vessel to which that license is attached must be endorsed to operate in the particular fishery in which it is engaged. There is also a statutory requirement that persons cannot engage in fishing for commercial purposes in Queensland unless they hold a current Master Fishermans Licence.

In addition to the above entry criteria, there is a wide range of restrictions on the apparatus commercial fishermen are permitted to use when operating in a particular fishery. These restrictions are determined by regulations governing the types of apparatus that can be used; the specific design of that apparatus; and, how, when and where that apparatus can, or cannot, be used. For example, fishing nets used in all commercial fisheries are restricted in length, overall size, mesh size and, where and when they can be employed. In addition, a number of areas in Queensland are closed completely to commercial fishing while in many other areas closures are placed on a seasonal basis. In most cases the size of fish which may be taken is strictly controlled and the females of some species are totally protected.

All regulations relating to commercial fishing are based on available scientific knowledge of species biology and are adopted for the purpose of ensuring commercial yields from these fish stocks remain sustainable over the long-term. Following recent reviews of the barramundi, reef line and otter trawl fisheries, the Queensland Fish Management Authority has released a number of discussion papers

on proposed changes to management arrangements within these fisheries. These proposed changes are currently being considered by the fishing industry.

#### Management of Recreational Fisheries

The use of fisheries resources for sport, relaxation and enjoyment by the community is seen as an important aspect of fisheries management in Queensland. In this regard, the basic aim of recreational fisheries management is to ensure that populations of angling species are maintained at a sustainable level to provide rewarding catches for the recreational fishing sector.

Unlike commercial fishing, controls on recreational fishing effort through restricting the numbers of individuals participating in the fishery are not practical. This is due to the 'common property' nature of fisheries resources in that access to the fishery is seen as the right of all individuals within society. For this reason, the management of recreational fishing in Queensland is primarily directed at controlling fishing effort by way of regulations on the fishing apparatus that can be used. The need to control recreational fishing effort is a function of both the state of fish stocks and the number of individuals targeting those stocks.

In Queensland, regulations pertaining to recreational fishing include, restrictions on the number of fishing lines an individual is permitted to use, the number of hooks that can be fixed to each fishing line, the number and design of crab pots and dillies, the design and use of cast nets and bait nets. In this regard, the regulations are primarily directed at limiting the type and quantity of fishing apparatus that can be employed. These restrictions are designed to ensure anglers can catch sufficient numbers of fish to provide enjoyment while at the same time not placing excessive overall effort on the fish stocks. The use of most types of commercial apparatus by recreational fishermen is strictly prohibited.

Fish stocks are also protected through regulations relating to minimum size limits on fish and crabs, the release of female crabs, bag limits, seasonal and area closures. In the case of some fish species maximum size limits also apply while others are afforded total protection status. Options such as the adoption of bag limits on some species and changes to management arrangements relating charter vessels within the Reef Region are currently being canvassed in discussion papers recently released by the Queensland Fish Management Authority.

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Management of the Environment

In addition, commercial and recreational fish stocks are protected indirectly through the protection of their habitat. Protection of the environment that supports Queensland's recreational and commercial fish species is of major concern and is now a major focus of management efforts. To this end, the QFMA and QDPI work closely with other Queensland and Commonwealth agencies on matters such as; the establishment and management of marine parks, assessing urban and industrial development proposals that could impact adversely on the marine environment, and the undertaking of research and monitoring programs to gain a better understanding of fisheries ecology and the marine environment. The Queensland Fisheries Act also affords specific protection to marine plants and makes provision for the declaration of Fish Habitat Reserves, Wetland Reserves and Fish Sanctuaries. There are currently over 600 000 hectares of tidal habitat under Fisheries Reserve status in Queensland.

Marine park areas closed to fishing? 20/10/72 to 1-1/72 to 1/1/73 \$100 000 GUD

Surveillance and Enforcement

With over 6 500 commercial fishermen and over 40 per cent of the Queensland population participating in Queensland's fisheries, the importance of surveillance and enforcement cannot be over emphasised. Rigid enforcement of fisheries regulations is fundamental to the success of management arrangements in protecting fish stocks for present and future generations. Enforcement is, therefore, also fundamental to the medium and long-term economic

viability of the commercial and recreational fishing sectors and those industries that depend directly and indirectly on fishing.

As with the enforcement of any statutory regulations, it is imperative the user groups involved recognise that should they contravene the regulations there will be a high probability of being breached. This can only be achieved by adequate presence of enforcement officers in the field. If this is not the case, and user groups perceive the probability of being breached is low, then management arrangements cannot achieve their objective in protecting fish stocks.

There is no doubt that future population growth will be matched with a proportional growth in the demand for seafood from the commercial fishing sector and growth in the demand for access to recreational fishing stocks. The resulting increased exploitation of fish stocks and potential for conflict between and within the commercial and recreational fishing sectors over the allocation of these stocks will necessitate increasingly complex fisheries management arrangements. This, in turn, will place an even greater burden on the enforcement capabilities of fisheries management agencies over the immediate future.

In the Great Barrier Reef Region, the allocation of resources for surveillance and enforcement purposes will become greater over time when one considers the added complexity of marine park zoning arrangements and the area of reef that must be covered. In this regard, the Queensland Boating and Fisheries Patrol has recently purchased two new patrol vessels, based in Cairns and Gladstone to strengthen its offshore surveillance capacity.

In addition, the education of the commercial and recreational sectors of the fishing industry on the benefits of enforcement and surveillance for the long-term protection of fisheries resources must also be given a high priority if management objectives are to be fully realised.

## 6 THE EAST COAST TRAWL FISHERY

### Background

Within the Great Barrier Reef Region the east coast trawl fishery is predominantly centred on otter trawling for prawns and scallops although other commercial species such as bugs, squid and some fish species are an important component of the total catch. Allowing for Marine Park zoning arrangements and fisheries closures, significant prawn catches are taken throughout the Great Barrier Reef Region. The composition of catch in terms of prawn species and the seasonality of that species varies significantly as one moves up the coast. This has an important bearing on trawl fishing operations and, in particular, the high degree of mobility that now characterises the east coast fleet.

The high degree of fleet mobility along the Queensland east coast and the fact that many fishermen operate in both the prawn and scallop fisheries is an important characteristic of the trawl fishery. This makes it very difficult to identify those economic and production related aspects of the fishery that are attributable specifically to the Great Barrier Reef Region. In this regard the following discussion provides a general assessment of the trawl fishery for the entire east coast of Queensland and not just the Reef Region.

The number of vessels operating in the east coast trawl fishery is currently 942 and has continued to decline from a peak of 1 413 in 1980 as a direct result of management policies aimed at restructuring the industry to reduce capital investment and fishing effort. In its recent assessment of the trawl fishery the Queensland Fish Management Authority estimated that the current annual catch could be taken with significantly fewer vessels than are presently endorsed to operate in the fishery.

According to estimates based on CFISH logbook data, the annual catch of prawns from the east coast trawl fishery has remained relatively constant over the last three years at about 7 000 to 9 000 tonnes. The estimated value to fishermen of this product is estimated at



between \$60 million and \$75 million annually. Early estimates indicate that about 80 per cent of the annual prawn production is attributable to the Reef Region.

An analysis of catch composition over the entire east coast shows that king and tiger prawns each make up 30 per cent of the total annual catch, endeavour prawns 20 per cent, and Banana prawns 10 per cent. This varies considerably on a regional and seasonal basis. Catches in areas north of Cairns are dominated by tiger and endeavour prawns, while catches between Cairns and the southern boundary of the Reef Region consist of a mix of banana, tiger and king prawns. As previously stated, catches are distributed over the entire coast but with notable peaks at Princess Charlotte Bay, Townsville and Rockhampton within the Reef Region. The species composition of catches also varies markedly on a seasonal basis from region to region.

The trawl fishery for saucer scallops is a significant component of the east coast otter trawl fishery with an estimated gross value of production of almost \$30 million in 1990. Catches have ranged from about 800 tonnes to 1 500 tonnes of scallop meat per annum over the last three years. The scallop fishery is heavily dependant on exports with approximately 80 per cent of product being consigned to overseas markets (Trainor 1991).

The principal scallop grounds extend from Hervey Bay to Yeppoon and account for approximately 70 per cent of the total annual catch. Significant catches are also taken off Mackay, Bowen and Townsville. CFISH logbook data indicates there are approximately 300 vessels operating in the fishery at some stage during the year, although many trawler operators alternate between scallop and prawn fishing depending on seasonal factors and their assessment of expected financial returns at the time.

While CFISH logbook data does not indicate a decline in scallop catches over the four years the program has been running, the voluntary scallop logbook program undertaken by the Department of Primary Industries between 1977 and 1987 shows some disturbing trends. In combining the results of both these databases Trainor (1991) made the following observations; average catch rates have declined from about 1 000 kg/boat/day in the late 1970's to about 90

kg/boat/day in the late 1980's and, effort in terms of average days fished per boat has steadily increased over the same period. Trainor also noted that anecdotal evidence from fishermen suggested that effort in terms of total boat days had also increased dramatically.

#### Current Situation

In general, production rates from prawn trawl grounds along the east coast of Queensland have remained relatively constant if one makes allowance for annual and regional fluctuations. However, falling prices coupled with increases capital costs due to high interest rates, have significantly reduced the margins that fisherman became accustomed to in the mid to late 1980's. This has resulted in difficulties for many fishermen in meeting their debt commitments. This situation is worsened by the fact that there are more vessels in the fishery than is needed to take the current annual catch.

As a result of industry concerns in this regard, the Queensland Fish Management Authority has commissioned a working group consisting of industry, managers and scientists to review and make recommendations on future management arrangements in the fishery. The working group has produced a situation report entitled 'East Coast Trawl Fishery Situation Paper' which is currently under consideration by industry and the Authority. This has resulted in the development of a revised management plan for the prawn and scallop fisheries of the east coast which is currently under consideration by the fishing industry and the Authority.

From an economic viewpoint an important difference between the trawl fishery and other commercial fisheries on the Great Barrier Reef is that a large proportion of product is consigned to export markets. Product from the line and net and other inshore fisheries is consigned primarily to domestic markets. As a result, prices for trawl-caught product (prawns and scallops) are strongly influenced by international supply and demand relationships.

*Mr. [unclear]  
[unclear]*

In recent years the growing volume of prawn product entering world markets, primarily from aquaculture sources, has resulted in consistent oversupply in Australia's traditional export market, Japan. This, coupled with a strong appreciation in the Australian dollar against U.S. and Japanese currencies over the last four years has resulted in a significant downward pressure on Australian export prices. Due to the industry's high dependence on export markets to clear the greater proportion of production (over 70 percent), price trends on international markets have also been reflected in the domestic market, albeit to a lesser degree. In this regard, international trends have played a major role in the current economic downturn faced by the Queensland east coast trawl fishery. This situation is exacerbated by the recent period of high interest rates and subsequent downturn in the Australian economy.

The significance of exchange rate fluctuations on the Queensland trawl fishery was clearly demonstrated in the paper given by Perry Smith of ABARE at the 1989 National Agricultural Outlook Conference. Smith noted that nearly 80 per cent of the growth in the value of fisheries production between 1984-85 and 1987-88 was due to higher prices and that the higher prices received over this period were largely due to higher export returns resulting from the depreciation of Australia's exchange rate. Smith noted that the total value of exports between 1984 and 1987 rose by 22 per cent per annum and that exchange rates accounted for over half of this increase. During this period the Australian dollar fell from an all time high of over 90 cents U.S. to an all time low of less than 60 cents U.S. This resulted in Australian exports being extremely price competitive on international markets and made imports significantly less competitive in our domestic markets. This, in turn, resulted in increased demand for Australian prawns on international markets and forced domestic prices up.

This significant increase in export prices encouraged prawn producers to place a greater emphasis on targeting export markets. However, the price increase to Australian producers was mostly a reflection of exchange rate fluctuation and, in fact, prices on the Japanese domestic market had actually fallen significantly over this period. In addition, Australia's depreciated exchange rate resulted in an increase to the price of imported seafood (and substitutes for seafood) and subsequent increase in domestic prices.

Regretfully, fishermen have tended to see the current market situation as relatively unusual and the boom conditions of the mid to late 1980's as normal. In fact, the reverse is more likely the case. Excluding the influence of aquaculture on international prawn prices, the market situation currently faced by the industry is close to normal. That is, the situation faced by the industry in the late 1970's is a better guide to the long-term sustainability of the industry.

#### Outlook for the Trawl Fishery

As previously mentioned the Queensland east coast trawl fishery has been facing relatively hard times over recent years due to a combination of factors, some of which are beyond the industry's control. The current economic downturn, a recent period of very high interest rates, the appreciating Australian dollar and the staggering growth in world aquaculture production have all had a significant impact on the profitability of the industry. All of this, combined with the reduced availability of stocks of some species as a result of inherent annual variability and the overcapitalised nature of the fishing fleet have resulted in the continued downturn in catching sector profitability.

On the international scene all indications are that the growth in aquaculture production is likely to continue, though at a slower rate, over the medium to long-term. As a result, the current world market situation where prawn supplies have outstripped demand is likely to continue for some time to come. This, coupled with Australia's inability to be price competitive on world prawn markets as a result of unfavourable exchange rates indicates the international scene will be a significant factor in constraining the industry's general recovery. These two factors are expected to have a major influence on the economic viability of the trawl fishery over the medium to long-term.

The significance of this scenario is obvious when one considers that Australia currently relies on export markets to clear over 70 per

cent of its prawn production and that exports have already suffered a decline in price and volume. This indicates there is likely to be further downward pressure on prices as an ever increasing proportion of product is diverted away from export markets and onto the domestic market. While some may argue the solution lies in the sourcing of new export markets, it should be recognised that overseas producers are also active on this option and the possibility of aquaculture product from South East Asia being targeted at Australia's domestic market should not be overlooked. Although the east coast trawl fleet is not in itself as reliant on exports it will nevertheless have to face a situation where product from other Australian prawn fisheries is targeted towards local domestic markets.

Current initiatives within the marketing sector specifically aimed at offsetting the impact of aquaculture production on Australia's traditional export markets include; the sourcing of new markets in Europe and in particular the Mediterranean region; an increase in focus on domestic markets; a move away from the traditional bulk product with the processing and packaging of value added product; product differentiation - marketing the differences between wild caught species as opposed to aquaculture species; and, product identification - the establishment and marketing of brand names in the retail sector.

On a brighter note, the recent reduction in interest rates and the expected recovery in general economic activity will provide a needed boost to the industry over the short to medium-term. In addition to direct benefits such as lower capital costs, flow-on benefits in the form of increased demand from the expected growth in tourism, the associated restaurant trade and consumer confidence in general, all point to a brighter and more stable future for the industry. However, while a steady and sustainable growth in domestic demand is expected this is unlikely to be accompanied by any increase in real prices over the short to medium-term due to the international influences discussed previously. With no real increase in prices envisaged, and with the acceptance that known prawn resources along the Queensland east coast are fully exploited, the profit margins received by individual fishermen are expected to continue to decline. This is because there are far too many vessels operating in the fishery than can be sustained over the medium to long-term,

and variable production costs are likely to continue to increase in line with the consumer price index.

While it is accepted the scenario in terms of capital costs, variable costs and returns to investment vary markedly with the individual fisherman, those currently facing financial difficulties are likely to face a relatively bleak future over the short-term at least. At this stage, the only foreseeable mechanism for improving individual profit margins is through fleet restructuring in an effort to better match the availability of stocks with total catching capacity. This can only be achieved through the withdrawal of vessels from the fleet and through efficiency improvements in those vessels that remain.

A similar scenario exists for the scallop fishery with the exception that aquaculture is unlikely to play a major role over the short to medium-term. Again this industry relies heavily on export markets to clear the major proportion of production and is therefore subject to exchange rate fluctuations and international market conditions. Possibly the two greatest influences on this fishery stem from concerns over current exploitation levels and the prospect of increased effort being directed into this fishery as more vessels move away from targeting prawns in search of greater profit margins. Again there is unlikely to be any increase in production levels as known resources are currently fully exploited.

At this stage it would seem that any increase in production value for the Queensland east coast prawn and scallop fisheries is most likely to come from the processing sector by way of value adding and new product development. Success in this area is unlikely to be achieved if innovations adopted are anything other than market driven.

While the above analysis results in a relatively pessimistic outlook over the short to medium-term, it is worth noting that the trawl fishery has been down similar roads before and has a history of adjusting to suit the economic climate of the time. The current economic downturn is relatively worldwide and should not be seen as an unusual event but merely as part of the long-term cycle of highs and lows in world economic activity. Current indications are that the expected improvement in the general economy as a result of

reduced interest rates and increased producer and consumer confidence will flow on to the fishing industry in the short-to-medium term. The speed with which this occurs and its sustainability is difficult to gauge at this stage.

For the moment, it seems most likely that the level of fishing activity in terms of numbers of vessels and persons employed will remain fairly stable or decrease slightly over the short to medium-term, although this is unlikely to be sustainable over the long-term. The final outcome, of course, will depend mainly on the profitability levels of individual trawl operators in terms of efficiency criteria and debt commitments, and any industry restructuring resulting from market forces or management schemes that may need to be introduced.

The critical factor will be for the industry as a whole to reduce its input costs associated with a relatively fixed level of output. This will require improved vessel efficiencies, the better matching of catching capability with production, and improvements in responses to international market forces. To date the fleet remains relatively inefficient, over capitalised, and slow to respond to changing market forces.

## 7 THE COMMERCIAL LINE FISHERY

### Background

The Queensland commercial line fishery extends from the Queensland/New South Wales border to the tip of Cape York and effectively covers the entire east coast of Queensland. As the Great Barrier Reef Region comprises approximately 85 per cent of the east coast of Queensland and contains an even greater component of commercial line fishing activity the information presented in this section of the report relates to the entire east coast line fishery. Where appropriate, information relating specifically to the Reef Region will be presented.

The commercial line fishery is a multi-species fishery which can be divided into two distinct components; a pelagic fishery targeting a variety of mackerel species and other pelagic fishes, and a demersal fishery targeting a variety of demersal reef fish species.

The pelagic fishery is predominantly centred on spanish (narrow barred) mackerel which comprises about 25 per cent of the total commercial line fishery catch. Other mackerel species, tuna and tuna-like fish are also targeted depending on the season and local market requirements. Fishing is undertaken primarily by trolling lures of various types, although some pelagic species are also taken in the more inshore areas using drift and gill nets.

Mackerel and other pelagic species are found throughout the Great Barrier Reef Region with the greatest concentration of fishing occurring between Cape Conway in the south and Cape Flattery in the north. Spanish mackerel migrate seasonally up and down the east coast of Queensland with the main season being from August to November when the fish are migrating northwards for the spring spawning. As a result of this seasonal characteristic, the majority of mackerel fishermen also engage in demersal reef fishing during the off season. In addition, mackerel fishing is also an important secondary activity for many other commercial fishermen in the Great Barrier Reef Region. While some mackerel fishermen do range over



long distances in their search for fish, most limit their fishing to areas relatively close to their home port.

The demersal component of the commercial line fishery is associated with coral reefs and shoals along the entire east coast of Queensland, although the Great Barrier Reef Region accounts for over 90 per cent of commercial demersal fish landings. The principal species targeted are coral trout and red throat emperor (sweetlip), with species such as cod, red emperor, tusk fish and wrasse taken in significant commercial quantities. Of the total commercial line fishery catch, coral trout and red throat emperor comprise about 30 and 15 per cent respectively. Fishing is undertaken using hand lines of 60 to 80 lb. breaking strain baited with either cut fish or pilchards.

As with the mackerel fishery, the majority of commercial demersal reef fishermen operate in areas relatively close to their home port although in the more southern areas where reefs are distant from the mainland some do range far afield.

#### Current Situation

There are currently 1 963 primary vessels endorsed to operate in the commercial line fishery along Queensland's east coast. However, not all of these vessels are active in this particular fishery or within the Great Barrier Reef Region. In addition, these primary vessels are licensed to utilise about 2 000 tender vessels in association with their line fishing activities.

In a recent review of the commercial line fishery undertaken by the Queensland Fish Management Authority, Gwynne (1990), noted that there are currently about 176 primary vessels with an associated 320 tender vessels that indicate their principal fishery is the commercial line fishery. The review also found that of the 1 963 vessels endorsed to operate in the commercial line fishery, just 158 vessels accounted for 80 percent of the total commercial catch. In addition, it was found that some 1 100 line endorsed vessels had

landed zero product, with over 1 600 vessels having landed less than one tonne.

The potential for this latent effort to be directed into the commercial reef line fishery was identified in the review as a major concern to the Authority in addressing future management arrangements for the fishery.

Trainor's (1991) analysis of the CFISH logbook data for the commercial line fishery indicates a total annual catch of between 4 000 and 5 000 tonnes on the Queensland east coast. The value to fishermen of this catch is estimated at between \$25 million and \$30 million. It is estimated that about 90 per cent of total annual landings would be derived from the Great Barrier Reef Region. While about 50 species groupings are landed in the commercial line fishery, coral trout, spanish mackerel and red throat emperor account for nearly 70 per cent of total annual landings. Coral trout account for the largest single component of the catch (over 30 per cent) with between 1 100 and 1 300 tonnes caught annually. Spanish mackerel comprise the second largest component of the catch (23 per cent) with between 800 and 1 000 tonnes annually. Red throat emperor is the third largest component (14 per cent) with between 450 and 550 tonnes caught annually.

One of the main problems currently facing the commercial line fishery is the increasing reports of a decline in fish stocks on reefs within relatively close proximity to port and regional centres. This has an important bearing on the economic viability of the fishery due to the greater capital and variable costs associated with venturing to more distant fishing grounds. In recent years there has been increasing concern expressed by both recreational anglers and commercial fishermen engaged in reef line fishing that stocks in the demersal reef fishery are showing signs of over exploitation, particularly in the more inshore areas. Craik (1989), has drawn attention to a number of signs for concern about demersal reef fish stocks in the Great Barrier Reef Region, namely:

- . a decline in the mean size of reef fish caught off Townsville from 2.6kg in 1961 to 1.4kg in 1985;
- . the mean number of reef fish caught off Cairns increases with increasing distance from shore;

- . the mean number of coral trout caught off Townsville increases with increasing distance from shore (Ayling and Ayling 1985); and
- . the smaller mean size of coral trout at fished reefs in Capricornia compared with closed reefs (Ayling and Ayling 1986).

Though the above information indicates that changes are occurring in the demersal reef fish population age classes and their spatial distribution, this is an expected characteristic of any fish population subject to exploitation. What needs to be determined, however, is whether the demersal reef stocks are sustainable at the current level of exploitation or, what level of exploitation would cause stocks to become unsustainable. To date, these questions remain unanswered.

In response to this the Queensland Fish Management Authority is undertaking a major review of the reef line fishery and has released a discussion paper which canvasses a range of management initiatives aimed at addressing this problem.

In an effort to provide a better understanding of the effects of commercial and recreational line fishing on the Reef Region, the Great Barrier Reef Marine Park Authority, the Queensland Department of Primary Industries and the Queensland Fish Management Authority have committed substantial funding towards comprehensive long-term research in this area.

#### Outlook for the Line Fishery

Possibly the most important characteristic of line fishing on the east coast of Queensland is that both recreational anglers and commercial fishermen are targeting the same species, in the same areas, and with similar apparatus. This has important ramifications for the future management of both sectors of the fishery in that a change to the management arrangements for one sector cannot be made in isolation of the other. In this regard, the outcome of the Fish

Management Authority's review of management arrangements for the recreational and commercial sectors of this fishery and the proposed comprehensive joint research study will be critical to the long-term economic outlook for the commercial line fishery.

While catch and effort data for the combined commercial and recreational sectors is inadequate to provide any clear indication of trends in line fishery resources, it would seem there is little room for any expansion in the current levels of output from the commercial sector. Information from the previous section indicates that the more inshore and less remote fishing grounds of the Great Barrier Reef Region are currently fully exploited. Though some potential exists to increase the level of commercial exploitation in the more remote reef areas (the far northern and offshore reefs), this is likely to be offset by a decrease in commercial production from inshore areas as a result of increased recreational fishing pressure. In this regard it is anticipated that the current annual output of 4 000 to 5 000 tonnes from the commercial sector is not expected to increase significantly over the medium to long-term.

Another important characteristic of the commercial line fishery is that it relies almost entirely on domestic markets, with most product consigned for local consumption. Unlike the trawl fishery this has so far insulated fishermen from overseas influences and provided a relatively high degree of security in terms of prices and market outlets. While this situation is likely to remain over the short to medium-term it should not be assumed it will continue indefinitely. It is worth noting that domestic prices for most species taken in the line fishery are relatively high compared to overseas equivalents. This has encouraged the importation of reef fish and mackerel into some segments of domestic markets, more so in the southern states. Indications are that the imported product is equal in quality and generally slightly cheaper by up to \$2 per kg.

If this situation continues there is likely to be some downward pressure on prices, although the influence of imports is buffered to the extent that markets for local product have been well established for some time and local consumers (hotels, restaurants, etc) have a marked preference for locally caught product. However, the potential for imported reef fish and mackerel to enter local markets

is expected to play a greater role in the prices paid to fishermen over the medium to long-term. This, of course, will depend largely on international price movements and currency exchange rate fluctuations.

On a more optimistic note, the expected upturn in the general economy is likely to strengthen the domestic demand for product from the line fishery (particularly in the tourist and associated restaurant trade), although it is difficult to gauge how strong this growth in demand will be.

Another influence worthy of consideration is the changing dietary trends in Australia due to the growing awareness of the healthy characteristics of fisheries products, particularly fresh fish from an unpolluted environment. This can only reflect positively on the fishing industry and is expected to have an even greater impact on the domestic demand for quality seafood in the medium to long-term.

As previously mentioned, there is significant concern within management agencies regarding the high level of latent effort that exists within this fishery. This stems primarily from the fact that almost all vessels entitled to operate in Queensland's commercial fisheries are endorsed to operate in the line fishery. This, coupled with the current downturn in the trawl fishery, has created an environment in which a shift of effort into the line fishery may offer the potential for greater financial returns. From an economic viewpoint, any significant increase in effort in the commercial line fishery would place greater financial strain on the ability of those fishermen currently dependent on this fishery for their livelihood.

## 8 THE COMMERCIAL INSHORE FISHERIES

### Background

The commercial inshore fisheries of the Great Barrier Reef Region include the crab fishery and a range of net fisheries. For the purposes of this paper the commercial inshore fisheries are defined as those in which fishing activity occurs primarily in coastal rivers and estuaries, along ocean foreshores and in some cases extending across the full extent of large bays.

On the east coast of Queensland there are three principal crab fisheries based on mud crabs, sand crabs and spanner crabs. Other edible crab species taken in Queensland waters are the three spot, coral and rock crab although they collectively make up very little of the total catch. Within the Great Barrier Reef Region the only crab fishery of any significance is the mud crab fishery. Mud crabs are exploited by both commercial and recreational fishermen and are found in most estuaries and foreshores along the Queensland east coast and southern Gulf of Carpentaria. Within the Great Barrier Reef Region significant commercial catches are landed adjacent to most regional centres and in recent years Princess Charlotte Bay has increased in commercial importance. The fishery is very seasonal in nature with about 70 per cent of total landings occurring between December and June.

According to CFISH logbook figures Queensland's commercial mud crab production is between 375 to 400 tonnes annually, with an estimated value of between 6.5 million and 7.5 million dollars. Approximately 70 per cent of total production is landed within the Reef Region. Studies undertaken by the Department of Primary Industries indicate that although mud crab populations are heavily exploited by both recreational and commercial fishermen, stocks are believed to be sustainable at the current rate of resource use. Possibly the greatest threat to mud crab populations in Queensland is the loss of mangrove habitat through coastal development pressure.

The net fisheries of Queensland can be divided into two components; the beach seine and mesh net fisheries and, the set gill net and drift net fisheries. In terms of employment, the beach seine and mesh net fisheries are second only to the otter trawl fishery, the set and drift net fisheries ranks next. Queensland's net fisheries target a wide range of river, estuarine and ocean fish species, with the netting apparatus used depending on the target species.

This point needs qualifying, however, in that a majority of these fishermen operate across all net fisheries. Hundloe (1985) found that about three quarters of beach seine/mesh net fishermen also worked in other fisheries, mainly set net or drift net fishing and mud crabbing. About 80 per cent of set net or drift net fishermen have mud crabbing and beach seining as secondary and tertiary activities.

Within the Great Barrier Reef Region the most common netting apparatus used are, the set gill net for barramundi and salmon, and drift netting for grey mackerel and shark. The use of beach seine for mullet and estuarine gill net for species such as bream, whiting and flathead is less common.

#### Outlook for the Inshore Fisheries

Possibly the most important characteristic of the crab and net fisheries is that most species targeted by commercial fishermen are also targeted by recreational anglers. With the growing participation in river and estuarine recreational fishing there has been increasing pressure to reassess the current catch sharing arrangements in these fisheries, particularly the barramundi set gill net fishery.

As a result of the concerns expressed by recreational and commercial fishermen over declining barramundi stocks, the Queensland Fish Management Authority implemented a detailed management program to protect the barramundi fishery in 1981. During the development of this plan, increased fishing pressure and the loss of vital fishery habitat as a result of coastal development were identified as the

major problems threatening the future viability of the fishery. As a result of increasing concerns this plan has since been reviewed and new management arrangements have now been announced and are effective from July 1992. In addition, the crab fisheries are currently under review and the remaining net fisheries are to be reviewed during the latter half of this year and into 1993.

There is little doubt that the future economic outlook for the inshore commercial crab and net fisheries will depend largely on the outcome of these reviews in terms of the management arrangements adopted. In addition, the protection of Queensland's coastal wetlands habitat is seen as vital to the maintenance of production from inshore fisheries.

Another important aspect of the inshore fisheries is the relatively low level of capital investment required to operate across all of the associated fisheries. As a result, debt commitments, interest charges and other capital costs are relatively low. In addition, fishermen tend in most instances to operate in very close proximity to their home port or home base. These characteristics, coupled with the fact that variable costs such as fuel, wages and maintenance are also relatively low, enable inshore fishermen to remain viable through periods of industry downturn and general economic downturn.

In addition, the high degree of diversification of operators across the various inshore fisheries provides an important buffer in smoothing out the marked seasonal characteristics of these fisheries. This provides fishermen with continuity of income and employment in times of depressed market prices and uncertain product availability that are inherent in the fishery. Fishermen can rapidly adjust their fishing effort across a range of species should circumstances in the fishery change. This provides these fishermen with greater financial security in the event of economic downturns than is available in the other Queensland commercial fisheries.

Without more comprehensive information on the impact of the recreational fishing sector on the inshore fisheries of the Reef Region it is difficult to make any predictions on the future outlook of the commercial sector. However, increasing effort from the recreational sector and the subsequent pressure for changes to catch



major problems threatening the future viability of the fishery. As a result of increasing concerns this plan has since been reviewed and new management arrangements have now been announced and are effective from July 1992. In addition, the crab fisheries are currently under review and the remaining net fisheries are to be reviewed during the latter half of this year and into 1993.

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Without more comprehensive information on the impact of the recreational fishing sector on the inshore fisheries of the Reef Region it is difficult to make any predictions on the future outlook of the commercial sector. However, increasing effort from the recreational sector and the subsequent pressure for changes to catch

sharing arrangements are likely to be the most important factors influencing the economic viability of the inshore crab and net fisheries over the longer-term. The loss of vital inshore habitat through coastal zone development is also expected to become of increasing importance to the maintenance of these fisheries over the medium to long-term.

## 9 OTHER COMMERCIAL FISHERIES

### Aquaculture

A recent study by ABARE (Treadwell et al., 1992), found that in the four years to 1989-1990 aquaculture production grew from only 7 per cent of the total value of fisheries production in Australia to 17 per cent, with an estimated value of around \$218 million. Over half of the current production value stems from the West Australian pearl industry, valued at about \$112 million. The edible oyster industry (primarily New South Wales) and the culture of Atlantic salmon (Tasmania), make up another \$33 million and \$30 million respectively.

Excluding the culture of Sydney rock oysters, the aquaculture industry in Queensland is still at the developmental stage, although interest in the industry has grown at a remarkable pace over the last decade. Production of Sydney rock oysters in Queensland is estimated at about 2 million dollars. Other species at a relatively advanced stage of development in Queensland are; prawns, with a current production of 1 100 tonnes and valued at about \$11 million; freshwater crayfish, with production at 160 tonnes valued at \$2 million; and, barramundi production at 90 tonnes and valued at \$1 million.

At this early stage in the development of the industry it would seem that the greatest potential for aquaculture in Queensland exists either adjacent to, or within, the Great Barrier Region. This excludes the culture of Sydney rock oysters which have a northern growth limit just south of the Reef Region. Apart from the species mentioned above, there has been some interest shown in the cultivation of other oyster species, pearls and clams. To date the commercial production of milky and black lip oysters within the Reef Region has been dependent solely on collecting of wild stocks, while little in the way of serious investment has been expended on clam culture and the culture of oysters for pearls.

The ABARE (Treadwell et al., 1992) study carried out a detailed assessment of a number of factors that it identified as critical to

the success of each species with potential in the Australian aquaculture industry. Applying the results of their analysis to Queensland, the species with the best prospects for expansion are redclaw and saltwater crocodiles. The study found the prospects for prawns (in the tropics) and barramundi were above average although growth in these industries is likely to be constrained by a range of production and market factors. The potential for the culture of clams and cage culture of marine fishes could not be assessed as these industries were identified as being only at the experimental stage.

In the past there has been some criticism levelled at the Great Barrier Reef Marine Park Authority's attitude toward the establishment of aquaculture within the Reef Region. The main concern here is that the Authority's environmental impact assessment requirements for aquaculture are placing a prohibitive cost barrier on the establishment of aquaculture facilities within the Marine Park. Investors seem reluctant to commit extensive funds to detailed environmental assessment when they are proposing to commit their funding toward what is a relatively high risk industry.

As a result of the industry being in its early stages of development, it is characterised by a large number of small producers who are mostly production driven. At this stage production is primarily directed toward specific local markets, although some producers have broadened their outlook through the establishment of links with domestic markets, and in a few cases, export markets. The results of the ABARE study indicate there is potential for long-term sustainable growth in some sectors of the industry, although a greater emphasis will need to be placed on both production and market research.

#### Marine Aquarium Fish Collecting

Until relatively recently this sector has not been very widely exploited. However domestic demand for marine aquarium fish and associated fauna suitable for display within aquaria has increased significantly over the last decade. The decline in the value of the

Australian dollar in the mid 1980's and subsequent sourcing of overseas markets led to a significant increase in commercial collecting activity adjacent to most regional centres along the east coast of Queensland.

Catch effort data on this fishery is relatively comprehensive, primarily as a result of the requirement that quarterly production and effort returns are a mandatory requirement of annual permit renewal. For the entire east coast of Queensland the total number of permits issued annually for the fishery has increased from 30 in 1986 to 160 in 1990. In 1991, 102 permits were issued. The value of the industry is estimated at \$3.5 million per annum with approximately 130 000 to 150 000 specimens taken annually. An estimated \$12 million in capital equipment is currently employed in the fishery. Fishing effort has remained relatively constant over the last three years with between 6 000 and 7 000 person days per annum being expended annually. Approximately 55 per cent of this effort is expended within the Great Barrier Reef Region.

The principal species targeted are; angelfish, chaetodons, wrasse, damselfish, anemone fish, trigger fish, surgeonfish, and various small species of shark and ray. There has been some concern expressed within the Marine Park Authority that increased collecting pressure and the targeting of these species in readily accessible areas may affect population distribution, and this concern is currently under examination.

With the expected growth in general economic activity, increasing disposable incomes and the increasing popularity of marine aquaria as a hobby and for display purposes, this industry is likely to experience continued growth over the short to medium-term.

### Trochus

The trochus fishery is one of the oldest commercial fisheries on the east coast of Queensland with data on annual harvest going back as far as 1912. Trochus is found throughout the Great Barrier Reef Region and harvesting centres on the supply of shells for the world

button trade. Trochus meat also has a commercial market in many Asian countries but this aspect of the market is yet to be fully exploited here.

In recent years there has been an upsurge in interest in the fishery although this now seems to have reduced in line with lower market prices for trochus shell. This upsurge in interest may have been encouraged by correspondingly rapid increase in prices paid for trochus shell from \$500 per tonne to \$1000 per tonne as a result of the Indonesian fishery being closed for a few years. This fishery is now back in production and prices have now shifted back to previous levels.

The commercial trochus fishery is a limited entry fishery with production now managed on a total allowable catch limit of 350 tonnes annually (includes Torres Strait). This quota was fully taken in 1990. Total production in 1991 was about 210 tonnes, with 160 tonne of this coming from within the Great Barrier Reef Region, reflecting lower prices.

Within the Reef Region there are currently about eight master pearlery endorsed to operate in the east coast trochus fishery. These master pearlery operate with crews of between four and sixteen assistants and can use a maximum of four tender vessels in conjunction with their operations. Total employment in the east coast trochus fishery is estimated at about 150 to 160 persons.

Due to the variable nature of the trochus button industry it is difficult to determine the short to medium-term outlook of the fishery. However, the comprehensive data available on the fishery indicates that provided total allowable catches remain below 350 tonnes per annum the stocks are sustainable over the long-term. In addition there is good opportunity for value adding in the industry through the processing of meat for export and the polishing of whole shells for the ornamental shell market.

## 10 THE RECREATIONAL FISHERIES

### Background

As previously stated, an important characteristic of fisheries in the Great Barrier Reef Region is that all species targeted by recreational anglers are also targeted by the commercial sector. This applies in particular to the more popular inshore species such as barramundi, mud crabs, a wide variety of estuarine fishes and offshore species such as spanish mackerel, coral trout, sweetlip, emperor and cod. In fact, the apparatus generally used in targeting the offshore pelagic and demersal reef fishes of the Reef Region is the same for both recreational and commercial fishermen. In addition, the more minor fisheries which include the collecting of bait fish, aquarium fish, corals, shells and oysters also have significant recreational and commercial components.

Unlike the commercial sector, there is no easy, cost effective means of gathering comprehensive data on the recreational sector of these fisheries. In partially addressing this problem, the Department of Primary Industries is currently establishing a data base on various aspects of recreational fishing on a Queensland wide basis through the assistance of amateur fishing clubs. In addition, the Great Barrier Reef Marine Park Authority is expected to release the findings of a major survey of recreational fishing on the Great Barrier Reef in the very near future. These, however, offer only partial solutions.

While there is currently very limited data available on the characteristics of recreational fishing in the Reef Region, a number of studies and surveys on recreational fishing have been undertaken at the national and state level. These studies have been primarily descriptive in nature, focusing on expenditure as a measure of value and on participation rates or motor vessel registrations as a measure of effort. While they are indicative of the general popularity of recreational fishing, they are of little use in assessing the outlook of recreational fishing for the Great Barrier Reef Region. Also, these data may not be site specific.

A national survey of participation in recreational fishing (P.A. Management Consultants) found that Queensland had by far the highest per capita participation rate of all Australian states. The survey found that 47 per cent of the adult population residing outside of Brisbane (over 400 000 people) had fished at least once in the twelve months prior to the survey. The Australian average was 34 per cent. In regard to the frequency of fishing, the study found that in the two weeks prior to the survey some 24 per cent of Queenslanders had gone fishing at least once. Again, higher than any other State.

Assuming that similar, if not higher, percentages applied to the Reef Region, the above figures indicate significant levels of recreational fishing effort are most likely being directed into the Reef Region. Hundloe (1985), in reviewing previous research specific to the Great Barrier Reef, found that in the coastal centres of Rockhampton, Townsville and Cairns, over one third of households were regularly engaged in recreational fishing, while in Bowen, the figure was as high as 71 per cent.

Accepting that per capita participation rates of this magnitude have been and will continue to be relatively static, then on population growth alone recreational fishing effort in the Reef Region is both high and increasing at a significant rate.

The above comment is supported to some degree when considering trends in the registration of private motor vessels in Queensland. Queensland Department of Transport figures show that the number of registered private motor vessels in Queensland has increased from about 73 000 in 1980 to about 103 000 in 1990. This represents an increase of 40 per cent in nine years, or a growth rate of about three per cent per annum.

More specific to the Reef Region, Gwynne (1990) showed that in the major centres which are feeder zones to reef boating activity, motor vessel registrations had increased from about 37 000 in 1985 to about 42 000 in 1989. While it is recognised that not all private motor vessels are large enough to operate on the reef proper, the significant annual growth rate in registrations is indicative of increasing fishing pressure being applied by the recreational fishing sector.



The research of Hundloe (1986) provides a clearer indication of the use of private motor vessels for fishing in the Reef Region. This study found that for the regional centres of Rockhampton, Mackay and Townsville between 53 per cent and 58 per cent of private motor vessels were engaged in fishing in the Reef Region, and for Cairns the figure was as high as 75 per cent.

In addition to the use of private motor vessels, access to fisheries in the Reef Region is also gained by charter vessel and while not large in numbers this is an important component of the Region's fisheries and worthy of consideration here. Chartering of vessels for fishing, as well as for other offshore activities, takes place along the entire east coast of Queensland. Gwynne (1990) identified about 110 charter vessels with the potential to undertake recreational fishing charters on more distant reefs in the Region. These vessels are licensed to carry six or more passengers and to operate up to 50 nautical miles from their home port. In addition there are a further 345 charter vessels licensed to carry less than six passengers and operate in the more sheltered and inshore areas of Queensland waters. Not all of the above vessels would operate in the Reef Region and adjacent inshore waters, although it would be expected that a large proportion do, and that fishing would be one of the purposes for which these vessels are chartered.

Hundloe (1985) notes that a particular feature of the charter vessel fishery is that regional differences exist, particularly with regard to the type of vessel and the work they undertake. In the southern area of the Reef Region (Capricorn, Swains, etc.), extended trips of up to two weeks in duration are common and are undertaken primarily for the purpose of fishing. Further north (Mackay, Shute Harbour), a large concentration of charter vessels are centred on the Whitsunday tourist industry with the majority being used relatively close inshore for pleasure boating, scenic tours and fishing. In the Townsville region fishing is a minor component of charter boat hire with day or overnight trips being the most common. The Cairns region is unique in that it is the staging post for the black marlin game fishery, with the majority of boats specifically designed and equipped for that purpose. Nevertheless, the seasonal nature of the marlin fishery (September to December) means that many of these

vessels are catering for pelagic and demersal line fishing during the lengthy off-season.

While there is little data available on the aggregate effort and catch of recreational fishing that could be attributed directly to the charter boat industry, the number of registered vessels, their permitted range and carrying capacities indicates that this is a significant component of recreational fishing in the Reef Region. In addition, the above figures stress the importance of recreational fishing as one of the many recreational experiences sought by tourists who visit the Great Barrier Reef; in particular, the marlin or game fishery is a principal draw-card for tourists visiting the Cairns region.

Regretfully, the use of participation rates and vessel registration figures only provides an indication of the numbers of persons involved in recreational fishing in Queensland. They are not comprehensive enough to provide an indication of the frequency of participation (fishing effort) or where that effort is being applied. Most importantly, however, this type of analysis cannot provide the necessary time series data on total recreational fishing catch and effort that is required to gain a clearer picture of trends in fish stocks required for management purposes.

In response to the increasing concern being expressed over the amount of fishing pressure being applied to fish stocks within the Reef Region, the Queensland Fish Management Authority has released a discussion paper which canvasses a range of manage options aimed at addressing this problem. These options include, the introduction of recreational bag limits on reef species, revised minimum and maximum size limits and revised management arrangements for the commercial charter fishing industry.

#### Outlook for Recreational Fishing

From an economic viewpoint the outlook for recreational fishing in the Great Barrier Reef Region cannot be considered in the same manner as the commercial sector. This is because commercial fishing is primarily a business venture driven by changing market forces and measurable in terms of financial gains or losses at the individual or industry level. Recreational fishing, on the other hand, is

driven primarily by the psychic benefit the individual angler derives from participating in the activity of fishing or actually catching fish. This is not to say that recreational fishing does not have an economic component, but rather that the economic component of recreational fishing is not strictly commensurate with that of commercial fishing. As a result of this fundamental difference, the outlook for recreational fishing in the Reef Region must be assessed from a different perspective.

When considering the outlook for recreational fishing the factors which determine the total number of individuals participating in the fishery and their rate of participation must be considered. In economic terms, this is known as the aggregate demand for recreational fishing. Neumann (1986) defines the factors that will change (either increase or decrease) the aggregate demand for recreational fishing. These are:

- changes in the cost (price) of fishing;
- population growth (in the surrounding area);
- changes in household income (disposable income);
- changes in the price (cost) of substitute goods and services (other leisure activities);
- changes in the price of complementary goods and services (such as boats and fuel);
- changes in the amount of leisure time;
- changes in tastes and preferences (values and attitudes);
- success rate.

In regard to success rate, Neumann (1986) points out that, in general, what recreational anglers seek is not so much the fish but rather the fishing experience. Nevertheless, anglers anticipate some degree of success, and can, in the long-term, be expected to change their fishing location and amount of effort in response to actual success rates. That is to say, even the most casual angler will not continue to fish a certain location indefinitely if, over time, catches prove to be unsatisfactory.

While all indications are that demersal and pelagic fish stocks on the Great Barrier Reef are relatively healthy, previous information in the line fishery section of the report indicates that fish stocks

close to urban centres have declined in both volume and quality relative to those further offshore. As many recreational anglers do not have the ability (in terms of time and vessel design) to fish further offshore, the reduced success rate is likely to have a negative impact on participation rates on inshore reefs over the longer-term. However, this is likely to be more than offset by population growth in regional centres adjacent to the Reef Region as newcomers will take some time to perceive a relative decline in their success rates.

In regard to the other factors determining aggregate demand, the recent downturn in the general economy, high interest rates, rapid growth in unemployment and a previous sharp decline in tourism are likely to have had a significant negative impact on recreational fishing in the Reef Region. This is likely to have been most noticeable in the charter boat industry and game fishery, although it is most likely some changes in participation rates would have occurred across all fisheries. One possibility is that due to increasing cost, anglers who would have normally fished offshore may have increased their participation rates in the more inshore fisheries.

On a more positive note, the expected improvement in general economic activity and subsequent growth in tourism is likely to result in steady growth in the recreational fishing sector over the short to medium-term. The negative side is that over the longer-term the congestion effect brought on mostly by an increase in tourism and population growth is likely to decrease the quality of the fishing experience due to reduced per angler catches. This increase in aggregate recreational fishing effort is likely to place further pressure on fish stocks in the medium to long-term.

## 11 THE TRADITIONAL FISHERIES

Fishing by Aborigines and Torres Strait Islanders cannot be categorised as commercial or recreational fishing in the European sense of the terms. Traditional fishing, as it is commonly called, is certainly not recreational fishing in the sense of sports fishing or fishing for pleasure. Nor could it be categorised as commercial fishing in the sense that product caught is not sold for financial gain. However, Hundloe (1985) likens the act of fishing to supplement consumption of foods as being closer to a commercial activity - in a purely cashless economy - than recreational fishing. In the sense that traditional fishing does impact on the availability and distribution of resources within these communities it is worthy of consideration in this paper.

Within the Great Barrier Reef Region traditional fishing is confined mainly to areas close to Aboriginal and Torres Strait Islander communities where fishes, turtles and dugong are hunted. Other than Palm Island, situated north east of Townsville, traditional hunting for marine products has in the past been confined mainly to areas north of Cairns. However, there has been a notable increase in the number of requests by community members for permits to hunt turtles and dugong in the mid to southern sections of the Reef Region. Noting that turtles and dugong are totally protected species under Queensland fisheries legislation, exemption provisions exist which enable Aborigines and Torres Strait Islanders to take turtles and dugong for consumption by traditional means and for traditional purposes.

To date there is not a great deal of documentary evidence available on the impact or sustainability of traditional exploitation of marine resources by Aborigine and Torres Strait Islander communities. It also needs to be recognised that traditional hunting now incorporates an element of technological advancement with the use of lightweight aluminium dinghies powered by outboard motors. While this represents a significant advancement on traditional hunting techniques by providing ease of access to the resource and hence a greater potential for over exploitation, there is unlikely to be any significant shift away from the current low exploitation levels over the short to medium-term. However, the

potential for site specific over-exploitation of protected species in the more northern areas of the Reef Region is worthy of further research over the medium to long-term.

## 12 CONCLUSIONS

As previously mentioned, the purpose of this report is to provide a broad overview of the short to medium-term outlook for commercial and recreational fishing within the Great Barrier Reef Region. In doing so a range of economic factors currently impacting on the commercial and recreational fishing sectors of the Reef Region have been identified and discussed. Of significance is that many of the factors adversely impacting on the short to medium-term outlook of the fishing industry stem from the general economic downturn and are, therefore, beyond the control of industry and management agencies.

In reviewing the economic outlook for these fisheries, a wide range of economic factors were identified and discussed. Those factors identified as having had a significant adverse impact on the fishing industry over the last decade include; fluctuations in currency exchange rates, the growth in international aquaculture production, the recent period of very high interest rates, growth in unemployment, and a general lack of investment and consumer confidence. Those factors identified as having a significant positive impact on the industry include; increased public awareness in the health advantages of seafood, growth in per capita seafood consumption, the expected upturn in economic activity, and an expected growth in tourism in Australia and the related restaurant trade. It is likely that many of the above factors will continue to influence the economic outlook of the fishing industry over the short to medium-term.

Within the commercial fishing sector the above adverse economic influences have culminated in a significant loss of Australia's competitive advantage in traditional export markets and reduced profit margins as a result of increased capital costs (interest) and depressed international and domestic market prices. These problems are exacerbated by the inherent annual variability associated with fisheries production and the fact that some of the Reef Region's fishing grounds have suffered relatively poor seasons in past years. As a result, an increasing number of operators, particularly those exposed to high levels of debt, are facing financial difficulties.

It is important to recognise that the economic situation presently facing the commercial fishing industry is no different to that facing other primary producers and small businesses within the Australian economy.

While the recent reduction in interest rates and the expected growth in economic activity point to a more optimistic outlook over the medium-term, the adverse effects of the current economic downturn are likely to continue over the short-term and possibly into the medium term, though to a lesser degree than at present. The outcome of this is largely dependent on how long it takes for a return in investor and consumer confidence to be fully realised. The need for greater investor confidence is particularly relevant to the Reef Region's aquaculture industry as it is currently at a relatively early developmental stage.

On a more optimistic note, the growing trend towards increased per capita seafood consumption as a result of the products current healthy image is expected to further stimulate demand for domestic seafood products over the short to medium-term. In addition, the expected improvement in general economic activity will eventually flow-on into the tourism and associated restaurant sectors, with the Reef Region being a major beneficiary. Of course, the rate of growth in demand for domestic seafood products will be largely dependent on the rate of economic recovery.

From the individual commercial fisherman's viewpoint, however, there is unlikely to be any real growth in ex-vessel prices over the short to medium-term. This, coupled with the poor profit margins currently being realised, is likely to force a significant degree of industry rationalisation. This will be largely in the form of fleet restructuring with an emphasis on economic efficiency and a better matching of catching capacity with the natural productivity of each fishery. At this stage it is envisaged the restructuring will be industry driven as fishing vessels are forced from the fleet as a result of inefficiencies.

It should be recognised that the above comments provide a general overview of the commercial fishing industry as a whole and that each of the Reef Region's fisheries faces a slightly different scenario. This applies in particular at the regional and individual fisherman



level and a more concise outlook for each of the commercial fisheries is provided under the relevant section within the report.

Turning to the recreational fisheries of the Great Barrier Reef Region, the report has identified expected population growth and current trends in the general economy as the most important factors influencing the short to medium-term outlook for the fisheries.

The expected improvement in general economic activity and subsequent growth in tourism in the Reef Region as a result of increased consumer confidence is likely to result in moderate but steady return to growth in the recreational fishing sector over the short to medium-term. This will, of course, be tied directly to the strength of the expected economic recovery which is difficult to gauge at this early stage. While high unemployment levels will have a dampening effect on growth in this area (recreational fishing is somewhat of a luxury commodity), this is likely to be offset to some degree by population growth and the continued emigration from the southern states.

On the negative side, however, the expected increase in the aggregate number of recreational anglers and the resulting competition over relatively finite fish stocks will result in a congestion effect over the medium to long-term. That is, current per angler catch rates are expected to decline at an increasing rate over the medium to long-term as a result of increasing recreational fishing pressure. This will result in a notable decline in the quality of the fishing experience and is likely to be felt in the more inshore fisheries and on reefs close to regional centres over the short to medium-term. As a result, the potential for offshore charter operators is likely to increase over the medium to long-term.

Current deficiencies in the availability of detailed time series data is identified as a major constraint in analysing the short to medium-term economic outlook for fisheries within the Great Barrier Reef Region. This problem is partly being addressed through the commercial fisheries logbook program of the Queensland Fish Management Authority and administered by the Department of Primary Industries, though this has only been operational for four years. However, within the Reef Region, trends within the commercial

fisheries cannot be addressed in isolation from the recreational fisheries. A recreational fisheries database is now being developed which may partially address this problem, although cost is a major constraint and is significantly hampering the collection of recreational fisheries data on an ongoing basis. In addition, the introduction of a logbook program for the charter fishing industry is currently being proposed. These programs will need to run continuously and over a significant period if medium to long-term trends in Queensland's fisheries resources are to be clearly identified.

As highlighted above, one of the main difficulties encountered in the preparation of this report was a lack of long-term time series data on the Reef Region's Fisheries stocks, especially in the recreational area. Accordingly, it would be appropriate for the various agencies involved in the management of the Reef Region's resources to give further consideration to collection of data on fisheries stocks and their utilisation.

Another issue is the diversity of the fisheries in the Reef Region and the complexity of the economic factors involved. A more detailed study than the present study will require a dedicated allocation of significant resources over the medium to long-term.

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