

REVIEW OF THE NORTHERN TERRITORY OFFSHORE NET & LINE FISHERY

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Northern Territory Government

Department of Primary Industry, Fisheries and Mines

A review of the adequacy of management objectives, performance indicators, trigger points and management actions and the development of species specific measure based on a risk analysis in the Offshore Net and Line Fishery.

Introduction

In 2004, the Offshore Net and Line Fishery (ONLF) was accredited with a Wildlife Trade Operation (WTO) under the *Environment Protection and Biodiversity Conservation Act 1999* until November 2007. As part of the WTO accreditation, the ONLF committed to meet a range of recommendations set out by the Department of Environment and Water Resources (DEW). One such recommendation was the:

review of the adequacy of management objectives, performance indicators, trigger points and management actions and develop species specific measure based on a risk analysis.

Review of the adequacy of current DPIFM management arrangements

DPIFM recently completed a review on the adequacy of current management arrangements, objectives, performance indicators and triggers points using the latest available verified data. The review determined that the current management objectives and performance indicators for the fishery are being met while trigger points are yet to be reached. In addition, management actions and responses to triggers are considered appropriate within available data and in alignment with a conservative approach. The fisheries management strategies and recent mitigative measures outlined in this report demonstrate this conservative approach taken.

The fishery is managed in accordance with the National Plan of Action for Sharks (NPOA-Sharks) and its subsidiary, the Operational Plan for the Sustainable Use of Northern Australian Shark Resources (OPSUNASR). The NPOA-Sharks was developed in accordance with the International Plan of Action for the Conservation and Management of Sharks. The OPSUNASR aims to ensure that the conservation and management of sharks for target and non-target fisheries in northern Australia is integrated on a local, regional and State level. The operational plan was developed in accordance with experts from the Commonwealth, Northern Territory, Western Australia and Queensland Governments.

The overarching precaution is in ensuring a small scale fishery from its commencement, and the further reduction in allowed effort has ensured a conservative fishery with low impact that targets small, more productive shark species that are considered low risk.

The fishery has deliberately been managed under a strategy of containing effort and catches so that harvest rates are below levels that would impinge on the sustainability of the stock, even though those effort and harvest levels imposed might actually be very conservative and represent loss of fishing opportunity and economic benefit. The harvest rate strategy is implemented via input controls. As Walters and Martell (2004, p. 59) note, good estimates of the absolute population sizes and recruitments are not required with such an approach.

The recent completion of the FRDC report *Northern Australian sharks and rays: the sustainability of target and bycatch species, phase 2* (hereafter termed "the FRDC Report") has further supported the outcomes of the DPIFM review and provided additional information to assist in the identification of species of potentially higher risk (Table 1) and to guide the

development of some species specific measures (Table 2). Not all information from the FRDC Report can be used to review management arrangements and provide a current species risk analysis as results were based on 2004 data and management arrangements at that time. Since 2004 DPIFM has, after a number of discussions with FRDC Report collaborators, fishery scientists, fishing operators and a review of available literature, implemented a number of mitigation measures based on a conservative regime, prior to the results of the report being fully available.

Risk Analysis

The risk analysis conducted by DPIFM, which is the basis of the species specific measures that were developed, utilised information from the FRDC Report and from more recent logbook and observer programs. This risk analysis was used as the basis for the development of the conservative approach to the species specific measures.

The FRDC Report provided susceptibility and recovery rankings for northern shark species with recommendations for species within specific fisheries. Species were given a rank between one and three, with three being the highest ranking for those species that were considered least sustainable.

It should be noted that the summary text within the FRDC report in relation to the susceptibility recovery ranking for the ONLF does not accurately reflect the table included in the report. Following discussions with one of the authors, it was confirmed that the rankings included in the FRDC Report Table 6.5-3 & 6.5-4 should be the primary reference source. DPIFM has used the reports rankings from these tables as the basis of identifying high risk species in the ONFL (see Table 1 below).

The FRDC report data indicates that there are 12 chondrichthyans species deemed as least likely to be sustainable. Of these, 5 species were considered to be the “least sustainable” with susceptibility and recovery rankings higher than 2.33. Seven species had a susceptibility rank above 2.33 and a recovery rank between 1.66 and 2.33. These were considered as the next “least likely to be sustainable” species. Specific measures addressing these species identified are detailed later in this report.

Table 1: List of species determined by the FRDC Report to be least sustainable in the ONLF (Salini *et al*, 2007).

Species	Common name	Final susceptibility	Final recovery
<i>Carcharhinus limbatus</i>	Common black-tip	2.43	2.64
<i>Sphyrna mokarran</i>	Great hammerhead	2.43	2.45
<i>Pristis clavata</i>	Dwarf sawfish	2.36	3
<i>P. microdon</i>	Freshwater sawfish	2.36	2.55
<i>P. zijsron</i>	Green sawfish	2.36	2.55
<i>Eusphyra blochii</i>	Wingheaded shark	2.5	2
<i>C. cautus</i>		2.43	2.27
<i>C. amblyrhynchoides</i>	Graceful shark	2.43	2
<i>C. melanopterus</i>	Blacktip reef shark	2.43	2
<i>C. fitzroyensis</i>	Creek whaler	2.43	1.91
<i>Rhizoprionodon oligolinx</i>		2.43	1.82
<i>Anoxypristis cuspidata</i>	Narrow sawfish	2.43	1.73

ONLF Fisheries Management

The following conservative management strategies are active and were introduced prior to the original WTO accreditation of 2004:

- Limited number of licences

The ONLF is a limited entry fishery with only 17 licence entitlements (licences). A licence reduction program has reduced the overall capacity from 39 to the current 17 entitlements. The significantly low number of vessels operating in the fleet combined with effort limits ensure sustainable harvests are maintained within this fishery. Additionally, all new entrants to the fishery undertake a detailed fishery interview with managers prior to fishing.

- Licence reduction scheme

Fishing capacity has been contained in the fishery through a “three for one” licence reduction program. The program requires new entrants to acquire and transfer three restricted ONLF licences to the Territory for the issuance of an unrestricted ONLF licence.

- Large fishing area

17 operators are authorised to fish in Northern Territory waters from high water to the Australian Fishing Zone boundary, encompassing an area greater than 520,000km². This equates to an available fishing area of approximately 30,500km² per licence. The majority of fishing occurs within 12 nm of the coast or baseline. Limited suitable infrastructure outside of the main port of Darwin has also limited the ability of operators to access remote fishing grounds and availability of transport of product for export.

- Input controls

To ensure ongoing sustainability of the fishery, a range of conditions were introduced prior to 2004 including:

- no demersal set nets
- no unattended nets
- no staked or unattached nets
- regional zoning of demersal and pelagic longlines
- long line length limit of no more than 20nm
- pelagic net length limit of no more than 2500m
- pelagic net must be set with a minimum 2m between seabed and net

- Observer Program

The collaborative Fisheries Observer Program, introduced in 2002, regularly collects biological samples and spatial data from ONLF vessels and bycatch operations in order to improve stock assessments. Observers provide valuable information on all species landed, including byproduct, bycatch and interactions with threatened species. While onboard, observers educate crews in species identification techniques, validate catch returns and the manner in which commercial fishers complete logbook returns. Observers also document vessel and gear information, location and depth fished.

- In 2003 a prohibition on the possession of sharks and shark product was introduced for the Timor Reef, Demersal, Finfish Trawl, and Spanish Mackerel Fisheries.

- A 500kg converted whole weight limit of shark (conversion ratios provided to all operators) per trip applies for the Barramundi, Coastal Line and Coastal Net Fisheries (fin to trunk ratios are also employed). All shark product must be unloaded prior to commencement of the next voyage.
- Shark fin to meat ratios were introduced in 2003 and are a condition of licence in all target and byproduct fisheries permitted to retain shark and shark products.

Recent Mitigative Measures

Since WTO accreditation and prior to the completion of the FRDC Report, DPIFM identified potential areas of higher risk associated with some shark species. The following mitigative measures adopted, combined with the existing conservative management regime, successfully reduce the impact of interactions with target and bycatch shark species and identify biological parameters to improve management strategies.

The licence reduction scheme has been extremely effective in reducing the number of licences and consequent effort in the fishery. However, NT Fisheries has focused on reducing actual effort through a number of measures (outlined below) rather than solely concentrating on reducing licences, as this often only reduces latent effort rather than address the actual effort within the fishery.

- Development and implementation of the OPSUNASR in 2005
- Voluntary Code of Practice with a “no take” policy on all sawfish for the ONLF.
- Improved logbooks record the species caught on a species specific lat-long, shot by shot basis. Tagged animals captured are recorded in the same manner prior to release.
- Improved logbooks to facilitate easier reporting of protected species interactions on a species specific basis and capacity to record bycatch weight on shot by shot basis.
- Distribution of educational information, including a species identification guide with background information and listing of turtles and *Glyphis* shark species.
- Development by industry of an Environmental Management System which includes publications on interactions with protected species for both marine turtles and sawfish. These documents have identification guidelines and best practice techniques for release.
- Strict fin ratios and catch limit controls for the harvest of shark species for the Barramundi, Coastal Line and Coastal Net Fisheries (fin to meat ratios, 500 kg converted whole weight of shark per vessel).*
- Shark fin to meat ratios reviewed annually and ratios tightened by ~20% in 2005.
- Reduction in effort allowed in the ONLF*:
 - Annual cap of 1599 days for pelagic net fishing gear to be shared between all licensees
 - Annual cap of 234 days for long-line fishing gear to be shared between all licensees
 - 2500 meters pelagic net reduced to 2000 meters maximum with maximum of 100 mesh drop
 - Reduction in mesh size range from 150 mm – 250 mm to 160 mm – 185 mm. This measure, in addition to the reduction in long-line effort significantly minimised interaction with larger sharks
 - 20 nm of long-line reduced to 15 nm with maximum 1000 snoods (hooks)
 - no autobaiting gear

- Release Techniques Education Program. New release techniques are being practised by the fishery to increase survivability of released turtles, sawfish and other shark species if interaction should occur.
- Active industry participation in shark tagging projects.

- Research projects:
 - AFMA-funded research project, *Developing catch statistics for the illegal shark Indonesian shark fishery of northern Australia*
 - NHT funded, Charles Darwin University/ DPIFM/ AIMS research project, *Distribution and abundance of Glyphis spp. In Northern Australia and their potential interaction with commercial fishers.*
 - ARC funded Charles Darwin University/ AIMS /DPIFM/ Industry research project, *Estimating fishing-related mortality and designing sustainable management protocols for shark fisheries in North Australia.*
 - Charles Darwin University/ NT Government research project, *Identification and genetics of Australian Glyphis species.*
 - DPIFM, NHT funded, *Determine Indigenous fishing impact on sharks and rays in NT.*

* No irregularity in the PMFES comparison of vessel logbooks with on-board catches or breaches of the *Fisheries Act* has been reported. Based on targeted operations and in-port and at-sea checks, PMFES has advised NT Fisheries that the risk of non compliance in the fishery is considered low.

Species Specific Measures

Based on the review of the FRDC Report, the recent mitigative measures undertaken and previous management strategies (as outlined above), DPIFM is of the strong view that the current conservative management regime for the ONLF ensures sustainable interaction with those species as identified as least sustainable by the FRDC Report. The review of the management objectives, performance indicators, trigger points and management actions for the ONLF and specifically for those species identified as “least sustainable” by the FRDC report is summarised in Table 2 below. Please note that this table builds upon the existing management strategy, which is aimed at specific groups, e.g. target species, byproduct and bycatch. Those species identified in the FRDC report as “least sustainable” are not targeted species and are therefore managed within the byproduct group strategy.

Further expansion regarding the specific management of those species identified as “least sustainable” by the FRDC Report is detailed in the subsequent sections of this report.

Please note that one purpose of the observer program is to record species composition to detect impacts of fishing in this or other fisheries, or extrinsic causes. In addition, cooperation with other northern Australian fisheries, through such mediums as NAFM, ensures that fishery managers and researchers are aware of information available from other fisheries and other sources. For example, research instigated by NAFM and FRDC, *The effect of IUU fishing on the ecosystem in the Gulf of Carpentaria: Management options and downstream effects of other fisheries* is designed to inform policy and indicate further information gathering approaches that northern Australia’s fisheries may use in this context.

ONLY RESPONSE TO DEW RECOMMENDATION 1

ONLF RESPONSE TO DEW RECOMMENDATION 1

Table 2: Management objectives, performance indicators, trigger points and management actions used in the ONLF.

	Species/Group	Management objectives	Performance indicator	Trigger reference point	Management Response Taken	Proposed Future actions
Target Species	Black tip sharks <i>C. tilstoni</i> & <i>C. sorrah</i>	Ensure inter-generational equity by maintaining ecologically sustainable annual catches in all sectors	Catches are below sustainable yield estimates; catches do not show significant decline	Catch levels increase to 2000t over the next calendar year Catch levels decline by 30% over the previous two calendar years	<ul style="list-style-type: none"> Annual analysis and reporting of status Cap on licences Licence reduction scheme Significant reduction of allowed effort in longline and pelagic net fishing gear 	<p>MACs to review fisheries annually and make recommendations to the Director of Fisheries.</p> <p>Any amended arrangements will be implemented within 12 months of trigger being reached.</p>
	Grey mackerel		Sustainable yield estimates to be developed Catches do not show significant decline	Until sustainable yield estimates are determined the trigger will be rise or decline of 30% of the catch from the previous calendar year		
Byproduct Species	<i>C. limbatus</i> <i>S. mokarran</i> <i>E. blochii</i> <i>C. cautus</i> <i>C. amblyrhynchoides</i> <i>C. melanopterus</i> <i>C. fitzroyensis</i> <i>R. oligolinx</i>	Ensure ecological sustainability of these species in all fisheries	Significant shifts in species targeted	<p>Catch increases in proportion of the total catch by greater than 35% over the next calendar year</p> <p>Catch increases to 10% of the total catch over the next calendar year</p>	<p>As above</p> <ul style="list-style-type: none"> ONLF code of conduct Improved logbooks enabling more accurate reporting of shark species in ONLF Fin to meat ratios introduced Shark ID guidebooks distributed through ONLF Strict limit of shark harvest in Barramundi, Coastal Line and Coastal Net Fisheries Research targeting increasing knowledge of shark species catch composition, distribution and abundance. 	<p>MACs to review fisheries annually and make recommendations to the Director of Fisheries.</p> <p>Any amended arrangements will be implemented within 12 months of trigger being reached.</p> <p>All Fishery logbooks to be reviewed regarding the reporting of byproduct species</p> <p>Continuing research via aligned projects and observer program to collect samples, information on catch composition, fishing mortality, distribution and abundance of specific shark species</p>

ONLF RESPONSE TO DEW RECOMMENDATION 1

Bycatch Species		Ensure ecological sustainability of bycatch species in all fisheries	Significant shifts in species targeted Changes in species composition of fauna due to impacts of fishing or environmental change	Total bycatch within the shark 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	<ul style="list-style-type: none"> • As above • No take of shark in Timor Reef, Demersal, Finfish Trawl & Spanish Mackerel Fisheries 	<p>MACs to review fisheries annually and make recommendations to the Director of Fisheries.</p> <p>Any amended arrangements will be implemented within 12 months of trigger being reached. All Fishery logbooks to be reviewed regarding the reporting of bycatch species</p> <p>Continuing research via aligned projects and observer program to collect samples, information on catch composition, fishing mortality, distribution and abundance of specific shark species</p>
	Endangered, threatened or protected species including <i>P. clavata</i> <i>P. microdon</i> <i>P. zijsron</i> <i>A. cuspidata</i>	Ensure the continued protection of species and communities listed under the <i>EPBC Act 1999</i> and the <i>Territory Wildlife and Conservation Act 2000</i>	Change in species composition of fauna due to impacts of fishing or environmental change	Identifiable impacts observed by commercial fishers, fisheries observers or other agencies regarding EPBC listed species or communities.	<ul style="list-style-type: none"> • As above • “No take” policy of sawfish adopted by ONLF • ONLF code of conduct • Release Techniques Education Program 	<p>MACs to review fisheries annually and make recommendations to the Director of Fisheries</p> <p>Fishery logbooks to be amended to include records of any interaction with endangered, threatened or protected species</p>
	Ecosystem components	Minimise effects on ecosystem components	Change in species composition of fauna due to ecological impacts of fishing or environmental change	Identification of significant negative interaction with components of the natural ecosystem present on fishing grounds		MACs to review fisheries annually and make recommendations to the Director of Fisheries

MAC – Management advisory committee

Further information

The current ONLF management regime, which is the result of the recently conducted review and summarised in Table 2, puts into practice strategies that will ensure sustainable interaction with those species identified by the FRDC Report as “least sustainable”. A further expansion on the management strategies addressing these specific species is detailed below.

Carcharhinus limbatus

During the recent final phase of the FRDC project, collaborators became aware that, due to the similarities between *C. limbatus* and *C. tilstoni*, observers and commercial fishers have encountered difficulty in ascertaining the true catch composition. It is understood that it is possible that records of *C. tilstoni* could be actually be a mix of *C. tilstoni* and *C. limbatus*. Discussions with fisheries researchers have concluded that neither of the species is known to be vulnerable. Coupled with the overarching precaution in ensuring this fishery has been small in effort, area and catch from its commencement and the further reduction in its permitted effort has made certain that the fishery is managed with minimal risk.

Outcome: DPIFM is scoping research into developing an easier identification method of *C. limbatus* that will enable observers and commercial fishers to identify and record actual catches. In addition, Fisheries is investigating research to ascertain the catch composition of *C. limbatus* in the ONLF, and other fisheries, in order to scope the extent of the possible problem. Currently the only reliable ways to identify the difference between the two species are by genetic sampling, or dissection to provide vertebral counts. This issue cannot be solved by the simple expansion of the observer program, without first learning how to correctly visually identify the species through morphometric comparison.

NT Fisheries is currently working with independent agencies to develop a user friendly identification method for the industry and observers. A recent project proposal which could have addressed this issue was submitted from Charles Darwin University and NT Fisheries to the Department of Agriculture, Fisheries and Forestry. The project is titled *Gene sampling shark catch data to determine bycatch recording error*. Although advice has been recently received of the proposal’s rejection, Fisheries will continue to investigate similar projects and funding avenues.

Sphyrna mokarran

The ONLF sustainably harvests *S. mokarran* using a strict conservative management regime. Specifically, the limitation of gear to reduce the harvest of larger sharks and the small scale of the fishery, with the precautionary approaches outlined earlier ensures a restricted harvest of this species with low risk.

Outcome: Continued monitoring

Pristis clavata

No interaction with *P. clavata* was recorded by operators in the ONLF in 2006. *P. clavata* are rarely caught in the ONLF as the fishery generally operates in waters outside the typical habitat where this species is found. See comment below

Outcome: Continued monitoring

Pristis microdon

P. microdon is rarely caught in the ONLF as the fishery generally operates in waters outside the typical habitat where this species is found.

DPIFM has successfully undertaken a number of strategies aimed at reducing the interaction of ONLF operators with sawfish. Records show that the harvest of sawfish has significantly decreased. In 2004 sawfish harvest (predominantly narrow sawfish) was recorded through the compulsory logbook program as greater than 50 tonnes. Since the preventative strategies were introduced the harvest has substantially decreased to 6 tonnes in 2005 and less than 1 tonne in 2006.

In addition, Fisheries has recently introduced a tagging program for released sawfish to ensure better understanding of the species' survival and movements. To date, 87 sawfish have been tagged in this program.

Outcome: Continued monitoring in conjunction with the tagging program.

Eusphyra blochii

Similar to the management arrangements for *S. mokarran*, this species is managed under a strict conservative regime. To assist in gathering of information relating to this species, logbooks have been amended to enable specific reporting of the species.

Outcome: Continued monitoring

Carcharhinus cautus*, *C. amblyrhynchoides*, *C. melanopterus*, *C. fitzroyensis* and *Rhizoprionodon oligolinx

The occurrence of these species in the catch is low and is monitored through logbook reporting and by the Observer Program.

Outcome: Continued monitoring

Anoxypristis cuspidata* and *P. zijsron

A. cuspidata, and to a much lesser extent, *P. zijsron*, are relatively common throughout the ONLF grounds, they are not targeted by the operators and where possible are released alive after capture, in accordance with the ONLF Code of Practice.

ONLF RESPONSE TO DEW RECOMMENDATION 1

DPIFM has successfully undertaken a number of strategies aimed at reducing the interaction of ONLF operators with sawfish. Prior to preventative strategies being introduced in 2004 the sawfish harvest was recorded at greater than 50 tonnes. The sawfish harvest has now substantially decreased to 6 tonnes in 2005 and to less than 1 tonne in 2006. These figures are reflective of the impact of mitigative measures and indicate a willingness to comply with the Code of Practice by industry.

In addition, Fisheries and industry have recently introduced a tagging program for released sawfish to ensure better understanding of the species' survival and movements. To date, 87 sawfish have been tagged in this program.

Outcome: Continued monitoring in conjunction with the tagging program.

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