



Australian Government

Department of the Environment and Heritage

**Assessment of the
Northern Territory Demersal Fishery**

Approvals and Wildlife Division

April 2004

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

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Assessment of the ecological sustainability of management arrangements for the Northern Territory Demersal Fishery

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EXECUTIVE SUMMARY

Background

The Northern Territory (NT) Fisheries, Department of Business, Industry and Resource Development (DBIRD), 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 *Assessing the ecological sustainability of the Northern Territory Demersal fishery* (the submission) was received by the Department of the Environment and Heritage (DEH) in September 2003 after a period of discussion between NT Fisheries and DEH, during which preliminary drafts were refined. The submission was released for a 20 business day public comment period that expired on 24 October 2003. Two public comments were received. NT Fisheries provided a response to the issues raised. No changes were made to the submission as a result of public comment.

The submission reports on the Northern Territory Demersal Fishery against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. The DEH assessment considers the submission and associated documents, public comments and NT Fisheries response to the comments.

Table 1: Summary of the Northern Territory Demersal Fishery

Area	Waters 15 nautical miles from the NT coast to the outer limit of the Australian Fishing Zone (AFZ), excluding the Timor Reef Fishery area (<5% of area currently fished). ¹
Fishery status	Underfished
Target Species	Goldband Snapper (62%), Red Snapper (19%), Red Emperor (7%), cod species (4%)
Byproduct Species	7% of commercial catch No take exclusions apply to barramundi, threadfin salmon, Spanish mackerel, shark, mudcrab.
Gear	Droplines – multiple droplines with 30-40 hooks Traps – baited traps set on suitable substrate
Bait	Generally pilchards for trapping and squid for droplining
Season	Year round
Commercial harvest 2002	120 tonnes
Value of commercial harvest 2001/02	\$0.95 million
Effort (boat days)	475 in 2001, 417 in 2002.
Recreational/FTO harvest	Negligible
Commercial licences issued	60 transferable licences (10 active in 2002)
Management arrangements	Input controlled through: limited entry, gear restrictions, fishing area restrictions (see table 2) coupled with precautionary trigger reference points (see table 3)
Export	Majority transported as whole fish to Sydney and Brisbane markets.
Bycatch	<1% of onboard observer data
Interaction with Threatened Species	No interactions reported

¹ See s104 of the *Fisheries Regulations* for a complete description of the area of fishery

The Demersal Fishery is a multi-species dropline and trap fishery operating in waters 15 nautical miles from the coast (roughly equates to the 30 m depth contour) to the outer limit of the AFZ. Only a relatively small portion of the area (<5%) is currently fished due to the added cost of exploring grounds and fishing further away from the port of Darwin. The majority of fishing effort within the Demersal Fishery grounds is along the eastern boundary of the Timor Reef Fishery, at depths of between 80 and 100 metres in areas with similar bottom types to those found in the Timor Reef Fishery. The Timor Reef Fishery area does not form part of the Demersal Fishery. Timor Reef fishers are required to hold a Demersal Fishery license but mostly choose to operate in the more profitable Timor Reef Fishery.

In addition to the Demersal Fishery, a single finfish trawl operator (finfish trawl fishery) also harvests demersal fisheries resources from the Arafura Sea and the Gulf of Carpentaria. Although the target and byproduct species may vary, both fisheries (demersal and finfish trawl) fish in the Arafura Sea, potentially from the same stock. The Finfish Trawl Fishery is the subject of a separate assessment. NT Fisheries has developed complementary management arrangements for the Demersal and Finfish Trawl fisheries to ensure the sustainability of demersal finfish species of the Arafura Sea and Gulf of Carpentaria. NT Fisheries advise that Juvenile Red Snapper are a negligible bycatch of the Northern Prawn Fishery,² however an estimate of the take is factored into stock assessments.

Historically red snappers (mainly *Lutjanus malabaricus*) dominated catches in the Arafura Sea. Currently, the majority of fishers target Goldband Snappers (*Pristipomoides* spp with *P. multidentis* and *P. typus* comprising 99% of Goldband catches)³, which make up 62% of the total annual catch. Other major target groups are the Red Snappers (*L. malabaricus* and *L. erythropterus*-19% of annual catch),⁴ Red Emperor (*L. sebae*-7%) and cod (Family Serranidae-4%). The remainder of the catch is byproduct (7%) and bycatch species (less than 1%). The catch is kept on ice and the majority transported as whole fish to Sydney and Brisbane markets. Increasingly, operators are developing marketing arrangements outside the wholesale central interstate marketing systems.

Goldband Snapper grow to around 30 cm, are long lived (approximately 30 years), have low rates of natural mortality (Newman *et al* 2001), are serial spawners but show peak spawning activity between November and January, and feed on a range of vertebrates and invertebrates.

Red Snapper also grow to around 30 cm, live for between 20 and 32 years, are serial spawners but show peak spawning activity between November and March, and feed on a range of vertebrates and invertebrates.

Japanese stern trawlers operated in the Timor and Arafura seas in the 1950s, while Thai and Taiwanese pair trawlers operated in the 1970s. Catch peaked at 10,000 tonnes in 1983, and in 1991 access arrangements for foreign trawl fleets ceased following concern over the possible over fishing of snapper stocks. In 1993, 75 licences were issued for the demersal fishery, of which 60 remain. In 2002 only 10 licences were active. The number of active licences varies from year to year, depending upon the number of new operators from local and interstate fisheries entering the fishery, as well as product value.

The fishery currently targets Goldband and Red Snapper using droplines and baited traps (maximum limit of 45 traps per licence). Droplines are normally baited with 30-40 hooks and are left in the water for up to 15 minutes before being hauled back aboard. Those fishers using baited traps usually set 30 to 40 traps which are left in the water for two to six hours depending on catch

² Kailola *et al* at p 302.

³ Use of the term Goldband Snapper in this report will relates to the species indicated.

⁴ Use of the term Red Snapper in this report will relates to the species indicated.

rates before being hauled aboard. In 2002 only trapping was used. Fishing trips generally last for 5 or 10 days depending on the distance to the fishing grounds, catch rates, and market prices.

The main management responses for the fishery include limited entry to 60 transferable licences, no take rules for barramundi, threadfin salmon, Spanish Mackerel, shark and mudcrab, restricting fishing to within the fishing area, and gear restrictions.

Bycatch in the NT Demersal fishery is estimated as less than 1% of the commercial catch. There are no reported interactions with protected species.

Fishing Tour Operators (FTOs) occasionally operate in the Demersal fishing area, and are required to provide logbook data on demersal snapper species landed. FTOs account for a very low level of catch. The 1995 recreational fishing survey and the 2000 National Recreational and Indigenous Fishing Survey (NRIFS) indicate the recreational catch levels in the fishery are low.

Under the Offshore Constitutional Settlement (OCS) agreements, responsibility for management of the Demersal Fishery passed to the Northern Territory in 1988. As a result of a revised OCS agreement in February 1995, management responsibility for the Demersal Fishery was passed from the NT to the Northern Territory Fisheries Joint Authority (NTFJA).⁵ The NTFJA provides for the Commonwealth and the Northern Territory to jointly manage the fishery, given the likelihood of shared resources with adjacent national and international jurisdictions. NT Fisheries, on behalf of the NTFJA, undertakes the day-to-day management of the fishery. Management of the recreational component of all fisheries resides with NT Fisheries. The management regime for the Demersal Fishery is documented in Part 8, Division 6 of the *Fisheries Regulations* under the *NT Fisheries Act 1988*. The Demersal Fishery Management Advisory Committee (DFMAC) formally represents the interests of stakeholders.

Overall assessment

The material submitted by NT Fisheries indicates that the fishery operates in accordance with the Australian Government *Guidelines for the ecologically sustainable management of fisheries*. DEH considers that the NT Demersal Fishery is a well-managed fishery that is unlikely to have an unacceptable or unsustainable impact on the environment in the short to mid term. Recommendations have been developed to ensure that the risk of impact is minimised in the longer term. Overall, the sophisticated management regime of a limited number of operators (and current small number of active operators), input controls and specific management objectives, performance indicators and triggers suggests that the fishery is being managed in an ecologically sustainable way.

In making this assessment, DEH considers that the information collection system, proposed risk assessments, management arrangements and objectives are sufficient to ensure that the fishery is conducted in a manner that does not lead to overfishing. Considering the research programs and management arrangements in place and the particular selective and benign characteristics of the fishery operations, DEH considers that fishing operations are managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem. Management of this fishery has a history of reacting appropriately to threats to sustainability and DEH is confident that NT Fisheries will continue to provide this high quality management.

The assessment finds that the fishery is managed in an ecologically sustainable way and its operation is consistent with the objects of Part 13A of the EPBC Act. DEH recommends that the

⁵ Jurisdictional arrangements for the NTFJA can be found in "The arrangement between the Commonwealth of Australia and the Northern Territory" published in the Australian Government Gazette of 1 February 1995 and the NT Gazette of 1 February 1995 (No. S7).

export of species taken in the fishery should be exempt from the export controls of Part 13A of the EPBC Act, with that exemption to be reviewed in five years. DEH considers that the fishery, as managed in accordance with the management regime is not likely to cause serious or irreversible ecological damage over this period.

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.

A number of protected species occur in the fishery area including green, hawksbill and loggerhead turtles.⁶ The fishery has no recorded interaction with any protected species groups. 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 management regime for the NT Demersal Fishery be declared an accredited management regime under Sections 208A, 222A, 245 and 265 of the EPBC Act. In making this judgement, DEH considers that the fishery to which the regime 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 regime requires that all reasonable steps are taken to avoid the killing or injuring of protected species and the level of interaction under current fishing operations is currently nil. On this basis, DEH considers that an action taken by an individual fisher, acting in accordance with the regime, would not be expected to have a significant impact on a listed threatened species or listed migratory species protected by the EPBC Act.

To further strengthen the effectiveness of the management arrangements for the NT Demersal Fishery, and to contain the environmental risks in the medium to long term, DEH has developed a series of recommendations. The implementation of these recommendations and other commitments made by NT Fisheries in the submission will be monitored and reviewed as part of the next DEH review of the fishery in five years time.

Recommendations

Recommendation 1: *NT Fisheries to inform the Department of the Environment and Heritage of any changes to the management regime that may impact on the ecological sustainability of the NT Demersal Fishery.*

Recommendation 2: *NT Fisheries to move towards analysing effort using a more accurate measure of effort in the fishery than days fished.*

Recommendation 3: *NT Fisheries to undertake a risk assessment of the species making up the groupings of Red Snapper, Goldband Snapper and Cod in order to establish greater confidence that there are no individual species that are particularly vulnerable or susceptible to fishing and may require additional management responses. In the event that a species is found to be particularly vulnerable NT Fisheries to implement appropriate management responses within 12 months.*

Recommendation 4: *NT Fisheries to maintain data validation mechanisms for target, byproduct, bycatch and protected species interactions and implement alternative data collection validation*

⁶ Sourced from Environment Protection and Biodiversity Conservation Act protected matters search tool accessed on 11/11/03

techniques if observer trips are no longer feasible or are insufficient to provide robust information on the fishery.

Recommendation 5: *NT Fisheries to continue to seek alternative cost effective fishery independent sampling techniques and report outcomes in annual status report.*

Recommendation 6: *NT Fisheries to continue to work towards more refined yield estimates of principle target species to determine sustainable harvest levels, particularly for Goldband Snapper. By 2006 NT Fisheries to implement an interim precautionary trigger reference point for Goldband Snapper.*

Recommendation 7: *NT Fisheries to determine spatial distribution of effort and catch in the fishery and investigate the risk of localised depletions by 2006. In the event that significant risks are identified, NT Fisheries to implement appropriate mitigation measures in a timely manner.*

Recommendation 8: *NT Fisheries to continue to cooperate with other relevant jurisdictions to pursue complementary management and research of shared stocks for all target and by-product species, that may be affected by cross-jurisdictional issues.*

Recommendation 9: *NT Fisheries to monitor the species composition of bycatch and byproduct with a view to undertaking a more rigorous risk analysis, if there is a significant increase in the catch of individual species.*

Recommendation 10: *NT Fisheries to continue to monitor the proportion of juvenile/adult snapper landed and implement appropriate management strategies, such as temporal/spatial restrictions, as appropriate.*

PART I - MANAGEMENT ARRANGEMENTS

NT Fisheries, Department of Business, Industry and Resource Development (DBIRD), on behalf of the NTFJA, undertake the day-to-day management of the Timor Reef Fishery (TRF). DEH considers that the management regime is adequately documented, publicly available and transparent. Currently there is no fishery management plan for the Demersal Fishery. The management regime for the Demersal Fishery is documented in Part 8, Division 6 of the Fisheries Regulations as a component of the *NT Fisheries Act 1988*. Both are freely available from DBIRD or from the NT Government website.⁷ Additionally, any discussion papers or proposed amendments to the fishery management arrangements are distributed widely to stakeholder groups and other interested individuals to ensure that management advice is transparent and that the community is fully informed about the current and predicted future status of the resource.

All commercial fishers are briefed on the regulations and licence conditions via a compulsory interview with the Aquatic Resource Manager responsible for the fishery prior to operating in the fishery.

An annual status report is published and distributed to stakeholder groups to ensure that management advice is transparent and that the community is fully informed about the current and predicted future status of the resource.⁸ The report includes information on catch, fishery status, sustainable yield estimates, management and research. NT Fisheries advises that as of 2004, the annual status report will report on management objectives, performance indicators and triggers and how the fishery is performing against these criteria. DEH strongly supports this move.

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 our assessment. Hence DEH requests that NT Fisheries advise of any changes to the management regime that may impact on the sustainability of the Demersal Fishery.

Recommendation 1: *NT Fisheries to inform the Department of the Environment and Heritage of any changes to the management regime that may impact on the ecological sustainability of the NT Demersal Fishery.*

The management regime for the fishery was developed through a consultation process involving adequate stakeholder representation. A Demersal Fishery Management Advisory Committee (DFMAC), made up of industry, a researcher and government representatives, provides a forum for any proposed amendments to the management regime.⁹

Conservation groups and non-government organisations are advised and consulted on topical fisheries issues, including the Demersal Fishery, through monthly advisory meetings with senior fisheries officers and the Executive Director of NT Fisheries. Conservation groups support the consultation process, particularly given their current level of resources. Members of the public, including community and environmental/conservation groups are also invited to provide their views to NT Fisheries through the release of public discussion papers and other consultative processes. The low levels of participation in the Demersal Fishery allow all stakeholders to be directly involved in discussions on any proposed management arrangements. Public comments did not identify any concerns with the current MAC structure.

⁷ www.fisheries.nt.gov.au

⁸ The annual report is available from the NT Fisheries or online from: www.fisheries.nt.gov.au.

⁹ *NT Fisheries Act 1988* s 24.

In recognising the specific cultural needs of indigenous stakeholders, a separate consultative process has been established by NT Fisheries for considering fishery related issues. Given the offshore nature of the Demersal Fishery there has been no interaction with Aboriginal stakeholders.

The Aquatic Resource User Group Forum provides a structured process for key user groups to discuss cross-sectorial fisheries resource allocation issues. The Forum members are at the Chief Executive or senior level of their respective organisations and include 2 representatives from NT Fisheries, 3 representatives of the Northern Land Council (NLC), 1 representative of the Tiwi Land Council, 1 representative of the Anindilyakwa Land Council, 3 representatives of the Amateur Fisherman's Association of the NT (AFANT) and 3 representatives of the Northern Territory Seafood Council (NTSC).

The stock assessment process involves specialised scientists, NGOs and DFMAC members. 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.

The management of the fishery is strategic, containing objectives, performance indicators, target reference points and management responses, with linked timeframes, for target species, byproduct and bycatch species, protected species and the general ecosystem (Table 3; also see Table 3 in the NT submission).

The *Northern Territory Fisheries Act 1988* provides overarching objectives for management of fish and aquatic life resources of the Territory, including the Demersal Fishery. These include:

- Ensuring that the fisheries of the Territory are not endangered or over exploited; and
- Ensuring that the habitat of fish or aquatic life and the general environment is not detrimentally affected.

NT Fisheries advises that these overarching objectives are strategically assessed through the annual Northern Australian Fisheries Management Workshop (NAFMW), which includes State, Territory and Commonwealth Fisheries managers, researchers, and compliance staff, as well as representatives from Indonesia and East Timor.

Specific management objectives for the Demersal Fishery are to ensure the ecological sustainability of target, byproduct, and bycatch species and minimal impact to threatened species and the marine environment (see Table 3 of the NT submission). The objectives aim to ensure that overall landings of target species do not exceed annual estimates of yield. The trigger reference points for these objectives are based on upper and lower catch limits. The associated management responses include a review of the fishery by stakeholders should a trigger reference point be exceeded, and any amended management arrangements to be implemented within 12 months of the trigger being exceeded. An assessment of the effectiveness of these measures is included in Part Two of this report.

Harvest levels in the fishery are controlled using input controls, namely limited entry (60 licences) and fishing gear restrictions (drop lines and traps) (see Table 2). There is currently no limit on the number of vertical or drop lines that may be used. Only one or two vessels are currently using vertical lines. NT Fisheries advised that a review of the levels of permitted gear (hand and drop lines) was undertaken during 2003 and it was considered that no changes were necessary as the fishery is a developing fishery. DEH generally concurs with these harvest controls in the short to mid term while sustainable yield estimates are refined.

Table 2: Input controls used in the Demersal Fishery

Control	Description
Limited entry	A limit of 60 transferable licences.
Catch restrictions	The holder of a Demersal Fishery licence shall not take barramundi, threadfin salmon, Spanish mackerel, shark or mudcrab under the licence.
Area restrictions	Restricted to waters seaward of 15 NM from the low water mark to the outer limit of the AFZ. The Timor Reef fishery is excluded.
Gear limitations	A Demersal Fishery licensee may use vertical lines (no more than 5 hooks), drop lines (between 6-40 hooks – not limited) and fish traps (maximum limit of 45 traps per licence). Scoop nets, cast nets and gaffs can be used to land catches.

Concern was raised during public comment that actual effort in the fishery in terms of trap lifts is not recorded. NT Fisheries advises that for the purposes of the Demersal Fishery, with current low levels of effort fishing, effort by days is the most appropriate measure. The logbooks currently require recording of effort in more detail than just number of days, for example number of traps and number of hauls and number of hooks deployed and soak time. DEH suggest that as more of the licences become active in the fishery that NT Fisheries will move towards assessing effort using this more detailed information.

Recommendation 2: *NT Fisheries to move towards analysing effort using a more accurate measure of effort in the fishery than days fished.*

In addition to input controls, a range of trigger values has been set which trigger a review of the fishery (see summary in Table 3; see Table 3 of the NT Submission for full information of objectives, performance indicators, trigger reference point and management responses to be taken). Currently catches in the fishery are significantly lower than the sustainable yield estimates. NT Fisheries are committed to formalising guidelines for a review of the fisheries management arrangements once reference points and triggers are reached, by December 2004. DEH considers that a clear, timely and documented management response is required to any trigger breach and supports the development of these guidelines. These management measures are discussed in more detail under Objective One. DEH considers that these management controls should be capable of controlling the level of harvest in the fishery in the short to mid term.

Compliance with management arrangements is enforced by the Police, Fisheries and Marine Enforcement Unit of the NT Police and Fire and Emergency Services (PFMEU). Monitoring of vessels takes place through the single port of Darwin, and includes the verification of catch returns against processor returns and the ability to investigate the records of wholesalers and licensees. NT Fisheries advise that the compliance rate is high. NT Fisheries has committed to undertake a compliance risk assessment of the Demersal Fishery by December 2004. Outcomes of the assessment will be incorporated into the management arrangements and compliance activities for the fishery. DEH considers that these compliance measures contain the means of enforcing critical aspects of the management arrangements for the fishery and that a risk assessment of the compliance regime is being undertaken.

NT Fisheries conduct periodic (at least every three years to date) stock assessment workshops consisting of public forums in which stakeholders and the wider community are able to participate. Outcomes from the workshops are widely publicised through technical reports, annual status reports and the annual report of the NTFJA. The overarching strategic management direction of the fishery is reviewed and assessed at the annual NAFMW.

Table 3: Summary of the Northern Territory Demersal Fishery trigger reference points

Species/Group	Trigger Reference Point	Current levels
Red Snapper	Combined demersal and finfish trawl catch levels increase to 2500 t over the next calendar year. Catch levels decline by 30% over the next calendar year.	723 t
Goldband Snapper	Triggers to be implemented into management arrangements when sustainable yield estimates are developed.	
Red Emperor	Proportion of catch of these species increases greater than 15% of total catch over the next calendar year. Catch levels decline by 30% over the next calendar year.	7%
Cods		4%
Byproduct Species	Catch increases in proportion of the total catch by greater than 10% over the next calendar year.	7%
Bycatch species	Total bycatch within the demersal fishery increases to 10% of total catch in successive calendar years or a decline in a species relative numbers without a corresponding change in fishing area or fishing technique.	<1%
Endangered threatened or protected species and/or communities	Identifiable impacts observed by commercial fishers, fisheries observers or other agencies regarding EPBC listed species or communities.	
Ecosystem components	Identification of significant negative interaction with components of the natural ecosystem present on demersal fishing grounds.	

Fishery-dependent data relating to the target species is collected on a regular basis in the fishery. Some fishery independent information has historically also been collected. Discussion of the information collection system can be found in Part Two of this report.

Due to the low number of participants in the fishery, and the large area in which they operate, independent monitoring of the fishery and its impacts on the wider marine ecosystem is not carried out in the Demersal Fishery. Onboard observers carry out monitoring of the adjacent Timor Reef fishery, which targets the same species, uses the same fishing techniques and is fished by the same license holders. NT Fisheries advise that the similarities of the two fisheries' ecosystems means that any adverse impacts from fishing detected in the Timor Reef fishery will be investigated further in the Demersal Fishery. DEH strongly supports a thorough investigation of the impacts. An analysis of the fishery's capacity for assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which the target species lives and the fishery operates is investigated further under Principle Two of this report.

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. NT Fisheries advises that if a threat abatement plan does become relevant, NT Fisheries will ensure that its recommendations are incorporated into management arrangements.

The current low level of bycatch (1% of total catch) in the Demersal Fishery, and the legislative provisions in place for the review of fishing management should the level of bycatch reach 10% of the catch, mean that a bycatch action strategy is not needed.

Ideally, management arrangements for fisheries affecting a single stock should be under a single jurisdiction or at least be complementary. If this is not achievable, management arrangements should, as a minimum, take into account the harvest and management regimes in other jurisdictions fishing the same population, particularly when assessing stock status and availability for harvest. NT Fisheries has developed complementary management arrangements for the Demersal and Finfish Trawl fisheries to ensure the sustainability of demersal finfish species of the Arafura Sea and Gulf of Carpentaria. The target species in the Demersal Fishery (ie red snappers) are not targeted in the NT Coastal Line fishery. The Coastal Line Fishery operates in waters within 3nm offshore targeting jewfish and golden snapper. Some byproduct species of Lutjanids are potentially shared but scientific evidence suggests that these species are relatively sedentary (Newman 2001) and therefore in real terms unlikely to be shared or impacted by the Finfish Trawl and Demersal fisheries. DEH considers that the management regime for the Demersal Fishery provides effective mechanisms to ensure that arrangements in adjacent fisheries jurisdictions are taken into account.

An analysis of the fishery's capacity for assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which the target species lives and the fishery operates is contained under Principle Two of this report.

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 (UNCLOS). The management regime essentially complies with this. Other international regimes are applicable to fisheries management but do not explicitly involve this fishery, for example the 1992 Convention on Biological Diversity and in particular the 1995 Jakarta Mandate requiring that, in relation to the sustainable use of marine and coastal biological diversity, the precautionary principle should apply in efforts to address threats to biodiversity. While these agreements are not specifically addressed in the Submission, the fishery's compliance with their requirements can be assessed by examination of Part Two of this report. The application of the International Convention for the Prevention of Pollution from Ships (MARPOL) 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 the NT Demersal Fishery 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 and performance criteria by which the effectiveness of the management arrangements can be measured, enforced and reviewed.

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

License holders in the commercial Demersal Fishery are required by legislation to comply with reporting requirements, which include returning daily logbook data and market information to NT Fisheries for catch validation and stock assessment purposes. The logbooks, recorded daily and submitted monthly, contain data on fishing method, catch (individual numbers of fish with combined weight), effort (number of shots and fishing time), depth fished and fishing location. Logbook data has been collected from the Arafura and Timor seas since 1979 and from the demersal fishery since 1995. Market information includes point of sale, level of processing undertaken, and the combined weight of individual species sold. The two reporting systems are available to cross-check the accuracy of catch data, and to identify any discrepancies between the two. NT Fisheries advises that the low risk and lack of incentive for the operator to record anything other than the actual catch and actual market sale has prevented the need to check logbook returns against market returns although resources can be targeted to the task if deemed necessary. NT Fisheries has committed to continue to refine the logbook data entry process together with the validation of market returns. DEH considers that data verification in this fishery is particularly important given the small number of operators and hence the possibility of a correspondingly large contribution of information error by each operator. The NT submission asserts that the level and reliability of the information collected via the logbook program is appropriate given the size and extent of the fishery. DEH agrees that the fishery dependent data collection is appropriate to the scale of the fishery.

From July 2003, all NT Fisheries logbooks, including those used in the demersal fishery, have contained information on Commonwealth legislative reporting requirements for any interactions with protected species in Commonwealth waters.

Concern was raised during public comment regarding the combining of red snapper species, Goldband Snapper species and cod species for stock assessment purposes and the risk that some species in these groupings may be more vulnerable or susceptible to fishing pressure. DEH suggests that a risk assessment be undertaken of the species in these groupings to determine if there are any variations in fishing susceptibility and vulnerability of the individual species in the groupings.

Recommendation 3: *NT Fisheries to undertake a risk assessment of the species making up the groupings of Red Snapper, Goldband Snapper and Cod in order to establish greater confidence that there are no individual species that are particularly vulnerable or susceptible to fishing and may*

require additional management responses. In the event that a species is found to be particularly vulnerable NT Fisheries to implement appropriate management responses within 12 months.

The Demersal Fishery is monitored indirectly through the Timor Reef Fishery, which due to similar fishing techniques, catch composition and operators, acts as an indicator of the health of the demersal fishery. Onboard observers in the Timor Reef fishery report on vessel and gear information, location and depth fished, and catch composition. Additionally, catch returns are validated and the manner in which commercial fishers complete returns is audited. Fish sampling by observers provides data for genetic analysis, breeding studies, and determining the age and size of the catch. Observer monitoring has occurred 2 to 3 times a year since 1989. The NT submission provides no clear information on monitoring rates, proportion of catch monitored and statistical reliability of the information obtained under the observer program. Observer coverage should be designed so that it is distributed across the span of the fishery such that it can detect seasonal events.

Within the Timor Reef Fishery, NT Fisheries has committed to include yearly results of observer surveys (including information on target species, bycatch and protected species interactions) in the annual status report as of 2003 and implement alternative data collection validation techniques if observer trips are no longer feasible or are insufficient to provide robust information on the fishery.¹⁰

Observer data collected in the Timor Reef fishery will continue to be used as an indicator for operations in the Demersal Fishery until the size and value of the Demersal Fishery increases or a management trigger point is reached. NT Fisheries advises that should the fishing effort (days fished) within the Demersal Fishery increase by a further 40 % during the next two calendar years (average around 450 days (01-2) so increase of approx 180 days), fisheries observers will then undertake onboard monitoring of the Demersal Fishery, provided that funding and resources are available. NT Fisheries advise that the fisheries observers will record all species landed including bycatch species. It is not clear what the extent of the observer coverage is to be undertaken. Given that the majority of the current effort in the Demersal Fishery is located along the eastern border of the Timor Reef Fishery, DEH considers that the strategy of using Timor Reef observer information for management purposes is satisfactory in the short term. However, given the key objectives for industry and government are to encourage further development of the fishery and to encourage operators to undertake fishing throughout the entire fishery area, as well as increased marketing opportunities, DEH envisages that this trigger will be met rapidly. DEH supports an observer coverage design that is distributed across the span of the fishery such that it can detect seasonal events. DEH supports the development and implementation of an alternative mechanism for data collection if observer trips are no longer feasible or are insufficient to provide robust information on the fishery.

Recommendation 4: *NT Fisheries to maintain data validation mechanisms for target, byproduct, bycatch and protected species interactions and implement alternative data collection validation techniques if observer trips are no longer feasible or are insufficient to provide robust information on the fishery.*

Fishery Independent

Historically key fishery independent research included:

- Independent random trawl surveys were used to assess the size of the groundfish stocks in the Australian sectors of the Timor and Arafura Sea. The surveys, in 1990 and 1992 provided fishery independent data to determine the spatial structure of the snapper stock and make predictions regarding the sustainable yields in the areas surveyed (Ramm 1994).

¹⁰ see NT Fisheries Timor Reef Fishery Submission

- In 1995 (Ramm *et al* 1997c) and 1996 (Mounsey *et al* 1998) the Demersal fishing grounds were surveyed using passive drop lines and traps to evaluate the commercial viability of the grounds and the efficiency of passive fishing methods, and to collect and analyse data for future use in managing the stock.

Fishery independent research has been undertaken on juvenile red snapper habitats and genetic composition (ACIAR project 97/165). The aim of the project was to identify the location of nursery areas and whether there is a specific red snapper habitat. Juvenile *L. erythropterus* habitats were identified in two sites near Darwin in depths between 4 – 7 m with bottom types of coral rubble, rock, sponges or gorgonians (Anon 2003b). DEH strongly encourages further research, and appropriate management responses, on the location of spawning and nursery grounds.

There is currently no commitment to ongoing fishery independent monitoring in the Demersal Fishery. DEH acknowledges that fishery independent data collection is cost prohibitive at this stage and that NT have committed to continue to seek alternative cost effective methods and will report on progress through the annual Status Report.

Recommendation 5: *NT Fisheries to continue to seek alternative cost effective fishery independent sampling techniques and report outcomes in annual status report.*

The spatial distribution of snapper stocks is currently being investigated in a project funded by the Fisheries Research and Development Corporation (FRDC) and the Australian Centre for International Agricultural Research (ACIAR).

NT Fisheries reviewed the strategic research needs in 2002 for all NT fisheries, including the Demersal Fishery, and developed the *Northern Territory Strategic Plan for Fisheries Research and Development 2002 to 2006*.

DEH considers that this information system is reliable, appropriate to the scale of the fishery. DEH has concerns with the lack of ongoing commitment to fishery independent data collection.

Assessment

Assessment and review of the Demersal Fishery is undertaken via the production of annual status reports and through stock assessment workshops. An annual review of the fishery in the fishery status reports provides information on catch and effort, stakeholder participation, research, compliance and management issues. NT Fisheries advises that future status reports will include information of the Demersal Fishery's performance against performance indicators and trigger points.

The Demersal Fishery is reviewed periodically by regular assessment workshops conducted by stock assessment scientists, local and interstate fisheries managers and researchers, industry representatives, representatives from non-government organisations and interested members of the general public. The workshops aim to:

- Re-assess major fisheries in the NT
- Advise the NT Government on the biological status of managed fisheries, any changes required in their management and any necessary changes to future research programs
- Provide comment on stock assessment and management strategies
- Provide NT fisheries scientists and managers with training in recent stock analysis and resource management methodologies
- Include industry and interested parties in the discussion of workshop results and contribute to the workshop findings (Ramm 1997b).

Joint Assessment Workshops between Indonesia and Australia commenced in 1992 in recognition of the need for complementary management of shared demersal snapper stocks. These workshops examined aspects of the fisheries' social, economic and environmental sustainability and management and research needs.

Assessment workshops have been held annually since 1999 within the current ACIAR project (FIS/97/165) focusing on developing assessment results as project information becomes available. Objectives of the 2003 workshop were to:

- Review the data and information available to the project;
- Review and update the stock assessments and socio-economic analyses; and
- Provide management recommendations for snapper fisheries in the Timor and Arafura Seas.

NT Fisheries advises that the most recent stock assessment workshop endorsed the management arrangements of the Demersal Fishery and provides confidence that the fishery is operating well below sustainable yield estimates.

Research has determined, within reasonable confidence limits, the potential productivity of Red Snapper stocks in the Arafura Sea as being 1500 t – 2500 t (Ramm 1997b). The trigger reference point is set at 2500 tonnes of combined Demersal and Finfish Trawl catch. The current combined annual harvest for both fisheries is 723 tonnes. The precautionary sustainable yield estimate is only for the Arafura Sea and does not consider the Gulf of Carpentaria and sections of the Timor Sea. Additionally, a trigger is set if catch levels of red snapper decline by 30% over the next calendar year. NT Fisheries advises that it will continue to use the Arafura sea estimates only until the results from the next stock assessment become available.

Goldband Snapper is not as well researched and low levels of confidence surround the potential productivity estimates. NT Fisheries advises that Goldband Snapper estimates will only be able to be refined when more fishers become active in the fishery and associated logbook data becomes available. Given that Goldband Snapper make up 62% of the current catch DEH strongly supports the development of precautionary trigger points based on sustainable yield estimates for Goldband Snapper grouping and suggests that an interim precautionary trigger reference point for Goldband Snapper be set in the interim.

Recommendation 6: *NT Fisheries to continue to work towards more refined yield estimates of principle target species to determine sustainable harvest levels, particularly for Goldband Snapper. By 2006 NT Fisheries to implement an interim precautionary trigger reference point for Goldband Snapper.*

The trigger reference point for Red Emperor and Cod is that the individual proportion of catch of these species increases greater than 15% of total catch over the next calendar year. Additionally, a trigger is set if individual catch levels of Red Emperor and Cod decline by 30% over the next calendar year.

Overall DEH considers that there are sound estimates of the potential productivity for Red Snapper, and for the other species (other than Goldband Snapper) where there is limited information precautionary reference points have been set.

Current management arrangements and existing fishery boundaries are derived from logbook and trawl survey data, which provided information to determine the spatial distribution and stock densities of tropical snapper in fishery.

Currently less than 5% of the demersal fishery area is used by licence holders. The sole landing point of Darwin port means that operators are concentrating fishing effort in localised areas. This could have impacts on the sustainability of the stocks in localised areas, especially if more licences are activated in the future. NT Fisheries advises that current logbook data provides spatial information on fishing effort and catch rates to a very fine resolution (GPS location) and that the current low levels of effort in the fishery prevent the likelihood of localised depletion. Nonetheless, NT Fisheries is seeking funding to use time series data, to examine the spatial distribution of fishing effort using Geographical Information System (GIS). The development of a GIS will increase the ability to incorporate and analyse complex environmental data, data from varied sources and the spatial aspects of fish distribution. The study will provide the spatial statistics for analysis of fisheries data to refine trigger points, which in turn will identify risks and lead to more effective management. Although effort levels are currently low with consequently low likelihood of localised depletions, DEH strongly encourages this research, particularly given the push by industry and the NT Government to develop this fishery, which will increase effort in the fishery and thus increase the likelihood of localised depletions.

An initial pilot project examining catch and effort of five fishers in the Timor Reef fishery did not determine any indication of fish-downs on an industry wide basis. This technique is to be further examined to determine its suitability to examine catch and effort information on a spatial basis. In the event that significant risks are identified using spatial data, NT Fisheries has advised that it will review the management arrangements and implement remedial management measures.

Recommendation 7: *NT Fisheries to determine spatial distribution of effort and catch in the fishery and investigate the risk of localised depletions by 2006. In the event that significant risks are identified, NT Fisheries to implement appropriate mitigation measures in a timely manner.*

The main uncertainty in the fishery concerns the degree to which snapper stocks are shared with Indonesia. NT Fisheries, WA Fisheries, Queensland Department Primary Industries (QDPI) and CSIRO (Commonwealth Scientific and Industrial Research Organisation) have undertaken a series of projects to determine the distribution of Red and Goldband Snapper stocks in northern Australia and southern Indonesian waters using mitochondrial DNA, otolith microchemistry analysis and parasite data. Results suggest that there is unlikely to be significant movement of Red and Goldband Snapper (Lloyd *et al* 2000) between Australia and Indonesia (Ovenden *et al* 2002 and Anon 2001b). Newman *et al* 2000 further concludes that there is unlikely to be substantial movement of Goldband Snapper between WA and NT waters and for the purpose of management they can be regarded as separate stocks. Although a single shared stock of the key target Red Snapper species (*L.malabaricus*) has been identified for the Arafura Basin, allozyme work together with parasite data suggest there is the likelihood of multiple stocks with limited movement across jurisdictions of the Arafura Sea. DEH strongly supports continued work on the extent of fish movements within the fishery.

If the stocks are determined to be shared between Australia and Indonesia with a high level of genetic flow between the populations, then the degree of sustainability in the fishery is much more reliant on the Indonesian sector than currently thought. Otherwise, if the stocks are not shared, and there is a low level of genetic flow (as the latest research suggests) then the sustainable management of the stocks depends primarily on management provisions administered by NT Fisheries. The final ACIAR Stock Assessment Workshop endorsed the continuation of the current management arrangements (Anon 2003). NT Fisheries advises that despite the results of the above research, it will continue to work with Indonesia, Queensland and WA to manage the Demersal and Finfish Trawl fisheries conservatively as though they are targeting a single shared stock. DEH considers that NT Fisheries is taking a pro-active role in determining the spatial structure of the key species in

the Demersal Fishery and has a process for incorporating the outcomes of the research into management responses.

Recommendation 8: *NT Fisheries to continue to cooperate with other relevant jurisdictions to pursue complementary management and research of shared stocks for all target and by-product species, that may be affected by cross-jurisdictional issues.*

There are reliable estimates of all commercial and recreational removals from the fishery. Datasets on catch and effort go back to Taiwanese trawl logbooks in 1974. Current reporting arrangements (as previously described) ensure that the fishery dependent data on commercial removals is accurate.

The level of bycatch in the fishery is monitored from the Timor Reef Fishery, which shares nearly identical fishing methods, gear, boats, operators, and target species. This gives a reliable indication of levels of bycatch in the Demersal Fishery.

Recreational fishers, including Fishing Tour Operators (FTOs), catch some of the same species, particularly red snappers and red emperor, from inshore waters. However, NT Fisheries considers that the overall impact on the offshore commercial fishery is negligible. Levels of recreational take in the Demersal Fishery have been assessed through several targeted surveys: “Fishcount 95” and the National Recreational Indigenous Fishing Survey (NRIFS), the latter survey having an Indigenous component. Results from the NRIFS indicate a negligible take from recreational and indigenous fishers.

Estimates of illegal Indonesian fishing effort in the fishery are compiled using Coastwatch flight information and interviews with detained illegal fishing vessel skippers. NT Fisheries advises that these estimates are provided as information for review at stock assessment workshops and, where possible, incorporated into stock assessment modelling. Continuing to control illegal take in the fishery and estimating the extent of past illegal fishing were identified in a recent stock assessment workshop as issues needing serious consideration by management. DEH considers that determining illegal catch is important, particularly given the recent increases in illegal, unregulated and unreported fishing occurring in northern Australian waters.

Removals from other fishing sectors that operate in the Demersal fishery area, such as the Finfish Trawl Fishery and the Northern Prawn Fishery are well documented. These removals are factored into the stock assessment process.

Management response

Cods (Family Serranidae) and tropical snappers (Family Lutjanidae) (currently 66% of the catch) are particularly vulnerable to fishing pressure due to their biological characteristics of early growth to maximum size, long life, relatively large size at sexual maturity, sex changing reproductive strategy and low natural mortality. Consequently, DEH supports a cautious approach to harvesting these fish to ensure sustainability.

The current Demersal Fishery management regime aims to maintain ecologically viable stock levels through a range of input controls (outlined in Table 2). As previously mentioned, there are trigger reference points linked to management responses with timeframes (see summary in Table 3). If a trigger is reached, provisions exist for a review of the management arrangements to be implemented within 12 months of the trigger point being exceeded. These cover harvest levels of Red snapper, Red Emperor, Cod, byproduct species, bycatch species, interactions with protected species and the general ecosystem. NT Fisheries has commented that setting reference points does not preclude the

management agency from taking action prior to the reference point being reached if necessary. DEH recognises the significant step forward that NT Fisheries has taken in ensuring the long-term sustainability of the Demersal Fishery through the development of trigger reference points.

Additionally, the TRFMAC or the NT Fisheries Director can request the NT Minister to declare emergency changes under the provisions of the NT *Fisheries Act 1988*.¹¹ Under this section the Minister may:

- Halt all or any fishing in that fishery or any specified part of the fishery;
- Restrict the number of vessels used in relation to fishing in the fishery;
- Restrict the amount of fish or aquatic life which may be taken from that fishery; or
- Restrict the quantity or nature of fishing gear that may be used in the fishery.

A notice containing brief reasons for the restrictions must be given for a period of 28 days and advertised in a newspaper circulating within the area.

Information on Indonesian fishing effort and movement of snapper stocks across the Australian Indonesian fishing zones will refine available stock assessments and subsequent management responses. DEH generally considers that the combination of the input controls and trigger reference points should ensure adequate protection of the target stocks. However, DEH is concerned at the lack of a precautionary reference point for the principle target species Goldband Snapper (see Recommendation 6).

Byproduct species currently make up 7% of the catch and can include any species except for barramundi, threadfin salmon, Spanish mackerel, shark or mudcrab. The fishing methods used currently ensure that levels of byproduct are kept to under 10% of the total catch. DEH concurs with NT Fisheries that the current performance indicators for catch, byproduct and bycatch are sufficient to detect a shift in effort to a new or previously lightly targeted species. NT Fisheries has advised that should byproduct levels exceed 10% of the total catch over the next calendar year, a review will take place and any new management arrangements will be implemented within 12 months of the trigger point being exceeded. However, this reference point does not look at an increase in targeting specific species within the 10%. DEH suggests that NT Fisheries monitor the species composition of byproduct and bycatch with a view to undertaking a more rigorous risk analysis, if there is a significant increase in the catch of individual species.

Recommendation 9: *NT Fisheries to monitor the species composition of bycatch and byproduct with a view to undertaking a more rigorous risk analysis, if there is a significant increase in the catch of individual species.*

Conclusion

DEH considers that the management regime in the NT Demersal Fishery is appropriately precautionary and provides for the fishery to be conducted in a manner that does not lead to over-fishing. DEH considers that the information collection system and stock assessment and management arrangements generally are sufficient 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.

¹¹ Section 29 *Fisheries Act 1988*

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'*

According to the submission, the stocks are not below reference points, and similarly were not below reference points in the stock assessment workshops (of 1992, 1994, 1996, 2000 and 2003). If the catch of the main target species does decline by 30% over the next calendar year, management responses, linked to timeframes, are in place to examine the cause of the decline and to implement an appropriate management response.

Additionally, the *NT Fisheries Act 1988* provides for a management response to stock decline, including emergency measures if required. As mentioned previously, NT Fisheries has committed to formalising guidelines, including clear timeframes for implementation, for undertaking review of the fishery management arrangements once reference points and triggers are reached. Overall DEH concurs with this assessment.

Conclusion

DEH considers that the NT Demersal Fishery fish stocks are not currently below a defined reference point but should that occur in the future, the fishery is conducted such that there is a high degree of probability the stock would recover to ecologically viable stock levels within nominated timeframes.

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

Onboard observers monitor the level of bycatch in the Timor Reef Fishery, which as previously mentioned is very similar in all respects to the Demersal Fishery. Bycatch monitoring in the Timor Reef Fishery is therefore seen as representative of the level of bycatch in the Demersal Fishery. Any adverse impact detected in the Timor Reef Fishery would trigger a management response in the Demersal Fishery. Observers undertake monitoring on Timor Reef vessels 2 –3 times a year. Bycatch currently makes up less than 1% of the total commercial harvest in the Timor Reef Fishery. Non-retained species include Chinaman fish (*Symphorus nematophorus*), red sea bass (*Lutjanus bohar*), big eye trevally (*Caranx sexfasciatus*), and starry triggerfish (*Abalistes stellatus*).¹²

As the level of bycatch in the Timor Reef fishery is low, NT Fisheries asserts that it is appropriate to monitor bycatch by independent observers rather than through the commercial fisher logbooks. DEH concurs with this response but, as discussed previously, suggests that observer survey bycatch results be published in the status report and that alternative data collection validation techniques be developed if observer trips are no longer feasible or not sufficient to provide robust information on bycatch in the fishery.

¹² For a detailed composition of bycatch see NT submission at p37.

The submission notes that observers would begin operations in the Demersal Fishery if fishing effort increased by 40% over the next two calendar years providing funding and resources are available. DEH considers that this would be particularly important given the move by industry and government to increase effort, currently concentrated on the western boarder, to the rest of the fishery where types and quantities of bycatch may not be comparable to the Timor Reef Fishery. See also Recommendation 4 on observer programs.

Assessment

The annual review of the fishery, through the Status Report, assesses the levels of bycatch in the fishery.

The NT submission states that due to the low levels of bycatch, the risk of significant impact on bycatch species is negligible. However, bycatch species may be vulnerable to overfishing due to localised distribution, life history characteristics or other factors. NT Fisheries has committed to undertaken a risk assessment of bycatch vulnerability by December 2004 and will implement appropriate management arrangements should a species be shown to be particularly vulnerable as a result of fishing operations. DEH supports this management initiative.

Survival of bycatch from barometric trauma, particularly given the depths from which the fish are taken (80-160 m for droplines and 80-120 m for traps), is likely to be small. However, virtually all species caught are sold as part of the combined multi species catch, resulting in the low bycatch levels as discussed.

Management response

A review of the management arrangements for the fishery will be initiated if bycatch levels rise to 10% of the total catch in successive calendar years, or a decline in a species relative numbers occurs without a corresponding change in fishing area or fishing technique. Any amended arrangements will be implemented within 12 months of a trigger being reached. Additionally, a trigger reference point is set if there is a decline in a bycatch species relative numbers without a corresponding change in fishing area or technique. As mentioned above this reference point does not look at increasing the take of specific species within the 10%. DEH suggests that NT Fisheries monitor the species composition of bycatch with a view to undertaking a more rigorous risk analysis, if there is a significant increase in the catch of individual species (see Recommendation 9).

Unlike Queensland and Western Australia where there are size limits on a range of fish species (eg. Coral trout 45 cm WA, 38 cm Qld, Red emperor 41 cm in WA, 45 cm in Qld), under the current NT Demersal management regime there are no size limits on fish species. Monitoring of commercial catches indicates that most Goldband Snapper are sexually mature before becoming vulnerable to baited lines and traps. The voluntary use of 11/0-13/0 size hooks excludes the capture of the majority of smaller species of fish, while the compulsory 75 mm x 50 mm size mesh in the traps also allows smaller fish species and immature fish to escape. NT Fisheries considers that size limits are an ineffective management tool in the Demersal Fishery as the fishery operates in depths between 80-100 m resulting in all species landed suffering from varying degrees of barotrauma preventing release. In addition, almost all species landed are mature and marketable. DEH suggests that NT Fisheries continues to monitor the proportion of juvenile/adult snapper landed and implement appropriate management strategies, such as temporal/spatial restrictions, as appropriate.

Recommendation 10: *NT Fisheries to continue to monitor the proportion of juvenile/adult snapper landed and implement appropriate management strategies, such as temporal/spatial restrictions, as appropriate.*

NT Fisheries advises that to minimise any risk, although there have been no reports of ghost fishing, in consultation with industry they are advocating the introduction of sacrificial anodes on traps. These anodes attached to the trap door and corrode away on an abandoned trap leaving an escape route for captured fish. Industry is currently undertaking gear trials to ensure the suitability of sacrificial anodes on fish traps. Sacrificial anodes will be introduced once proven to be effective. DEH supports this consultation particularly with the shift to 100% use of traps in the fishery and looks forward to the results of the trials.

The *Guidelines* suggest that an indicator group of bycatch species is monitored with associated decision rules that trigger additional management measures when there are significant perturbations in the indicator species numbers. Monitoring an indicator species would also facilitate the best possible use of monitoring resources. NT Fisheries considers that, given the low quantities of any single bycatch species caught, it is not practical to designate a single indicator group of bycatch species. Hence no indicator species is currently monitored in the fishery, though management arrangements will respond to the findings of the risk assessment on bycatch vulnerability. DEH concurs with this response.

Conclusion

DEH considers that there is a high likelihood that the fishery is conducted in a manner that does not threaten bycatch species. Should this situation change, or the risk assessment process indicate otherwise, DEH expects that NT Fisheries would undertake appropriate actions to ensure bycatch species are not threatened by this fishery.

A recommendation has been developed to ensure that the risk of unacceptable impact on bycatch species is detected and minimised in the longer term.

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

Information collection on bycatch in general is extrapolated from observer data collected in the Timor Reef Fishery (see Principle One). NT Fisheries advises that no interactions with protected species have been reported in the Demersal Fishery. Similarly, no interactions have been reported in the Timor Reef Fishery since its inception in 1989. From July 2003, all NT Fisheries logbook cover sheets now provide details of the legislative reporting requirements of the Australian Government on any interaction with threatened species, (including contact details), and a DEH-produced leaflet on “Interactions with protected species” has been distributed with the modified logbooks.

No listed threatened ecological communities have been identified within the Demersal Fishery area.

Assessment

DEH encourages NT Fisheries to analyse data arising from the protected species logbooks as part of the annual review of the fishery. DEH recognises that the minimal data collection and analysis of protected species interaction to date is due to the relatively benign fishing methods employed.

Management response

The lack of reported interactions with protected species is largely due to the methods and location of fishing, which generally prevent any interactions occurring. NT Fisheries advises that management arrangements will be responsive to the risk assessment on the vulnerability of bycatch and implement responses to identified issues.

Although no threatened ecological communities have currently been identified within the Demersal Fishery, NT Fisheries advises that if a community is identified in the future provisions under the NT *Fisheries Act 1988* can allow appropriate action to be taken.

Although there are currently no management responses specific to protected species interaction, NT Fisheries notes that as observer data and results from the risk assessment on bycatch vulnerability become available the suitability of the current performance measures may need to be reviewed and appropriate alterations to fishing operations implemented.

Section 29 of the NT *Fisheries Act 1988* provides for the NT Minister to impose emergency restrictions if the ecosystem is adversely affected by fishing operations.

Conclusion

DEH notes that there are no current interactions with protected species in this fishery and 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 suggests that appropriate actions be undertaken by NT Fisheries to ensure that the fishery avoids mortality, injury to these species and avoids or minimises impacts on threatened ecological communities.

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

Data collection related to target, byproduct, bycatch and protected species within the fishery is described under Objectives One and Two of Principle Two. NT Fisheries advises that current research effort is directed towards the main target species in the fishery. No research has been undertaken on the impact of fishing activities on ecologically related, associated or dependent species. The submission states that until greater certainty has been established regarding the assessment of stock productivity, no further research will be carried out on broader fishery impacts on the ecosystem. NT Fisheries contends that although no specific research has been undertaken on the impacts of the Demersal Fishery on the associated ecosystem, the relatively low number of vessels, the method of fishing, gear restrictions and the extent of the fishing area limits the potential of a significant impact.

DEH is concerned at the lack of information collection and research covering the fisheries impact on the ecosystem and environment generally. However, DEH understands that this lack of information is the case across a range of Australian and International fisheries and until appropriate

research techniques and programs are developed and implemented this will continue to be the case. DEH strongly supports research in this area.

Assessment

Although the effect of fishing activities on benthic communities is yet to be fully assessed, footage from cameras attached to droplines and traps suggests that there is an extremely limited and localised impact on the substrate and benthic communities resulting from placing traps on the predominantly soft muddy sand substrate. Anchoring is usually limited to overnight stand down of fishing activity.

Fishing takes place between 80-120 m and the only interaction is when fishing gear is lowered and retrieved. Therefore interaction on water column communities is considered to be minimal.

No research has been undertaken on the effects of removing an upper level predator from the food chain. Due to low levels of catch, the effect is considered to be minimal. DEH understands that this situation is not unique to this fishery and that the amount of information available on these aspects in any of the world's fisheries is scant.

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 small number of commercial operators reduces the likelihood of any significant impact on water quality.

DEH considers that the impacts on the general ecosystem are minimal and that should any significant impact be observed, management arrangements would ensure that an appropriate response is initiated.

Management response

NT Fisheries has implemented a range of management measures that minimise the risk of significant impact of fishing on the ecosystem and its component. The majority of these input measures, including the small number of operators, coupled with precautionary trigger points, were established to protect target species.

NT Fisheries advises that should a threat of significant impact be detected through logbook or observer data, provisions under s 29 of the *NT Fisheries Act 1988* enable the NT Minister to take appropriate remedial action.

The National Oceans Office is currently leading a regional marine planning process in 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 (NRSMPA). The regional marine planning process is a potential vehicle for pursuing sustainable fisheries objectives, particularly where cross-sectoral or cross jurisdictional approaches are required. NT Fisheries should continue to engage in the process as far as practical. More information is available at www.oceans.gov.au.

Conclusion

DEH considers that the fishery is conducted in a sufficiently precautionary manner to minimise 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. DEH notes that should circumstances alter significantly in the fishery appropriate assessments and NT Fisheries will develop additional actions.

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Table 4: List of acronyms

ACIAR	Australian Centre for Agricultural Research
AFANT	Amateur Fishermen's Association of the Northern Territory
AFZ	Australian Fishing Zone
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DBIRD	Department of Business, Industry and Resource Development
DEH	Environment Australia
DFMAC	Demersal Fishery Management Advisory Committee
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FRDC	Fisheries Research and Development Corporation
FTO	Fishing Tour Operators
GIS	Geographical Information System
GoC	Gulf of Carpentaria
GPS	Global Positioning System
MARPOL	International Convention for the Prevention of Pollution from Ships
MFEU	Marine and Fisheries Enforcement Unit
MOU	Memorandum Of Understanding
NAFMW	Northern Australian Fisheries Management Workshop
NRIFS	National Recreational and Indigenous Fishing Survey
NRSMPA	National Representative System of Marine Protected Areas
NT	Northern Territory
NTFJA	Northern Territory Fisheries Joint Authority
NTSC	Northern Territory Seafood Council
OCS	Offshore Constitutional Settlement
PFMEU	Police, Fisheries and Marine Enforcement Unit
QDPI	Queensland Department of Primary Industries
QLD	Queensland
TRFMAC	Timor Reef Fishery Management Advisory Committee
UNCLOS	United Nations Convention on the Law of the Sea