



Assessment of the Northern Territory Spanish Mackerel Fishery

**Marine and Water Division
Environment Australia**

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This document is an assessment carried out by Environment Australia of a commercial fishery against the Commonwealth's 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. 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 Spanish Mackerel Fishery

Table of Contents

EXECUTIVE SUMMARY	1
Process Followed in the assessment	1
Background	1
Overall assessment	4
Recommendations	4
PART I MANAGEMENT ARRANGEMENTS.....	6
Conclusion.....	11
Recommendations	12
PART II GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES	13
Stock Status and Recovery	13
Maintain ecologically viable stock levels	13
Information requirements	13
Assessment	14
Management response	17
Conclusion.....	19
Recommendations	19
Promote recovery to ecologically viable stock levels.....	19
Management Response	19
Ecosystem Impacts	21
Bycatch Protection	21
Information requirements	21
Assessment	21
Management response	22
Conclusion.....	22
Recommendation.....	22
Listed species and threatened ecological communities	23
Information requirements	23
Assessment	23
Management response	23
Conclusion.....	23
Recommendations	24
Ecosystem Protection	24
Information requirements	24
Assessment	24
Management response	24
Conclusion.....	25
REFERENCES	25

Table of Tables

Table 1	Summary of Northern Territory Spanish Mackerel Fishery	3
Table 2	Summary of performance indicators and trigger points.....	8
Table 3	Summary of management controls for stakeholders in the Northern Territory Spanish Mackerel Fishery.....	10
Table 4	Acronyms	26

EXECUTIVE SUMMARY

Process Followed in the assessment

The Northern Territory Department of Business, Industry and Resource Development (DBIRD), Fisheries Division, has provided the report “*Assessing the ecological sustainability of the Northern Territory Spanish Mackerel Fishery*” (the ‘submission’) addressing the Commonwealth’s *Guidelines for the ecologically sustainable management of fisheries* (the ‘Guidelines’) for assessment under Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Environment Australia (EA) provided comments on the draft Northern Territory (NT) Spanish mackerel submission prior to its release for public comment.

The NT Spanish mackerel submission was released for public comment on 15 June 2002. At this time, stakeholders, interested parties and other members of the public were invited to comment on the submission. The public comment period ended on 15 July 2002, with a total of 5 submissions received. The main issues raised in the submissions were the lack of information on the extent of the recreational catch and the possible impact of Indonesian and East Timor Spanish mackerel captures. Generally the public comments were positive and supported a favourable assessment of the fishery. Following public comment NT Fisheries updated their submission to cover issues raised by EA and public comments.

Following the public comment period and receipt of the revised NT submission, EA drafted this assessment report against the *Guidelines*. In addition to the submission and associated documents, public comments and NT Fisheries responses to the public comment informed EA’s assessment. Although details of the bait net fishery were provided in the NT submission, this is a separate fishery and will not be assessed in this report. EA noted that NT Fisheries have committed to undertake a review of the appropriateness of bait nets across NT commercial fisheries.

Background

The Northern Territory (NT) commercial Spanish Mackerel Fishery (SMF) covers oceanic waters from the NT coast to the edge of the Australian Fishing Zone (AFZ). Trolling is the only method in the commercial SMF. Recreational fishers may use hook and line. The main target species is narrow-barred Spanish mackerel (*Scomberomorus commerson* Lacépède 1800). Spanish mackerel are a pelagic continental shelf species distributed around the northern Australian coastline south to approximately 30°S latitude on the eastern and western coasts. Most fishing takes place during the second half of the year, peaking in September to November. The principal fishing areas include waters near Bathurst Island, New Year Island, northern and western Groote Eylandt, the Gove Peninsula, the Wessel Islands, the Sir Edwards Pellew Group and suitable fishing grounds on the western and eastern mainland coast.

The Northern Territory Government assumed responsibility for the management of the Spanish mackerel resources from the Commonwealth government in all water adjacent to the NT coast to the outer boundary of the AFZ with the passage of the Offshore Constitutional Settlement in 1988.

The SMF is managed as a multi sector fishery including commercial, recreational, fishing tour operator (FTO) and traditional stakeholders. FTOs, recreational and indigenous fishers may catch Spanish mackerel in all NT waters. FTOs are conducted from line fishing vessels, with commercial operators using either a single vessel or a mother boat and up to a maximum of 2 fishing dories. Recreational anglers also fish for Spanish mackerel by trolling or using hooks and lines. Most recreational fishing for Spanish mackerel takes place in waters within reach of pleasure boats from

major coastal population centres. The commercial SMF is managed by input controls including limited entry, a licence reduction scheme and gear restrictions. A summary of the NT SMF is provided in Table 1.

Taiwanese gill-netters exploited mackerel (chiefly Spanish mackerel) in waters off the NT coast from 1974 until 1986. An analysis of logbook and observer data from these vessels by CSIRO indicated a decline in catches of Spanish mackerel coupled with a decrease in mean size, suggesting that the Taiwanese had overfished the stocks of this species. Age structure data supports a hypothesis that the fishery has been recovering from heavy fishing by the Taiwanese gillnetters during the 1970 and 80's, explaining increases in CPUE during the late 1990s and the absence of older fish in the age structure data collected in the early 1990s. There is also some genetic evidence for this hypothesis. Without alternative information on harvest rates to constrain the stock assessment models, it is possible that the increasing trend on catch rates of recent years really reflects increasing efficiency of operators and/or trends in environmental factors.¹

¹ Technical Annual Report 2000/01 at page 280.

Table 1 Summary of Northern Territory Spanish Mackerel Fishery²

Area	Oceanic waters to the edge of the Australian Fishing Zone from the WA/NT border east to the QLD/NT border in the Gulf of Carpentaria
Target Species	Spanish mackerel (<i>Scomberomorus commerson</i>)
Byproduct	Byproduct comprises < 2.5% (by whole weight) of total catch: Long tail tuna (<i>Thunnus tonggol</i>) Cobia (<i>Rachycentron canadus</i>) Coral Trout (<i>Plectropomus</i> Spp) Various trevallies (Carangidae) Grey Mackerel (<i>Scomberomorus semifasciatus</i>)
Bycatch	Mainly shark species
Fishing method	Trolling, floating handlines, rod and lines
Bait	Majority of operators purchase bait. Each licensee has a bait entitlement
Fishery Season	Strongly seasonal September to November
Fishery status/development stage:	Nearing full utilisation.
Stock assessment reliability:	Low as available data provides insufficient information about stock status
Stock assessment method:	Age structured modelling.
Commercial harvest 2000:	301 tonnes (Spanish mackerel in the SMF only).
Value of commercial harvest 2000:	\$1.04 million based on the ex-vessel price
Five year trend and average (commercial):	Catch: Rising average 256 t. Effort: Stable average 753 fishing days.
Total number of commercial licences issued:	18 licences.
Number which took 90% of troll line catch in 2000:	9 licensees.
Number of licensed fishing guides (FTO):	572 licensees catching 2,919 Spanish mackerel. Fishinfo (the commercial, recreational and FTO logbook data base) will provide more accurate information on the number of FTO's reported landings of Spanish Mackerel or status report.
Indigenous harvest:	Unknown.
Recreational harvest:	Unknown. 1995 – estimated 25,000 mackerel (all species) (FISHCOUNT Coleman 1998).
Commercial management arrangements:	Input controls: Limited entry, licence transfer reduction scheme, gear restrictions.
Recreational management arrangement:	A range of input and output controls including possession limits (5 Spanish mackerel and part of the general possession limit of 30 fish per person), licensing of FTOs.
Export:	Taiwan is currently the major international export destination for Spanish Mackerel, with larger (above 10kg) fish in premium condition being exported.
Threatened Species interactions	None identified

² Information in this table is largely taken from the Spanish Mackerel report in the Technical Annual report 2000/01

Overall assessment

The material submitted by NT Fisheries indicates that the fishery operates in accordance with the Commonwealth's *Guidelines for the ecologically sustainable management of fisheries*. EA concurs that the SMF 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. Overall, the nature of the target species, selective gear, the limited numbers of fishers and the management regime suggest that the fishery is being managed in an ecologically sustainable way.

In making this assessment, EA is satisfied that the information collection system, risk assessments, management arrangements and objectives are sufficient to ensure that the fishery is conducted in a manner that does not lead to overfishing and that stocks are not currently overfished. The management regime is developed through a consultative process, is underpinned by adequate objectives and includes performance criteria aimed at managing the fishery in an ecologically sustainable manner. The management arrangements in place are adaptable, have the ability to control the level of take from the fishery and are reviewable and enforceable. The small number of commercial fishery operators, relatively benign fishing method, recreational surveys and bag limits, small numbers of landing ports and precautionary catch limits and trigger points, among other measures, should enable the fishery to continue to be sustainable into the future.

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. EA is satisfied that the monitoring of interactions, assessment of the impacts, current management responses and triggers for future management are sufficient to ensure that all persons engaged in fishing are required to take all reasonable steps to minimise impacts. EA considers that the fishery is unlikely to have an unacceptable impact on protected species. EA recommends that this fishery be accredited under Part 13 of the EPBC Act.

The assessment concludes that the fishery is managed in an ecologically sustainable way. EA recommends that the export of species taken in the fishery should be exempt from the export permit requirements of Part 13A of the EPBC Act, with that exemption to be reviewed in five years.

To further strengthen the effectiveness of the management arrangements for the SMF and to contain the environmental risks in the medium to long term, a series of recommendations have been developed. 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 Commonwealth review of the fishery in five years time.

Recommendations

1. Inform Environment Australia of any future amendment to the management regime for the Spanish Mackerel Fishery.
2. Formalise the objectives, performance indicators, trigger points and management actions outlined in Table 1 of the NT submission into the Spanish Mackerel Management plan, as appropriate.
3. By 2005 formalise guidelines, including clear timeframes for implementation, for undertaking review of the fishery management arrangements once reference points and triggers are reached.
4. Conduct a compliance risk assessment for the Spanish Mackerel Fishery during the life of the approval encompassing compliance risks for both the commercial and recreational sectors.

5. From 2003, report on objectives, performance indicators and triggers for the Spanish Mackerel Fishery in the annual status report.
6. Include yearly results of observer surveys (including information on target species, bycatch and protected species interactions) in the annual status report and implement alternative data collection validation techniques if observer trips are no longer feasible.
7. Continue to seek out alternative cost effective fishery independent sampling techniques and report outcomes in the annual status report from 2003.
8. Gather information that would support a move to a precautionary biological reference point for Spanish mackerel.
9. Implement the Byproduct Action Plan, for fisheries targeting species other than Spanish mackerel, within the first year.
10. 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.
11. Monitor the size composition of the commercial catch of Spanish mackerel and to introduce additional management measures if the catch composition shifts to pre mature fish.
12. Make reporting of all protected species interactions compulsory and to implement an education program to ensure industry has the capacity to make accurate reports.

PART I MANAGEMENT ARRANGEMENTS

The Northern Territory (NT) Spanish Mackerel Fishery (SMF) is managed by NT Fisheries, Department of Business, Industry and Resource Development (DBIRD) under the NT *Fisheries Act 1988*, the *Northern Territory Fish and Fisheries Regulations 1995*, relevant Gazetted notices and licence conditions and the Spanish Mackerel Fishery Management Plan (1 February 1993).³ There are a number of other documents, including research reports, scientific literature and discussion papers, which are germane to the management of the fishery. NT Fisheries are to inform EA of any significant changes to the management regime for the SMF.

EA considers that the NT SMF provides adequate mechanisms to ensure that the management regime takes into account management arrangements for Spanish mackerel in adjacent jurisdictions fisheries. 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 regime in other jurisdictions fishing the same population, particularly when assessing stock status and availability for harvest. The Northern Australian Fisheries Managers Workshop (NAFMW) is undertaken annually and attended by members from the three northern States/Territory and the Commonwealth. Strategic directions for research and management of all northern fisheries are discussed, including Spanish mackerel. NT Fisheries consider that this forum is effective in addressing cross-jurisdictional issues, particularly stock assessment and bycatch information.

A size limit on Spanish mackerel to complement the Western Australia and Queensland regulations is not considered necessary in the NT SMF because Spanish mackerel rarely survive the trauma of capture. NT Fisheries comment that the fishery does not target small fish and if small fish are caught they make up a very small proportion of the catch. Spanish mackerel are generally sexually mature and have spawned before becoming vulnerable to the fishery.

There are no regional or international management regimes to which Australia is a party of relevance to the fishery. The prime international regime affecting the fishery is the UN Convention on the Law of the Sea (UNCLOS). The management regime essentially complies with this. Australia is developing a National Plan of Action – Sharks (NPOA-Sharks) as required under the International Plan of Action – Sharks, developed by the Committee on Fisheries of the United Nations Food and Agriculture Organisation (FAO), which places some obligations upon managers of all fisheries in which sharks are taken. Given that the bycatch in the fishery includes some shark species, albeit at low levels, the NPOA-Sharks may be germane to the fishery. The Northern Territory Spanish Mackerel Troll Line Association proactively implemented a voluntary nil byproduct limit on shark in the fishery which has now become a legislative requirement.

EA is satisfied that sufficient opportunity is provided to all interested and affected parties, including the general public, to contribute to the development of the management regime, and that an appropriate range of expertise and community interests are involved in the fishery management committee and during the stock assessment process.

The documents relating to the management regime as listed above are available from the DBIRD and online at the NT Fisheries Department's website.⁴ Prior to entering the fishery, commercial fishers are provided with a copy of these documents and briefed on the management arrangements. EA is satisfied that the management regime for the SMF is adequately documented, publicly available and transparent.

³ <http://notes.nt.gov.au/dcm/legislat/legislat.nsf/d989974724db65b1482561cf0017cbd2/297028aab0adef24692565b7002409ba?OpenDocument>

⁴ DBIRD website www.dbird.nt.gov.au

A consultative process was employed throughout the development of the management regime and has provided sufficient opportunity to all interested and affected parties. The Spanish Mackerel Fishery Management Plan was developed with assistance from the Spanish Mackerel Fishery Management Advisory Committee (SMACFMAC)⁵, which includes members representing the commercial, trading, tourist, recreational and government sectors. The plan was released for public comment in September 1991 and was also made available to all commercial SM fishers, the Amateur Fishermen's Association of the Northern Territory (AFANT), interested groups, tackle shops, and the Northern Territory Seafood Council (NTSC).

A review of the SM Fishery Management Plan commenced in November 2000. A discussion paper was distributed to all key stakeholder groups for comment. The paper was also discussed at relevant Aboriginal Consultative Committees. Release of the Discussion Paper was advertised in all major regional newspapers and on the NT Fisheries website. Submissions were discussed at the June 2001 SMACFMAC meeting and will be considered in the drafting of the revised Spanish Mackerel Fishery Management Plan. NT Fisheries have advised that a revised Fisheries Management Plan will be implemented in 2003.

Indigenous peoples are consulted and informed of relevant fisheries issues through the Aboriginal Fisheries Consultative Committees (AFCC). AFCC, established in 1993, comprise traditional owners, relevant land councils, and government and industry representatives. The committees were established to provide the NT Government an opportunity to inform Aboriginal people on scientific management practises and any relevant matters regarding sea country as well as a forum for aboriginal members to raise matters of importance relating to sea country. NT Fisheries are looking to make the AFCC more outcomes orientated.

All AFCC have been advised of proposed changes in the SMF and were provided with the discussion paper on the review. EA believes that indigenous communities are important stakeholders in the SMF and consultation with such communities should be an important part of broader stakeholder consultation by NT Fisheries. EA suggests that constant review of the mechanisms for indigenous consultation be continued to ensure sustained effectiveness of consultation with this stakeholder group.

The NT submission to EA was widely available to the public by placing it on the EA web site, providing copies at the NT Fisheries Offices and targeted mail outs to key stakeholders. Input on the assessment report was also sought from all fishers in the SMF.

Two public stock assessment workshops have been held to review the SMF. Members of the public, commercial SM fishers, industry, recreational representatives, fisheries managers, conservation and indigenous groups attended the public sessions of the stock assessment workshops. EA considers that a sufficient range of expertise and community interests were involved in these stock assessment processes.

EA believes that it is beneficial to include an environmental representative on MACs, as occurs in other jurisdictions in Australia using the MAC model, the advantage being that all parties concerned with the fishery can be fully exposed to the views of other parties. Environment groups and non-government organisations are advised and consulted on tropical fisheries issues, including Spanish mackerel, through monthly advisory meetings with senior officers and the NT Director of Fisheries. NT Fisheries consider that this is an effective method of communication and has been implemented, rather than a specific representative on the MAC, due to the low level of environmental representatives available. Conservation groups, particularly given their current level of resources,

⁵ SMACFMAC was established in 1991

endorse the consultation process. Public comments did not identify any concerns with the current MAC structure.

EA considers that the SMF management regime is strategic, containing objectives and performance criteria by which the effectiveness of the management arrangements are measured. The *Northern Territory Fisheries Act 1988* provides overarching objectives for management of fish and aquatic life resources of the Territory, including the SMF. These objectives 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.

The review of the SM Fishery Management Plan proposes fishery specific objectives and performance criteria by which the effectiveness of the management arrangements are measured. A summary of the performance indicators and trigger points are provided in Table 2. Details of the objectives, performance indicators, triggers points and management actions are provided in Table 1 of the NT submission and are discussed in detail in Part II of this report. EA recognises the significant step forward that NT Fisheries has made in ensuring the long-term sustainability of the SMF through the development of fishery specific objectives, performance indicators and triggers. NT Fisheries have committed to formalising these objectives, performance indicators, trigger points and management actions into the Spanish Mackerel Management plan, as appropriate.

Table 2 Summary of performance indicators and trigger points

Performance Indicator	Trigger point
Estimated catch by all sectors does not exceed the estimated sustainable yield of Spanish mackerel	Aggregate landings by all sectors reach 90% of the sustainable yield (by whole weight) and/or total fishery catch declines by 30% over the calendar year (by whole weight)
Genetic studies indicate discrete Spanish mackerel stock(s)	Discrete Spanish mackerel stocks identified
Sustainable yield estimates are reviewed annually	Annual review
Estimated catch share (as a percentage of total aggregate landings, by whole weight) for all sectors remains unchanged	Estimated catch share by a stakeholder group(s) (commercial or recreational) changes (increase or decrease) over the calendar year by more than 20% (by whole weight)
Byproduct in the Spanish mackerel fishery increases significantly	Byproduct in the Spanish mackerel fishery increases to 10% over the calendar year of the total catch (whole weight)
Bycatch	Bycatch to increase to 10% of total catch over the calendar year (whole weight)
Endangered/threatened/protected species/communities are identified in NT waters	Impacts are observed by commercial fishers or fisheries observers

Currently the NT submission details that once a trigger has been breached, SMACFMAC is to make recommendations to the NT Director of Fisheries on appropriate management arrangements to address the breach. EA suggests that there should be a timeframe determined for both the development of the report by SMACFMAC and for implementation of the proposed strategy. NT Fisheries have committed to formalising guidelines, including clear timeframes for implementation, for undertaking a review of the fishery management arrangements once reference points and triggers are reached, by 2005.

Additionally, the SACFMAC or the NT Fisheries Director can request the NT Minister to declare emergency changes under the provisions of the NT *Fisheries Act 1988*.⁶ 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.

The fishery is managed through a mixture of input and output controls including limited entry (resulting in low numbers of commercial operators), a licence reduction scheme and gear restrictions as outlined in Table 3. The licence reduction scheme has reduced licence numbers from in excess of 100 licences to 19 licences.⁷ NT Fisheries believes that these effort controls are largely responsible for the recovery of Spanish mackerel stocks to date. These management measures are discussed in more detail under Objective one. EA considers that these management controls should be capable of controlling the level of harvest in the fishery.

There is currently no limit to the number of FTO licence operators. NT Fisheries considers that it is not appropriate at this time to limit the number of FTO licences as they are bound by rules imposed on recreational fishers (see Table 3). Additionally, the catch sharing benchmarks will seek to address any increase in landings by individual stakeholders. EA concurs with the use of catch shares to manage the FTO take coupled with the formalisation of guidelines, including clear timeframes for implementation, for undertaking review of the fishery management arrangements once reference points and triggers are reached.

The management regime for the SMF contains the means of enforcing critical aspects of the management arrangements. The NT Police, Fisheries and Marine Enforcement Unit (PFMEU) enforces all aspects of fishing operations, including regularly checking the byproduct of the SMF and the Spanish mackerel catch in other commercial fisheries for compliance with byproduct possession limits. Recreational fishers and FTOs are subject to random inspections to ensure compliance with possession limits. The NT only has 3 ports for unloading catch which assists in the monitoring of commercial operators. The SM Status Report 2000 noted that there were no significant compliance issues with the SMF at the time. NT Fisheries is currently in the process of working with the Fisheries Enforcement Unit to undertake a compliance risk assessment for the mud crab fishery and have committed to complete a compliance risk assessment for the SMF during the life of the approval. EA believes that this would be a useful process that should encompass compliance risks for both the commercial and recreational sectors.

⁶ Section 29 NT *Fisheries Act 1988*

⁷ See Appendix III of the NT submission for a summary of licensing and management arrangements.

Table 3 Summary of management controls for stakeholders in the Northern Territory Spanish Mackerel Fishery

	INPUT CONTROLS	OUTPUT CONTROLS	REPORTING REQUIREMENTS
COMMERCIAL	<ul style="list-style-type: none"> • Licence reduction scheme. Since 1993 the number of licences has dropped from 28 to 19 (9 fully transferable and 10 restricted) • Fishers may use only one vessel together with up to two tenders. • Commercial gear limitations. 	<ul style="list-style-type: none"> • Possession limits on Spanish Mackerel in other fisheries <ul style="list-style-type: none"> - Timor Reef and Demersal fisheries - nil - Commonwealth managed Northern Prawn and Western Tuna fisheries – ten finfish in possession, including Spanish mackerel. • The NT Barramundi and Shark Fisheries through the review of the Spanish Mackerel Fishery Management Plan, have agreed to implement Spanish mackerel catch limits. 	<ul style="list-style-type: none"> • Compulsory monthly Logbooks • Voluntary daily reporting • Market returns required to be submitted with catch and effort logbooks.
RECREATIONAL	<ul style="list-style-type: none"> • Gear limitations⁸ 	<ul style="list-style-type: none"> • Possession limit of 5 Spanish Mackerel. This possession limit controls apply <i>in addition</i> to the general 30 fish possession limit. • A person may not possess a combination of fish and fillets exceeding the equivalent of 30 whole fish, other than in his or her place of permanent residence. This applies to the main byproduct species identified. 	<ul style="list-style-type: none"> • National Indigenous and Recreational Fishing Survey • FISHCOUNT
FTO	<ul style="list-style-type: none"> • Recreational gear limitations⁹ 	<ul style="list-style-type: none"> • As above for recreational fishers 	<ul style="list-style-type: none"> • Compulsory daily logbook recording of all catch (retained and released) and monthly submission.

⁸ See Appendix I of the NT submission for details

⁹ See Appendix II of the NT submission for details

The SMF is reviewed at meetings of SMACFMAC and through annual desktop reviews by the NT Fisheries Division, resulting in the production of an annual Status Report and Fisheries Assessment report. NT Fisheries have committed to report on objectives, performance indicators and triggers for the Spanish Mackerel Fishery in Status Reports from 2003. Management directions and day-to-day management of the SMF are reviewed at meetings of the SMACFMAC. Fisheries managers, researchers and compliance officers at the Northern Australian Fisheries Managers Workshop review strategic management directions for the fishery annually. A review of the whole management plan is scheduled every 3-5 years. The review involves the preparation of a discussion paper canvassing objectives and performance of management arrangements and alternative options for management intervention. The Fisheries group and the MAC then prepare a draft management plan for public comment.

The number of compliance issues dealt with throughout the year also provides information on the effectiveness of the management arrangements, together with the number of concerns raised by the general public.

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.

There are currently no threat abatement plans, recovery plans or bycatch action strategies that relate specifically to the SMF. The NT submission details that the SMF management plan would be amended to facilitate a threat abatement/recover/bycatch action strategy, if one became relevant to the fishery.

Conclusion

Overall EA considers that the management arrangements implemented in the NT SMF are reasonably precautionary.

The Northern Australian Fisheries Managers Workshop provides an adequate forum for discussion of cross-jurisdictional management and assessment.

EA considers that the consultative process employed by NT Fisheries in the development and review of the management regime provides opportunity to all interested and affected parties, including the general public, to engage in the consultation process. The management regime for the SMF is adequately documented, publicly available and transparent and generally complies with relevant international regimes to which Australia is a party.

EA supports the SMF specific objectives and performance criteria and trigger points for target, byproduct, bycatch and protected species as outlined in the NT submission.

EA considers that the range of input and output management measures used in the SMF are capable of controlling the level of harvest during the period of data collection and analysis associated with improved stock assessment.

EA concurs with NT's submission that the limited launch or docking sites, together with a dedicated fisheries enforcement unit, are sufficient to enforce the critical aspects of the management arrangements.

Although there are no threat abatement/recovery/ bycatch action strategies currently relevant to the fishery the NT submission details that the SMF management plan would be amended to facilitate a threat abatement/recover/bycatch action strategy if one became relevant to the fishery.

Further analysis of specific aspects of the management regime is contained in Part II of this report.

Recommendations

- Inform Environment Australia of any future amendment to the management regime for the Spanish Mackerel Fishery
- Formalise the objectives, performance indicators, trigger points and management actions outlined in Table 1 of the NT submission into the Spanish Mackerel Management plan, as appropriate.
- By 2005 formalise guidelines, including clear timeframes for implementation, for undertaking a review of the fisheries management arrangements once reference points and triggers are reached.
- Conduct a compliance risk assessment for the Spanish Mackerel Fishery during the life of the approval encompassing compliance risks for both the commercial and recreational sectors.
- Report on objectives, performance indicators and triggers for the Spanish Mackerel Fishery in the annual status report from 2003.

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 stock levels

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

Commercial fishers are required, under the NT *Fisheries Act 1988*, to provide logbook returns to the NT Fisheries Division listing catch and effort and market details on a monthly basis. Fishers have the option to record fishing information on a daily basis. Logbooks record location of fishing operations, information pertinent to SM catch (number of fish and total weight), effort and all byproduct species. Locations are required at the precision of one-degree square grids but many operators provide information of a finer precision by specifying fishing grounds or GPS fixes.¹⁰

FTOs are required to record daily logbook returns on all catch (retained or released), effort and locations details. These are submitted monthly.

Market returns, which are required to be submitted with catch and effort logbooks, also serve to audit catch returns. These returns detail target and byproduct species catch and their sale destinations. Any discrepancies detected through data entry are investigated. NT Fisheries are in the process of refining the logbook data entry process together with the validation of market returns. EA considers that data verification in this fishery is particularly important given the small number of operators and hence the possibility of correspondingly large contribution of information error by each operator.

NT Fisheries observers undertake regular monitoring onboard vessels (typically occurring 6 times a year), to validate catch returns and audit the manner in which commercial fishers complete returns. They may also sample fish for biological research including genetic analyses, gonad staging, measuring length and removing otoliths for age determinations.¹¹ Monitoring of catch is also undertaken wharf side by NT Fisheries research staff. Researchers charter commercial Spanish mackerel fishing boats to undertake research. 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 and to implement alternative data collection validation techniques if observer trips are no longer feasible.

Commercial Spanish mackerel fishers are trained by fisheries researchers to collect a range of biological information on their catch, such as the fork length of the fish, sex and the stage of gonad development. Commercial fishers and NT Fisheries observers sample a minimum of ten percent, and at times up to twenty percent of commercial catch, annually. Length, composition and

¹⁰ Buckworth and Clarke 2001

¹¹ See Appendix VIII of the NT submission for an example of a NT Fisheries research mackerel biological data pro forma.

reproductive status data were collected on samples of nearly 2000 fish during 2000 representing about 7% of the landed catch.¹² EA acknowledges the considerable contribution that has been made to the research and monitoring effort by the commercial sector.

Currently no fishery independent data is collected in the fishery due to the fact that Spanish mackerel does not lend itself to the independent assessment methods currently available. For example, fish school near reefs and shoals where the water is turbid precluding trawling and aerial surveys and Spanish mackerel are difficult to capture uninjured for tagging. Clear signals on harvest rates or abundance are unlikely to come from the fishery in terms of fishery dependant catch rates unless over fishing is marked. Therefore it is critical for confident management of the stocks that improved methods for monitoring harvest rates become available. EA 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 Status Report.

Limited information has been collected on the recreational and indigenous take of SMF species. A Territory wide recreational survey¹³ determined the estimate of landings of all mackerel species. The survey did not distinguish between the individual mackerel species therefore no accurate estimate is available of recreational catch. The National Recreational and Indigenous Fishing Survey (NRIFS), currently underway, aims to provide catch and effort details on the recreational and indigenous take of Spanish mackerel. NT Fisheries envisages that further catch assessments will be undertaken on a periodic basis, for these two fishing sectors.

EA concurs that the logbook information provided by commercial fishers and fishing tour operators, together with biological information gathered by commercial fishers and fisheries research observers, is reliable and appropriate to the size and scale of the fishery.

Assessment

A desktop review and assessment of the fishery are undertaken through the production of the annual Technical Report¹⁴ and Status Report¹⁵ and the Fisheries Assessment Reports (every 3-5 years). Technical reports detail all research and technical work undertaken by the DBIRD. The Status Report provides current information on catch/effort, stakeholder participation, research, compliance and management together with major issues that have occurred throughout the year. Fishery Assessment Reports identify historical and current stock assessments and implications for the management arrangements of the fishery.

SMF stocks are reviewed annually at the Northern Australian Fisheries Management Workshop (NAFMW), attended by fisheries managers, researchers and compliance officers from Western Australia, Northern Territory, the Commonwealth and Queensland.

Four major assessments of the status and dynamics of the SMF have been undertaken since the management of the fishery was passed to the Northern Territory Government in 1998. Stocks of SM were assessed just prior to the declaration of the fishery in 1991. Taiwanese gill net data was analysed in order to establish the potential magnitude of the annual sustainable yield of the fishery. Overall catches stabilised between 400t and 500t of SM through the early 1980s.¹⁶ Reductions in catch per unit effort and mean size in the fishery during the early 1980s suggests that the species

¹² Technical Annual Report 2000/01 at p. 280

¹³ FISHCOUNT Coleman 1998

¹⁴ Technical Annual Report 2000/01 Technical Bulletin No. 295 <http://www.nt.gov.au/dbird/dpif/pubcat/pdf/tar01.pdf>

¹⁵ <http://www.nt.gov.au/dbird/dpif/fisheries/aqresman/pdf/SpanishMackerel00.pdf>

¹⁶ Stevens and Davenport 1991

may have been overfished.¹⁷ These conclusions also supported the conclusions of earlier work on the status of the fishery.¹⁸

Genetic analyses have shown a substantial reduction in genetic variation over the last two decades consistent with a large reduction in population size by the foreign fishing of the 1970s and 1980s.¹⁹ NT Fisheries undertook a risk analysis and determined that investigation for a loss of heterozygosity is not a high priority compared to the need to establish other key biological/stock information for the fishery. NT Fisheries will keep a watching brief on any developments world wide on the issue.

Stock assessment of the SMF in 1992 concluded that catch and effort data were not informative about the impact of the fishery upon the stock.²⁰ This provided the impetus to collect otolith material to provide information on age structure. This study²¹ also concluded that fishing showed no detectable impact on the Spanish mackerel stocks. However, it was emphasised that this lack of impact may be due to hyperstability, a phenomenon frequently observed in schooling species where catches and catch rates can remain stable if schools are successfully targeted, even though the size of the fish stock is diminishing.²²

Two public stock assessment workshops on Spanish mackerel, lead by nationally and internationally recognised assessment scientists, were held in 1997 and 2000. The 1997 workshop concluded that the impact of the fishery on the stock, defined as the harvest rates or fishing mortality, still remained uncertain. The 2000 stock assessment workshop updated the assessment undertaken in 1997 and concluded that the target annual yield of 450 tonnes of SM should remain until the fishing mortality rate was more accurately defined and that the SMF is probably at or near sustainable catch levels.²³

The Fisheries and Research Development Corporation (FRDC) have approved the project “*GENETAG: genetic mark-recapture for real-time harvest rate monitoring : Pilot studies in northern Australia Spanish mackerel fisheries*” which is expected to be completed in June 2006. The project will assess the feasibility of *in situ* genetic sampling of SM and genetic auditing of the commercial catch. The aim is to enable monitoring of the catch for fishing mortality rates, seeking to overcome the current deficiency in stock assessment modeling for the fishery.

There are concerns about selective fishing of larger female fish in spawning aggregations in the Queensland Spanish mackerel fishery²⁴ and it was also raised as an issue in the public comment period. NT Fisheries consider that the low levels of effort and reduced fishing capacity lower the likelihood of targeting spawning aggregations impacting on sustainability. Additionally, the fishing method targets only feeding fish and Spanish mackerel are serial batch spawners resulting in the species having an irregular spawning period rather than a more vulnerable spawning period. EA is satisfied that current research will provide greater understanding of the movement of SM stocks and the sustainability of targeting spawning aggregations.

The current harvest of Spanish mackerel in the SMF (201 tonnes commercial catch in 2000) is substantially below the targeted annual yield (currently at 450 tonnes). NT Fisheries suggest that current fishing levels are unlikely to impair the stocks’ reproductive capacity. They also comment that removals by the fishery are likely to be substantially below any population fluctuations

¹⁷ Stevens and Davenport 1991

¹⁸ McPherson 1985

¹⁹ Technical Annual Report 2000/01 at p 281.

²⁰ Buckworth 1993

²¹ Hall and Buckworth unpublished cited in the NT submission

²² Hilborn and Walters 1992

²³ Clarke and Buckworth 2000

²⁴ Queensland Condition and Trend Report at p 89.

imposed by environmental variations and as such are also unlikely to have an impact on biological diversity.

Preliminary research from the FRDC funded project: *Stock Structure of Northern and Western Australian Spanish mackerel* (98/159), indicates that Spanish mackerel are not as highly migratory as previously thought and that there may be several semi-discrete stocks across the NT coast. This fine scale of mackerel stock structure will need to be taken into account in future management. The NAFMW has identified SM as a species that may require complementary management. Results of the FRDC project, which are currently in the process of being completed, will be reviewed by SMACFMAC who will then provide recommendations to the NT Director of Fisheries. These may include joint management between the states and Territory or management responses to cater for the individual SM stocks. EA strongly supports the incorporation of these results into management of the fishery.

NT Fisheries contends that there is a low risk of regionalised depletion of SM stocks due to the relatively low number of commercial and recreational fishers and fishing tour operators. The spatial catch and effort information of the commercial SMF is reviewed annually via the production of the status report. EA is satisfied that NT Fisheries is taking a pro-active role in determining the stock structure of SM and has a process for incorporating the outcomes of the research into management responses.

EA is satisfied that there are measures in place to determine reliable estimates of removals, including commercial, recreational and indigenous, from the SMF. FTOs, SM commercial operators, operators who take SM in other NT fisheries and Commonwealth fisheries all supply catch returns that are incorporated into stock assessments of NT Spanish mackerel.

Currently little reliable information is available on the capture rates of Spanish mackerel by recreational and indigenous fishers in this fishery. An estimate of the proportion of SM taken by recreational fishers based on anecdotal evidence is included in stocks assessments. Stock assessment will include data from the National Recreational and Indigenous Fishing Survey, the results of which are expected to be released early in 2003. NT Fisheries comment that there is no evidence of illegal take and as such there is no estimate of illegal catch.

A target yield of 450 tonnes of Spanish mackerel from all sectors has been established based on the long-term reported landings of SM by foreign fishing fleets (for the period 1980 – 1995), which stabilised around 400 to 500 tonnes per annum. A notional catch limit from all sectors of 90% of this target annual yield has been defined as a trigger point for the fishery. With the lack of information necessary for alternative assessments this precautionary target has been adopted. Commercial catch rates of byproduct species are available from logbook returns. Because byproduct catch rates are low (currently less than 2.5% by whole weight of the commercial SMF), the NT submission details that stock assessments and estimates of the potential productivity of the fished stock will not be undertaken on these species.²⁵

The commercial fishery catch and effort data used for stock assessment modelling have been inadequate for improved assessment and estimation of production potential.²⁶ A mark and recapture method currently being trialed by researchers seeks to assist with estimating the fishing mortality rate and further refine the total biomass estimates for Spanish mackerel in Northern Territory waters (FRDC project *Genetic mark-recapture for real-time harvest rate monitoring. Pilot studies in northern Australia*). This information will provide an improved understanding of the potential productivity of the fished stock and a more precise potential harvest.

²⁵ See Figure 2 of the NT submission for a graph of byproduct as a percentage of the total Spanish mackerel catch

²⁶ Buckworth and Clarke 2001

The current rates are between 10-30% of the estimated biomass vulnerable to fishing of the Northern Territory stocks (Rik Buckworth pers com. 2003). It has been predicted (from the analysis listed in Principle 1.1.2) that safe levels of fishing are between 20% and 30% of the fishable biomass for this species.

NT Fisheries have recently reviewed the strategic research needs for all NT fisheries, including the SMF, and developed the *Northern Territory Strategic Plan for Fisheries Research and Development 2002 to 2006*.²⁷ The NAFMW reviews the current stock assessment estimates and research priorities for all NT fisheries.

Management response

NT Fisheries has implemented a range of management measures that should be capable of controlling the level of take in the fishery. The overall impact of the SMF on Spanish mackerel and byproduct stocks is largely unknown. NT Fisheries manages this uncertainty through a series of precautionary management responses as outlined in Table 3 and a series of performance indicators and triggers as summarised in Table 2. NT Fisheries believes that the management strategies in place are capable of controlling the level of take in the fishery.

The management regime for the NT SMF contains a range of performance indicators linked to trigger points as summarised in Table 2. A target aggregate annual catch of 450 tonnes of Spanish mackerel from all sectors was chosen, based on the equilibrium catch of the Taiwanese operated gill net fishery, as the notional catch limit for SM with 90% of the estimated yield (by whole weight) defined as the major reference point for the SMF. If 90% of the estimated sustainable yield (by whole weight) is reached from all sectors, NT Fisheries Division will request SMACFMAC to review management arrangements so that the total take of Spanish mackerel will not exceed sustainable yield estimates. NT Fisheries have committed to gathering information that would support a move to a precautionary biological reference point for Spanish mackerel.

Additionally, a 30% decline in the total catch of the fishery (by whole weight) will trigger a review of the fishery and the management arrangements. Concerns regarding the adequacy of the level of the 30% decline trigger were raised during public comment. NT Fisheries contend that the trigger is adequate given the low number of participants in the fishery and stringent input controls coupled with the influence of weather in catch levels.

The NT submission proposes the introduction of sectoral catch shares where each sector (commercial and recreational) is allocated a share of the fishery. Individual sectors will trigger revised management arrangements for that sector if that sector's catch level changes (increase or decrease) by more than 20 percent (whole weight). Concerns were raised during public comment regarding the lack of an indigenous catch share. NT Fisheries have commented that the indigenous take of Spanish mackerel will be incorporated into the sectoral catch share arrangements currently being developed.

EA welcomes the introduction of performance indicators and triggers in the fishery and suggests refining these over time.

NT has committed to develop a Spanish mackerel Byproduct Action Plan for fisheries targeting species other than Spanish mackerel and to implement the Plan within the first year of the decision. NT Barramundi and Shark fisheries have agreed to implement Spanish mackerel byproduct limits and discussions with Finfish trawlers to determine a byproduct limit are underway.

²⁷ http://www.nt.gov.au/dbird/dpif/pubcat/books_reports/fishstratpln_revision2002/R&D%20Plan_wk_Final_161002.pdf

Given the population growth, particularly around the Darwin region, and the pressures that increased recreational effort place on the fishery, the recreational sector has agreed to consider a review of the possession limit for SM, should information from the NRIFS suggest that the recreational sector harvests a significant portion of the resources. The NT submission comments that the sectoral catch allocation seeks to address the expected growth by the recreational sector.

A number of the public comments raised the issue that the inference in the Fishery Assessment Report is that the recreational catch of SM is substantial and may be of a similar magnitude to the commercial troll fishery, suggesting that the fishery may be close to or even above the target annual yield of 450 tonnes. NT Fisheries have committed to reviewing management arrangements should the landings reach the trigger point as a result of inclusion of data from the NIRFS.

EA considers that the current and proposed management responses for managing the Spanish mackerel stocks are adequate to address potential negative impacts that may arise during the period of data collection and analysis associated with improved stock assessment.

On balance EA considers that management arrangements for the SMF ensure that fishing is conducted in a manner that should not threaten stocks of byproduct species. The selective nature of SM fishing gear and targeting practices restrict the take of byproduct to other pelagic species, which comprise less than 2.5 % percent (by whole weight) of the commercial SMF catch. NT Fisheries considers that as byproduct is incidentally caught in all NT waters, effort is dispersed thereby discounting any chance of localised depletions of byproduct species. Although there is no defined byproduct list for the fishery, EA is satisfied that that the current byproduct and bycatch trigger will ensure that a shift towards targeting species other than SM will be detected. This reference point does not look at shifts in targeting specific species within the 10%. As such NT Fisheries have undertaken to 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.

Byproduct is monitored through the commercial logbooks and assessed annually as part of the production of annual Status and Technical Reports. An increase to 10% of the total catch of the fishery (whole weight) of byproduct will trigger a review of the current management action and discussion at SMACFMAC will commence. As noted earlier the NT Spanish Mackerel Troll Line Association has voluntarily implemented a nil byproduct limit of shark in the fishery which is now a condition of the licence. EA commends this proactive move by the commercial industry.

The use of floating lines and 10-12 size hooks or lures (favoured by commercial and recreational fishers) minimises the incidental capture of non-marketable or undersized fish and any sedentary species. Elsewhere in the world, fewer resource sustainability problems have been encountered with *Scomberomorus* line-based fisheries, as used in the NT SMF, compared to gill-net fisheries for this species.²⁸

The NT submission concludes that analysis of byproduct data from logbook returns and observers shows that byproduct is of such insignificant levels that commercial SM fishing is not considered a risk to the stocks of these species. The submission details that given the size and scale of the SMF, it is not appropriate or possible to undertake research on byproduct species. Trevally and coral trout, the main byproduct species, are target species in fisheries in other Australian jurisdictions and NT considers that they are not particularly vulnerable to fishing pressure exerted by this fishery.

On balance EA considers that the input and output management strategies in place coupled with performance indicators and triggers should be capable of controlling the level of take in the fishery.

²⁸ Williams, L Ed. (2002). Queensland Fisheries resources: Current Condition and Recent Trends 1988-2000, Queensland Government: Department of Primary Industries. At p. 93.

The management of the SMF has a high chance of ensuring that catch levels maintain ecologically viable stock levels with acceptable levels of probability in the short to medium term.

Conclusion

NT Fisheries currently have an adequate data collection system for the collection of fishery dependant data. The current limited information on the recreational and indigenous catch will be enhanced by the NIRFS. Independent data collection is currently cost prohibitive and NT Fisheries will continue to seek out alternative fishery independent methods.

EA is satisfied that the doubts surrounding the spatial structure of the SM stock are currently being addressed through the FRDC study and that NT Fisheries has committed to implementing the recommendations.

Assessment and review of the SMF appears to be well coordinated through the annual Technical and Status reports and the Fisheries Assessment Reports (every 3-5 years) coupled with the NAFMW, public stock assessment workshops and stock assessments.

Stock assessment is still quite unreliable due to reliance on CPUE data and uncertain foreign fishing data. EA acknowledges that NT are currently addressing the lack of a fishing mortality rates needed for more refined stock assessment modelling, however, results from this research will not be available for at least another 3 years.

Recommendations

- Include yearly results of observer surveys (including information on target species, bycatch and protected species interactions) in the annual status report and to implement alternative data collection validation techniques if observer trips are no longer feasible.
- Continue to seek alternative cost effective fishery independent sampling techniques and report outcomes in annual status report.
- Gather information that would support a move to a precautionary biological reference point for Spanish mackerel.
- Implement the byproduct action plan, for fisheries targeting species other than Spanish Mackerel within the first year of the approval.
- 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.

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.”*

Management Response

NT Fisheries considers that the management triggers in place, particularly the 30% catch decline trigger, should be sufficient to allow enough time for consultation and adjustment of appropriate management controls before the fishery becomes threatened. Given this, NT Fisheries concludes that the SMF should never be fished below a point whereby stocks are not ecologically viable and hence there is no need for a recovery strategy. Further, the management controls under which the SMF is managed are based on the precautionary approach and should never allow the fishery to fall to levels nearing the biological and/or effort bottom line. The *NT Fisheries Act 1988* provides for a

management response, including emergency measures if required. As mentioned previously NT Fisheries have 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 EA concurs with this assessment.

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

Bycatch in the SMF is negligible (estimated to be <1% of catch by whole weight) due to the fishing gear used and targeting practices. SM fishing practices involve fishing from dories where troll lines are tended as soon as fish are caught, allowing fishers to quickly release unwanted species. Bycatch in the commercial fishery is mainly comprised of large sharks, which usually break free, or the fisher cuts the line to release the shark.

As bycatch is negligible and poses no threat to bycatch species stocks, commercial fishers are not required to record bycatch under the compulsory logbook returns. Observers and fishery dependant research have established the negligible take of bycatch, which are monitored on research-based trips typically occurring 6 times a year. The NT submission asserts that this method of bycatch monitoring is reliable and appropriate to the size and scale of the fishery. As mentioned previously, NT Fisheries has committed to include yearly results of observer surveys in the status report and to implement alternative data collection validation techniques if observer trips are no longer feasible.

The SMF does not target small fish and if small fish are caught they make up a very small proportion of the catch. All Spanish mackerel are retained. Marketing preference is for fish larger than 90cm, hence fishers will relocate fishing operations if smaller fish are encountered. There is no discarding of “undersized” Spanish mackerel. Spanish mackerel are generally sexually mature and have spawned before becoming vulnerable to the fishery. EA has concerns that the fishery could shift to targeting immature fish. NT Fisheries that this is very unlikely and shouldn't be a concern. However, as a precautionary measure they have committed to monitoring the size composition of the commercial catch of Spanish mackerel and to introduce additional management measures if the catch composition shifts to pre mature fish.

EA considers that suitably reliable information, appropriate to the scale of the fishery, is collected on the composition and abundance of bycatch.

Assessment

The vulnerability of bycatch species to targeted Spanish mackerel fishing is considered to be minimal due to the negligible levels of bycatch (due to the highly selective targeting practices used in the fishery) and very little association of bycatch species with schooling mackerel. Levels of bycatch in the fishery are reviewed in the annual Technical and Status Reports for the SMF.

Given the negligible level of bycatch taken of species that are taken in high numbers elsewhere in the country (eg coral trout), coupled with triggers, NT has not undertaken a risk assessment and analysis of bycatch species.

Management response

The selective gear used in the fishery limits capture of bycatch species and also allows immediate release of bycatch if caught. NT Fisheries considers that the level of bycatch taken is sustainable. Although bycatch is currently considered negligible NT have incorporated a precautionary trigger so that a review is triggered if the level of bycatch should increase to 10% of the catch. As detailed previously NT Fisheries have committed to 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.

The *Guidelines* suggest that an indicator group of bycatch species could be monitored with associated decision rules that trigger additional management measures when there are significant perturbations in the indicator species numbers. Monitoring an indicator species will also facilitate the best possible use of monitoring resources. An indicator group of bycatch species has not been identified in this fishery. NT Fisheries considers that as bycatch levels are low in the fishery an indicator group of bycatch species is not appropriate to the scale of the fishery given the levels of bycatch. EA concurs with this response.

Conclusion

EA considers that the permitted fishing apparatus and operational nature of the SMF limits bycatch and this, together with a performance indicator and trigger, should ensure the probability of achieving the objective of not threatening bycatch is high.

Recommendation

- Monitor the size composition of the commercial catch of Spanish mackerel and to introduce additional management measures if the catch composition shifts to pre mature fish.

Listed species and threatened ecological communities

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 collected from commercial fishers’ and FTO logbooks, independent observers and technical and research officers has not indicated any interaction with endangered, threatened or protected species. NT considers that the information gathered from these sources is reliable and appropriate to the scale of the fishery. NT Fisheries has undertaken to make reporting of all protected species interactions compulsory and to implement an education program to ensure industry has the capacity to make accurate reports.

There are currently no threatened ecological communities identified in NT waters.

Assessment

Currently there is no assessment of the impacts of the fishery on threatened species as there is no interaction. NT Fisheries has committed, in the event of an observed interaction with an endangered, threatened or protected species, to undertake an immediate review of the situation and may change any aspect of the fishing operation by imposing conditions on the licence and/or amending the SMF management plan.

There are currently no threatened ecological communities identified in the fishery area, consequently no information collection system or assessment is required. Should a threatened marine ecological community be declared NT Fisheries has committed to implement appropriate changes to the licence conditions or the SMF management plan to minimise any possible impact of the fishery.

Management response

EA considers that the nature of the fishing gear and the targeted fishing practises of the Spanish mackerel fishery avoids interaction with endangered, threatened or protected species.

Given that there are currently no recorded interactions with endangered, threatened or protected species and there are no identified threatened ecological communities in NT waters the SMF has a high probability of achieving the objective. There is also added confidence on the fisheries ability to minimise impact through NT’s commitment to undertake a review and adopt new management strategies if required.

Conclusion

Overall the risk of the fishery impacting on protected species and ecological communities is likely to be low. EA considers that the SMF operates in a manner that should avoid mortality of, or injuries to, endangered, threatened or protected species and should avoid or minimise the impacts on threatened ecological communities.

As there are no ecological communities identified in the fishery area the development of an information collection system, risk assessment and management arrangements are not required at

this time. EA understands that should such a community or threatened species interaction be identified, NT Fisheries will take appropriate management action in a timely manner.

Recommendations

- Make reporting of all protected species interactions compulsory and to implement an education program to ensure industry has the capacity to make accurate reports.

Ecosystem Protection

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. There has been no formal information collection system dedicated to determining the impact of the fishery on the ecosystem or broader environment. NT Fisheries comments that this is due to the fact that the SMF is a surface-based fishery of hand-hauled hook, line and lure method, that does not impact on any part of the ecosystem apart from the first few meters of the water column. FTOs, recreational and indigenous fishers use similar gear and targeting methods. Observers and fishers report to NT Fisheries any interaction with the ecosystem. To date there has been no reported incidents from the fishery observers who undertake monitoring voyages about 6 times a year.

Assessment

The SMF targets surface schools of SM and subsequently there is no interaction with benthic communities. The only benthic impact may occur during anchoring. The NT assessment details that anchors are usually deployed in barren ground where there would be minimal benthic interaction.

As with the majority of the world’s fisheries, there is a poor understanding of the food chains and predator-prey relationships operating in the SMF area. NT Fisheries asserts that given the complex web of predators and competitors within which SM exist it is highly unlikely that the current level of fishing will have any measurable effect on ecologically associated species. NT Fisheries comment that a low participation base and resulting minimal licensing fees preclude the feasibility of investigating the systemic role of Spanish mackerel or any ecosystem impact assessment of the fishery. NT Fisheries considers that there is a low risk of any impact on ecological communities by the SMF and so no information has been collected on these communities.

The only possible impact to water quality is through poorly maintained vessels and the leaking of mechanical fluids and fuels. The NT *Marine Act* requires vessels to be maintained and not discharge any materials into the water. The Marine Branch, of the Department of Infrastructure, Planning and the Environment, is responsible for checking vessel maintenance and safety, by annual survey inspections. The Department inspects vessels wharf side and at sea for their compliance and sea worthiness.

Management response

Overall impact of the SMF on the wider environment is unknown. As there are no identified impacts of the fishery on the ecosystem no management actions are currently in place. If a threat to

the ecosystem was identified, an analysis of the threats and proposed mitigation will take place immediately through the combined efforts of the NT Fisheries Division and related environmental governing agencies. The NT submission details that if the threat warrants an urgent response, the Minister for Fisheries has the power under Section 26 of the NT *Fisheries Act 1988* to impose emergency controls on the fishery.

The NT submission concludes that as the SMF imposes no risk and has minimal interaction with all components of the ecosystem, there is currently no monitoring of any ecosystem indicators. Should any aspect of the fishery change that may affect any component of the ecosystem or the environment as a whole, a monitoring program will be devised and incorporated into the Spanish mackerel research program. Monitoring would assess any changes, the level of change and any impact on target or bycatch stocks or the environment. If any detrimental effects are identified, suitable methods of rehabilitation and avoidance would then be built into the Spanish Mackerel Fishery Management Plan and would become enforceable under the Plan.

The management response should achieve the objective given that there is minimal impact of the fishery on the ecosystem generally.

Conclusion

Given the relatively benign impact of the fishing gear on the physical environment, the only risk to the ecosystem appears to be a lack of understanding of food chain relationships and the subsequent impact on predator prey relationships. This is not considered a high risk given the capacity of the current management arrangements to limit stock harvest and maintain stock biomass. EA concludes that the low bycatch levels, lack of interaction with protected species and benign impact on the physical environment, means that the fishery generally meets Objective 3 and is conducted in a manner that minimises the impact of fishing operations on the ecosystem generally.

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Table 4 Acronyms

AFANT	Amateur Fishermen's Association of the Northern Territory
AFZ	Australian Fishing Zone
DBIRD	Department of Business, Industry and Resource Development
EA	Environment Australia
EPBC Act	<i>Environment Protection and Biological Conservation Act 1999</i>
FRDC	Fisheries Research and Development Corporation
FTO	Fishing Tour Operators
NAFMW	Northern Australian Fisheries Managers Workshop
NRIFS	National Recreational and Indigenous Fishing Survey
NTSC	Northern Territory Seafood Council
PFMEU	Police, Fisheries and Marine Enforcement Unit
SM	Spanish Mackerel
SMACFMAC	Spanish Mackerel Fishery Management Advisory Committee
SMFMP	Spanish Mackerel Fishery Management Plan