

# The management of fisheries in the Great Barrier Reef Marine Park

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## Introduction

Fishing, both commercial and recreational, is the major extractive activity in the Great Barrier Reef World Heritage Area (GBRWHA). The commercial fishery consists of about 3700 professional fishers and 1400 vessels involved in a wide range of commercial activities, including about 800 prawn trawlers, 200-300 reef fishing operations and about 300 inshore (net and crab) operations. The direct economic value of the commercial fishery in the Great Barrier Reef region is between AUD\$150 to AUD\$200 million annually (Driml 1995).

Under the offshore constitutional settlement between the Australian States and the Australian Government the management of fisheries within the Great Barrier Reef Marine Park (GBRMP) is the responsibility of the Queensland Government through the Queensland Fisheries Management Authority (QFMA) and the Queensland Department of Primary Industries (QDPI).

The Great Barrier Reef Marine Park Authority (GBRMPA) in its aim to protect the natural qualities of the Great Barrier Reef whilst providing for reasonable use of the reef region, does have control over fishing by virtue of the use of management zones which restrict certain fishing activities in specific areas. GBRMPA well recognises that the harvesting of fish, prawns and other living resources as an established reasonable use of the GBRMP, yet GBRMPA acknowledges that fishing effects target species, non-target species and the habitat and hence has the potential for producing ecological effects in both the fished areas and the reef system as a whole.

Because of the potential overlap between the activities of the GBRMPA and fisheries management agencies, a Memorandum of Understanding (MOU) was established between the agencies to clarify roles and responsibilities. As outlined in this MOU, GBRMPA's responsibilities are primarily for the care and development of the Marine Park and are not responsible for fisheries management except for this purpose. The fisheries agencies responsibilities are defined as primarily responsible for the management of fishing and collecting operations and optimisation of the use of available fisheries resources.

Common to the charter of all resource management agencies are the principles of conservation, ecologically sustainable use, the protection of critical areas, equitable resource use, and an integrated management approach which involves the preparation of management plans in consultation with the major users and interest groups. These principles are applied as effectively as possible but for most of the fisheries within the GBRMP, the issues are extremely complex. Such issues include declining catch or a decreased average size of fish caught in some areas, increased fishing effort or a large excessive capacity in the fishery (termed 'latent effort'), potential environmental impacts of fishing activities on incidentally caught species some of which are endangered, the impacts of fishing on the marine habitat, the increase and emerging significance of the recreational fishery in resource allocation, indigenous use and rights to the resource, and issues associated with compliance of fisheries and marine park management regulations.

### **Management arrangements of the Queensland Fisheries Management Authority**

The *Fisheries Act 1994* details the legislative arrangements and regulations that apply to fisheries in Queensland. Under the Act there are also legislative arrangements for developing, implementing and repealing fisheries management plans. Management plans can be applied to specific fisheries and can be much more flexible and prescriptive than the fisheries regulations. In general for commercial fisheries, effort and catch regulations are achieved through limited entry licences, gear type and size restrictions, species size restrictions, and areas and seasonal closures. The recreational fisheries are managed by gear type and size restrictions, species size restrictions, area and seasonal closures, and bag limits on most popular species.

The QFMA has established a system of Management Advisory Committees (MAC) for all the major fisheries in Queensland. The MACs contain representation from all major stakeholder groups including recreational and commercial fishing, marine park managers, enforcement officers, research scientists, conservation and Aboriginal and Torres Strait Islanders. The MAC system works well in ensuring all interests are considered in the management of a fishery. On a more regional scale the QFMA has developed Zonal Advisory Committees (ZAC) which consider more local fisheries related matters. The ZACs have representation from local commercial and recreational, conservation, local council, local Aboriginal and Torres Strait Islander interests, and local representatives of relevant state government agencies. The MACs and the ZACs meet on a roughly quarterly basis and report directly to the QFMA Board. Currently a review of the management of all the major fisheries in Queensland is being undertaken by the MACs.

### **Management arrangements of the Great Barrier Reef Marine Park Authority**

The *Great Barrier Reef Marine Park Act 1975* provides for the establishment, control, care and development of the GBRMP. The Act has significant influence on the management and accessing of fish stocks as GBRMPA's framework for planning and management the Marine Park is provided principally by zoning plans which regulate activities such as fishing. The purpose for which areas of the Marine Park are zoned is in accordance with the following objectives:

- (i) the conservation of the Great Barrier Reef;
- (ii) the regulation of use of the Marine Park so as to protect the Great Barrier Reef, while allowing the reasonable use of the Great Barrier Reef region;
- (iii) the regulation of activities that exploit the resources of the Great Barrier Reef region so as to minimise the effect of those activities on the Great Barrier Reef;
- (iv) the preservation of some areas of the Great Barrier Reef in their natural state undisturbed except for the purposes of scientific research.

The GBRMPA has significant responsibilities for ensuring the conservation of fish stocks, within the wider context of its responsibilities. Similar complementary legislation for Queensland's marine parks is contained in the *Marine Park Act 1982* administered by the Queensland Department of Environment.

The zoning plans for each section of the GBRMP have traditionally been reviewed every five years although in recent years this period has been more protracted due to the greater activity in many areas of the GBRMP leading to a greater complexity in rezoning procedures. There is now a tendency to change from section by section reviews to reef wide amendments to zoning plans based on a particular theme or issue. It is hoped that such an approach will lead to greater consistency in zoning arrangements than currently exists between the different sections of the GBRMP.

The QFMA and GBRMPA consult regularly to ensure that fisheries and Marine Park management planning arrangements are complementary and compatible. The GBRMPA also

maintains its practice of consulting representatives of the commercial and recreational fishing organisations and individuals in the development and review of zoning plans. In practice, there is some overlap, but a good working arrangement has been established, with close involvement of the fisheries agencies when zoning plans are being developed and reciprocal consultation by the QFMA.

### **Effectiveness of the management arrangements in relation to the major Great Barrier Reef fisheries**

The degree to which the fisheries and marine park management schemes protects fished and non-fished species and their habitats is difficult to assess but could be evaluated in relation to three of the major fisheries.

#### **Trawl fishery**

The trawl fishery in the GBRWHA occurs predominantly within the Great Barrier Reef lagoon, the area between the Queensland coastline and the western margin of the mid-shelf reef complex. The fishery has two main components: (i) The inshore tiger prawn (*Penaeus semisulcatus* and *Penaeus esculentus*) and banana prawn (*Penaeus merguensis*) fisheries which occur to a maximum depth of 40 m; and (ii) the offshore fisheries, which target king prawns (*Penaeus longistylus* and *Penaeus latisulcatus*) in the central and northern sections of the park (30-50 m) and scallops (*Amusium japonicum balloti*) in the southern sections of the park. In addition, endeavour prawns (*Metapenaeus endeavouri* and *Metapenaeus ensis*) and Moreton Bay Bugs (*Thenus orientalis*) make up valuable by-catch in some areas.

The trawl fishery is a limited entry fishery. Licensed operators fish both components of the fishery and are free to fish anywhere within the GBRWHA where trawl fishing is permitted. Restrictions are placed on the size and number of nets used and also their mesh size. A logbook program has been established since 1988 and indicates that the total catch for the whole GBRWHA has fluctuated for both the tiger and king prawn fishery while catch per unit effort (CPUE) has remained relatively stable and actually increased in 1995. From the logbook data the fishery seems in sound condition although a number of issues currently face the trawl fishery including the excessive level of by-catch, the incidental capture of vulnerable turtle species, and the damage to sessile epibenthic communities. Most of these issues will be addressed in the development of the new management plan.

Both spatial and seasonal closures under fisheries management regime and the zonal management system for the GBRMP apply to the trawl fishery. Spatial closures are intended to protect fisheries habitat such as inshore seagrass beds or reserve areas free from extractive use. The area of the Great Barrier Reef lagoon that is protected from trawling is approximately 10% of which 40% is in the Far Northern Section of the GBRMP. Apart from nearshore areas much of the Great Barrier Reef lagoon south of Princess Charlotte Bay is not protected from trawling. This is a problem which GBRMPA is planning to evaluate and address in future major rezoning exercises for the entire Great Barrier Reef. Seasonal closures also apply in some areas and are designed to protect young adolescent prawns recruiting to the fishery and reaching a commercial size before fishing commences.

#### **Reef fish line fishery**

The commercial reef line fishery is also a limited entry fishery. Restrictions apply on the number of hooks used, and minimum size limits on the major species (*Plectropomus* sp, *Lutjanus* sp, and *Lethrinus* sp). The total catch of the principal species, the common coral

trout *Plectropomus leopardus* has fluctuated slightly since 1988 yet the CPUE has remained quite consistent. A number of issues currently face the fishery however, including the effectiveness of minimum sizes for hermaphroditic fish, the increasing interest in the live fish fishery, the latent effort in the fishery and what levels of fishing are ecologically sustainable in the different regions of the Great Barrier Reef.

Under the zoning plan, the GBRMPA makes no distinction between commercial and recreational operations in this fishery. The reef area that is protected is 12% of the total reef area yet approximately 65% of this protected area is in the Far Northern Section of the GBRMP. Clearly in the sections other than the Far Northern Section, very little protection is offered from fishing. Reef closures under the GBRMP zoning plan are for conservation purposes only and are not intended to be a fisheries management tool. Under the GBRMP a provision also exists, however, to nominate reefs as replenishment areas which enables suspected over-fished reefs to be closed for several years until fish stocks recover. The potential for reef closures to act as harvest refugia for fisheries management has been often speculated and attempts have been made to incorporate reef closures into the management of fish stocks in the Great Barrier Reef (QFMA 1996). Several studies of the status of fish stocks on open and closed reefs and on reefs opened to fish following years of protection suggest that fishing can significantly alter the number and size of targeted reef fish populations (Ayling and Ayling 1985, 1986). Preliminary studies at Bramble Reef which received a very high amount of fishing effort once the reef was reopened to fishing after 3.5 year closure, indicated that fishing may reduce the total coral trout population by 25% in the first two months (Sea Research 1996). How this scale of fishing affects the age and size structure of fish populations remains to be determined. However, not all studies have provided conclusive evidence that reef closures support more numerous and larger fish than their fished counterparts (Ayling and Ayling 1992) and may relate to the amount of fishing pressure, the strength of the age cohorts that are supporting the fishery and the amount of illegal fishing on protected areas.

#### Inshore gill net fishery

Two types of netting are associated with this fishery: i) beach seining and mesh netting; and ii) set net fisheries. Both components of the fishery are generally undertaken in coastal rivers and creeks, estuaries and foreshores extending to less than 0.5 km from low water mark. Beach seining targets Mullet, Whiting, Flathead, Bream and Tailor. Set netting targets fish which do not travel so much in schools such as barramundi, salmon and grunter.

The restrictions placed on the net fishery by the fisheries management agencies are limited entry plus a maximum length on net and minimum mesh size. There is a minimum size on the major fish species taken and also a maximum size limit on some species. A closed season exists for Barramundi from November to February. Spawning zones also exist at the mouths of some rivers and some estuaries are closed to commercial netting.

In the GBRWHA certain areas cannot be net fished under Great Barrier Reef and State Marine Park regulations. Gill netting impacts considerably on the exploited fish stocks and threatens vulnerable species such as dugong in a number of localities in the GBRWHA. Current zoning arrangements are potentially inadequate to counteract the decline in dugong numbers at the most significant areas in the animal's distribution.

## **A strategic approach to managing fishing impacts by the Great Barrier Reef Marine Park Authority**

To ensure that the nature conservation and world heritage values of the GBRWHA are maintained, the GBRMPA is adopting a strategic approach to managing fishing impacts which contains the following components:

### **1. Improving knowledge of fishing and its impacts**

To achieve this objective a four stage process is considered which includes:

#### *(i) Research into the environmental impacts of fishing*

Research began in 1992 into the impacts of trawling on marine ecosystems including the effects on the target species, the by-catch and the sea-bed communities, recovery of benthos after trawling, and the effectiveness of closing large areas as a management tool to conserve the prawn stocks and associated sea bottom communities. Additionally, research has been proposed to investigate the effects of reef based fishing on targeted reef fish stocks, the recovery of fished populations following protection, the gross secondary effects on non-target species and indications of sustainable levels of fishing.

#### *(ii) Spatial and temporal distribution of fishing*

The commercial fishing logbook records provide the best information of the coarse distribution of fishing effort and catch. QFMA are currently developing a database to record recreational catch and effort data. The resulting maps of fishing distributions provide indications of high fishing areas and hence potential areas of major fishing impacts. The fishing distribution maps can be refined with time as other data comes to hand and the accuracy and definition of the fishing records improve.

#### *(iii) Description of ecological communities in the Great Barrier Reef Marine Park*

Little is known about many communities in the GBRMP particularly in the inter-reefal areas and the Great Barrier Reef lagoon. Such areas have been largely overlooked by scientific research in the last two decades. The paucity of data for inter reefal areas and the Great Barrier Reef lagoon makes the mapping of these areas extremely difficult and requires the compilation of existing data to identify proxies, e.g. sediment type, that could be used to provide a coarse map of biotypes. It is expected that the limitations in the data will highlight regions where additional information needs to be collected.

#### *(iv) Spatial modelling of fishing impacts over the Great Barrier Reef Marine Park*

The spatial modelling is the culmination of the synthesis of information on where fishing occurs, what ecological communities occur in fished areas and their sensitivity and resilience to fishing impacts. With a spatial model of fishing impacts it is then possible to assess whether the current zoning regime for the GBRWHA is adequate in protecting representative habitat types, critical areas and rare and endangered species.

### **2. Adequate protection of habitats**

By compiling as much information as is available on the species and habitats in the Great Barrier Reef, the major and critical habitats in the Marine Park are identified. The aim of this work is to establish a system of ecologically representative areas, and ensure adequate protection is afforded to these habitats.

### 3. Integrated ecosystem and fisheries management

The integration of fisheries and ecosystem management in the GBRMP is being achieved through continual collaboration with fisheries management agencies and the fishing industry. It is the intent of GBRMPA to ensure effective representation is maintained on Fisheries Management Advisory Committees and by ensuring fisheries management complements the Marine Park management planning. The GBRMPA also actively supports new/improved technology to reduce by-catch and capture of vulnerable and endangered species, in association with management agencies and industry.

### 4. Protection of endangered species

By zoning and other species-specific management strategies, rare, threatened and endangered species, together with their critical habitats, are protected from the effects of fishing.

### 5. Involvement of indigenous peoples

The GBRMP continues to support traditional fisheries of Aboriginal and Torres Strait Islander peoples. The GBRMPA's strategy is to recognise and involve indigenous peoples in Marine Park management to develop management strategies for the ecologically sustainable use of the area.

### 6. Compliance

The Marine Park is used by recreational and commercial fishers, tourist operators, pleasure craft, divers and shipping. Surveillance is carried out using vessels and aircraft that regularly patrol the Great Barrier Reef, to obtain activity data and to ensure compliance with Marine Park legislation. The most prevalent offence occurring in the Marine Park is illegal fishing in the Marine National Park 'B' Zone, a 'look but don't take area'. In addition to prosecution, education is a key to reducing this activity. By informing the users about the values and attributes of the Great Barrier Reef, they will have a greater understanding and a commitment to conservation and ecologically sustainable use of the world's largest and most complex Marine Park.

## Conclusion

Fishing is an important use of the GBRMP but has the potential to impact significantly on the Great Barrier Reef. It is the objective of both the QFMA and GBRMPA to ensure that fish stocks are conserved and that fishing is ecologically sustainable. The QFMA has established a consultative management framework to allow all major interests to be incorporated into the management of Queensland fisheries. This system appears to be achieving its objective in the current review and development of all fisheries management plans. The zoning plans used in the management of the GBRMP are intended to protect the resources of the Marine Park while providing a reasonable opportunity for fishing to continue. The extent to which they do that is open to debate. A greater understanding of the environmental effects of fishing and the application of broad-scale habitat protection measures are required to be sure that the zoning plans adequately address the GBRMPA's conservation objectives.

The GBRMPA is taking a strategic approach to dealing with the impacts of fishing. The components of the strategy will serve to improve our understanding of fishing and its ecological impacts in the GBRWHA and to ensure that representative ecological communities and vulnerable species are adequately protected from extractive use. The

approach will hopefully ensure that in fished areas, fishing is undertaken in a equitable and ecologically sustainable way.

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