



Australian Government

Department of the Environment and Heritage

Assessment of the
Gulf of Carpentaria Inshore Finfish Fishery

September 2004

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This document is an assessment carried out by the Department of 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 Gulf of Carpentaria Inshore Finfish Fishery

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EXECUTIVE SUMMARY

Background

The 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 Gulf of Carpentaria Inshore Finfish Fishery* (the submission) was received by the Department of Environment and Heritage (DEH) on 30 May 2003. The submission was released for a twenty-day public comment period that expired on 20 February 2004. Four public comments were received. No changes were made to the submission as a result of public comment. A final submission for assessment was received on 18 June 2004.

The submission reports on the Gulf of Carpentaria Inshore Finfish Fishery (GOCIFF) against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. The DEH assessment considers the submission, associated documents, public comments and DPI&F's response to the comments.

Table 1: Summary of the GOCIF Fishery

Area	Waters adjacent to the State of Queensland (includes Commonwealth and State waters under a Joint Authority agreement).
Fishery status	The target species are considered fully fished. Concern for shark species and Grey mackerel where there is a paucity of information and no formal stock assessment has been conducted.
Target Species	Multi-species fishery includes Barramundi (<i>Lates calcarifer</i>), King (<i>Polydactylus macrochir</i>) and Blue threadfin (<i>Eleutheronema tetradactylum</i>), Small grunter (<i>Pomodasys argenteus</i>) and Spotted grunter (<i>P. kaakan</i>), Grey mackerel (<i>Scomberomorus semifasciatus</i>) and Tropical sharks (various spp), Sorrah whaler (<i>Carcharhinus sorrah</i>) and Blacktip whaler (<i>C. tilstoni</i>).
By-product Species	62 species listed for the fishery as a whole. Black jewfish (<i>Protonibea diacanthus</i>) and Jewfish (<i>Nibea squamosa</i>) are the main components. All N3 and the offshore (N9) operators also hold an N6 symbol allowing them to fish for garfish and mullet as bait.
Gear	Set mesh nets. N3: 50 mesh drop (~ 7 m) nets anchored to substrate. Maximum net length of 360 m when fishing in creeks and rivers and 600 m when fishing in the foreshore. N9: 1,200 m (per licence) 85 meshes drop (~12 m).
Season	February to September. Closed season to all QLD managed commercial net fishing in the GOCIFF October to January inclusive.
Commercial harvest 2001-02	2078 tonnes. N3 1558 t. N9 649 t. Barramundi 43% (\$5.1M), Threadfins 33%, Sharks 8% (\$1.9M), Grey mackerel 5% (\$2M). Queenfish Grunter and Jewfish ~5%.

Value of commercial harvest 2001	11.9 million in 2001-02.
Recreational harvest	For Barramundi estimated to be 10% of the commercial take for that species.
Commercial licences issued	N3; 90 licences, down from 105 in 2003. N9; Capped at 5 licenses, 3 active in 2003.
Management arrangements	Input controlled through: <ul style="list-style-type: none"> • limited entry; • boat and gear restrictions; • spatial and temporal closures; • possession limits; • Size limits.
Export	Shark fins are the only component exported (to Asia). Potential for Grey mackerel to be exported in future.
Bycatch	Bycatch of various species reported as low.
Interaction with Threatened Species	As per report; Sea turtles – very few caught, all returned alive. Sawfish – no data, risk assessment underway. Dugong – no reported interaction. Large seagrass areas closed to netting. Cetaceans – 4 dolphins caught in nets in 2001, 1 in 2002. This level of interaction triggered development of draft Bycatch Action Plan (BAP). Estuarine crocodiles – considerable interaction due to feeding off fish in nets however no reported mortalities.

The area of the fishery extends from Slade Point on the west coast of Cape York Peninsula to the Queensland/Northern Territory border, from the high water mark to 25 nm. Inshore finfish within this area is managed by the State of Queensland in accordance with the Offshore Constitutional Settlement (OCS) agreement of 1995. The Queensland Fisheries Joint authority in accordance with the OCS Agreement of 1995 manages all demersal and pelagic fish stocks within this area. Queensland Fisheries Joint authority in accordance with the OCS Agreement of 1995 also manages access to demersal and pelagic fish stocks beyond 25 nautical miles. Access to all demersal and pelagic fish stocks is by Queensland Fisheries Joint Authority (QFJA) authority or condition of a Queensland fishing licence.

The Queensland Gulf of Carpentaria Line Fishery (GOCLF) also operates in these waters with a minor overlap in species taken with GOCIFF. Overlapping species represent on average less than 1% (weight percentage basis) of the GOCLF harvest. Species include Grey mackerel, Shark, Mackerel, Fork Catfish, Jewfish, Kingfish and “Other”.

The GOCIFF is divided into an inshore sector (N3) that operates from the high tide mark out to 7 nm and an offshore sector (N9) operating from 7 to 25 nm. Both of these sectors use mesh nets. Although there is an overlap in species caught, N3 operators mostly target Barramundi, King and Blue threadfin and Small and Spotted grunter species while the N9 sector targets Tropical sharks and Grey mackerel. There is no limit to the quantity or species that may be taken as by-product by the fishery and 62 have been recorded. Black jewfish (*Protonibea diacanthus*) and Jewfish (*Nibea squamosa*) are the main components. A by-product limit for mackerel and shark (targeted by the N9 sector) is under consideration for the N3 sector.

67 spp are recorded as bycatch, comprising 13% of the catch (by number). Bycatch in N3 is dominated by catfish (42.5%) and bony bream (17.5%). Other species include several types of shark, rays and finfish. N9 bycatch consists mainly of tuna (34.9%) and trevally (25.6%).

Most of the target, by-product and bycatch species in the GOCIFF have a widespread tropical Indo-West Pacific distribution. Gulf of Carpentaria (GOC) stocks of barramundi, black jewfish, grunter, king and blue threadfins and grey mackerel are generally separate from Queensland east coast stocks, while the predominant tropical shark species (Australian blacktip whaler *Carcharhinus tilstoni* and sorrah whaler *C. sorrah*) appear to have single stocks across northern Australia.

Status of main target species:

Barramundi – freshwater, estuarine and marine coastal distribution. Fully exploited with harvest and effort trends and population modelling suggesting stocks have increased since early 1980s.

Threadfins – coastal distribution. Harvests and stocks stable, considered not under threat at current fishing effort.

Grunters – The Small and Spotted grunthers are moderate sized predatory fish found in estuarine and coastal waters. Catch levels have varied over the last 10 years, along with fishing effort, with no clear trend. Recreational take has not been formally estimated but is believed to be substantial (40-60 t from one location). Susceptible to fishing pressure during aggregations around mouth of rivers. Commercial take was only 34 t in 2002.

Jewfish - called by-product but targeted by fishermen during parts of the year. Susceptible to fishing effort during aggregations. The Indigenous community implemented a voluntary moratorium on fishing in 2000 which was followed by a DPI&F closed area declaration in 2002 to address concerns over the sustainability of black jewfish stocks.

Tropical sharks – low fecundity. Data deficient fishery. Sustainability of shark resource unknown. Effort increasing since 1990 with no clear effort trend although mean daily boat harvest has been increasing since 1997.

Grey mackerel – medium to high fecundity. Data deficient fishery. Harvest increased from 1995 – 2001 and there are concerns whether this level of catch is sustainable.

Total net catch was 2078 t worth \$11.9M in 2002. Barramundi makes up 43% of catch (\$5.1M), threadfins 33%, Shark (fins only export component of GOCIFF) \$1.9M and Grey mackerel \$2M (sharks and mackerel combined 13% of catch by volume). Queenfish, grunter and jewfish ~5%.

Commercial netting began during the 1950s, mostly for barramundi and threadfin. In 1977, 16 rivers were partially closed to commercial fishing but remained open to recreational fishing. Management measures have mostly been targeted to assist barramundi stocks. The shark and Grey mackerel fishing sector has developed from the expansion of the fishery boundaries. Concerns about shark and Grey mackerel led to the separation of the fishery in 1999 into N3 and N9 to allow for separate management arrangements to be implemented. N9 is where most of the sharks and Grey mackerel are caught.

The fishery uses set nets (attached to the substrate at both ends) in the N3 fishery and set mesh (anchored at one end and attached to the boat in the other) in the N9 fishery. Length and drop of mesh is defined for both methods. In 1981 declining barramundi stocks prompted the introduction of:

- Seasonal closures – currently September to January inclusive.
- Gear restrictions – mesh size and net length
- Limited entry
- Logbooks and catch validation
- Recreational bag limit
- Protection of nursery habitats
- Increase in legal minimum total length (TL) in barramundi from 55 to 58 cm.

In spite of this, barramundi stocks continued to decline and additional measures were introduced in 1996:

- Net mesh size increased to protect juveniles.
- Extension of seasonal closure to include October.
- Recreational bag limit decreased.

Barramundi stocks are considered to be recovering and under no threat from current fishing effort.

Additional strategies introduced in the Gulf Management Plan (1999) include:

- Netting arrangements to minimize capture or interaction with endangered, protected or non-target species.
- Revised minimum /maximum size limits.
- Revised recreational bag limits
- Tougher penalties for fishery offences
- Separate spatial closure provisions for recreational and indigenous fishing

Concerns with shark stocks prompted the separation of the fishery into the inshore N3 and offshore N9 sectors. The N9 sector is where most of the shark and mackerel are taken and it was recognised that different management regimes were required. In addition, DPI&F is involved in the Fisheries Research and Development Corporation (FRDC) Shark Phase II risk assessment study. Access to N9 required the surrender of two N3 symbols.

A draft BAP has been developed by DPI&F with input from stakeholders and is due for implementation in 2004. The BAP has no legislative powers however required measures can be implemented through legislation via changes to the Gulf Management Plan or through fisheries permit conditions. The BAP includes provisions for reviews against performance indicators. Some of the recommendations in the BAP include closures to protect turtle nesting grounds and restrictions on the design and operation of nets.

Take of protected species as bycatch is considered incidental. Fishery observers reported no interactions with seabirds in either N3 or N9. There are a number of measures in place or being developed to further reduce or avoid interactions, including Codes of Practice, interaction recording requirements (draft Species of Conservation Interest [SOI] logbooks), research and development (R&D), gear restrictions and temporal spatial closures. Net fishers are required to complete an Endangered Species Awareness Course. Industry participated in trials using acoustic pingers to eliminate interaction with dolphins. A final report on the trials was completed in 2004. There were not enough data to prove pingers reduced the incidents of entanglements of marine mammals and fishing gear. Observations from fisheries observers and participating fishers however suggested that the lower frequency acoustic pingers were effective in reducing incidents with dugong, while higher frequency pingers appeared not to reduce interactions with dolphin species. Other measures being considered to reduce bycatch and interaction with protected species include prohibitions on offshore nets coming in contact with the sea floor or prohibiting fishing operations where the depth of the water is less than the drop of the net. Voluntary and compulsory observers have been working in the fishery since 1999.

Species of conservation interest in GOCIFF include:

Sea turtles - a few recorded isolated entanglements, where turtles have been released alive.

Sawfish – observer data suggests a very low level of interaction and 85% of narrow sawfish is released alive. The commercial net closure (October to January) coincides with the monsoon season, when the freshwater sawfish can be found in the marine environment. Shark Phase II is conducting risk assessment for all elasmobranchs.

Dugong – interactions are reported as rare. Large seagrass areas, where dugong converge, are closed to commercial netting. There is concern that those dugong caught in nets and released alive may suffer from post-release cryptic mortality. In 1999 a recovery plan for dugongs was implemented in Queensland which included changes to fishing regulations around the Wellesley Islands which have the highest levels of dugong populations in the GOC.

Cetaceans – limited interaction with rare Irrawaddy dolphins, four bottlenose dolphins were reported caught in nets in 2001 and one in 2002. This has triggered a management review with the BAP being developed as an outcome.

Estuarine Crocodiles – minimum interaction in N9 but considerable in N3 where crocodiles feed from nets. Observers recorded 7 interactions from 1999 to 2002. 3 crocodiles were released alive and 4 were drowned.

Grey nurse sharks – two were caught and released alive in 1998.

Other sharks – Speartooth and Northern River sharks have not been observed in the GOCIFF.

Others – syngnathids, sea birds, sea-snakes unlikely to interact with gear.

The Northern Prawn Fishery (NPF) is active in the GOC and takes a significant amount of banana and tiger prawns. A small proportion of the catch consists of tropical shark as bycatch. A risk analysis for those shark species caught by the NPF is part of the Shark Phase II research project. The NPF is a Commonwealth fishery and has a nil possession limit for shark. DPI&F will ensure that this information is recognised in any risk analysis undertaken for sharks. The GOCLF targeting Spanish mackerel and demersal fish species (coral trout, red throat, red emperors and sea perch) also operates within the GOC as well as a potting fishery for mud crab. While there is no reported GOCIFF species reported as bycatch in the mud crab fishery the line fishery takes a minimal amount of grey mackerel and tropical sharks (0.9% and 0.1 to 2.2% respectively of all catch of those species in GOC). All of these fisheries are under different management regimes and are not considered in this assessment.

The level of recreational fishing, both land or boat based, has steadily increased over the last decade. While recreational fishing targets GOCIFF species it only takes about 10% of the total commercial take of target species. Areas popular with GOC recreational fishing tend to be in the proximity of townships.

Indigenous fishing is based on traditional, recreational and commercial practices. Traditional fishing is not limited under legislation while commercial and recreational fishing are subject to normal legislative restrictions. Indigenous fishing targets near coast species, such as those taken by the N3 sector of the fishery, although the level of catch is considered to be low.

The DPI&F manages the commercial, recreational and Indigenous components of the GOCIFF with advice from the GOC fishery Management Advisory Committee (GulfMAC) through the Queensland Fisheries (Gulf of Carpentaria Inshore Finfish) Management Plan 1999, the Queensland *Fisheries Act 1994* and the *Fisheries Regulations 1995*.

Overall assessment

The material submitted by DPI&F demonstrates that the management arrangements for GOCIFF meet most of the requirements of the Australian Government *Guidelines for the ecologically sustainable management of fisheries*.

While the fishery is relatively well managed, DEH has identified a number of issues that must be managed to ensure that their impacts are minimised:

- Concerns over sustainability of Grey mackerel stocks at current effort levels;
- Paucity of information regarding a number of target, by-product and bycatch species;
- Limited work on the development of robust assessment models for most of the species;
- Limited information on the recreational and indigenous take; and
- Poorly defined trigger points (Review Events) and management responses.

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 and the continuation of a responsible attitude to the management of the fishery, management arrangements are likely to be sufficiently precautionary and capable of controlling, monitoring and enforcing the level of take from the fishery while ensuring that the stocks are fished sustainably.

The management regime aims to ensure that fishing is conducted in a manner that does not lead to over-fishing and for fishing operations to be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem. On balance, the fishery is being managed in an ecologically sustainable manner and is working to address existing problems and minimise environmental risks.

The operation of the fishery is consistent with the objectives of Part 13A of the EPBC Act. Given the management arrangements specified in the Fisheries (Gulf of Carpentaria Inshore Finfish) Management Plan 1999 and the existing review of management arrangements, DEH considers that the 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 Wildlife Trade Operation (WTO) with the actions specified in the recommendations to be undertaken by the DPI&F to contain the environmental risks in the long term. DEH considers that the fishery, as managed in accordance with the management plan, is not likely to cause serious or irreversible ecological damage over the period of the export decision. Specifically, the WTO declaration would allow the export of product from the fishery for a period of 3 years. The WTO declaration will require annual reporting on the progress of implementing the recommendations of this report and other managerial commitments. The implementation of the recommendations and commitments will be monitored and reviewed as part of the next DEH review of the fishery in 3 years time.

As the official fishery area encompasses Commonwealth as well as State waters, consideration under Part 13 of the EPBC Act is required regarding the impact of the fishery on listed threatened species, listed migratory species, cetaceans and listed marine species.

Protected species occurring in the fishery area include marine turtles, sawfish, dugong, dolphins, estuarine crocodiles and seabirds. While only a small number of interactions with these species have been reported there are concerns regarding the extent of reporting and the limited observer coverage especially in the near-shore component of the fishery. However, the actual and potential impact on Part 13 species under the management arrangements is considered low and adequate protection is provided. There are no listed threatened ecological communities in the fishery area.

DEH recommends that the Fisheries (Gulf of Carpentaria Inshore Finfish) Management Plan 1999 be declared an accredited management plan under Sections 208A, 222A, 245 and 265 of the EPBC Act. In making this judgement, DEH considers that the fishery to which the management plan relates does not, or 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. DEH also considers that the management plan requires that all reasonable steps be taken to avoid the killing or injuring of protected species, and the level of interaction under current fishing operations is likely to

be low. On this basis, DEH considers that an action taken by an individual fisher, acting in accordance with the management plan would not be expected to have a significant impact on a listed threatened species or listed migratory species protected by the EPBC Act.

The implementation of recommendations and other commitments made by DPI&F in the submission will be monitored and reviewed as part of the next DEH review of the fishery in 3 years time.

Recommendations

Recommendation 1: *DPI&F to inform DEH of any intended amendment to the management arrangements that may affect the sustainability of the target species or negatively impact on byproduct, bycatch, protected species or the ecosystem.*

Recommendation 2: *From 2005, DPI&F to report publicly on the status of the fishery on an annual basis, including explicitly reporting against each review event.*

Recommendation 3: *As part of its review of management arrangements for the fishery, DPI&F to develop and a list of species permitted to be taken in the fishery, which clearly defines target and by-product species. DPI&F to develop a clear process for the inclusion of any additional target species on the list.*

Recommendation 4: *Within 12 months, DPI&F to collect data on shark catch by species or species groups.*

Recommendation 5: *Within 18 months, DPI&F to undertake a risk assessment, in conjunction with other relevant jurisdictions where possible, to identify target, byproduct and bycatch species most at risk from the fishery and areas at risk from overfishing. Actions seeking to reduce risk should be implemented as appropriate within a further 12 months.*

Recommendation 6: *Within three years, DPI&F to have processes in place that provide reliable estimates of stock status for target species, on a risk priority basis.*

Recommendation 7: *Within 18 months, DPI&F to develop a process to improve estimates of recreational and Indigenous take and factor these into stock assessments and management controls to ensure overall catch levels are sustainable.*

Recommendation 8: *Currently, Review Events are imprecisely defined and may not be adequate to ensure sustainability. Within 18 months, DPI&F to develop fishery specific objectives linked to performance indicators and Review Events for target, byproduct, bycatch, protected species and impacts on the ecosystem.*

Recommendation 9: *DPI&F to monitor the status of the fishery in relation to the Review Events in the plan. Within three months of becoming aware that a Review Event has been triggered, DPI&F to finalise a clear timetable for the implementation of appropriate management responses.*

Recommendation 10: *Within 12 months, DPI&F to amend its restrictions on shark finning to include rays (all chondrichthyans).*

Recommendation 11: *Within 1 year, DPI&F to support the implementation of the Species of Conservation Interest logbooks, DPI&F to ensure that an education program for fishers, both recreational and commercial, is developed and implemented, to promote the importance of protected species protection and accurate incident reporting.*

Recommendation 12: *Within 18 months, DPI&F to develop a mechanism to improve knowledge of the level of interactions with protected species. If interaction “hot spots” are identified, additional mitigation measures are to be implemented.*

Recommendation 13: *Within three years, DPI&F to undertake an enforcement risk analysis seeking to develop and implement a strategic enforcement and compliance program which includes measurable performance criteria. DPI&F to ensure that the following issues are specifically addressed in the development of the compliance program for the fishery:*

- *Catch and effort data reliability (target species, bycatch and by-product data).*
- *Non-compliance with gear restrictions and size limits.*
- *Reporting of protected species interaction.*
- *Closed area restrictions.*

PART I - MANAGEMENT ARRANGEMENTS

The Gulf of Carpentaria Inshore Finfish Fishery (GOCIFF) is managed by the Department of Primary Industries and Fisheries (DPI&F).

The management regime is described in the following documents, all of which are, or will be publicly available:

- The *Queensland Fisheries (Gulf of Carpentaria Inshore Finfish Management Plan 1999)*
- The *Queensland Fisheries Act 1994*
- The *Queensland Fisheries Regulations 1995*
- The *Queensland Fisheries Joint Authority 1995*
- Relevant Gazetted notices and licence conditions

A number of other documents, including research reports, scientific literature and discussion papers, are integral to the management of the fishery.

Management of the fishery incorporates a sound range of consultative mechanisms and a clear commitment to effective consultation with a variety of stakeholders. 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.

GulfMAC has a wide representation of stakeholders which ensures that a range of expertise and community interests are involved in fishery management discussions and during the stock assessment process. It consists of an independent chair, a departmental representative, commercial fishers (3), a recreational fisher, a charter boat operator, a non-government conservation representative, indigenous representatives (2), a marketer, a fisheries researcher, a fisheries enforcement officer, a local government representative and observers including representatives from the Environment Protection Agency, the Department of Business, Industry & Resource Development, the Northern Territory fisheries agency and from the Australian Fisheries Management Authority (AFMA). GulfMAC also seeks advice from an expertise based scientific assessment group. GulfMAC aims to provide information and advice to the Minister on matters related to the protection and management of the fishery.

The fishery is managed according to the Queensland Fisheries (Gulf of Carpentaria Inshore Finfish) Management Plan 1999. This document contains a number of objectives relating to the maintenance of fish stocks at sustainable levels, protecting spawning target species, minimising adverse effects of fishing on protected wildlife, providing for viable commercial and recreational fisheries that give economic and social benefits to the community and satisfying traditional fishing needs of Aboriginal and Torres Strait Islanders. Each objective has a number of management strategies. Review Events are specified in the policy document. An assessment of the effectiveness of these measures is included in Part II of this report. The Gulf Management Plan was developed with participation from industry, government, recreational/regional groups, non-governmental environmental groups and invited specialists.

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Due to the importance of the documents discussed above to DEH's assessment of the fishery, an amendment could change the outcomes of the assessment.

Recommendation 1: *DPI&F to inform DEH of any intended amendment to the management arrangements that may affect the sustainability of the target species or negatively impact on byproduct, bycatch, protected species or the ecosystem.*

The Gulf Management Plan has in place what are termed “Review Events”. When breached, they trigger a series of actions by management. In the first instance GulfMAC would be notified and it in turn can seek expert advice on the state of fish stocks and/or the reason why the Review Event was triggered and make recommendations on appropriate management actions. A number of management measures and actions are available to DPI&F to address fishery issues if and when required by a Review Event.

Review Events are primarily based on an increase in effort levels and on “significant” declines in mean finfish catch size distributions, abundance of juveniles, catch per unit effort (CPUE) and changes to areas fished. The triggers for the review actions could be better defined as discussed under Part II of this report.

The management arrangements of the GOCIFF are considered capable of controlling the level of harvest in the fishery using input and/or output controls. Such controls include:

- Limited entry with 95 (N3 & N9 combined) licences;
- Gear and vessel restrictions;
- Size limits
- A seasonal closure for the whole fishery;
- Numerous permanent spatial closures; and
- Restrictions in bag and size limits for the recreational fishery.

The Gulf Management Plan contains the means of enforcing critical aspects of the management arrangements. Compliance and enforcement tools implemented in the fishery include a Vessel Monitoring System (VMS) for the N9 sector and random at sea and port inspections. Given the level of enforcement, compliance in this fishery appears to be high with only seven breaches in 2002. It is likely that operators feel an ownership of the management arrangements and therefore comply with them because of their involvement in the management decision process and efforts by DPI&F staff to educate operators on their scientific process and basis for management decisions. DEH considers that although these compliance measures contain the key elements for enforcing critical aspects of the management arrangements, improvements can be made and these are discussed further under Principle 1.

The Gulf Management Plan commenced in 1999 and must be reviewed within 5 to 9 years from its implementation or earlier if trigger events are activated beforehand. In anticipation of this review, DPI&F is preparing a report on the Queensland fisheries “Current Condition and Recent Trends Report” which is to be widely distributed to stakeholders. The review is scheduled to begin in 2004.

GOCIFF is subject to an annual review based on analysis of the fishery performance against Review Events based on catch and effort returns. Other analyses are included in the annual review (eg bycatch and by-product trends). However, the outcomes of the reviews and the triggering of Review Events are not reported. DEH believes that management should be transparent and include public reporting on the status of the fishery annually including explicit reports against each Review Event. DEH notes that while the Condition and Trends Reports provide valuable information about the status of fish resources under Queensland management, there is no public reporting of performance on a fishery-by-fishery basis.

Recommendation 2. *From 2005, DPI&F to report publicly on the status of the fishery on an annual basis, including explicit reporting against each Review Event.*

DEH considers that the level of uncertainty in the fishery is moderate. Hence a five year review of the entire fishery policy framework is suitable while critical aspects are reviewed in conjunction with GulfMAC, and while DPI&F continues to act when adverse signals appear in the fishery.

Fishery dependent and independent information relating to the target species is collected on a regular basis in the fishery. Fishery dependent data is obtained through a compulsory daily logbook program with monthly reporting arrangements. This commercial data is mostly un-validated, however quarterly compliance runs on the commercial fishery information system (CFISH) data base allow for checks on lodgement of logbook returns by fishers. Logbook data forms the primary basis for stock assessment. VMS is compulsory in the N9 fishery and is being considered for N3 vessels that target Grey mackerel.

A number of initiatives will increase the level of understanding of the impact of the fishery on the wider marine ecosystem. These include the compulsory requirements to record any interaction with protected species. A specific logbook for reporting interactions with species of conservation interest is being introduced in 2004. A draft Turtle and Marine Mammal Record Sheet has been circulated to fishers and observers in the GOC. Discussion of the information collection system can be found in Part II of this report.

An analysis of the fishery's capacity for assessing, monitoring, 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.

A number of demersal and pelagic fish stocks in the GOCIFF are shared with the Northern Territory and the Commonwealth. These are mainly shark and mackerel species as well as barramundi, threadfin and mud crab stocks. In the case of highly motile species such as Grey mackerel and sharks, there is a degree of stock sharing with Indonesia and Papua New Guinea. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) studies indicate that the blacktip shark stock is a single stock across northern Australia and is shared with NT, QLD, Indonesia and Papua Guinea. The DPI&F jointly manages shark species with the Commonwealth and Northern Territory through the provisions of the Queensland Fisheries Joint Authority. A memorandum of understanding between Queensland and the Northern Territory provides for consultation and cooperation on catch and effort data, monitoring and surveillance, results of scientific research and proposed management regimes. Fisheries managers and researchers meet annually at the Northern Australia Fisheries Managers Forum (AFMF) with invited participation of representatives of State, Commonwealth and international jurisdictions.

DEH considers that the current management arrangements comply with all relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy. DEH expects that DPI&F will also ensure compliance with any future plans or policies as 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 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 II of this report. The application of the

International Convention for the Prevention of Pollution from Ships (MARPOL) 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.

Conclusion

DEH considers that GOCIFF's management regime is documented, publicly available and transparent, and is developed through a consultative process. The management arrangements are adaptable and underpinned by appropriate objectives. Performance criteria (Review Events) by which the effectiveness of the management arrangements can be measured, enforced and reviewed require further development.

The management arrangements are capable of controlling the harvest through a combination of input controls appropriate to the size of the fishery. Periodic review of the fishery is provided for, as are the means of enforcing critical aspects of the management arrangements.

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

DEH considers that there is scope to further refine the management arrangements and has provided a number of recommendations for improvements in the longer term.

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

Fishery dependent data are obtained through the compulsory daily CFISH program with monthly reporting and based on grids (30’ lat/long) and sites (6’ lat/long). The logbooks contain information on location, fishing effort (eg net in water) gear description, target species and catch description.

Target species for this fishery are not well defined. DPI&F is seeking to rectify this issue during its upcoming review of the *Gulf Management Plan*. DEH believes that future management of the fishery should include a clear definition of target species. A process is also needed for including a new species on the target species list.

Recommendation 3. *As part of its review of the management arrangements for the fishery, DPI&F to develop and formalise a list of species permitted to be taken in the fishery, which clearly defines target and by-product species. DPI&F to develop a clear process for the inclusion of any additional target species on the list.*

In view of the concerns over the sustainability of sharks stocks generally, it is of prime importance that species specific information is collected on these stocks. DEH commends DPI&F for developing a shark identification key which will be useful in increasing knowledge of the take of different species. DEH notes that current logbooks provide for recording “Tropical sharks” which may include two or more species. While the shark identification key will help resolve some of the uncertainty over which specific sharks are being caught, DEH believes that more information is needed to provide the basis for effective decision making in managing the GOCIFF fishery. Accordingly DPI&F should investigate further options to improve species-specific data collection on shark stocks.

Recommendation 4. *Within 12 months, DPI&F to collect data on shark catch by species or species groups.*

Information provided by logbooks is mostly un-validated. DPI&F advises that checks are in place to monitor data provision compliance and data irregularities and a range of sources of information are available that would help widen the scope of validation mechanisms which currently focus mostly on key target species. Fishery dependent observers are part of the DPI&F Long Term Monitoring Program (LTMP) and from 1999 an industry funded compulsory observer program was started in the N9 component of the fishery. Voluntary diaries are also completed by volunteers from the recreational sector that help estimate the recreational harvest, effort, fishing method and type, catch and number of fishers. Additional sources of information include the Recreational Fisheries Information System (RFISH) data collection program, last undertaken in 2001/2002. Similarly the National Recreational and Indigenous Fishing Survey (NRIF) findings were released in 2003.

Fishery-independent data collection is limited. A number of fishery independent surveys have been conducted over the last decade to improve information on fish stocks. Ongoing programs include the LTMP which is collecting long term trend data on Barramundi and Mud crab stocks and which could be expanded to cover additional species as required pending funding availability. Additional research projects such as bycatch reduction for mammals through the use of sonic “pingers” were completed in 2004. DPI&F will consider any recommendations arising from the project. DPI&F is seeking to further expand fishery independent research, such as baseline assessment of the GOC Grey mackerel, pending funding applications.

DPI&F collects data from a wide range of sources (logbooks, processor records, quota management docketts, voluntary catch sampling and observer data) in an effort to counteract the lack of fishery-independent data. DEH considers this a useful approach given the economic and resource constraints under which the fishery operates. DEH is concerned however that the data validation mechanisms available in the fishery largely relate to landed target species and there is little validation of data relating to non-target species.

The level of collection and reliability of fishery dependent data are appropriate for the principal target species in the N3 fishery, however data and knowledge are still limited for the tropical sharks and Grey mackerel stocks. To address this lack of information the submission highlights the following research programs and management arrangements:

- FRDC Northern Australia Sharks and Rays – Phase II will be completed 2005 along with a first stock assessment. This project has a link with NPOA Sharks.
- CFISH log book program in place. Validation of logbooks being addressed by observers and through LTMP.
- LTMP since 1999. Fisheries dependent and independent data collection. Focused mainly on Barramundi and mud crab fisheries but since 2003 covering all other species caught in net surveys.
- VMS – only N9; N3 may be considered for boats targeting Grey mackerel.
- RFISH fishing surveys and diaries – un-validated.
- Observer program. Since 1999, industry funded compulsory program covering N9 sector.
- Historic and ongoing fishery project database.
- Tropical Resource Assessment Program (TRAP) Phase I and Phase II. Phase II set out to evaluate effectiveness of effort reduction measures of Gulf Management Plan.
- Grey mackerel (proposed) baseline assessment coordinated with Northern Territory.

Overall, given the range of fishery dependent and independent data gathered by DPI&F and the mechanisms for regularly reviewing the data requirements, DEH considers that there are reliable processes in place to improve information collection systems and that they are appropriate to the scale of the fishery. Continuation of existing data collection and research programs, combined with extension and refinement of such activities will be important for the future management of the fishery.

Assessment

The level of monitoring and assessment of stocks in the GOCIFF was traditionally targeting the barramundi component of the fishery and was only recently increased in scope to include a wider spread of target fish and sharks. Much is known about the biology of barramundi which contrasts with the lack of information about tropical sharks and Grey mackerel for critical elements such as growth rates, natural and fishing mortality, recruitment, role in the ecosystem, and habitat. DEH concurs with DPI&F that “there are sound estimates for productivity and sustainable harvest levels of barramundi and threadfins in the GOCIFF provided by recent stock assessments” and that the

present level of fishing effort for barramundi and threadfin is sustainable. These statements are based on the analysis of catches recorded through the logbook program started in 1981. DPI&F is proactive in evaluating modelling tools. It has tested the effectiveness of biomass modelling and compared its predictions with actual CPUE for barramundi and threadfin catches. The result has been the retention of the biomass dynamic model for barramundi and the trial of an alternative model for the threadfin catch providing a Maximum Constant Yield.

Public comments have raised concerns over the potential for overfishing in some areas of the fishery as a result of concentrated fishing by both commercial and recreational fishermen. This may be exacerbated by the number of boats (90) operating over the area of the N3 sector within a reduced fishing season (February to September inclusive). DEH suggests that this concern should be addressed by investigating the potential for localised overfishing and, if necessary, developing and implementing management responses.

Because the N9 sector of the fishery has developed relatively recently and is not considered to be a high value fishery, research into the distribution and spatial structure of shark and Grey mackerel stocks targeted by this sector has not been extensive. Knowledge of the resource is mostly in the form of commercial catch and effort data from 1995 onwards. Therefore a limited data-set is available with which to detect trends in catch and effort and environmental influences.

DPI&F recognises that the tropical shark and grey mackerel fishery requires more information on target and bycatch species composition before productivity estimates can be made. Data for initial stock assessments for these species is being gathered through an observer program in the N9 fishery as well as research and catch validation initiatives.

DPI&F considers that the stocks of sharks and Grey mackerel are of concern only due to the limited biological and spatial information and that it is managing these species with a sufficient level of precaution. DEH considers that DPI&F needs to validate this assumption through a risk assessment process that would identify the level and nature of risk from the GOCIFF on target, by-product and bycatch species. The risk assessment process should also prioritise data collection on those most at risk, followed by identification of actions aimed at reducing risks to acceptable levels.

Recommendation 5. *Within 18 months, DPI&F to undertake a risk assessment, in conjunction with other relevant jurisdictions where possible, to identify target, byproduct and bycatch species most at risk from the fishery and areas at risk from overfishing. Actions seeking to reduce risk should be implemented as appropriate within a further 12 months.*

DEH recognises DPI&F's attempts to secure funding for basic research on target species such as Grey mackerel. The paucity of information and the reliance on CPUE data, with limited effort validation and no reliable indicator of stock abundance or recruitment indicates the need for a robust stock assessment model to provide a reliable estimate of stock status as the basis for management decisions and for setting Review Events. Research should be undertaken on a risk priority basis as set by the GOCIFF risk assessment project (See recommendation 5).

Recommendation 6. *Within three years, DPI&F to have processes in place that provide reliable estimates of stock status for target species, on a risk priority basis.*

Recreational catch data was collected yearly from 1996 to 2001 and further surveys at two yearly intervals are being conducted under the RFISH program. The program has been under development for the past two years and the next survey is timed to begin in October 2004. Although recreational fishers take a number of species in common with the GOCIFF, only catches of barramundi and mud

crabs are contained in the RFISH survey summaries. Catch data indicate that commercial target species comprise only a relatively small percentage of the recreational take (e.g. recreational fishers take an average of less than 10% of the total commercial catch of barramundi).

Recreational fishing (including charter boat operators) is increasing with no commensurate increase in data collection or analysis. There is no firm understanding of the nature and degree of impact on fish stocks.

Catch data for the indigenous sector is limited. Surveys of the indigenous take are in progress and DPI&F advises that new data will be incorporated in revised stock assessments as a matter of priority.

DEH recognises previous initiatives in consulting and collecting information on Aboriginal and Torres Strait Islander fishing activity across QLD fisheries and the challenges the remoteness of the GOC presents in those endeavours. Although the level of Indigenous take is assumed to be small, there is very little information on the type and extent of Indigenous fishing in the area of operation of the GOCIFF. With no sound estimates on the level of take it is not possible to factor Indigenous impact into overall stock assessment.

With no accurate knowledge on the level of take it is not possible to factor Indigenous and recreational impacts into overall stock assessment. Therefore it is necessary to establish a process to improve estimates of the take by both these sectors. DEH considers that the data collection system requires further enhancements to ensure that reliable estimates of all removals from the fishery are available.

Recommendation 7. *Within 18 months, DPI&F to develop a process to improve estimates of recreational and Indigenous take and factor these into stock assessments and management controls to ensure overall catch levels are sustainable.*

Under the *Gulf Management Plan*, a lack of relevant catch and effort data on commercial, recreational or Aboriginal or Torres Strait Islander fishing triggers a Review Event. DEH notes that despite the paucity of information on Aboriginal, Torres Strait Islander and recreational fishing in the GOC, there has been no review.

Management response

GOCIFF management regime aims to maintain ecologically viable stock levels through a range of input and output controls. These are:

- limited entry to the vessels operating in the fishery (licenses);
- gear restrictions (nets and vessels);
- fish size limits;
- a fixed seasonal closures;
- effort trigger levels (12,000 boat-days in N3 fishery);
- permanent spatial closures (21 in total); and
- a range of monitoring approaches.

The level of take in both N3 and N9 sectors of GOCIFF has steadily increased over the last decade while effort (reported as boat-days) has remained relatively constant. Increase in the level of take has been attributed to improvements in knowledge, skill and technology (adoption of power assisted net drums). Improvements in technology may continue to drive increases in take with little or no increase in effort as measured by boat-days. CPUE trends can be masked if effort creep is not factored in. The submission is silent on the process for quantifying/managing effort creep in this fishery. Because of concerns over the sustainability of shark and Grey mackerel stocks at

current harvest levels it is advisable to factor in effort creep in Review Events based on effort and CPUE to ensure they are meaningful.

DEH considers that the combination of the above input controls and application of acceptable ranges will ensure adequate protection of the target stocks in the short to medium term. This is predicated on the development of formal stock assessments, especially for data deficient Grey mackerel and tropical sharks, which will help define sustainable effort levels.

Under the Gulf Management Plan a number of prescribed Review Events, with follow up procedural mechanisms are in place. Review Events include lack of catch and effort data for the Indigenous sector, an increase in effort levels, “significant” declines in mean finfish catch size distributions, or abundance of juveniles, or CPUE or changes to areas fished. In the event of a breach of a Review Event, DPI&F would notify GulfMAC, which would consider why the review was triggered and recommend an appropriate management response to DPI&F. GulfMAC, through DPI&F, would seek expert advice if required and recommend an appropriate management response. Responses could include, among others, reduction of effort through the issue of revised unit effort certificates, spatial and/or temporal closures.

DEH considers that Review Event triggers require better definition. The ambiguity of the term “significant” as a trigger for Review Events may be placing varying degrees of risk on species depending on their biological productivity and resilience to fishing activity. DEH is concerned over the lack of definition and suggests that DPI&F needs to identify specifically defined trigger points for Review Events.

Of particular concern are Shark and Grey mackerel species, where monitoring of stocks has only recently started and catches may not be sustainable at current levels of effort. Worldwide, some fisheries have suddenly collapsed even though CPUE levels continued to be stable in preceding years. The lack of information in this fishery suggests that effort based triggers may not have been set at a level that equates to sustainable harvest levels and therefore the additional uncertainty caused by lack of well defined Review Events may increase the level of risk. Ideally a Review Event should be based on biological productivity capacity arrived at by a formal research process. In the interim, more clearly defined and precautionary triggers for Review Events should be progressively refined as information becomes available.

Recommendation 8. *Currently, Review Events are imprecisely defined and may not be adequate to ensure sustainability. Within 18 months, DPI&F to develop fishery specific objectives linked to performance indicators and Review Events for target, byproduct, bycatch, protected species and impacts on the ecosystem.*

Responses to Review Events need to be timely and should be in accordance with an agreed process. Currently neither a timeframe nor a requirement to report a Review Event publicly are prescribed. To ensure transparency and accountability of management arrangements, Review Events should commit to a defined timeframe and process. For example, the NSW process is that there is a review of the breach, including consultation a report to the Minister within 3 months of the breach, including reasons for the breach, recommendations and timeframes for remedial action, and the report is made public.

Recommendation 9. *DPI&F to monitor the status of the fishery in relation to the Review Events in the plan. Within three months of becoming aware that a Review Event has been triggered, DPI&F to finalise a clear timetable for the implementation of appropriate management responses.*

There is a mixture of fishery dependent and independent sources of information of by-product species in the GOCIFF. These include the compulsory CFISH logbook system, RFISH surveys and diaries program, the DPI&F LTM P, TRAP phase I & II, Shark phase I & II, the mandatory N9 observer program and recreational and indigenous fishing surveys. The comprehensive logbook recording of by-product commenced in 1988 although the submission states that there is a low level of reliability due to lack of accuracy of species identification and the lack of reporting of bycatch which is not processed but discarded. To a degree, this is being addressed through the observer program in N9. Of the by-product species, only the black jewfish and jewfish have comprehensive commercial removal estimates.

Information about the biology, distribution, ecology and stock status of the major by-product species is sufficient to produce robust assessments of their dynamics and status. However, no stock assessments or estimates of available biomass exist for any by-product species.

The submission argues that gear restrictions effectively limit by-product catch and that together with the closed season during the reproductive cycle of many of the target and by-product species provide a sufficiently precautionary approach to managing the fishery. DEH concurs with the assessment that by-product levels in this fishery are low. DEH notes that better data collection and validation will help to confirm this assessment.

Currently this fishery does not have a list of permitted by-product species. This means that any species may be retained as by-product if a demand is identified in the market-place. Although DPI&F has a demonstrated history of adaptive management and will review the risk assessment every five years, DEH believes that unacceptable levels of damage could be caused if markets were to shift and increased fishing pressure was brought to bear on information poor by-product species. DEH therefore recommends that permitted by-product should be limited to species currently harvested, with a robust system developed to add or remove species as appropriate (See Recommendation 3). Suitable catch triggers should be developed to ensure any change in targeting behaviour can be detected and addressed as it occurs. Management responses should be clarified, with timeframes for implementation to address such changes, so that the management arrangements are able to minimise threats to by-product species.

DEH commends the initiative shown by the Indigenous communities and DPI&F in addressing the perceived over-exploitation of black jewfish aggregations with an Indigenous community led two-year moratorium on fishing. This has been followed by a closed area declaration under Fisheries Regulations.

There are no specific reference points (target and/or limit) for any of the by-product species. Recorded by-product information is validated through the N9 observer and TRAP programs. While validation of by-product is important and may address under or misreporting, it is still reliant on fishery dependent sources. A fishery independent confirmation of by-product catchability in the fishery would be of benefit. DEH suggests that fishery-independent research be strengthened in the harvest of by-product (and bycatch) species to validate current assumptions. It is advisable that as part of the review of the Gulf Management Plan, DPI&F establishes a process to identify appropriate reference points for byproduct species.

The current restrictions on landing shark fins unless accompanied by a corresponding amount of shark carcasses were introduced by DPI&F during 2003. This restriction does not include rays and therefore ray finning continues. The NT Primary Industry and Fisheries agency (NTF) has recently implemented finning restrictions that cover both sharks and rays. It is important that complementary management measures be established between jurisdictions for shared stocks.

Recommendation 10. *Within 12 months, DPI&F to amend its restrictions on shark finning to include rays (all chondrichthyans).*

Conclusion

DEH considers that the management regime in GOCIFF is appropriately precautionary and provides for the fishery to be conducted in a manner that does not lead to over-fishing and for fishing operations to be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem. DEH is also satisfied that stocks are not currently overfished, but should that occur in the future, the fishery is conducted such that there is a high degree of probability the stock(s) would recover.

DEH considers that the information collection system and stock assessment and management arrangements require further refinement to ensure that the fishery is conducted at catch levels that maintain ecologically viable stock levels with acceptable levels of probability.

DEH considers that there is scope to further refine some of the existing information collection, assessment and 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’*

This objective is not applicable to the fishery at present. None of the target species require a precautionary recovery strategy and GOCIFF is managed in a sustainable manner with sufficient precautionary management arrangements measures in place where information for a particular species may be deficient. As an example the submission states that the major trigger for Review Events concerning target stocks is a significant decline in CPUE in any sector of the fishery over three consecutive years which has so far not occurred.

In determining the status of stocks, DPI&F will consider advice from GulfMAC as well as fisheries scientists as part of the assessment of the fish stocks in GOCIFF presented in the Current Condition and Recent Trends reports. The indication of overfishing is likely to come from having some performance indicator outside acceptable parameters. Other species status will be reviewed on the basis of the best available biological and catch information.

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

The fishing gear and methods used in GOCIFF are selective and there is an appropriate mix of fishery dependent and independent data collection of bycatch as part of the programs for the target species of the commercial sector and, to a lesser degree, for the recreational and Indigenous sectors.

Operators in the N9 sector are required to participate in an industry funded independent observer program. Data collected by the observers includes bycatch and discard rates, haul by haul geo-referencing and biological data. Additional data is collected through the LTMP, the TRAP phase I & II, Shark phase I & II and the Mammal bycatch reduction program. The N3 sector was covered by an observer program from 1998-2002 (TRAP phase II). A comprehensive report on the effects of netting on bycatch was completed in 2001 and the TRAP phase II was completed in 2004.

In the commercial sector operators are required to record bycatch in the compulsory logbooks in the comment section. Reporting is limited and, in the case of sharks, has suffered due to a lack of distinguishing between species. This may be helped by the preparation of shark identification keys as part of the undertakings of the National Plan of Action (NPOA)-sharks but will require a complementary education program to ensure reporting is accurate.

DEH strongly encourages ongoing bycatch monitoring in the fishery. It is also important that through a risk assessment process, those bycatch species identified as susceptible to netting be the subject of additional management measures in line with recommendation 5.

Assessment

Bycatch composition in the GOCIFF is diverse, with 81 listed species. In the N3 bycatch is dominated by Catfish (42.5%) and Bony bream (17.5%). Tuna (34.9%) and Trevally (25.6%) are the principal bycatch in N9.

The level of bycatch in this fishery is moderate (13% in N3 and an average of 16% in N9 by number) compared to the processed component of the catch. Further work on gear selectivity and deployment methods to increase the efficiency in fishing for the target species should be undertaken on an ongoing basis seeking continuous improvement. There is considerable variability in the seasonal bycatch rate, increasing in the warmer months. The four month closure to commercial netting from October to January, although not reducing bycatch take, does reduce overall impact on bycatch species.

DPI&F has developed a draft BAP which is in final draft form and is expected to be finalised by the end of 2004. The draft BAP identifies the collection of data as a priority in order to prepare a scientifically based data set for future risk assessments. The recently completed NPF risk assessment may also be useful in helping to identify similar risks in the GOCIFF.

Management response

Management measures in place such as closed areas, long seasonal closure, the selectivity of the fishing gear, net attendance rules and the moderate percentage of bycatch result in a level and

composition of bycatch that is considered to not impact significantly on the ecology of the fished environment or overall marine biodiversity.

Furthermore, industry is proactive in investigating environmentally-friendly netting techniques that include acoustic pingers, lighter lead lines, lower mesh strength and adjustable headline set depths as a means of reducing the likelihood of interaction with dugong and dolphins as well as facilitating their release if entangled. The trials on the effectiveness of acoustic pingers on reducing marine mammal interactions with nets was completed in 2004. The data were inconclusive, however observer information suggested that the lower frequency pingers were effective in reducing interactions with dugongs. Industry would like to continue the use of these pingers in their fishing operations, and if they are found to be effective, some of these measures may be incorporated in fishing regulations. Possible impact of the GOCIFF on freshwater sawfish is being studied by the Shark Phase II program, which is a study on the biology, distribution and catch rate of members of the freshwater sawfish group. This research program includes participation by net fishers in a DPI&F/National Heritage Trust funded tag and release program.

Measures for the reduction of incidental catch of sawfish, such as preventing net contacting the sea floor, are being investigated and their effectiveness as well as their incorporation into GOCIFF management will be considered by GulfMAC. Additional measures that serve to reduce bycatch include seasonal and area closures, net attendance and deployment restrictions.

The Queensland Environment Protection Agency (EPA) and local communities have identified discarded gill nets and trawl nets as a potential “ghost fishing” threat to turtles and other species. A large number of nets were found during a helicopter survey in the eastern coast of the GOC. These nets had captured and killed numerous turtles. The Gulf of Carpentaria Commercial Fishermen Association (GOCCAF) Code of Conduct prohibits the discard of nets. The Kiessling report¹ states that about 12% of discarded or lost nets are from GOC fisheries and GulfMAC is considering options to ameliorate this threat, including cleanup of beaches, identifying and targeting action of the source of the nets and instigating a public awareness and clean-up day.

The draft BAP includes a number of initiatives to reduce bycatch including consideration of closures of those areas where interaction with protected species is high; implementation and assessment of net attendance rules; restrictions on the use of offshore nets in depths lesser than the net drop; reviews of net dimensions; restrictions on set nets across waterways; declarations of protected areas; identification of areas of shark depletion to be considered for closures; identifying further means to reduce interaction with sawfish and rays; continued trials with sonic pingers and the consideration of their mandatory use if trials are positive; encouragement of compliance with commercial and recreational codes of conduct; and support for research into shark release survival. DEH will monitor with interest the implementation of these measures in the fishery.

An indicator group of bycatch species has not been identified. A summary report of TRAP Phase II program will be available in 2004 and may indicate the appropriateness of a group of species as indicators of bycatch stock levels.

An important initiative is the industry driven Environment Management System (EMS) program which was implemented in 2003. The EMS will assist in the survival of returned bycatch through education of best practice methods for handling and release.

¹ Kiessling, I. 2003. Finding Solutions, Derelict Fishing Gear and other Marine Debris in Northern Australia. National Oceans Office and Department of the Environment and Heritage.

Conclusion

DEH considers that the fishery is conducted in a manner that does not threaten bycatch species. However, should this situation change, or the risk assessment process indicate otherwise, DEH expects that DPI&F will take appropriate actions to ensure bycatch species are not threatened from this fishery.

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

Interactions with protected species by the commercial and recreational sectors in the GOCIFF are incidental. Fishers are aware that they are required to report interactions with protected species. Management responses and a code of practice have been implemented to minimise and, if possible, to avoid interactions.

Observers have been operating within the N3 on a voluntary basis from 1999 to 2002 and on a compulsory basis in N9 since 1999 and have helped to validate interaction reports. Data collected in this form is the major source of information on the levels of interaction of the commercial fishery with these species. Previously the only data collected on these species was by un-validated logbooks.

New logbooks were made available in 2002 which include fields to record accurate information on the catch of protected species. Not all protected species that may interact with nets are included in the species codes. Improvements in logbooks, identification kits and a new SOCI logbooks with an extensive species list were introduced in late 2003. Turtle and marine mammals record sheets have been circulated for use by fishers and observers in the N3 and N9 fisheries. The record sheets clearly state the legal requirements to report interactions to relevant State and Commonwealth Government agencies.

DEH welcomes the SOCI logbooks that have been developed to enable comprehensive recording of protected species across the Queensland fisheries. To accompany the introduction of the SOCI logbooks, an education program for fishers is needed to enable accurate reporting, promote appropriate handling techniques and highlight the importance of minimising interactions with protected species.

Recommendation 11. *Within 1 year, DPI&F to support the implementation of the Species of Conservation Interest logbooks, DPI&F to ensure that an education program for fishers, both recreational and commercial, is developed and implemented, to promote the importance of protected species protection and accurate incident reporting.*

Assessment

A great number of species of conservation interest either inhabit or migrate through the area of the fishery. Key species include the freshwater sawfish, whale sharks, flat back turtle, Pacific Ridley turtle, hawksbill turtle, leatherback turtle, green turtle, loggerhead turtle, dugongs, saltwater crocodiles and dolphins.

The level of interaction with protected species has been, as reported by observers, minimal during the period 2000 to 2002. Interactions with freshwater sawfish, green turtles, Irrawaddy dolphins and saltwater crocodiles were the only ones reported by observers during that period.

No reported sawfish interaction in the N9 sector has been reported while a low level incidental catch has been reported in the N3 sector with over 85% being released alive. Sawfish interaction in the N3 sector is largely during the monsoon months when rivers are in flood.

A few isolated instances of turtle entanglements with subsequent live release have been reported by observers. The Irrawaddy and bottlenose dolphins and others are known to interact with commercial fishing gear.

Based on current (N9) and past (N3) observer program reports, the level of interaction with protected species is considered minimal and/or incidental to commercial fishing activities and DEH consider that existing measures such as area seasonal closures, gear restrictions, R&D (pingers) seek to further reduce the number of interactions. However, public comments suggest that the level of interaction (especially in the N3 sector) are higher than that reported. This discrepancy needs to be investigated and the efficacy of logbook reporting validated.

Recommendation 12. *Within 18 months, DPI&F to develop a mechanism to improve knowledge of the level of interactions with protected species. If interaction “hot spots” are identified, additional mitigation measures are to be implemented.*

DEH notes that there are no threatened ecological communities listed under the EPBC Act or its amendments within the area of operation for the GOCIFF.

The closure to all net fishing during October to January mostly coincides with the monsoon season affording protection from incidental capture to protected species in the GOC. As stated above sawfish interaction is mostly during the monsoon months, however some interaction occurs before and after the closed season and this will be a consideration in the risk assessment for elasmobranchs undertaken as part of the Shark Phase II project. A “Handling and Release Procedures Document for Sawfishes” has been incorporated into the GOCCFA Code of Conduct and fishers are participating in a tag and release program endorsed by DEH, World Wide Fund for Nature, Sunfish and Ecofish.

Net attendance and restrictions on the complete blocking of river mouths are vital components of the strategy to reduce interactions and DEH therefore recommends that DPI&F conduct a compliance risk assessment to identify hot spots and compliance strategies.

Compliance efforts are hampered by the remote area in which the fishery operates. DEH believes that the fishery should include in its management regime a compliance and enforcement strategy based on a risk analysis. Compliance risks with this fishery include effort data validation, reporting of protected species interactions, non-compliance with gear restrictions, size limits and closed areas. The strategy should be subject to periodic reviews and include measurable performance criteria.

Recommendation 13. *Within three years, DPI&F to undertake an enforcement risk analysis seeking to develop and implement a strategic enforcement and compliance program which includes measurable performance criteria. DPI&F to ensure that the following issues are specifically addressed in the development of the compliance program for the fishery:*

- *Catch and effort data reliability (target species, bycatch and by-product data).*

- *Non-compliance with gear restrictions and size limits.*
- *Reporting of protected species interaction.*
- *Closed area restrictions.*

DEH notes that ghost nets also pose a threat to protected species. This issue has been addressed under Part 2, Objective 1 of the report.

Minimal interaction is reported with other species of conservation interest. Two Grey nurse sharks were reported caught and released live in the N3 fishery in 1998. GOCIFF fishers are aware of the requirements of the Grey Nurse Shark Recovery Plan. The critically endangered Speartooth shark and the Northern River Shark may occur in the GOCIFF area but no interaction has been reported as yet. This may be through the inability of fishers to identify these sharks and this is being addressed through education efforts by observers.

Management response

DPI&F and industry are proactive in reducing interactions and increase the survival of species incidentally caught in nets through the development and/or implementation of a BAP, Codes of Conduct, education programs and research. DPI&F has identified data gaps on the nature and frequency of interactions and is considering options to collect and strengthen its knowledge base in the commercial, recreational and indigenous sectors.

Interactions with protected species are managed by controls such as area and seasonal closures, net attendance rules, gear placement and training and education programs. Fishers are encouraged to complete an Endangered Species Awareness course conducted across the GOCIFF.

The use of sonic pingers is being investigated as a means of reducing interaction. Observers have reported seven saltwater crocodile entanglements resulting in 4 mortalities in the N3 sector. Mortalities are more prevalent in juvenile crocodile which become wedged in the mesh.

DPI&F supported R&D into the use of pingers to ward off cetaceans from nets, participation in Shark Phase II risk assessment, the development of codes of conduct, education programs, SOCI logbooks and the development of a BAP are all measures which will serve to continue to reduce interactions.

DPI&F has implemented management arrangements that have served to both protect fish stocks and reduce the level of interactions with protected species. Although concern regarding the level of interactions in a sector of the fishery has been raised in public comment, DPI&F has demonstrated in the past appropriate responsiveness in dealing with high interaction issues as they were identified. DEH expects that if additional interaction issues are identified, through a process such as that outlined in recommendation 12, DPI&F will respond accordingly.

The capture of four bottlenose dolphins in 2001 and one in 2002 triggered a management review leading to changes in the management of the GOCIFF and the development of the BAP.

The commercial sector of the GOCIFF has no reported interaction with Sygnathids, sea birds, sea snakes or other species of cetaceans besides dolphins. Additional measures in place to reduce interaction with SOCI include education programs, such as the Endangered Species Awareness Course, and Codes of Practice.

DEH notes and commends effort by DPI&F in training and education of stakeholders and encourages the ongoing expansion of these programs to cover all commercial, recreational and indigenous sectors.

Examples of management responses implemented by DPI&F dealing with interactions with protected species include large seagrass area closures to commercial netting stemming from the dugong recovery plan implemented in 1999. Seagrass areas serve as habitat and nursery to dugongs, turtles and fish. An extended seasonal closure aimed at protecting fish spawning stocks has also served to reduce the potential interaction with protected species in the GOC including sawfish.

Entanglement by protected species in discarded rubbish and net is progressively being addressed through fishers being encouraged to retain all rubbish on board. Closures (e.g. marine protected areas) within the fishery area also should reduce the potential for interactions with protected species. Additional measures are being developed and considered by GulfMAC.

Current management arrangements are consistent with all threat abatement plans, national plans of action and recovery plans.

Conclusion

The available information indicates there are minimal interactions with protected species in this fishery. DEH considers that 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. Should this situation change, or the risk assessment process indicate otherwise, DEH expects that DPI&F would take appropriate actions to ensure that 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 provided a number of recommendations for improvements in the longer term.

DEH notes that the management strategies to address catch of protected species include the development of a code of practice to encourage fishers to consider potential impacts on protected species. DEH supports the development of the code of practice but believes adoption and implementation of the code needs to be monitored and complemented by mandatory management measures.

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

A number of reports and research programs are underway that provide background information relating to the ecosystem in the area of operation of the GOCIFF. These include TRAP and DPI&F observer programs, the DPI&F's LTMP, seagrass surveys, mangrove and coastal wetland habitat surveys and studies on the ecological and environmental impacts of commercial gillnet fishing in tropical Queensland. These will continue to be monitored and considered in assessments related to the fishery where appropriate.

The National Oceans Office is currently leading a regional marine planning process that includes the area of the fishery. The planning process aims to ensure the ecologically sustainable use of the resources in the planning area and will help to integrate management across jurisdictions and

sectors. It will also identify potential candidate areas for the National Representative System of Marine Protected Areas. The regional marine planning process is a potential vehicle for pursuing sustainable fisheries objectives, particularly where cross sectoral or cross jurisdictional approaches are required. DEH encourages DPI&F to continue to engage in the process as far as practical. More information is available at www.oceans.gov.au. Outcomes of this process may be considered in the future assessment of the Gulf Management Plan in 2004.

Assessment

Commercial net fishing, recreational line fishing and Indigenous fishing activities are essentially passive fishing methods that can be highly species selective and have reduced effect on the ecosystem and environment generally. Gill nets are fished passively and are not dragged across the seabed and drift netting is not permitted. This precludes any substantial damage to benthic communities/structures. Although the impact on seagrass beds has not been specifically studied all major seagrass areas are closed to commercial fishing. The level of impact by nets would be further reduced if DPI&F proposed restrictions on nets coming into contact with the sea floor are implemented.

There are concerns about the sustainability of shark species across northern Australia. DPI&F recognises that the shark and grey mackerel sector of the fishery requires more information before productivity estimates can be made. DEH considers that DPI&F needs to undertake a risk assessment process that would identify the level and nature of risk from the GOCIFF on target, by-product and bycatch species. The risk assessment process should also prioritise data collection on those most at risk, followed by identification of actions aimed at reducing risks to acceptable levels. This issue is discussed under Part II, Principle 1 and addressed through recommendations 4, 5 and 6.

Fishing operations in the GOCIFF are likely to have an effect on local food chains although this is considered negligible. Research into the impact of fishing in Queensland tropical estuaries indicated that although commercial fishing reduced abundance of the target species relative to non-fished areas, the abundance levels of prey and competing predators species did not change significantly. DPI&F recognises that further research is needed to determine whether this finding can be applied to the GOCIFF.

Ghost fishing from discarded nets is having an adverse impact on turtles and actions have been proposed to reduce the level of discarded/lost nets.

Management response

There are no specific measures within the Gulf Management Plan relating to ecosystem impacts beyond the objective of providing a sustainable fishery and minimising unintended adverse effects on protected wildlife. The plan is to be reviewed in 2004 and it is a timely opportunity to consider actions with measurable performance criteria that address potential impacts on the ecosystem.

DPI&F has implemented a range of management measures that minimise the risk of significant impact of fishing on ecosystems and their components. Most management measures were established to protect target species and their habitats, although some actions are specifically designed to protect the broader environment. Further work to improve management of ecosystem impacts is also proposed.

As discussed under Principle 1 of this report, reductions in effort, in the form of closed seasons and areas and a reduction in number of boats, have been imposed in the fishery in recent years. These reductions, while mostly protecting Barramundi stocks, have resulted in a reduction in the amount of bycatch and discards and reduction in the impact of fishing on benthic communities.

Impacts on water quality through the discharge of plastic wastes and pollution from vessels are controlled under MARPOL 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.

The GOCIFF industry and DPI&F have a history of addressing sustainability and impact issues in the fishery. Their record of incorporating research results into management is excellent. DEH is confident that the fishery will continue to be managed in a manner that aims to minimise ecosystem and broader environmental impacts.

Conclusion

DEH considers that the fishery is conducted in a manner that minimises the impact of fishing operations on the ecosystem generally. Recommendations have been developed to ensure that the risk of significant impact by the fishery on the marine environment generally is minimised in the longer term.

LIST OF ACRONYMS

AFMA	Australian Fisheries Management Authority
AFMF	Australian Fisheries Managers Forum
BAP	Bycatch Action Plan
CFISH	Commercial Fishery Information System
CPUE	Catch Per Unit Effort
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEH	Department of the Environment and Heritage
DPI&F	Department of Primary Industries and Fisheries
EMS	Environmental Monitoring System
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FRDC	Fisheries Research and Development Corporation
GOC	Gulf of Carpentaria
GOCIFF	Gulf of Carpentaria Inshore Finfish Fishery
GOCIFA	Gulf of Carpentaria Commercial Fishermen Association
GOCLF	Gulf of Carpentaria Line Fishery
GulfMAC	Gulf of Carpentaria Management Advisory Committee
LTMP	Long Term Monitoring Program
MARPOL	International Convention on Marine Pollution
NPF	Northern Prawn Fishery
NPOA	National Plan of Action
NRIFS	National Recreational and Indigenous Fishing Survey
NTF	Northern Territory Fisheries
OCS	Offshore Constitutional Settlement
R&D	Research and Development
RFISH	Recreational Fishery Information System
SOCI	Species of Conservation Interest
TRAP	Tropical Resource Assessment program
VMS	Vessel Monitoring System
WTO	Wildlife Trade operation