



Australian Government

Department of the Environment and Heritage

Assessment of the
New South Wales Estuary Prawn Trawl Fishery

January 2004

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Assistant Secretary
Wildlife Trade and Sustainable Fisheries Branch
Department of the Environment and Heritage
GPO Box 787
Canberra ACT 2601

ISBN: 0642549435

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This document is an assessment carried out by the Department of the Environment and Heritage of a commercial fishery against the Australian Government Guidelines for the Ecologically Sustainable Management of Fisheries. It forms part of the advice provided to the Minister for the Environment and Heritage on the fishery in relation to decisions under Parts 13 and 13A of the EPBC. 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 New South
Wales Estuary Prawn Trawl Fishery**

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	4
Background.....	4
Summary of NSW EPT Fishery.....	4
Overall assessment.....	6
Recommendations.....	6
PART I – MANAGEMENT ARRANGEMENTS.....	7
Conclusion.....	10
Recommendations.....	10
PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES.....	11
<i>STOCK STATUS AND RECOVERY.....</i>	<i>11</i>
Maintain ecologically viable stocks	11
Information requirements	11
Assessment	12
Management response.....	13
Conclusion.....	15
Promote recovery to ecologically viable stock levels	15
<i>ECOSYSTEM IMPACTS.....</i>	<i>16</i>
Bycatch Protection	16
Information requirements	16
Assessment	17
Management response.....	17
Conclusion	18
Protected Species and Threatened Ecological Communities	19
Information requirements	19
Assessment	19
Management response.....	20
Conclusion	20
Recommendations.....	20
Minimising Impactions on the Ecosystem	21
Information requirements	21
Assessment	21
Management response.....	22
Conclusion	23
ACRONYMS.....	24

EXECUTIVE SUMMARY

Background

New South Wales (NSW) Fisheries has submitted documentation to the Department of the Environment and Heritage (DEH) for assessment under Part 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The NSW Estuary Prawn Trawl (EPT) Fishery Environmental Impact Statement (EIS) contained the draft Fishery Management Strategy (FMS) and was received by DEH in February 2002 after a period of discussion between NSW Fisheries and DEH, during which preliminary drafts were refined. It was released for public comment on 1 March 2002. The public comment period ended on 15 April 2002 with a total of 57 submissions received. NSW Fisheries then submitted a Preferred Strategy Report to DEH for a preliminary assessment. This report was submitted simultaneously to Planning NSW for comment. Comments from DEH and NSW Planning were incorporated into a final FMS.

The final FMS (the submission) was then determined by the NSW Minister for Fisheries and was submitted to DEH for final assessment under the EPBC Act in February 2003. The new fishery management strategy includes significant improvements to the previous management arrangements of the fishery.

The DEH assessment considers the submission and associated documents, public comments and NSW Fisheries response to the comments. It assesses the EPT Fishery against the Australian Government Guidelines for the Ecologically Sustainable Management of Fisheries.

Summary of NSW EPT Fishery

Area	Fishing occurs in four NSW estuaries – Clarence, Hunter and Hawkesbury Rivers and Port Jackson.
Target Species	School Prawn (<i>Metapenaeus macleayi</i>), Eastern King Prawn (<i>Penaeus plebejus</i>), Broad Squid (<i>Photololigo etheridgei</i>) and Bottle Squid (<i>Loliolus noctiluca</i>).
Byproduct Species	29 species, a mix of finfish and invertebrates.
Fishery status	Most species are fully fished, all others are unknown status.
Gear	Otter trawl gear. Requirements vary between estuaries. Ranges from one net with headrope length of less than 11m to two nets with total headrope length of 22m.
Season	Clarence – start of October to end of May Hunter – start of December to end of May Hawkesbury – open all year Port Jackson – end of October to mid April
Commercial harvest prawns	510 tonnes in 00/01
Commercial harvest byproduct	59 tonnes in 00/01
Value of commercial harvest (including byproduct)	\$4 million in 00/01
Recreational harvest	Unknown
Commercial licences issued	219 businesses endorsed in September 2002. Approximately 50% of businesses fished less than 15 days in 2001.
Management arrangements	Primarily input controls
Export	Minimal
Bycatch	Various
Interaction with Protected Species	Believed to be very limited

The NSW EPT fishery operates in four estuaries of the NSW coastline. These estuaries are the Clarence River, Hunter River, Hawkesbury River and Port Jackson. This fishery is entirely within State waters.

The fishery targets prawn species in all estuaries and squid species in the lower Hawkesbury River (Broken Bay). The byproduct that may be retained is specified in the FMS. There are lists of allowable species, which are exclusive to individual estuaries, coupled with limits on the quantities of byproduct that can be retained. These allowable catches are proportional to the catch of target prawn species by individual vessels. Some target and byproduct species are also targeted, and/or retained as byproduct, in the NSW Estuary General, Ocean Haul and recreational fisheries and fisheries in other jurisdictions, such as the Queensland (Qld) East Coast Otter Trawl fishery.

The target species in the fishery are short lived species, rarely observed at older than two years of age. Some of the species occurring in these estuaries are in a juvenile stage of their life cycle and migrate out into the marine environment in their adult stage. These species are also harvested during their adult phase, in a variety of fisheries as indicated above. Research into the lifecycles of the target species has resulted in the closure of various areas of important juvenile habitats, including seagrass beds, and has led to a winter closure in three of the four estuaries. The need for a seasonal closure in the Hawkesbury River will be reviewed within three years and this is discussed further under Principle one, Objective one. In general, estuaries are regarded as essential nursery grounds for a large variety of marine and freshwater species.

Approximately 569 tonnes of product was harvested in the EPT fishery in 2000/01, at an estimated value of \$4m. Estuary prawn trawling began in Port Jackson in 1926 and in four other estuaries during the 1940s. Botany Bay was closed to otter trawling in 2002 and the 48 previous entitlements to prawn trawl in that estuary were bought out. Stocks of the fishery appear to have been fairly stable over the last few decades, however comprehensive stock assessments are yet to be conducted. NSW Fisheries believes the target species to be fully fished. Product is either chilled, frozen or cooked (occasionally on board the boat) and sold predominantly into domestic markets.

The fishery targets prawn and squid species with otter trawl gear. There are restrictions on the size of the vessel, the fishing gear and the operating procedures. Some gear restrictions vary between the four different estuaries. Bycatch reduction devices (BRDs) are compulsory for all fishers targeting prawns. Research is currently underway to identify devices suitable for use in squid operations.

Fishery management arrangements include temporal and spatial closures, unique to individual estuaries. Fishing entitlements are exclusive to the one estuary, and in the case of the Clarence River Estuary, the one part of the estuary, that they are assigned to. Currently 219 businesses have EPT fishery endorsements. Six businesses are endorsed to fish in more than one estuary. The latent effort in this fishery is significant. Approximately 50% of the entitled businesses fished less than 15 days during 2001.

As in any trawl fishery, bycatch to target ratios are high, with a large variety of species caught. Some bycatch species in this fishery are currently listed protected species under NSW legislation and the EPBC Act. Protected species interactions in this fishery are predominantly with species protected under NSW legislation, such as Australian Bass and Estuary Perch. Provisioning of seabirds also occurs through the discarding of bycatch.

Indigenous take of target species is insignificant. Many of the target and byproduct species in the EPT fishery are targeted by recreational fishers within and outside the fishery area.

Overall assessment

The FMS includes a range of new actions, including monitoring, assessments and management responses, to be implemented over the next five years and beyond. These new actions will help to ensure the commercial utilization of the Australian native wildlife of the fishery is managed in an ecologically sustainable way in the future. Due to extensive consultation between NSW Fisheries and DEH during the development of the FMS, many of DEH's issues and recommendations have already been addressed and implemented in the strategy.

There are many uncertainties in this fishery, and many of the actions to address them will not be implemented for another five years. Some do not have a timeframe specified and will occur as resources and priorities dictate. Due to the nature of trawl fisheries, it is possible that unacceptable impacts may still occur in the medium term. Therefore DEH considers the inclusion of the catch on the list of exempt native specimens for the next five years, without interim review, would not be sufficiently precautionary.

The operation of the fishery is consistent with the objects of Part 13A of the EPBC Act. Given the management arrangements specified in the FMS, DEH is satisfied that the fishery will not be detrimental to the survival or conservation status of the taxon to which it relates in the short term. Similarly, it is not likely to threaten any relevant ecosystem in the short term. DEH therefore recommends that the fishery be declared an approved Wildlife Trade Operation (WTO) with the actions specified in the recommendations to be undertaken by NSW Fisheries. This declaration would be effective for a period of three years. The WTO declaration will require biennial reporting on the performance of the fishery against the management arrangements.

Recommendations

1. NSW Fisheries to inform DEH of any changes to the FMS.
2. NSW Fisheries to ensure that ecological sustainability considerations take precedence over other considerations in determining an acceptable range in response to a trigger point review.
3. The systematic risk based assessment on the interaction and impacts of commercial fishing on protected and threatened species, populations or communities to consider the impacts of provisioning through discards.

PART I – MANAGEMENT ARRANGEMENTS

The NSW EPT fishery is managed by NSW Fisheries. This agency is the State's principal agency responsible for conserving the aquatic environment and managing fisheries resources. The FMS has been developed to be consistent with the requirements and objects of the EPBC Act, the *NSW Environmental Planning and Assessment Act 1979* and the *NSW Marine Parks Act*.

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

- The *Fishery Management Strategy for the Estuary Prawn Trawl Fishery, February 2003*
- The *NSW Fisheries Management (General) Regulation 2002*
- An EPT Share Management Plan

The EPT Share Management Plan (SMP) can only be implemented after the NSW Minister for Fisheries has made a determination with respect to the fishery, and after provisional shares have been issued. The SMP will provide a legislative structure for the class or classes of shares and the rights of shareholders.

During the transition to full share management, criteria for the allocation of shares and an allocation formula are decided. Based on the criteria and applications received, provisional shares are issued. A limited access stage then commences in which a licensed fisher must hold at least one provisional share in the fishery to be eligible to hold an endorsement. A SMP for the fishery is prepared and put into regulation, final shares are issued and the fishery commences as a full share management fishery.

The SMP will also bring into operation a number of aspects of the fishery described in the FMS, such as a share forfeiture scheme as a compliance and enforcement tool. The SMP will include objectives and performance indicators that will be consistent with the FMS.

The FMS and the NSW fisheries legislation are publicly available, and the FMS was developed through a consultative process. The public comment period was widely advertised and this is reflected in the large number of public comment submissions received. In addition, there is a range of consultative bodies designed to advise on fisheries issues in NSW.

The NSW Minister for Fisheries is advised by the Estuary Prawn Trawl Management Advisory Committee (the MAC) on:

- The preparation of any plan, strategy or regulations for the fishery;
- Monitoring whether the objectives of the management plan, strategy or those regulations are being attained;
- Reviews in connection with any new management plan, strategy or regulation; and
- Any other matter relating to the fishery.

Membership of the MAC consists of representatives from industry from all four estuaries in the fishery, recreational fishers, indigenous interests, conservation interests and Government interests and is chaired by an independent person.

The NSW Total Allowable Catch (TAC) Committee consists of an independent chair, a natural resource economist not employed by the Government, a fishery scientist not employed by the Government and other persons appointed by the Minister who have appropriate fisheries management qualifications. This committee will not develop a TAC for the fishery, but will make determinations about the total level of fishing effort to apply in the capture of prawns. These are

legal determinations under the *NSW Fisheries Management Act 1994*. This is discussed further in Part Two.

A cross-fishery stakeholder group will meet on an as-needs basis to provide for cross fishery consultation regarding commonly shared prawn stocks. It will consider operations in the Estuary General and Ocean Trawl fisheries and Indigenous and recreational fisher interests.

In addition to the consultative requirements of these bodies, the FMS includes two performance indicators relating to improving the knowledge of the community about the operations and management of the fishery. Management strategies to address these indicators are specified in the FMS.

The development of the FMS has resulted in the creation of clear performance criteria, triggers, timelines, management responses and associated monitoring programs. They have been developed to address each of the eight goals of the FMS and many goals have several associated performance measures. These will be implemented with the introduction of the FMS. The effectiveness of some of these measures is currently uncertain as their introduction is a significant change to past management practices.

Some performance measures are still in development and so contingent measures have been implemented in the interim. Reporting against the performance measures will occur on an biennial basis however some triggers will not be applicable for several years as they have been designed to incorporate information from future research and actions in the fishery.

If trigger levels are breached at any time, a review must be presented to the Minister for Fisheries within three months of the breach. This review will be conducted in consultation with the MAC and may also require input from representatives from other fisheries. Some triggers have suggested interim measures until the review is complete, but these have not been formalised as decision rules in the FMS.

The NSW Fisheries submission indicates that if the review concludes that the FMS objectives are compromised by continued, unchanged operations then management action should be taken to ensure the indicators return to an acceptable range within a specified time period. The FMS does not specify what is considered to be an acceptable range for each of the performance indicators. Determining an acceptable range should include consideration of issues that will be identified through the review. DEH considers that ecological sustainability considerations should take precedence over other considerations in the determination of these acceptable ranges and therefore recommends that NSW Fisheries implement this approach.

A review may also result in the NSW Minister for Fisheries amending the FMS performance measures or objectives if the review concludes that they are inappropriate. The submission does not specify restrictions on this authority, aside from the review requirements through the MAC. DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Due to the importance of the FMS to DEH's assessment of the fishery, any change to it could change the outcome of this assessment. DEH therefore recommends that NSW Fisheries inform DEH of any changes to the FMS.

The FMS manages the level of take in the fishery through a variety of input and output controls. Input controls limit the amount of effort placed on the resources. In the NSW EPT fishery input controls include:

- Limited entry – 219 endorsements at September 2002;
- Boat capacity and replacement restrictions;

- Various spatial and temporal closures within each estuary;
- Gear restrictions specific to each estuary;
- Incidental catch ratios specific to each estuary, including move on provisions; and
- Total effort cap on all fisheries sharing prawn stocks is still in development.

Output controls in the fishery include:

- Byproduct landing limits which allow byproduct species to be retained at amounts proportional to the prawn landings;
- Limited list of species able to be retained; and
- Maximum prawn counts are still in development (effectively implementing a biologically based size limit).

There are several ways in which the management arrangements in this fishery are enforced and compliance encouraged. These include:

- Pre-season inspections of gear (September in the Hawkesbury River which does not have a seasonal closure);
- Random on-board inspections of catch and gear throughout the fishing seasons;
- An endorsement suspension scheme and share forfeiture scheme based on demerit points;
- Publication of successful prosecutions;
- Requirements for registered fish receivers; and
- Review required if compliance rate from inspections drops below 85%. (The actual compliance rate in 99/00 was 91%. Improved inspections are expected to reduce this rate).

NSW Fisheries, in consultation with the MAC will develop, implement and monitor a compliance audit scheme and operational plans for each estuary and encourage voluntary compliance through educational programs. The District compliance plans are subject to fortnightly review to consider any changed circumstances and are also subject to an annual review. DEH is satisfied that the compliance provisions in place contain the means of enforcing critical aspects of the management arrangements.

An annual review will be conducted against the goals in the FMS as well as the reviews of particular aspects that are triggered by breaches of the performance indicators. In addition, the FMS is linked to the SMP which will be reviewed in five to ten years. DEH is satisfied that this review would consider the total performance of the fishery management arrangements as well as the strategies, objectives and criteria.

The FMS requires compliance with any recovery or threat abatement plan. This provision and other issues associated with protected species are discussed under Principle one, Objective two.

The EPT fishery harvests the same stocks of species caught in the NSW Estuary General, Ocean Haul and Ocean Trawl Fisheries. Fishers in the Queensland East Coast Otter Trawl (QECOT) target stocks of eastern king prawns in the Queensland jurisdiction north of the NSW Ocean Prawn Trawl fishery. 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 stock, particularly when assessing stock status and availability for harvest. The FMS states that NSW Fisheries' management and research staff will meet with adjacent jurisdictions to consider consistent management regimes for shared species and to discuss initiatives such as stock assessment, complementary size limits, monitoring programs and recovery programs for overfished species. It notes that although this has occurred in the past, a more formalised approach to joint management will occur in the future.

There are no regional or international management regimes to which Australia is a party of relevance to the fishery. All fishing operations occur completely within State waters.

Conclusion

The performance measures and triggers for review in the FMS have been developed through an open and consultative process, with input from Planning NSW and DEH. As a result of a review, the NSW Minister for Fisheries has the power to change or adjust performance measures. This authority allows ease of administration and realistic response times to recommendations by the MAC. There is no specification of limitation or restriction on this power however, nor consultative requirements outside the MAC process. DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Due to the importance of the FMS to DEH's assessment of the fishery, any change to it could change the outcome of this assessment. DEH therefore recommends that NSW Fisheries inform DEH of any changes to the FMS.

The FMS introduces many new measures to address concerns associated with the management of target and byproduct species, and the impact on bycatch, protected species and the environment generally. Many of these measures require work before their introduction and some actions will not be effective for another five years. The management of this fishery is greatly improved under the FMS however it is difficult to assess the effectiveness of many of the management actions until they have actually been implemented. In addition, a completion date has not been specified for some of the critical actions under the FMS as work will rely on availability of resources and other priorities in the fishery.

DEH is satisfied that the effectiveness of these management measures, once implemented, will be adequately monitored through the triggers and performance indicators. The NSW submission comments that there is an incomplete understanding of the status of particular stocks and their associated ecological interactions and the wide range of external influences affecting the environment in which the fishery operates. Given this lack of understanding it is impossible to predict the precise effect of the FMS's implementation on the resource status of the species taken in the fishery or its impact on the environment. DEH concludes that it is reasonable to assume that the strategy's responses in combination should lead to the maintenance of fish stocks in the medium term.

Recommendations

- NSW Fisheries should inform DEH of any changes to the FMS.
- NSW Fisheries should ensure that ecological sustainability considerations take precedence over other considerations in determining an acceptable range in response to a trigger point review.

PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES

Stock Status and Recovery

Principle 1: *“A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover.”*

Maintain ecologically viable stocks

Objective 1: *“The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability.”*

Information requirements

Fishery dependent data is collected through monthly catch and effort records submitted by the fishers. These sheets are estuary specific and record the catch of target and the most frequently retained byproduct types, effort expended and the area/s fished. There are provisions on the form for other byproduct types and also discarded prawn and fish weights. The FMS specifies that the intention is to move from grouping of species by family to recording individual species. These catch records are compared to market/landing records and a review is triggered if catches are recorded at greater than 20% above or below the market records. This trigger aims to prevent under and over reporting of catches. NSW Fisheries has advised that any discrepancy detected is considered when these data are used in assessments.

Conducting stock assessments based entirely on fishery dependent data can be problematic. To address this concern the FMS details the design and implementation of an industry funded, fishery independent survey program. It will use stratified randomised surveys of relative abundances and size and age structures of wild populations. NSW Fisheries believe that such data will provide more robust and rigorous assessments of natural populations than assessments that rely solely on data from commercial operations. This program will begin as a pilot study in 2003/04 to develop appropriate fishing gears and to conduct a cost-benefit analysis of the information to determine the most appropriate sampling regime. It will be developed in consultation with the Estuary General and Ocean Haul fisheries and will be implemented at full scale by July 2006. The surveys will provide information about the distribution and abundances of species, sizes and sex composition of individuals in a population.

An observer program will be developed and implemented in the fishery by July 2004. Although a primary role of this program will be to collect information on the quantity and composition of retained and discarded species, and interactions with threatened and protected species, the program will also provide quality control information on commercial catch and effort data. The data will help to assess the impact of gear modifications upon fish populations and collect information for stock assessment purposes. The observer program is explained more fully under Objective 1 of Principle 2.

The FMS also allows for industry research by issuing permits authorising modified fishing practices to assist research programs. This research could be additional to the current research program if it is consistent with the vision and goals of the FMS.

NSW Fisheries and the MAC have identified research priorities for research in this fishery and these are used to guide the process for external funding applications and other research into the

fishery and its associated resources. The research priorities will be reviewed annually and will incorporate feedback from research programs such as those described above.

There have been several externally funded research programs in the past which have provided valuable information for the management of this fishery. A project funded by the Fisheries Research and Development Corporation (FRDC) to obtain estimates of the parameters to do a full stock assessment of prawn resources began in July 2002. NSW Fisheries will continue to apply for external funding for research in accordance with the priorities identified through stakeholder consultation.

Assessment

There is currently no comprehensive assessment of stock in the EPT fishery for target or byproduct species. Preliminary assessments have concluded that the two target prawn species are currently fully fished, as is one byproduct species, Yellowtail. All other target and byproduct species have been classified as unknown status.

Although previous stock assessments have been conducted in the fishery, none of them included the development of a stochastic, length-based model, and most of the assessments have been based on fishery dependent information. A model to address these concerns is currently in development and will be the basis for future assessments. The FMS commits to developing a system for and conducting a formal stock assessment of all target species by June 2007, which will be reviewed every three years. In addition, NSW Fisheries have developed an objective system for defining and setting trigger points to detect concerning trends in landings of species taken in the fishery which will enhance the performance monitoring system.

The University of Sydney is currently undertaking a study of the broad squid in the Hawkesbury River. It is investigating distribution of the population, size and/or age of first breeding, fecundity, rates of growth and mortality and migration. The information collected will be used in yield per recruit analyses to determine an optimal legal minimum length for the broad squid.

Once the assessments have been developed and parameters identified, annual stock assessments will be based on estimates of population parameters provided from a variety of studies (as listed above), independent surveys and observer surveys. NSW Fisheries commits to promoting research that contributes to more robust and reliable stock assessments of prawn and squid populations and through the MAC, prioritising research programs. As discussed previously, the FMS commits to formalising cooperative research, assessment and management with jurisdictions that share stocks of harvested species.

All available information, including that from stock assessments, will be used by the NSW TAC committee to assess all the fisheries accessing prawn stocks in NSW waters. The committee will make a determination under the NSW *Fisheries Management Act 1994* about a maximum allowable effort to be applied across all of these fisheries. This process began in 2003, with an investigation into the data required by the committee in order to make this determination on an ongoing basis. The FMS lists several tools that could be used to achieve any effort cap but the most appropriate methods for implementing this cap would be decided when required.

Until the formal stock assessments are developed, catch will be managed through the use of single year triggers based on Catch Per Unit Effort (CPUE) data. Acceptable annual variations in CPUE are developed based on the known range of past variation in the CPUE. The ranges will be reviewed annually by NSW Fisheries to incorporate the data from each year. If the CPUE in a year is outside the expected range, that is it is either higher or lower than expected based on historical variation, a review will be triggered. This review will aim to identify the cause of the fluctuation (whether

environmental, short-term pressure on the resource, long-term pressure on the resource etc) and to recommend methods to manage or remedy the impact. These trigger points will be further refined with the progressive information from stock assessments.

The system for managing the take of byproduct species works in a similar way. Currently byproduct limits have been developed based on historical proportions relative to the take of target species. A review will be triggered if the take of a byproduct species exceeds its expected catch level, and the limit levels will be reviewed annually to incorporate the data from the latest year's catch and research results. In addition to this monitoring of allowable catch, some byproduct species also have single year triggers as specified for target species.

Management response

The FMS contains a variety of trigger points related to performance measures. Trigger points for the catch of target species have been developed based on landing and CPUE data. As described above, they are triggered if the catch moves outside of the expected range of the catch from the previous year. Results from stock assessments will refine these triggers to ensure they remain meaningful.

Each of the trigger points specified in the FMS was developed to identify when there may be a problem with the fishery and consequently when a review is required. A report on the review must be forwarded to the NSW Minister for Fisheries within three months of the breach being detected and may require participation from representatives from other fisheries.

There are no clear decision rules regarding the take of target species and a biological bottom line beyond which stock should not be taken has not yet been identified. The TAC committee has commenced a process for determining an effort cap for the fishery. Recovery strategies are required if a species is classified as overfished, however a level at which species will reach this classification has not been specified in the FMS. There are several processes specified in the FMS to improve knowledge of the status of species harvested in the fishery.

In all estuaries, nets must consist of cod-end mesh of 40 – 50 mm, and mesh elsewhere in the net of 40 – 60 mm. Maximum counts can be used where minimum legal lengths are not appropriate. Instead, prawns will be deemed too small if it takes above the count level to weigh half a kilogram. Agreement with industry has been reached on arrangements for first point of sale counts, and this is currently being introduced into the Clarence River as part of a package that includes prawn cod-end counts and incidental catch ratios. The implementation of first point of sale counts will then occur across the other estuaries in the Estuary Prawn Trawl Fishery as well as estuaries in which prawns are harvested from within the Estuary General Fishery.

The management arrangements in each of the estuaries have developed over time in response to the environments and users of the estuaries. Thus there is at times significant variation in management arrangements between estuaries. Vessel power and size restrictions are individual to each estuary. So too are gear size restrictions. Net sizes range from the requirement for a single net with headline length of no more than 11 metres in the Hunter River to the permitted use of two nets each of 11 metres headline length in Port Jackson.

The implementation of seasonal and other temporal closures in the four estuaries is another area of large variation. Part of the Clarence River will be closed from June to October and another part from June to December. The Hunter River is closed from June to October, but fishing is only allowed two days a week from October to November and mid April to the end of May. Port Jackson is closed from Easter to November, however the closure may be shortened to April to October if catch criteria are met during trawling trials. This allows greater exploitation of the fishery resources during the times that the environment can support it, while protecting the resources during years of

low recruitment. The Hawkesbury River does not have a seasonal closure at all. It has recently been discovered that previous assumptions about prawn sizes in that estuary may have been inaccurate and that a seasonal closure could be beneficial or even necessary. In response to these concerns, NSW Fisheries will assess the need for a seasonal closure in the Hawkesbury River within three years and will consider the ecological, social and economic impacts of such a closure.

All estuaries are closed on public holidays and weekends (the Hawkesbury River only recently as part of the implementation of the FMS), predominantly as a resource sharing measure with recreational fishers and other waterway users. The Clarence and Hunter Rivers only allow daytime fishing. Port Jackson only allows night fishing. The Hawkesbury River allows both day and night fishing except in the waters of Marra Marra Creek and Coba Bay which are closed to night trawling. Potential ecological benefits of such closures include a reduction in the quantity of bycatch and/or changes in bycatch species composition. This is further discussed under Principle two, Objective one.

Spatial closures are also used in the management of this fishery. Approximately 50% of the area of the four estuaries of the fishery is currently closed to trawling, spread throughout all four estuaries. Under the FMS, there will be no increase to the total area fished in the EPT fishery. However as environmental elements change so too will productive fishing grounds. Therefore, although the total spatial effort will not increase, its distribution may change so that areas not currently fished may be in the future. Closures are normally reviewed every five years and are occasionally modified to address changing fishing patterns and/or environmental conditions. There is a system in place to identify and permanently close environmentally sensitive areas and this is discussed under Principle two, Objectives one and three.

The NSW submission indicates that closures are implemented in the fishery to, among other things, conserve target and byproduct species. Although closures exist for a range of reasons, each closure generally benefits numerous aspects of the resource and the fishery. The FMS does not detail what other activities may occur in these closed areas or whether the resources sought by the fishery are protected from other users during these times or in these areas, although the recreational take of prawns in the four estuaries in question is not thought to be significant (see EIS pg. B-54).

Byproduct species are managed through allowable catches proportional to the target catch. Catch limits have been implemented for individual species in some cases, and grouped by family in others. These levels have been determined based on historical catch data. They are reviewed annually however, considering all available information. The biological data acquired through scientific and observer surveys will be considered in this review to ensure that the catch limits become based more on the biological capacity of the species. The catch limits for byproduct vary between estuaries due to variations in historic catch and capacity of the estuaries to support particular species.

Of all the target and byproduct species in this fishery, three have been classified as fully fished and the status of the remaining species is unknown. The only data available for classifying the unknown status species are long-term fishery dependent information. Under the FMS, a strategic approach for ascertaining the status of byproduct species will be developed by December 2004. The actual implementation of these assessments will have regard to the prioritisation of all research projects related to the fishery. A risk assessment was conducted of each of the byproduct types in the EIS, with all but one listed as a high risk (in terms of vulnerability of species and impact of fishing pressure). NSW Fisheries believes that the FMS contains direct action, such as the measures discussed above, to adequately address the risks associated with each of the byproduct species.

Without knowing the ecological benefits of each of the input controls in each estuary, it is difficult to substantiate such claims by NSW Fisheries. The information gained through the scientific observer program and the scientific surveys, and assessment of the data, over the next few years should indicate what results are being achieved.

The byproduct list and proportional limits are specified in the FMS. They are implemented on a per vessel basis. Not all of the byproduct is identified to species level, with many groups specified as the family. In some cases these are grouped by family to allow for accurate identification by industry in logbooks and in the landing data, however the intention of the FMS is to move to recording individual species in the future.

Some operators in the EPT fishery currently grade the sizes of their prawn catch by passing it over a wire mesh of a device called a riddler. Larger prawns cross the riddler but smaller prawns (and debris in some cases) pass through the wire to a discard container underneath. The riddling of cooked prawns was prohibited in September 2002 by way of an amendment to the *Fisheries Management (General) Regulation 2002*. Uncooked prawns that are discarded through the riddling process are returned to the water. The survival of these prawns is largely unknown and NSW Fisheries will investigate the impact of riddling on live prawns through an FRDC project, to be completed by April 2005. The riddling of live prawns may be modified or prohibited pending the results of this research.

Conclusion

Many of DEH's concerns regarding the management of impacts on target and byproduct species have been addressed through actions adopted in the FMS throughout its development.

Byproduct catch limits and single year triggers have been implemented based on historical catch of these species. There is no indication that this level of take has been, or will continue to be, sustainable. Although these catch limits will be reviewed annually to incorporate most recent data, it is uncertain when a formal stock assessment of the byproduct species will take place. Although unsustainable harvest of byproduct could occur, DEH is satisfied that the implementation of the large range of improvements in the fishery management arrangements of the next few years will minimise this risk.

Latent effort is a significant concern in this fishery. The FMS commits to preventing the activation of this potential effort by implementing:

- Minimum share holdings over set time periods;
- Limited number of total fishing days for each estuary; or
- Limited number of fishing days available to each business.

The TAC committee will determine an effort cap for all NSW prawn fisheries. In addition NSW Fisheries will be controlling the ability for fishing business owners to place a nominated fisher on the boat so as to prevent the activation of latent effort. Minimum entry requirements and training will be required for any new operator to the fishery.

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.”*

Currently, none of the target or byproduct species of the EPT fishery are classified as overfished. Some concerns have been raised through recent research that prawn species may be reclassified from fully-fished to growth overfished at the next review. All but three of the target and byproduct

species in this fishery are of unknown status. Assessments to identify the status of these species have been discussed under Principle one, Objective one.

The FMS contains provisions for managing overfished species. When the fishery is a major harvester of an overfished species, the FMS commits to develop and implement a recovery strategy. The recovery strategy must be drafted for consultation within 6 months. When the fishery is a minor harvester of an overfished species, the strategy commits to contribute to the development of a recovery program and adopt any measures required by that plan. During the development of any recovery program, NSW Fisheries must implement precautionary actions including, but not limited to:

- Total harvest controls;
- Reductions in effort associated with the harvest of the species;
- Implementation of fishing closures;
- Incidental catch management provisions; and
- Mandatory gear changes.

DEH is therefore satisfied that stocks that are identified as overfished will be managed to promote recovery to ecologically viable stock levels within nominated timeframes.

Ecosystem Impacts

Principle 2: *“Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem.”*

Bycatch Protection

Objective 1: *“The fishery is conducted in a manner that does not threaten bycatch species.”*

Information requirements

Observer surveys were conducted in the majority of estuaries of the EPT fishery between 1989 and 1992. The Hunter River is the only estuary of the fishery that lacks historical bycatch data. NSW Fisheries proposes to use data from these surveys as a baseline for incidental catch in order to assess the effectiveness of actions to reduce bycatch.

A scientific observer program will be implemented in the fishery to obtain information on bycatch interactions. The program will be implemented by July 2004. The submission does not clearly outline the extent of this program except that it is expected that the level of sampling will provide estimates of mean abundances with levels of precision of around 30%. Observers will board random vessels on random days during the fishing season to count, measure and weigh individuals of each species caught during each trawl shot that day.

A fishery independent survey program is discussed under Principle one, Objective one. Although the program focuses predominantly on target species, information on various bycatch species will also be collected, including samples to collect biological information. A pilot study is expected in 2003/04 with the program implemented in full by July 2006.

Commercial logbooks currently provide for the reporting of catch of incidental species. It is unclear how many operators actually provide this information. NSW Fisheries and the MAC will periodically review the information requirements of logbooks. Changes may be implemented if the data collected is perceived to be of poor quality or insufficient for the purpose of conducting an environmental assessment. The observer program will be able to provide a quality check of this data, however it is unclear what actions will be taken if this validation demonstrates significant inaccuracies in the fishery dependent data.

Assessment

The impact of the fishery on bycatch species was assessed as part of the EIS of the fishery. This assessment was based on data from research in the early and mid 1990s. It focussed on the ten most abundant bycatch species, the majority of which are currently byproduct species. The bycatch assessment did not focus on species of particular vulnerability, instead on those that had high catch rates during the surveys.

The EIS concluded that due to the lack of information regarding the fate of bycatch species and the effectiveness of BRDs, it is difficult to assess the impact of the fishery on bycatch species or the effectiveness of management responses. The bycatch information collected through the processes described above will be reviewed annually to assess the progress of reducing incidental catch.

As a result of concerns raised throughout the development of the FMS, NSW Fisheries will develop a research strategy to assess the risk associated with the fishery impacting on bycatch species and to assess the impact of trawling upon biodiversity within the fished area of each estuary. There is no date specified in the FMS for the completion of this assessment. It will depend on the prioritisation of research projects in the fishery. DEH is satisfied that it is unlikely that the fishery will have an unsustainable impact on bycatch species in the short term while the large range of new management initiatives are implemented. However, DEH encourages NSW Fisheries to conduct this risk assessment as a priority.

Management response

The EIS states that the major issue associated with bycatch in the EPT fishery is that the majority of species caught are targeted in other commercial and recreational fisheries. Interactions with these species at a juvenile stage in this fishery will impact on the adult stocks accessed by other fisheries.

The use of BRDs is mandatory for all fishing operations except for vessels operating in the lower Hawkesbury River that are targeting squid. This exception occurs as the current devices in the fishery allow the escape of squid from the fishing gear and more time is required to develop an acceptable alternative. Research into the development of environmentally sensitive fishing gear for targeting squid in the Hawkesbury River is currently underway. Appropriate modifications to fishing gear, identified by this research, will be implemented as soon as possible.

Significant work has been done on the development of BRDs in NSW trawl fisheries, resulting in the permitted use of particular devices in this fishery and a preliminary assessment of their effectiveness. The required devices are described in the FMS. Permits may also be issued for commercial trials of new designs when applicable. In addition, the use of destructive equipment such as spikes has been banned in the EPT fishery.

The survival of bycatch species that escape through BRDs is largely uncertain in most, if not all, trawl fisheries in Australia. Reducing the catch landed on the vessel of some species by 50% does not necessarily equate to a 50% reduction in fishing mortality of that species. Fish escaping BRDs are often damaged and/or disoriented and therefore more susceptible to disease and predation. A presentation to DEH by Seanet officers in 2002 raised the issue that a large proportion of fish currently escaping through BRDs in the EPT fishery may be caught and eaten soon after by seabirds that have habituated to the fishery. Current technology and competing priorities limit the extent to which researchers can assess these reductions in a single fishery. This is a significant issue in a number of fisheries in Australia and DEH considers it should be a priority for research in the future.

As discussed earlier, there are various spatial and temporal closures in the four estuaries of the EPT fishery. Only 50% of the area of the four estuaries is open to trawling and all estuaries now have regular periods (weekends and public holidays) when trawling does not occur. The FMS states that

NSW Fisheries will continue to use fishing closures to control the area and time fished to (among other things) prevent trawling in areas and at times of high abundances of incidental species. A closure system for environmentally sensitive areas is discussed under Principle two, Objective three. Temporal closures would be expected to reduce the total amount of bycatch taken in the fishery and permanent closures should provide permanent refuge for a range of potential bycatch species.

The FMS will also introduce an incidental catch ratio system to trigger closures of areas with high levels of bycatch in early 2004. This will effectively implement move-on provisions during times and areas of high bycatch in comparison with target species catch. The implementation of these ratios will be determined through discussion with the MAC. Adhering to these ratios will be the responsibility of operators and will be enforced as part of patrol inspections. Preliminary discussions on this system indicate that the ratios are likely to be set based initially on data collected from various research projects between 1994 and 1996, and for the Clarence River, from research currently underway regarding gear selectivity. These former data were collected before BRDs became mandatory in the fishery. These ratios will be reviewed annually, or at other times where needed, in light of new information.

A review will be triggered if, five years after the introduction of the FMS, the quantity of incidental catch in the fishery is not reduced by, or maintained at, a level of 40% of that of the baseline years. The progress in achieving this reduction, and the need to change the achievable level, will be reviewed annually taking into account data collected through the observer program. NSW Fisheries are not certain that the 40% reduction goal is appropriate to ensure the ecological sustainability of all bycatch species, however have implemented it as a precautionary measure while they implement the new monitoring and management systems including the bycatch risk assessment. There is not currently sufficient information to estimate what reduction has already been achieved.

NSW Fisheries have not identified an indicator bycatch species for the EPT fisheries. The observer surveys will collect data on all bycatch species. Currently significant perturbations in the species numbers will not trigger additional management measures. Incidental catch ratios trigger closures based on total weight of bycatch and not individual species. DEH is confident that the review events and triggers will ensure that appropriate action will be taken when required.

Conclusion

The compulsory use of BRD's in most fishing operations (currently excluding squid harvesting) and the system of spatial and temporal closures operating throughout the fishery, especially the commitment to permanently protect environmentally sensitive areas, provides confidence that adequate protection will be available to a range of bycatch species which may be negatively impacted by the operation of the fishery.

The incidental catch ratios for the estuaries, with the exception of the Clarence River, will be developed from data collected before BRDs were used in the fishery. DEH is concerned that in order for a closure to be triggered for operations using BRDs, the interaction with bycatch species must be significantly higher than was observed during research in the mid 1990s, in order for the incidental catch retained in the fishing gear to reach the same volumes, but notes the commitment by NSW Fisheries to review catch ratios annually. In addition, enforcement of this management commitment will be extremely difficult. It is important that fishers have an ownership of this system in order for it to be effective and therefore the details of its implementation are still to be discussed through the MAC. DEH considers that such a system, if implemented effectively, will be an essential component of an ecosystem based management approach.

The assessment in the EIS on the impact of the fishery on bycatch species focused primarily on the most abundant incidental species. It did not address species that, although not as common as bycatch as others, may be particularly vulnerable to trawling pressure. Under the FMS, if a species harvested in the fishery is classified as overfished, a recovery program must be developed for the species (if the fishery is a major harvester) or any recovery program must be complied with and development assisted (if the fishery is a minor harvester). DEH considers that the determination of the fishery as a major or minor harvester should consider the impact of the fishery on the individual species, not just the proportion of that species in the total bycatch of the fishery.

Protected 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

NSW Fisheries have identified the need to improve information on interaction of the fishery with protected species. The FMS considers protected species to be all those listed in the *NSW Fisheries Management Act*, *NSW Threatened Species Conservation Act 1995* and the EPBC Act.

Consequently, in 2002, EPT fishers were instructed to begin using the ‘general comments’ field on existing catch return forms to report interactions with protected species and sightings of marine protected species. As new forms are re-printed for use in catch reporting, they will include a specific field for entering this information. In addition, a photo identification chart is being prepared to assist fishers in identifying protected species. The FMS commits to training fishers on the identification of species during port visits, via documentation and by interaction with scientific staff as part of the observer program.

One of the aims of the observer program is to collect information on the quantity and composition of retained and discarded species, and interactions with threatened and protected species. Data from this program will help to identify the extent of interaction in the fishery and perhaps to highlight specific areas and times of significant interaction with such species. The observer surveys will commence by July 2004.

Although the requirements of the fishery independent surveys have not been clearly described in the submission, NSW Fisheries expects them to, among other things, provide information on the occurrence of threatened and protected species. A pilot study for these surveys will occur in 2003/04, and they will be implemented in full by July 2006.

Assessment

An assessment was conducted, as part of the EIS, of the impact of the EPT fishery on protected species. It used an “eight part test” from the *NSW Environmental Planning and Assessment Act 1979* to assess the likelihood of a significant impact from the fishery on any threatened species, populations, ecological communities or their habitats.

This assessment concluded that the EPT Fishery could have a significant impact on Green Sawfish, if it were found in the trawled estuaries. This species has not been seen in these estuaries in the last thirty years.

The fishery alone was not found to have a significant effect on other protected species. The other species included in the assessment included bony fish, cartilaginous fish, birds, plants, turtles and marine mammals.

NSW Fisheries will analyse the data from catch returns, observer surveys and fishery independent surveys annually. In addition, under the FMS a systematic risk-based assessment will be undertaken on the interaction and impacts of commercial fishing on protected and threatened species, populations or communities. This assessment will be to a standard and timeframe agreed to by the NSW Minister for Fisheries and Minister for Planning and will consider the cumulative impacts of the Estuary General, Ocean Hauling and EPT fisheries.

Management response

The FMS prohibits the taking of any protected fish as specified in the *NSW Fisheries Management Act 1994*. It also prohibits the taking of any species protected under other jurisdictions' arrangements including species identified under the *NSW Threatened Species Conservation Act 1995*, the *NSW National Parks and Wildlife Act 1974*, and the EPBC Act.

The FMS commits to complying with any recovery or threat abatement plan. NSW Fisheries and the NSW National Parks and Wildlife Service will provide reports to the MAC recommending actions required to conserve protected species. A review will be triggered if the Director of NSW Fisheries considers that any recovery or threat abatement plan is not adequately provided for in the FMS.

NSW Fisheries will continue to use spatial closures to, among other things, avoid direct interactions with threatened species, populations or ecological communities. It is unclear from the NSW submission if the current closures are applied for this purpose nor does it give any indication of their effectiveness. However DEH is confident the systematic risk assessment described above will include these considerations and notes that the ability exists to implement closures in the future for this purpose.

As discussed in Objective 1 of Principle 2, BRDs are compulsory in all fishing operations except those targeting squid. Research is currently underway to investigate suitable devices for squid operations and these will be adopted as soon as possible. It is unclear from the submission how the BRDs specifically affect all of the protected species individually, however the monitoring programs soon to be implemented will improve information regarding their effectiveness.

A code of conduct for the fishery is currently being developed by the MAC, in consultation with industry and other stakeholder groups. The code of conduct will address, among other things, operating in the vicinity of threatened species, populations and ecological communities. The code of conduct is explained more fully under Principle two, Objective three.

Conclusion

As discussed in Objective 1 of Principle 2, anecdotal evidence suggests that a large proportion of bycatch that escapes through BRDs may be taken immediately by seabirds. The impact of provisioning on protected seabirds or other species has not been addressed in the NSW submission. DEH therefore recommends that the systematic risk assessment should consider the impacts on protected species of provisioning through discards.

There are no threatened ecological communities in the fishery area and therefore these provisions in the Guidelines are not applicable.

Recommendations

- The systematic risk based assessment on the interaction and impacts of commercial fishing on protected and threatened species, populations or communities should consider the impacts of provisioning through discards.

Minimising Impactions on the Ecosystem

Objective 3: *“The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally.”*

Information requirements

Data from observer and fishery independent surveys on environmental conditions and incidental catch will provide standardised information with which to monitor the long and short term impact of the fishery on the ecosystem and environment generally.

NSW Fisheries has committed to work with fishers to clearly define areas of key habitat and/or environmental sensitivity. These areas will be identified and closed by June 2006. Areas within the fishery able to be trawled that are not actually trawled will also be identified through this process.

The submission states that there is a general lack of knowledge of the effects of fishing on biodiversity in marine ecosystems, especially diverse and complex systems like the environment in which the EPT fishery operates. In order to develop a better knowledge of ecosystem function and the effects of trawling NSW Fisheries commits to collaborate with other institutions. In doing this they aim to better understand the concepts of ecosystem function and the individual importance of species, populations and ecological communities.

A performance indicator to monitor trawling impacts on biodiversity in the fishery will be developed by June 2007. Once this indicator is developed, NSW Fisheries will develop a research strategy to monitor and assess this impact.

The FMS states that the response of the fishery to marine pest and disease incursions will be monitored through reports to the MAC by the marine pest management program. This program is responsible for monitoring marine pests and diseases and developing contingency plans in the event of new incursions.

Assessment

The EIS contains a chapter to assess the impact of the fishery on the biophysical environment. It included an assessment of the effectiveness of control measures in the FMS and the monitoring and research programs to address information gaps.

Although there is some uncertainty associated with the assessment of trawling on biodiversity and habitat of estuaries, the damage from trawl gear to benthic habitats has been well documented. The EIS concluded that the precautionary measures adopted in the FMS ensure a relatively high confidence that most habitats, especially seagrass beds, will be sufficiently conserved. It noted that the fishery has been impacting the areas of the fishery for sixty years and that species found within the trawled areas are probably adapted to frequent disturbance from trawling activity.

The EIS considers the risk of impact on the health of target or non-target species of the fishery is low. It notes however that there is no information available on the levels of stress, injury or susceptibility to disease that might be imposed as a consequence of the activities associated with the fishery.

The EIS identified a high risk that trawling could substantially alter trophic relationships to the detriment of maintaining biodiversity and stock sustainability. It considers that the management responses necessary to address this risk are very poorly developed in the fishery. However, the capacity of any single management strategy to address this risk is very low as the management of cumulative impacts of other fisheries and uses is critical.

An assessment of the effects of the fishery on water quality concluded that the risk from the fishery is low to medium. A code of conduct for the fishery will be developed and the EIS considers that this precautionary measure should ensure that fishers remain conscious of the pollution they are causing and minimise such events occurring. It also considers that more focus should be placed on the discharge of water from cooking prawns.

Management response

The first goal of the FMS is to manage the EPT fishery in a manner that promotes the conservation of biological diversity in the estuarine environment. A variety of actions have been specified to address this goal. These include a combination of continued historical actions and the introduction of new management activity.

Continued management actions include:

- Restrictions on fishing gear including controls on the dimensions, construction materials and modes of operation;
- The use of closures to control the area and time fished;
- Prohibition on the use of firearms, explosives or electrical devices to take shellfish and finfish; and
- Prohibition on the wilful damage of marine vegetation.

Several significant actions for ecosystem protection are introduced with the FMS. NSW Fisheries will work with fishers to clearly define areas of key habitat and/or environmental sensitivity. These areas will be identified and closed by June 2006. A review will be triggered if identified areas are not closed by July 2006. Areas within the fishery able to be trawled that are not actually trawled will also be identified through this process.

The total area able to be trawled in the fishery will not increase. The current fishery area may however change. Previously trawled areas may be closed to allow untrawled areas to be opened for fishing. NSW Fisheries have advised that the declared environmentally sensitive areas will remain closed permanently.

As detailed in Objective 1 of Principle 2, the FMS implements incidental catch ratios which, when triggered, result in closure of the area of high bycatch for a period of time. A review will be triggered if the incidental catch ratios have not been implemented to the satisfaction of the Director of NSW Fisheries. In addition, a review will be triggered if within five years of the commencement of the FMS, the incidental catch in the fishery is not reduced by, or maintained at, a level of 40% of that of the baseline years.

The MAC is consulting with fishers to develop a code of conduct for the fishery. The code will include guidelines related to:

- Operating near river banks, seagrass, saltmarsh or mangrove habitat and in any other area of environmental sensitivity, in a manner that minimises environmental impacts in those areas;
- Operating in the vicinity of listed Ramsar wetlands or known JAMBA and CAMBA migratory bird habitat, in a manner that minimises disturbance;
- Respecting the rights and recognising the needs of other users of the waterways and residents along the estuaries;
- Minimising the levels of pollutants associated with the fishing operation, including exhaust, noise and fuels and oils in bilge water;
- Assisting in reducing the amount of rubbish in estuaries by retaining, for disposal onshore, the rubbish recovered during fishing operations; and
- Operating in the vicinity of threatened species, populations and ecological communities.

The FMS requires NSW Fisheries and the MAC to implement any measure required in marine pest or disease management plans. As only six businesses in the EPT fishery are endorsed to fish in more than one estuary, the likelihood of translocation of marine pests is low. A review is triggered if the Director of NSW Fisheries believes that the fishery does not respond appropriately to any recommendations from the marine pest and disease management program.

NSW Fisheries has identified the need to develop a performance indicator to monitor biodiversity impact at the species, community and ecosystem levels. This will be developed by June 2007. A research strategy to monitor the performance indicator will be developed at that time. During the interim, NSW Fisheries believes that the surrogate indicators described above will offer sufficient protection to the environment of the fishery. Species composition and abundance in samples from fishery independent surveys may also assist in monitoring this indicator.

Conclusion

With the uncertainties associated with this fishery, and the timeframes, or lack thereof, for implementing some management responses and performance indicators, it is not possible to conclude that the fishery is conducted in a manner that adequately minimises the impact of fishing on the environment generally. The FMS introduces many measures to address this uncertainty in the future. DEH is satisfied that although the effectiveness of interim actions in the fishery to address this objective is uncertain, the process to identify them was robust. The potential for unacceptable environmental impacts in trawl fisheries is quite high. DEH considers that careful monitoring of the implementation of these actions is required to ensure that the risk of unacceptable impact remains low.

The proposal in the FMS to not increase the area able to be trawled in the fishery is an important element of minimising the impact of fishing on the environment generally. DEH is concerned that areas of the fishery previously unfished can be opened in exchange for the closure to areas previously fished. However, the closure of environmentally sensitive areas will ensure permanent protection of areas within the fishery. Long term protection of some areas is essential to ensure that sessile and long-lived species are provided with sufficient protection.

ACRONYMS

BRD	Bycatch Reduction Device
CAMBA	China and Australia Migratory Bird Agreement
CPUE	Catch per Unit Effort
DEH	Department of the Environment and Heritage
EIS	Environment Impact Statement
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPT	Estuary Prawn Trawl
FMS	Fishery Management Strategy
FRDC	Fisheries Research and Development Corporation
JAMBA	Japan and Australia Migratory Bird Agreement
MAC	Management Advisory Committee
NSW	New South Wales
PSR	Preferred Strategy Report
TAC	Total Allowable Catch
TED	Turtle Exclusion Device