



Australian Government

Great Barrier Reef
Marine Park Authority

POSITION STATEMENT

Great Barrier Reef Marine Park Authority Position Statement on the conservation and management of sharks and rays in the Queensland East Coast Inshore Finfish Fishery

[Post publishing note]

This Great Barrier Reef Marine Park Authority Position Statement in relation to the *Queensland East Coast Inshore Finfish Fishery* was developed in June 2007.

The Statement was developed to inform the Queensland Government review of the fishery. Recently, the Australian Government assessed the revised management arrangements for this fishery against provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (the *EPBC Act 1999*). An independent review informed this assessment. In February 2009 the fishery was declared an approved Wildlife Trade Operation until February 2012.

The fishery is now operating under a suite of conditions and recommendations. For more information on the assessment, conditions and recommendations please refer to the Department of Environment, Water, Heritage and the Arts website: <http://www.environment.gov.au/coasts/fisheries/index.html>



Great Barrier Reef Marine Park Authority Position Statement on the conservation and management of sharks and rays in the Queensland East Coast Inshore Finfish Fishery

Overview

The purpose of this document is to state the Great Barrier Reef Marine Park Authority's (GBRMPA) position on conservation of sharks and rays in relation to the Queensland East Coast Inshore Finfish Fishery (ECIFF). The GBRMPA's primary concern for sharks and rays is ensuring their conservation in the Great Barrier Reef Marine Park (Marine Park), which includes preventing population declines and ecosystem impacts. This requires an ecosystem-based approach to the management of this fishery. The GBRMPA also provides for reasonable use of marine resources within the Marine Park so long as the use can be demonstrated to be ecologically sustainable. Around 80 per cent of sharks and rays caught on Queensland's east coast come from within the Great Barrier Reef World Heritage Area¹. Catch of sharks within the World Heritage Area has increased dramatically in recent years, with the total catch peaking in 2003 at more than three times the catch of 1988².

The Australian and Queensland Governments have expressed concerns about the long-term ecological sustainability of sharks and rays affected by the ECIFF, and further action is required to improve the ecological performance of the fishery³. High and unselective mortality of sharks and rays from targeted fishing and incidental capture in the ECIFF poses a serious risk to this important functional group of predators and to the natural systems of the Marine Park. Risk assessments have shown that some species of sharks and rays in the ECIFF catch are at 'high risk' from fishing (see *Current status of sharks and rays in the ECIFF*). By-catch in the ECIFF includes many species of sharks and rays, some of which are protected species (i.e. species in the Marine Park that are protected under the *Great Barrier Reef Marine Park Regulations 1983 Regulation 29*⁴ and need special management)⁵.

The GBRMPA considers it unlikely that adequate measures will be developed for the ECIFF in the short or medium term to ensure that targeted fishing of sharks and rays can be sustainably managed, given:

- Potentially high vulnerability of sharks and rays to overfishing
- Lack of selectivity of fishing gears used in the ECIFF, demonstrated by the large number of by-product and by-catch species
- Numerous species of sharks and rays at risk from even small levels of fishing mortality⁶
- The lack of verified data on the species biology and the fishery
- That of the few Great Barrier Reef shark species for which population estimates are known, a number have been shown to be declining
- Poor sustainability record and species collapses evident in many shark fisheries around the world, including relatively well informed fisheries with specific management plans for sharks and rays (for example school shark in southern Australia)
- Significant additional sources of human-induced mortality throughout ranges of many sharks and rays caught in the ECIFF, including managed as well as illegal, unregulated and unreported fisheries in and outside Australian waters⁷
- Poorly known distribution, abundance and life history of some shark species, for example spartooth shark (also known as Bizant River shark, *Glyphis* sp. A).

All sources of human-induced mortality should be minimised to prevent further population declines and where declines have occurred, to facilitate recovery of shark and ray populations. The GBRMPA will only support targeted fishing for sharks and rays when the fishery is able to demonstrate that targeted fishing for sharks and rays can be conducted selectively, and that all sources of fishing mortality can be controlled within sustainable levels. By-catch of sharks and rays, including protected species, should also be minimised as a matter of priority.

Summary of recommendations to the Queensland Government in relation to the ECIFF

The following summary of recommendations to the Queensland Government in relation to the ECIFF is underpinned by GBRMPA's position that until such time that the fishery is able to demonstrate that targeted fishing for sharks and rays can be conducted selectively, and that all sources of fishing mortality can be controlled within sustainable levels, there should be no targeted fishing of sharks and rays in the ECIFF.

The GBRMPA recommends, as there is considerable uncertainty as to the status of some shark species, that the fishery-wide management arrangements developed for the ECIFF should ensure that:

1. Any future targeted take of sharks and rays is selective for low risk species and at a catch level that is demonstrably sustainable.
2. Any effort removed from the target fishery for shark is not transferred to other sectors of the fishery.
3. Mechanisms to reduce the by-catch of sharks and rays (including protected species) in the ECIFF are identified and introduced within an agreed timeline.
4. There is improved by-catch reporting for sharks and rays.
5. A Code of Conduct is developed and implemented to promote best practices for handling and release of sharks and rays.
6. Education and awareness raising programmes are implemented to promote the live release and subsequent post-release survival of sharks and rays caught by commercial and recreational fishers.
7. There is improved compliance and adequate enforcement of management measures relating to sharks and rays.
8. That research is conducted on shark and ray species impacted by the fishery to inform discussions about the sustainability of any future targeted fishery for sharks and/or rays.

These recommendations are outline in detail below (see *Assessment of issues and recommendations*).

Background

Australian tropical sharks and rays have been identified as having a potentially high risk of over-exploitation⁸. The Australian Government Department of the Environment and Water Resources' (DEW) environmental assessment of the ECIFF in November 2006 identified concerns regarding the status of certain shark and ray species in the fishery⁹. The assessment of the ECIFF by the Queensland Department of Primary Industries and Fisheries (QDPI&F)¹⁰ and 2006 annual status report for the fishery¹¹ also recognised sharks and rays as a priority sustainability issue for the fishery. QDPI&F's concerns include the sustainability of current harvest levels of shark species and protected species interactions including sawfish (*Pristis* spp) and grey nurse shark (*Carcharias taurus*)¹². Risk assessments for sharks and rays caught in the ECIFF have identified a number of species with high sustainability concerns¹³ (see *Current status of sharks and rays in the ECIFF*). These assessments were conducted by the QDPI&F, CSIRO and the ECIFF Scientific Advisory Group (which advises the ECIFF Management Advisory Committee).

The GBRMPA's primary concerns for sharks and rays are ensuring their conservation in the Marine Park, which includes preventing population declines and ecosystem impacts. This requires an ecosystem-based approach to fishery management. The GBRMPA recognises that sustainable fisheries are an important and reasonable use of the Marine Park and consistent with use of the Great Barrier Reef World Heritage Area. However, it also acknowledges that fishing affects target species, non-target species and their habitats, and consequently has the potential for producing ecological effects in both the fished areas and the reef system as a whole if not managed properly. In relation to sharks and rays, the GBRMPA is working with QDPI&F and other stakeholders to ensure that fishing activities that impact these species in the Great Barrier Reef World Heritage Area and Marine Park are ecologically sustainable.

The Great Barrier Reef Marine Park Authority's obligations and responsibilities

The GBRMPA's fundamental obligation is to protect the Great Barrier Reef Marine Park and the World Heritage Area. Subsidiary objectives include providing for a range of uses consistent with the principles of ecologically sustainable use.

Attachment 1 outlines the International, National and State obligations that the GBRMPA must consider in determining its response to conservation of sharks and rays (including protected species) in the Marine Park. This list of conventions, agreements and legislative instruments is not exhaustive but rather gives a context for some of the GBRMPA's responsibilities in relation to the conservation of sharks and rays.

The GBRMPA has paid particular attention to the *National Plan of Action for the Conservation and Management of Sharks* (Shark-Plan) in developing this document (the objectives of which are detailed in Attachment 1).

Forty species (i.e. about 30 per cent) of sharks and rays that occur in the Great Barrier Reef World Heritage Area are listed as threatened internationally, nationally or in Queensland. In addition, an Australian Government commissioned overview and action plan for Australian threatened and potentially threatened marine and estuarine fishes¹⁴ found 32 shark and ray species occurring in the Great Barrier Reef World Heritage Area as being of conservation concern, some of which are 'data-deficient' (see Attachment 2 for summary table of all listings). The GBRMPA and other management agencies have an obligation to conserve these listed species. Many of these species are caught in the ECIFF (see *Interactions with the ECIFF*).

Significance of sharks and rays

Sharks and rays play an important role in marine ecosystems. As apex predators, sharks play a key role in maintaining balanced populations of prey species and ecosystem integrity¹⁵. As a functional group, sharks and rays have been fulfilling this important role for about 400 million years¹⁶. Reducing the number of sharks and rays is likely to have significant and unpredictable impacts on other parts of the ecosystem, as recently reported for the northern Gulf of Mexico and along the U.S. East Coast¹⁷.

Sharks and rays are a significant part of the culture and subsistence lifestyle of Indigenous Australians, with some species being totems of some Indigenous groups, and featuring widely in traditional stories and art. Sharks and rays are of value alive to many stakeholders of the Marine Park. There is also growing public interest in the conservation of sharks and rays, illustrated for example, by the high level of support for grey nurse shark protection areas in southern Queensland¹⁸.

Need for special management of sharks and rays

Sharks and rays need special management to prevent further population declines and facilitate recovery of depleted populations. In recent times sharks and rays in Queensland, as in other parts of the world, have come under increasing pressure. While this pressure arises from a variety of sources (for example coastal development, pollution, gear set for bather protection), the main pressure is from targeted fishing and as a by-catch of increased fishing for other species¹⁹. Some species are now threatened with extinction, and some sharks and rays have disappeared from areas where they were once found in large numbers, for example sawfish (*Pristis* spp), several species of skate and grey nurse shark²⁰.

At a global scale, the 2006 IUCN Red List of Threatened Species is the first comprehensive assessment of sharks and rays. Of the 547 species of sharks and rays assessed, 20 per cent are threatened with extinction²¹. Many shark fisheries around the world have collapsed and the IUCN assessments confirm that sharks and rays are particularly vulnerable to over-fishing and are disappearing at an unprecedented rate across the globe, reinforcing the need for special management²².

Sharks and rays are particularly vulnerable to overfishing because, in general:

- They are naturally less abundant than most other types of fishes
- They live for a long time, and mature and reproduce very slowly, making it easy to overfish stocks in a short period of time
- They are relatively easy to catch in a variety of fishing gears
- There is documented slow recovery from depletion
- Demand and prices for some shark products, including fins, are relatively high
- Species of sharks and rays captured by fisheries (as target or by-catch) are not identified and the quantities of separate species taken are not recorded
- Compliance is inadequate, particularly associated with trade in shark fins and illegal fishing activities
- There is insufficient information about the biology of species caught and pressures on them
- Widespread species may be caught in two or more fisheries²³
- Protected species, once outside the area in which they are protected, may be subject to fishing (for example great white shark is protected in Australia but not in all neighbouring countries).

The conservation and management of sharks and rays is also hindered by perceptions of them as dangerous animals or pests that have little ecological or economic value²⁴. When taken as by-catch, anecdotal reports indicate sharks and rays may be killed instead of being released alive with care for their welfare, because they are considered unimportant or pest species, or because of difficulties in handling them.

No-take areas on their own may not provide adequate protection for highly mobile or migratory animals, such as many sharks and rays, caught as target or by-catch species in fisheries. Additional management measures are usually necessary to prevent unsustainable mortality for such species.

Current status of sharks and rays in the ECIFF

The Queensland east coast has a diverse range of sharks and rays, with 134 species of sharks, rays, skates and chimeras (collectively termed 'sharks and rays') found in the Great Barrier Reef²⁵. The habitats used by many of these sharks and rays (for example estuaries and tidal rivers, foreshore habitats and coastal waters) coincide with the area used by the multi-species ECIFF. Consequently, the fishery catches many species of sharks and rays. Attachment 3 lists 20 species of sharks and rays recorded in the ECIFF commercial catch during four observer surveys over the period February – March 2002. This is likely to be an underestimate of the number of shark and ray species caught in the fishery. It is reasonable to expect that the number of species recorded in catch would increase with more extensive surveys covering a wider area and water depth range.

To date, no stock assessments have been completed for sharks and rays taken in the ECIFF. Work is underway on stock assessments for the two principle target species (Australian blacktip shark *Carcharinus tilstoni* and Spot-tail shark *C. sorrah*)²⁶. The most concerning and recent results from research has reported that populations of white tip reef sharks and grey reef sharks have collapsed on reefs in the northern and central Great Barrier Reef²⁷ (both of these species are caught by the ECIFF, see Attachment 3). The study notes the need to review the conservation status of these species²⁸.

The lack of stock assessments and population estimates for sharks and rays caught in the ECIFF mean that population declines are unlikely to be detected for most species. In light of this, risk assessments are being used to infer the ecological sustainability of species and classify sharks and rays according to their relative vulnerability to overfishing²⁹. Risk assessments for sharks and rays caught in the ECIFF include:

- Preliminary sustainability risk assessment for Queensland east coast sharks and rays published by QDPI&F in 2005 (which updates an assessment undertaken in 2003)
- Risk assessment of target and by-catch fisheries to sharks and rays in Northern Australia published by CSIRO in 2007

- An overall assessment of the risk posed by the fishery by the ECIFF Scientific Advisory Group in 2007
- 'Back on Track' species prioritisation framework by the Queensland Environmental Protection Agency, which is ongoing.

It is important to recognise that sharks and rays as a whole are at high risk of overfishing compared to most other fish targeted by fisheries when interpreting these risk assessments (see *Need for special management of sharks and rays*).

The QDPI&F preliminary sustainability risk assessment for Queensland east coast sharks and rays³⁰ used the same method as for assessment of risk to the sustainability of sharks and rays in the Northern Prawn Fishery. This method assumes the species sustainability depends on a balance between its productivity and fishing mortality attributes³¹. All 20 species of sharks and rays observed in the ECIFF commercial catch were assessed, and of these 75 per cent were found to be particularly vulnerable to even small levels of fishing mortality (Attachment 3 – Table 1).

The CSIRO risk assessment of target and by-catch fisheries to sharks and rays in Northern Australia provided fishery-level assessments, including for the ECIFF, plus a cumulative risk assessment for all northern Australian fisheries. Approximately 25 species were described as 'least likely to be sustainable' in the ECIFF (see Attachment 3 – Table 2). These species include: pigeye shark *C. amboinensis*, spinner shark *C. brevipinna*, bull shark *C. leucas*, common blacktip shark *C. limbatus*, Australian blacktip shark *C. tilstoni*, spartooth shark *Glyphis sp. A*, sicklefin lemon shark *Negaprion acutidens*, green sawfish *Pristis zijsron*, freshwater sawfish *P. microdon*, great hammerhead *S. mokarran*, graceful shark *Carcharhinus amblyrhynchoides*, nervous shark *C. cautus*, blacktip reef shark *C. melanopterus*, creek whaler *C. fitzroyensis*, winghead shark *Eusphyra blochii* and whitespotted wedgefish *Rhynchobatus australiae*.

The ECIFF Scientific Advisory Group considered information available on species biology and the species susceptibility of key species of sharks and rays caught in the ECIFF and made an overall assessment of the risk posed by the fishery (net and line sectors). Species identified as at high risk through this process were: all sawfish, grey reef shark, spartooth shark, hammerheads, whitetip reef shark and white spotted guitarfish; and a further 11 species were considered to be at moderate risk (list in Attachment 3 – Table 3).

'Back on Track' is an initiative of the Queensland Environmental Protection Agency that aims to prioritise Queensland's native species to guide species conservation and recovery³². Technical experts are assessing sharks and rays during species assessment workshops, but the results are not yet available³³.

National Recovery Plans have been developed by the Australian Government for white shark (*Carcharodon carcharius*), whale shark (*Rhincodon typus*), and grey nurse shark (*Carcharius taurus*) (see Attachment 1).

The abundance of sawfish appears to be much reduced over their Queensland east coast range, based on the absence of sawfishes in commercial catch during an observer programme and declining catch frequencies in the Queensland Shark Control Program long-term data series³⁴. Sawfish inhabit freshwater, estuarine and marine waters, with a preference for coastal bays and foreshores³⁵. Unfortunately, this preference, in combination with their toothed rostrum, makes them vulnerable to capture in all forms of fishing nets, including those used in the ECIFF³⁶. Sawfish are also vulnerable to capture by baited line³⁷. Their fins and rostrums fetch high prices in national and international trade, and sawfish are of high value in the aquarium trade³⁸. The freshwater sawfish is listed as vulnerable in Australia³⁹. Australian populations of sawfish are considered particularly important given the poor condition of global populations⁴⁰. Sawfish (Family Pristidae) have recently been listed under the *Convention on the International Trade of Endangered Species of Wild Flora and Fauna* (CITES, see Attachment 1 and 2 of this document)⁴¹.

Interactions with the ECIFF

Depending on species, sharks and rays may be target, by-product, by-catch or discard species in the ECIFF. The total pressure by the ECIFF on sharks and rays is considerable (Attachment 4); this is the largest and most diverse fishery in Queensland comprising a commercial sector of about 800 fishers, a large recreational sector of about 800 000 anglers and an Indigenous sector⁴².

Some sharks and rays caught in the ECIFF are shared with other jurisdictions in Australia, as well as international fisheries such as Indonesia and Papua New Guinea (for example grey nurse shark, tiger shark, blacktip sharks⁴³). It is important to consider overall human-induced mortality levels in determining management responses.

Fisheries trends

The QDPI&F ecological assessment of the ECIFF acknowledged that sharks and rays have been largely an incidental part of the catch from the Queensland east coast, although there has been a trend towards increased targeting of sharks by the ECIFF in the last ten years⁴⁴ (also Attachment 4). There has been increased pressure on shark populations with more specialist shark fishers entering the fishery and/or existing fishers becoming more efficient or switching target species⁴⁵. The increased targeting of sharks has been largely unchecked, however an investment warning for the ECIFF was issued by the QDPI&F in April 2002, stating that increases in level of catches or fishing effort might not be recognised in future management arrangements. Subsequently, the need for specific restrictions on the targeting of sharks and rays in the ECIFF are being considered by the QDPI&F⁴⁶.

The emerging target fishery for shark in eastern Queensland was not part of the inshore finfish fishery when the Great Barrier Reef Marine Park was established. Today, the largest proportion of the ECIFF shark harvest is taken in the Great Barrier Reef, it being 85 per cent of the total commercial ECIFF shark catch in 2003⁴⁷.

Catch and effort for sharks and rays in the ECIFF has increased substantially in recent years, especially amongst those fishers who deliberately target sharks, and more recently rays⁴⁸. For example, the catch of sharks and rays by the net fishing component of the ECIFF in the Great Barrier Reef World Heritage Area increased from 147 tonnes in 1990 to a peak of 1202 tonnes in 2003 (QDPI&F's CHRIS database accessed on 6 March 2007). Logbook data for the ECIFF does not record catch data for most individual species of sharks and rays. The fishing gear used in the fishery (particularly mesh nets used by commercial fishers and hooks and lines used by recreational fishers and some commercial fishers) catches some sharks and rays even when they are not being targeted. Therefore, given the high total fishing effort in the ECIFF, pressure on by-catch species, including protected species, may be considerable.

Discarded species are not generally recorded in commercial and recreational catch records, but may result in a significant additional mortality for some species of sharks and rays. For example, anecdotal evidence suggests that some commercial and recreational line fishers deliberately kill 'pest' sharks and discard them to reduce the incidence of sharks biting off lines or attacking target fish species. A further issue which may cause injury, illness or even mortality is hook-related damage and/or stress from capture and handling of sharks and rays.

Composition of the catch

Information on species composition in the catch is limited, however 20 species of sharks and rays were recorded in the commercial catch during only four observer trips (Attachment 3⁴⁹). For comparisons, 28 species of sharks and rays were recorded in the Gulf of Carpentaria Inshore Finfish Fishery⁵⁰. It is noteworthy that the primary target species of shark in the ECIFF (Australian blacktip shark, *C. tilstoni* and Spot-tail shark, *C. sorrah*) accounted for only 40 per cent of total catch of sharks and rays, with a further 18 species taken (Attachment 3). This is a lower proportion of primary target species than found in a previous study of northern sharks⁵¹. The limited ECIFF observer data indicates the unselective nature of the fishing gear used in the ECIFF in relation to the capture of

sharks and rays⁵². In addition, the overlapping species distributions of many sharks and rays suggest it would be very difficult to target a particular species without significant by-catch of other species at higher risk of overfishing, particularly if large mesh nets are used.

The scalloped hammerhead (*Sphyrna lewini*) was a significant part of the Queensland shark catch (18 per cent of commercial catch in the ECIFF during observer trips, Attachment 3), and is one of the species that risk assessments by QDPI&F and CSIRO have identified as having a high sustainability risk⁵³ (see Attachment 3). The grey reef shark (*C. amblyrhynchos*) made up 6.6 per cent of the shark catch (Attachment 3). Based on the average catch of sharks from 1990 to 2005 (793 tonnes per year, from data in Attachment 4 Figure 1), these proportions equate to estimated catches of 143 tonnes per year for scalloped hammerhead and 52 tonnes per year for grey reef shark. Other species considered to be at high risk in QDPI&F's published assessments include the great hammerhead (*S. mokarran*) (2.9 per cent of catch) and white-spotted guitarfish (*Rhynchobatus djiddensis*) (0.4 per cent of catch).

By-catch in the ECIFF includes rays (*Rhinobatus typus*, *Dasyatis kuhlii*, *Himantura uarnak*, *Rhinoptera neglecta*), sharks (*Loxodon macrorhinus*, *Eusphyrna blochii*, *Orectolbus ornatus*) and sawfish⁵⁴. Fishing practices will influence the interactions with by-catch species. For example, the capture of benthic dwelling by-catch species such as sawfish and rays may increase when nets are in contact with the seafloor. To date, effective management or gear design measures to address by-catch issues have not been developed⁵⁵.

Protected species of sharks and rays

Five shark species in the Marine Park are currently listed as threatened species under Queensland and Commonwealth legislation: great white shark (*Carcharodon carcharias*), whale shark (*Rhincodon typus*), grey nurse shark, spartooth shark and freshwater sawfish (*Pristis microdon*)⁵⁶. These species are protected species in the Marine Park and are considered in the *Great Barrier Reef Marine Park Authority Position Statement on the Conservation and Management of protected species in relation to the Queensland East Coast Inshore Finfish Fishery (April 2007)*.

The GBRMPA's management intent for sharks and rays

The GBRMPA's objective in relation to sharks and rays is to ensure their long-term conservation by facilitating the recovery of populations that have declined, preventing future declines in populations, and only supporting commercial, recreational and Indigenous uses that have been demonstrated to be ecologically sustainable.

Meeting this objective will need a prompt and substantial reduction in the mortality of sharks and rays. To facilitate this, the GBRMPA recommends:

- No targeted take of sharks and rays by commercial and recreational fishing; and
- Immediate measures be introduced to minimise incidental capture of sharks and rays in the ECIFF.

Achieving this objective will require close collaboration with stakeholders, other Australian and Queensland government agencies and research providers, and education of Marine Park users about the need to conserve sharks and rays.

Assessment of issues and recommendations

In summary, sharks and rays are particularly vulnerable to targeted and incidental fishing, and need special management. The GBRMPA recognises that pressures on sharks and rays are the result of multiple factors, including impacts by the ECIFF. There are concerns about the long-term ecological sustainability of sharks and rays interacting with the ECIFF, and the DEW assessment of the fishery indicated further action is required to improve the ecological performance of the fishery⁵⁷. Pressure on sharks and rays from targeted fishing and incidental capture in the ECIFF has substantially increased since the 1990s. Fishing gear used in the ECIFF is relatively unselective in relation to sharks and rays,

and assessments indicate that 75 per cent of the key species in the commercial catch are particularly vulnerable to even small levels of fishing mortality⁵⁸.

The GBRMPA's primary concern for sharks and rays is ensuring their conservation in the Great Barrier Reef Marine Park, which includes preventing population declines and ecosystem impacts. Special management of sharks and rays using an ecosystem-based approach is required as a matter of priority in light of high ecological sustainability risks, rising global demands for shark products and the lack of information on sharks and rays and the fishery.

Based on the above information, the GBRMPA makes the following recommendations to the Queensland Government in relation to the ECIFF. With about 80 per cent of the ECIFF shark catch coming from within the Great Barrier Reef World Heritage Area and the wide-ranging nature of many species of sharks and rays⁵⁹, these recommendations are applicable fishery wide.

1. No targeted take of sharks and rays in the ECIFF

The QDPI&F acknowledge that the ECIFF has changed from taking sharks and rays largely as an incidental catch to increased targeting of sharks and rays by some fishers in the last ten years⁶⁰. Pressure on stocks of sharks and rays has increased, with more specialist shark fishers entering the ECIFF and/or the existing fishers becoming more efficient or switching target species⁶¹. Many of the sharks and rays caught in the ECIFF are also subject to other significant sources of human-induced mortality throughout their ranges, including managed and illegal fisheries in and outside Australian waters⁶². To date, no management measures have been agreed for the high risk species⁶³. However, the need for specific restrictions on the targeting of sharks and rays in the ECIFF are being considered by the QDPI&F⁶⁴.

The major conclusions in the QDPI&F preliminary sustainability assessment included that consideration be given to management intervention for high risk species of sharks and rays, particularly for some hammerheads and guitarfish⁶⁵. Sawfish, guitarfish, shovelnose rays and some whaler sharks have been identified as particularly susceptible to fishing mortality⁶⁶. The recently published CSIRO risk assessments identified 25 species of sharks and rays as 'least likely to be sustainable' in the ECIFF⁶⁷. The DEW recommended interim management measures should be in place for any species identified as at significant risk until stock assessments and resultant management measures are implemented⁶⁸. The GBRMPA agrees this should be a priority and recommends management intervention to minimise mortality of all species of sharks and rays at significant risk of overfishing identified through an agreed assessment process.

In line with the precautionary principle approach called for by DEW, and in light of the lack of selectivity of current fishing practices for sharks and rays, the GBRMPA considers that unselective, targeted fishing of sharks and rays in the ECIFF poses an unacceptable risk to this important functional group of predators and to the natural systems of the Marine Park. Until such time that it is able to be demonstrated that fishing for sharks and rays can be conducted selectively, and that all sources of fishing mortality can be controlled within sustainable levels, the GBRMPA does not support targeted fishing of sharks and rays in the ECIFF.

The continued targeted fishing of sharks and rays is only acceptable if the management regime in place is capable of substantially mitigating ecological risk and it can be demonstrated that the take of shark and rays is species selective for low risk species through an agreed assessment process and at a catch level that is demonstrably sustainable.

2. No transfer of any effort removed from the target fishery for shark

Management mechanisms must be introduced to ensure that any effort removed from targeted shark fishing operations is not displaced into other sectors of the ECIFF. Increased effort in other ECIFF sectors would be undesirable because this could increase interactions with protected species such as dugongs, increase pressure on finfish stocks, and may lead to resource allocation conflicts.

3. *By-catch of sharks and rays (including protected species) to be reduced*

By-catch, including that of sharks and rays, is a significant issue in the ECIFF. For mixed species fisheries such as the ECIFF, it is important that by-catch of sharks and rays is addressed before their population numbers are reduced to critically low levels⁶⁹. Many depleted populations of sharks and rays are likely to be very slow to recover⁷⁰, and some Australian and overseas populations have shown no recovery over decades⁷¹. In addition, the lack of species-level data could be masking threats to some species⁷².

The QDPI&F have recognised the need for a more precautionary approach to sharks in developing a revised management regime for the multi-species ECIFF, and that particular consideration must be given to managing the less productive species of shark so that depletion of their numbers is mitigated⁷³. The DEW assessment also emphasised the need for appropriate measures to mitigate the level of by-catch, and given the lack of definitive species or fishery data, a precautionary approach is required.

Therefore, it is critical that management and operation of the ECIFF minimise by-catch of sharks and rays to facilitate population recovery of species that have declined, prevent future population declines and improve ecological performance of the fishery. Gear and fishing operations should be tailored to optimise catch of target species while reducing by-catch of sharks and rays (for example optimising net mesh size and localised fishing effort). Handling procedures should also be evaluated and improved to enhance the survival of by-catch and discard species (including sharks and rays) caught by all sectors (see recommendation #5).

4. *Improved by-catch reporting for sharks and rays*

The most recent detailed assessment of by-catch in the ECIFF took place between April 1998 and July 2000⁷⁴, however fishing practices in relation to sharks and rays appear to have changed markedly in the last six years (for example increased targeting of sharks and retention of rays, see Attachment 4). By-catch reporting requirements should be improved to meet the standards required in the *National Plan of Action for the Conservation and Management of Sharks*.

Currently, there is no ongoing comprehensive collection of by-catch data in the ECIFF and no legal requirement for operators to record discards, other than Species of Conservation Interest, in commercial logbooks. Species of Conservation Interest reporting currently includes the following sharks: Whale Shark, Great White Shark, Grey Nurse Shark, Narrow Sawfish, Green Sawfish, Freshwater Sawfish, Wide Sawfish and Dwarf Sawfish (note: spartooth shark is not included). All interactions with listed threatened species are required to be reported by commercial fishers⁷⁵. The by-catch and discards from the recreational fishing sector is poorly known. While recreational release rates appear to be high for many species, the post-release survivorship of sharks and rays is unknown. The fate of these sharks and rays should be investigated and appropriate mechanisms introduced to reduce by-catch and to promote increased survivorship post-release. Further analysis of data regarding interactions was recommended by the DEW assessment of the fishery with a view to identifying factors which may be contributing to the catch and implementing appropriate mitigation measures.

To address these information gaps, an observer programme should be implemented and form a key component of ongoing comprehensive collection of by-catch data for the fishery. Such an observer programme should cover the latitudinal extent of the fishery in addition to the various sectors of the fishery. All logbook data, including the Species of Conservation Interest data collection from logbooks, needs validation. This validation could occur via an independent observer programme.

5. *A Code of Conduct for sharks and rays*

Improved fishing and handling practices that reduce the incidence of by-catch and enhance the post-release survival of sharks and rays should be developed and promoted through education and awareness raising programmes (see recommendation #6). A Code of Conduct that promotes best practices for handling and release of sharks and rays should be developed jointly with fishers.

Strategies to encourage the uptake of best practice should be developed, for example incentive schemes.

6. Education and awareness raising programmes to promote the conservation and live release of sharks and rays by all fishers

Education and awareness raising programmes could help to reduce the impact of by-catch. By-catch includes all discarded catch and catch that is not landed but that is killed as a result of interaction with fishing gear, including all forms of cryptic fishing mortality that is unaccounted for in quantifying removals from stocks of sharks and rays⁷⁶. The GBRMPA recommends that education and awareness raising programmes are implemented to promote the live release and subsequent post-release survival of sharks and rays caught by commercial and recreational fishers. Fishers should be educated about the ecological and economic values of sharks and rays as living resources to prompt them to follow best practice when releasing animals taken as by-catch.

7. Improved compliance and adequate enforcement in relation to sharks and rays

The DEW assessment noted that existing compliance arrangements for the ECIFF are inadequate to monitor and identify breaches. Issues identified of particular relevance to the sustainability of sharks and rays include inadequacies in: commercial catch limits including shark catch controls; monitoring of recreational catches, including from charter vessels (including black marketing); and controls to minimise interactions with protected species, subsequent reporting of interactions with protected species and assessment of fate of animals after such interactions⁷⁷.

The GBRMPA recommends that greater targeted enforcement of rules associated with the ECIFF should commence with the introduction of the management plan for the fishery. A risk-based process should be used to determine priorities for compliance and enforcement. Additionally, compliance relating to the trade in shark products, particularly shark fins, should be a priority.

8. Research on sharks and rays taken as target or by-catch

Research should be conducted on shark and ray species impacted by the ECIFF to inform management. The GBRMPA has listed research on sharks and rays as one of its 21 Critical Research Questions. Specifically: *What is the risk to elasmobranch (sharks and rays) populations taken in commercial mesh net, line and recreational fisheries (including species and quantities taken)?* Other priority research questions relating to sharks and rays are contained in *Research Needs for the Protection and Management of the Great Barrier Reef Marine Park*⁷⁸.

Assessing the risk to Great Barrier Reef sharks and rays will require the following information:

1. The species composition and quantities of the catch of sharks and rays in the commercial mesh net and line fishery, and in the recreational and Indigenous fishery
2. Biological, ecological and population data to feed into risk and stock assessments
3. Habitat use and movement of key shark and ray species
4. Measures to minimise the by-catch of sharks and rays (for example modified netting practices)
5. Information on the post-release survival of sharks and rays taken as by-catch

Such information is currently lacking for sharks and rays impacted by the fishery, and is needed as a matter of priority to inform discussions about the sustainability of any future targeted fishery for sharks and/or rays. In addition, the GBRMPA supports the QDPI&F's suggestion that the survival rates of released fish require investigation, particularly given the high percentages of catch discarded through catch and release procedures in the recreational fishery⁷⁹.

Research and stock assessment of priority sharks and rays in the Marine Park would be undertaken in accordance with the GBRMPA's *Policy on Managing Activities That Include the Direct Take of a Protected species From the Great Barrier Reef Marine Park* and the *Policy on Managing Scientific Research in the Great Barrier Reef Marine Park*⁸⁰.

Attachment 1. Obligations and responsibilities to sharks and rays in the Great Barrier Reef Marine Park

Following is a list of key species conservation and fisheries instruments that the GBRMPA must consider in determining its response to shark and ray conservation issues in the Marine Park. This list is not exhaustive but rather gives a context for some of the GBRMPA's obligations in relation to sharks and rays to various conventions, agreements and pieces of legislation.

International

Australia is a signatory to and a participant in several international conservation conventions. By being a signatory or a participant, the Australian Government has committed to implement and follow the principles of the agreements.

- Convention for the Protection of the World Cultural and Natural Heritage (World Heritage Convention)
- Convention on Biological Diversity
- Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention)
- Convention on the International Trade of Endangered Species of Wild Flora and Fauna (CITES)
- International Plan of Action For the Conservation and Management of Sharks (IPOA-Sharks)
- FAO Code of Conduct for Responsible Fisheries (Food and Agriculture Organization of the United Nations)

A number of shark species are listed (see Attachment 2 of this document) under CITES including sawfish (Family Pristidae)⁸¹.

National

- *Environment Protection and Biodiversity Conservation Act 1999*
The Australian Government assesses the management of commercial fisheries in the Marine Park through the *Environment Protection and Biodiversity Conservation Act 1999* (the *EPBC Act 1999*). These assessments help to ensure that fisheries are managed in an ecologically sustainable manner.

The *EPBC Act* contains measures to protect threatened species. The *EPBC Act* lists the great white shark (*Carcharodon carcharius*), whale shark (*Rhincodon typus*), and freshwater sawfish as 'vulnerable', and the east coast population of the grey nurse shark (*Carcharias taurus*) and the spartooth shark as 'critically endangered'. All three species are rare in the Marine Park as they are only occasionally sighted or encountered. The Department of the Environment and Water Resources have developed recovery plans for the great white, grey nurse and whale sharks.

Nominations for listing as threatened species under the *EPBC Act 1999* include Endeavour dogfish (*Centrophorus moluccensis*), which is found in the Great Barrier Reef Marine Park.

- National Plan of Action for the Conservation and Management of Sharks
In 2004 the Australian Government launched the Australian [*National Plan of Action for the Conservation and Management of Sharks*](#) (Shark Plan) to fulfil Australia's obligations under the United Nations Food and Agriculture Organisation's International Plan of Action for the Conservation and Management of Sharks. The Shark Plan provides a national framework for actions to conserve sharks and rays, and assists Marine Park and fisheries managers in developing conservation and management plans. The objectives of this Shark Plan are those identified in the IPOA-Sharks, which are:
 - i. To ensure that shark catches from target and non-target fisheries are sustainable
 - ii. To assess threats to shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use
 - iii. To identify and provide special attention, in particular, to vulnerable or threatened sharks

- iv. To improve and develop frameworks for establishing and coordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States
- v. To minimise unutilised incidental catches of sharks
- vi. To contribute to the protection of biodiversity and ecosystem structure and function
- vii. To minimise waste and discards from shark catches in accordance with article 7.2.2. (g)³ of the Code of Conduct for Responsible Fishing (FAO 1995) (for example, requiring the retention of sharks from which fins are removed)
- viii. To encourage full use of dead sharks
- ix. To facilitate improved species-specific catch and landings data and monitoring of shark catches; and
- x. To facilitate the identification and reporting of species-specific biological and trade data.

The GBRMPA also must have regard to Australia's:

- National Strategy for Ecologically Sustainable Development
- National Strategy for the Conservation of Australia's Biological Diversity
- National Oceans Policy
- National Bycatch Policy
- National Strategy for the Conservation of Australian Species and Communities Threatened with Extinction.

Queensland

- *Fisheries Act 1994*

Queensland Fisheries Regulation 1995 and Management Plans lists species of fish that may be taken under each type of fishery (for example recreational, net, trawl, line). If the species is not listed, it cannot be taken. These lists do not contain information about the conservation status of any species.

Fishing activities in the Marine Park are managed by the Queensland Department of Primary Industries and Fisheries (QDPI&F) through fisheries plans and regulations. These set out the rules for commercial fisheries and recreational anglers such as the type of fishing gear that may be used, the number of commercial fishing boats allowed in a fishery and size and bag limits. Protected species such as grey nurse sharks and great white sharks cannot be kept. It is illegal to cut the fins off a shark and dump the carcass at sea. However, there are currently no other restrictions on the take of sharks and rays.

- *Nature Conservation Act 1992*

Nature Conservation (Wildlife) Regulation 1994 lists the grey nurse shark as critically endangered.

The Queensland Environmental Protection Agency (EPA) is conducting a programme to prioritise Queensland's native species to guide species conservation and recovery. The 'Back on Track' framework is designed to prioritise all species, regardless of their current classification under the Queensland *Nature Conservation Act 1992* or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, to better reflect the level of management required for conservation and recovery. The framework is used to score plant and animal species from marine, freshwater and terrestrial habitats; this includes scoring sharks and rays. Multiple criteria are used to identify those species that are most in need of conservation action and have the greatest chance of recovery.⁸²

- *Marine Parks Act 2004*

Within the Great Barrier Reef Marine Park

In addition to the above-mentioned obligations, the following also apply within the Marine Park.
Great Barrier Reef Marine Park Act 1975

- Under the *Great Barrier Reef Marine Park Act 1975*, the GBRMPA is required under s.32 (7) to have regard, among other things, to the 'conservation of the Great Barrier Reef'.
 - Under *Great Barrier Reef Marine Park Regulations 1983*, Regulation 29, is the ability to list protected species, the take of which from the Great Barrier Reef Marine Park requires the GBRMPA's permission. Protected species under Regulation 29* are:
 - (a) Each species that is a listed threatened species, a listed migratory species or a listed marine species (in each case within the meaning given by the *Environment Protection and Biodiversity Conservation Act 1999*)
 - (b) Each species of marine mammal, bird or reptile that is prescribed as 'endangered wildlife', 'vulnerable wildlife' or 'rare wildlife' under the *Nature Conservation Act 1992* of Queensland
 - (c) Each species mentioned or referred to in Table 29
- (2) An individual of a species of the genus *Epinephelus* (other than *E. tukula* or *E. lanceolatus*) is taken to be of a protected species if the individual is more than 1000 millimetres long.

*taking into account amendments up to SLI 2007 No. 32, prepared on 6 March 2007.

Table 29 from Great Barrier Reef Marine Park Regulations 1983, Regulation 29

Item	Species	Common name
Invertebrates		
1	Family Tridacnidae (all species)	Giant clams
2	<i>Cassia cornuta</i>	Helmet shell
3	<i>Charonia tritonis</i>	Giant triton shell
Fish		
4	Families Syngnathidae and Solenostomidae (all species)	Seahorses, pipefish, seadragons
5	<i>Epinephelus tukula</i>	Potato cod
6	<i>Epinephelus lanceolatus</i>	Queensland grouper
7	<i>Cheilinus undulatus</i>	Maori wrasse
8	<i>Cromileptes altivelis</i>	Barramundi cod
9	<i>Rhincodon typus</i>	Whale shark
10	<i>Carcharias taurus</i>	Grey nurse shark
11	<i>Carcharias carcharias</i>	Great white shark
Marine reptiles		
12	Genus <i>Crocodylus</i> (all species)	Crocodiles
13	Families Hydrophiidae and Laticaudidae (all species)	Sea snakes
14	Family Cheloniidae (all species)	Green turtle, loggerhead turtle, olive ridley turtle, hawksbill turtle, flatback turtle
15	Family Dermochelyidae (all species)	Leatherback turtle
Birds		
16	Class Aves (all species)	Birds
Marine mammals		
17	Families Otariidae and Phocidae (all species)	Seals
18	<i>Dugong dugon</i>	Dugong
19	Order Cetacea (all species)	Whales and dolphins

- Objectives under the [25 Year Strategic Plan for the Great Barrier Reef World Heritage Area: 1994-2019](#) (Great Barrier Reef Marine Park Authority 1994) relevant to sharks and rays include:
 - *To improve the capacity to determine ecologically sustainable catches for major fisheries in the Area.*
 - *To improve the understanding of the effects of fishing on non-target and target species and their habitats.*
 - *To pay special attention to conserving rare and endangered species.*

Attachment 2. Conservation status

The following table summarises threatened species listings of sharks and rays occurring in the Great Barrier Reef World Heritage Area at the international, national and state levels. In addition, an Australian Government commissioned overview and action plan for Australian threatened and potentially threatened marine and estuarine fishes found 32 shark and ray species occurring in the Great Barrier Reef World Heritage Area as being of conservation concern, some of which are 'data-deficient'.

Common Name	Scientific Name	IUCN	Bonn	CITES	Australia	Qld	Pogonoski ⁸³
Banded eagle ray	<i>Aetomylaeus nichofii</i>	V					
Banded wobbegong	<i>Orectolobus ornatus</i>	DD					DD
Black shark	<i>Dalatias licha</i>	DD					DD
Black whaler	<i>Carcharhinus obscurus</i>	LR (nt)					LR (nt)
Blacktip shark	<i>Carcharhinus tilstoni</i>	DD					
Blacktip topeshark	<i>Hypogaleus hyugaensis</i>	LR (lc)					LR (lc)
Bluespotted ribbontail ray	<i>Taeniura lymma</i>	LR (lc)					LR (lc)
Bizant River shark (or speartooth shark)	<i>Glyphis sp. A</i>	CE			CE		CE
Bull shark	<i>Carcharhinus leucas</i>	LR (lc)					LR (lc)
Colclough's shark	<i>Brachaelurus colcloughi</i>	V					V
Common blacktip shark	<i>Carcharhinus limbatus</i>	DD					DD
Crocodile shark	<i>Pseudocarcharias kamoharai</i>	LR (lc)					LR (lc)
Dwarf sawfish	<i>Pristis clavata</i>	CE		I			E
Eastern angel shark	<i>Squatina sp. A</i>	V					
Endeavour dogfish	<i>Centrophorus moluccensis</i>	EN*					
Estuary stingray	<i>Dasyatis fluviorum</i>	V					LR (nt)
Freshwater sawfish	<i>Pristis microdon</i>	CE		II	V		CE
Freshwater whipray	<i>Himantura cf. chaophraya</i>	V					
Great hammerhead	<i>Sphyrna mokarran</i>	LR (lc)					LR (lc)
Great white shark	<i>Carcharodon carcharias</i>	V	I, II	II	V		V
Green sawfish	<i>Pristis zijsron</i>	CE		I	V		E
Greeneye spurdog	<i>Squalus mitsukurii</i>	EN*					
Grey nurse shark	<i>Carcharias taurus</i>	CE*			CE	CE	E
Grey reef shark	<i>Carcharhinus amblyrhynchos</i>	LR (lc)					LR (lc)
Gulper shark	<i>Centrophorus granulosus</i>	V					DD
Manta ray	<i>Manta birostris</i>	LR (lc)					LR (lc)
Narrow sawfish	<i>Anoxypristis cuspidata</i>	CE		II			V
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	V					
Porcupine ray	<i>Urogymnus asperrimus</i>	V					LR (nt)
Purple eagle ray	<i>Myliobatis hamlyni</i>	EN					
Sandbar shark	<i>Carcharhinus plumbeus</i>	LR (nt)					LR (nt)
Scalloped hammerhead	<i>Sphyrna lewini</i>	LR (lc)					LR (lc)
Shortfin mako	<i>Isurus oxyrinchus</i>	LR (lc)					LR (lc)
Silky shark	<i>Carcharhinus sfalciformis</i>	LR (lc)					LR (lc)
Spinner shark	<i>Carcharhinus brevipinnas</i>	LR (lc)					LR (lc)
Spotted eagle ray	<i>Aetobatus narinari</i>	LR (lc)					LR (lc)
Tiger shark	<i>Galeocerdo cuvier</i>	LR (lc)					LR (lc)
Whale shark	<i>Rhincodon typus</i>	V	II	II	V		DD
Whitespot giant guitarfish	<i>Rhynchobatus djiddensis</i>	LR (lc)					LR (lc)
Whitetip reef shark	<i>Triaenodon obesus</i>	LR (lc)					LR (lc)

- *Disclaimer* Whilst every attempt has been made to include Great Barrier Reef species that are listed under the various conventions and pieces of legislation, for certainty the original source documents should be examined.
- Key: CE = Critically endangered; DD = Data deficient; E = Endangered; LR (lc) = Lower risk, least concern; LR (nt) = Lower risk, near threatened; V=Vulnerable

- IUCN 2006 Red List Assessments are for global populations, except where a separate IUCN assessment exists for Australia (denoted by*)
- Bonn = Bonn Convention. Appendix I lists migratory species that are endangered; Appendix II lists migratory species that have an unfavourable conservation status and that require international agreements for their conservation and management, as well as those that have a conservation status that would benefit significantly from international co-operation and agreement.
- CITES = *Convention on the international trade in endangered species*. Appendix I includes those threatened with extinction that are or may be affected by trade. Trade in specimens of these species is subject to particularly strict regulation in order not to endanger further their survival and can only be authorised in exceptional circumstances. Appendix II includes: (a) species which, although not necessarily now threatened with extinction, may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilisation incompatible with their survival; and (b) other species which must be subject to regulation in order that trade in specimens of certain species referred to in sub-paragraph (a) of this paragraph may be brought under effective control.

Attachment 3. Species composition and risk assessments for the ECIFF

Table 1. Queensland East Coast shark catch composition (per cent of sharks caught) for all species caught across 4 observer trips (Rose *et al.* 2003)*. Species indicated in bold have an *index of productivity* value of 2.17 or higher, meaning they may be particularly vulnerable to the impact of fishing.**

Shark species	Common name ⁸⁴	Per cent of sharks*	Index of productivity**
<i>Carcharhinus tilstoni</i>	Australian blacktip shark***	32.0	2.00
<i>Sphyrna lewini</i>	Scalloped hammerhead	18.0	2.17
<i>Carcharhinus sorrah</i>	Spot-tail shark	7.7	1.67
<i>Carcharhinus dussumieri</i>	Whitecheek shark	7.5	2.33
<i>Rhizoprionodon acutus</i>	Milk shark	6.8	2.33
<i>Carcharhinus amblyrhynchos</i>	Grey reef shark	6.6	2.00
<i>Carcharhinus amboinensis</i>	Pigeys shark	4.8	2.33
<i>Carcharhinus brevipinna</i>	Spinner shark	3.1	2.17
<i>Carcharhinus fitzroyensis</i>	Creek whaler	2.9	2.17
<i>Sphyrna mokarran</i>	Great hammerhead	2.9	2.50
<i>Carcharhinus macrotis</i>	Hardnose shark	2.2	2.00
<i>Carcharhinus melanopterus</i>	Blacktip reef shark	1.3	2.17
<i>Rhizoprionodon taylori</i>	Australian sharpnose shark	1.3	1.33
<i>Rhinoptera neglecta</i>	Australian cownose ray	1.1	2.50
<i>Triaenodon obesus</i>	Whitetip reef shark	0.4	2.17
<i>Aetobatus narinari</i>	White-spotted eagle ray	0.4	2.50
<i>Rhynchobatus djiddensis</i>	White-spotted guitarfish	0.4	2.33
<i>Hemipraris elongatus</i>	Fossil shark	0.2	2.33
<i>Galeocerdo cuvier</i>	Tiger shark	0.2	2.17
<i>Carcharhinus falciformis</i>	Silky shark	0.2	2.17

*Observers on board commercial fishing vessels collected the species composition data. The first three trips were of 2 to 11 days duration on vessels ranging in length from 6 to 18 metres. Two trips were out of Cardwell in 4 to 33 m water depth and the third trip was from Margaret Bay to Cape York in 20 to 30 m water depth. The fourth trip was part of the CRC Reef Coastal Fisheries Monitoring Project, and fished off Cairns. All vessels used net reels and fished with bottom set monofilament, 6.5 inch mesh nets, set during both day and night.

**Gribble *et al* 2005 page 22 described the value of 2.17 for the *index of productivity* for the scalloped hammerhead as meaning 'particularly vulnerable to even small levels of fishing mortality'. We note that 75 per cent of the species in the above table (in bold text) have the same or a higher value of the index of productivity, and therefore, would also be particularly vulnerable to even small levels of fishing mortality.

***This species is very similar to, and has only recently been separate from, the common blacktip shark *C. limbatus*. The two species cannot reliably be separated visually.

Table 2. Summary of the sustainability of species from the risk assessment of target and by-catch fisheries to sharks and rays in Northern Australia published by CSIRO in 2007***East Coast Inshore Finfish Fishery**

Approximately 25 species were least likely to be sustainable in the ECIFF (Figure 6.5-7 of Salini et al 2007). Of these, 14 species had susceptibility and recovery ranks above 2.33 and were the least sustainable species in this fishery. These species include *C. amboinensis*, *C. brevipinna*, *C. leucas*, *C. limbatus*, *C. tilstoni*, *Glyphis sp. A*, *Negaprion acutidens*, *Pristis zijsron*, *P. microdon*, *S. mokarran*. Eleven species had a susceptibility rank above 2.33 and a recovery rank between 1.66 and 2.33 and were also least likely to be sustainable. These species include *Carcharhinus amblyrhynchoides*, *C. cautus*, *C. melanopterus*, *C. fitzroyensis*, *Eusphyra blochii* and *Rhynchobatus australiae*.

Cumulative risk assessment for all northern Australian fisheries

Sawfishes were the least sustainable group with all four species having the highest susceptibility ranks due to the fact that they are captured by prawn and fish trawls, gill nets and long lines**. Other species that were least likely to be sustainable*** were *C. amblyrhynchoides*, *C. amboinensis*, *C. brevipinna*, *C. leucas*, *C. limbatus*, *Glyphis sp. A*, *Glyphis sp. C*, *N. acutidens*, *S. mokarran*, and *E. blochii*.

*Information in table from Chapter 6.5 of Salini et al 2007 (see summary below on methods used).

** The only fisheries in which sawfish were likely to be sustainable were those fisheries that did not capture these animals (NT Mackerel fishery, trap fisheries and drop line fisheries targeting teleosts).

*** These species were classified as being least likely to be sustainable due to their high susceptibility in target and by-catch gill net and long line fisheries. Fisheries that contributed to these species high susceptibility ranks included the ECIFF and 7 other northern Australian fisheries.

Summary of CSIRO methods (from Salini et al 2007): A total of 29 northern Australian fisheries that have the potential to capture elasmobranchs were included in the risk assessment by CSIRO. Data from fisheries observers in the Salini et al 2007 project as well as observer data from previous projects were used to produce a list of species captured in these fisheries. A total of 75 species were recorded in 29 fisheries. The risk assessment methodology was based on methods developed by Milton (2001), Stobutzki et al. (2001b, c) and Walker (2004). The sustainability of species was considered to be dependant on: 1) the susceptibility of the species to capture and mortality by the fishery, and 2) the capacity of a population to recover after depletion. The 'susceptibility' and 'recovery' of each species was plotted along two axes to estimate the overall risk or sustainability of each species. The weighted average method was chosen to determine susceptibility of each species in each fishery. These fishery specific susceptibility values were used to calculate the cumulative susceptibility.

Table 3. Species of sharks and rays identified by the Scientific Advisory Group of the Inshore Finfish Management Advisory Committee in February 2007 as high or moderate risk*.

High risk:		Moderate risk:	
All sawfish	<i>Pristis spp., Anoxypristis cuspidata</i>	Dusky shark	<i>C. obscurus</i>
Grey reef shark	<i>Carcharhinus amblyrhynchos</i>	Spinner shark	<i>C. brevipinna</i>
Speartooth shark	<i>Glyphis sp. A</i>	Nervous shark	<i>C. cautus</i>
Hammerheads	<i>Sphyrna spp., Eusphyra blochii</i>	Blacktip reef shark	<i>C. melanopterus</i>
Whitetip reef shark	<i>Triaenodon obesus</i>	Hardnose shark	<i>C. macroti</i>
White spotted guitarfish	<i>Rhynchobatus australiae</i>	Creek whaler	<i>C. fitzroyensis</i>
		Graceful shark	<i>C. amblyrhynchoides</i>
		Whitecheek shark	<i>C. dussumieri</i>
		Lemon shark	<i>Negaprion acutidens</i>
		Australian blacktip	<i>C. tilstoni</i>
		Common blacktip	<i>C. limbatus</i>

*The SAG considered information available on species biology and the species susceptibility and made an overall assessment of the risk posed by the ECIFF (net and line sectors).

Attachment 4. ECIFF catch and effort data

Commercial fishery

Sharks and rays are taken as target and incidental catch in the ECIFF, which primarily targets species such as barramundi and threadfin salmon. Sharks are increasingly taken in the emerging target fishery for shark with offshore nets set in waters greater than two metres.

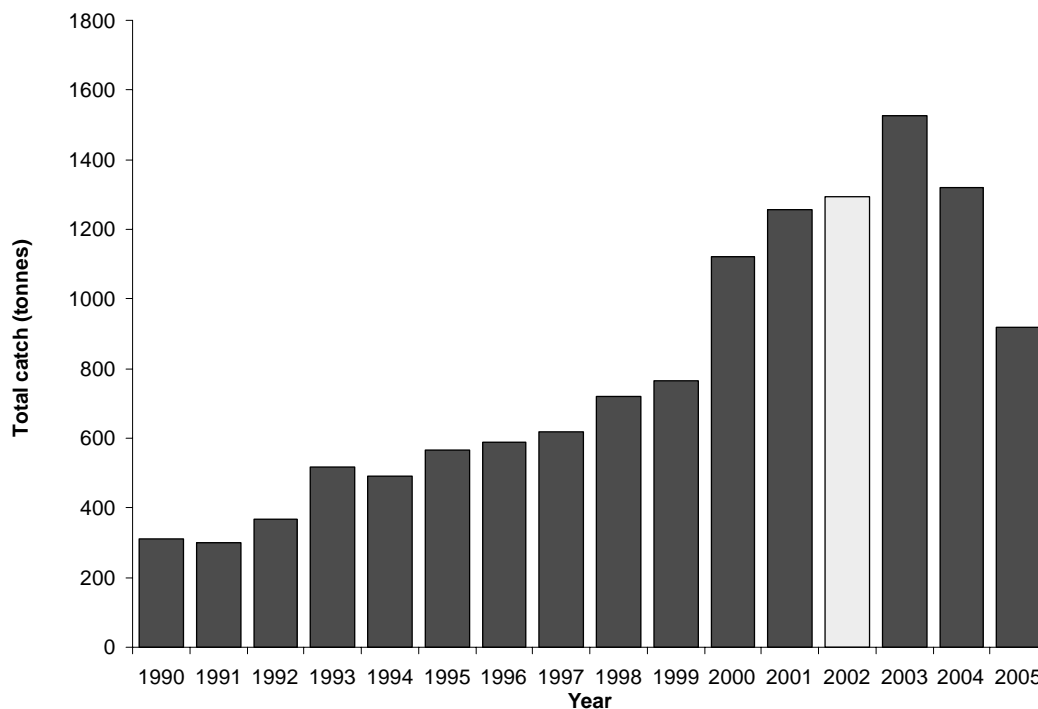


Figure 1. Total recorded commercial landings of sharks in ECIFF between 1990 and 2005⁸⁵. The catch of sharks was 1292 tonnes in 2002 (i.e. when the investment warning was issued).

The reported commercial catch of sharks and rays from the Queensland East Coast increased from 313 tonnes in 1990 to a peak of 1527 tonnes in 2003 (Figure 1). However, since 2003 there has been a dramatic decline of catch to 919 tonnes in 2005. The largest proportion of the ECIFF shark harvest is taken in the Great Barrier Reef area, it being 85 per cent of the 2003 catch⁸⁶. Within the Marine Park, the spatial trends in shark take showed a reduction in take in northern regions from the Mackay area northwards and a slight increase in harvest in the Fraser-Burnett region between 2003 and 2005⁸⁷. The DPI&F 2006 annual status report noted that the buyout of 59 active net licenses under the structural adjustment package following rezoning of the Marine Park is likely to have impacted on the catch and fishing effort⁸⁸.

Recently, commercial logbook data show a sharp increase in the amount of rays landed as by-product in the ECIFF (average 17.5 tonnes per year in 2003 and 2004, Figure 2), and this may still be an underestimate of the total catch of rays⁸⁹. The reported catch is more than three times the average amount recorded between 1990 and 2002 (5 tonnes per year)⁹⁰. DPI&F researchers have confirmed that a number of ray species, including the white spotted guitarfish (known as spotted ray by fishers), previously considered as by-catch in the fishery have recently been confirmed as being retained by fishers, indicating targeting⁹¹. Similarly, concerns have been expressed about targeting of some sharks previously assumed to be part of the by-catch⁹². Fins from species such as the white spotted guitarfish fetch high prices in Asian markets⁹³.

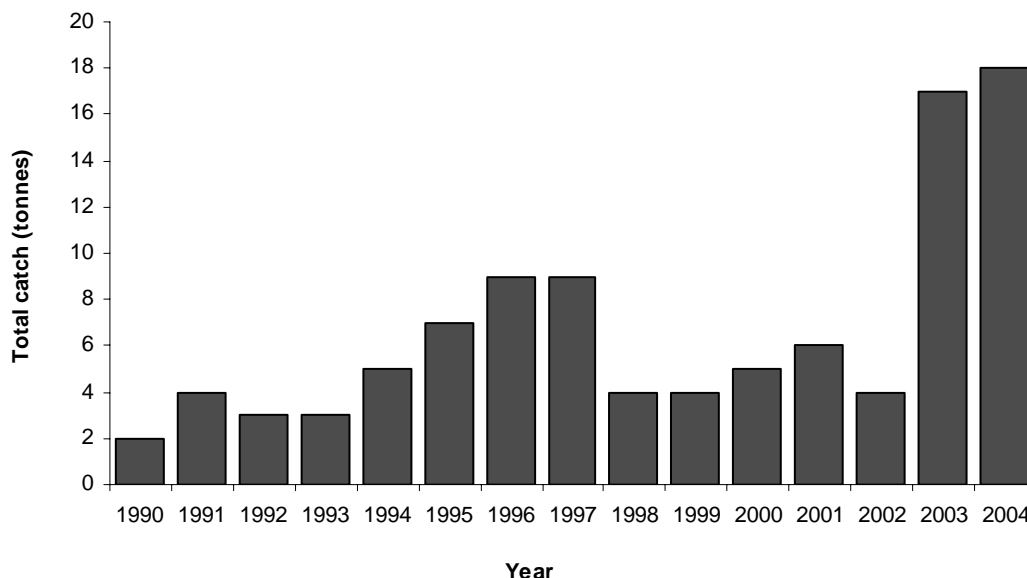


Figure 2. Total recorded commercial landings of rays in ECIF between 1990 and 2004⁹⁴.

Recreational fishery

Data from the Recreational Fishing Information System (RFISH) diary surveys of recreational anglers in 2002 indicate that 212 tonnes of sharks were taken by recreational anglers and a further 1750 tonnes of sharks were released⁹⁵. Sharks were not reported before 2002 so no trend data is available.

The mortality rates of released sharks are generally unknown. However, hooking mortality is known to have contributed to the decline in grey nurse sharks⁹⁶ and there are anecdotal reports of mortality in other east coast sharks and rays that have been injured by embedded fishing hooks. These figures do not include all discard sharks and rays, such as sharks that are caught without the fisher knowing it. Therefore the total mortality is likely to be considerably higher than recorded catch figures.

Charter fishery

The estimated amounts of sharks harvested and released by the charter fishing industry in Queensland increased substantially between 1996 and 2004, but were relatively low compared to other sectors of the ECIF⁹⁷. In 2004, 4.4 tonnes of shark were retained and a further 5.1 tonnes were released (of unspecified species). Data from 1995 through to 2004 suggests an average of 61 per cent of sharks is released in east coast fishing charters⁹⁸.

Indigenous fishery

The amount of sharks and rays caught by the Indigenous sector is unknown. However, a national survey in 2001 estimated that 55 per cent of Indigenous fishers in northern Australia fished inshore⁹⁹.

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- ⁸⁴ Last & Stevens 1994
- ⁸⁵ Data from QDPI&F 2006a, Table 1
- ⁸⁶ Gribble et al 2005
- ⁸⁷ QDPI&F 2006a
- ⁸⁸ QDPI&F 2006a
- ⁸⁹ Note: For example, anecdotal reports indicate that some commercial catch of rays is being reported in logbooks as sharks (e.g. white spotted guitarfish reported under ‘whaler’ shark category). Logbooks currently have very few categories for reporting sharks and rays.
- ⁹⁰ Zeller & Snape 2005 Part B, p 29
- ⁹¹ Zeller & Snape 2005 Part C, p 8
- ⁹² Zeller & Snape 2005 Part C, p 9
- ⁹³ Last & Stevens 1994
- ⁹⁴ Data from Zeller & Snape 2005 Table 4, Part B, p29.
- ⁹⁵ QDPI&F 2006a. Note: This tonnage equates to an average catch of 2.5 kg of shark per year for each angler (of which 0.26 kg is harvested and the rest released). However, that tonnage was estimated from numbers of sharks caught and an estimated average weight, so is subject to considerable uncertainty.
- ⁹⁶ Environment Australia, 2002
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- ⁹⁸ Zeller & Snape 2005 Part C, p 5
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