

Annual status report 2007

East Coast Inshore Fin Fish Fishery



The Department of Primary Industries and Fisheries (DPI&F) seeks to maximise the economic potential of Queensland's primary industries on a sustainable basis.

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Introduction

The East Coast Inshore Fin Fish Fishery (ECIFFF) is Queensland's third most valuable commercial fishery targeting a number of fin fish species, using a variety of different net fishing methods with some species also taken by hook and line. Commercial operations occur in inshore coastal and estuarine waters adjacent to Queensland's east coast where species targeted vary between tropical and sub tropical regions. Some of the commercially targeted species include: mullet, shark, whiting, bream, tailor, small mackerel, threadfins and barramundi, with export markets for mullet roe, shark and small mackerel products. Other tropical and temperate species are harvested as by-product including garfish, queenfish, flathead, trevally and dart.

Target species groups for recreational fishers in the ECIFFF include: whiting, bream, trevally, flathead, tailor, barramundi and small mackerels. The ECIFFF also includes a number of pelagic species such as cobia and dolphinfish. Recreational fishers typically catch these species by hook and line.

This report describes the ECIFFF for the 2006 calendar year.

Fishery profile 2006

Commercial harvest for 2006: Approximately 5700 t

Recreational harvest for 2006¹: Approximately 3000 t harvested and 4400 t released

Indigenous harvest for 2006: No estimate available for 2006

Charter harvest for 2006: Approximately 130 t harvested and 80 t released

Commercial Gross Value Production in 2006: Approximately \$24 million

Number of licences in 2006: 500 net fishery symbols, 1651 line fishery symbols (at 6 February 2008) and 384 charter licences

Commercial boats accessing the fishery in 2006: 451 net boats, 358 line boats and 323 charter boats (reporting catch of ECIFFF species).

Fishery season: Annual seasonal closures apply to barramundi fishing between 1 November and 1 February. A general seasonal fishing closure applies off southern Queensland to near shore waters between Indian Head and Waddy Point, Fraser Island, from 1 August to 30 September.

Source: DPI&F Commercial Fisheries Information System (CFISH), 15 October 2007.

Description of the fishery

Fishing methods

The ECIFF is a multi-species fishery with commercial operators targeting a range of fin fish species. Gear permitted in the commercial fishery includes mesh, haul (seine), tunnel and cast nets as well as hook and line. Most commercial fishers prefer to use net sizes that selectively catch fish of a certain size to meet market demand for fillet and whole product.

Recreational gear includes cast, small seine (bait) nets and hook and line.

¹ For the purpose of this report, the total harvest estimate for 2006 includes the recreational harvest estimate from 2005, based on the assumption that the subsequent years of catch would be similar enough for a gross total estimate.

Indigenous communities use traditional subsistence fishing methods for traditional and customary purposes to supply product solely for community use, as well as recreational fishing practices to catch ECIFFF species. Traditional fishing methods include the use of spears, stone fish traps and nets.

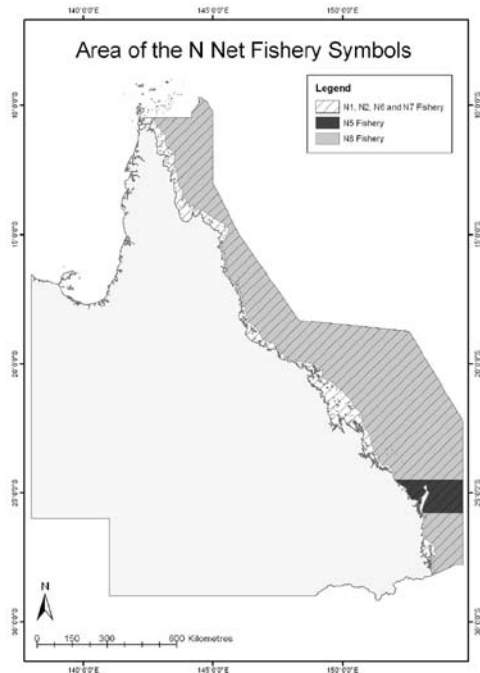


Figure 1: ECIFFF Net fishery areas.

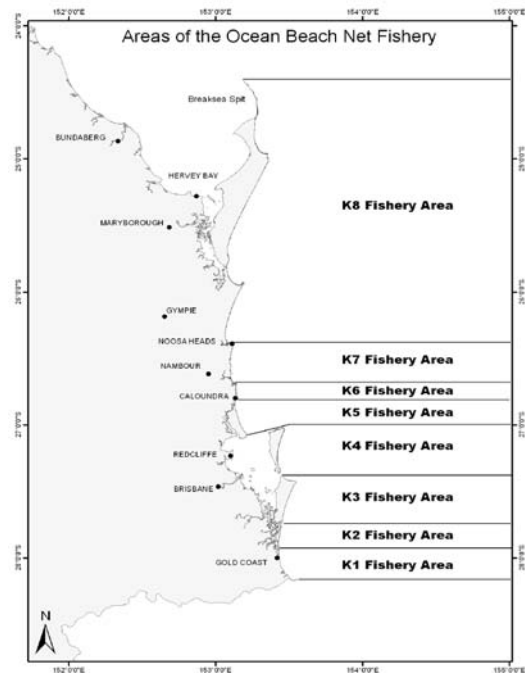


Figure 2: ECIFFF Ocean Beach fishery areas.

Fishery area

The area of the ECIFFF includes all tidal waters along Queensland's east coast eastward of 142° 09' E Long., near Crab Island (approx. 11° S Lat.), to the New South Wales border (Figure 1). To operate in the ECIFFF commercial fishers must hold a primary commercial fishing vessel licence endorsed with the appropriate 'N', 'L' or 'K' fishery symbol to legally operate in the fishery. While 'N' and 'K' fishery symbols allow commercial net fishing, 'L' fishery symbols allow commercial line fishing (Figures 1, 2 and 3)². The number of nets permitted to be used, mesh size and length is dependent on the species being targeted and whether the fisher is operating in nearshore or offshore waters. Permitted net and line fishing gears are currently prescribed under the Fisheries Regulation. New rules on use of nets in the fishery are proposed.³

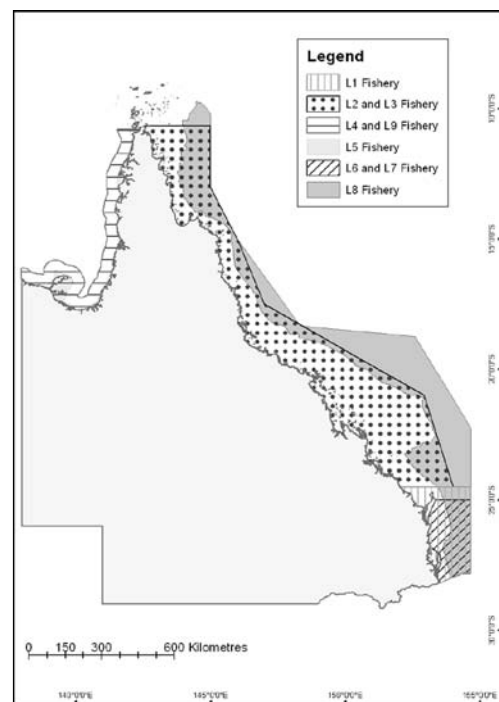


Figure 3: ECIFFF Line fishery areas.

² 'K' licence symbols allow commercial netting along southern Queensland ocean beaches in areas specified under the Queensland Fisheries Regulation 1995.

³ Proposed new management arrangements for the ECIFFF have been outlined in the Regulatory Impact Statement and draft Public Benefit Test available on the DPI&F website at: www2.dpi.qld.gov.au/extra/pdf/fishweb. Public consultation is being sought on proposals for new commercial netting arrangements in the fishery

Because the ECIFFF extends along the entire Queensland east coast, the fishery comprises a number of types of fishing operations that differ fundamentally on the basis of the fishing gear used to target regionally important species, including:

- sea mullet catches from Bundaberg to the NSW border
- bream, whiting and flathead catches in the Fraser-Burnett region
- barramundi, threadfin salmon and trevally catches in the Cairns to Townsville and Fraser–Burnett regions
- shark catches northwards from Mackay and in the Fraser-Burnett region
- grey mackerel and spotted mackerel catches between Cairns and Moreton Bay.

Main management methods used

A range of input and output controls are used to manage the ECIFFF including:

- Limits on the type of net that can be used, its length and mesh size
- Minimum legal size limits for many species and maximum size limits for some
- Competitive Total Allowable Commercial Catches (TACs) for tailor and spotted mackerel
- Commercial in-possession limits for some species (e.g. spotted mackerel)
- Recreational bag limits for popular angling species
- Permanent, seasonal and weekend closures that apply to commercial or recreational fishers.

Closures to various forms of fishing are also in place under Queensland and Commonwealth marine parks legislation.

A number of changes are proposed to the management of the fishery including new and amended bag and size limits, new netting arrangements and improvements to the management of shark resources.

Approximate allocation between sectors

The ECIFFF includes many species of recreational significance and, for several species the estimated annual recreational catch is greater than the commercial catch.

Fishery accreditation under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

The ECIFFF was granted a Wildlife Trade Operation (WTO) approval under Part 13 of the EPBC Act on the 30 November 2005. Declaration as a WTO demonstrates that the management arrangements for the ECIFFF meet, on-balance, the requirements of the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. The WTO makes a number of recommendations for management of the fishery. The current WTO approval expires on 30 November 2008.

Catch statistics

Commercial

Commercial catch and effort information is provided to DPI&F by fishers through compulsory daily logbooks. Catch of the main species retained in individual sub-fisheries is presented (Table 1). Each sub-fishery accounts for a high proportion of the total ECIFFF catch of these species. Reporting by sub-fisheries provides for more precise commercial catch trend monitoring of the main retained species, taken by the main fishing methods used, and in the regional areas where they are harvested. This also serves to improve assessments of the performance of the fishery in relation to sustainability benchmarks. The collective sub-fisheries catch estimate accounted for more than 90% of the total ECIFFF commercial catch in 2006.

Table 1: Species group composition of the ECIFFF from 2002-06 (Source: DPI&F CFISH database 15 October 2007).

		Harvest (t)				
Sub-fishery	Species/species group	2002	2003	2004	2005	2006
Ocean Beach	Mullet	656	773	871	622	655
	Tailor	40	47	82	54	31
	Dart	10	11	23	8	15
Shark	Australian blacktip	8	139	304	195	200
	Scalloped hammerhead	2	67	151	131	113
	Other shark species	1270	1298	829	633	603
	Rays	4	13	16	8	7
Barramundi	Barramundi	199	300	324	229	210
	King Threadfin	82	126	156	109	127
	Blue Threadfin	135	192	198	128	161
	Grunter	23	29	28	20	27
Estuarine	Mullet	1148	1378	1406	1022	1274
	Whiting	284	335	393	359	289
	Bream	152	169	226	222	175
	Flathead	56	58	98	76	75
Spotted mackerel	Spotted mackerel	81	58	104	83	49
	School mackerel	21	31	45	37	41
	Shark mackerel	46	61	37	34	41
	Trevally	62	53	65	65	82
Small mackerel	Grey mackerel	112	237	243	232	298
Baitfish	Baitfish	157	246	323	296	243
	Garfish	189	216	261	171	219
Other species	Mainly batfish, black trevally, queenfish, jewfish, luderick, bonito, catfish and scad	255	355	303	284	296
Total		4992	6192	6486	5018	5231⁴

⁴ The total sub-fisheries catch excludes the commercial catch of other minor species included in the whole of fishery commercial catch total reported in the Fishery Profile

Approximately 5700 t of fin fish were landed and retained by the commercial fishery in 2006, a slight increase from 2005 (Figure 4). During the period 2002–06, annual commercial harvest estimates were variable for most species, excluding trevally and grey mackerel harvests which have steadily increased. But the total harvest of the main retained species has declined in the last three years (Table 1). From 2002–06 effort in the net fishery has declined slightly, while line effort has remained steady (Figure 4).

The declining catch and effort trends reflect the impacts of closures of inshore waters to fishing as part of the rezoning of the Great Barrier Reef (GBR) Marine Park in July 2004 and the subsequent buyout of 59 active net fishing licences under the GBR Structural Adjustment Package.

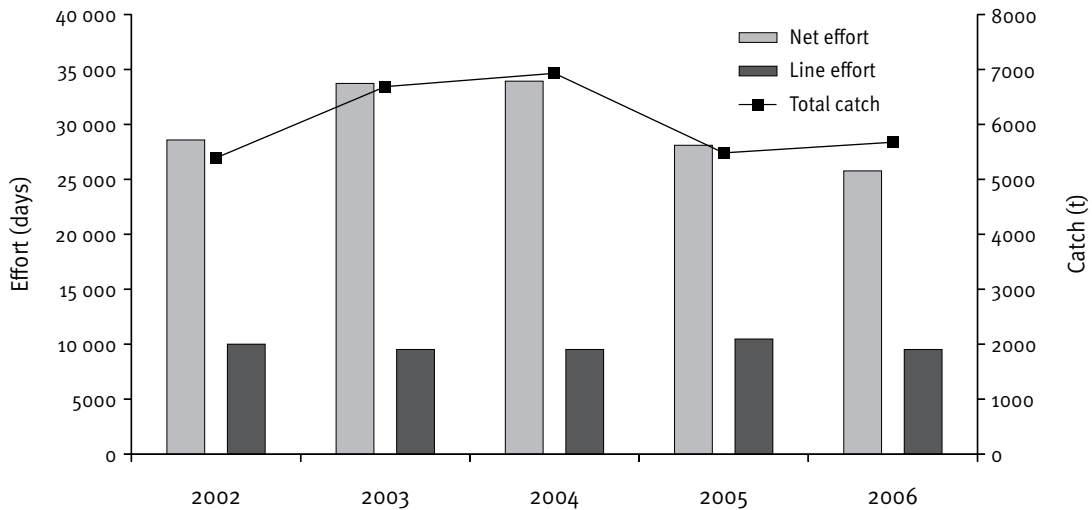


Figure 4: Total estimated catch and effort for the ECIFFF 2002-06 (Source: DPI&F CFISH database 15 January 2008).

Mullet species harvested in the estuarine sub-fishery represent the largest component of the ECIFFF commercial catch. Smaller quantities of shark, ocean beach caught sea mullet, barramundi and threadfin also make up a significant part of the commercial catch (Figure 5). Spotted mackerel and other small mackerels, baitfish (mainly garfish) and a collection of minor species make up the remainder of the commercial catch.

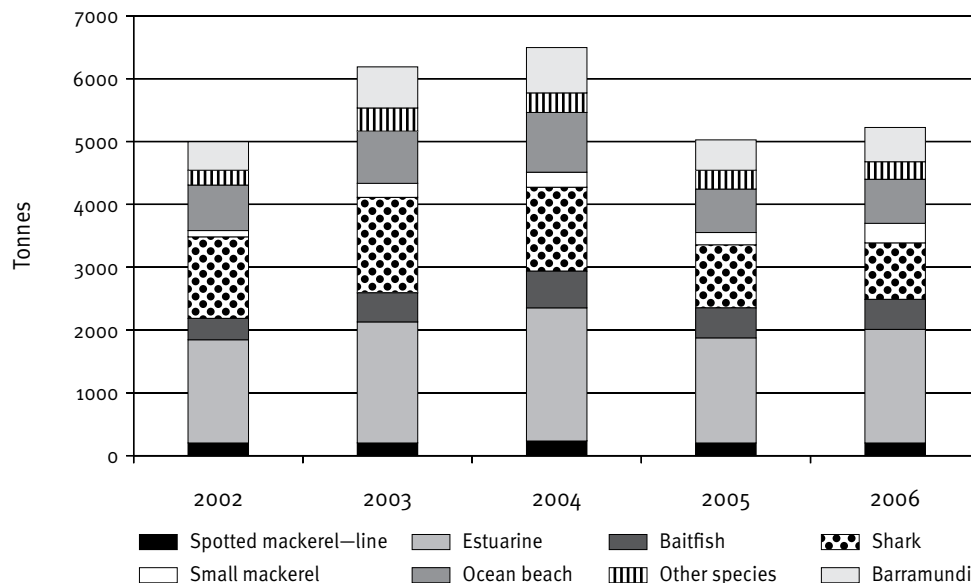


Figure 5: Sub-fishery contributions to annual commercial landings (t) from 2002–06 (Source: DPI&F CFISH database 15 October 2007).

Recreational

Table 2 shows estimated weights in tonnes of ECIFFF species caught by recreational fishers based on the Recreational Fishing Information System (RFISH) diary surveys conducted in 1997, 1999, 2002 and 2005.⁵ This table also indicates the large numbers of fish that are released and not actually harvested by recreational fishers.

Table 2: Species group harvest and release estimates (t) from the RFISH diary surveys (Source: DPI&F RFISH database 26 January 2007).

Species Group	1997		1999		2002		2005	
	Harvest	Release	Harvest	Release	Harvest	Release	Harvest	Release
Barramundi	186	599	320	840	171	543	136	372
Bream	530	994	517	780	412	839	367	626
Dart	n/a	n/a	160	162	122	160	120	179
Flathead	133	141	113	86	96	149	70	110
Grunter	n/a	n/a	n/a	n/a	131	269	127	350
Mackerel—Grey	*18	*4	10	3	3	1	20	5
Mackerel—School	*145	*110	120	56	74	51	203	164
Mackerel—Shark	*6	*3	2	0.2	7	2	6	3
Mackerel—Spotted	*485	*99	159	37	97	39	148	60
Mangrove Jack	n/a	n/a	116	121	107	137	77	96
Mullet	n/a	n/a	n/a	n/a	507	24	422	81
Shark and ray	n/a	n/a	n/a	n/a	212	1750	104	1345
Tailor	320	87	163	61	182	94	129	63
Threadfin	n/a	n/a	n/a	n/a	55	35	55	37
Trevally	**462	**692	513	505	378	511	362	519
Winter Whiting	*767	*303	400	93	206	46	255	58
Summer Whiting	*109	*189	109	74	92	128	95	85
Whiting Unspecified	n/a	n/a	325	261	447	376	267	233
Total	***3614	***3901	***3688	***3735	3826	5838	2963	4386

* Indicates numbers of fish have been estimated by allocating the reported “unspecified” catch of a species group such as “whiting” or “mackerel” into species based on the proportional composition of catch reported to species level.

** In 1997, the trevally figures include dart.

*** Total figures in 1997 and 1999 exclude species such as shark, mullet and threadfin which were not reported on previous to 2002. Interpretation of trends for these species is therefore difficult.

Charter

Reported weight of fish harvested and released in the ECIFFF charter sector steadily increased following the introduction of logbooks in 1996. Since 2004, the total charter catch has declined by about 10%, while the discards have decreased by one-third. There is also an emerging trend of increasing harvested fish weights compared to weight of fish released in each year compared to similar harvest and release weights prior to 2003 (Figure 6). Figure 7 indicates the main species groups caught by the charter sector in 2006.

⁵ Data in Table 2 should be interpreted with care due to possible sampling errors that may accompany the estimates. Depending on the species, the actual harvest or release weight may vary around the estimate by up to 20% but for others may be as low as 6%.

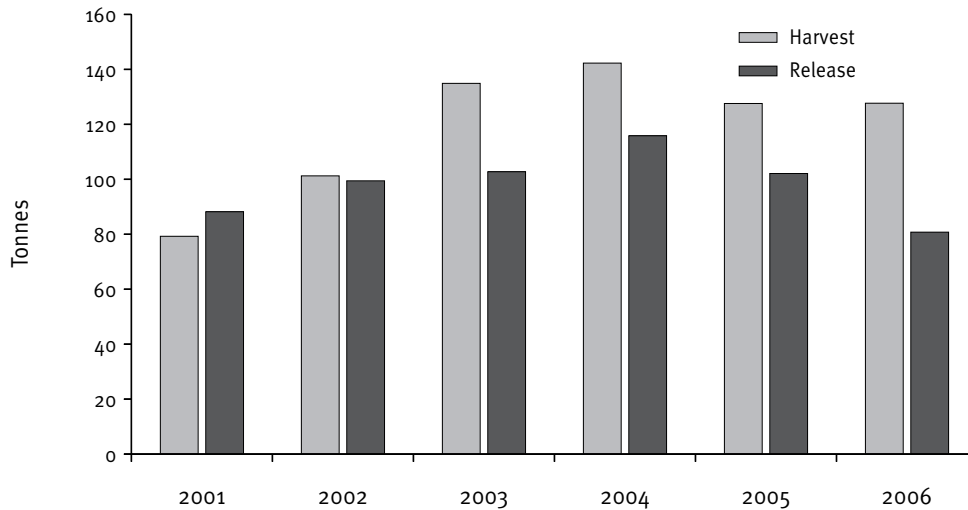


Figure 6: Charter harvest and release total estimates (t) in the ECIFFF from 1996–2006 (Source: DPI&F RFISH database 22 January 2008).

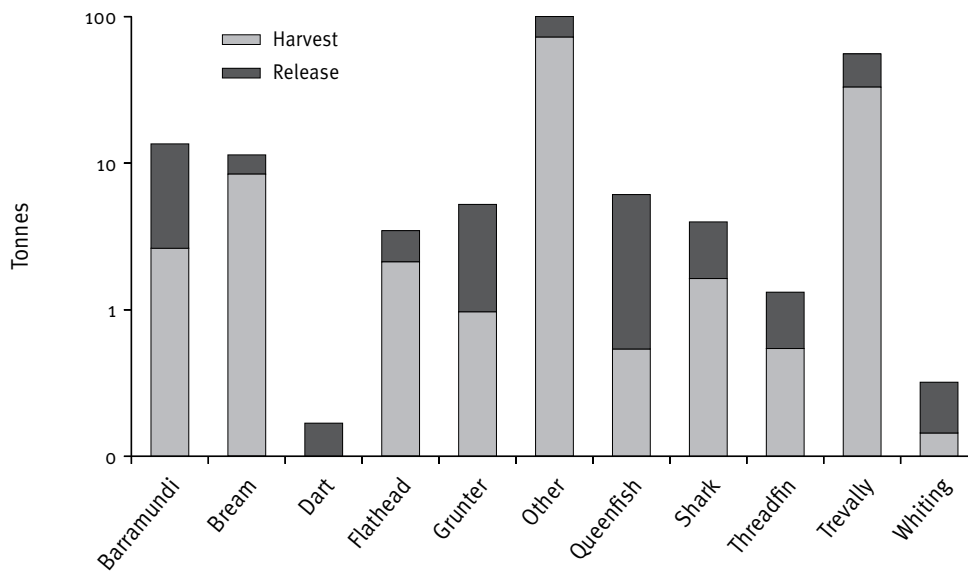


Figure 7: Estimated catch of popular ECIFFF species by charter fishers in 2006 (Source: DPI&F RFISH database 22 January 2008).

Indigenous

There are no estimates available of inshore fin fish catches by indigenous fishers within the ECIFFF area for 2006. Limited information is available on indigenous fish catches throughout the northern part of the fishery area from the National Recreational and Indigenous Fishing Survey conducted/released in 2003 (NRIFS).⁶ However these estimates are not representative of the indigenous harvest of ECIFFF species and are no longer considered reflective of current catch levels.

⁶ GW Henry & JM Lyle, *The National Recreational and Indigenous Fishing Survey*, FRDC Project No. 99/158, Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, 2003.

Socio-economic characteristics and trends

The gross value of production (GVP) has fluctuated between \$20 million to \$30 million since 1990 (Figure 8). The sharp decrease of GVP in 2005 (although still within the \$20 million to \$30 million range) may have resulted from the closure of inshore waters to fishing as part of the rezoning of the Great Barrier Reef Marine Park (GBRMP) in July 2004. Subsequent removal of 59 active net fishing licences under the GBR Structural Adjustment Package is expected to have had an impact on economic output from the fishery and this was sustained during 2006.

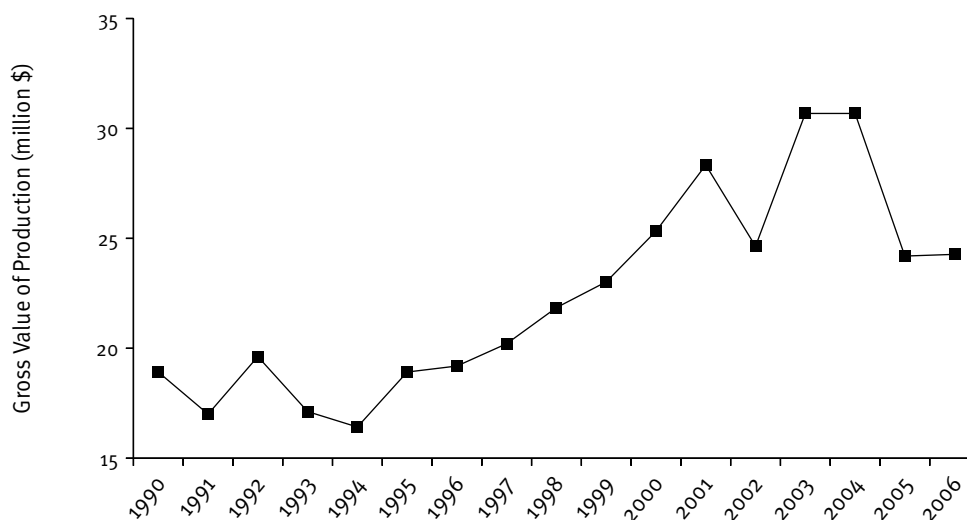


Figure 8: Annual gross value of production (GVP) figures (AUD \$) from 1990–2006 (Source: DPI&F CFISH database 15 October 2007).

Fishery Performance

Appraisal of fishery in regard to sustainability

The ECIFFF is managed using a variety of input and output controls and is regarded as being managed in a precautionary and sustainable manner. There are some concerns for the sustainability of certain species of sharks, which take a long time to mature, give birth to few young and have a relatively long life span compared to other fish. Increased catches over recent years resulted in the issue of an investment warning for fishers in 2002, advising against any further expansion of fishing effort towards shark.

A management plan is currently being developed for the ECIFFF and is expected to be finalised in 2008. External factors have also influenced management of the ECIFFF over recent years, including the re-zoning of the GBRMP in mid 2004 with significant areas closed to both commercial and recreational fishing and complementary state Marine Park zoning. Further closures to commercial and recreational fishing are also proposed in a Draft Zoning Plan for the Moreton Bay Marine Park.

Proposed changes to management arrangements

DPI&F has undertaken a comprehensive review of the fishery and has proposed a number of changes to current management of the ECIFFF.

Changes proposed to the fishery include changes to:

- size and bag limits
- netting arrangements
- shark management
- Dugong Protection Areas
- closures
- quota management for certain species.

DPI&F is currently working with stakeholders to develop a statutory management plan which will consolidate management arrangements for the fishery. Public consultation on proposed management changes in the ECIFFF closes 17 March 2008 and a management plan implemented by late 2008.

Progress in implementing the Department of Environment, Water, Heritage and the Arts (DEWHA) recommendations

A number of recommendations were attached to the WTO approval to address any perceived risks or uncertainties regarding the operation of this fishery. Details of the progress DPI&F has made in implementing each of these recommendations is provided in Table 3.

Table 3: Progress with implementing DEWHA conditions and recommendations

Conditions	Progress	Improvement to management regime
Operation of the fishery will be carried out in accordance with the management regime in force under the Queensland <i>Fisheries Act 1994</i> and the Fisheries Regulation 1995.	<i>Ongoing</i> The ECIFFF is currently being managed in accordance with the Queensland <i>Fisheries Act 1994</i> and the Fisheries Regulation 1995.	N/A
The Queensland Department of Primary Industries and Fisheries (DPI&F) to inform DEWHA of any intended amendments to the management regime or managerial commitments made in the submission that may affect sustainability of the target/byproduct species or have a negative impact on the status of bycatch, protected species or the ecosystem.	<i>Ongoing</i> DPI&F is developing a management plan for the fishery which is expected to be finalised in late 2008. In mid-2007 DEWHA was provided with a copy of the draft Inshore Regulatory Impact Statement (RIS) and advised of the proposed public consultation process. DEWHA have also been advised of: <ul style="list-style-type: none"> • development status of a Performance Measurement System for the fishery • deferral of the proposed tailor stock assessment • deferral of the assessment of protected species interactions with fishing gear to take into account public views of protected species interactions in the RIS. DPI&F has also been involved in discussions with DEWHA regarding the package of management arrangements proposed to address sustainability concerns about shark	Intended improvements to existing legislation and proposed new management arrangements for inclusion in the ECIFF Management Plan are outlined in a Regulatory Impact Statement and draft Public Benefit Test available on the internet at: www2.dpi.qld.gov.au/extra/pdf/fishweb/

Conditions	Progress	Improvement to management regime
<p>QDPI&F to finalise the development of a formal management regime, including fishery specific objectives, performance measures and criteria and management responses that addresses the ecological sustainability of target (including byproduct) and bycatch species (including protected species) taken in the Fishery.</p>	<p><i>In progress</i> Public consultation on proposed management changes in the ECIFFF closes 17 March 2008 and a management plan implemented by late 2008. A draft Performance Measurement System (PMS) has been developed for the fishery with further refinement of the PMS planned and implementation scheduled in association with the management plan.</p>	<p>DPI&F is currently working with stakeholders to develop a statutory management plan which will consolidate management arrangements for the fishery. Proposed new management arrangements for the ECIFFF have been outlined in the Regulatory Impact Statement and draft Public Benefit Test available on the DPI&F website at: www2.dpi.qld.gov.au/extra/pdf/fishweb. Development of the management plan is being based on a comprehensive public consultation process. The management plan is expected to be finalised by late 2008.</p>
<p>QDPI&F to conduct a program of stock assessments for species taken in the fishery and based on priorities established through a risk assessment analysis.</p>	<p><i>Completed</i> An expertise based working group has been convened to review stock assessment priorities. The priorities will be based on an assessment of the sustainability status of each of the key target species. The highest priorities are completing a surplus production model for barramundi and updating the age structured stock assessments for tailor and sea mullet. The stock assessments are supported by an expanded suite of monitoring programs in the fishery (RFISH, LTMP and observers).</p>	<p>The sustainability status of higher priority species for detailed stock assessment is continuing to be addressed.</p>
<p>QDPI&F to report on progress in developing the formal management arrangements for the fishery and progress in conducting stock assessments for species considered at risk by 1 November 2008.</p>	<p><i>Required by 1 November 2008</i></p>	<p>N/A</p>
<p>DPI&F to inform DEWHA 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.</p>	<p><i>Ongoing</i> See Condition 2 and Condition 5</p>	<p>See Condition 2</p>

Conditions	Progress	Improvement to management regime
<p>From the end of 2007, DPI&F to report publicly on the status of the ECIFFF on an annual basis and to report explicitly against each performance measure specified in the management regime to be developed for the fishery.</p>	<p><i>Ongoing</i> This annual status report is the second to be completed under the current WTO approval. Draft performance measures have been developed and will be finalised following introduction of the ECIFFF management plan.</p>	<p>Public reporting on the status of Queensland's fisheries is an important aspect of managing fisheries on behalf of the community. These reports provide an important summary of the status of each fishery, links to ecological assessments demonstrating to the community that fisheries meet sustainability guidelines, and the most up-to date catch and effort information on Queensland's fisheries.</p>
<p>In developing the management regime for the ECIFF, DPI&F to:</p> <ul style="list-style-type: none"> • 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. 	<p><i>In progress</i> See Condition 3 A management response process including a timeframe for action is an integral part of the draft ECIFFF ecosystem PMS. <i>No progress proposed</i> It is not proposed that the management plan stipulate the target species in the fishery. Rather, it is proposed that the management plan regulate key target species (e.g. through size limits, possession limits and other arrangements). Consequently, there will be no need for a process to include additional target species.</p>	<p>See Condition 3 Research is also currently underway through an FRDC project which is evaluating the socio-economic impacts of changes to Queensland's ECIFFF. This research project is expected to generate a number of social and economic indicators that can be used in the PMS longer term.</p>
<p>Within one year, DPI&F to develop a management regime for the ECIFFF, 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 ECIFFF before the end of the declaration.</p>	<p><i>In progress</i> DPI&F has undertaken a comprehensive review of the fishery and has proposed a number of changes to current management of the ECIFFF. These changes are designed to limit access to the fishery and protect the sustainability of key target species as well as more vulnerable or protected species. A management plan for the fishery is expected to be finalised in late 2008.</p>	<p>DPI&F is currently working with stakeholders to develop a statutory management plan which will consolidate management arrangements for the fishery and ensure a long term sustainable fishery. Development of the management plan is being based on a comprehensive public consultation process. The management plan is expected to be finalised by late 2008.</p>

Conditions	Progress	Improvement to management regime
<p>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.</p>	<p>Partially completed The <i>Policy for the Management of Excess Fishing Capacity in Queensland's East Coast Net Fisheries</i> removed approximately 40% of the fishery symbols from the fishery. It is proposed as part of the management plan that latent effort in some of the sub-fisheries be removed and that access to sub-fisheries be restricted.</p>	<p>The Policy took effect in July 2005 and led to a significant latent effort reduction in the fishery. Further latency in the fishery is proposed to be removed as part of the implementation of the management plan for the fishery.</p>
<p>DPI&F to complete a compliance risk assessment for the ECIFFF and implement a risk-based compliance plan within three years taking into account risks of non-compliance associated with:</p> <ul style="list-style-type: none"> • 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. 	<p><i>No progress</i> A compliance risk assessment is scheduled after the ECIFFF management planning process has been completed.</p>	<p>The proposed compliance risk assessment will provide a risk profile of compliance issues in the ECIFFF and provide a basis for comparison between the effectiveness of the management regime, prior to the management plan and subsequent to its implementation.</p>
<p>DPI&F to implement a pilot observer program by the end of 2007 and a full observer program by the end of the declaration and to ensure that the observer program is capable of providing the required information at, where appropriate, a statistically robust level and provides for the collection of at least the following:</p> <ul style="list-style-type: none"> • 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). 	<p><i>In progress</i> During 2006, one observer trip was undertaken with a shark net vessel and two with a vessel targeting grey mackerel. The aim of observer activity on these trips was to scope practical limitations to collection of catch sample data and observer safety concerns onboard these vessels. The Fisheries Observer Program was allocated observer coverage of 80 days in 2007. The Marine and Tropical Science Research Facility (MTRSF) at James Cook University assisted in reaching this target through placement of observers aboard commercial fishing vessels as part of the Inshore Biodiversity project currently underway. A shark identification guide for ECIFFF fishers is in preparation. Provision of the guide to fishers and observers will assist with species identification in the field. When completed, the guide will be distributed to shark fishers throughout Queensland.</p>	<p>The current focus of the program is to identify the catch composition of sharks on the east coast of Queensland and to gather base line data on ECIFFF bycatch and interactions with protected species. These data will be used to validate fisher logbook catch data and provide information for ecological risk assessment in the fishery.</p>

Conditions	Progress	Improvement to management regime
<p>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.</p>	<p><i>In progress</i> Currently there are no data from the observer program that can be used to determine whether there is a problem with commercial fisher identification of ECIFF species. In 2008, it is proposed to introduce a shark identification guide that will assist species recording accuracy in the fishery. It is also proposed to amend the current commercial fishing logbook following commencement of the ECIFFF Management Plan to facilitate species level recording by fishers. A minimum of one year observer data collected in parallel to fisher use of an amended logbook would be required to assess whether there are species identification problems in the fishery.</p>	<p>When available, commercial shark catch data reported at a finer taxonomic level can be validated with observer data. This will allow logbook catch identification accuracy to be assessed, provide more detailed information for management and reduce uncertainties about harvesting levels of individual species.</p>
<p>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.</p>	<p><i>In progress</i> RFISH: Regional creel surveys of recreational fish catches and a modified fisher diary program are currently being trialed. These techniques are being designed to provide more robust recreational fish catch estimates than in previous years and provide an additional source of data for validation of the Long Term Monitoring fish sample data currently used in stock assessments. Charter: DPI&F is developing a policy for the management of the charter sector. As part of this policy, consideration is being given to the collection of catch data by all charter fishers could be made a requirement under the legislation.</p>	<p>DPI&F determines the basis for conversion of numbers of fish caught to weight for incorporation into stock assessments on a species-by-species basis according to the most reliable data available. Rather than using catch weight estimates converted from estimates of numbers caught in RFISH surveys, stock assessments use length-weight relationships and catch length-frequency distributions from long-term monitoring data of recreational fish catches (eg tailor and barramundi). This approach gives more precise estimates on which base the level of recreational catch in the fishery.</p>

Conditions	Progress	Improvement to management regime
<p>DPI&F to ensure that:</p> <ul style="list-style-type: none"> • a risk analysis is conducted within 18 months to identify those target and byproduct 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: Barramundi 2007; Tailor 2007; Bream 2008 Flathead 2008 Whiting 2008 Sea Mullet 2008; Spotted mackerel 2009. 	<p><i>In progress</i> See Condition 4</p>	<p>Quantitative stock assessments for the main species caught in the ECIFF monitors fish stocks with the best and most up-to-date information and scientific methods to ensure that harvesting remains at sustainable levels.</p>
<p>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).</p>	<p><i>Ongoing</i> Inter-jurisdictional management processes are in place, such as the Australian Fisheries Managers Forum (AFMF), annual meetings with NSW Fisheries and collaboration with NSW and Northern Territory through the National Plan of Action – Sharks that allow discussion of complementary management arrangements for shared stocks.</p>	<p>Complementary size and bag limit rules are being proposed for a range of species and recent sustainability concerns about garfish in NSW have been taken into account in the review of proposed management in the ECIFFF Regulatory Impact Statement and draft Public Benefit Test. These initiatives have been put forward to maximise the likelihood of consistently sustainable outcomes for shared stocks across within range.</p>
<p>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.</p>	<p><i>In progress</i> A precautionary 700 t limit reference level for commercial harvest of shark has been proposed in the RIS and incorporated in the draft PMS. This is significantly lower than the catch at the time of the Investment Warning (around 1200 t).</p>	<p>The RIS contains a suite of proposals that are designed to constrain total shark catch, protect more vulnerable species of shark and ray, and collect better information on the species captured in the fishery.</p>

Conditions	Progress	Improvement to management regime
<p>Within six months of the completion of a tropical shark fishery situation report in 2009–10, 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.</p>	<p><i>In progress</i> In 2009–10 the MTSRF tropical shark inshore research project will update the 2007 Northern shark and ray ERA project led by CSIRO Marine Research. In the interim, a suite of arrangements is proposed that are designed to constrain total shark catch, protect more vulnerable species of shark and ray, and collect better information on the species captured in the fishery. Finning of sharks at sea is currently prohibited under the Fisheries Regulation 1995. However, it is intended that as part of the review of the Fisheries Regulation, which is expected to be completed by mid 2008, this be expanded to include all elasmobranchs.</p>	<p>The RIS contains a suite of proposals that are designed to constrain total shark catch, protect more vulnerable species of shark and ray, and collect better information on the species captured in the fishery.</p>
<p>DPI&F to include in the management regime a requirement that rebuilding strategies, including reference points (target and or limit) and timeframes be developed for species if assessments indicate that stocks are over fished.</p>	<p><i>In progress</i> There is no evidence that any ECIFFF stock is overfished or that overfishing of the stock is occurring. The stock assessment for tailor suggests that the stock is heavily exploited and that the minimum size limit should be raised. This is being proposed as part of the RIS.</p>	<p>While there is no evidence that any ECIFFF stock is overfished or that overfishing of the stock is occurring, DPI&F will continue to monitor stock status of high priority species and take appropriate actions to ensure that harvesting is sustainable.</p>
<p>DPI&F to develop a Bycatch Action Plan for the fishery within 3 years.</p>	<p><i>In progress</i> There are several proposals in the RIS that address bycatch issues in the ECIFFF. DPI&F intends to incorporate these into development of a management plan for the fishery rather than through a specific Bycatch Action Plan.</p>	<p>Management proposals on net attendance rules, additional closures and gear changes implemented through the management plan, will further reduce potential impacts on bycatch.</p>
<p>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.</p>	<p><i>In progress</i> DPI&F is developing a policy for the management of the charter sector. As part of this policy, consideration is being given to the collection of catch data by all charter fishers.</p>	<p>While the charter sector is manly line fishing based and likely to have negligible impact on east coast protected species populations, expansion of the Species of Conservation Interest Logbook to all charter fishers could provide data from additional charter operations to confirm this expectation of the sector as a whole.</p>

Conditions	Progress	Improvement to management regime
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.	<i>In progress</i> In early 2007, DPI&F convened a stakeholder Working Group that reviewed the effectiveness of dugong protection areas (DPAs) for dugongs. A number of proposed changes to DPAs are proposed which will further minimise potential interactions between nets and dugongs. A further review of the effectiveness of net closures to east coast turtle populations is scheduled for 2008.	Generally, the DPA working groups agreed that the network of DPAs had been effective at reducing interactions between nets and dugong. Some refinement of the DPA arrangements were recommended by the working group to further reduce any potential interactions.
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.	<i>Completed</i> In early 2007 a review of fishery gear interactions with protected species was undertaken and the results used in development of the draft ecosystem PMS for the fishery. A range of mitigation measures to minimize interactions with protected species are proposed in the RIS for the fishery.	DPI&F has developed performance measures for protected species interactions in the draft ecosystem PMS based on results of the review.

Annual fishery performance review

During 2007, a draft performance measurement system (PMS) for the ECIFFF was developed with stakeholder consultation to track fishery. The purpose of the ECIFFF PMS is to establish a set of reference levels in key fishery indicators (e.g. catch and catch rate) to provide a consistent basis for annual review of the fishery. The PMS identifies several sub-fisheries in the ECIFFF defined by the target species, fishing method or region of fishing operations, or a combination of these. The PMS includes preliminary performance measures to monitor the sustainability of interactions with retained and non-retained species (bycatch), protected species and ecological diversity within the fishery area. It also includes a process for appropriate management action according to whether fishery performance is acceptable on a specific issue.

It is proposed to finalise the draft ecosystem PMS in mid-2008 after the ECIFFF Regulatory Impact Statement (RIS) public consultation process is completed. Further development of robust socio-economic indicators and reference limits has been initiated in a collaborative research project led by James Cook University in mid-2007.

Resource concerns

While there are few major sustainability concerns in the ECIFFF, concerns have been raised over recent harvesting trends for several species. DPI&F is ensuring that the management of these species is responsive to these concerns and is adequate for their sustainable use. The management arrangements proposed in the RIS process address some specific concerns:

- Given their biology, sharks are more vulnerable to overfishing than other more productive fin fish. DPI&F has proposed a number of management proposals to enhance sustainable outcomes for shark harvesting including a regulation on finning-at-sea. Further shark management proposals are identified in the ECIFFF RIS.

- The most recent 2004 stock assessment for tailor indicated that the stock is heavily exploited and recommended an increased minimum legal length at which tailor may be retained. Concerns about increased catch of grey mackerel and sea gar are also being considered in the development of new management arrangements for the fishery.

Quantitative stock assessments are regularly undertaken for a number of the target species in the fishery including barramundi, tailor, mullet and spotted mackerel. In 2005, DPI&F convened an expertise-based working group to assess priority species for future stock assessments on the basis of risk.

In 2009–10 the Marine and Tropical Sciences Research Facilities (MTSRF) tropical shark inshore research project will update the CSIRO led 2007 Northern shark and ray Ecological Risk Assessment project.⁷

Ecosystem

Non-retained species/bycatch

Undersized species or species with no market value are discarded.⁸ The level of bycatch in the ECIFFF net fishery has been shown to be low when compared to the retained component of the catch, indicating the gear and methods used in net fishing are highly selective at harvesting the target species. Halliday *et al*⁹ found that bycatch in east coast commercial netting operations for mullet, whiting, small mackerels, barramundi and mixed estuary species is low relative to other commercial fisheries. Bycatch, as a percentage of the total number of fish caught, was less than 20% for netting operations targeting these species, except where sand whiting are targeted, where 28% of the total fish caught was bycatch.

Interactions with protected species

In 2003, a Species of Conservation Interest logbook (SOCIO1) was introduced to record interactions with all species that are of conservation concern. In the 35 504 fishing days (net and line fishing) recorded in the ECIFFF in 2006, SOCI data indicates that interactions with turtle species occur more frequently than with other protected species (Table 4). Only two out of the 229 interactions reported indicated protected species mortality. The majority of turtle interactions occur in tunnel net operations where operators use turtle excluder devices to release the turtles unharmed. Turtles are accustomed to this and take advantage of the availability of food in the tunnel net.

7 J Salini, R McAuley, S Balber, R Buckworth, J Chidlow, N Gribble, J Ovenden, S Peverell, R Pillans, J Stevens, I Stobutzki, C Tarca & T Walker, *Northern Australian sharks and rays: the sustainability of target and bycatch species, phase 2*. Project No. 2002/064 Final Report. Fisheries Research and Development Corporation and CSIRO Marine and Atmospheric Research, 2006.

8 The DPI&F Fisheries Observer Program started measuring bycatch weight and composition in the ECIFFF in early 2008. Preliminary bycatch data will be reported in the 2008 Annual Status Report.

9 I Halliday, J Ley, A Tobin, R Garrett, N Gribble & D Mayer, *The effects of net fishing: addressing biodiversity and bycatch issues in Queensland inshore waters*, FRDC project No. 97/206, 2001.

Table 4: Reported interactions with species of conservation interest during 2006. (Source: DPI&F CFISH database 20 February 2007).

Species	Released alive	Dead
Green turtles	165	–
Loggerhead turtles	22	1
Marine turtles, unspecified	32	–
Cetaceans	5	–
Dugong	–	1
Sea snakes	2	–
Cormorants	1	–
Marine turtles, unspecified	28	–

Fishery impacts on the ecosystem

Commercial net fishing, recreational line fishing and Indigenous fishing activities are essentially passive fishing methods that have minimal negative effect on the ecosystem and environment generally. Commercial net fisheries target high order predator fish species and use highly selective fishing gear types and methods that catch only small amounts of bycatch species.

Due to the low levels of discards, there is limited potential to supplement additional food resources for other marine species through discarding. However, it would only be a small and interrupted food source for opportunistic scavenging species. Long term changes in densities of these species as a result of this provisioning are unlikely.

Other ecosystem impacts

Two introduced and ecologically damaging pest fish species, *Tilapia mariae* and *Oreochromis mossambicus* have caused considerable damage to ECIFFF river catchments. Collectively known as Tilapia, these declared noxious fish species can degrade natural freshwater and coastal river and stream habitats and aggressively displace native fish species. Although restricted to freshwater and brackish environs, tilapia have the potential to impact negatively on important ECIFFF species, such as barramundi, that rely on these habitats for food or other critical parts of their lifecycle. Through Invasive Animals CRC funding, DPI&F are conducting a project in north Queensland that will provide for the development of management strategies for the control and eradication of feral tilapia populations in Australia. The project is scheduled to finish at the end of 2008.

Ghost fishing from discarded nets has an adverse impact on marine wildlife. DPI&F is participating in Australian Government efforts to quantify and address risk of incidental capture of marine fauna by harmful marine debris. Sources of harmful marine debris as a key threatening process under the EPBC Act were identified at multi-jurisdictional workshops in Brisbane and Adelaide in 2004¹⁰. Avoidance of unintentional discarding of fishing line, nets and disposal of waste are key points in Codes of Practice / Codes of Conduct developed by both the commercial and recreational fishing industries to protect habitats and aquatic biodiversity (Australian Seafood Industry Council, Mackay Branch 10 of the Queensland Seafood Industry Association and Recfish Australia 2001).

¹⁰ Anon, *Marine Debris Threat Abatement Plan Workshop Report*, Australian Government, Department of the Environment and Heritage, Canberra, Australia, 2004.

Research and monitoring

Recent research and implications

Results from the Queensland and New South Wales sea mullet (*Mugil cephalus*) stock assessment¹¹ and the 2004 stock assessment conducted for Queensland and New South Wales tailor stocks¹² were reporting in the previous Annual Status Report for this fishery.

During late 2007, an updated assessment of the status of both the Gulf and East Coast barramundi stocks was conducted.¹³ Catch and effort information from the commercial (CFISH logbooks) and recreational (RFISH diaries) sources was split into six geographical regions with each having its own aggregated total commercial and recreational catch. Standardised catch rates were calculated to obtain an index of abundance and a surplus production model was fitted to the catch time series and catch rate data. The main conclusions to be drawn from the assessment are that:

- the absolute abundance of the Queensland barramundi stock is unknown
- there are major constraints to reliable estimation of stock biomass or management parameters such as maximum sustainable yield (MSY) with the available data.

Notwithstanding there is a poor data fit to the model, the assessment tentatively concluded that:

- catch rate trends indicate that the relative barramundi abundance is increasing in four of the six geographic regions
- catch rate trends in the other two geographic regions (East Coast Cape York and the Central East Coast regions) are highly variable
- it is possible that absolute stock abundance is very low (in all regions) compared with unfished (virgin) biomass estimates.

Given there is some uncertainty about whether these findings are accurate it is important to continue to seek improvements in commercial and recreational fisher data quality and to consider the constraints and caveats on the use of these data for future stock assessments. The Long Term Monitoring Program has begun to collect high quality data to support more powerful age-based stock assessments.

Once better age and selectivity data become available and the fidelity of the catch and effort data can be verified, the status of the Queensland east coast barramundi fishery will be reassessed. The next stock assessment for barramundi is scheduled to begin in mid-2010.

DPI&F, James Cook University and CSIRO Marine Research are collaborating on an evaluative study of the impacts from industry and community uses on inshore marine biodiversity adjacent to the Great Barrier Reef. The study commenced in early 2007 and is due for completion in 2010. Preliminary results from an observer program describe the species composition and length distribution of shark and fish species caught by commercial net fishers within the GBRWHA from Princess Charlotte Bay to Gladstone. To date, data from a total of 2635 fish from 49 species and 1056 sharks and rays from 22 species have been recorded in the catch of commercial net fishers.

11 PA Bell, MF O'Neill, GM Leigh, AJ Courtney, & SL Peel, *Stock Assessment of the Queensland – New South Wales Sea Mullet Fishery (Mugil cephalus)*, Department of Primary Industries and Fisheries, Brisbane, Australia, 2005.

12 GM Leigh, & MF O'Neill, *Stock Assessment of the Queensland – New South Wales Tailor Fishery (Pomatomus saltatrix)*, Department of Primary Industries and Fisheries, Brisbane, Australia, 2004.

13 AB Campbell, & MF O'Neill, *Assessment of the barramundi fishery in Queensland, 1989 - 2007*. Department of Primary Industries and Fisheries, Brisbane, Australia, in prep.

Recreational boat ramp surveys on the impact of the 2004 Great Barrier Reef Marine Park Rezoning commenced in June 2007. Sample collection from commercial fishers and seafood processors for estimation of longevity, growth rates, mortality rates, fecundity size and age at first maturity and genetics of key species commenced in December 2007. Development of a risk assessment framework for inshore species is scheduled to begin in June 2008.

A project to determine the spatial management units for grey mackerel fisheries in coastal waters of Queensland, Northern Territory and Western Australia commenced in late 2005 and is due for completion by mid-2008. Information on its stock structure will allow a policy direction for management of grey mackerel harvesting to be developed.

Monitoring programs and results

Compulsory Logbook Program

Commercial fishery catch and effort information for the ECIFFF continues to be monitored through the compulsory daily logbook program (CFISH). The development of a new net fishery logbook with the intention to improve the species resolution of catch and effort recording in the ECIFFF is being considered with development of the management plan.

Long Term Monitoring Program

The DPI&F Fisheries Long Term Monitoring Program (LTMP) provides data to complement the information obtained from commercial logbooks and recreational fishing diaries for various Queensland fisheries. These data include length and sex composition of the catch used in stock assessments. The species taken in the ECIFFF that are monitored include barramundi, tailor, mullet, spotted mackerel, yellowfin bream, sand whiting and dusky flathead.

The most recent published LTMP results from the 2000–02 barramundi surveys¹⁴ indicate that the commercial barramundi harvest relies on a relatively small set of age classes, mainly two to five year old fish. In 2006, the program underwent a comprehensive review. A major outcome of the review was confirmation that the primary aim of the program is to collect biological data to assess the barramundi resource. Consistent with this approach it is expected that future LTMP estimates of length, age and sex structures of the recreational and commercial catch will be incorporated into future barramundi stock assessments. Sampling in 2007 was expanded to collect more information from three of the six barramundi genetic stocks in Queensland. The goal of the expanded program is to provide representative biological data from the commercial and recreational sectors for a new stock assessment model of barramundi stocks and reduce uncertainties in managing the fishery.

LTMP data for tailor and sea mullet fisheries have been collected since 1999. During 2006 and 2007, sampling expanded to encompass estuarine and ocean beach components of the commercial fishery for mullet and the recreational and commercial fisheries for tailor. The expanded monitoring of these species has improved representativeness of the data collected from each respective fishery and will provide greater certainty about assumptions about the fishery in future stock assessments.

¹⁴ C Lunow, R Garrett, N Gribble, S Helmke, D Rose, *Fisheries Long Term Monitoring Program—Barramundi survey results from 2000 to 2002*, Department of Primary Industries and Fisheries, Brisbane, 2005.

LTMP surveys of yellowfin bream, summer whiting and dusky flathead started collecting fishery-dependent data from recreational, charter and commercial sectors in late 2006. Results to date indicate that the length distributions of the commercial and recreational catches are similar and the gender balance of the dusky flathead catch is heavily skewed towards females. Data collection continued through 2007 to provide data for age-structured stock assessments of the south east Queensland populations of these species.

Collaborative research

Collaborative research among fishery agencies in Queensland, Northern Territory and Western Australia and commercial fishers began in July 2005 to distinguish the structure of northern Australian grey mackerel stocks. The project uses genetic, microchemistry and parasitological analyses. Results are expected by mid-2008 and will identify the spatial orientation of stocks for consideration in future grey mackerel fishery assessments.

James Cook University researchers are also collaborating with DPI&F assessing the impacts of inshore fisheries in the Great Barrier Reef region on marine biodiversity. The project commenced in mid 2006 focusing on enhancing biological and ecological knowledge of shark, threadfin, grunter, queenfish, mangrove jack, garfish, grey mackerel and other species in east coast inshore net and line fisheries. The results will be used in future sustainability assessments of these species.

Scientific collaboration between DPI&F and New South Wales researchers continues with quantitative assessments of shared east coast mullet and tailor stocks scheduled for 2008-09.

Fishery management

Compliance report

Compliance and enforcement in the ECIFFF is the responsibility of the DPI&F, Queensland Boating and Fisheries Patrol (QBFP). During 2006, 16 011 units, including 90 commercial line fishing vessels and 363 commercial net fishing vessels, were inspected in the ECIFFF, with an associated compliance rate of approximately 98% on units inspected. The majority of inspections were of recreational fishers. Offences in Appendix 1 are reported as either a Fisheries Infringement Notice (FIN); Caution (FIN Caution or official caution issued by DPI&F); or Prosecution (to proceed by complaint summons).

A compliance risk assessment will be conducted in 2008 to determine compliance priorities for the ECIFFF and allow the most effective use of QBFP resources.

Changes to management arrangements in the reporting year

The commercial catch of both tailor and spotted mackerel is managed under Total Allowable Catch quotas. Reporting arrangements for both the quotas were changed in 2006. Previously, fishers had to report catch over 100 kg for tailor and 15 fish for spotted mackerel by telephone immediately as well as through commercial logbooks submitted on a monthly basis. Operators are now required to report their catch in commercial logbooks which are to be submitted to DPI&F within 14 days of the catch. When a certain portion of the quota is reached (i.e. 100 t for tailor and 120 t for spotted mackerel) fishers are advised by DPI&F that they are required to telephone prior to further fishing to obtain permission, and to report by telephone immediately if they catch over 100 kg for tailor and 15 fish for spotted mackerel.

New fees and licensing arrangements for Queensland's fisheries were implemented in July 2006. Commercial licence holders can now move individual fishery symbols from one primary licence to another. The movements are subject to application.

Complementary management

Queensland continues to work with NSW fisheries management officers on complementary arrangements for shared stocks. In particular, the two management agencies have discussed complementary size and bag limits for species caught in both jurisdictions. The fishery agencies have also agreed to seek mutual beneficial approaches to meeting recommendations for management under DEWHA approvals. DPI&F and NSW Fisheries have also discussed management of shark stocks on the east coast.

Appendix 1: Offences recorded in the East Coast Inshore Fin Fish Fishery in 2006.

Offence	FIN	Prosecution	Caution
Take/possess/sell regulated fish	150	5	70
Recreational fisher possess fin fish on a boat with skin removed	11		
Left fish in fishing apparatus out of the water		2	
Breached closed waters or closed season declaration	10	3	7
Use more than the prescribed number of apparatus (recreational fisher)			1
Use prohibited fishing apparatus (eg. net). (recreational fisher)	14		
Take fish for trade/commerce with fishing apparatus not marked in the prescribed way	2		
Person in control of boat used boat while not marked correctly	1		
Taking fish in a prohibited way		4	
Use/possess commercial fishing apparatus without an authority		1	
Contravened a condition of an authority		1	
Contravened a fishery provision		5	
Provided false or misleading information		2	
Fail to have a document required to be available for immediate inspection	9		
Failed to comply with a requirement to keep or give stated records, documents or other information in the approved form	1	1	1
Did not comply with a requirement in support of seizure		1	
Obstructed an inspector		3	
Disturbed fish to prevent a fisher or someone else acting under an authority from taking them		1	
Total	198	29	79

Note: The majority of prosecutions recorded here are still pending. Furthermore, the majority of cautions issued were for minor regulated fish offences such as one fish in possession regulated by size or number. In addition to the above offences 45 unlawful nets, 1 hand spear and 1 drum line were seized during the period for which no owner could be identified.

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Image

Barramundi (*Lates calcarifer*)

