



**Australian Government**

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**Department of the Environment and Heritage**

Assessment of the  
**Queensland East Coast Inshore Finfish Fishery**

**November 2006**

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This document is an assessment carried out by the Department of the Environment and Heritage of a commercial fishery against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. It forms part of the advice provided to the Minister for the Environment and Heritage on the fishery in relation to decisions under Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999*. The views expressed do not necessarily reflect those of the Minister for the Environment and Heritage or the Australian Government.

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# Assessment of the ecological sustainability of management arrangements for the Queensland East Coast Inshore Finfish Fishery

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<i>Background</i> .....	1
<i>Overall assessment</i> .....	7
<i>Recommendations</i> .....	10
<b>PART I - MANAGEMENT ARRANGEMENTS .....</b>	<b>13</b>
<i>Conclusion</i> .....	19
<b>PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES. 20</b>	
STOCK STATUS AND RECOVERY .....	20
MAINTAIN ECOLOGICALLY VIABLE STOCKS.....	20
<i>Information requirements</i> .....	20
<i>Assessment</i> .....	24
<i>Management response</i> .....	28
<i>Conclusion</i> .....	31
PROMOTE RECOVERY TO ECOLOGICALLY VIABLE STOCK LEVELS .....	32
<i>Conclusion</i> .....	33
ECOSYSTEM IMPACTS .....	33
<i>Bycatch protection</i> .....	33
<i>Information requirements</i> .....	33
<i>Assessment</i> .....	34
<i>Management response</i> .....	35
<i>Conclusion</i> .....	35
PROTECTED SPECIES AND THREATENED ECOLOGICAL COMMUNITY PROTECTION .....	36
<i>Information requirements</i> .....	36
<i>Assessment</i> .....	37
<i>Management response</i> .....	38
<i>Conclusion</i> .....	40
MINIMISING ECOLOGICAL IMPACTS OF FISHING OPERATIONS .....	41
<i>Information requirements</i> .....	41
<i>Assessment</i> .....	41
<i>Management response</i> .....	42
<i>Conclusion</i> .....	42
<b>REFERENCES .....</b>	<b>43</b>
<b>LIST OF ACRONYMS .....</b>	<b>44</b>

## EXECUTIVE SUMMARY

### *Background*

The Queensland Department of Primary Industries and Fisheries (DPI&F) has submitted a document for assessment under Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The draft document *Ecological Assessment of the East Coast Inshore Finfish Fishery* (the submission) was received by the Department of the Environment and Heritage (DEH) in October 2005. The submission was released for a thirty-day public comment period that expired on 11 November 2005. Five public comments were received.

During the course of the assessment of the Queensland East Coast Inshore Finfish Fishery (ECIFF) in 2005, as significant concerns about the fishery were identified, it was not considered prudent to finalise the full assessment by the 1 December 2005 deadline. The concerns centered on the lack of progress in the development and implementation of a formal Management Plan, the likely impact of the fishery on a range of protected species, including dugong, marine turtles, crocodiles, cetaceans and sea snakes, the lack of quantitative stock assessments on key species taken in the fishery, the lack of verified data on all species impacted by the fishery operations, compliance concerns and possible latent effort issues.

To enable DPI&F to continue development of effective management arrangements and to address the issues identified more fully, two declarations under the EPBC Act were made, initially declaring the ECIFF as an approved Wildlife Trade Operation (WTO) under section 303FN of the EPBC Act, for a period of six months (expiring on 31 May 2006) and then subsequently extending the declaration for a further six months (expiring on 30 November 2006). These declarations were made under conditions that required DPI&F:

1. to manage the fishery in accordance with the management regime in force under the Queensland *Fisheries Act 1994* and the *Fisheries Regulation 1995*;
2. to inform DEH of any intended amendments to the management regime or managerial commitments made in the submission that may affect sustainability of the target/ by-product species or have a negative impact on the status of bycatch, protected species or the ecosystem;
3. to expedite the development of a formal Management Plan for the fishery that addressed the ecological sustainability of target (including by-product) and bycatch species (including protected species) taken;
4. to develop a programme for stock assessments for species taken in the fishery based on priorities established through a risk assessment analysis; and
5. to report on progress in implementing revised management arrangements for the ECIFF to DEH before the expiration of the WTO declarations.

These declarations effectively allowed the export of product from the fishery while the necessary preparatory work was undertaken by DPI&F.

The DPI&F provided a response to the issues raised in the public comment and amended the submission where necessary. The final submission for assessment including an annual report on the fishery and a report on compliance with the conditions placed on the short term declaration of the fishery as a WTO in May 2006 was received in November 2006.

This report assesses the ECIFF against its current management arrangements, the submission made in 2005 and the work undertaken by DPI&F in consultation with DEH in developing and implementing an effective management regime (including a formal Management Plan) for the fishery.

The submission reports against the Australian Government's *Guidelines for the Ecologically Sustainable Management of Fisheries* (the Guidelines). The DEH assessment considers the submission, associated documents, public comments, DPI&F's response to the comments and reports on compliance with the conditions placed on the short term WTO .

**Table 1: ECIFF: Summary**

<b>Area</b>	All tidal waters along Queensland's East Coast east of 142°09'E, 11°S), except closed waters, from Cape York to the New South Wales/ Queensland border (approx. 153°34'E°, 28°10'S). Fishery can extend to the boundary of the Australian Fishing Zone (AFZ) although it is uncommon for fishing to occur beyond 20 km from the mainland.
<b>Target Species</b>	<p><u>Commercial fishery</u>  <u>Northern Inshore Fishery</u>  Barramundi (<i>Lates calcarifer</i>), king threadfin (<i>Polydactylus sheridani</i>), blue threadfin (<i>Eleutheronema tetradactylum</i>), king salmon (<i>Polydactylus macrochir</i>), bream (<i>Acanthopagrus australis</i> and <i>A berda</i>), grey mackerel (<i>Scomberomorus semifasciatus</i>), swallow tailed dart (<i>Trachinotus botla</i>), queenfish (<i>Scomberoides commersonnianus</i>), spotted grunter (<i>Pomadasys kaakan</i>), garfish (<i>Hemiramphus quoyi</i>), sea mullet (<i>Mugil cephalus</i>), tailor (<i>Pomatomus saltatrix</i>), mangrove jack (<i>Lutjanus agentimaculatus</i>), jewelfish (<i>Nibea squamosa</i>), black jew (<i>Protonibea (Johnius) diacanthus</i>), spotted mackerel (<i>Scomberomorus munroi</i>), sand whiting (<i>Sillago</i> spp), rabbitfish (Siganidae), flathead (<i>Platycephalus</i> spp), pilchards, black tip whaler (<i>Carcharhinus tilstoni</i>) and sorrah whaler (<i>C. sorrah</i>), great hammerhead shark (<i>Sphyrna mokarran</i>) and scalloped hammerhead shark (<i>Sphyrna lewini</i>).</p> <p><u>Southern Inshore Fishery</u>  Mullet, tailor, whiting, flathead, bream, mulloway (<i>Argyrosomus hololepidotus</i>) and school mackerel (<i>Scomberomorus queenslandicus</i>).</p> <p><u>Recreational</u>  Principal recreational species are tailor, barramundi, bream, mullet, trevally and sand whiting.</p>
<b>By-product species</b>	School mackerel, flathead, dart ( <i>Trachinotus</i> spp.), tripletail ( <i>Lobotes surinamensis</i> ), scad ( <i>Decapterus</i> spp.) silver biddy ( <i>Gerrres oyeana</i> ), speckled grunter ( <i>Pomadasys argenteus</i> ) and luderick ( <i>Girella tricuspidata</i> ) and tarwine ( <i>Rhabdosargus sarba</i> ).

<b>Fishery status</b>	<p>Only sea mullet, spotted mackerel and tailor, of the principal commercial species, have quantitative stock assessments. Spotted mackerel has been a species of sustainability concern in the past but in 2002 the biomass was estimated to be above <math>B_{msy}</math>.</p> <p>Stocks of barramundi, yellowfin bream (<i>Acanthopagrus australis</i>), dusky flathead (<i>Platycephalus fuscus</i>) and sand whiting (<i>Sillago ciliata</i>) are considered to be sustainable at current levels of fishing effort.</p> <p>Key species with no stock assessments include school mackerel, grey mackerel, hammerhead sharks, whaler sharks (<i>Carcharhinus</i> spp.), white-spotted guitarfish (<i>Rhynchobatus djiddensis</i>) and garfish (<i>Hemirhamphus quoyi</i>). The three key species of shark taken in the ECIFF are considered to be at moderate to high risk.</p>
<b>Gear</b>	<p><u>Commercial fishery:</u></p> <p><b>Mesh nets:</b> used in the northern areas of this fishery to target barramundi, the threadfins, tropical shark and mackerels. In southern areas, mesh nets are used as drift nets or ring nets to target species caught in the larger estuaries and bays, such as mullet and lesser mackerels.</p> <p><b>Seine nets:</b> mainly used in the southern areas. The net is deployed in an arc from the shoreline, usually from a small boat, surrounding an area of water containing fish, and then hauled to the shore. This technique is used mainly for mullet, whiting and tailor.</p> <p><b>Line and Hook.</b></p> <p><u>Recreational fishery:</u> Line and hook, cast net, small seine (bait) net.</p>
<b>Season</b>	<p>Annual seasonal closures apply to barramundi fishing between 1 November and 1 February.</p> <p>In the Southern Inshore Fishery weekend closures to all forms of net fishing apply in the general inshore component and a general closure applies from September to March in the ocean beach net component. A general seasonal fishing closure applies to waters between Indian Head and Waddy Point, Fraser Island from 1 August to 30 September.</p>
<b>Commercial harvest (4 yr average)</b>	8,130 tonnes (2005 – 5437 t)
<b>Value of commercial harvest (4 yr average)</b>	A\$39 m (2005 – A\$23 m)

<b>Recreational (including charter) and Indigenous harvest</b>	<p>Recreational catch of main finfish species is not well quantified. In 2002 it is reported that 10.7 million fish were retained.</p> <p>There are in excess of 750,000 recreational fishers.</p> <p>There are no reliable estimates of the Indigenous harvest.</p>
<b>Commercial licences issued</b>	<p>As at June 2005 there are approximately 2,050 separate licences authorising fishers to fish in the ECIFF. 1,649 of these are line fishery symbols. There are approximately 500 active operators.</p> <p>There has been an ongoing programme to reduce latent effort with a reduction of 40% achieved in 2004/ 2005.</p>
<b>Management arrangements</b>	<p>Input and output controls including:</p> <ul style="list-style-type: none"> <li>• temporal closures (e.g. harvest of barramundi is not permitted on the east coast between 1 November and 1 February, effectively closing the fishery to all netting activity);</li> <li>• spatial closures (e.g. the closure of the area between Indian Head to Waddy point on Fraser Island to protect spawning tailor);</li> <li>• limited entry;</li> <li>• total allowable commercial catches for certain species;</li> <li>• gear and vessel restrictions; and</li> <li>• fish size and possession limits for some species</li> </ul> <p>Dugong Protection Areas (DPAs) were introduced in mid-1997/ 1998. Depending on the type of DPA, netting is either prohibited or restricted in the 17 nominated areas in Queensland.</p> <p>The fishery is divided into the Northern Inshore Fishery and the Southern Inshore Fishery. The fishery is further classified according to a system of 14 areas, each represented by a fishery symbol- that describes where licensed net-fishers are authorised to fish.</p>
<b>Export</b>	<p>Small scale: Export markets exist mainly for mullet roe, shark fins and small mackerel products.</p>
<b>Bycatch</b>	<p>More than 100 species, but 40 - 60 major species.</p>
<b>Interaction with threatened species</b>	<p><u>Mammals</u> Dugong (<i>Dugong dugon</i>), dolphins (<i>Delphinidae</i>)</p> <p><u>Reptiles</u> Hawksbill turtle (<i>Eretmochelys imbricata</i>), green turtle (<i>Chelonia mydas</i>), loggerhead turtle (<i>Caretta caretta</i>), flatback turtles (<i>Natator depressus</i>), saltwater crocodile (<i>Crocodylus porosus</i>), and sea snakes (<i>Hydrophilidae</i> spp.).</p>

<b>Interaction with threatened species (cont)</b>	<p><u>Fish</u> Wide sawfish (<i>Pristis pectinata</i>), freshwater sawfish (<i>P. microdon</i>), narrow sawfish (<i>Anoxypristis cuspidata</i>), green sawfish (<i>P. zijsron</i>) and black pomfret (<i>Parastromateus niger</i>).</p> <p><u>Elasmobranchs</u> Grey nurse shark (<i>Carcharias taurus</i>) and white shark (<i>Carcharodon carcharias</i>).</p> <p><u>Birds</u> Pelican (<i>Pelicanus conspicillatus</i>), and cormorants (<i>Phalacrocorax</i> spp.).</p>
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The ECIFF is a multi-species net fishery operating in tidal waters along the entire East Coast of Queensland and is Queensland's oldest commercial fishery. The ECIFF spans over 10,000 km of coastal foreshores, including mainland and offshore islands and encompassing around 75 major river systems and numerous tributaries. Most species harvested are taken from inshore waters including beaches, rivers and creeks, however some species such as sharks are also taken from offshore waters. The area of the fishery includes both tropical and sub-tropical regions and the mix of species taken varies markedly between the northern and southern parts of the fishery. Although the management arrangements apply over the entire area of the fishery it is effectively divided into the Northern Inshore Fishery (north of 24.5°S to Cape York) and the Southern Inshore Fishery (south of 24.5°S to the New South Wales/ Queensland border) segments. While the fishery covers a large area, catch is concentrated in a number of areas. On average, approximately 40% of the catch is taken in the Moreton Region in the Southern Inshore Fishery.

There are a large range of species taken in the fishery. These include:

- 16 - 20 identified target species;
- approximately 40 by-product species; and
- 40 – 60 species of bycatch.

Most species taken in the Northern Inshore Fishery have a widespread tropical Indo-West pacific distribution (Kailola *et al.*, 1993). Queensland east coast stocks of barramundi, black jewfish, grunter, king and blue threadfin and grey mackerel are genetically separate from the Gulf of Carpentaria stocks, while tropical sharks, predominantly blacktip whaler and sorrah whaler, appear to have only one stock across northern Australia (Garrett (ed.),1997, Kailola *et al.*, 1993).

Species taken in the Southern Inshore Fishery are a mixture of tropical species, endemic subtropical species (eg yellowfin bream, dusky flathead and trumpeter whiting (*Sillago maculata*), temperate western pacific species (eg luderick, silver mullet and flat-tail mullet (*Liza subviridis*)) and species with a wider global distribution (eg sea mullet and tailor). Sea mullet are distributed worldwide between the latitudes 42°S and 42°N (Kailola *et al.*, 1993). East coast sea mullet aggregate for spawning along with temperate species such as tailor, yellowfin bream, luderick and dart, in coastal waters of southern Queensland.

**Table 2: ECIFF: Catch Information**

Year	Number of boats	Number of days fished	Catch (tonnes)	Approximate gross value of production (AUD \$million)
2001	807	46,400	8,553	40
2002	769	45,795	7,227	35
2003	796	49,389	8,219	40
2004	782	49,789	8,525	41

Fishermen operating in the ECIFF are authorised to use specified net types to take finfish within specified areas (net fisheries are defined by fishery symbols) prescribed under Queensland's *Fisheries Regulation 1995*. The type of fishing activity that can be carried out under each fishery symbol is subdivided on the basis of location, species that may be retained and fishing gear that may be used. Licences can provide for the use of mesh (gill) nets, haul (seine) tunnel nets, cast net and line. Mesh netting is the most commonly used method in the Northern Inshore Fishery while haul netting is the most commonly used method in the Southern Inshore Fishery. Traditionally, only a small proportion of the catch has been taken by line. Recently the spotted mackerel fishery was made a line only fishery with only incidental catches able to be taken by net.

There are 14 fishing symbols applicable to the ECIFF. These are: N1 (East Coast No 1), N2 (East Coast No 3), N7 (Bait No 2) and N8 (East Coast No 2) symbols which describes permitted fishing using various nets along the whole east coast. The N5 (Baffle Creek to Kauri Creek) symbol describes fishing in the area between Baffle Creek to Kauri Creek behind Fraser Island. The N6 (Bait No 1) symbol describes the use of nets to take fish which is then usually used for bait. The K symbols refer to netting ocean beaches in the Southern Inshore Fishery sector. These are: K1 (Ocean Beach-Area 1), K2 (Ocean Beach-Area 2), K3 (Ocean Beach-Area 3), K4 (Ocean Beach-Area 4), K5 (Ocean Beach-Area 5), K6 (Ocean Beach-Area 6), K7 (Ocean Beach-Area 7) and K8 (Ocean Beach-Area 8).

Catch is landed in a variety of forms including 'whole', 'iced, gilled and gutted' and 'fillets'. Barramundi taken by mesh net is generally landed as 'iced, gilled and gutted'. Since 2000, in response to market needs, spotted mackerel has generally been landed as whole rather than filleted and frozen. Sea mullet is also targeted for roe in the autumn and early winter months.

Bycatch data is not systematically collected from commercial fishing operations. Discards occur in response to regulation preventing retention of fish, including protected species legislation and minimum/ maximum size regulations, and to low or zero market value (eg milkfish (*Chanos chanos*), catfish and large sharks). Halliday *et al.* (2001) recorded over 60 bycatch species in the ECIFF and found that on average these comprise around 15% of the number of fish caught. Bycatch composition depends largely on the species targeted, fishing gear, area of operation and seasonality. Observer validated bycatch data in the northern areas of the fishery indicate that bycatch is dominated by silver croaker (*Nibea soldado*) (24%) and catfish (15%). Other major bycatch species consist of undersized target and by-product species (e.g. barramundi, blue threadfin and yellowfin bream). Several species of sharks and rays have been reported in the Northern Inshore Fishery bycatch including hammerhead, shovelnose (*Rhinobatus* spp.), whaler and sliteye sharks (*Loxodon macrorhinus*), and cownosed rays (*Rhinoptera neglecta*). Shark species found in the Southern Inshore Fishery area include the grey nurse shark (*Carcharias taurus*) and the white shark (*Carcharodon carcharias*).

Species taken in the ECIFF are also taken by fisheries in New South Wales (eg tailor and spotted mackerel), other Queensland fisheries including the Gulf of Carpentaria Inshore Finfish Fishery (GOCIFF) and in Commonwealth, Northern Territory and Western Australian fisheries in the north of Australia. In addition the species taken are common in fisheries in Indonesian and Papua New Guinean waters (eg tropical sharks, mackerel). Target species are also found in the Great Barrier Reef Marine Park (GBRMP).

Commercial fish species in the ECIFF are also taken by recreational, charter and Indigenous fishers. As in most other fisheries, catches of recreational fishers are not recorded at any significant level of confidence, however, estimates from DPI&F surveys indicate that recreational catch of the key recreational species of bream, whiting and tailor are between two and four times the commercial harvest. Charter catches are recorded in logbooks and estimates indicate that total annual harvest of ECIFF species has been in the order of 200 t since 2000. On average over 60% of this catch is released. The survival rate is unknown.

Some species that may be affected by the ECIFF are listed protected species under the EPBC Act. Since recording of interactions commenced in 2002, interactions have been recorded with green turtles, hawksbill turtles, loggerhead turtles, flatback turtles, wide sawfish, narrow sawfish, freshwater sawfish, green sawfish, dugong, dolphins, saltwater crocodile, pelicans, cormorants, black pomfret and sea snakes. Reporting of interactions with protected species was enhanced in 2003 by the introduction of the Species of Conservation Interest (SOCI) Reporting Logbook. These interactions are addressed under Principle Two of this report. While grey nurse and white sharks are reported as occurring in the Southern Inshore Fishery, interactions are considered to be very infrequent.

The ECIFF is managed under the Queensland *Fisheries Act 1994* and the *Fisheries Regulation 1995*. Provisions of the *Great Barrier Reef Marine Park Act 1975* also apply to the fishery.

The ECIFF is managed by a combination of input and output controls including spatial and temporal closures, limited entry, total allowable catches for certain species, gear and vessel restrictions and fish size limits.

Efforts to remove latent effort in the fishery were implemented in 2004 resulting in more than a 40% reduction of endorsements (excluding bait endorsements) to date. Latent effort management is ongoing within the fishery.

### ***Overall assessment***

The material submitted by DPI&F demonstrates that the management arrangements for the ECIFF meet, on-balance, the requirements of the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. DEH has however identified a significant number of risks that must be managed to ensure that any adverse impacts are eliminated or minimised in the longer term. These include:

- a history of a piecemeal approach to management, particularly the progress in the development and implementation of a formal Management Plan;
- lack of capacity to monitor the effectiveness of management arrangements;

- the absence of regular robust quantitative stock assessments for most of the target, by-product and bycatch species;
  - in particular there are concerns about the sustainability of shark catch given the increasing reliance of shark as a target species;
- a lack of verified data on the majority of species taken in commercial fishery operations, especially bycatch;
- the impact of the fishery on a range of protected species, particularly dugong and increasingly interactions with turtles (particularly green turtles) but also on crocodiles, cetaceans (possibly 2 species of dolphin and humpback whales), sawfish and possibly also sea snakes;
- a lack of validated catch and bycatch, from the recreational sector, including charter vessels, or from Indigenous fishers;
- lack of a risk-based compliance programme (particularly including black marketing of recreational catches); and
- possible ongoing latent effort issues.

Recommendations to address these issues have been developed to ensure that the risk of impact is minimised in the longer term. Through the implementation of the recommendations (importantly the progress commenced towards the end of 2006 in the development of a formal Management Plan) and the continuation of a responsible attitude to the management of the fishery, management arrangements are considered likely to be sufficiently precautionary in the short term and capable of controlling, monitoring and enforcing the level of take from the fishery.

The introduction of a formal statutory Management Plan for the ECIFF will be a significant step toward developing sound management arrangements for the fishery to ensure its long term ecological sustainability. DEH considers that the finalisation of the Management Plan must be a priority and has made a number of recommendations about the timing and issues that must be addressed in the Management Plan. DEH believes that the resultant management regime (based on the legislation and, in particular, the Management Plan together with DEH's recommendations) will be capable of ensuring that fishing is conducted in a manner that does not lead to over-fishing and that fishing operations are managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem.

The operation of the fishery is considered, on balance, to be consistent with the objects of Part 13A of the EPBC Act. DEH considers that the commercial fishery will not be detrimental to the survival or conservation status of the taxon to which it relates in the short term. Similarly, it is not likely to threaten any relevant ecosystem in the short term. DEH therefore recommends that the fishery be declared an approved WTO under section 303FN of the EPBC Act with conditions and recommendations appended to the WTO declaration to be met by DPI&F to contain any environmental risks in the longer term. DEH considers that the fishery, as managed in accordance with the management regime is not likely to cause serious or irreversible ecological damage over the period of the export decision. The WTO declaration would allow the continued export of product from the fishery for a total period of three years, noting that two back-to-back short term WTO declarations covered the first year of this declaration. The WTO declaration will require reporting on the progress of implementing the recommendations of this report and other managerial commitments. The implementation of the recommendations will be monitored and reviewed as part of the next DEH review of the fishery.

As the official fishery area encompasses Commonwealth as well as State waters, consideration of the impacts of the fishery management regime under Part 13 of the EPBC Act is required regarding the interactions by the fishery on listed threatened species, listed migratory species, cetaceans and listed marine species. Protected species of particular concern occurring in the fishery area include dugong, marine turtles, crocodiles, cetaceans, sawfish, sharks and seabirds. The available evidence suggests that there are ongoing but limited interactions with this wide range of protected species. There is limited verified data available and DEH is particularly concerned about the apparently increasing number of interactions with turtles, specifically green turtles. DEH also notes however that these interactions have in most instances, reportedly involved the return of all turtles to the sea alive. Further, DEH notes DPI&F observer data that post-capture survival of this species is considered high and that more than 90% of the nesting habitat for green turtle in Queensland is protected.

DEH is also concerned over any interaction (particularly any leading to mortality) with dugong or cetaceans. The establishment of DPAs in 1997/ 1998 does provide some protection to these species, but the effectiveness of these areas (including the management of fishery operations within these areas) needs to be reviewed and if found to be ineffective alternative mitigation approaches implemented.

DEH is concerned that the number of interactions with all protected species is minimised and has made a recommendation to this effect. The overall actual and potential impact on Part 13 species under the current and future management arrangements is of concern and adequate protection must be provided in the Management Plan under development.

DEH recommends that the management regime for the ECIFF (taking into consideration the current arrangements and the arrangements under consideration in the proposed Management Plan) be declared an accredited plan of management under Sections 208A, 222A, 245 and 265 of the EPBC Act. In making this recommendation, it is DEH's judgement that it is unlikely that the fishery to which the plan of management relates does not, nor is not likely to, adversely affect the survival in nature of listed threatened species or population of that species, or the conservation status of a listed migratory species, cetacean species or listed marine species or a population of any of those species. While the level of interaction under current fishing operations warrants further specific attention, DEH considers that the management regime requires that all reasonable steps are taken to avoid the killing or injuring of protected species.

There are no listed threatened ecological communities in the fishery area.

DEH's assessment also considered the possible impacts on the World Heritage values of the GBRMP. DEH believes that the management regime together with changes to the zoning in the GBRMP and resultant management changes instituted through the Representative Areas Programme (RAP), the development and implementation of a formal Management Plan and the implementation of the recommendations made in this assessment, will provide adequate protection for the world heritage values of the GBRMP. The RAP was undertaken with the objective of protecting the biodiversity within the Great Barrier Reef World Heritage Area (GBRWHA), by protecting

'representative' examples of all the different habitats and communities in the GBRWHA and building upon the existing network of Green Zones (no-take areas).

### ***Recommendations***

1. *DPI&F to inform DEH of any intended amendments to the management regime that may affect sustainability of the target or negatively impact on by-product, bycatch, protected species or the ecosystem.*
2. *From the end of 2007, DPI&F to report publicly on the status of the ECIFF on an annual basis and to report explicitly against each performance measure specified in the management regime to be developed for the fishery.*
3. *In developing the management regime for the ECIFF, DPI&F to:*
  - *develop fishery specific objectives for target, by-product, bycatch, protected species and impacts on the ecosystem and which are linked to performance indicators by which these objectives are to be attained and performance measures against which the indicators will be assessed;*
  - *develop and formalise management response processes and timelines to triggers being activated; and*
  - *develop and formalise a list of species permitted to be taken in the fishery, which clearly defines target and by-product species and a clear process for the inclusion of any additional target species on the list.*
4. *Within one year, DPI&F to develop a management regime for the ECIFF, capable of controlling the level of take of target, by-product and bycatch species and of minimising interactions with protected species and impacts on the ecosystem and to implement the statutory Management Plan for the ECIFF before the end of the declaration.*
5. *DPI&F to undertake a review of latent effort in the fishery and incorporate into the management arrangements controls to ensure the activation of latent effort does not jeopardize the long term sustainability of the fishery.*
6. *DPI&F to complete a compliance risk assessment for the ECIFF and implement a risk-based compliance plan within three years taking into account risks of non-compliance associated with :*
  - *catch, possession, size and gear restrictions (including net attendance requirements) and shark finning at sea;*
  - *reporting of protected species interactions;*
  - *area and fishery closures; and*
  - *black marketing of product by recreational fishers, including charter vessel operators.*
7. *DPI&F to implement a pilot observer programme by the end of 2007 and a full observer programme by the end of the declaration and to ensure that the observer programme is capable of providing the required information at, where appropriate, a statistically robust level and provides for the collection of at least the following:*
  - *validation of commercial catch information for use in stock assessments and management;*

- *accurate identification of retained species to ensure logbook accuracy ;*
  - *data on bycatch (including composition and abundance);*
  - *protected species interactions; and*
  - *ecosystem impacts of fishing operations (to the extent possible noting the nature of the fishing operations).*
8. *Should the pilot observer program identify species identification problems, DPI&F to review the logbook to ensure it provides for adequate reporting of catch on a species basis and to ensure that fishers are equipped to make accurate species identification by the end of the declaration.*
9. *DPI&F to review within 12 months from the date of the declaration, the current methods for estimating recreational catch, including from charter vessels, of ECIFF species and the basis for the conversion of numbers of fish taken in the recreational catch, including from charter vessels, to weights for incorporation into stock assessments and subsequently into management controls to ensure overall (commercial and recreational) catch levels are sustainable.*
10. *DPI&F to ensure that:*
- *a risk analysis is conducted within 18 months to identify those target and by-product species, other than elasmobranchs, at most risk from the fishery;*
  - *based on the risk analysis, develop and conduct scientifically robust stock assessments, commencing with those species considered at most risk (noting that where data on which to base stock assessments are of poor quality or does not exist, qualitative assessment methods will be employed); and*
  - *stock assessments for the principal and/ or high risk species are conducted at least every three years and, consistent with this risk analysis and timetable, that the following assessment are considered as priorities:*
- |                         |              |
|-------------------------|--------------|
| <i>Barramundi</i>       | <i>2007</i>  |
| <i>Tailor</i>           | <i>2007</i>  |
| <i>Bream</i>            | <i>2008</i>  |
| <i>Flathead</i>         | <i>2008</i>  |
| <i>Whiting</i>          | <i>2008</i>  |
| <i>Sea Mullet</i>       | <i>2008</i>  |
| <i>Spotted mackerel</i> | <i>2009.</i> |
11. *DPI&F to continue to pursue collaborative management of shared stocks with New South Wales (for species such as tailor, mullet and mackerel) and NT Fisheries (tropical sharks).*
12. *DPI&F to ensure the commercial take of shark does not exceed the catch levels when the investment warning (8 April 2002) was issued, unless assessments for particular species demonstrate that catches at a particular level are sustainable.*
13. *Within six months of the completion of a tropical shark fishery situation report in 2009/ 2010, and taking into account the results of any prior research undertaken, DPI&F to implement appropriately precautionary management responses for elasmobranch species taken in the ECIFF, including consideration of banning all finning at sea for all elasmobranchs.*

14. *DPI&F to include in the management regime a requirement that rebuilding strategies, including reference points (target and or limit) and time frames, be developed for species if assessments indicate that stocks are overfished.*
15. *DPI&F to develop a Bycatch Action Plan for the fishery within 3 years.*
16. *DPI&F to review use of the charter fishing logbook in the ECIFF and based on the findings, develop a strategy for continued catch reporting through the charter logbook including a requirement to provide information on interactions with endangered, threatened and protected species within 2 years.*
17. *Within two years of the date of the declaration, DPI&F to review the effectiveness of the range of closed areas to address take/ interaction of protected species (particularly dugong and marine turtle) and if warranted develop and implement additional/ alternative mitigation measures and include these in the bycatch action plan and/ or in the management regime as appropriate.*
18. *DPI&F to analyse available information on the interactions of the various gear types used in the fishery with dugong, turtles, crocodiles, sea snakes and cetaceans within 12 months and implement appropriate mitigation measures to minimize interactions with these species.*

## **PART I - MANAGEMENT ARRANGEMENTS**

The ECIFF is managed by the DPI&F. The management regime is described in the following documents which are publicly available:

- the *Fisheries Act 1994*; and
- the *Fisheries Regulation 1995*.

The *Great Barrier Reef Marine Park Act 1975* also has a significant bearing on the operations of the ECIFF. A number of other documents, including research reports and scientific publications are integral to the management of the fishery.

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Because of the importance of the Management Plan being developed and related documents describing the existing management regime to DEH's assessment of the fishery, an amendment could change the outcomes of the assessment and decisions stemming from it. Decisions resulting from this assessment relate to the arrangements in force at the time of the decision. In order to ensure that these decisions remain valid, DEH needs to be advised of any changes that are made to the management regime and make an assessment that the new arrangements are equivalent or better, in terms of ecological sustainability, than those in place at the time of the original decision.

### **Recommendation 1:**

*DPI&F to inform DEH of any intended amendments to the management regime that may affect sustainability of the target or negatively impact on by-product, bycatch, protected species or the ecosystem.*

The DPI&F receives management advice on the ECIFF from the East Coast Inshore Finfish Fishery Management Advisory Committee (Finfish MAC), which is the consultative stakeholder forum for the fishery. The membership of Finfish MAC includes representatives from commercial and recreational fishing, processing/marketing, conservation, enforcement and research sectors and the Great Barrier Reef Marine Park Authority (GBRMPA). Finfish MAC receives scientific and technical advice from a number of subcommittees. DEH considers the level of consultation to be adequate and is confident that the management agency will continue to ensure interested parties are consulted appropriately.

As part of the consultation process in the development of the management plan for the fishery, DPI&F propose to conduct a series of public meetings throughout the State, provide a questionnaire about more specific aspects of the fishery and circulate the draft management plan once prepared in mid 2007.

The latest publicly available data on the fishery (stock status, management, catch and effort trends) is dated and is not regularly updated. DEH believes that public reporting on a fishery would be beneficial and that such reports include specific comment against each performance measure and performance criteria.

### **Recommendation 2:**

*From the end of 2007, DPI&F to report publicly on the status of the ECIFF on an annual basis and to report explicitly against each performance measure specified in the management regime to be developed for the fishery.*

The *Fisheries Act 1994* has broad objectives for the management of Queensland fisheries. There are no other stated management objectives for the ECIFF and no performance criteria by which performance of the management arrangements for the fishery can be assessed.

Under the legislative instruments (the *Fisheries Act 1994*, *Fisheries Regulation 1995* and the *Great Barrier Reef Marine Park Act 1975*) the ECIFF is managed by a combination of input and output controls including spatial and temporal closures, limited entry, total allowable catches for two species (spotted mackerel and tailor), gear and vessel restrictions and fish size limits. Recreational bag limits also apply to some species. DEH considers that while the current management arrangements are generally adequate, there is a number of issues requiring urgent attention in the fishery and DEH agrees with DPI&F's assessment that management of the fishery will be enhanced through an integrated management approach introduced under a formal Management Plan.

In developing the Management Plan consideration should be given to investigating a range of management approaches for the fishery. This could include:

- spatially based management including development of arrangements to protect marine and estuarine ecosystems, particularly nursery or breeding areas;
- the development of a number of plans, one for each of the major fishery foci (essentially southern, central and northern zones); and
- managing the fishery through a single plan that divides the fishery into regions, with specific management elements in each to address specific issues.

A regional approach has perceived advantages particularly to foster stewardship within fishing zones and has the potential to mitigate against the risks of localised depletion of target species and other species at risk from fishery operations). Consideration should be given to the feasibility of managing the ECIFF on a regional basis as part of the reduction of latent effort.

DPI&F's 2005 submission indicates that the development of a Management Plan for the ECIFF was being proposed. The development of the Management Plan effectively commenced through a wide public consultation process towards the end of 2006. Its development is being progressed through a staged process that includes wide stakeholder consultation. It is envisaged that a draft plan will be ready for finalisation by mid 2007. At the current stage of development major issues under consideration include:

- management arrangements for using commercial nets (e.g. mesh sizes, net lengths, attendance rules);
- size limits;
- take and possession limits;
- dugong protection areas;
- shark and ray management;
- use of closures for sustainability or fair access to the resources;
- quota management; and
- zoning for commercial netters.

DEH notes that DPI&F has identified that the ECIFF must be sustainably managed for the benefit and enjoyment of current and future generations, ensuring:

- a fair allocation of fisheries resources between all fishers;
- a profitable commercial fishery; and
- maximum benefits for the community with minimal impacts on this fishery, other fisheries and the environment.

DEH notes that discussions about sustainable management arrangements for the fishery have been underway for a decade, originally under the auspices of the Queensland Fisheries Management Authority. DEH sees the development of a Management Plan as a high priority and important for the ordered management of the fishery. DEH believes the development and finalisation of the Management Plan should proceed without any un-necessary delay.

DEH's assessment of the management regime relies heavily on DPI&F's stated intention to review the current management regime and to implement a formal Management Plan for the fishery. The Management Plan must address the issues already identified, include clear objectives for the management of the fishery and also include performance measures, performance criteria and reference points (target and/or limit). A clear process for responding to a performance measure not being met is also required to ensure that where such an event is determined to be the result of fishery impact prompt management action is taken to address any threats to sustainability. This should include timelines in which a review should be undertaken and in which management responses must be implemented (if warranted). As bycatch is a significant issue in the fishery appropriate measures to mitigate the level of bycatch (including interactions with protected species) must also be a high priority in the formulation of the Management Plan.

A list of species permitted to be taken in the fishery, which clearly defines target and by-product species is recommended to be developed along with a clear process for the inclusion of any additional target species on the list is also seen as important.

**Recommendation 3:**

*In developing the management regime for the ECIFF, DPI&F to:*

- *develop fishery specific objectives for target, by-product, bycatch, protected species and impacts on the ecosystem and which are linked to performance indicators by which these objectives are to be attained and performance measures against which the indicators will be assessed;*
- *develop and formalise management response processes and timelines to triggers being activated; and*
- *develop and formalise a list of species permitted to be taken in the fishery, which clearly defines target and by-product species and a clear process for the inclusion of any additional target species on the list.*

**Recommendation 4:**

*Within one year, DPI&F to develop a management regime for the ECIFF, capable of controlling the level of take of target, by-product and bycatch species and of minimising interactions with protected species and impacts on the ecosystem and to implement the statutory Management Plan for the ECIFF before the end of the declaration.*

The progress Queensland has made in removal of latent effort is noteworthy and commendable, noting that a 40% reduction in the number of inshore net licences was achieved in 2004 and DEH notes that there has been an ongoing removal of un-used

licences since then. However the level of latent effort available in the fishery is still of concern. DEH is also concerned about the possibility of latent effort within cross-fishery permits/ endorsements held by licence holders. Indicative information derived from the submission and other available related documentation are:

- each fishing licence holder takes on rough average 2.6 t/ year (as compared to an average of 10.3 t/ year for the active fishers);
- each fishing licence holder fished approximately 50 fishing days annually (or 60 days/ year for the active fishers); and
- the average income in the northern sector is \$32, 000 and \$56,000 in the southern sector (or an average of \$49, 500 for the active fishers in both sectors).

DEH agrees with DPI&F's comments regarding the potential that closures (eg commercial fishing closures, Recreational Only Fishing Areas (ROFAs), DPAs and additional closures introduced through the Commonwealth government's GBRMP RAP) may cause effort to be displaced onto adjacent grounds open to net fishing or into other fisheries (noting that most ECIFF fishers have licences that are endorsed to fish in other fisheries, such as line and crab fisheries). Acknowledgement is also given that the Structural Adjustment Package which bought out fishing licences including those with historical netting effort in the ECIFF and that the RAP conducted by GBRMPA, were designed to minimize adverse affects of the zoning in the GBRMP by the placement of zones in accordance with social, economic and cultural principle wherever possible.

DEH believes that a further reduction in latent effort should be considered if a review indicates that activation of the latent effort could impact on the ecological sustainability of the fishery in the long term.

DEH is concerned that the investment warnings released for the ECIFF in April 2002 and reinforced in September 2003, particularly for the take of elasmobranchs must be factored into current and future management and acted upon to limit or cap effort and/ or take of elasmobranchs. DEH notes that potential investors, current fishers and licence holders were reminded that increased fishing effort, catches and investment in these fisheries made after the release of the investment warning may not be recognized in any future management arrangements and they were warned not to increase their level of investment or activities until Management Plans for these fisheries are put into place.

**Recommendation 5:**

*DPI&F to undertake a review of latent effort in the fishery and incorporate into the management arrangements controls to ensure the activation of latent effort does not jeopardize the long term sustainability of the fishery.*

The Queensland Boating and Fisheries Patrol (QBFP) is responsible for ensuring compliance with relevant fishery (and GBRMP legislation) in the ECIFF. A State-wide Strategic Compliance Plan is supported by Regional and District Operational Plans. The latter contain strategies, performance indicators and review and evaluation provisions.

The QBFP conducts at-sea surveillance of inshore and offshore areas. Shore-based inspections of commercial and recreational fishers are made at wharves, boat ramps and unloading facilities. These inspections monitor compliance with logbooks, licences and possession limits regulated by number, size and volume. DPI&F report

compliance rates of 95% for recreational fishers and 92% for commercial fishers. However, DEH has concerns about the potential for existing compliance arrangements to monitor (and identify breaches) in:

- commercial catch limits including shark catch controls;
- gear restrictions (in particular attendance at nets);
- spatial and temporal controls;
- size limits;
- recreational catches, including from charter vessels, (including black marketing); and
- controls to minimize interactions with protected species, subsequent reporting of interactions with protected species and assessment of fate of animals after any such interaction.

Given the significance of time and area closures in the fishery the absence of Vessel Monitoring System (VMS) in the commercial fishery is of concern.

DEH believes that there needs to be an effective compliance programme in place for the fishery which is based on a risk analysis and designed particularly to ensure an effective 'at-sea' capacity. DEH believes that the recreational sector (including the charter sector) also requires an effective compliance programme to ensure all management measures such as recreational in-possession and minimum legal lengths are effectively enforced.

**Recommendation 6:**

*DPI&F to complete a compliance risk assessment for the ECIFF and implement a risk-based compliance plan within three years taking into account risks of non-compliance associated with :*

- *catch, possession, size and gear restrictions (including net attendance requirements) and shark finning at sea;*
- *reporting of protected species interactions;*
- *area and fishery closures; and*
- *black marketing of product by recreational fishers, including charter vessel operators.*

DEH notes that the current management arrangements for the fishery are under review and has recommended above that a Management Plan be implemented as a priority. Where DPI&F has developed Management Plans for other fisheries adequate provision for review of the Plan and its effectiveness has been included. DEH is confident that DPI&F will adopt a similar approach in development of a Management Plan for the ECIFF.

Fishery-dependent data relating to target/ by-product species are collected on a regular basis in the fishery. However, bycatch data are not collected on a regular basis. A range of fishery independent data has been collected through research projects. The most significant ongoing collection of fishery-independent data is that from the DPI&F Long Term Monitoring program (LTMP) which was initiated in 1999. Discussion of the information collection system can be found in Part Two of this report.

An analysis of the fishery's capacity for assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which

the target species lives and the fishery operates is contained under Principle Two of this report.

Management arrangements in the ECIFF take into account the impact of management measures in the GBRMP, New South Wales fisheries and northern Australian fisheries for sharks and mackerels. Further discussion of interactions with other fisheries is contained in Part Two of this report.

DEH considers that the current management arrangements comply with all relevant threat abatement plans and recovery plans. However, currently there is no bycatch action plan, no ongoing collection of bycatch data, and reporting requirements on the catch and bycatch of shark do not meet the standards required in the National Plan of Action POA - Sharks. DPI&F has indicated that these issues will be addressed as part of the revised management arrangements for the fishery. DEH has made a number of recommendations elsewhere in this report to address these deficiencies. DEH is confident that DPI&F will ensure compliance with any future plans or policies as, and when, they are developed.

No regional or international management regimes to which Australia is a party are of direct relevance to the fishery. The prime international regime affecting the fishery is the United Nations Convention on the Law of the Sea. The management regime essentially complies with this. Other international regimes are applicable to fisheries management but do not explicitly involve this fishery, for example the 1992 Convention on Biological Diversity and in particular the 1995 Jakarta Mandate requiring that, in relation to the sustainable use of marine and coastal biological diversity, the precautionary principle should apply in efforts to address threats to biodiversity. While these agreements are not specifically addressed in the Submission, the fishery's compliance with their requirements can be assessed by examination of Part Two of this report. The application of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/ 78) to vessels operating in the fishery is explicitly discussed under Principle 2, Objective 3.

DEH considers it is incumbent on all authorities to develop a thorough understanding of the framework of national, regional and international agreements and their applicability to export-based fisheries for which they are responsible.

The ECIFF includes areas within the GBRMP in which commercial fishing is allowed and whilst operating in accordance with requirements of the *Great Barrier Reef Marine Park Act 1975*. Within the GBRMP, net fishing is permitted only within the General Use and Habitat Protection zones. Bait netting is permitted also in the Conservation Park zone. Since 1997, 15 Dugong Protection Areas, in which netting is restricted or prohibited, have been established in the GBRMP. To protect world heritage values, from July 2004, closures through GBRMP re-zoning removed commercial net fishing from significant areas of inshore fishing grounds. Under the RAP the area of the GBRMP protected through closed green zones has increased to 33.3% (114,530 km<sup>2</sup>) of the GBRMP area and a minimum of 20% of each of the 70 bioregions identified in the park were afforded protection.

The impact of fishing was one of a range of factors driving the increase in protected areas within the GBRMP. DEH considers that the changes to zoning introduced in 2004, together with outcomes of the assessment as listed throughout Part Two of this assessment report, mean that fishing activities as currently practiced in this fishery are

unlikely to have a significant impact on the world heritage values of the GBRMP in the period of the WTO declaration. Under the EPBC Act, a person may not take an action that has, will have or is likely to have a significant impact on the world heritage values of a declared World Heritage property, in this instance, the GBRWHA. People that are taking actions that are a lawful continuation of a use of land, sea or seabed, that was occurring immediately before the commencement of the EPBC Act, may continue to take those actions. An enlargement, expansion or intensification of a use is not a continuation of a use. Any significant change to existing practices, which is likely to significantly impact on the GBRMP's World Heritage Values, may additionally require approval by the Commonwealth Minister for the Environment and Heritage.

### ***Conclusion***

DEH considers that the ECIFF management regime is documented, publicly available and transparent, and is developed through a consultative process. The management arrangements are adaptable. However a Management Plan underpinned by appropriate objectives and performance measures for target, by-product, bycatch and protected species and the ecosystem needs to be developed and implemented as a matter of priority. The Management Plan should include performance criteria (review events) to ensure that the effectiveness of management arrangements can be measured and reviewed.

The management arrangements are generally capable of controlling the harvest through a combination of input and output controls appropriate to the size of the fishery and the means of enforcing critical aspects of the management arrangements are in place. However DEH agrees with DPI&F's assessment that there is scope to further refine the management arrangements. For example DEH is confident that the Management Plan, when introduced, will provide for periodic review of the fishery.

The management regime takes into account arrangements in other jurisdictions, and adheres to arrangements established under Australian laws and international agreements.

## **PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES**

### **Stock Status and Recovery**

Principle 1: *'A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover'*

### **Maintain ecologically viable stocks**

Objective 1: *'The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability'*

### ***Information requirements***

Data collection systems in use in the ECIFF include the Commercial Fisheries Information System (CFISH), Daily Fisher Logbook Program, the Recreational Fishing Information System (RFISH), Recreational Fishing Surveys and Fishing Diaries, Charter Fishing Logbooks and the DPI&F's LTMP. Research projects such as the *Tropical Resource Assessment Program* (Fisheries Research and Development Corporation Project 1995/ 049) and Phase 1 and 2 of the *Northern Australian Sharks and Rays: The sustainability of target and bycatch fisheries* (Fisheries Research and Development Corporation Projects 2001/ 077 and 2002/ 064) and the National Recreational and Indigenous Fishing Survey (NRIFS) (Henry and Lyle, 2003) have also provided data of relevance to the ECIFF.

### ***Fishery Dependent Information***

Fishery dependent data from the commercial sector of the fishery is collected via CFISH. Since 1988, the logbook programme has required compulsory daily recording and monthly reporting. The logbook requires reporting of fishing activity by location (latitude/ longitude or 6' lat./ long. grids), date, code (non fishing or fishing), effort (days fished), net mesh size and net length, target species, net set location and retained catch (weight and product form). DEH notes that fishing effort data are collected only as fishing days.

The DPI&F believes that the information collection systems in place for the ECIFF are comprehensive, robust and reliable. There is provision for catches of up to 30 of the major species/ species groups retained in the ECIFF to be recorded in the logbooks.

DEH agrees that the collection of catch data on target and by-product species is reasonable, noting that there is provision for up to 30 of the major species/ species groups retained within the ECIFF and with upwards of a further 40 minor species. DEH understands the situation that there is considerable risk in amending the logbook to accommodate further species level reporting and that there is a real prospect of poor compliance in completing logbooks accurately by fishers if the requirements are too onerous. However, DEH stresses the need for greater species breakdown in the logbook data but is conscious of the potential adverse effects on accuracy of reporting if logbook design and completion requirements are overly complicated. This risk must be balanced by the problems in management of not having complete and accurate data

on which to assess the status of the stocks or effectiveness of management. Williams (ed.) (2002) identified that the collection of logbook data on whiting covers four species and the lack of identification of these precludes individual stock assessments for these species. Also the general classifications for hammerhead and whaler sharks are considered inadequate. DEH considers that DPI&F should review such species issues in the logbook and also ensure that fishers have adequate information to allow discrimination between significant species. Given the extensive list of species taken and retained in the fishery, emphasis must be given to ensuring fishers are capable of accurately identifying and recording their catch.

In addition, the level and nature of protected species interactions are not clear and DEH believes the logbook employed by DPI&F for the fishery should be reviewed and if necessary amended to provide for comprehensive reporting of protected species interactions. This should include an education programme for fishers (commercial and recreational, including charter vessel operators) on the importance of minimizing interactions with protected species and in reporting any interaction.

While the LTMP provides a level of validation of CFISH logbook data there is no ongoing validation of the logbook information. DEH believes there needs to be an increased level of data validation within the fishery to confirm the information provided through fishery dependent processes, particularly logbooks and DPI&F recognizes this. DEH notes that recent changes in obtaining and renewing seafood buyer's licences means that from July 2006 any member of the public will be entitled to obtain a buyer's licence at minimal cost. It is expected there will be a large increase in the number of seafood buyers licences and buyers accessing product from this fishery. In addition, it is likely that many fishers will also obtain buyers licences. DPI&F comment that administration of a buyer's monitoring system to validate logbook catch data would be likely to impose additional very significant costs to management. This will reduce the utility of monitoring of buyer's transaction to act as a robust fisher independent measure of catches in the fishery. Irrespective, DEH believes that to provide greater assurance in the species composition and quantity taken in the commercial fishery and to control or prevent the entry of recreational catches into the market (black marketing), a system to corroborate logbook data would be valuable and in time may be necessary.

DEH notes that observer coverage in the ECIFP has been restricted to that undertaken as part of research projects. DEH also notes the logistical difficulties associated with the placement of observers on the types of vessels employed in the fishery. However, DEH believes that an ongoing observer programme should be implemented to validate all aspects of the data provided by operators. The introduction of a fishery 'independent' observer programme is seen as important to collect the necessary verified information on which a fully commercial fishery could be based. Consideration also needs to be given if an observer programme would be necessary and applicable to the charter sector.

The design of this observer programme needs to be established, particularly the level of coverage (to ensure that it collects statistically robust information), the range of information collected (eg catch and bycatch verification, serial and/ or localized depletion, protected species interaction, gear restrictions, damage to escapees and post release mortality, suitability of mesh size to allow for escape of juveniles) as well as validating logbook data.

**Recommendation 7:**

*DPI&F to implement a pilot observer programme by the end of 2007 and a full observer programme by the end of the declaration and to ensure that the observer programme is capable of providing the required information at, where appropriate, a statistically robust level and provides for the collection of at least the following:*

- *validation of commercial catch information for use in stock assessments and management;*
- *accurate identification of retained species to ensure logbook accuracy ;*
- *data on bycatch (including composition and abundance);*
- *protected species interactions; and*
- *ecosystem impacts of fishing operations (to the extent possible noting the nature of the fishing operations).*

Currently there is provision for catches of up to 30 of the major species/ species groups retained in the ECIFF to be recorded in the logbook, with upwards of a further 40 minor species taken in small quantities. There are however, suggestions that there are difficulties in separating similar looking species by fishers and recording these in the logbooks. Accurate identification training is problematic and an amendment to the logbook to accommodate further species level reporting is physically difficult. There is a concern that any increase in the complexity of a logbook may lead to an increase in poor reporting. This situation can translate into difficulties in conducting stock assessments and implementing any necessary management arrangements. DEH concurs with DPI&F that initial emphasis to ensure accuracy in the recording of catch is to use the observer program to assist fishers in ensuring that identification of the catch as reported in the logbook is correct. However should identification problems be demonstrated then the situation will need to be remedied.

**Recommendation 8:**

*Should the pilot observer program identify species identification problems, DPI&F to review the logbook to ensure it provides for adequate reporting of catch on a species basis and to ensure that fishers are equipped to make accurate species identification by the end of the declaration.*

Information on recreational fishing is derived from the RFISH surveys. DPI&F conducted surveys in 1996/ 1997, 1998/ 1999 and 2000/ 2001 which provided recreational catch estimates on a state-wide and regional basis. DEH notes that RFISH data are collected in numbers of fish and that weight of recreational harvest is estimated by application of average weight of species. Charter operators are required to submit logbook information including the total number of fish kept and released and the total weight of fish harvested. These data are entered into DPI&F's CFISH database.

While the DPI&F submission indicates that data on recreational catch has been factored into various stock assessments, the quality of the data available is seen as questionable. Williams (ed.) (2002) notes that "The information provides estimates only and no conclusion about the trends in recreational harvest should be drawn from these figures." Key recreational species include whiting (several species), mullet, bream, dart, tailor, flathead, mangrove jack and barramundi. The take by recreational fishers, including charter vessels, of the same species taken in the commercial fishery is very significant and in several instances exceeds the commercial take by up to 5 times (dart), 4 times (tailor, bream and flathead) and 3 times (whiting) and in many instances equal to the commercial take (barramundi, school mackerel and spotted

mackerel). In light of this, DEH strongly supports efforts to improve the accuracy and frequency of estimates of recreational catch and, in particular to ensure that the conversion of numbers of fish to weights is as accurate as possible.

While clearly not part of the assessment of the commercial fishery, DEH believes the increasing pressure on fish stocks attributable to recreational fishing is a issue that Queensland must address as a matter of priority. Effective management of the recreational fishery is seen as a necessary adjunct to management of the commercial fishery. Current management includes gear controls, limits on take (bag and/ or boat limits), temporal and spatial controls. In many instances the controls imposed apply to both sectors. Effective management of the recreational, including charter vessel operations, is necessary to ensure the long term ecological sustainability of the commercial fishery. In the first instance there is a need to collect the necessary data (at a level that is reliable and able to inform the stock assessments for key species) and build this information into appropriate and complementary management for both the recreational, including charter vessel operators, and commercial fisheries.

DEH is also aware of inconsistencies in in-possession and legal lengths within the recreational fishery (such as those in place in the Gulf of Carpentaria and the East Coast for king salmon, blue salmon, mangrove jack, queenfish, spotted grunter bream and black jewfish) and believes these inconsistencies need to be reviewed and if necessary brought into line with each other for a consistent statewide approach.

**Recommendation 9:**

*DPI&F to review within 12 months from the date of the declaration, the current methods for estimating recreational catch, including from charter vessels, of ECIFF species and the basis for the conversion of numbers of fish taken in the recreational catch, including from charter vessels, to weights for incorporation into stock assessments and subsequently into management controls to ensure overall (commercial and recreational) catch levels are sustainable.*

DEH acknowledges that DPI&F is awaiting the results of an Australian Bureau of Statistics review of the RFISH recreational fishing survey methodology and its capacity to provide regional as well as State wide estimates. DPI&F will use the recommendations from the review to contribute to a broader review of the RFISH program.

DEH recognizes that Indigenous fishes are allowed to fish as of right and while clearly not part of the assessment, the take by Indigenous fishers needs to be factored into the management of the commercial and recreational fisheries. The NRIFS also collected information on Indigenous fisher's catch and effort. It reported that 55% of Indigenous fishers in Northern Australia fished inshore, targeting sea mullet, catfish (*Arius* spp.), yellowfin bream and barramundi. DEH notes that a comprehensive 'Indigenous Subsistence Fishing Survey Kit' has been developed for Indigenous community management agencies to develop and conduct community based fishing surveys that are specific to their own community. DEH supports the wide distribution of this kit to support an ongoing collection of information on Indigenous fishing for ECIFF species and subsequent inclusion of the information into stock assessments and management.

The incidental take of protected species by fishers from Indigenous communities is of concern to DEH and DEH would expect DPI&F to ensure that any bycatch of marine

turtles or dugong is sustainable so that the principles of the National Partnership Approach (Queensland endorsed the "Sustainable Harvest of Marine Turtles and Dugongs in Australia - A National Partnership Approach 2005" at the Natural Resource Management Ministerial Council in October 2005) can be achieved to allow for the continued sustainable use of dugong and marine turtles by Indigenous people of Australia.

DEH believes it would be valuable to undertake extension work that explains the objectives, issues and rationale in the management of the commercial and recreational fishery and to ensure the rights and aspirations of Indigenous communities are taken into consideration in the management of the resources on which the commercial fishery relies.

#### ***Fishery Independent Information***

Between 1996 and 1999 a detailed assessment of several major tropical east coast waterways was undertaken in order to improve the level of fishery independent information on fish stocks in Queensland coastal streams. This assessment provided information on the relative importance of species to commercial, recreational and Indigenous fishers, movement and growth of key finfish species and habitats. Size and age data for barramundi, sea mullet and tailor have been monitored, under the LTMP, since 1999. Since 2000 all other species caught in the net surveys for barramundi are also monitored. The LTMP has both a fishery dependent and fishery independent component.

Overall, given the range of fishery dependent and independent data gathered by DPI&F and the proposed introduction of revised mechanisms to ensure data is available to support the Management Plan, DEH considers that the information collection system in place, while it could be improved, is acceptable to the scale of the fishery. Continuation of existing data collections and research programs, combined with the proposed extension and refinement of such activities will be important for the future management of the fishery. There is a particular need for validation of logbook data and improved estimates of recreational catch. Recommendations have been made to address these issues.

#### ***Assessment***

There are approximately 16 - 20 identified target species and approximately another 40 by-product species. A total of around 100 species are taken in the ECIFF.

Review of catch and effort data for ECIFF species is undertaken routinely. Quantitative stock assessments have been conducted on only a number of the major commercial and recreational species in the fishery. By mid-2005, age structured assessments of tailor, mullet and spotted mackerel stocks (incorporating commercial and recreational catch and effort data and environmental variables) were completed. Species composition and catch trend analysis of tropical sharks and a semi-quantitative risk assessment for shark species captured in the fishery were completed in 2004. A risk assessment for stingrays and sawfish had been proposed for 2005.

The DPI&F submission identifies barramundi, sea mullet, spotted, grey and school mackerels and garfish as the principal species in the ECIFF. Tailor, now subject to a Total Allowable Commercial Catch (TACC), was, according to the submission, also a

principal species in the Southern Inshore Fishery along with sea mullet. Given its history, the high level of recreational catch and the need to implement specific management for the species, DEH believes that tailor should continue to be regarded as a principal species in this fishery, regardless of the level of commercial catch.

DEH notes that:

- the most recent assessment of barramundi was published in 2002. There is no indication of when the next assessment will be undertaken;
- a full stock assessment of shark species has not been undertaken although there has been some work undertaken in 2004 on the relative sustainability risks posed to the major commercially exploited species in the ECIFF;
- full stock assessments of grey and school mackerel have not been undertaken;
- the 2004 stock assessment for tailor indicates that the resource is heavily exploited and DEH believes that rebuilding strategies for this species needs consideration;
- the most recent, limited status assessments of bream, flathead and whiting were conducted in 2000; and
- it has been a common practice to group a number of species in catch records (such as mullet, shark, which includes rays, whiting, bream, gar, trevally) and in some instances a variety of species are grouped (eg baitfish and other finfish). While the rationale behind this practice is understood the management issues it has raised need to be addressed. This is particularly important when the ongoing expansion of the fishery and the apparent practice of changing focus from one particular species group once a level of economic return is reached is noted.

In general terms comprehensive stock assessments:

- have not been conducted for most of the species retained;
- assessments are not conducted on a regular basis;
- many of the assessments are only qualitative in nature and of limited use in the effective management of the fishery; and
- in many instances there is considerable issues in species identification and in recording catches to species levels.

While recognizing the resource and data collection implications associated with the conduct of stock assessments, DEH believes there is a pressing need to conduct a range of comprehensive stock assessments for species taken in the fishery that includes information on recreational (including charter fishing) and Indigenous catches and all mortalities attributable to commercial take (ie all retained catch (target and incidental) and discards). DEH notes that a risk analysis was conducted in 1998 and in 2006 (Resource Priority Workshops) but included in those discussions was a caveat that a decision to conduct assessments took into consideration the ability to collect suitable monitoring data. It is further understood that the LTMP research and species priorities and strategic direction of the programme is reliant on ongoing funding being sourced. Given the large number of species taken, a programme of stock assessments should be developed (and undertaken) based on a risk analysis of the species taken, particularly their present status (as much as is known) and their vulnerability to fishing.

**Table 3: ECIF: Summary of stock assessments for key species**

Species	Catch information	Assessment type (risk)	Stock assessment dates	Stock assessment status
Barramundi	increasing catches	quantitative	Late 1990s/ 2002	re-assessment needed
Tropical sharks – graceful; – blacktip reef; – Aust blacktip; – spot-tail; – scalloped hammerhead; – great hammerhead; – white spotted guitarfish.	Significant increase in catches with recent downturn	qualitative low risk; low risk; low to mod; low to mod; moderate  high;  high;	Late 1990s/ 2004	Quantitative assessment needed which will identify stock structures and distribution
Threadfin	?? catch		Late 1990s	assessment needed
Mullet	heavily exploited stock variable catch but suggestions of recruitment failure	quantitative - mathematical model	1998/ 2004	3yrs
Spotted Mackerel	TACC (140 tonnes) introduced	quantitative	2005	3yrs
Tailor	heavily exploited stock TACC (120 tonnes) recently introduced, decreasing commercial but heavy recreational catch	yield per recruit/ quantitative (surplus production, age structured and age and length population models/	1998/ 2004, 2005	3yrs need for spawning stock protection
Rays	Unknown	quantitative/ yield per recruit	2005 ????	assessment needed
Bream	fully fished	quantitative/ yield per recruit	1998/ 2000	re-assessment needed
Flathead	heavily fished	quantitative/ yield per recruit	1998/ 2000	re-assessment needed
Whiting	heavily fished	quantitative/ yield per recruit	1998/ 2000	re-assessment needed
Grey mackerel		unknown	Late 1990s	assessment needed
School mackerel			never	assessment needed
Garfish			never	assessment needed
Mangrove jack			never	assessment needed
Trevallies			never	assessment needed
Lutjanids (Cods)			never	assessment needed

Species (cont)	Catch information	Assessment type (risk)	Stock assessment dates	Stock assessment status
Siganids (rabbitfish)	decreasing catch		never	assessment needed
Queenfish			never	assessment needed
Spotted Grunter			never	assessment needed
Jewfish			never	assessment needed
Sawfish			2005 ????	assessment needed

DEH notes that work on development of a stock assessment for blacktip and sorrah sharks in northern Australia is progressing. However, DEH remains concerned about the lack of assessments available in relation to a number of key species, including hammerhead sharks and white-spotted guitarfish, taken in the ECIFF which have been assessed as of moderate to high risk.

DEH believes a list of key species taken in the fishery needs to be developed (based on a risk analysis) and a programme developed and implemented that systematically ensures stock assessments are conducted and results factored into management decisions.

In the absence of quantitative stock assessments, precautionary catch limits need to be set and, allied with this, should be triggers and management responses to provide surety and minimize time for response should there be concerns about the species. If a significant risk is identified for a particular species or species group DEH believes consideration should be given to the implementation of interim management measures to be in place until the stock assessments and resultant management measures are finalized.

### **Recommendation 10:**

*DPI&F to ensure that:*

- *a risk analysis is conducted within 18 months to identify those target and by-product species, other than elasmobranchs, at most risk from the fishery;*
- *based on the risk analysis, develop and conduct scientifically robust stock assessments, commencing with those species considered at most risk (noting that where data on which to base stock assessments are of poor quality or does not exist, qualitative assessment methods will be employed); and*
- *stock assessments for the principal and/ or high risk species are conducted at least every three years and, consistent with this risk analysis and timetable, that the following assessment are considered as priorities:*

<i>Barramundi</i>	<i>2007</i>
<i>Tailor</i>	<i>2007</i>
<i>Bream</i>	<i>2008</i>
<i>Flathead</i>	<i>2008</i>
<i>Whiting</i>	<i>2008</i>
<i>Sea Mullet</i>	<i>2008</i>
<i>Spotted mackerel</i>	<i>2009</i>

DPI&F will rely on:

- a current stock discrimination project on grey mackerel, scheduled for completion in 2007/ 2008;
- validation of logbook data on school mackerel in 2007; and
- an estimation of biological parameters for garfish and a fishery situation report for tropical sharks (or if sustainability issues are identified in the development of the management plan for the fishery) including hammerhead and whaler sharks,

as the basis for risk analyses and on which to base management decisions and a precautionary approach to management until stock assessment are able to be conducted.

Several of the key species taken in the fishery are also target species in adjacent fisheries. Cross jurisdictional co-ordination of research, management, monitoring and compliance is necessary to ensure the impacts of all fisheries on these species are sustainable. Species taken in the ECIFF are also taken in New South Wales (eg tailor and spotted mackerel), other Queensland fisheries including the GOCIFF and in Commonwealth, Northern Territory and Western Australian fisheries in the north of Australia as well as fisheries in Indonesian and Papua New Guinean waters (e.g. tropical sharks, mackerel). DPI&F currently collaborates with researchers in New South Wales, the Northern Territory and Western Australia to share research information and to ensure consistent management arrangements for shared stocks. Discussions with New South Wales are underway in relation to implementation of size and possession limits and catch limits for tailor and spotted mackerel, which are now subject to catch quotas in the ECIFF. Management arrangements for shark stocks in other jurisdictions are being considered as part of the consideration of a Management Plan for the ECIFF.

There is a need to continue to pursue collaborative management of shared stocks with New South Wales (for tailor, mullet, bream and mackerel) and NT Fisheries (sharks, barramundi and mackerel) and consider stocks shared internationally with countries including Indonesia.

**Recommendation 11:**

*DPI&F to continue to pursue collaborative management of shared stocks with New South Wales (for species such as tailor, mullet and mackerel) and NT Fisheries (tropical sharks).*

***Management response***

DPI&F relies heavily for management decisions on information from commercial catches derived from logbooks, broad estimates of the relative volume of commercial and recreational catch and catches from charter operations from logbooks. DEH has made a recommendation above in order to improve the level of confidence in logbook and recreational data. There are sound estimates of productivity and sustainable harvest levels for only four of the seven primary species in the ECIFF - barramundi, tailor, sea mullet and spotted mackerel. No such estimates exist for a number of other targeted species such as grey or school mackerel or garfish. With respect to grey mackerel, DEH notes that Williams (ed.) 2002, advised that, in relation to data up to 2000, the dramatic increase in catch from 1995 to 2000 should be viewed with concern. The absence of productivity estimates for hammerhead shark species (and other shark species) is also of particular concern to DEH. DEH notes that a major

constraint is the lack of species specific catch data and supports DPI&F's attempts to improve identification and recording of shark catch in line with the requirements of the NPOA-Sharks.

The available information indicates that barramundi stocks appear to be healthy and that current levels of fishing effort are sustainable. Recent reductions in the level of latent effort in the fishery together with temporal and spatial closures and ongoing monitoring through the LTMP should assist in ensuring that this stock continues to be fished sustainably.

The latest assessment on sea mullet indicates that the current biomass is approximately 60% of the virgin level and that recruitment is highly variable, but appears to have declined to particularly low levels in recent years (2001 and 2002). Management recommendations (Bell *et al.*, 2004) in relation to this species include the need for a further stock assessment in three years time (ie by 2007), reductions in effort if catch rates drop and an extension to the LTMP to capture the age length and sex structure of the estuarine component of the fishery.

The most recent assessment for tailor indicates that the population is very heavily exploited, with its ability to reproduce dependent on the fishery's incomplete selectivity of one-year old fish. Exploitable biomass and egg production are thought to have fallen to about half the levels that prevailed in the 1970s, or about 40% of virgin levels. Management recommendations (Leigh *et al.*, 2004) identified the need to provide better protection for the spawning stock by increasing the minimum size from 30 cm to 40 cm in order to allow most one year old fish to spawn and to confirm the mortality rate of fish released by the recreational fishery, which currently takes about 1000 t per year compared to around 200 t by the commercial fishery. The size limit remains unchanged and this situation should be reviewed. There is no indication that any research to confirm the mortality rate of discards particularly in the recreational sector is underway. In addition, DEH notes that commercial operators are allowed to retain 100 kg of tailor per trip as by-product and that catch of this by-product is not deducted from the TACC, introduced in 2002, of 120 t. The TACC does not therefore provide an effective ceiling on catch. The DPI&F submission fails to provide an explanation for the level of the TACC for tailor or the factors underlying its introduction. Given this situation a review of the tailor sector of the fishery is warranted and possible stock rebuilding strategies considered.

Despite a management recommendation (Cameron and Begg, 2002) that small mackerel stocks be managed with 'utmost caution until detailed stock assessments are undertaken' management has been introduced only for spotted mackerel. That species is now subject to a TACC of 140 t and the species can only be targeted commercially by line. Net fishers have an incidental catch possession limit of 15 fish/ trip. The DPI&F submission provides no basis for the level of the TACC or the factors that led to its introduction. As with tailor, the incidental catch allowance reduces the effectiveness of the TACC as a cap on catch. Catches of grey and school mackerel have increased significantly since 2002.

There are no stock assessments for bream, flathead or whiting. Assessments of these species groups in the Burnett and Maroochy Rivers and Pumicestone Passage found that they were heavily or fully fished in each of these areas.

DEH notes that there has been a fivefold increase in the catch of shark across the fishery between 1990 and 2003, peaking at 1500 t in 2003 before dropping back to 1200 t in 2004 and 919 t in 2005. Between 2001 and 2003 shark comprised, on average, 22% of the total catch (Williams and Bibby, 2004) making it the second highest component of the catch after mullet. In the Northern Inshore Fishery tropical sharks comprised 45% of the harvest in 2001-2003, peaking at 1000 t in 2001. Shark catch is much lower in the Southern Inshore Fishery with the highest catch of 242 t recorded in 2000. However this represents a doubling since 1990 and shark now comprises 6% of the catch in the Southern Inshore Fishery. DPI&F acknowledge that the ECIFF has moved over the last decade from taking shark largely as an incidental catch to becoming for some fishers, a dedicated shark fishery. DEH has concerns over the impact of the fishery on shark species as it is apparent the fishery is increasing its take of shark and the impacts on the species taken are not well understood. The biological characteristic of many of the shark species taken in the ECIFF make them susceptible to fishing pressure and precautionary approaches to management are necessary until sustainable levels of take are established.

Recent work on the assessment of risk to the sustainability of sharks taken in the ECIFF identified the urgent need for information on biology, stock structure and optimal harvesting of these species, the need for management intervention for high risk species (such as scalloped hammerhead and great hammerhead sharks and white-spotted guitarfish) and the need for a further review of sustainability of sharks and rays as part of the introduction of Management Plan. DEH notes that these three species of shark, especially white-spotted guitarfish, are valued for their fins. Further, DEH notes that the white-spotted guitarfish is classified as Vulnerable by the World Conservation Union. Scalloped and great hammerheads are classified as Lower Risk (near threatened) and Data Deficient respectively. DEH has made a recommendation above concerning the timing of stock assessment for these species. DEH notes that no management measures have yet been agreed for the high risk species and that no new data collection mechanisms have been implemented. Given the trends in catch, the vulnerability of shark species and the requirements of the NPAO- Shark, DEH considers that DPI&F should be taking a more precautionary approach to management of these species.

DEH believes the investment warning issued by DPI&F in 2002 and reinforced in September 2003 which specifically advises that any increase in fishing effort, catches and investment in the fishery may not be recognised in any future management arrangements. It warned fishers not to increase their level of investment or activities until management plans for these fisheries are put into place. This must be acted upon in the development of the Management Plan. DEH expects that this will cap the allowable catch and provide some certainty for the fishers and protection to the species until the long term sustainability of the species taken be determined through robust stock assessments.

**Recommendation 12:**

*DPI&F to ensure the commercial take of shark does not exceed the catch levels when the investment warning (8 April 2002) was issued, unless assessments for particular species demonstrate that catches at a particular level are sustainable.*

DEH acknowledges the current restriction on shark finning that precludes the landing of shark fin unless accompanied by a corresponding amount of shark carcass. DEH does not, however, agree with DPI&F's claim that such a restriction constitutes a

precautionary approach to management of elasmobranch species. While DEH understands that Finfish MAC are developing proposals for appropriate arrangements to cap effort in the shark fishery, there are no time frames provided for a decision on such arrangements. DEH understands that the results of FRDC Project 2002/064 (Shark Phase 2) should have been available in 2005 and DEH believes that DPI&F should respond to these results as a matter of urgency. The prohibition of finning of sharks at sea needs to be in place in the fishery and such a ban should include all sharks, skates and rays (elasmobranchs).

**Recommendation 13:**

*Within six months of the completion of a tropical shark fishery situation report in 2009/ 2010, and taking into account the results of any prior research undertaken, DPI&F to implement appropriately precautionary management responses for elasmobranch species taken in the ECIFF, including consideration of banning all finning at sea for all elasmobranchs.*

Sharks are also at risk from illegal, unregulated and unreported fishing and this is thought to be a growing concern. This activity should be addressed through a concerted and co-ordinated response involving the Commonwealth, States and Territory Governments.

DEH notes that the findings of such assessments and related research are being considered in the context of developing a Management Plan for the ECIFF. However, given that some of the advice is now several years old, that discussion of management arrangements for the fishery have been underway for nearly a decade and that there is no time frame set for implementation of the Management Plan, DEH considers that action in response to the management implications should not be delayed.

**Conclusion**

DEH considers that the current management regime in the ECIFF provides a reasonable platform for management of the fishery in the short term. The removal of latent effort and the introduction of TACCs for tailor and spotted mackerel demonstrate the DPI&F are able to take management action to address sustainability concerns. However, concerns remain about the timeliness of management decision making, the implementation of management measures and the capacity of the current management regime to implement and enforce management measures across all sectors of the fishery, noting the significance of the recreational sector to the total removals of some key species. Efforts towards development of a Management Plan are noted and DEH strongly supports the move to a more integrated and formalised management regime.

The management arrangements are underpinned by an information collection system that is generally acceptable to the scale of the fishery but which needs improvement in relation to the reliability of recreational catch estimates, better species discrimination in catch data, conduct of quantitative stock assessments and an ongoing process to validate data collections from all sectors.

There are significant issues in the management of the fishery attributable to the lack of reliable stock assessment of all but a few species. DEH, while recognising the resource implications of conducting stock assessment, believes that a programme of

stock assessments based on a species based risk assessment should be instituted. A recommendation to this end has been developed.

There is little or no information available on the sustainability of current catch levels of by-product species. There remains considerable uncertainty as to the sustainability of some stocks, particularly sharks. In particular, DEH notes the lack of management response to significant increases in shark catch, particularly in the north of the fishery. These increases are even more concerning since the lack of species identification in data could be disguising threats to some species. DEH does not consider that DPI&F's approach to management of sharks in the ECIFF has been fully consistent with the application of the precautionary principle.

The management response to some research appears to have been delayed pending finalisation of discussion on the nature of a Management Plan. Until management responses are made and the assessments conducted for some species, and further data collection and research undertaken for others, DEH cannot be confident that management arrangements generally are sufficient to ensure that the fishery is conducted at catch levels that maintain ecologically viable stock levels with high levels of probability in the medium to longer term.

DEH considers that there is scope to refine the existing information collection and assessment procedures and to strengthen management responses and has provided a number of recommendations for improvements in the longer term.

### **Promote recovery to ecologically viable stock levels**

Objective 2: *'Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes'*

There are no clearly defined reference points for the range of species taken in the ECIFF and accordingly it cannot be demonstrated that any of the species are below its relevant reference point. Concern for the status of stocks of tailor and spotted mackerel has prompted the introduction of the commercial catch limits for these species but there is inadequate control over the level of recreational catch of these species. There are concerns about the adequacy of compliance checks on bag limits and such limits do not, in any case, effectively control catch since they do not restrain the number of fishers to whom the possession limits apply.

The absence of stock assessments for a range of target and by-product species means that it is not possible to determine whether these stocks are overfished. However, DPI&F asserts in its submission that 'no species currently taken in the ECIFF requires a precautionary recovery strategy'. DPI&F maintains that it has at its disposal an extensive range of management tools to address species specific issues and undertakes to manage the ECIFF 'in a sustainable manner with sufficient precautionary management measures in place where information for a particular species may be deficient'. However, DPI&F's practice to date in the ECIFF has not been consistent with this approach. Management measures have been delayed, for example, for shark species, on the grounds that research on these species is underway.

**Recommendation 14**

*DPI&F to include in the management regime a requirement that rebuilding strategies, including reference points (target and or limit) and time frames, be developed for species if assessments indicate that stocks are overfished.*

**Conclusion**

DEH considers that DPI&F should develop rebuilding strategies, including target reference points and time frames, for those species currently considered to be of concern and include in the Management Plan the requirement that rebuilding strategies be developed for species where assessments indicate that stocks are overfished.

**Ecosystem impacts**

Principle 2: *'Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem'*

**Bycatch protection**

Objective 1: *'The fishery is conducted in a manner that does not threaten bycatch species'*

**Information requirements**

There is no ongoing comprehensive collection of bycatch data in the ECIFF and no legal requirement for operators to record discards, other than protected species, in their logbooks. DEH believes that the lack of an ongoing bycatch data collection system is a significant weakness in the management of the fishery. The most comprehensive assessment of bycatch in Queensland inshore waters was conducted by Halliday *et al.* (2001). This study reported on the composition relative abundance and spatial distribution of commercial net bycatch species in the ECIFF.

DEH has recommended that an observer programme be implemented in the fishery. Such a programme could be used to collect bycatch data or to validate bycatch data collected via another mechanism, eg logbooks.

DEH believes that a bycatch action plan (BAP) is required that identifies fishery specific risks and issues for protected species and ecological communities, high risk species habitat issues and impacts on the broader ecosystem. The BAP should also include strategies to address the issues and risks identified, including data collection, data analysis and management responses. DEH understands that a BAP introduced in Queensland may not have any legislative standing. DEH believes that by whatever means (including consideration of the introduction of a BAP with legislative powers or through other means) bycatch minimisation should be a high priority and an integral part of the management of the fishery.

**Recommendation 15:**

*DPI&F to develop a Bycatch Action Plan for the fishery within 3 years.*

DEH believes that as part of the observer programme recommended elsewhere that observers' duties include the verification of the levels of bycatch in the fishery and the implementation of the BAP.

DPI&F report that species are discarded either as a result of regulations restricting retention of species (eg size limits) or because of low market value. DEH notes that the imposition of TACCs for spotted mackerel and tailor may increase the discarding of these species despite provision for retention of small quantities of incidental catch. In the absence of an observer programme DEH is concerned that the true mortality rates of these species may not be recorded.

In the recreational and charter fisheries gear is usually designed to target certain fish species and bycatch usually comprises released target species (in compliance with minimum size and/or possession limits). Release rates are thought to be high with release rates in the recreational sector of 43% for barramundi and 30% for other finfish. Charter fishing logbooks indicate that between 1995 and 2004 an average of 29% of blue threadfin, 61% of sharks, 89% of barramundi and 83% of grey mackerel were released by charter fishing operations in the ECIFF. DPI&F contends that the survival is likely to be high for average size fish that are not damaged during the handling and release stages (Roelofs, 2003) but that the fate of larger fish, which can have high mortality if they are lifted in an unsupported manner, requires research.

### ***Assessment***

Halliday *et al.* (2001) recorded more than 60 bycatch species in the ECIFF, but on average these made up only 15% of the total catch by numbers. The highest rate was 28% in the sub-tropical whiting fishery and the lowest, 7% in the sub-tropical mullet fishery. Bycatch composition varied between locations, fishing gear and season. Halliday *et al.* (2001) also found that the fishing gears and methods used by commercial fisheries in the ECIFF are selective at harvesting the nominated target species. Bycatch is comprised mainly of fish and elasmobranch species. Elasmobranchs taken as bycatch include rays (*Rhinobatus typus*, *Dasyatis kuhlii*, *Himantura uarnak* and *Rhinoptera neglecta*), sharks (*Loxodon macrorhinus*, *Eusphyrna blochii* and *Orectolobus ornatus*) and the protected narrow sawfish. Work conducted under the LTMP has also resulted in collection of information on bycatch in the Burdekin and Fitzroy Rivers. Fishery independent catch and effort data have been collected and a report is being prepared.

Halliday *et al.*'s main findings were:

- bycatch in the ECIFF is low relative to other commercial fisheries, being less than 20% (of number of fish caught) for fisheries targeting mullet, small mackerels, barramundi and mixed estuary species. The bycatch was highest, at 28%, where whiting was targeted;
- catches of undersize fish are low (less than 6%);
- discards were comprised of a multitude of species but generally dominated by two or three main species;
- fate trials conducted on undersized fish bycatch species showed high survival rates for bream (100%), whiting (88%) and flathead (81 %) but slightly lower rates for silver biddies (*Gerres oyeana*) (67%); and

- some species have relatively high mortalities prior to discarding, eg undersized blue threadfin while others, such as undersized barramundi are more resilient to net capture.

DEH agrees with DPI&F's assessment that given the relatively low bycatch rate and the available data on post capture mortality a risk analysis for finfish bycatch is not required at this stage. This is dependant on the results of the programme to collect information on the composition and abundance of bycatch described in a recommendation for the management of this fishery. DEH notes that the relative risks to sustainability of elasmobranchs are being assessed through the FRDC Projects, 2001/077 and 2002/064 and has made a recommendation regarding the DPI&F response to the results of the assessment.

### ***Management response***

There are no specific bycatch mitigation measures in place in the ECIFF apart from those established for protected species. DPI&F submit that the widespread use of temporal and spatial closures in the fishery and the increase in areas closed to fishing in the GBRMP as a result of re-zoning in 2004, provide refuges and protection for bycatch species by reducing the potential for interaction with fishing gears. In addition, DPI&F identify regulated net mesh sizes, net attendance rules and restrictions on the type and deployment of net that can be used in ecologically sensitive areas as measures that have a beneficial impact on bycatch species.

DPI&F highlights that research underway to develop mitigation devices for interactions with dugong and with benthic dwelling species such as sawfish and rays as having potential application in the ECIFF. In addition, the submission emphasises that the commercial fishing industry is committed to the principles in the Code of Conduct for a Responsible Seafood Industry and is also involved in addressing a range of environmental issues including management of bycatch through the development of environmental management systems.

DPI&F has indicated that a BAP will be developed after the introduction of the Management Plan to provide a framework for collection and assessment of bycatch data with a view to producing scientifically validated data for stock and risk assessments. DEH supports the decision to develop a BAP for the ECIFF but considers that its development would be better in parallel with the Management Plan.

### ***Conclusion***

DEH accepts that the rate of bycatch in the ECIFF is relatively low and that fishing gear and methods are relatively selective. Nevertheless DEH is concerned at the nature and range of bycatch and particularly at the lack of ongoing monitoring of bycatch. DEH supports DPI&F's intention to develop a BAP, including mechanisms for collection and validation of species specific information and to better educate fishers to make accurate species identification. DEH believes that development of the BAP should be fast-tracked and has made a recommendation to support this.

## **Protected species and threatened ecological community protection**

Objective 2: *'The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities'*

### ***Information requirements***

A number of species present in the waters of the ECIFF are protected under the EPBC Act the *Great Barrier Reef Marine Park Regulations 1983*, Queensland's *Nature Conservation Act 1992* and the *Fisheries Regulation 1995*. There are no threatened ecological communities within the area of operation of the ECIFF.

Since 2002, commercial fishers in the ECIFF have been required to report interactions with protected species in logbooks. The range of protected species was extended to cover sea birds and syngnathids in October 2003 with the introduction of the SOCI Reporting Logbook. Logbook data is the other main source of bycatch data in the ECIFF.

DEH notes that charter fishing operators are not required to report interactions with endangered, threatened or protected species in their logbooks.

Dugongs and turtles are taken for traditional purposes by Indigenous fishers. This take is permitted under the Queensland's *Nature Conservation Act 1992*.

The DPI&F submission acknowledges that the level of capture and/ or mortality of, or injuries to, endangered, threatened or protected species cannot be estimated from present data sets. DPI&F contend that the level of interaction of recreational fishing gear with sea turtles, dugong, crocodiles and cetaceans is likely to be low but that there may be a certain level of interaction with sawfishes.

DEH notes that a barrier to successful commercial reporting of protected species interactions is the capacity of the fishers to identify the species involved. This is particularly the case for sharks and sawfishes. In addition, many operators may not be aware of the importance of reporting interactions or their legal obligations. DPI&F had committed to the introduction of an education programme for recreational and commercial fishers to address this problem and in 2005 a Protected Species Education Program was implemented for commercial and recreational fishers

DEH believes that there is a need for validation of all logbook data, including SOCI data through the use of observers on vessels. DEH has recommended that an observer programme be implemented in the ECIFF. This programme could be used to validate SOCI data collected from logbooks.

DEH is concerned that the charter industry, that relies entirely or in part on the same species taken in the commercial fishery, is not required to provide the same raft of information required of the commercial sector. DEH sees this as an important issue that needs to be addressed.

### **Recommendation 16:**

*DPI&F to review use of the charter fishing logbook in the ECIFF and based on the findings, develop a strategy for continued catch reporting through the charter logbook*

*including a requirement to provide information on interactions with endangered, threatened and protected species within 2 years.*

### ***Assessment***

The commercial logbook data collected since 2001 shows an increasing trend in interactions particularly with green turtles and pelicans. Six species of sea turtles listed as threatened under the EPBC Act occur within the ECIFF. Significant rookeries for sea turtles occur along the Queensland east coast, including the only known nesting area for flatback turtle (*Natator depressus*) at the extreme northern limit of the fishery and areas of seasonally high abundance of this species on the central Queensland coast. In the south of the ECIFF there are major mainland nesting sites for east Australian populations of loggerhead turtles and major green turtle rookeries are located on offshore sand cays of the Great Barrier Reef. A formal risk assessment for sea turtles in the ECIFF was conducted by Slater *et al.* (1998). Many of the high risk areas are closed to commercial net fishing. Halliday *et al.* (2001) reports that turtles were the most frequently reported protected species grouping in discards. These were predominantly taken during target fishing for mullet and whiting. Where mullet was targeted Halliday *et al.* recorded 152 unidentified turtles from 818 net shots while in the whiting fishery 64 unidentified turtles were recorded in 471 shots.

Since April 2002, of the 885 turtle interactions reported all were reported to have been released alive. Roelofs (2003) and Halliday *et al.* (2001) also reported high survival rates for released turtles.

Since the collection of protected species interactions commenced there have been no reports of interactions with grey nurse sharks (*Carcharias taurus*) or great white sharks (*Carcharodon carcharias*). Only one interaction with the estuarine crocodile has been reported and there have been no reports of interactions with the freshwater crocodile (*Crocodylus johnstoni*). Roelofs (2003) reported that observer data suggested that in the inshore component of the GOCIFF there was some risk of juvenile estuarine crocodiles drowning after their shoulders became wedged in the meshes of the net. This risk may also apply to net fishing in the tropical ECIFF.

No sea snakes have been recorded by commercial fishers but Halliday *et al.* (2001) reported the capture of a small number of unidentified sea snakes in net operations for mullet and whiting. No interactions were reported in over 1500 net shots in a voluntary commercial fisher logbook programme or in 280 net shots monitored by DPI&F observers. Halliday *et al.* recorded very low levels of bycatch of cormorants and Narrow sawfish.

No interactions with spartooth shark (*Glyphis* sp. A) have been reported in the ECIFF. However, DEH notes that DPI&F is attempting to increase the accuracy of reporting of interactions with this species, due to the potential for misidentification as bull shark (*Carcharhinus leucas*). DEH considers that particular attention be given to the conservation issues and identification of spartooth shark in the education programme recommended above.

The submission notes that interactions with narrow sawfish and wide sawfish have been reported in logbooks but incidental catches of these have not been scientifically confirmed. Incidental catches of these species were not recorded by Halliday *et al.*

(2001), however they did report one interaction (from 95 net shots) with the freshwater sawfish. The submission notes that the Shark Phase 2 project (FRDC 2002/064) will conduct research into the biology distribution, catchability and survivability after capture of sawfish in the GOCIFF and that this information will be used to assess the sustainability of sawfish interacting with the ECIFF.

The NRIFS estimated that traditional communities in northern Queensland take approximately 1200 dugongs per year, however, the level of take in the area of the ECIFF is uncertain. The level of interaction between commercial operations and dugong in the ECIFF appears to be low with only four reported interactions since 2002. All dugong were released alive. This claim needs to be thoroughly tested given the conservation status of the species and their reliance on the same areas where ECIFF fishers operate. Halliday *et al.* (2001) did not report any interactions with dugong or other marine mammals.

Capture data from logbooks also suggest that interactions with dolphins are low with only one recorded since April 2002. This low level of interaction is supported by observer data from the GOCIFF.

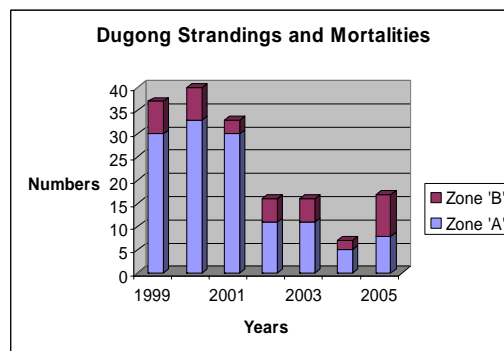
A number of listed marine bird species occur within the area of the ECIFF. The data available suggest that interactions with cormorants (Halliday *et al.*, 2001) and pelicans are the most common and interactions with other species are considered unlikely. All pelicans and cormorants reported taken in the ECIFF have been released alive.

### ***Management response***

A wide suite of protected species is taken in the fishery, including dugong, marine turtles, crocodiles, sea snakes, sawfish saw sharks and cetaceans. The level of all Protected Species interactions is unclear and needs to be clearly established and in the lack of definitive data a precautionary approach needs to be clearly obvious.

DEH notes that there are a large number of permanent and seasonal closures to net fishing in the ECIFF and that the area of the fishery closed to fishing has been increased with the rezoning of the GBRMP. These closures provide considerable protection to turtle species. DEH is concerned at the increasing number of turtle interactions recorded in the fishery, particularly interactions with green turtles, although most instances the turtles are released alive. DEH is not sure that these closures are the only management measure to provide protection particularly to marine turtles and to dugong. DEH considers that DPI&F should undertake, as a priority, further analysis of the data regarding these interactions with a view to identifying factors which may be contributing to the catch and implementing appropriate mitigation measures.

**Figure 1: ECIFF: Dugong Strandings and Mortalities 1999 - 2005**



Much reliance on providing protection to dugong rests with the fishery closures or areas where use of fishing nets is restricted (e.g. DPAs, GBRMP closed areas etc). DEH notes that DPAs, in place since 1997/ 1998, provide considerable protection to dugongs within the area of the ECIFF. In DPAs described as Zone “A” there are restrictions on the use of offshore set nets, foreshore set nets and drift nets. The use of modified nets is allowed except in two key dugong areas where they are prohibited – Hinchinbrook Channel and Shoalwater Bay. In DPAs described as Zone “B” nets are allowed but are smaller than the general purpose nets and the number of nets is restricted to three.

DEH is aware of the need to complete a review of the current DPA “B” Zones and as part of this review to investigate regimes that includes both a consideration of strengthening of the southern DPA network and the need to ensure protection to inshore netting in the far northern areas of the fishery. DEH believes there is a need to complete the review noting that even with the paucity of data available there are anecdotal reports of accidental take and fatalities of protected animals in nets.

**Recommendation 17:**

*Within two years of the date of the declaration, DPI&F to review the effectiveness of the range of closed areas to address take/ interaction of protected species (particularly dugong and marine turtle) and if warranted develop and implement additional/ alternative mitigation measures and include these in the bycatch action plan and/ or in the management regime as appropriate.*

DPI&F has undertaken to assess the results of research into sawfish biology in the GOCIFF, when available to develop measures to mitigate fishing impacts on these species in the ECIFF. DPI&F has also undertaken to monitor entanglement of juvenile estuarine crocodiles and to implement management measures if required. DEH notes that research into more environmentally friendly netting technologies and acoustic technology to reduce interactions with dugong and cetaceans is underway and that the results of this research will be assessed to determine their applicability to the ECIFF.

Methods to ensure accurate reporting of interactions with protected species needs to be developed. The location of such interactions will help better place “closed areas” or allow different management arrangements to be developed.

There is growing reliance of the use of acoustic deterrent devices without corroborating scientific evidence. There is no independent peer-reviewed scientific studies of the effectiveness of pingers for dugongs, inshore dolphins, whales or turtles. The effectiveness of pingers needs to be reviewed and advantages/ limitations in all

environments and gear configurations particularly in offshore and foreshore situations, need to be accurately assessed.

DEH considers that DPI&F should undertake an analysis of the existing data with a view to identifying factors within the fishery which may be contributing to such bycatch and to developing and implementing appropriate management measures in accordance with the requirements of any plan of action, recovery plan or similar plan enacted under State or Commonwealth legislation.

DEH is also concerned over the possibility of entanglement of cetaceans in nets. If a significant risk to these species is identified DEH considers that DPI&F should develop and implement appropriate management measures, including consideration and scientific evaluation of net attendance rules, sonic warning devices, etc.

**Recommendation 18:**

*DPI&F to analyse available information on the interactions of the various gear types used in the fishery with dugong, turtles, crocodiles, sea snakes and cetaceans within 12 months and implement appropriate mitigation measures to minimize interactions with these species.*

DPI&F has indicated that it will use the data provided by SOCI logbooks to develop appropriate bycatch mitigation measures through the proposed BAP to reduce identified impacts on endangered threatened or protected species. DEH has made a recommendation concerning the BAP.

DEH notes the reliance on SOCI data to monitor interactions with protected species. DEH believes that this data needs to be subject to verification and that compliance with reporting requirements is also subject to compliance checks. In addition, closed areas play an important part in providing protection for protected species, especially turtles. Compliance with these closed areas is therefore critical to the effectiveness of this management strategy. DEH has recommended that as part of the compliance risk assessment DPI&F assess the risks posed to protected species by non-compliance with reporting requirements and closed areas.

**Conclusion**

DEH agrees that, with the exception of turtles and pelicans, the frequency of interactions with endangered, threatened and protected species in the ECIFF is reportedly low. This is consistent with the findings of fishery-dependent observations (Halliday *et al.*, 2001). DEH considers that the fishery is conducted in a manner that generally seeks to avoid mortality of, or injuries to, endangered, threatened or protected species. Should this situation change, or a risk assessment indicate otherwise, DEH suggests that appropriate actions be undertaken to ensure the fishery avoids mortality, injury to these species and avoids or minimises impacts on threatened ecological communities.

DEH considers that there is scope to further refine some of the existing information collection, assessment and management responses and has made a number of recommendations for improvements in the longer term.

## **Minimising ecological impacts of fishing operations**

Objective 3: *'The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally'*

### ***Information requirements***

The major current sources of information that may be used in assessing any ecosystem impacts arising from the ECIFF are the commercial logbook, DPI&F's LTMP and the Tropical Resource Assessment Program. Baseline information on species abundance, diversity and life stages of estuarine fish communities and the condition of their habitats in Queensland coastal streams was also collected between 1993 and 2000. DPI&F surveys of major seagrass areas and mangrove and coastal wetland habitat for the whole ECIFF area have also been completed and provide reliable baseline information on the spatial extent and diversity of these habitats. Halliday *et al.* (2001) compared estuarine systems closed and open to commercial fishing and described the direct and indirect effects of fishing on the diversity and abundances of target, non-target and prey species.

### ***Assessment***

Data from commercial fishing operations shows that fishing is concentrated between Cairns and Brisbane. Within this area effort levels are highest at restricted locations including Halifax Bay near Townsville, the Fitzroy River near Rockhampton and Hervey Bay, the Great Sandy Straits and Moreton Bay in southern Queensland. However, nets and lines used in the commercial, recreational and Indigenous fishing operations of the ECIFF are generally passive, highly species selective and have little impact on the ecosystem and environment generally (Roelofs, 2003). Nets fish passively with only minor disturbance of the sea floor during mesh netting through the use of anchors to fix the net in position or by manual hauling over sand/mud substrate during beach seine netting. Sensitive sea grass and coral reef habitats are protected from damage by commercial fishing operations through fishing closures in the GBRMP, State marine parks and ECIFF area closures.

Marine birds (including raptors, cormorants, egrets, herons and pelicans), sharks, teleosts and invertebrates feed opportunistically on discards from ECIFF operations. However, given the relatively low level of discards in the fishery, the ECIFF is not thought to be a significant additional food source for these species.

Ghost fishing through discarded nets is not thought to be a significant problem in the ECIFF although no studies on this have been conducted. The threat posed to marine species through ingestion of material discarded from fishing vessels is being addressed nationally through the development of a Threat Abatement Plan for injury and fatality to vertebrate marine life caused by ingestion of or entanglement in, harmful marine debris.

DEH is concerned at the lack of information collection and research covering the fisheries impact on the ecosystem and environment generally. However, DEH understands that this lack of information is the case across a range of Australian and International fisheries and until appropriate research techniques and programs are developed and implemented this will continue to be the case. DEH strongly supports

research in the areas of ecological indicators regarding the impacts of fishing and the assessment of impacts of predator removal on the ecosystem.

### ***Management response***

There are no specific measures in the management arrangements for the ECIFF directed specifically to mitigating ecosystem impacts. However many of the management measures in place to protect target species and their habitats, have had positive impacts on the ecosystem in which the fishery operates. The development of a Management Plan for the fishery will provide an ideal opportunity to develop and include in that Plan specific and measurable performance criteria that address potential impacts on the ecosystem by the ECIFF and DEH has made a recommendation to ensure that this occurs.

Impacts on water quality through the discharge of plastic wastes and pollution from vessels are controlled under MARPOL 73/ 78 legislation. Operators are required to comply with the legislation and must retain any plastic waste and dispose of it only when the vessel returns to port.

DEH understands that the fishery is conducted in several Ramsar Convention areas (in Moreton Bay, Great Sandy Strait, Corio Bay and Bowling Green Bay). These internationally listed wetlands may be impacted by the operation of the fishery and, although this impact would seem to be minimal, there needs to be work undertaken to substantiate this. Shoalwater Bay, a Ramsar site is also a Dugong Protection Area 'A' Zone where the use of all nets is prohibited. Most of the area is also a marine national park and zoned to prohibit the use of all fishing nets.

### ***Conclusion***

DEH considers that the fishery is conducted in a sufficiently precautionary manner to minimise the impact of fishing operations on the ecosystem generally.

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## LIST OF ACRONYMS

AFZ	Australian Fishing Zone
BAP	Bycatch Action Plan
CFISH	Commercial Fisheries Information System
DEH	Department of the Environment and Heritage
DPA	Dugong Protection Area
DPI&F	Department of Primary Industries and Fisheries
ECIFF	East Coast Inshore Finfish Fishery
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
Finfish MAC	Finfish Management Advisory Committee
FRDC	Fisheries Research and Development Corporation
GBRMPA	Great Barrier Reef Marine Park Authority
GBRMP	Great Barrier Reef Marine Park
GBRWHA	Great Barrier Reef World Heritage Area
GOCIFF	Gulf of Carpentaria Inshore finfish Fishery
LTMP	Long Term Monitoring Program
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships
NPOA-Sharks	National Plan of Action for the Conservation and Management of Sharks
NRIFS	National Recreational and Indigenous Fishing Survey
QBFP	Queensland Boating and Fisheries Patrol
RAP	Representative Areas Program
RFISH	Recreational Fishing Information System
RFOA	Recreational Fishing Only Area
SOCI	Species of Conservation Interest
TAC	Total Allowable Catch
TACC	Total Allowable Commercial Catch
TRAP	Tropical Resource Assessment Program
VMS	Vessel Monitoring System
WTO	Wildlife Trade Operation