

**Fishery Management Strategy  
for the  
Estuary Prawn Trawl Fishery**

**February 2003**





## **Fishery Management Strategy for the Estuary Prawn Trawl Fishery**

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## Abbreviations

ACCF	Advisory Council on Commercial Fishing
ACFC	Advisory Council on Fisheries Conservation
ACoRF	Advisory Council on Recreational Fishing
ADT	Administrative Decisions Tribunal
AFMA	Australian Fisheries Management Authority
AQIS	Australian Quarantine and Inspection Service
BRD	Bycatch reduction device
CAMBA	Agreement between Australia and the People's Republic of China for Protection of Migratory Birds and their Environment
COE	Certificate of Exemption
CPUE	Catch per unit effort
DLWC	Department of Land and Water Conservation
DUAP	Department of Urban Affairs and Planning (now Planning NSW)
EG	Estuary General
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMPMP	Emergency Marine Pest Management Plan
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	Environmental Protection Authority
EPBC Act	Environmental Protection and Biodiversity Act 1999
EPT	Estuary Prawn Trawl
ESD	Ecologically Sustainable Development
FAD	Fish aggregation device
FM Act	Fisheries Management Act 1994
FMS	Fishery Management Strategy
FP Act	Food Production (Safety) Act 1998
FRCAC	Fisheries Resources Conservation and Assessment Council
FRDC	Fisheries Research and Development Corporation
IMCRA	Interim Marine and Coastal Regionalisation for Australia
IPA	Intertidal protected area
JAMBA	Japan-Australia Agreement for the Protection of Migratory Birds, Birds in Danger of Extinction and their Environment
MAC	Management Advisory Committee
MPA	Marine Parks Authority
NCC	Nature Conservation Council
NPWS	National Parks and Wildlife Service
NRSMPA	National Representative System of Marine Protected Areas
NSW	New South Wales
NSWF	NSW Fisheries
Regulation	Fisheries Management (General) Regulation 1995
RFA	Recreational fishing area
RFO	Recognised Fishing Operation
RFG	Recognised fishing ground
RFR	Registered Fish Receiver
RRFR	Restricted Registered Fish Receiver
TAC	Total allowable catch
TCM	Total catchment management
TSC Act	Threatened Species Conservation Act 1995
WP Act	Wildlife Protection (Regulation of Exports and Imports) Act 1982



# Introduction to the Estuary Prawn Trawl FMS

## Background

In December 2000, the NSW Government made changes to the way fisheries are managed in NSW. These changes place increased emphasis on ensuring that fishing activities are environmentally sustainable.

The changes require the development of a fishery management strategy for each major commercial fishery, the recreational fishery, the charter boat fishery, fish stocking and for the beach safety program. They also require an assessment of the environmental impacts of those fishing activities.

## Estuaries of New South Wales

The Estuary Prawn Trawl Fishery operates in parts of four estuaries in NSW. Estuaries represent a 'mixing zone' between completely sheltered freshwaters and the open ocean. The forces driving this mixing include tides, wind, waves and river run-off, although the relative importance of each of these varies according to estuary type and location within the estuary.

There are at least 690 such water bodies joining the Tasman Sea along the New South Wales (NSW) seaboard (Williams *et al.*, 1998). The vast majority of these are very small and only intermittently open to the sea. Only 130 have a water area greater than 0.05 km<sup>2</sup>.

Most estuaries have been directly affected by works that have modified or reduced freshwater inflows, and most are surrounded by urban, industrial or agricultural developments that also impact on their ecosystems.

A wide range of competing activities take place in estuarine waters, and the Estuary Prawn Trawl Fishery is just one of these. Other activities undertaken in estuaries include other commercial fisheries such as the estuary general, recreational and charter boat fisheries, aquaculture and non-harvesting activities such as scuba diving and recreational boating.

## The Estuary Prawn Trawl Fishery

The Estuary Prawn Trawl Fishery is one of eight major commercial fisheries in New South Wales. It exploits the prawn stocks in NSW together with the ocean prawn trawl, estuary general and recreational fisheries. The prawn stocks are ranked first in value amongst the wild caught seafood resources managed solely by the State Government. Over the period from 1997/98 to 2000/2001 the Estuary Prawn Trawl Fishery contributed on average around 23% (501 tonnes) by weight and 19% (\$5 million)<sup>1</sup> by value to the production from prawns.

The Estuary Prawn Trawl Fishery is a single method fishery that operates in most cases over a defined season and in all cases in defined areas in four of the 130 major estuaries of NSW. It targets a single group of species, the prawns of the family Penaeidae and also squid in one of the four estuaries.

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<sup>1</sup> Unless otherwise stated, the information about annual landings and their value come from the catch statistics database of NSW Fisheries. Information about value is calculated by multiplying the landings recorded on fishers monthly return forms by the monthly price for species auctioned at the Sydney fish market.

In recent years fishers have reduced the volume of incidental species in their nets by using bycatch reduction devices.

The practice of trawling for prawns in NSW began in 1926 in Port Jackson and spread to four other estuaries in the 1940s. In 1984 a freeze on the issue of new boat licences was introduced and in 1988 the number of vessels operating in the Estuary Prawn Trawl Fishery was limited to 309 and vessels were in most cases restricted to one estuary. In March 1997 the Estuary Prawn Trawl Fishery, along with five other major commercial fisheries, was formally declared a restricted fishery<sup>2</sup> and the operators in the fishery were issued with 'endorsements' to replace their previous authorisations.

The *Fisheries Management Act 1994* was amended in December 2000 to create a new framework for commercial fisheries management called category 2 share management fisheries. The Estuary Prawn Trawl Fishery was declared a category 2 share management fishery in March 2001. While management arrangements have been in place in the fishery ever since its inception, never before have fishers had a long term secure access entitlement. The category 2 share management framework will provide 15 year shares in the fishery that are subject to statutory compensation if the fishery is closed within that time and the shares are cancelled. This provides commercial fishers with a greater incentive to ensure the fishery is sustainable in order to maintain or improve the value of their entitlements.

It is possible that, in the future, the fishery may become a category 1 share management fishery. It is intended that the management strategy will apply to the fishery whether it has category 1 or category 2 share management status.

## The Fishery Management Strategy

The fishery management strategy for the Estuary Prawn Trawl Fishery is much more than a collection of rules for the fishery. The strategy contains the goals and objectives for the fishery, a detailed description of the way the fishery operates, and describes the management framework for the future. It also outlines a program for monitoring the biological, social and economic performance of the fishery, establishes trigger points for the review of the strategy, and requires annual reporting on performance in order to ensure the objectives set out in the strategy are met. Where necessary information about the impacts of harvesting by other fishing sectors (such as recreational fishing) is also provided, however the rules contained in this fishery management strategy apply only to the Estuary Prawn Trawl Fishery. The rules applying to other fishing sectors are dealt with under separate management arrangements and are not the subject of this strategy.

The management advisory committee (MAC) for the Estuary Prawn Trawl Fishery provided significant input into the drafting of the strategy. Input into the draft strategy was also sought from all fishers endorsed in the Estuary Prawn Trawl Fishery, the Minister for Fisheries' advisory councils on fisheries conservation, recreational fishing and commercial fishing (which includes commercial fishers from other fisheries), and the Fisheries Resource Conservation and Assessment Council. Government agencies, such as Planning NSW and the Commonwealth's Environment Australia, have also been consulted throughout the drafting of the fishery management strategy.

An environmental impact statement was prepared for the Estuary Prawn Trawl Fishery in 2002. The EIS contained the draft fishery management strategy and an environmental assessment on

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<sup>2</sup> Under s.111 of the *Fisheries Management Act 1994*

the management rules and risk mitigation measures contained in the strategy. The structure of the EIS was based on guidelines issued by Planning NSW including an assessment of the likely biophysical, social and economic impacts of implementing the draft management strategy.

The EIS was on public exhibition between 2 March 2002 and 15 April 2002 inclusive. The EIS highlighted the importance of the Estuary Prawn Trawl Fishery to the community in terms of employment, supply of seafood to the community and economic benefits. The EIS concluded that the management rules proposed by the fishery management strategy provide for an appropriate allocation of the resource, and incorporate measures needed to address the various principles of ecologically sustainable development.

The Minister for Fisheries made a formal determination under the *Environmental Planning and Assessment Act 1979* on 5 November 2002 with respect to the Estuary Prawn Trawl Fishery, which in effect, allows the fishery to continue in accordance with the fishery management strategy. This process relieves estuary prawn trawl fishers of the requirement to undertake individual environmental assessments.

# 1. Relevant Legislation

## a) Objects of the *Fisheries Management Act 1994*

The *Fisheries Management Act 1994* (the FM Act) seeks to achieve ecologically sustainable development for the fisheries of NSW through the achievement of its stated objectives, which are:

To conserve, develop and share the fishery resources of the State for the benefit of present and future generations. In particular the objectives of the FM Act include:

- (a) *to conserve fish stocks and key fish habitats*
- (b) *to conserve threatened species, populations and ecological communities of fish and marine vegetation*
- (c) *to promote ecological sustainable development, including the conservation of biological diversity*

*and, consistently with those objects:*

- (d) *to promote viable commercial fishing and aquaculture industries*
- (e) *to promote quality recreational fishing opportunities*
- (f) *to appropriately share fisheries resources between the users of those resources*
- (g) *to provide social and economic benefits for the wider community of NSW.*

## i) Ecologically sustainable development

Ecologically sustainable development (ESD) has been defined under the National Strategy for ESD as “development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends”. It can be achieved through the implementation of the following principles and programs<sup>3</sup>:

- precautionary principle – if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- intra-generational equity – the benefits and costs of pursuing ESD strategies should be distributed as evenly as practicable within each generation
- inter-generational equity – the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations
- conservation of biological diversity and ecological integrity – conservation of biological diversity and ecological integrity should be a fundamental consideration
- improved valuation, pricing and incentive mechanisms – such as user pays and the use of incentive structures to promote efficiency in achieving environmental goals.

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<sup>3</sup> Adapted from section 6 (2) of the NSW *Protection of the Environmental Administration Act 1991*.



## **b) The NSW Environmental Planning and Assessment Act**

The evolution of the new environmental assessment process for commercial fisheries in NSW stems largely from a decision handed down by the Land and Environment Court in January 2000. The Court decided that the issuing of an individual commercial fishing licence had to meet the requirements of the *Environmental Planning and Assessment Act 1979* (the EP&A Act). This meant that the environmental impacts of any authorised activities had to be assessed at the time the licence was issued or renewed.

It is widely accepted that in most cases the best way of assessing the impact of fishing activity is by considering the total impact of fishing, instead of the potentially minor impacts of individual fishers. The Government was concerned that requiring assessment for each individual licence would be an unnecessarily expensive and time consuming activity. Licensed fishers would have faced a high level of uncertainty and significant individual costs.

After thorough consultation with stakeholders, the Government decided that the best approach would be to assess the environmental impact of fishing activities at the fishery level. This provides the best approach for both our aquatic environment and stakeholders. The legislation was subsequently amended to provide for the development of fishery management strategies and the environmental assessment of those strategies.

## **c) The Commonwealth Environment Protection and Biodiversity Conservation Act**

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) makes it an offence for a person to undertake an action that has the potential to significantly impact on a matter of 'national environmental significance' without first obtaining a permit from the Commonwealth Minister for Environment and Heritage. Matters of 'national environmental significance' include: declared World Heritage areas; declared RAMSAR wetlands; listed threatened species and ecological communities; listed migratory species; listed marine species; nuclear actions; and the environment of Commonwealth marine areas. This management strategy details the controls to manage the impacts of the Estuary Prawn Trawl Fishery on such matters.

The EPBC Act was amended in January 2002 to incorporate the provisions of the Wildlife Protection Act (which was repealed at the same time). The new Part 13A of the EPBC Act has the effect of removing the previous blanket exemption from export controls for marine species. As a result, the export of all marine organisms will come under the controls of the FM Act and be subject to ecological sustainability assessments based on guidelines established by the Commonwealth to give time for those assessments to be made. The exemption will continue until 1 December 2003. Until then, current arrangements regarding export of marine species will remain in effect, that is, the export of most marine fish and the bulk of marine invertebrates will continue to be exempt from export controls under the Act.

If a fishery is not assessed as exempt, it will more than likely be able to continue to supply product for export through an approved wildlife trade operation (section 303FN) under the EPBC Act. These declarations will have conditions attached that will bring the management and operations of the fishery in line with the Commonwealth guidelines. Once declarations are made, exporters will need to apply for and obtain from Environment Australia a permit to export. The responsibility of

implementing the necessary changes to the fishery management arrangements will rest with the management authority.

## **d) The NSW Marine Parks Act**

The NSW Government is using a systematic approach to identify sites for marine protected areas and to prioritise new areas for marine biodiversity conservation in NSW waters. There are three types of marine protected areas in NSW - large multiple-use marine parks, small aquatic reserves and the marine and estuarine components of national parks and nature reserves.

Marine parks aim to conserve biodiversity by protecting representative samples of the habitats in defined 'bioregions'. Zoning and operational plans are used to guide the protection of conservation values and manage activities that occur within the marine park. These are required for all marine parks and the zones clearly identify the conservation and management priorities within marine parks (MPA, 2000). Four zones are used in marine parks - sanctuary zones, habitat protection zones, general use zones and special purpose zones.

The *Marine Parks Act 1997* was introduced to provide for the declaration of marine parks in NSW. The objects of the Act are as follows:

- (a) *to conserve marine biological diversity and marine habitats by declaring and providing for the management of a comprehensive system of marine parks*
- (b) *to maintain ecological processes in marine parks*
- (c) *where consistent with the preceding objects:*
  - (i) *to provide for ecologically sustainable use of fish (including commercial and recreational fishing) and marine vegetation in marine parks*
  - (ii) *to provide opportunities for public appreciation, understanding and enjoyment of marine parks.*

Consultation occurs with the community prior to the declaration of marine parks. Up to date information on the creation and zoning of marine parks in NSW waters is available on the Marine Park Authority website: [www.mpa.nsw.gov.au](http://www.mpa.nsw.gov.au)

While none of the estuaries managed as part of this management strategy for the Estuary Prawn Trawl Fishery are located within the boundaries of an existing marine park, fish are likely to move between the parks and these estuaries. Any recovery plans identified for species within the parks and whose life cycle is impacted upon by estuary prawn trawling, will be taken into account as part of the future management of the fishery.

## **e) Share management plans**

### **i) The role of a share management plan**

The FM Act requires that a share management plan be developed and implemented for each share management fishery. A share management plan for the Estuary Prawn Trawl Fishery will be prepared as part of the transition of the fishery to a full share management regime.

The primary role of a share management plan is to provide a legislative structure for the class or classes of shares and the rights of shareholders in a share management fishery. The share management plan also makes provision for a range of fishery specific controls to be formalised into a

regulation. Examples of these include the finfish and shellfish that may be taken, the areas for taking these fish, the times or periods during which the fishery may operate, the protection of fish habitats and animals, as well as the use of boats, fishing gear and bait in the fishery.

The share management plan for the Estuary Prawn Trawl Fishery may also bring into operation a number of controls in the fishery that are described in this management strategy. One example of this is the share forfeiture scheme referred to in the management strategy. Whilst the management strategy relies on the share forfeiture scheme as a compliance mechanism for creating an effective deterrent, the workings and provisions of the scheme will be included in the share management plan for the fishery.

A share management plan must include objectives and performance indicators which, for the Estuary Prawn Trawl Fishery, will be consistent with the goals and objectives of this management strategy. The share management plan must also specify at what point a review of the plan is required when a performance indicator is not being met. The review process to be included in the share management plan will complement the review process outlined in this management strategy. This will ensure that there is a robust review and reporting framework for the fishery that is underpinned by the provisions of the share management plan.

In addition to a review that may occur if a trigger point is breached, a share management plan for a category 2 share management fishery must also be subject to scheduled periodic review. In the case of the Estuary Prawn Trawl Fishery, shares are to be issued for an initial term of 15 years and a review of the management plan is to be conducted between years five and ten of that period.

## **ii) Transition to share management**

The Estuary Prawn Trawl Fishery is in the process of moving from being a restricted fishery (under section 111 of the FM Act) to a category 2 share management fishery. The progression to a share management regime is a staged implementation.

The fishery is first identified as a share management fishery by being included in Schedule 1 of the Act. Criteria for the allocation of shares are then determined and when the allocation formula has been decided, a public notice is published inviting applications for shares. Based on the criteria and applications received, provisional shares are issued.

After provisional shares are issued, a legal order is placed in the NSW Government Gazette signifying the commencement of the “limited access stage” of share management. Once the limited access stage commences a person must hold at least one provisional share in the fishery to be eligible to hold an endorsement. Throughout this stage, the fishery continues to operate under the regulations that applied to the restricted fishery.

Applications for appeals against the allocation of shares are lodged before the fishery is formally commenced. The Management Advisory Committee for the fishery and any other relevant commercial or recreational industry groups will be consulted on the proposed management plan. The management plan for the fishery is then put into regulation, final shares are issued and the fishery then commences as a full share management fishery.

## **iii) Changes to Regulations**

In the most part, the current regulations that apply to the Estuary Prawn Trawl Fishery appear in the *Fisheries Management (General) Regulation 2002*. The Regulation sets out the working

arrangements that underpin the provisions of the FM Act, and are made pursuant to that Act. For example, an offence appears in the Act for possessing prohibited size fish (section 16), however it is the Regulation that prescribes the fish species subject to size limits and what those size limits are (clause 7). Where it is necessary to introduce or change controls prior to the development and implementation of a share management plan for the fishery, changes to the Regulation will be made.

If a management plan for a fishery is inconsistent with any other regulation or fishing closure, the management plan prevails. Therefore, a share management plan is an appropriate tool that can be used to implement controls that are specific to the Estuary Prawn Trawl Fishery. The only occasion where a management plan does not prevail over another regulation is if a regulation specifically expresses that it is to have effect despite a management plan. An example of when this may occur is where a short-term closure may be introduced in response to an emergency.

## **2. Vision and Goals for the Fishery**

### **a) Fishery vision**

The long term vision for the Estuary Prawn Trawl Fishery is to have:

*A fishery that under the principles of ecological sustainable development is economically viable, using environmentally friendly fishing gear to provide fresh, high quality seafood and bait to the community.*

### **b) Fishery goals**

The goals that have been set for the fishery to assist in achieving this vision are:

1. To manage the Estuary Prawn Trawl Fishery in a manner that promotes the conservation of biological diversity in the estuarine environment
2. To maintain target and byproduct species harvested by the Estuary Prawn Trawl Fishery at sustainable levels
3. To promote the conservation of threatened species, populations and ecological communities associated with the operation of the Estuary Prawn Trawl Fishery
4. To appropriately share the resource and carry out fishing in a sustainable manner that minimises social impacts
5. To promote a viable commercial fishery (consistent with ecological sustainability)
6. To ensure cost-effective and efficient management and compliance in the Estuary Prawn Trawl Fishery
7. To improve the knowledge of the community about the operations and management of the Estuary Prawn Trawl Fishery
8. To improve the knowledge about the Estuary Prawn Trawl Fishery and the resources upon which the fishery relies.

### **3. Fishery Description**

#### **a) An Overview**

The Estuary Prawn Trawl Fishery uses otter trawl nets to target school and eastern king prawns and in the case of the fishery in the Hawkesbury River, also squid. Incidental catch containing byproduct and bycatch species occurs in this fishery. Bycatch reduction devices have helped reduce this impact in recent years. In addition, this management strategy incorporates rules to control the quantities of incidental species caught and byproduct species landed (see management responses 1.3a and 4.2c). There are 225 fishing entitlements to operate in the fishery held amongst 219 fishing businesses (as at September 2002).

The Estuary Prawn Trawl Fishery currently operates for defined seasons (with the exception of the Hawkesbury River) and within defined areas in four of the 130 significant coastal estuaries within NSW; namely the Clarence, Hunter and Hawkesbury Rivers, and Port Jackson. Table 1 provides a comparison between the Estuary Prawn Trawl Fishery and the eight other commercial fisheries in NSW.

**Table 1.** Overview of the major marine commercial fisheries in NSW.

Note : information is based upon statistics from 2000/2001.

(Source: Fletcher & McVea, 2000; Tanner & Liggins, 2000; NSW Fisheries Licensing database – March 2001)

	Estuary Prawn Trawl	Estuary General	Ocean Trap and Line	Ocean Prawn Trawl	Ocean Fish Trawl	Ocean Hauling	Lobster	Abalone
<b>Methods</b>	Otter trawl net	Handline, Trap, Hauling net, Mesh/gill net, Hand collecting	Demersal trap, Handline, Setline, Dropline, Lift net	Otter trawl net	Otter trawl net	Beach seine net, Purse seine net	Trap, pot	Diving (hookah)
<b>Species</b>	School prawn, King prawn, squid	Yellowfin bream, Dusky flathead, Sand whiting, Longfinned eels, Sea mullet, pipis	Snapper, Kingfish, Morwong, Spanner crabs, Silver trevally	King prawn, School prawn, Royal red prawn, Balmain bugs, Octopus	Silver trevally, Tiger flathead, Redfish	Sea mullet, Sea garfish, Luderick, Yellowtail, Pilchards	Rock lobster (eastern)	Black lip abalone
<b>Total catch in 2000-01 (t)</b>	569 t	5,043	1,742	3,411	1,171	3,462	105	305
<b>Est. value in 2000-01 (A\$m)</b>	4.1	18	10	32	4	6	4.5	15.2
<b>No. of authorised fishing businesses</b>	225	944	630	330	102	374	170	37
<b>Standard boat length (m)</b>	9	5	6-8	14	14	4	6-8	6
<b>General no. of unlicensed crew</b>	1	0*	0-1	2	2-3	0**	0-1	1

\* unlicensed crew permitted only when undertaking boat based prawn seining.

\*\* unlicensed crew permitted in some forms of boat based hauling.

## b) Extent of the Fishery

### i) Number of operators

As at September 2002 there were a total of 219 fishing businesses with estuary prawn trawl entitlements. Of these, six businesses have entitlements to trawl for prawns in more than one estuary. The total number of businesses authorised to operate in the Estuary Prawn Trawl Fishery will not increase under the strategy, but will most likely reduce depending on the type of effort control strategy implemented (see management response 2.3c in section 8 of this management strategy). The freeze on the issue of new boat licences will also remain under the strategy (see management response 2.3d in section 8 of this management strategy).

### ii) Activities endorsed in the fishery

There are five types of endorsements in this fishery, which, with the exception of the Clarence River, corresponds to one type of endorsement for each estuary. The endorsement is known as the

‘estuary prawn trawl endorsement’. An endorsement authorises the fisher to use an otter trawl net (prawns) to take prawns for sale from the relevant estuary waters.

Fishing vessels used to take prawns in the Estuary Prawn Trawl Fishery are also subject to a particular set of boat licence conditions. These conditions (S2, S3, S4, S5 and S6) are used to restrict each vessel, when trawling, to one or more of the estuaries, or parts thereof, where prawn trawling is permitted.

**Table 2.** Classes of prawn trawl entitlements and number of endorsements (September 2002).

Estuary	Class of Entitlement	Number of Entitlements
Clarence River		
Access to Lake Wooloweyah and the Clarence River	S5	112
Access to Lake Wooloweyah only	S6	2
Hunter River	S4	29
Hawkesbury River	S3	61
Port Jackson	S2	21

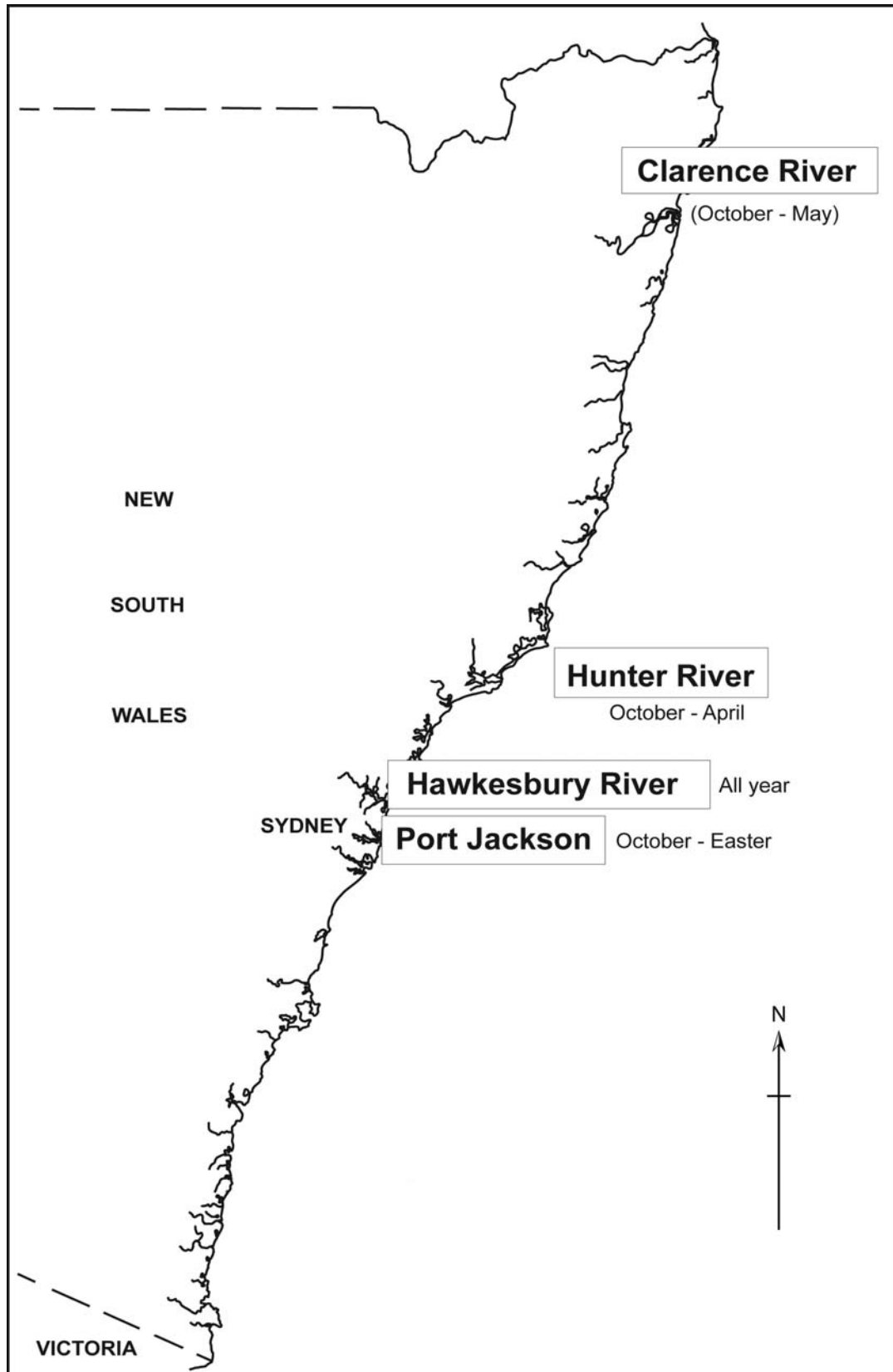
### iii) Overall catch levels and value

Annual reported landings by the Estuary Prawn Trawl Fishery in 1998/99, 1999/2000 and 2000/01 were 493, 527 and 469 tonnes respectively whilst the respective values of the fishery at the point of first sale were 3.97, 3.96 and 4.8 million dollars. Annual reported landings and value for the fishery in each estuary are discussed in section 10, whilst the patterns in landings for the target species and prominent byproduct species are detailed in the Environmental Impact Statement for the Estuary Prawn Trawl Fishery (NSW Fisheries, 2002).

### iv) Area of the fishery

Trawling for prawns is limited to four estuaries namely, the Clarence, Hunter and Hawkesbury Rivers and Port Jackson (see Figure 1). Each estuary in the Estuary Prawn Trawl Fishery is subject to separate management arrangements. The areas of operation in each estuary are described in section 10.

The overall area of the Estuary Prawn Trawl Fishery will not increase under the strategy, but will decrease as closures are implemented to protect environmentally sensitive areas including *Zostera* and *Posidonia* seagrasses (see management response 1.1f), and to prevent trawling over previously non-trawled areas within the overall area of the fishery (see management responses 1.2a & 1.2b).

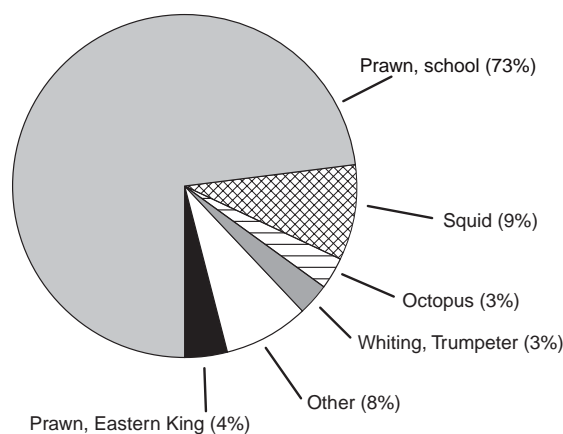


**Figure 1.** Location of the four estuaries where the Estuary Prawn Trawl Fishery operates and the period when fishing is permitted. *Note: The periods when trawling is permitted may change from year to year.*



## c) Species

Species in the catch of the Estuary Prawn Trawl Fishery can be categorised into target, byproduct or bycatch. The target species in the Estuary Prawn Trawl Fishery are prawns and in the case of the Hawkesbury River, squid are also considered a target species (see Figure 2). The species caught other than the target species are referred to as the incidental species.



**Figure 2.** The mean proportion of the most abundant species in the annual reported landings for 1997-98 and 1998-99 of the Estuary Prawn Trawl Fishery.

The incidental species can be divided into the small number of non-target species that have always significantly contributed to the marketed catch of the fishery, referred to as byproduct species (see Table 4) and the discarded portion of the catch known as the bycatch. Also, the *Fisheries Management (General) Regulation 2002* provides for a review process to identify species that are threatened and warrant protection from either commercial fishing or all fishing sectors.

Many species taken in the Estuary Prawn Trawl Fishery are also taken in other NSW commercial fisheries, by other sector groups and by fisheries managed under the jurisdiction of the Commonwealth or other States. The FM Act establishes a system of advisory councils who provide advice to the Minister for Fisheries on cross-fishery management issues. 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, complimentary size limits, monitoring programs and recovery programs for overfished species. Cross jurisdictional collaboration has occurred often on an as-needed basis in the past, however, a more formalised approach to joint management will now be undertaken.

**Table 3.** The target species caught in each estuary of the EPT Fishery.

“Yes” signifies that the species is a target species in that estuary

“No” signifies that the species is not target species in that estuary

Common Name	Scientific Name	Estuary			
		Port Jackson	Hawkesbury River	Hunter River	Clarence River
Eastern king prawn	<i>Penaeus plebejus</i>	Yes	Yes	Yes	No
School prawn	<i>Metapenaeus macleayi</i>	No	Yes	Yes	Yes
Broad squid	<i>Photololigo etheridgei</i>	No	Yes	No	No
Bottle squid	<i>Loliolus noctiluca</i>	No	Yes	No	No

## **i) Target species**

The target species in the Estuary Prawn Trawl Fishery are prawns, but the target species may vary between estuaries (see Table 3). An exception to this is the Hawkesbury River where squid are also recognised as a target species. Overall, the school prawn *Metapenaeus macleayi* contributes by far the most to the reported landings of the Estuary Prawn Trawl Fishery (see Figure 2), but these proportions depending on the estuary because of several reasons including changes in species diversity and abundance. Information about patterns in landings and catch rates for each species within each estuary of the fishery can be found in Appendix B5 of the EIS for the Estuary Prawn Trawl Fishery and will continually be monitored under the FMS (see management response 8.2a). A formal stock assessment on each target species will be undertaken within five years (see management response 2.1h).

An independent Total Allowable Catch Setting and Review Committee will determine the maximum level of effort that the NSW prawn stocks could sustain in connection with this fishery (see management response 2.3b). A meeting of stakeholders convened by NSW Fisheries will provide advice to the Minister for Fisheries on cross fisheries issues associated with the management of the prawn stocks including how the available prawn stocks should be shared between commercial fisheries and recreational fishers (see management response 4.2d).

If effort in the Estuary Prawn Trawl Fishery must be decreased this will be achieved by either reducing the number of operators in the fishery using minimum shareholding requirements, limiting the total number of days fishing within each estuary, or limiting the number of days fishing by each business based on past participation. If restructuring is the method used to reduce fishing effort, a determination will be made by the Minister, in consultation with the MAC, as to the number of operators that must be removed from each estuary.

Maximum counts will be introduced during 2003 for all species of prawn taken in the Estuary Prawn Trawl Fishery (see management response 2.1d). The introduction of counts will stop the taking, possession and sale of small prawns. A count is expressed as the number of prawns per half kilogram and is a relative measure of the size of prawns in a catch.

In the Hawkesbury River, squid is a target species. Current research by the University of Sydney will provide information on the optimal size of harvest for squid. This management strategy provides an 18 month timeframe for determining whether or not there is a need to introduce a legal minimum length for squid (see management response 2.1f). It also provides for a review of the exploitation status of squid (see management response 2.1b) and if the research shows that the level of exploitation of squid stocks is too high, then consideration would also be given to limiting fishing effort upon the stock consistent with management response 2.3c.

## **ii) Byproduct species**

Byproduct species are those that are caught as part of the Estuary Prawn Trawl Fishery and which have significantly contributed traditionally to the marketed catch of the fishery. Whilst many species are caught in the Estuary Prawn Trawl Fishery (see Appendix B1 of the Estuary Prawn Trawl Fishery EIS), only the relative few listed in Table 4 will be permitted to be landed.

**Table 4.** The byproduct species permitted to be landed as part of the future management of the Estuary Prawn Trawl Fishery.

Note that not all species that were landed in previous years will be permitted to be landed under the management strategy for the fishery.

“Yes” signifies that the species is a by-product species in that estuary. “No” signifies that the species is not a by-product species in that estuary and therefore cannot be landed by fishers working this fishery. “Target” signifies that the species is a target species in that estuary.

Common Name	Scientific Name	Estuary			
		Port Jackson	Hawksbury River	Hunter River	Clarence River
School prawn	<i>Metapenaeus macleayi</i>	Yes	Target	Target	Target
Eastern king prawn	<i>Penaeus plebejus</i>	Target	Target	Target	Yes
Greasyback prawn	<i>Metapenaeus bennettiae</i>	Yes	Yes	Yes	Yes
Tiger prawn	<i>Penaeus esculentus</i>	Yes	Yes	Yes	Yes
Trumpeter Whiting	<i>Sillago maculata</i>	Yes	Yes	No	Yes
Large-toothed flounder	<i>Pseudorhombus arsius</i>	Yes	Yes	No	No
Small-toothed flounder	<i>Pseudorhombus jenynsii</i>	Yes	Yes	No	No
Black sole	<i>Synaptura nigra</i>	No	Yes	No	No
Silverbidy	<i>Gerres subfasciatus</i>	Yes	Yes	No	Yes
Striped trumpeter	<i>Pelates quadrilineatus</i>	Yes	Yes	No	No
Whitebait(glass fish) & sandy sprat	Clupeidae	No	Yes	No	No
Fork-tailed catfish	<i>Euristhmus lepturus</i>	Yes	Yes	No	Yes
Estuary catfish	<i>Cnidoglanis macrcephalus</i>	No	No	No	Yes
Striped catfish	<i>Plotosis lineatus</i>	Yes	Yes	No	Yes
John dory	<i>Zeus faber</i>	Yes	No	No	No
Bullseyes	Pempheridae	No	Yes	No	No
Hairtail	<i>Trichiurus lepturus</i>	No	Yes	No	No
Yellowtail	<i>Trachurus novaezealandiae</i>	No	Yes	No	No
Sand Crab	Portunidae	Yes	No	No	No
Blue swimmer crab	<i>Portunus pelagicus</i>	Yes	Yes	No	Yes
Mud crab	<i>Scylla serrata</i>	Yes	Yes	No	Yes
Octopus	ORDER OCTOPODA	Yes	Yes	No	No
Mantis shrimp	<i>Oratsquilla oratoria</i>	No	No	No	No
Mantis shrimp	<i>Erugosquilla grahami</i>	Yes	Yes	No	No
Mantis shrimp	<i>Harpiosquilla harpex</i>	Yes	Yes	No	No
Arrow squid	<i>Nototodarus gouldi</i>	Yes	No	Yes	Yes
Broad squid	<i>Photololigo etheridgei</i>	Yes	Target	Yes	Yes
Slender squid	<i>Loligo</i> sp.	Yes	Target	Yes	Yes
Bottle squid	<i>Loliolus noctiluca</i>	Yes	Target	Yes	No
Bubble squid	<i>Eupyrmina stenodactyla</i>	Yes	Target	No	No
Candy-striped squid	<i>Sepioloida lineolata</i>	Yes	Target	No	No
Southern calamari	<i>Sepioteuthis australis</i>	Yes	No	No	No

The management strategy limits the taking of byproduct in each estuary to those species historically taken within the estuary. The quantity of byproduct reported as taken in each estuary will be monitored (see management response 2.1a) and validated through an observer study (see management response 8.1a). Annual reported landings of byproduct will be limited to historical levels and proportional to the annual reported landings of target species (see management response 4.2c). This will prevent targeting and increased catches of byproduct species.

### iii) Bycatch species

Species that are considered to be of high commercial and recreational importance which are incidentally caught in the Estuary Prawn Trawl Fishery include sand whiting, yellowfin bream, tarwhine, snapper, leatherjacket, flathead, tailor, and mulloway. Four strategies will be used to ensure that bycatch in the Estuary Prawn Trawl Fishery is minimised. These are:

1. the current prohibition against retaining fish that are subject to a size limit will remain under the management strategy (see management response 1.1a)
2. bycatch reduction devices will be improved to further reduce by catch (see management response 1.1b)
3. incidental catch ratios will be introduced to close areas where the abundance of incidental species is high (see management response 1.3a)
4. best-practice techniques will be used to minimise the impact of fishing activities on bycatch (see management response 1.1e).

Estuary prawn trawl fishers are attempting to minimise their catch of incidental species by incorporating within this management strategy the use of bycatch reduction devices, incidental catch ratios, limits on the quantities of annual reported landings of by-product species, “compliance audits”, a compliance penalty points scheme and an observer program. Again, only species listed in Tables 3 and 4 can be retained for sale.

### iv) Size limits

Clause 34 of the *Fisheries Management (General) Regulation 2002* prescribes the species that may be retained after being taken in a prawn trawl net from estuarine waters. In summary, it is lawful for a fisher to retain species:

- that are not subject to a prohibited size class
- that are not protected (i.e. no prohibition against taking)
- crustaceans (other than lobsters) that are not of a prohibited size.

See Appendix B7 of the Environmental Impact Statement for the Estuary Prawn Trawl Fishery (NSW Fisheries, 2002) for further details on species with prohibited size classes.

In addition, under this management strategy fishers will be limited to taking the species prescribed in Tables 3 and 4 for the estuary in which they fish.

### v) Protected fish

The *Fisheries Management (General) Regulation 2002* identifies a number of species which are protected, either from commercial fishing, or fishing by all sectors.

Protected fish include:

Ballina Angelfish	Herbst nurse shark
Eastern blue devil fish	Black rock cod
Elegant wrasse	Weedy sea dragon
Estuary cod	Australian grayling
Giant Queensland groper	Eastern freshwater cod
Grey nurse shark	Trout cod
Great white shark	Macquarie perch
Green sawfish	

Fish protected from commercial fishing include:

Black, blue and striped marlin	Blue groper
Atlantic salmon	Silver perch
Australian bass	Brook, brown and rainbow trout
Eel-tailed catfish	Freshwater crayfish
Estuary perch	

Of the species which appear in the lists above, fishers in the Estuary Prawn Trawl Fishery are not likely to have any direct or indirect interaction with the majority of the species as a large percentage of them are freshwater and oceanic species (see Appendix F4 of Environmental Impact Statement for the Estuary Prawn Trawl Fishery – NSW Fisheries, 2002). Any interactions of the fishery on protected fish are more likely to be through incidental capture of Australian bass, estuary perch, giant Queensland groper and estuary cod. Anecdotal evidence indicates that Australian bass and estuary perch may be taken in numbers when a fresh or flood washes fish downstream into trawled areas where they are usually not found during the summer months. These species migrate downstream into estuarine areas to breed during the cooler winter months when estuaries (except the Hawkesbury River) are closed to trawling. Estuary cod and giant Queensland groper are captured far less frequently probably because they prefer rocky substrate and structures which are avoided by trawl fishers. Anecdotal evidence suggests that large specimens which inhabit deep holes at some locations may have been recaptured a number of times over the years and with proper care in returning them to the water survive these captures.

## **vi) Interactions with threatened species and species of public concern**

Although interactions with threatened species have not been commonly recorded in this fishery, this management strategy contains three direct measures to obtain data on any such interactions. The first of these measures is to implement a scientific observer program, which will amongst other things, collect data on whether threatened or other species of concern are caught in the Estuary Prawn Trawl Fishery. The second measure is to modify the monthly catch return forms completed by commercial fishers to include information on threatened species. The third measure is the records of occurrence of threatened species during fishery independent surveys.

A number of management responses aimed at minimising impacts with threatened species also appear in section 8. These include using fishing closures, modifying gear and implementing the provisions of any threatened species recovery plans and threat abatement plans.

## **vii) Status of species within the fishery**

The exploitation status of the target and byproduct species of the Estuary Prawn Trawl Fishery is shown in Table 6. NSW Fisheries uses a standard set of definitions for reporting the exploitation status of shellfish and finfish stocks across all commercial fisheries. Determinations about the status

of the stock are based upon available information which will vary between species but includes analyses of catch and effort information and where possible, formal stock analyses. Where it is known, an estimate of the catch of recreational fishers, charter boats, and other sectors are also taken into consideration. This reporting method uses terms as detailed in Table 5 to describe the stock status.

**Table 5.** Definitions used in determining exploitation status.

<b>Exploitation Status</b>	<b>Definition</b>
Under fished	The appraisal of a shellfish or finfish stock that suggests that the stock has the potential to sustain catches significantly higher than those currently being taken
Moderately fished	The stock is assessed to be fished at levels which would probably allow only limited increases in catches
Fully fished	The appraisal of a stock which suggests that current catches are sustainable and close to optimum levels (the definition of which may vary between fisheries; eg catches are close to maximum sustainable yield, or fishing effort is close to a biological reference point). In a fully fished fishery, significant increases in fishing effort above current levels may lead to overfishing
Over fished / Depleted	The appraisal suggests that current fishing levels may not be sustainable, and/or yields may be higher in the long term if the fishing level is reduced in the short term. This may be due to recruitment overfishing, growth overfishing and/or as a result of habitat degradation.
Uncertain	There is little or no information about the status of this stock (eg. no catch data or only very recent catch data)
Unknown	The only information about the status of this stock is long term fishery dependant catch data

While eastern king and school prawn are categorised in Table 6 as “fully fished” they may be changed in the next review of the fisheries resources of NSW to overfished. This management strategy has taken a precautionary approach to the determination of the status of eastern king and school prawn resources by introducing several management responses that would be implemented if the species were considered as growth overfished (see section 3(c) and section 8).

In addition the squid resources show a pattern in annual reported landings that requires an explanation. Accordingly this management strategy provides a management response to review the status of the stock(s) of squid and to collect the basic information needed to review the exploitation status of this resource (see management response 2.1b).

There are also several byproduct species that, under section 9 of the management strategy, set off the “one year trigger” and so would require a review of the exploitation and management of this species. The management strategy has already addressed this by implementing management responses to:

- (a) limit the landings of byproduct species (see management response 4.2c)
- (b) temporarily close areas when the abundance of incidental species is considered too great (see management response 1.3a), and
- (c) introduce improved BRDs into the fishery (see management response 1.1b).

**Table 6.** Exploitation status and related information for target and byproduct species in the Estuary Prawn Trawl Fishery.

Common Name	Exploitation Status	Target or Byproduct	Targeted by other Commercial Fisheries	Stage in Lifecycle when Harvested
School prawns <sup>1</sup>	Fully Fished	Target	estuary general fishery ocean prawn trawl fishery Queensland	Sub-adult
Eastern king prawns <sup>2</sup>	Fully Fished	Target	estuary general fishery ocean prawn trawl fishery Queensland	Juvenile to sub-adult
Greasyback prawns	Unknown	Byproduct	estuary general fishery ocean prawn trawl fishery Queensland	Juvenile to adult
Tiger prawns	Unknown	Byproduct	estuary general fishery ocean prawn trawl fishery Queensland	Juvenile to adult
Blue swimmer crab	Unknown	Byproduct	estuary general fishery ocean prawn trawl fishery Queensland	Juvenile to adult
Mud crab	Unknown	Byproduct	estuary general fishery Queensland	Juvenile to adult
Squid (at least five species)	Unknown	Target and Byproduct	estuary general fishery ocean prawn trawl fishery ocean fish trawl fishery Victoria	Juvenile to adult
Mantis shrimp (at least three species)	Unknown	Byproduct	–	Unknown
Octopus (at least three species)	Unknown	Byproduct	ocean prawn trawl fishery Victoria	Juvenile to adult
Trumpeter whiting	Unknown	Byproduct	estuary general fishery Queensland	Juvenile to adult
Flounder (at least two species)	Unknown	Byproduct	ocean fish trawl fishery	Unknown
Silver biddy	Unknown	Byproduct	estuary general fishery	Unknown
Sole (black)	Unknown	Byproduct	–	Unknown
Trumpeter	Unknown	Byproduct	–	Unknown
Whitebait (at least two species)	Unknown	Byproduct	–	Juvenile to adult
Catfish (at least three species)	Unknown	Byproduct	–	Juvenile to adult
Yellowtail	Fully Fished	Byproduct	ocean hauling fishery estuary general fishery Commonwealth	Juvenile to adult
Dory, john	Unknown	Byproduct	offshore fish trawl fishery	Juvenile to adult
Crab, sand	Unknown	Byproduct	estuary general fishery ocean prawn trawl fishery Queensland	Juvenile to adult
Bullseye (at least two species).	Unknown	Byproduct	ocean prawn trawl fishery	Unknown

1 See (Montgomery 2000).

2 See (Glaister *et al* 1990; Gordon *et al* 1995; and Montgomery 2000).

### **viii) Overfished species**

If a species taken in this fishery is determined as ‘overfished’, this management strategy requires the implementation of, or assistance in developing, a recovery program for that species (see objective 2.6 and related management responses in section 8). A recovery program must include a description of the actions proposed to return to acceptable levels those parameter(s) which have led to the determination of the species being overfished. The recovery program will also set out a timeframe for that process and may specify further appropriate action should recovery targets not be met.

#### ***Definitions of overfished status***

There are two types of overfishing, both of which, when detected, require management action. “Growth overfishing” occurs when individual fish are typically harvested under the size that takes best advantage of the species growth in relation to expected natural mortality. “Recruitment overfishing” can be far more serious and occurs when fishing pressure has reduced the ability of a stock to replenish itself. It is important to note that the two types of overfishing are not mutually exclusive.

#### ***Designating a species as overfished***

The information needed to clearly determine that a species has been growth overfished is more likely to be available than the information needed to detect recruitment overfishing. Most formal definitions of recruitment overfishing are determined on the basis of an understanding of relative rates of fishing mortality, population growth and population biomass, as well as the relationship between spawners and recruitment (e.g. Hilborn and Walters, 1992). Even the most thoroughly studied species in NSW may not have relevant information on all those topics.

NSW Fisheries will consider advice from fisheries scientists as part of the annual assessment of the status of shellfish and finfish stocks in NSW. That advice could come as results of internal research become available, or from other agencies or institutions doing research relevant to the assessment of species harvested in NSW. If a species is the subject of a formal stock assessment process, the indication of overfishing is likely to come from having some performance indicator outside acceptable parameters.

A stock that has had sufficient fishing mortality to cause a reduction in recruitment requires effective rehabilitation. However, information that clearly demonstrates that a species’ recruitment has been impacted by fishing is difficult and expensive to collect, and likely to be rare. Management responses will need to be precautionary and are likely to draw inference from reported landings and catch composition, rather than from direct measurements of recruitment. For example, rapid declines in reported landings (especially when the species is targeted in a spawning aggregation), decreases in average size or missing size and/or age class compositions are all indicative of potential problems with recruitment.

When new information that is likely to change the present status of a species is received by NSW Fisheries, NSW Fisheries’ scientists will review the status determination for that species against the criteria specified in Table 5 and report on the updated status in the annual report “Status of Fisheries Resources”. If a species is designated as overfished, a recovery program involving all harvest sectors will be developed.



### ***Appropriate management responses for different types of overfishing***

Growth overfishing generally implies the productivity of a stock is being mismanaged by harvesting animals at too small a size, or young an age. Fish stocks that are growth overfished are not necessarily in danger of imminent collapse and populations can be growth overfished and still be stable. However, growth overfishing may increase the risk to the population of subsequent recruitment failure arising from increased fishing pressure or external factors. The typical and most appropriate response to growth overfishing is to increase the average size at first harvest. This is commonly done by imposing a minimum size limit or increasing an existing one. The efficacy of such a response depends largely on the methods of capture and whether the selectivity of those methods can be appropriately altered to match the new size limit, otherwise wasteful discarding can occur. Careful thought must be given to changing size limits where there are problems in adjusting the selectivity of the primary fishing methods for that species.

Recovery programs for species suspected of having depressed recruitment due to overfishing must include strong precautionary action. Actions could include (but may not be limited to) temporary fishery closures or caps on either catch or fishing effort. Recovery programs for recruitment overfished species may also include changes to the monitoring program for that species and/or require targeted research to improve the assessment of risk to the species in critical areas.

Montgomery (2000) used available information to show that school and eastern king prawns were being captured at sizes smaller than that which optimised biological yield per recruit. The assessment fell short of categorising this as growth overfishing because of the preliminary nature of the analyses, low level of precision about some population parameters and insufficient information about the sizes of prawns caught by all harvesting sectors for prawns.

Considering the results presented by Montgomery (2000), a precautionary approach has been taken in the management strategy which contains several management responses to address the likelihood of growth overfishing, namely:

- (a) modifying fishing gear to reduce the capture of prawns of non-marketable quality (see management response 1.1c).
- (b) protecting areas of key habitat (see management responses 1.1f and 1.2a)
- (c) implementing a legal minimum size in the form of a count of prawns to the half kilogram (see management responses 2.1d,e,g and 5.1a)
- (d) conserving the spawning stock (see management response 2.2a)
- (e) using a meeting of diverse stakeholders convened by NSW Fisheries to discuss the management issues that are relevant to more than one fishery (see management response 4.2d)
- (f) using the Total Allowable Catch Setting and Review Committee to determine levels of fishing effort on prawn resources across each commercial fishery (see management response 2.3b).

In addition, objective 2.6 in section 8 provides a mechanism for the fishery to participate in the recovery of overfished species. The objective has three major management responses as set out below, and the most appropriate management response for the fishery to adopt will be dependent upon the levels of reported landings relative to other fisheries. The three management responses for objective 2.6 are:

- (a) where the fishery is a major harvester of an overfished species, develop and implement a recovery program for the species within a specified timeframe
- (b) where the fishery is a minor harvester of an overfished species, contribute to the development of a recovery program for the species and adopt any measures required by that plan
- (c) during the period of development of a recovery program for a species that has been determined as being recruitment overfished, implement precautionary actions including, but not limited to, any of the following:
- total harvest controls
  - reductions in effort associated with the harvest of the species
  - the implementation of fishing closures
  - bycatch management provisions
  - mandatory gear changes.

## d) Gear used in the fishery

### i) Prawn nets

An endorsement in the fishery allows a commercial fisher to use an otter trawl net to target prawns (and also squid in the Hawkesbury River) in estuarine waters. A trawl net is a funnel of net towed along close to the seabed (Figure 3). The net to be used is restricted by the definition of an otter trawl net for prawns under the *Fisheries Management (General) Regulation 2002* (see Appendix 1).

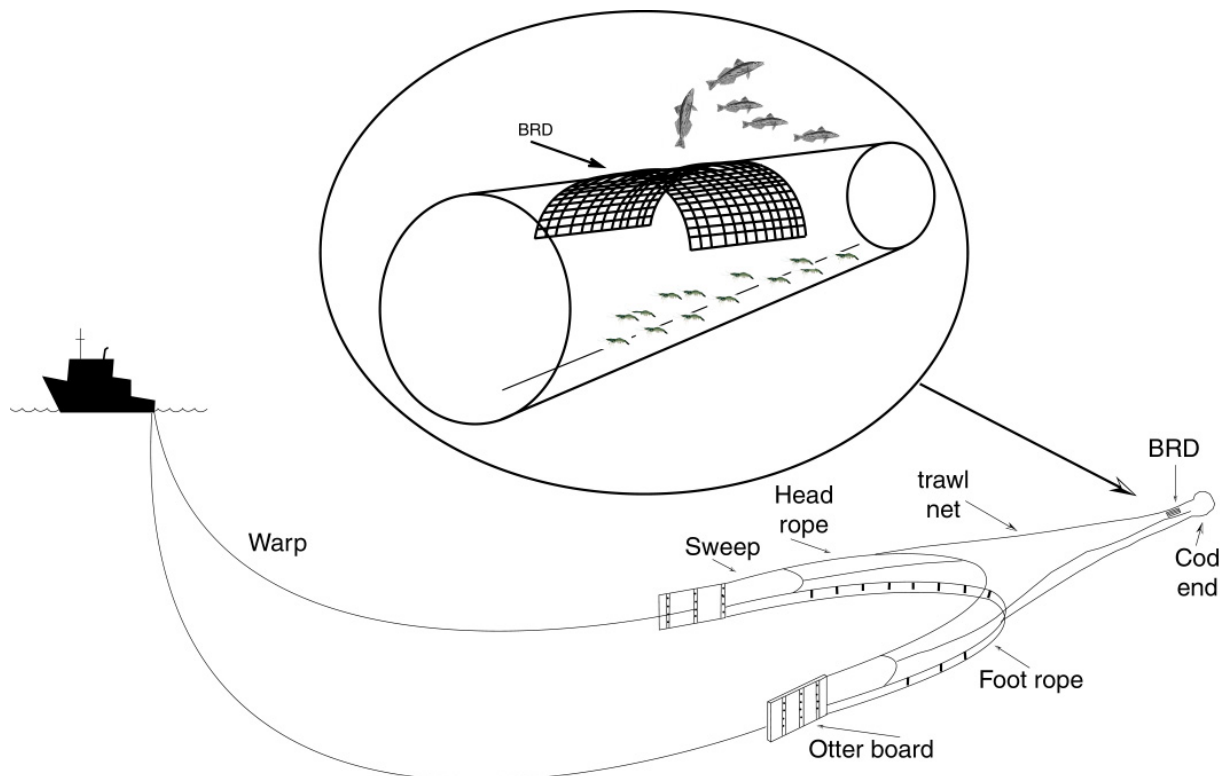
Restrictions apply to the size of mesh that may be used in the net (see Table 7). The amount of net (i.e. headrope length) and number of nets that may be towed behind the vessel is also restricted to limit fishing effort (see Table 7). Although two nets may be used in Broken Bay (Hawkesbury River) and Port Jackson almost all vessels only use one net. In the Clarence River most trawlers use two nets.

**Table 7.** Summary of the characteristics of the nets permitted in each estuary.

Characteristic	Estuary			
	Clarence River	Hunter River	Hawkesbury River	Port Jackson
Mesh size of net (mm)	40-60	40-60	40-60	40-60
Mesh size of codend (mm)	40-50	40-50	40-50	40-50
Maximum number of nets	2	1	2 (Broken Bay) 1 (Other)	2
Maximum headline length (m)	7.5m each net (if twin gear) 11m (if single gear)	11	11	11
BRD	Yes	Yes	Yes (see below)	Yes

All prawn trawl nets, except for those used in Broken Bay (Hawkesbury River), must be fitted with a BRD that has been approved for use in the fishery (see Table 8). A description of the BRDs used in the Estuary Prawn Trawl Fishery is given in Appendix 2.

Bycatch reduction devices have not yet been introduced in Broken Bay because the devices presently used would severely reduce catches of squid. A joint research project involving fishers, NSW Fisheries and University of Sydney is currently underway on the Hawkesbury River squid fishery which, amongst other things, aims to develop gear to minimise incidental catch without reducing squid catch.



**Figure 3.** Diagram of an otter trawl net used in the Estuary Prawn Trawl Fishery.

The major components of the net are shown in the bottom of the figure. “BRD” refers to bycatch reduction device located near the codend.

**Table 8.** Bycatch reduction devices (BRDs) approved for use in each estuary.

Estuary	BRD
Clarence River	1. Composite square mesh panel 2. Blubber chute 3. Nordmore grid 4. Quality Clarence panel 5. Diamond BRD 6. Modified Nordmore grid
Hunter River	1. Composite square mesh panel 2. Blubber chute 3. Nordmore grid 4. Quality Clarence panel
Hawkesbury River	1. Composite square mesh pane 2. Blubber chute 3. Nordmore grid 4. Quality Clarence panel 5. Hawkesbury square mesh panel
Port Jackson	1. Port Jackson screen 2. Blubber chute 3. Nordmore grid 4. Composite square mesh panel

The current gear restrictions will remain under the management strategy (see management responses 1.1a) unless: more effective BRDs are introduced (see management response 1.1b), nets are modified to minimise the capture of target and byproduct species of non-marketable quality (see management response 1.1c), or a new net is developed to selectively harvest squid or gear is to be modified under a recovery program for an overfished stock (see management response 2.6c).

## ii) Boats used in the fishery

Vessels used in the Estuary Prawn Trawl Fishery are of both planing and displacement hull designs. Some of these vessels are also used to fish in other fisheries such as the Ocean Prawn Trawl, Estuary General and Ocean Trap and Line fisheries, hence the large range of in vessel length and power. The characteristics of the fleet within each estuary are summarised in Table 9.

**Table 9.** Summary of general characteristics of vessels used in the Estuary Prawn Trawl Fishery in each estuary.

Characteristic	Parameter	Estuary			
		Clarence River	Hunter River	Hawkesbury River	Port Jackson
Hull design	Displacement or planing	Both	Both	Both	Displacement
Length (m)	Range	4.3-17.2	6.2-13.1	4.7-15.7	5.6-9.2
	Average	9.9	8.6	8	8
Engine power (kW)	Range	6.3-269	30-134	20.1-165.5	22.4-156.6
	Average	97.12	71.73	81.12	77.78

## **e) Interaction with other designated fishing activities**

Various fisheries catch prawns at different stages in the prawn life cycle. It is important therefore to carefully balance the exploitation relationships between the fisheries that harvest the resource. School prawns have a life span of approximately 12 to 18 months, and eastern king prawns of between one and two years, possibly even three years. Prawns spawn at sea, and their larvae enter estuaries where they grow to adolescents before migrating back to ocean waters prior to spawning. The three commercial fisheries and recreational fisheries that harvest school and eastern king prawns are therefore fishing the same stocks of prawns, and consequently rely upon management measures in each others fisheries to be responsible for sustaining the resource rather than a particular fishery.

### **i) NSW commercial fisheries**

The ocean prawn trawl fishery relies upon the estuary general fishery and Estuary Prawn Trawl Fishery to let sufficient numbers of prawns to escape from estuaries to provide economical numbers of prawns to catch in ocean waters. Conversely, the estuary general fishery and Estuary Prawn Trawl Fishery rely upon the ocean prawn trawl fishery to leave sufficient spawners to produce enough recruits to make fishing for prawns economically viable in the estuaries. For the same economic reasons the estuary general and estuary prawn trawl fishers rely upon one another to leave prawns that are too small to capture. A summary of the relative reported landings between fisheries for school and eastern king prawns and other key species in the Estuary Prawn Trawl Fishery can be found in Appendix B5 of the Environmental Impact Statement for the Estuary Prawn Trawl Fishery.

The over-riding consideration is that sufficient numbers of prawns escape the fishing process to sustain the population. To achieve these goals representatives from the three commercial fisheries, the recreational fishery and conservation groups sometimes meet to develop common management measures directed toward sustaining the populations of prawns.

There is also considerable overlap between fishers who operate in the Estuary Prawn Trawl Fishery and other commercial fisheries, particularly the Estuary General and Ocean Prawn Trawl fisheries. As of September 2002, 141 estuary prawn trawl endorsement holders were also endorsed to operate in the Estuary General Fishery and 73 also have endorsements in the Ocean Prawn Trawl Fishery. There are 39 fishers endorsed to operate in all three of these fisheries. Other commercial fisheries in which estuary prawn trawl endorsement holders also hold endorsements; lobster (six), ocean fish trawl (five), ocean hauling (22) and ocean trap and line (26).

The Estuary Prawn Trawl Fishery may catch species other than prawns that are primary or secondary species of the Estuary General, Ocean Hauling and/or other line and trap fisheries. The catch of these species by the Estuary Prawn Trawl Fishery is minimised through the use of bycatch reduction devices, legal minimum lengths and, in some cases, counts of individuals of a species in the catch. Additionally, the management strategy includes rules for bycatch ratios (management response 1.3a) and byproduct limits (management response 4.2c).

### **ii) Recreational fishery**

A high level of competition (for principally finfish and fishing areas) over the years between the commercial sector and recreational sector has resulted in a substantial level of ongoing conflict between these groups. Many of the closures with respect to commercial fishing in estuaries have been introduced (many as industry initiatives) to resolve long standing conflict issues.

Recreational fishers harvest school and eastern king prawns in estuarine waters with the use of hand hauled prawn nets, push or scissor nets and dip or scoop nets. There is very little competition between commercial fishers in the Estuary Prawn Trawl Fishery and recreational fishers for prawns in the estuaries within which the fishery takes place. Notwithstanding this, recreational fishers are significant harvesters of prawns in some estuaries in NSW (Montgomery and Reid, 1995) and overall contribute around 5% by weight to the total reported landings of prawns in NSW (confirmed by the results of the National Recreational and Indigenous Fishing Survey completed in 2002).

The main conflict between the Estuary Prawn Trawl Fishery and the recreational fishing sector comes from recreational fishers concerns about the incidental catch of the prawn trawl fishery. This incidental catch contains some species which are targeted by recreational fishers including; sand whiting, yellowfin bream, tarwhine, snapper, leatherjacket, flounder, flathead, tailor, bass, estuary perch, and mulloway. These species occur in estuaries for varying times as both juveniles and adults and with the exception of bass and estuary perch are caught primarily in the juvenile stages by the Estuary Prawn Trawl Fishery.

### **iii) Charter boat fishing**

The marine and estuarine charter fishing industry was restricted in 2000 when eligible vessels became licensed under the FM Act. Since licensing arrangements commenced, operators have been required to enter logbook returns, detailing the catch taken on board the vessel during charter activities, as part of a compulsory monitoring program. A separate logbook exists for estuarine charter fishing operations so the catch taken in estuarine waters by charter fishing operations can be identified. In August 2002, 195 charter boats were authorised to operate in estuarine waters.

Logbook returns entered to date indicate that one third of the fish taken during estuarine charter fishing activities are returned to the water. The retained catch from estuarine charter operations is dominated by dusky flathead, bream, tailor, sand whiting and luderick (charter boat monitoring program database, 2002). All of these species are bycatch in the Estuary Prawn Trawl Fishery and can not be retained for sale.

### **iv) Other designated fishing activities**

#### ***Beach safety (shark meshing) program***

There is negligible interaction between the Estuary Prawn Trawl Fishery and the beach safety program which occurs in ocean waters.

#### ***Fish stocking***

There is minimal interaction between the Estuary Prawn Trawl Fishery and fish stocking as stocking programs predominantly take place in freshwater areas including lakes and impoundments. Australian bass is generally the only stocked species that moves into the upper reaches of estuarine waters at certain times of the year. Australian bass are protected from commercial fishing.

## **4. Management Controls and Administration**

### **a) Limited entry**

As discussed in 1(e) of this management strategy, the Estuary Prawn Trawl Fishery is in the process of moving from a restricted fishery regime to a share management fishery regime. Access to the fishery is limited to the owners of vessels with an existing endorsement in the restricted fishery and, in future, will be limited to the holders of shares in the share management fishery (subject to the share management plan).

### **b) Licensing arrangements**

There are two broad types of fishery management controls, known as input controls and output controls. Input controls limit the amount of effort commercial fishers put into their fishing activities, indirectly controlling the amount of fish caught. They need to continually be modified in response to increases in fishing effort usually caused by advances in fishing technology.

The Estuary Prawn Trawl Fishery in NSW is managed predominantly by input controls. The following section sets out the controls that have common limitations to all estuaries.

#### **i) Commercial fishing licences**

A commercial fishing licence is required by an individual before she/he can take fish for sale or be in possession of commercial fishing gear in or adjacent to waters. The licence only authorises activities that are covered by endorsements issued in respect of each part of a fishery and specified on the licence.

Generally speaking, commercial fishing licences are currently available to persons who held a licence immediately prior to the commencement of the *Fisheries Management Act 1994*, or owners of recognised fishing operations (RFOs). An RFO is a fishing business that has a minimum level of past participation (validated catch history) in the fishery or a particular type of fishing entitlement. Businesses allocated an estuary prawn trawl endorsement fall into the latter category and are automatically granted RFO status. The RFO policy was introduced via the Licensing Policy issued by NSW Fisheries in June 1994. The provisions in this management strategy will supersede the relevant provisions of the Licensing Policy as they are implemented.

A commercial fishing licence may also be issued to an individual who is the holder of shares in a share management fishery. This will become the more relevant requirement as the Estuary Prawn Trawl Fishery moves to category 2 share management.

Because estuary prawn trawl fishing businesses are automatically granted RFO status and a new owner is automatically issued an entitlement to access the fishery it has not been possible in this fishery to ensure that active effort has been replaced by the new fishing business owner. In a share management fishery, minimum shareholdings may be used to restructure and consolidate estuary prawn trawl fishing businesses. During the development of this management strategy there has been support from the Estuary Prawn Trawl MAC for a structural adjustment program to better manage fishing effort and to maintain or improve the economic viability of fishers.

The eligibility to hold endorsements on a commercial fishing licence in a category 2 share management fishery is based on the shareholder holding the minimum number of shares specified in

the share management plan for the fishery. Different minimum share holdings may apply to each endorsement of each estuary in the fishery, or both.

Section 8 of this management strategy includes a number of principles that will be adopted with respect to setting minimum shareholdings in the management plan. The principles relate to having a minimum shareholding at the fishing business level (taking into account shares in other fisheries) for new entrants to the fishery, and at the endorsement and estuary level to ensure that the number of endorsements available for use at any one time does not exceed the historic and sustainable levels of activity in the fishery.

It must be recognised that any application of minimum shareholdings in the Estuary Prawn Trawl Fishery is a long-term approach to restructuring fishing effort. Unless there is a direct link between shareholdings and fishing effort, other management tools (particularly closures) will be needed to achieve any required short term changes in fishing effort or practices.

### ***Skipper policy***

In addition to fishing business owners, there are two types of licensed skippers that can operate in the Estuary Prawn Trawl Fishery; general skippers and employee skippers. Skipper endorsements are held by:

- licensed persons who were part owners of a fishing business in 1996 and held entitlements in the Estuary Prawn Trawl Fishery or other boat based fisheries
- licensed persons who were operating as employed skippers for other fishing business owners in 1996.

### ***Provision for unlicensed crew***

The holder of a commercial fishing licence or fishing boat licence endorsed in the Estuary Prawn Trawl Fishery may also apply for an authorisation to employ unlicensed crew (commonly referred to as a “block licence”) or may employ a person who themselves are registered as crew. A fee for each applies.

A licensed fisher employing crew must maintain records about her/his crew. Information relating to crew must be recorded on the mandatory catch and effort return submitted by the licence holder.

## **ii) Fishing boat licensing**

In addition to each fisher requiring a commercial fishing licence, every fishing boat used in connection with estuary prawn trawling must also be licensed. There has been a cap on the total number of fishing boat licences since 1984 (includes boats used in all fisheries).

## **iii) Renewal of licences**

Commercial fishing licences and fishing boat licences must currently be renewed annually. Fishers are sent renewal application forms approximately one month before the expiry date on the licence. If a commercial fishing licence is not renewed within 60 days of the expiry date on the licence, the renewal application is taken to be an application for a new licence. Additional fees apply to late renewal applications.



### ***Abeyance period for fishing boat licences***

Fishing boat licences can be held in abeyance for a period of up to two years from the date of expiry of the licence or when advised in writing by the owner. Fishing boat licence fees are not payable during the period of abeyance, but the full amount due is payable if the licence is reinstated within the two years specified.

#### **iv) Appeal mechanisms**

Fishers may lodge an appeal to the Administrative Decisions Tribunal (ADT) against a decision to refuse to issue or renew, suspend, cancel or place conditions on a commercial fishing licence (or an endorsement on that licence) or a fishing boat licence.

The main role of the ADT is to review administrative decisions of New South Wales government agencies. To lodge an appeal with the ADT, a request must first be made to NSW Fisheries for an internal review of the decision, then a written application should be lodged with the ADT no more than 28 days after the internal review was finalised.

The ADT can make various orders concerning an appeal application including:

- upholding the original decision
- reversing the decision completely or in part
- substituting a new decision for the original decision
- ordering the agency to reconsider the decision in light of the ruling.

For further information, refer to the *Administrative Decisions Tribunal Act 1997* or the following website: <http://www.lawlink.nsw.gov.au/>

#### **v) Nomination policy**

Upon the introduction of the restricted fishery regime, allowance was made for the endorsements of a fishing business to be nominated to a person. This was necessary due to some fishing businesses being held in company or partnership names and because fishing licences can only be issued to natural persons. Under that nomination policy, if the owner of a fishing business was eligible for an endorsement in the Estuary Prawn Trawl Fishery, the owner could nominate another person to take fish on behalf of the business. If a person nominated another fisher to take fish on their behalf, that person forfeited her/his right to fish (under all endorsements) while the nomination was active.

To avoid instances where relatively inactive fishers can use the nomination provision to 'pass' their entitlements to a new entrant (who may fish more intensively in the fishery) or to a person who operates in a less responsible way because they do not have the same long term interest in the fishery, this management strategy ceases the approval of new nominations (unless under extenuating circumstances, such as death or serious illness). In the case where a person owns two fishing businesses, then a nominated skipper can continue for one business.

The management strategy does, however, make provision for the share management plan to specify circumstances under which future nominations will be authorised in the Estuary Prawn Trawl Fishery, provided the Minister for Fisheries is satisfied that those provisions will not lead to significant increases in fishing effort. For example, applying a 'past participation' criteria could ensure that nominations can occur without the reactivation of latent effort.

## vi) Training licences

Licences are available to eligible persons for the purposes of training a new entrant to the commercial fishing industry. There are two types of training licences available.

**Trainer's licence:** The seller of a fishing business may apply to continue to hold his/her fishing licence for up to one year to work with the purchaser of the fishing business for the purpose of training the new entrant. Licence conditions apply and the trainer must surrender his/her licence at the end of the one year period unless a further recognised fishing operation (RFO) [or relevant number of shares specified in the share management plan] is acquired.

**Trainee's licence:** Within six months of acquiring an RFO a new entrant may request that the RFO be placed in abeyance whilst they gain skills working with an experienced fisher. This arrangement may apply for a period of up to two years. The methods and areas that the new entrant may work are limited to those authorised by the new entrant's fishing business.

This policy complements the provision within this management strategy to implement a new entrant training program, such that only new entrants who have successfully participated in the program will be entitled to hold an endorsement to begin working in the fishery.

## c) Net registration

The prawn trawl nets used in the Estuary Prawn Trawl Fishery do not need to be registered as required for other gear types under the *Fisheries Management Act 1994*.

## d) Controls on fishing gear and boats

Detailed restrictions relating to the dimensions of fishing gear, including the use of prawn nets, are legislated in the *Fisheries Management (General) Regulation 2002* and discussed in more detail in Section 3(d) (see also Appendix 1). The current regulations relevant to the Estuary Prawn Trawl Fishery will continue, subject to any changes necessary to implement the management strategy.

To prevent significant increases in the size and therefore efficiency of vessels in the fishery, a boat replacement policy applies. The applicability of the policy to prawn trawlers in each estuary within the fishery is described in Section 10 of this management strategy.

Additionally, a provision allowing fishers to temporarily replace their fishing boats with smaller boats for up to two years applies. During the two year period, a permanent boat replacement must be made with respect to the original boat.

## e) Transfer policies

### i) Transfer of licensed fishing boats

All licensed fishing boats that are authorised for prawn trawling in estuarine waters are classified as "boat history" vessels, whereby the validated, historic reported landings associated with the vessel is transferred whenever the fishing boat licence is transferred. The fishing boat licences for vessels in this fishery cannot be transferred separate to the remainder of the fishing business.

Any transfer of a fishing boat licence must first be approved by the Director, NSW Fisheries.

## **ii) Transfer of fishing business entitlements**

Commercial fishing licences and endorsements to participate in a fishery are not freely transferable. Currently, commercial fishing licences and endorsements only become available to a new entrant under guidelines issued by the Director of Fisheries.

Under the Licensing Policy, fishing businesses must be sold as an entire package (ie. the catch history or endorsements cannot be split). Proposals regarded as licence splitting, or contrary to the intention of the Licensing Policy are generally not approved. Variations to the licence splitting policy are provided on a case by case basis where there are demonstrable extenuating circumstances and where there are no net increases in fishing effort as a result.

While it is likely that shares will be able to be traded more freely between shareholders under the share management scheme, minimum shareholding may apply upon transfer of a business and restrictions will be included to prevent an increase in the number of entitlements in the fishery.

Under the guidelines issued by the Director of NSW Fisheries and in place at the commencement of this management strategy, upon transfer of a business with an estuary prawn trawl entitlement the new owner automatically becomes eligible for a commercial fishing licence and an estuary prawn trawl entitlement.

The only variations to this arrangement apply in the Hawkesbury River and Port Jackson, where there is a 'freeze' on the issue of prawn trawl endorsements to new business owners (exceptions may be approved in cases of serious illness or death of the current owner). The 'freeze' will be lifted as soon as suitable transfer criteria are introduced for these estuaries. The transfer criteria will ensure that new business owners gaining access to the fishery replace real fishing effort. Minimum shareholding and/or past participation requirements specified in the share management plan will supersede this policy.

## **iii) National licence splitting policy**

The Commonwealth and the State Governments have a longstanding nationally agreed policy in place on licence splitting. The policy prevents entitlements held by one person or entity and issued by more than one jurisdiction, from being split and transferred separately. The transfer of a fishing business will not be approved unless all entitlements issued to the business by other jurisdictions are also transferred to the same person, or surrendered.

Where fishing effort has been historically 'shared' across a number of entitlements held by a person, the policy prevents the increase in effort that would occur by creating two separate entitlements that could operate at full capacity.

This fundamental component of the Licensing Policy has been retained under this management strategy for the Estuary Prawn Trawl Fishery.

## **f) Time and area closures**

Closures are an important tool for achieving resource management goals. Under section 8 of the FM Act the Minister for Fisheries may prohibit, absolutely or conditionally, the taking of fish or a specified class of fish, from any waters or from specified waters. These closures either prohibit or restrict activities of commercial and/or recreational fishers in a given area for a specified time. Fishing closures may be used to:

- protect and conserve areas of key habitat
- manage the amount of fishing effort in an estuary or designated parts of an estuary
- manage conflicts between stakeholders over the use of the resource and to ensure it is equitably shared
- protect populations during their times of spawning
- minimise incidental catch and the impacts of the fishery on threatened and protected species.

The specific time and area closures applying to each of the four estuaries at the commencement of the management strategy are discussed under the specific management controls for each estuary described in Section 10 and Appendix 3 of this management strategy. The opening and closing times for individual estuaries often vary from year to year depending on changes in the availability of prawns within those estuaries. The existing fishing closures will remain until reviewed and new closures will be developed as required in accordance with the provisions in Section 8

Approximately 50% of the estuarine area in each estuary of the Estuary Prawn Trawl Fishery is currently closed to trawling. The closed areas are mostly located in the less marine dominated upper reaches of these estuaries with the exception of the Hawkesbury River which has several closures in its lower reaches. The Clarence and Hunter Rivers and Port Jackson are closed during winter to conserve prawn stocks and stocks of juvenile finfish. These estuaries contain mostly small prawns during winter, when the prawns grow very little and tend to stay in the estuary before moving to sea over summer and autumn (Racek, 1959; Ruello, 1973b; Glaister, 1978b). The Hawkesbury River has historically been open year round as quantities of prawns of a marketable size can be found in the Hawkesbury River year round (see McDonall and Thorogood, 1988). Apart from biological reasons, closures have been introduced into the Estuary Prawn Trawl Fishery to reduce conflict with other stakeholders, address noise level issues, lower the profile of trawling when the public is most likely to be using the waterways and to protect areas of key habitat.

Fishing closures are required to be published in the NSW Government Gazette, however if the Minister for Fisheries considers that a fishing closure is required urgently, the Minister may introduce the closure and advise the public through media outlets and by displaying prominent signs in areas adjacent to the waters affected. In the case of an urgent closure, the Minister is to publish the closure in the Government Gazette as soon as practicable.

Details on up-to-date fishing closures that apply to the Estuary Prawn Trawl Fishery can be found on the NSW Fisheries' website at: [www.fisheries.nsw.gov.au](http://www.fisheries.nsw.gov.au).

## **g) Permits**

The *Fisheries Management Act 1994* allows for permits to be issued for research and other authorised purposes. These permits provide a legal framework for activities that fall outside normal operating rules set out in the FM Act or its Regulation. Each permit sets out a number of conditions, which vary depending on the purpose of the permit. These conditions ensure that permits are used only for the intended purpose and may be used to limit the extent of the permitted activity.

**Table 10.** Types of permits that will be issued.

Permit type	Description
Research	Permits are issued to research scientists (including NSW Fisheries staff, Universities and other research organisations) and commercial fishers assisting in undertaking research programs. The permits generally authorise the retention of prohibited size shellfish and finfish, shellfish and finfish in excess of the possession or bag limits or use of gear not prescribed in the regulation
Trial of bycatch reduction devices (BRDs)	The development of an effective BRD requires significant testing under normal operating conditions to assess their effectiveness. Permits are often required to trial types of fishing gear with dimensions or configurations not prescribed in the regulation
Development of new fishing gear	This permit provides a legal framework for the possible development of a more selective and passive fishing method for this species
Crossover or V bridles	Permits have been issued to six fishers from the Hawkesbury River (as at 27 June 2001) to allow the use of crossover or V bridles on their prawn trawl gear. Crossover or V bridles lift the trawl net off the bottom of the estuary floor and are fitted when targeting squid in the Hawkesbury River.

Permits issued under section 37 are valid only in so far as they do not conflict with approved determinations of Native Title made under the Commonwealth *Native Title Act 1993*.

Permits are valid for one year or such other period as specified in the permit, and may be suspended or cancelled at any time by the Minister. Permits are not transferable.

## **h) Catch limits or quotas**

There are no direct catch limits or quotas on the target or byproduct species taken in the Estuary Prawn Trawl Fishery. However, Section 9 in this management strategy sets trigger points for landings levels of the target and byproduct species in this fishery which, if exceeded, cause a review of the fishery to be undertaken and may ultimately result in modifications to the management rules.

## **i) Seafood safety programs**

Food safety programs which relate to the Estuary Prawn Trawl Fishery are administered by Safe Food Production NSW under the *Food Act 1989*. Food safety programs for all commercial fisheries are being prepared by Safe Food Production NSW and will continue to be supported under this management strategy (see management response 5.4a).

## **j) Cost recovery policy**

NSW Fisheries recoups costs that are attributable to industry through a cost recovery policy. Cost recovery is a common principle among Australian commercial fisheries and an important component of ecologically sustainable development.

NSW Fisheries is in the process of implementing cost recovery in a progressive manner, so that all charges are not passed on to industry immediately. The FM Act requires that in a share management fishery, the fees payable must be paid in proportion to the shareholdings in the fishery.

In November 2000, the Government announced a new cost recovery policy. As part of the second reading speech for the *Fisheries Management and Environmental Assessment Legislation*

*Amendment Act 2000*, the Minister for Fisheries, the Hon. Eddie Obeid, gave the following commitment for the fisheries that were moving to category 2 share management fisheries:

“Over the next five years the Government will develop and implement a cost recovery framework for category 2 share management fisheries. This framework will be subject to extensive industry consultation.”

“During this period, the total amount of money collected for NSW Fisheries, for its existing management services, will not increase without the support of the relevant management advisory committee.”

“After five years, the costs that have been identified as attributable to the industry will be progressively introduced over a further three-year period.”

It is important to note that the new services required to be implemented under the management strategy or as a result of the environmental assessment process will need to be fully funded by the fishery participants.

A range of regulatory and administrative fees are payable by fishing business owners in the Estuary Prawn Trawl Fishery. The management strategy does not, in itself, set the charges, or limit or otherwise govern the way fees are changed.

## **5. Compliance**

NSW Fisheries has approximately 90 positions for fisheries officers who are responsible for coordinating and implementing compliance strategies in NSW. These strategies include:

- maximising voluntary compliance
- providing effective deterrence
- providing effective support services.

Approximately sixteen of these fisheries officers are located in areas along the NSW coast where the Estuary Prawn Trawl Fishery occurs. Part of their duties includes conducting patrols, inspecting commercial fisher's catch and gear and recording rates of compliance. During the period from July 2000 to February 2001 the rate of compliance of commercial fishers in the Estuary Prawn Trawl Fishery was 91%.

Once an offence has been detected, officers have a range of responses available to them. Matters are dealt with depending upon severity by the use of a verbal caution, the issue of a written caution or penalty notice or by referring the matter to a court where a determination is made and penalty issued. Records are kept by NSW Fisheries of all convictions and a record of any previous convictions is handed to the court with the brief of evidence for any matters raised. Previous convictions are taken into account by the courts when fines are issued.

Briefs of evidence are prepared by the investigating officer. Briefs include a summary of the events which took place, a full statement including a description of the events, interviews with the offender/s and any witnesses, details of the offence/s and maximum penalties and any additional information such as video footage, photographs, records, maps, copies of any closures, supporting statements, summary of any fishing gear and catch seized and any other information relevant to the matter.

Any fishing equipment used to commit an offence is seized and held as evidence. If the gear is of legal dimensions the fisher can make application to NSW Fisheries for the return of the gear. Provided the fisher has no prior convictions and there are no extenuating circumstances, e.g. obstruction charges, the return of the gear is usually approved. An undertaking to produce the gear in court if necessary must be signed by the fisher before it is returned. Fishing gear forfeited to the crown by the court is disposed of by being destroyed or auctioned. Catch seized is disposed of by selling through a market if practical, donation to a charity, hospital or similar establishment or destroyed if not suitable for human consumption.

In addition to the traditional penalties handed out to fishers the management strategy contains a penalty points system. Fishers upon payment of a penalty notice or conviction in court of an Estuary Prawn Trawl Fishery related offence will be allocated penalty points (see section 5 of this management strategy).

NSW Fisheries manages compliance service delivery for each significant fishing or target program through a district compliance planning process that is administered within the Fisheries Services Division. Each district fisheries office is responsible for compliance service delivery within a geographical area, and develops a district plan based upon the particular priorities associated with that area.

Officers have in the past, at the request of fishers, checked trawl nets at private residences and on-board vessels when not working to assist fishers in maintaining gear at legal dimensions. Requests have been most common immediately prior to the commencement of the trawling season in each estuary. This strategy formalises this practice by implementing a compliance audit scheme into the Estuary Prawn Trawl Fishery. The compliance audit will be carried out by Fisheries Officers on board trawlers in the fishery prior to the commencement of each prawn trawling season, and in the case of Hawkesbury River operators each September.

The purpose of the audit is to check prawn trawl nets and associated fishing gear for compliance with mesh size and other legal requirements, and to give operators an opportunity to replace or modify illegal gear without penalty before commencing operations for the season. Quality inspections will be done at random throughout the season to ensure compliance with the rules applicable to the Estuary Prawn Trawl Fishery. Non compliance by fishers may result in the prosecution of the offender and in penalty points being placed upon that fishers' licences.

## **a) A penalty points system**

A penalty points scheme with share forfeiture provisions will be introduced under this strategy and will be developed as part of the share management fishery management plan for the Estuary Prawn Trawl Fishery.

The Estuary Prawn Trawl Fishery generally has a high compliance rate, however, despite the relatively large number of potential offences and the maximum penalties specified in the FM Act and Regulation, there are still a small number of fishers who regularly operate beyond the rules. These few people continue to breach the law partly because the courts are often unwilling to uphold hefty fines for fisheries offences (which are often viewed as minor compared to criminal offences). The penalty points system is a way of providing a clear deterrent to fishers who are considering breaching the provisions of the management strategy or associated rules, as well as providing the courts with a regulated management plan that reflects the serious nature of some fisheries offences.

Similar to how the motor vehicle licensing scheme works (administered by the Roads and Traffic Authority), the system will see a list of penalty points assigned to serious or repeated offences. If a fisher accrued a certain level of penalty points by breaching the management rules, the endorsement or licence would be subject to predetermined periods of suspension or cancellation through provisions in the share management plan for the fishery.

The offences deemed as “serious” and the definition of a “repeated offence” would need to be included in the share management plan, as would the points attributable to each offence.

## **6. Research**

### **a) Purposed research areas**

The basic areas of research for the Estuary Prawn Trawl Fishery can be categorised into seven broad areas:

- (i) stock assessments of target species
- (ii) quantification and reduction of the incidental catch
- (iii) effects of fishing methods on habitats
- (iv) importance of habitats to shellfish and finfish populations
- (v) importance of ecological processes to shellfish and finfish populations
- (vi) impacts of fishing on trophic interactions and ecosystems
- (vii) impacts of fishing on threatened species.

Outlined below are those strategies by which research into these areas ideally should proceed.

### **i) Stock assessment of key species**

Previous assessments on eastern king prawns in NSW have been done by Glaister *et al.* (1990), Montgomery (1993), and Gordon *et al.* (1995). However, none of the studies developed a stochastic, length-based model. Data are available for a desk top study to develop such a model.

Despite the extensive studies on the school prawn fisheries of the Hunter River (Ruello, 1969, 1971, 1973a,b, 1977) and the Clarence River (Glaister, 1977, 1978a,b), there is little information on the dynamics of school prawn populations and none that is of a quality that could be used in a stock assessment of the resource. Notwithstanding, Montgomery and McDonall (1988) used available information to do yield per recruit analysis to determine optimal times to open estuaries to prawn trawling. In addition, Montgomery (2000) used these data to determine optimal sizes at first capture for eastern king prawns and school prawns. A much needed, four year study funded by the Fisheries Research and Development Corporation (FRDC) to obtain estimates of the parameters to do a full stock assessment of this very important resource is underway.

Further, past research has suggested that the level of landings of school prawns (particularly from the oceans), is determined by the level of river discharge. This association needs to be updated and will be done as part of the FRDC funded prawn research project discussed above.

Until recently, no research had been done on the squid stocks of the Estuary Prawn Trawl Fishery in NSW. A PhD student at the University of Sydney is currently doing a project to study the



broad squid in the Hawkesbury River, the main commercial species. The study will investigate the distribution of the population, the 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. This study will provide information essential to the review of the status of squid populations as provided for in management response 2.1b, and together with the results of the review will determine the need for future research on the squid stocks of the Estuary Prawn Trawl Fishery.

Stock assessments of prawns conducted under this management strategy will be based upon estimates of population parameters provided from the studies mentioned above, from fishery independent surveys to provide information about the abundances and sizes of individuals in the populations and from observer surveys to provide information about what is being caught in commercial and recreational fishing gear. Fishery dependent data will be used to provide information on the level of reported landings and the level of fishing effort that is being expended.

In the past, information on reported landings and effort has been used to monitor the relative abundances of prawn species in the Estuary Prawn Trawl Fishery. However, this management strategy also requires reliable information on the size and species composition of the target and incidental species taken in the fishery. Fishery dependent data does not currently provide this level of information. Further, while good fishery dependent data can provide information about the spatial distribution of fishing effort, often it does not collect data at the point of detail required to determine the levels of effort expended upon different habitat types, nor information about the spatial distribution of species within the estuary. Also, fishery dependent data would be biased by the introduction of BRDs into the trawl nets, incidental catch ratios and prawn counts into the fishery.

Because of the problems with fishery dependent data, stock assessments for the Estuary Prawn Trawl Fishery will be based upon fishery independent methods involving stratified randomised surveys of relative abundances and size and age structures of wild populations. Such data will provide more robust and rigorous assessments of natural populations than that solely relying on data from the fishery.

The first step in implementing such a major change in focus is to do the necessary pilot studies that will develop appropriate fishing gears for such surveys, and to do cost-benefit analyses of information from pilot surveys to determine the most appropriate sampling regimes. This pilot work will then be followed by two years of sampling to test the developed survey design and allow the preparation of a final design for subsequent surveys that will continue into the future.

The fishery independent survey will also have significant side-benefits, providing samples of target and incidental species for studies on age determination and reproductive biology, stock assessments and also samples for diet analyses which will provide some information toward preliminary examinations of trophic interactions. These may also include some sampling to collect information about threatened and protected species.

Table 11 shows a gap analysis of information for stock assessments of the target species highlighting areas where research is required to completely assess these stocks.

**Table 11:** Gap analysis of information required for stock assessments of target species in the Estuary Prawn Trawl Fishery.

Yes' signifies that information on this parameter is available and references are provided. '1' signifies that information on this parameter is not yet available.

For the parameters that are shaded, information on the species in general is provided with distinction being made where information is only available from other states in Australia. The unshaded parameters comment on whether information exists for NSW only.

Species	Distribution	Life cycle	Age/Size at first maturity	Age at length data	Landings size composition (for NSW)	Natural mortality estimate (for NSW)	Fishing mortality estimate (for NSW)	Total mortality estimate (for NSW)	Yield per recruit (for NSW)	Stock recruitment relationship (for NSW)	Stock structure (for NSW)	Biomass estimate (for NSW)
Eastern king prawn	Yes <sup>1</sup>	Yes <sup>1</sup>	Yes <sup>2</sup>	Yes <sup>3</sup>	Yes*	Yes <sup>3</sup>	Yes <sup>3</sup>	Yes <sup>3</sup>	Yes <sup>3,4</sup>	-	Yes <sup>4,5</sup>	-
School prawn	Yes <sup>1</sup>	Yes <sup>1</sup>	Yes <sup>6</sup>	-	Yes*	-	-	-	Yes <sup>4</sup>	-	Yes <sup>6,7</sup>	-
Broad squid	Yes <sup>1</sup>	-	-	-	-	-	-	-	-	-	-	-
Bottle squid	-	-	-	-	-	-	-	-	-	-	-	-

1 - Kailola, P. J., Williams, M. J., Stewart, P. C., Reichelt, R. E., McNee, A. and Grieve, C. (1993). *Australian Fisheries Resources*. Bureau of Resource Sciences and the Fisheries Research and Development Corporation. Commonwealth of Australia. 422 pp. (and references contained therein).

2 - Courtney, A. J., Montgomery, S. S., Die, D. J., Andrew, N. L., Cosgrove, M. G. and Blount, C. (1995). Maturation in the female eastern king prawn *Penaeus Plebjus* from coastal waters of eastern Australia, and considerations for quantifying egg production in penaeid prawns. *Marine Biology* **122**: 547-556.

3 - Glaister, J. P., Montgomery, S. S. and McDonnall, V. C. (1990). Yield-per-recruit analysis of eastern king prawns *Penaeus plebejus* Hess, in eastern Australia. *Australian Journal of Marine and Freshwater Research* **41(1)**: 175-197.

4 - Montgomery, S. S. (2000). Status of eastern king and school prawn stocks. **In:** *Proceedings of Juvenile Prawn Summit June 26-27*. NSW Fisheries Publication. Sydney. Pp. 28-47.

5 - Glaister, J. P. (1983). Dynamics of the Eastern Australian King Prawn Population. PhD Thesis, University of NSW. 208pp.

6 - Ruello, N. V. (1971). Some Aspects of the Ecology of the School Prawn *Metapenaeus macleayi* in the Hunter region of New South Wales. MSc Thesis, University of Sydney. 145 pp.

7 - Glaister, J. P. (1977). Ecological Studies of *Metapenaeus macleayi* (Crustacean, Decapoda, Penaeidae) in the Clarence River Region, Northern New South Wales. MSc Thesis, University of New England. 80 pp.

\* - NSW Fisheries. Pilot Data. (Unpublished).

## ii) Quantification and reduction of the bycatch and discarding of untargeted species

It is well accepted that the most reliable and accurate way one can assess incidental catch and discarding is to use observer-based surveys.

Observer surveys were done between 1989 and 1992 on the estuary prawn trawl fisheries of the Clarence River, Hawkesbury River, Port Jackson and Botany Bay (Gray and McDonall, 1993; Liggins and Kennelly, 1996; Liggins *et al.*, 1996). Data from these surveys will provide the baseline information from which to determine whether the incidental catch in prawn trawls is being reduced. However, there have been no observer surveys done of the prawn trawl fleet in the Hunter River.

Observer surveys will be done periodically to collect information on what is being caught. On randomly chosen days during the trawl season observers will go on randomly chosen trawlers and,

count, measure and weigh individuals of each species caught during each trawl shot that day. The level of sampling will provide estimates of mean abundances with levels of precision of around 30%.

Bycatch reduction in the Estuary Prawn Trawl Fishery has been much studied (e.g. Broadhurst and Kennelly, 1994; Broadhurst and Kennelly, 1996; Broadhurst *et al.*, 1996; Broadhurst *et al.*, 1997) and based upon this work BRDs are now mandatory in the Estuary Prawn Trawl Fishery. When specific bycatch and discarding problems are identified, targeted research will be directed at ameliorating the identified problems and may be funded by externally funded grants. This will include the development and testing of alternative gears and fishing practices as well as assessments of the utility of spatial and temporal fishing closures that are designed to reduce any identified problems. For example, NSW Fisheries currently has a study funded by FRDC to investigate methods for reducing the capture of small prawns in prawn fishing gear, including the trawl net used in the Estuary Prawn Trawl Fishery and the practice of riddling.

### **iii) Effects of fishing methods on habitats**

The significant gaps in our knowledge about the physical impacts of trawling on habitats will be addressed via targeted projects involving manipulative and mensurative field experiments on specific problems. Specific issues will be prioritised and funding from external sources sought. If problems of physical damage on habitats are identified, then targeted projects will be undertaken to reduce such effects through gear and/or operational modifications and/or spatial and temporal closures in sensitive areas.

### **iv) Importance of habitats to fish populations**

Some research has been done on the associations between estuarine shellfish and the habitats on which they depend (e.g. Young and Carpenter, 1977; Young, 1981; Coles and Greenwood, 1983; Bell and Pollard, 1989; Ferrell and Bell, 1991; Gray *et al.* 1996). It is important that the role different habitats play in supporting fisheries resources continue to be studied and that the effects of the degradation of such habitats be fully understood. Current research includes a project investigating the impacts of acid sulphate soils on fisheries resources.

The extent and distribution of key estuarine habitats (e.g. seagrasses, mangroves, saltmarsh, etc.) have been recorded previously (West *et al.*, 1985) and this work is currently being repeated. It is planned to continue and, in fact expand, the monitoring and assessment of changes in the state's estuarine habitats.

Research on specific interactions between particular populations and particular habitats would involve targeted research projects directed at specific problems, which would include field-based manipulative experiments and mensurative studies. Specific issues will be prioritised and funding from external sources sought.

### **v) Importance of ecological processes to fish populations**

The structure and functioning of ecosystems and the myriad of ecological processes that occur in them underpin the sustainability of most of those shellfish and finfish that are exploited from estuarine systems. It is therefore important for the fisheries that target species in these systems to understand the complex ecological processes in those systems, whether these processes directly involve target species or not.

The techniques and methodologies for examining such interactions involve quite complex field experimentation and there exists a substantial body of literature on the subject, though not often involving the estuaries of NSW that are exploited by the Estuary Prawn Trawl Fishery.

Directed, detailed, experimental and mensurative programs need to be undertaken so that management decisions about exploited shellfish and finfish can be made in the light of entire ecosystem processes. Such information will, of course, also provide vital information to other non-fisheries agencies that manage other aspects of such systems under the principles of ecological sustainable development. Specific issues will be prioritised and funding from external sources sought.

#### **vi) Impacts of fishing on trophic interactions and ecosystems**

Little research has been done anywhere to assess the impacts that fishing has on the structure of estuarine ecosystems. In general, such work is very much in its infancy throughout the world but, where work has been done, it is invariably characterised by being complex, expensive, of a long duration and usually shows that fishing can significantly affect the structure and function of ecosystems (Hall, 1999; Kaiser and de Groot, 2000). Currently there is a three year study being done to investigate the effects of fishing upon the benthos in the Clarence River. Once this research is completed the need for future studies will be assessed. It is proposed to examine the impact of fishing upon biodiversity will be examined by doing targeted projects on specific impacts via manipulative experimentation in the field. Samples from fishery independent surveys will provide data that can be used to determine species richness and dietary information that perhaps can be used in trophic level analyses. External funding will be sought to conduct studies to investigate the impacts of trawling upon biodiversity.

Before this ecosystem research commences however, a risk assessment as proposed by the Sustainability Indicators Working Group of the Standing Committee on Fisheries and Aquaculture will be done. The Working Group is in the process of developing a national reporting framework for ESD for Australian fisheries and has completed some work on identifying the main ecosystem components that may be subject to impacts from fishing. Acknowledging that research resources are limited, the working group is recommending that Australian fisheries management agencies undertake a risk assessment for each fishery to determine the level of management (including research) necessary for each component of the ecosystem. The working group recommends that this be done through a workshop so that the outcome is a combined judgement of a group of people who have considerable expertise in the areas being examined.

#### **vi) Impacts of fishing on threatened species**

Little is known about the biology and ecology of those species listed as endangered and threatened, and potential impacts of commercial fishing on these species is even less understood. Because of the rare occurrence of threatened and endangered species in any fishery, it is appropriate that research on such issues should involve specific projects targeted at particular species and the many factors that influence them, rather than studying particular fisheries for their impacts on certain species.

Such studies would involve examining the biology and ecology of certain species to assess potential impacts of many factors (only one of which would be the Estuary Prawn Trawl Fishery). Specific issues and species will be prioritised and funding sourced.

## **b) The Conservation Technology Unit**

In March 2001, NSW Fisheries established a Conservation Technology Unit to examine conservation-based gear technology in commercial and recreational fisheries. This focussed research initiative will help address gaps in knowledge including the selectivity of fishing gear used in the Estuary Prawn Trawl Fishery. The research will also assist in identifying the most appropriate gear to be used in the fishery so that future changes to gear regulations can be based on accurate scientific information. The development of new and innovative fishing techniques will help minimise unwanted catches, discarding and environmental change.

## **c) Catch monitoring**

The information collected on commercial landings assists in the ongoing monitoring and assessment of the status of shellfish and finfish stocks. The landings and effort information collected from commercial fishers has other critical roles in fisheries management including helping understand patterns of fishing activities and the mix of species from targeted and general fishing operations.

The entry of information on landings and effort onto the database is subject to stringent quality control procedures including a three month timeframe for data entry following receipt of a fisher's catch return by NSW Fisheries. A policy is being developed to manage the timely receipt and entry of commercial catch return data onto the commercial catch records database.

Fishers in the Estuary Prawn Trawl Fishery are required to submit records on a monthly basis detailing their landings and fishing effort. The information includes landings for each species, the effort expended (for each method) to take the catch, and the area/s fished. This information will be entered onto a database by NSW Fisheries and allows for analysis of fishing activity, reported landings and effort levels.

The accuracy of the data provided on catch returns, particularly with respect to fishing effort data, is variable. There are a number of management responses in this strategy to improve the quality and reliability of the information provided on catch returns, including a review of the current monthly catch return and validation of landings and effort data under the scientific monitoring program.

To maximise the accuracy of the data collected on monthly catch returns a range of quality control procedures are currently in place or scheduled for implementation in the near future. A brief synopsis of these quality control procedures is provided here:

- Every return is scanned for errors when received by the "Commercial Catch Records" Section in NSW Fisheries, and omissions and errors are queried with fishers (by phone and/or written correspondence) and corrected if needed
- Logical checks of data accuracy (range, consistency and validity checks) are performed automatically by computer during data-entry. Errors are queried with fishers (by phone and/or written correspondence) and corrected if needed
- fishers who have not submitted catch returns in a timely fashion are being notified and requested to submit omitted returns and an ongoing procedure for dealing with missing returns is being developed
- Data from the commercial catch statistics database "FINS" is regularly downloaded to a database "COMCATCH", which can be accessed or queried by biologists and managers responsible for individual fisheries. Subsequently, any problems with data identified by the relevant biologists or

managers are queried and may be corrected by the commercial catch records section after consulting fishers where necessary

- A pilot survey was undertaken to assess the accuracy of data entry with respect to the catch records. The results showed that data-entry errors by staff were of minimal significance. Errors were rare and generally concerned minor species. It is planned to repeat this survey annually to provide ongoing monitoring of the quality and accuracy of data entry
- Following implementation of routine reporting of the quantities of fish handled by registered fish receivers in NSW, it will be possible to compare the quantity of landings (by species) reported by fishers on catch returns with the quantity handled by fish receivers in NSW. This will provide a cross-validation of weights of individual species caught and handled in NSW
- The information collected on catch returns and options for improving the catch return forms (and increasing the reliability of data) is reviewed periodically by the management advisory councils and annually by a catch and effort working group comprising industry representatives from each fishery.

All existing and new procedures attempt to maximise data quality. It is, however, inevitable that the accuracy of data supplied by fishers cannot be directly assessed and can sometimes be variable, particularly with respect to data on fishing effort. Consequently, the statistics supplied by fishers and maintained in the commercial catch records database is most accurately described as representing “reported landed catch”.

## 7. Consultation

There are a range of consultative bodies established in NSW to assist and advise the Minister and NSW Fisheries on fisheries issues. There are committees that are established to provide advice on specific issues as well as bodies to advise on matters which cut across different fisheries or sectors.

### a) The Management Advisory Committee

Share management and restricted fisheries in NSW each have a management advisory committee (MAC) that provides advice to the Minister for Fisheries on:

- the preparation of any management 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
- any other matter relating to the fishery.

Table 12 details the membership on the Estuary Prawn Trawl MAC. The industry members of the MAC comprise representatives that are elected by endorsement holders in the fishery (or shareholders in the share management fishery). There is an industry representative from each of the estuaries included in the Estuary Prawn Trawl Fishery. The members hold office for a term of three years, however the terms of office are staggered and the terms of half of the industry members expire every 18 months.

The non-industry members on the MAC are appointed by the Minister for Fisheries and also hold terms of office for up to three years. To ensure that all issues discussed by the committee are

fairly represented the MAC is chaired by a person who is not engaged in the administration of the FM Act and is not engaged in commercial fishing.

Although the MAC receives advice from NSW Fisheries observers on research, compliance and administrative issues relating to the fishery, only members of the MAC have voting rights on the decisions of the MAC.

The actual composition and role of the MAC is set by the FM Act and its regulations and may be altered from time to time.

There are many references in this management strategy to consultation with the Estuary Prawn Trawling MAC. Consultation involves seeking the advice of the MAC their views. The MAC generally meets at least twice a year but many issues may require resolution urgently, and it may not be practicable to defer consultation to a face-to-face meeting of the MAC. For this reason, references to consultation with the Estuary Prawn Trawl MAC in this management strategy may include the distribution of documentation to individual members by a specific date. NSW Fisheries may then compile the comments received into a single document recording the views of the MAC members. This document is then used as a basis for further decision making by NSW Fisheries and/or the Minister for Fisheries.

**Table 12.** Membership on the Estuary Prawn Trawl MAC

<b>Position</b>	<b>Group represented</b>
Independent chairperson	Independent
Clarence River	Clarence River prawn trawl fishing business owners and endorsement holders
Hunter River	Hunter River prawn trawl fishing business owners and endorsement holders
Hawkesbury River	Hawkesbury River prawn trawl fishing business owners and endorsement holders
Port Jackson	Port Jackson prawn trawl fishing business owners and endorsement holders
Recreational fishing	Recreational fishing interests across all estuaries
Indigenous fishing	Indigenous interests across all estuaries
Conservation	Conservation interests across all estuaries
NSW Fisheries	Government interests across all estuaries

## **b) Ministerial advisory councils**

Four Ministerial advisory councils are currently established under the *Fisheries Management Act 1994*. The councils provide advice on matters referred to them by the Minister for Fisheries, or on any other matters the councils consider relevant. They report directly to the Minister.

The Ministerial advisory councils currently established are:

- Advisory Council on Commercial Fishing (ACCF)
- Advisory Council on Recreational Fishing (ACoRF)
- Advisory Council on Fisheries Conservation (ACFC)
- Advisory Council on Aquaculture (ACoA).

The Estuary Prawn Trawl Fishery and each of the other share management and restricted fisheries have representatives on the ACCF. These representatives are nominated by each of the respective MAC's and appointed by the Minister.

Representatives from the commercial fishing industry in NSW, or people who in the opinion of the Minister have expertise in commercial fishing are also represented on the ACFC.

The name and composition of the Ministerial advisory councils are determined by regulations under the FM Act and may be altered from time to time.

### **c) Fisheries Resource Conservation and Assessment Council**

The Fisheries Resource Conservation and Assessment Council (FRCAC) has been established to play a key role in advising the Government on fisheries conservation and assessment throughout the State. The members on the council represent a wide range of interests and includes representatives from commercial fishing, recreational fishing, fish marketing, the fishing tackle industry, charter boat fishing, regional tourism, academic expertise, conservation, aquaculture and Indigenous peoples.

The FRCAC advises the Minister for Fisheries on the preparation and revision of Fishery Management Strategies for fishing activities, including this management strategy for the Estuary Prawn Trawl Fishery.

The legislated role of the FRCAC includes providing advice on:

- the preparation or revision of a fishery management strategy (and for that purpose to review the environmental impact statement prepared in connection with a draft strategy)
- other matters as may be referred to it by the Minister.

In summary, the FRCAC's duties involve:

- fostering relationships between community groups, recreational fishing interests, commercial fishing interests and government agencies
- advising on the preparation and revision of fishery management strategies
- reviewing environmental impact statements prepared in connection with draft strategies
- providing an opportunity for key stakeholder groups to have input into issues papers prepared for recreational fishing havens selection processes
- reviewing community consultation reports that arise from the recreational fishing havens selection process.

Both the FRCAC and the ACCF are consultative bodies that facilitate cross-sectoral and cross-fishery consultation, respectively.

The composition and role of the FRCAC are set by the FM Act and its regulations, and decisions by the Minister for Fisheries. These arrangements may change from time to time.

### **d) Total Allowable Catch Setting and Review Committee**

A process will be developed in line with this strategy which provides for cross-fishery consultation regarding commonly shared prawn stocks. Other fisheries to be involved in this consultation will include the estuary general fishery, the ocean prawn trawl fishery and recreational fishers.

The process for assessing the status of and pressure on prawn stocks will ultimately include the Total Allowable Catch Setting and Review Committee (TAC Committee). This committee will, as required by the share management plan, make determinations about the total level of fishing effort to apply in the capture of prawns in connection with this fishery. The TAC Committee consists of at least four members, including:



- (a) a person appointed by the Minister as the Chairperson of the TAC Committee, being a person who is neither engaged in the administration of the *Fisheries Management Act 1994* nor in commercial fishing
- (b) a person appointed by the Minister who is a natural resource economist not employed by the Government
- (c) a person appointed by the Minister who is a fishery scientist not employed by the Government
- (d) persons appointed by the Minister who have appropriate fisheries management qualifications.

The composition and role of the TAC Committee are set by the FM Act and its regulations, and decisions by the Minister for Fisheries. These arrangements may change from time to time.

## 8. Goals, Objectives and Management Responses

This section sets out the goals, objectives and management responses for the Estuary Prawn Trawl Fishery management strategy.

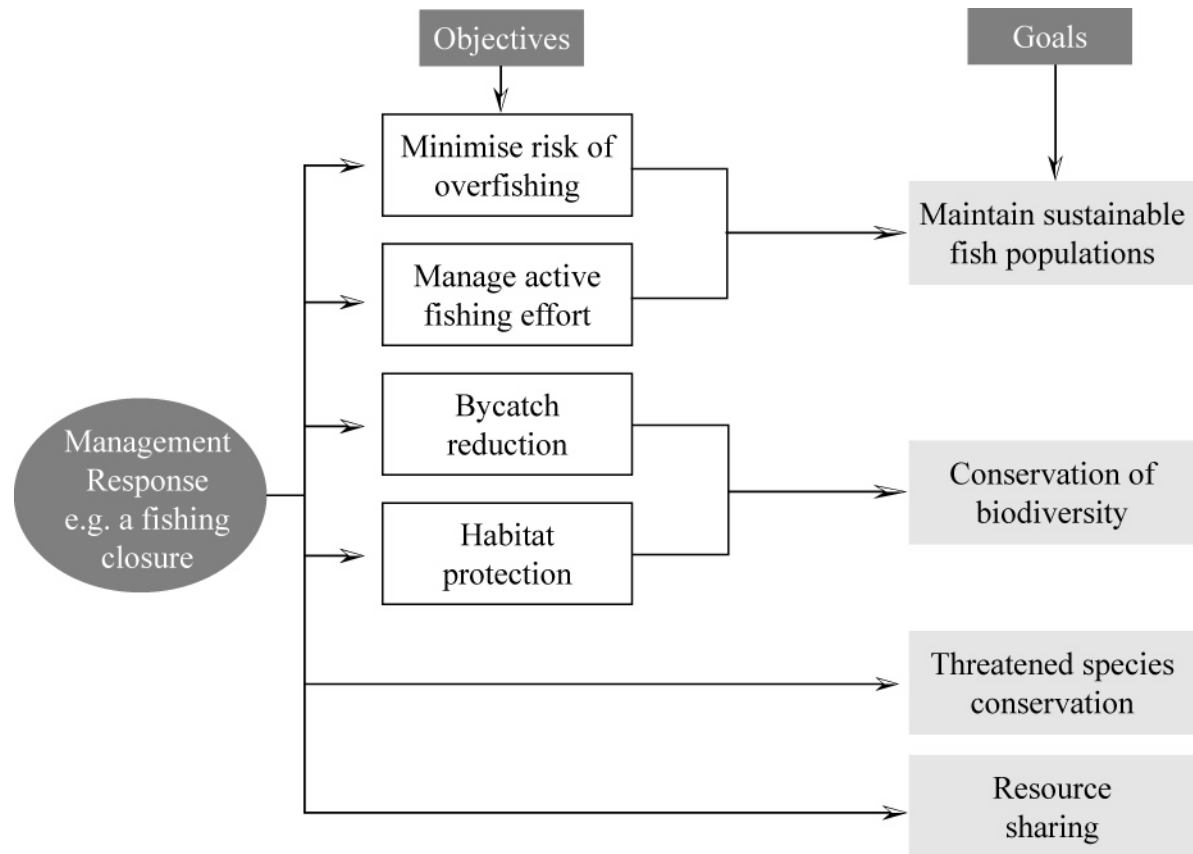
### a) A model framework



**Figure 4.** A model of the framework for a management strategy.

The link between the goals, objectives and management responses is not as simple as that portrayed in Figure 4. The reality is that most fishery management responses assist in achieving more than one goal.

A fishing closure is one example of a management tool that has been used in the past in the Estuary Prawn Trawl Fishery which can contribute towards achieving objectives and goals in addition to those for which it was put in place. A closure to protect juvenile shellfish and finfish from capture fits into “Goal 2, maintaining stock sustainability”, but it will also protect the habitat and biodiversity in the closed area from the effects of fishing and may reduce conflict between commercial and recreational fishers (see Figure 5).



**Figure 5.** An example of how a single management response affects multiple goals and objectives.

This complex structure has been dealt with in the following section by listing each of the management responses once only, under the objective that the response contributes most towards achieving. Below each management response is a box that sets out the implementation plan for the particular response and cross references the response to other goals that the response may assist in achieving.

When identifying the responses that are in place to achieve a particular objective, it is important to look at the cross referenced responses as well as any listed individually under the objective (i.e. the “Other important responses” must be taken into account).

Information under each response is also provided detailing the time frames in which the action will be done, the agency or group responsible for implementation and the authority under which the action will be implemented.

## b) Goals, objectives and management responses

### **GOAL 1. To manage the Estuary Prawn Trawl Fishery in a manner that promotes the conservation of biological diversity in the estuarine environment**

Healthy fish habitats are essential for the ongoing sustainability of shellfish and finfish populations and the conservation of biological diversity in the estuarine environment. Many areas within estuaries act as nursery areas for juvenile shellfish and finfish. Mangrove, seagrass and saltmarsh areas are believed to provide very important habitats for fish and crustaceans.

Estuaries are extremely dynamic environments with a high diversity of species. A range of activities take place in coastal catchments that have the ability to damage biodiversity and which need to be appropriately managed, with fishing being only one. Trawling could potentially impact not only upon those populations caught in the trawl but also upon those species that are in the path of the trawl operation but not retained. There is little information about this latter impact and a precautionary management approach is warranted. Incidental catch occurs in the trawling operation as other species become inadvertently caught in the gear while it is being used to catch target species. The incidental catch includes species that are retained for sale (byproduct) and those which are discarded (bycatch). When handled properly, some of the bycatch that is taken and returned to the water can survive.

Industry is sensitive to its impact upon the environment and this fishery was one of the first fisheries in Australia to embrace the concept of bycatch reduction devices (BRDs) to reduce the catch of unwanted species. The effectiveness of BRDs is continually being improved as fishers and scientists experiment with new ideas and with advances in fishing technology.

#### **Objective 1.1 To minimise the impact of fishing activities on non-retained shellfish and finfish (including prohibited size, unwanted fish and fish protected from commercial fishing)**

Other important responses: 1.2a,b,d; 2.1h; 2.3e; 2.4a; 4.4a; 5.1a; 6.1a,b; 8.1a

- (a) Continue the restrictions on the use of fishing gear contained within the *Fisheries Management (General) Regulation 2002* including controls on the dimensions, construction materials and modes of operation, subject to the changes required to implement this management strategy.

*Note: This management response is part of the current rules operating in the fishery. The current gear regulations are listed in Appendix 1.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4,5	Current and Ongoing	NSW Fisheries	Regulatory

- (b) Using the best available knowledge and appropriate technology, modify fishing practices (such as by adopting bycatch reductions devices (BRDs)) to reduce the impacts of trawling upon organisms **other than target and byproduct species.**

*Background: The incidental catch of the Estuary Prawn Trawl Fishery prior to the introduction of Bycatch Reduction Devices (BRDs) is well documented. Extensive research has been done on the effects of various designs of BRDs on abundances of incidental species in the prawn trawl. Bycatch reduction devices are mandatory in all but the lower Hawkesbury estuary where because of the effects of current BRD's have on catches, research has been continuing to develop alternatives. These devices will be mandatory in the prawn component of the fishery in this area by December 2002 and in the squid component of this fishery by June 2003. The improvement of BRDs will be an on-going process and fishers will be able to apply for permits to trial new designs. The types of BRDs approved for general use in the fishery may vary through time in response to improvements in the design and efficiency of the devices.*

*An observer based sampling strategy will be used to collect information about quantities of the various species caught in the prawn trawl net and the effectiveness of BRDs to reduce the catch of incidental species under commercial fishing conditions.*

*The National Policy on Fisheries Bycatch provides a national framework for coordinating efforts to reduce incidental catch. It provides options by which each jurisdiction can manage incidental catch according to its situation in a nationally coherent and consistent manner.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4	Current and Ongoing	NSW Fisheries and EPT fishers	Regulatory

- (c) Using available knowledge and appropriate technology, develop and introduce alternate fishing gears to minimise the capture of target and byproduct species of non marketable quality.

*Background: Research is being done by University of Sydney to develop an environmentally sensitive fishing gear for the new Hawkesbury River squid component.*

*Studies are being done under a FRDC funded project to investigate alternate gear configurations for the otter trawl to reduce the catch of small, non-marketable prawns and to minimise any possible impact upon non-target species.*

*An observer-based sampling strategy will collect information to ascertain whether this management response is being successful at minimising the capture of target and byproduct species of non-marketable quality.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,5	June 2003 for a squid net June 2006 for small prawns	NSW Fisheries	Regulatory

- (d) Ban the discarding of cooked prawns and investigate the sustainability of riddling uncooked prawns.

*Background: Prawn fishers in some estuaries use a device known as a riddler to grade the sizes of prawns in their catch and in some cases to separate debris from the prawn catch. A riddler is a screen of wire mesh stretched over a frame. The mesh size of this screen varies but is usually between 35 and 50 mm. The riddler is used like a "chute" as it is positioned at an angle of about 60 degrees and the prawn catch is passed over the top of the screen. Small prawns pass through the screen and are collected in a container underneath, while larger prawns pass over the top and are collected in a container at the lower end of the "riddler". The unwanted portion of the prawn catch from riddling is discarded with green prawns returned to the water and cooked prawns disposed of. There is little information about the survival of "riddled" green prawns once they are returned to the water.*

*A research program to be done by NSW Fisheries and funded by the Fisheries Research and Development Corporation will investigate the impact of riddling upon school prawns and then eastern king prawns. The research on the impact of "riddling" of green prawns will be completed by April 2005.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4,5	Ban for cooked prawns by July 2003; complete investigations on the sustainability of riddling uncooked prawns by April 2005	NSW Fisheries and EPT Fishers	Regulatory

- (e) Use best-practice techniques for the handling of non retained animals; in particular ban invasive implements such as spikes and encourage non invasive tools like tongs and scoops.

*Background: Fishers use various implements to sort through their catch efficiently, remove debris and to avoid injury from poisonous aquatic life or from the spines on some animals. One such implement is a spike which is used mainly to discard harmful animals over board.*

*Fishers are experimenting with ways to keep their catch alive whilst on the deck of their trawler. Some techniques that are being used are "swim tanks" to keep the catch alive whilst it is being sorted and "release tubes" to release discarded fauna below the surface away from predators such as birds and fish near the surface.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,4	By December 2003 for spikes and then as required	NSW Fisheries and EPT Fishers	Regulatory

- (f) [Continue to] use fishing closures to control the area and time fished to:

- (i) conserve target and byproduct species
- (ii) prevent trawling in areas and at times of high abundances of incidental species
- (iii) avoid direct interactions with threatened species, populations or ecological communities
- (iv) protect key habitats and areas of environmental sensitivity; in particular, prohibit trawling over beds of *Zostera* and *Posidonia* seagrass
- (v) equitably share the resource between stakeholders.

*Background: Fishing closures prohibit fishing over an area either absolutely or conditionally. In this management strategy all uses of the term "fishing closure" are intended to give a broad meaning encompassing any legally enforceable prohibition or restriction on fishing activity. This includes: fishing closures made under Division 1, Part 2 of the FM Act, aquatic reserve notification under Subdivision 3, Division 2, Part 7 of the FM Act; regulations under section 20 of the FM Act (as amended); regulations under 220ZE of the FM Act; and regulations under section 205B of the FM Act. Closures are normally reviewed every five years and are occasionally modified to address changing fishing patterns and/or environmental conditions.*

*All but four of the 130 coastal estuaries of NSW are currently closed to trawling. In addition, approximately 50% of the area of each of the four estuaries (Clarence River, Hunter River, Hawkesbury River and Port Jackson) where trawling is permitted, is closed. Numerous other closures already exist in the Estuary Prawn Trawl Fishery for a range of reasons. Each closure generally has benefits to numerous aspects of the resource and the fishery.*

*Environmentally sensitive areas referred to in this management response are the geographic areas containing aquatic habitats that are likely to be particularly vulnerable to loss or irreversible alteration from any interaction with prawn trawling gear, and may include:*

- *significant stands of aquatic vegetation such as seagrass, mangroves and macroalgae*
- *areas of submerged rocky reef and their immediate surrounds which provide important refuges for some estuarine species*
- *areas of known remnant populations of sessile soft bottom invertebrate communities*
- *areas of known importance to threatened species particularly any areas identified in recovery plans (NB. areas of critical habitat could be identified under the specific provisions of the FM Act)*
- *areas which are known to be important for marine mammals or birds, particularly those protected under National or International agreements.*

*Industry members of the Estuary Prawn Trawl MAC advise that trawling is not carried out over seagrass beds in the Clarence, Hunter or Hawkesbury Rivers.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,3,4,5	(i), (iii), (iv) and (v) ongoing and by December 2003 for part (ii)	NSW Fisheries	Regulatory

- (g) Continue the prohibition on using firearms, explosive or electrical devices to take shellfish and finfish in the fishery.

*Note: This management response is part of the current rules operating in this fishery and all other fisheries of NSW.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4	Current and Ongoing	NSW Fisheries	Regulatory

### **Objective 1.2 To minimise the impact of activities in the fishery on marine and estuarine habitat**

Other important responses: 1.1a,c,f,g; 1.3f; 2.3b; 2.5b,d; 4.4a; 6.1b; 8.1a

- (a) Clearly define key habitat or environmental sensitivity areas and non-trawled areas within the area where trawling is currently permitted within each estuary.

*Background: The Estuary Prawn Trawl MAC has placed a high priority on research into mapping the environmentally sensitive areas of the Estuary Prawn Trawl Fishery. Applications for grant funding to do this research will be submitted. Also, research is being undertaken by the University of Sydney on the effects of trawling upon benthic communities in the Clarence River. Results from this and other studies will provide direction for future research to investigate the effects of trawling upon the ecosystem. Discussions will be held with industry, researchers and other stakeholders about closing any areas that are identified as being key habitat areas (including nursery areas for juvenile shellfish and finfish) and/or areas of environmental sensitivity (as defined in the background to management response 1.1f).*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4,7	June 2006 and then ongoing	NSW Fisheries and EPT fishers	Regulatory

- (b) There will be no increase in the current total area that is trawled within the boundaries of each estuary.

*Background: This management strategy will maintain the current boundaries within each estuary of the fishery except where areas are identified as environmentally sensitive. Environmentally sensitive areas within each estuary will be mapped and closed to trawling. Areas not identified as environmentally sensitive within the current boundaries will remain open to trawling.*

*The trawl grounds for each estuary within the current boundaries will be mapped. Recognised environmentally sensitive areas from which trawling is excluded will be identified on these maps. The grounds the fishery works may change as fluctuating environmental conditions prohibit trawling in one area but enable trawling in another. For instance, shifting substrate may cover rocky areas making trawling possible in that previously non-trawled area. However, the percentage of the area that is trawled within the boundaries of the fishery (and excluding environmentally sensitive areas) in each estuary will not increase between years.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4,7	June 2006 and then ongoing	NSW Fisheries and EPT fishers	Regulatory

- (c) Continue the prohibition on wilfully damaging marine vegetation.

*Note: This management response is part of the current rules operating in this fishery and all other fisheries of NSW.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,4,7	Current and Ongoing	NSW Fisheries	Regulatory

- (d) Prohibit the removal (by commercial fishers in this fishery) of woody debris from the estuary.

*Background: The removal of large woody debris was declared a key threatening process in November 2001 under the FM Act. However, NSW Fisheries' policy on woody debris provides for moving snags from a trawl ground. The "Policy & Guidelines For Aquatic Habitat Management And Fish Conservation" provides for re-aligning snags and if this is not possible then relocating the snag "out of the way" but still within the estuary and in close proximity to where the snag was taken.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,7	Current and Ongoing	NSW Fisheries	Regulatory

- (e) Develop a code of conduct for the fishery with respect to:

- (i) guidelines for 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
- (ii) operating in the vicinity of listed Ramsar wetlands or known JAMBA and CAMBA migratory bird habitat in a manner that minimises disturbance
- (iii) respecting the rights and recognising the needs of other users of the water ways and residents along the estuaries



- (iv) minimising the levels of pollutants associated with the fishing operation, including exhaust, noise and fuels and oils in bilge water
- (v) assisting in reducing the amount of rubbish in estuaries by retaining for disposal onshore the rubbish recovered during fishing operations
- (vi) operating in the vicinity of threatened species, populations, and ecological communities.

*Background: Fishers of the Estuary Prawn Trawl Fishery are responsible stewards of the ecosystem from which they earn an income. Formalising the actions that are already done by many will go a long way towards improving the relations between the commercial fishing industry and other stakeholders.*

*The code of conduct for the Estuary Prawn Trawl Fishery will be developed and periodically reviewed (and amended where necessary) by NSW Fisheries in consultation with the Estuary Prawn Trawl MAC. Input from other natural resource agencies (e.g. National Parks and Wildlife Service) will be sought when developing relevant parts of the code. The code of conduct should provide for regional codes and will be enforceable through the share management plan for the Estuary Prawn Trawl Fishery.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,3,4	By December 2003	EPT MAC and NSW Fisheries	Voluntary and Regulatory

**Objective 1.3 To reduce the likelihood of species, populations and ecological communities being changed in a manner which threatens ecosystem integrity (i.e. composition and function)**

Other important responses: 1.1a-c, e-g; 1.2a-e; 2.1a,h; 2.3b; 2.4a; 2.5a-d; 2.6a,b; 4.2c; 4.4a; 6.1a,b; 6.4a; 8.1a,b; 8.2a,b

- (a) Implement incidental catch ratios in each estuary.

*Note: The incidental catch ratio is the ratio, by weight, of the target prawn species to all other species in the catch (incidental catch) of a trawl. This ratio will be used to identify areas where the abundance of incidental species is too great to allow trawling to occur.*

*The implementation of incidental catch ratios will be discussed with the Estuary Prawn Trawl MAC to ensure that it is practical and cost effective. The essential components are that adhering to the incidental catch ratios system will be the responsibility of industry and incidental catch ratios will be enforced as part of quality inspections by fisheries officers. The system is to be implemented by December 2003. The incidental catch ratios will be reviewed annually, or at other times where needed, in light of new or up to date information.:*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4,7	By December 2003	EPT fishers	Regulatory

- (b) Promote research on the impacts of estuary prawn trawl fishing on the general environment; in particular, pursue the research priorities identified in section 6 of this management strategy.

*Background: Like most fisheries around the world, direct effects of the Estuary Prawn Trawl Fishery on habitats and species of importance are poorly understood and indirect effects are unknown. The Estuary Prawn Trawl Fishery needs to promote and support long-term research that aids understanding of the impact of the fishery in an ecological setting. An observer study will provide information that will be useful when determining the direct impact of the fishery. Information from the current study by the University of Sydney into the impacts of trawling upon benthic communities in the Clarence River and from other studies done on the impact of trawling will provide direction for future research.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,8	Ongoing	NSW Fisheries and EPT MAC	-

- (c) Collaborate with other institutions (such as universities and other research facilities) to better understand the concepts of ecosystem function and the individual importance of species, populations and ecological communities.

*Background: There is a general lack of knowledge about the way in which biodiversity in marine ecosystems is affected by fishing and how to measure these effects. This is especially true for diverse and complex systems like the environment in which the Estuary Prawn Trawl Fishery operates. A better knowledge of how these ecosystems function is needed to understand the effects of trawling upon these systems. NSW Fisheries collaborates with universities and other institutions in a range of ways such as offering scholarships and in-kind contributions, collecting specimens and providing fish samples.*

*An example of such a program is the joint research program being carried out by NSW Fisheries and the University of British Columbia will explore the potential of whole-ecosystem simulations based on ECOSPACE, a spatially-explicit modelling technique, to forecast the results of alternative policy options for the marine and estuarine fisheries in New South Wales. Estuarine, sub-littoral, inshore, coastal, shelf and deep-water offshore habitats will be represented by approximate habitat maps at a range of spatial scales, probably on grids 20 and 4 km square. Species, or functional groups of species, associated with these habitats will also be represented in these models and will include available information on life-history and movement as determined from the literature and from workshop inputs. Models will be constructed using data from as wide variety of local sources as possible, including local University and Government publications, theses and research projects*

Contributing to Goals	Timeframe	Responsibility	Authority
1,6,8	Current and Ongoing	Other institutions and NSW Fisheries	-

- (d) Develop a performance indicator to measure the impact of trawling upon biodiversity.

*Background: There is no simple performance measure currently available to give an accurate representation of the impacts of the Estuary Prawn Trawl Fishery on biodiversity. Performance measures are needed for biodiversity impacts at the species, community and ecosystem levels. Careful thought must be given to deciding the most appropriate performance measures (and trigger points), so as to avoid expending resources unnecessarily on monitoring unrepresentative or inappropriate indicators. This will require substantial research over many years to determine the best approach and useful performance measures may be unavailable for some time. Collaboration among fishery management, scientific and stakeholder groups will be essential to the development of appropriate indicators. Funding will be sought through external grants.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,8	By June 2007	Other institutions and NSW Fisheries	-

- (e) Having regard to the prioritisation of research projects related to the Estuary Prawn Trawl Fishery, develop a research strategy to assess the risk associated with the fishery impacting on the bycatch species and to assess the impact of trawling upon biodiversity within the fished area of each estuary

*Background: The species composition and quantity of the bycatch taken by estuary prawn trawlers is well documented and the observer program included within this management strategy will provide updated information on a periodic basis. There is a need to ensure that the amount of bycatch taken does not jeopardise the sustainability of the species affected (or perhaps the ecological relationships of which they are part), and a risk assessment would assist in determining the species that are likely to be most vulnerable due to the operation of the fishery.*

*Once a performance indicator for biodiversity impacts has been agreed to by stakeholders then a research strategy will need to be developed to provide the information necessary to implement the performance indicator.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,3,6,7,8	When required	NSW Fisheries	-

- (f) The Estuary Prawn Trawl MAC will have the opportunity to comment on the selection and ongoing management of marine protected areas in estuarine waters.

*Background: A comprehensive system of representative marine protected areas (i.e. marine parks and aquatic reserves) is being declared in NSW to protect and enhance marine and estuarine biodiversity. Large marine bioregions have been identified by the Interim Marine and Coastal Regionalisation for Australia (IMCRA) report.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,3,4,7	Current and Ongoing	EPT MAC	-

**Objective 1.4 To prevent the introduction and translocation of marine pests and diseases**

Other important responses: 2.5b,c; 6.4a

(a) Implement, in consultation with the Estuary Prawn Trawl MAC, measures required in accordance with any marine pest or disease management plans.

*Background: The Minister for Fisheries or other agencies may alter management arrangements from time to time to minimise or mitigate the impact of marine pests and/or diseases. A recent example of the need for a link with other strategies was the suspected incidence of white spot disease in NSW. A system of closures and monitoring was implemented in NSW during that suspected outbreak. The industry views with concern the use of imported prawns being sold as bait without AQIS certification.*

*NSW Fisheries has a pest program team which has three key responsibilities:*

- *identifying pest species at high risk of establishment in NSW and developing pest incursion plans for those species*
- *conducting biodiversity surveys and assessing the potential impact of any identified alien species. Potentially high risk species would be recommended for listing as noxious under the Fisheries Management Act 1994.*
- *developing appropriate control measures for noxious species and other established pests.*

<b>Contributing to Goals</b>	<b>Timeframe</b>	<b>Responsibility</b>	<b>Authority</b>
1,2,6	Current and Ongoing	NSW Fisheries and EPT MAC	To be determined

## **GOAL 2. To maintain target and byproduct species harvested by the Estuary Prawn Trawl Fishery at sustainable levels**

It is important that the species harvested by this fishery are fished at a level that minimises the risk of overfishing the stocks. Because the fishery is managed by input controls, the key issue with respect to controlling the level of harvest is controlling the amount of fishing effort that is applied to the stock. There is a large latent effort component in the Estuary Prawn Trawl Fishery that could place increased pressure upon the resources. Controlling fishing effort can include very specific measures such as regulating the size and dimensions of the fishing gear used, but at a broader level can involve measures such as controls on the number of fishers who have access to (or are 'endorsed' to operate in) each part of the fishery.

### **Objective 2.1 To maintain the stocks of target and byproduct species of the Estuary Prawn Trawl Fishery at or above a level that minimises the risk of overfishing**

Other important responses: 1.1b,d,f,g; 1.2a,b; 1.3a,f; 2.2a; 2.3a-c; 2.4b; 2.6a-c; 4.1a; 4.2a-d; 4.4a; 5.1a,b; 5.4b; 6.1a,b; 8.1a,b; 8.2a,b

- (a) Monitor the quantity, length, and/or age and sex composition of target and byproduct species caught in the Estuary Prawn Trawl Fishery.

*Background: Information on the structure of populations in catches is essential for stock assessment purposes. Monitoring will be done through; (1) a episodic observer based program to collect information on the quantities and sizes individuals of species caught in the trawl net, (2) fishery independent surveys to collect information on the relative abundance and size of individuals in populations impacted by the Estuary Prawn Trawl Fishery and (3) fishers monthly return forms. For further details see Goal 8 of this section and section 6.*

<b>Contributing to Goals</b>	<b>Timeframe</b>	<b>Responsibility</b>	<b>Authority</b>
1,2,4,5,8	By July 2002 and then ongoing	NSW Fisheries	-

- (b) Together with all harvest sectors of squid in NSW review the exploitation status of the squid resources.

*Background: Data from fisher's monthly return forms show a long-term decline in the level of annual total reported landings of squid (Appendix B5 Figure AB41 in the Estuary Prawn Trawl Fishery EIS). This pattern is different to that shown from the same data source for the Estuary Prawn Trawl Fishery in the Hawkesbury River where squid is a target species (Appendix B5 Figure AB43 in the Estuary Prawn Trawl Fishery EIS). The Estuary Prawn Trawl Fishery contributes 36% by weight to the annual total reported landings of squid and 99% of its contribution comes from the Hawkesbury River.*

*The review should investigate reasons for the decline in the total annual reported landings of squid and information about the species composition of catches and stock structure. Funding for this review and any subsequent action required should be forthcoming from all participants in fisheries that harvest squid.*

Contributing to Goals	Timeframe	Responsibility	Authority
2,4,5,8	By December 2003 and then as required	NSW Fisheries and EPT fishers	-

- (c) Promote research that contributes to more robust and reliable stock assessments of prawn and squid populations and through the Estuary Prawn Trawl MAC prioritise research programs.

*Background: A clear expression of the relative priorities for stock assessments is essential to ensure the most effective use of resources for stock assessments. NSW Fisheries will be undertaking a study, funded by the Fisheries Research and Development Corporation, to collect information on the growth and mortality of the school prawn populations. A desktop study to provide updated estimates of population parameters for eastern king prawns is also needed. Management response 2.1b requires a review of the information available on squid. Results from this and stock assessments will provide direction about the priorities for future research that may benefit the fishery and improve the reliability of the stock assessments.*

Contributing to Goals	Timeframe	Responsibility	Authority
2,4,5,8	By December 2003 and then ongoing	NSW Fisheries	-

- (d) Implement (for each estuary) maximum 'point of sale' prawn counts and 'cod-end' prawn counts to minimise trawling at times and in areas where prawns are below optimum size

*Background: Legal minimum lengths are used to protect animals from capture. This assists to conserve stock and promote recruitment to the spawning population so that the risks of recruitment overfishing are minimised. In the case of prawns it is difficult to manage a legal minimum length because of the size of the prawns and the quantities that are landed. A maximum count of prawns (number to the half kilogram) is used instead.*

*Following recommendations by the Juvenile Prawn Summit Working Group (which has representatives from all stakeholder groups), statewide 'point of sale' prawn counts will be introduced by December 2003. Information on the growth and mortality of king prawns will be reviewed by July 2004 and the counts for school prawns will be reviewed by July 2007 when the result of a three year research project on the growth and mortality of school prawns becomes available.*

*The system under which 'cod-end' counts for prawns will be determined following consultation with the Estuary Prawn Trawl MAC, and may vary between estuaries. The essential components are that trawlers avoid specific areas within the estuary where prawns of sub-optimal size are abundant and 'cod-end' counts are self regulated by the industry (with compliance being monitored by fisheries officers).*

*It should be noted that it is not the intention of this management response to close an entire estuary to trawling if a single operator breaches the prawn counts.*

Contributing to Goals	Timeframe	Responsibility	Authority
2,4,5	By December 2003	NSW Fisheries and EPT fishers	Various

- (e) Review the maximum counts for eastern king and school prawns in light of available information and information collected between 2002 and 2005 on the growth and mortality of school prawns.

*Background: A three year research project funded by the Fisheries Research & Development Corporation is underway to investigate the growth and mortality of school prawns. Information on the growth and mortality of school prawns will provide information about the optimal biological conditions (with greater levels of precision than is currently possible) for harvesting school prawns. This information may effect decisions about the maximum prawn counts, see management response 5.1a. Results from this research will be available by December 2006.*

Contributing to Goals	Timeframe	Responsibility	Authority
2,4,5	By July 2007	NSW Fisheries and EPT MAC	-

- (f) Ascertain the need for a legal minimum length for squid and implement as required.

*Background: Research is being undertaken by the University of Sydney to determine the optimal levels of certain input controls for the Hawkesbury River squid component. This research might provide the information needed to determine whether a minimum legal length on squid is necessary to prevent overfishing of the stock.*

Contributing to Goals	Timeframe	Responsibility	Authority
2,5	By June 2004	NSW Fisheries and EPT MAC	-

- (g) Encourage the adoption of complementary counts for prawns and legal minimum lengths for squid in other fisheries.

Contributing to Goals	Timeframe	Responsibility	Authority
2,4,5	Current and ongoing	NSW Fisheries and EPT MAC	-

- (h) Develop a system for and do formal stock assessments of the target species within five years and review the system of assessment at least every three years thereafter.

*Background: Stock assessments will provide information that can be used by the Total Allowable Catch Setting and Review Committee to make determinations about levels of fishing effort on the target species in connection with this fishery. These will be done in consultation with stakeholder groups including the EPT MAC (see section 7(d)). Stock assessments will also provide information about the optimum sizes (prawn counts and legal minimum lengths) at which to catch the target species, appropriate levels of spawner biomass and results about patterns in annual reported landings and catch per unit effort.*

*Information to assess the impact of fishing on stocks of target species is at different stages of completion, ranging from having lots of information on rates of growth and mortality to having little information beyond that on catch and effort. It is important to note that stock assessments are done on a species basis and must take a holistic approach to assessing the impact of exploitation upon the stock by considering the catch taken from all sectors including recreational, charter boats, Indigenous and commercial fisheries.*

*The process of doing stock assessments will need to be reviewed at least every three years to ensure that the system of collecting information and analysis remain the most appropriate for this fishery. An important part of the review of stock assessments will include improvement of trigger points (biological reference points) for each species. (See section 9(e)).*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4,5,7,8	By July 2007	NSW Fisheries, EPT MAC and other stakeholders	-

- (i) Having regard to the prioritisation of research projects related to the Estuary Prawn Trawl Fishery, develop a strategic approach for ascertaining the status of byproduct species taken in the fishery

*Background: There are many byproduct species permitted to be taken in the fishery, the health or status of which is not known. While the focus of stock assessment under this management strategy is initially on the target species (due to the costly and time consuming nature of stock assessment work), a longer term plan is needed to allow an assessment of the status of the byproduct species.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4,5,8	By December 2004	NSW Fisheries	-

- (j) Subject to approval by the Minister for Fisheries, provide for the development of species based resource plans and/or area based resource plans in consultation with the Estuary Prawn Trawl MAC, relevant stakeholders and the public as appropriate

*Background: If there are found to be benefits in producing plans of management for particular species or areas relevant to the Estuary Prawn Trawl Fishery over and above the existing programs, the management strategy provides for their development subject to approval by the Minister for Fisheries.*

*An example of such plans may include the Estuary Management program for many of the State's estuary systems, which has been established by the NSW Government. Estuary Management Committees are formed and funded by Department of Land and Water Conservation and local council(s) with representation from State Government agencies (NSW Fisheries, National Parks and Wildlife Service, NSW Waterways, etc.) and local community interest groups*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4	As required	NSW Fisheries	-

**Objective 2.2 To achieve levels of spawner biomass on a stock basis that will reduce the risk of recruitment overfishing**

Other important responses: 1.1d,f; 2.1c-h; 2.3a,b; 2.4b; 2.6a-c; 4.2a,d; 8.1a,b; 8.2a

- (a) Encourage other prawn harvest sectors to adopt an appropriate level of fishing effort on the spawning stocks of target species.

*Background: It is generally accepted that maintaining a spawning biomass of around a certain level of the virgin spawning biomass helps guard against recruitment overfishing. Appropriate levels of spawner biomass will be determined from the population models used for stock assessments (see management response 2.1c and h).*

Contributing to Goals	Timeframe	Responsibility	Authority
2,5	Ongoing	NSW Fisheries and EPT MAC	-



**Objective 2.3 To conserve shellfish stocks by managing levels of active effort in the fishery**

Other important responses: 1.1a,f,g; 1.2a,b; 1.3f; 2.1b,c,h; 2.4a,b; 2.6a-c; 4.2c,d; 4.4a; 6.1a,b; 6.2a; 8.2a

(a) Implement separate management rules for each estuary open to prawn trawling.

*Background: The management rules for each estuary will be based upon the management tools outlined in this management strategy. Currently, some management controls used in the fishery differ between estuaries. The practice of managing each estuary to meet the specific needs of that estuary will continue.*

Contributing to Goals	Timeframe	Responsibility	Authority
2,4	Current and ongoing	NSW Fisheries	Regulatory

(b) The Minister for Fisheries will require the Total Allowable Catch Setting and Review Committee to make determinations relating to the maximum level of effort exerted upon the target species in connection with this fishery, after considering submissions and advice from the public, management advisory committees and other stakeholders.

*Background: This does not mean that a total allowable catch will be set in this fishery. It is acknowledged that prawn catches fluctuate greatly. The TAC Committee would only recommend the level of fishing **effort** put into catching prawns. For further information see section 7(d).*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4,5	From 2003	NSW Fisheries, EPT MAC and other stakeholders	Section 28 (4) of the FM Act

(c) Implement either of the following:

- (i) minimum shareholdings over set time periods to limit the number of vessels and operators in each estuary to historically active levels
- (ii) limit the number of total fishing days for each estuary
- (iii) limit the number of fishing days available to each business based upon past participation.

*Background: The management strategy requires a meaningful control on fishing effort in this fishery. The Estuary Prawn Trawl MAC will be consulted over the development of the options in this management response and the best available information on the potential economic impacts of each option will be provided to the MAC.*

Contributing to Goals	Timeframe	Responsibility	Authority
2,4,5	By July 2003	NSW Fisheries	Regulatory

(d) continue the licensing arrangements described in this management strategy (see section 4).

Contributing to Goals	Timeframe	Responsibility	Authority
2,5,6,8	Current and ongoing	NSW Fisheries	Various

(e) Restrict the engine power of vessels in the Estuary Prawn Trawl Fishery in Port Jackson.

*Background: Restricting engine power of trawlers indirectly limits fishing effort (i.e. input control). Engine restrictions already apply to Clarence River prawn trawlers.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,5	By July 2003	NSW Fisheries	Regulatory

#### Objective 2.4 To prevent the activation of latent (unused) fishing effort

*Background: For the purpose of this management strategy latent effort relates specifically to the number of never used, or seldom used, estuary prawn trawl entitlements. The Estuary Prawn Trawl MAC considers that there are benefits in maintaining the status quo in the fishery where fishers have fishing businesses with endorsements in several fisheries. These fishers tend to only use their estuary prawn trawl endorsement in years when the prawns are most abundant and can sustain higher fishing pressure. This maintains a lower level of fishing effort during years when catch rates of prawns are not high.*

*It is the intention of this management strategy that any restructuring of fishing effort considers the benefits of having fishing businesses with several endorsements in the fishery. The Estuary Prawn Trawl MAC advises that fishery specific restructuring could result in a move from multi-endorsed businesses to fishery specific businesses, particularly where a business is active across a number of fisheries and has a relatively low level of participation in each. Where restructure mechanisms are introduced, the MAC considers that they should apply at the fishing business level rather than the fishery level.*

Other important responses: 2.3b; 4.4a; 8.2a

(a) Provide for the nomination of estuary prawn trawl entitlements within the share management plan for the fishery, but only where such nominations will not lead to increases in the level of fishing effort

*Background: A provision for nominations will be created under the share management plan that allows business owners to employ other persons to work their business, but in a manner that does not result in any increase in fishing effort. There have been instances where the nomination provisions have been used in the past to circumvent restrictions on the transfer of fishing endorsements and where relatively inactive fishers have 'passed' their entitlements to new entrants who fish more intensively in the fishery than the inactive fisher.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,5	By December 2003	NSW Fisheries	Regulatory

(b) Establish minimum entry requirements for new entrants at the fishing business level (i.e. taking into account entitlements held in other fisheries) that will prevent increases in effort by small businesses.

*Background: Similar to how the Recognised Fishing Operation (RFO) policy works for other NSW commercial fisheries, safeguards are needed to ensure that new entrants to the fishery replace active fishing effort before they can operate. Representatives of industry and NSW Fisheries will continue to consult through the Estuary Prawn Trawl MAC about how best to treat latent fishing effort.*

*Operators need to be in a position, by 2008, to afford to pay for the attributable costs of management from their fishing revenue. Viable fishing businesses also have a greater incentive to support long term management decisions that are needed now and into the future.*

Contributing to Goals	Timeframe	Responsibility	Authority
2,4,5,6,7	By December 2003	NSW Fisheries	Regulatory

**Objective 2.5 To minimise the impact of activities external to the Estuary Prawn Trawl Fishery on the resources harvested by the fishery and on fishery related habitats**

Other important responses: 1.3e,f; 1.4a; 2.1c,h; 2.2a; 2.6c;

- (a) NSW Fisheries will continue to review and, where legislatively enforceable under the *Fisheries Management Act 1994 (FM Act)*, place conditions on development applications referred to it by other determining authorities, in order to avoid or minimise impacts on fishery resources from coastal developments within the catchment area of each estuary of the Estuary Prawn Trawl Fishery.

*Background: Development applications submitted under the Environmental Planning and Assessment Act 1979 that have the potential to adversely impact on fish or habitat are often referred to NSW Fisheries for review and comment. Using its legislative powers under the FM Act, the Department has the ability to recommend refusal of the development (if inconsistent with the Act or Policy and Guidelines for Aquatic Habitat Management and Fish Conservation 1999), recommend the approval of the development without changes, or in some cases, recommend the approval of the development with conditions to be attached to limit the potential impacts of the activity. Where issues do not fall within the legislative jurisdiction of the Department, NSW Fisheries may still provide advice to the relevant determining authority to ensure that these issues are considered and appropriately addressed.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,7	Current and ongoing	NSW Fisheries	EP&A Act

- (b) The Estuary Prawn Trawl MAC will consider comments they receive from EPT fishers regarding impacts upon the resources from activities external to the fishery (including those of other fisheries) and will bring any detrimental impacts to the attention of NSW Fisheries and/or the relevant managing agency.

*Background: For example fishers may notice changes in the quality of water in the river which they think has been caused by factors that are 'external' to the fishery.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,3,5,6,7	Current and ongoing	EPT MAC and EPT fishers	-

- (c) The Estuary Prawn Trawl MAC will contribute to NSW Fisheries' reviews of the habitat management policy and guidelines or habitat protection plans which aim to prevent or reduce impacts of all activities on aquatic habitats, including seagrass, saltmarsh and mangrove habitats.

*Background: Habitat management guidelines and plans have been and will continue to be prepared under the FM Act to prevent or minimise the impact of all types of activities on shellfish and finfish habitat.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,6,7	Current and ongoing	NSW fishers and EPT MAC	Various

- (d) NSW Fisheries and commercial fishers will contribute to the development of policies or legislation established by the NSW Government to ensure that shellfish and finfish stocks and habitat issues are properly considered in other environmental planning regimes.

*Background: NSW Fisheries and fisheries stakeholders are already represented on many natural resource management committees (e.g. Catchment Management Boards, Healthy Rivers Commission, Coastal Council of NSW, etc.) that operate in areas relevant to the Estuary Prawn Trawl Fishery.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,6,7	Current and ongoing	NSW Fisheries and EPT Fishers	-

#### **Objective 2.6 To promote the recovery of overfished species**

Other important responses: 1.1c; 2.1d,h; 2.2a; 2.3b,c; 2.4b

*Background: The process of determination of the species' status is described in 4(c). This process may commence with a trigger point review (explained in section 9). It is important to note that an indicator for a species that has exceeded its trigger point does not automatically mean that the species is overfished. Trigger points are set conservatively, (that is they are likely to trigger false alarms) in order to maximise the chance of detecting a genuine event of importance (see section 9).*

*The implementation of recovery programs includes those developed by the Commonwealth or other states for the same populations that are harvested by the Estuary Prawn Trawl Fishery. They may be developed for target, byproduct and bycatch species impacted by the Estuary Prawn Trawl Fishery.*

- (a) Where the fishery is a major harvester of an overfished species, develop and implement a recovery program for the species within a specified timeframe.

*Background: The fishery may be a major harvester of both target and byproduct species.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4,5,6	Recovery program drafted for consultation within 6 months	NSW Fisheries and EPT MAC	To be determined

- (b) Where the fishery is a minor harvester of an overfished species, contribute to the development of a recovery program for the species and adopt any measures required by that plan.

<b>Contributing to Goals</b>	<b>Timeframe</b>	<b>Responsibility</b>	<b>Authority</b>
1,2,4,5,6	As required	NSW Fisheries	To be determined

(c) During the period of development of a recovery program for a species that has been determined as being recruitment overfished, implement precautionary actions including, but not limited to, any of the following:

- total harvest controls
- reductions in effort associated with the harvest of the species
- the implementation of fishing closures
- incidental catch management provisions
- mandatory gear changes.

*Background: In the event that a species is determined to be recruitment overfished urgent action is needed to prevent the risk of a stock collapse. Growth overfishing on the other hand relates to maximising the yield from the stock and does not necessarily require immediate measures prior to the introduction of a recovery program.*

<b>Contributing to Goals</b>	<b>Timeframe</b>	<b>Responsibility</b>	<b>Authority</b>
2,5,6	As required	NSW Fisheries	Various

### **GOAL 3. To promote the conservation of threatened species, populations and ecological communities associated with the operation of the Estuary Prawn Trawl Fishery**

Activities that impact on species, populations or ecological communities that are listed as being threatened must, under several pieces of state and federal legislation, be modified or phased out so as to mitigate those impacts. Protected animals must also receive a higher conservation status. This includes threatened mammals, birds, and reptiles, as well as fish species and could include habitats that are critical to the survival of such animals.

While there are no firm data, it is thought that the impact of the Estuary Prawn Trawl Fishery on threatened species, populations and ecological communities is small. Nevertheless, it is important to quantify and monitor any threatened species interactions, and have a management framework that is responsive to change in the event that impacts are identified and found to be unacceptable.

**Objective 3.1 To identify and minimise any impacts of fishing activities in the fishery on threatened species, populations and ecological communities (including mammals, birds, reptiles, amphibians, shellfish and finfish, and vegetation), and where possible promote their recovery**

Other important responses: 1.1f; 1.2e; 1.3e,f; 2.5b; 6.4a; 8.1b

- (a) Modify the catch and effort returns, in consultation with the Estuary Prawn Trawl MAC, to collect and monitor information on sightings of threatened or protected aquatic species and captures of any threatened or protected species.

*Background: The guidelines for a “ecologically sustainable” fishery approved by the Commonwealth under the EPBC Act include a requirement to collect information on interactions with endangered, threatened or protected species and threatened ecological communities. These species populations and communities are listed in the FM Act, Threatened Species Conservation Act 1995 and the EPBC Act. Information on the occurrence of threatened species will come from modified catch and effort return forms, observer based surveys and fishery independent surveys (see management responses 8.1a and b).*

*Fishers will be trained on the identification of species during port visits, via documentation and by interaction with scientific staff as part of the observer program.*

<b>Contributing to Goals</b>	<b>Timeframe</b>	<b>Responsibility</b>	<b>Authority</b>
3,6,8	By July 2003	NSW Fisheries, EPT MAC and EPT fishers	-

- (b) Implement, in consultation with the Estuary Prawn Trawl MAC, the provisions of any relevant threatened species recovery plans or threat abatement plans.

*Background: The recovery plans referred to in this response include those being developed under the Fisheries Management Act 1994, the Threatened Species Conservation Act 1995 or other State or Commonwealth legislation. The response recognises that the statutory*

*provisions of a threatened species recovery plan must be implemented and take precedence over the provisions of this management strategy.*

*Consultation with the Estuary Prawn Trawl MAC to discuss such matters may not need to wait for the next scheduled meeting of the MAC.*

Contributing to Goals	Timeframe	Responsibility	Authority
3,6,7,8	As required	NSW Fisheries and EPTMAC	Various

- (c) Continue the prohibition on taking protected fish and on fish protected from commercial fishing as set out in the *Fisheries Management (General) Regulation 2002*.

*Background: 'Protected fish' refers to species of fish that are protected from all forms of fishing. 'Fish protected from commercial fishing' as the name suggests, refers to species of fish that are protected from commercial fishing only. Protected fish includes species identified as threatened, endangered or vulnerable under the Fisheries Management Act 1994.*

*At the commencement of this management strategy, the marine and estuarine species of protected fish included Ballina anglefish, black rock cod, eastern blue devil fish, elegant wrasse, estuary cod, giant Queensland groper, green sawfish, grey nurse shark, herbst nurse shark, great white shark and weedy sea dragon. Fish protected from commercial fishing included marlin (black, blue and striped), groper (blue, brown and red), Australian bass and estuary perch.*

Contributing to Goals	Timeframe	Responsibility	Authority
3,4	Current and ongoing	NSW Fisheries	Regulatory

- (d) Continue the prohibition of taking any species in commercial fishing operations protected under other jurisdictions' arrangements (this may include invertebrates, fish, reptiles, birds, mammals, plants, algae etc).

*Background: Protected species are identified under the NSW Threatened Species Conservation Act 1995, the NSW National Parks and Wildlife Act 1974, and the Commonwealth EPBC Act.*

Contributing to Goals	Timeframe	Responsibility	Authority
3,4,6	As required	NSW Fisheries	Various

- (e) A systematic risk-based assessment will be undertaken to a standard agreed between the Director General of Planning NSW and the Minister for Fisheries on the interaction and impacts of commercial fishing on protected and threatened species, populations or communities.

*Background: Consideration will be given to undertaking a single assessment in relation to the Estuary General, Ocean Hauling and Estuary Prawn Trawl fisheries so the cumulative impacts can be considered. The risk-based assessment may include, but not be limited to assessment of:*

*(1) the spatial overlap between the operation of the fishery and protected and threatened species, populations and ecological communities*

*(2) the likelihood of interaction given any spatial overlap between the operation of the fishery and protected and threatened species, populations and ecological communities, and*

(3) *the likelihood of the interaction leading to injury, mortality of threatened species or populations, or significant impacts on threatened ecological communities.*

<b>Contributing to Goals</b>	<b>Timeframe</b>	<b>Responsibility</b>	<b>Authority</b>
1,3	To be agreed between Director General of PlanningNSW and the Minister for Fisheries	NSW Fisheries	-



## **GOAL 4. To appropriately share the resource and carry out fishing in a sustainable manner that minimises social impacts**

The Estuary Prawn Trawl Fishery operates in close proximity to residential areas, popular picnic areas and other general users of the State's waterways. It catches species that are actively targeted in other commercial fisheries, the charter boat fishery and the recreational fishery, or that may have significant conservation value. The social interaction between estuary prawn trawl fishing operations and other stakeholders is a significant issue in this fishery and needs careful management.

### **Objective 4.1 To evaluate and provide an appropriate allocation of the fisheries resource between fishing sector groups, acknowledging the need of seafood consumers to access fresh quality shellfish and finfish**

Other important responses: 1.1a,f; 2.1b-d,g,h; 2.3a-c; 2.6a,b; 4.2b,c,d; 4.4a; 5.1a; 8.2b

- (a) Estimate as far as practicable, the size of the non-commercial catch and the catch by indigenous peoples and the relative impact of such harvesting on the resource, taking into account the results of the National Recreational and Indigenous Fishing Survey and information obtained from charter fishing boat logbooks.

*Background: Estimates of all harvest rates are vital for stock assessments. While the National Recreational and Indigenous Fishing Survey report was not published at the time of preparation of this management strategy, the NSW portion of the recreational catch information from the survey has been released. It is envisaged that this survey will be repeated periodically within NSW. The non-commercial catch includes any 'black market' catch sold by both licensed commercial fishers and unlicensed fishers. Information on illegal catch will come from surveys of commercial fishers and fish receivers.*

*In November 2000, a licensing scheme was introduced for all marine and estuarine charter boat operators. These operators are required to record catches taken on board licensed charter vessels as part of a mandatory logbook program. Estimates of harvest rates from all sectors will be used in stock assessments.*

*The accuracy of data or estimates of non-commercial catch will impact directly on the robustness of stock assessment information.*

<b>Contributing to Goals</b>	<b>Timeframe</b>	<b>Responsibility</b>	<b>Authority</b>
2,4,5,8	By June 2006	NSW Fisheries	-

### **Objective 4.2 To monitor and manage a fair and equitable sharing of the fisheries resource among commercial fisheries**

Other important responses: 1.1a,b,d,f; 2.1a-d,g,h; 2.3a,b; 2.4b; 2.6a,b; 4.1a; 4.4a; 5.1a; 8.2b

- (a) Evaluate catch levels and monitor management structures in fisheries that are outside NSW jurisdiction but where catches in those fisheries impact on stocks shared with the Estuary Prawn Trawl Fishery.

*Background: The Estuary Prawn Trawl Fishery shares an eastern king prawn resource with fisheries under Victorian, Queensland and Commonwealth jurisdictions.*

*Note: This management strategy must provide for regular updates on catch and changes in management or catch composition in these other fisheries. Where possible, it is important to have consistent or complimentary management arrangements for shared stocks, between jurisdictions.*

Contributing to Goals	Timeframe	Responsibility	Authority
2,4,5,8	By July 2003 and then annually	NSW Fisheries	-

- (b) Evaluate the annual reported landings of the prawn and squid species that are also taken in other commercial fisheries (i.e. Estuary General and Ocean Prawn Trawl) in New South Wales.

Contributing to Goals	Timeframe	Responsibility	Authority
2,4,8	By July 2003 and then annually	NSW Fisheries	-

- (c) Limit the annual landings of byproduct species within each estuary in the Estuary Prawn Trawl Fishery to those species and the quantities listed in Table 13.

*Background: The landing limits in Table 13 are based upon reported landings from the commercial fisher's monthly return forms. Whereas the incidental catch (byproduct plus bycatch) ratios in management response 1.3a are based upon the weight of incidental catch at the time the cod-end is landed on the vessel, the byproduct limits are based upon the weight of each byproduct species (relative to the weight of target species) that are reported as landed for sale. These landing limits will be monitored through the system of fisher's month return forms and the Compliance Quality Inspection Scheme.*

*The byproduct species landing limits specified in Table 13 apply on a per vessel basis, and will also be used during the annual monitoring of total landings by estuary. The limits will be reviewed in light of new information, such as data coming from the observer program.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4	By June 2003 and then ongoing	NSW Fisheries and EPT MAC	-

- (d) Use cross-fishery stakeholder consultation to discuss management issues (e.g. maximum prawn counts) relevant to more than one fishery and ensure equitable and sustainable use of the target species.

*Background: Representatives from stakeholder groups including those of the Estuary General Fishery, Ocean Prawn Trawl Fishery, recreational fishery and Indigenous fishers will be invited on an as-needs basis to meet to discuss common issues about the management of the prawn resources. The information from the research undertaken in the fishery, such as the three year research program investigating the growth and mortality of school prawns, will be beneficial to this process.*

Contributing to Goals	Timeframe	Responsibility	Authority
2,4,5,6,8	From 2003 as required	NSW Fisheries	-

**Table 13.** Quantities in kg of byproduct species that can be landed for sale per 1,000 kg of target species.

\*Note that quantities are on a per vessel basis.

Common Name	Scientific Name	Port Jackson	Hawkesbury River	Hunter River	Clarence River
Prawn, eastern king	<i>Penaeus plebejus</i>	na	na	na	15
Prawn, school	<i>Metapenaeus macleayi</i>	139	na	na	na
Prawn, greasy back	<i>Metapenaeus bennetae</i>	50	0.5	1.1	0.2
Prawn, tiger	<i>Penaeus esculentus</i>	10.7	0.2	0	0.9
Octopus	Octopoda	30	2	0	0
Squid	Loliginidae, Sepioidae & Teuthoidae	60	na	0	0.1
Crab, Blue Swimmer	<i>Portunus pelagicus</i>	170	40	0	0.1
Crab, Mud	<i>Scylla serrata</i>	1	0.3	0	2
Crab, Sand	Portunidae	0.6	0.1	0	0
Mantis Shrimp	Squillidae	30	0.4	0	0
Whiting, Trumpeter	<i>Sillago maculata</i>	820	120	0	0.1
Flounder	Bothidae	60	10	0	0
Sole	Soleidae	0	0.7	0	0
Silver biddy	<i>Gerres subfasciatus</i>	60	50	0	0.4
Trumpeter	Tetrapontidae	60	0.2	0	0
Whitebait (glass fish)	Clupeidae	0	3	0	0
Catfish	Plotosidae	13.4	5	0	2
John Dory	<i>Zeus faber</i>	13.5	0	0	0
Bullseyes	Pempherididae	0	0.1	0	0
Hairtail	<i>Trichiurus lepturus</i>	0	0.3	0	0
Yellowtail	<i>Trachurus novaezelandiae</i>	0	25	0	0

<sup>4</sup> “na” means not applicable to this estuary because the species is a target species for the fishery in that particular estuary.

**Objective 4.3 To minimise any negative impacts of the Estuary Prawn Trawl Fishery on Aboriginal and other cultural heritage**

Other important responses: 1.1a; 2.1c; 4.1a; 6.4a

(a) Participate in the development and subsequent reviews of any Indigenous fisheries strategies.

*Background: Consistent with objective 6.4, this management strategy is adaptive to a range of other concurrent programs, such as the Indigenous Fisheries Strategy. However, it should be noted that successful native title claims may effect the operation of the Estuary Prawn Trawl Fishery.*

Contributing to Goals	Timeframe	Responsibility	Authority
4,6	As required	NSW Fisheries	-

- (b) Respond, wherever practicable, to new information about areas or objects of cultural significance in order to minimise the risk from fishing or fishing activities.

*Background: The Estuary Prawn Trawl Fishery must respond appropriately to new information about items or locations of cultural significance. The NSW NPWS is the authority determining items of cultural significance.*

Contributing to Goals	Timeframe	Responsibility	Authority
4	Immediate	NSW Fisheries and EPT Fishers	-

**Objective 4.4 To promote harmony between the commercial fishery and other resource users, including recreational fishers, Indigenous fishers and local communities, through fair and equitable sharing of the fisheries resource**

Other important responses: 1.1a,b,e,g; 1.2a-c,e; 1.3a,f; 2.1c-e,g; 2.3b,c; 3.1c,d; 4.1a; 4.2c,d; 4.3a,b; 5.3b; 6.3a,b; 6.4a; 7.1a-c; 7.2a; 8.1a; 8.2a,b; 8.3a

- (a) Implement closures to trawling on weekends and public holidays across all estuaries and provide scope for adjusting the timing of the beginning and/or end of the annual trawling season.

*Background: Previously, the Hunter River and Port Jackson were closed to trawling during parts of weekends and public holidays. The Clarence River was open to trawling on weekends during the permitted season between 7 am and 9 am on Saturdays and on public holidays. Trawling is currently permitted year round in the Hawkesbury River but upstream of Juno Point was closed on weekends. Most weekend closures in each estuary have been at the initiative of industry in the interests of sharing resources.*

*Any reduction in the number of fishing days through the weekend and public holiday closure should be considered by the Estuary Prawn Trawl MAC during the discussion of the effort management options outlined in management response 2.3c.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4	Immediate	NSW Fisheries	Regulatory

## **GOAL 5. To promote a viable commercial fishery (consistent with ecological sustainability)**

In terms of gross value of production, the Estuary Prawn Trawl Fishery is worth approximately \$4 million annually (not including revenue received from the export market which generally yields higher prices). An economic survey of the Estuary Prawn Trawl Fishery carried out in 2001 showed that only a small proportion of fishing businesses (10%) had a long run economic surplus. With the progressive phasing in between year 2005 and 2008 of full cost recovery to meet all the attributable costs, estuary prawn trawl fishers need to be in a position economically to fund a greater proportion of the management costs. Viable fishing businesses have a greater incentive to support long term management decisions that are needed for sustainability now and into the future.

### **Objective 5.1 To manage the prawn and squid stocks so that the best outcome in terms of optimising biological yield and maximising economic return to the fishery is achieved**

Other important responses: 1.1a,c,d,f; 2.1b-h; 2.2a; 2.3b; 2.6a-c; 4.1a; 4.2a,d; 8.1b

(a) Taking into account available results of research, determine a size at first capture for eastern king and school prawns and appropriate counts for each target species of prawn.

*Background: This response relates to the equitable sharing of the resources across all fisheries. The sizes will depend upon the results of pending research between 2002 and 2005 on the school prawn resource and any available information for eastern king prawns. When determining counts of prawns consideration must be given to sustainability and equitable sharing of the resources. These issues form part of the deliberations of the MACs, the combined stakeholder group meetings and the Total Allowable Catch Setting and Review Committee. Once implemented, these sizes will be enforced through the compliance audit scheme. The "point of sale" counts (see management response 2.1d) will be reviewed also at this time.*

<b>Contributing to Goals</b>	<b>Timeframe</b>	<b>Responsibility</b>	<b>Authority</b>
1,2,4,5	By July 2007	NSW Fisheries and other stakeholders	-

### **Objective 5.2 To promote the economic viability of estuary prawn trawl fishing**

Other important responses: 1.1a,d; 2.1c-f,h; 2.3c,e; 2.4a,b; 2.5b; 2.6a,b; 4.1a; 4.2d; 5.1a,b; 5.3a,b

(a) NSW Fisheries will develop, in consultation with the Estuary Prawn Trawl MAC, a performance measure for viability at the individual fishing business level.

*Background: A performance indicator is already provided for in Table 18 to measure economic viability on a fishery-wide basis. This management response would provide an additional measure of viability that is related to the economics and "life style" of individual fishing businesses in the fishery.*

Contributing to Goals	Timeframe	Responsibility	Authority
5,7	By December 2005	NSW Fisheries and EPT MAC	-

- (b) NSW Fisheries will develop and implement, in consultation with the Advisory Council on Commercial Fishing, a cost recovery framework.

*Background: On 2 November 2000, the Government announced that over the succeeding five years NSW Fisheries would develop and implement a fair and transparent cost recovery framework for category 2 share management fisheries. During this period, the total amount of money collected by NSW Fisheries, for its existing management services, will not increase without the support of the relevant MAC. Each estuary prawn trawl fisher currently pays the same commercial fishing licence fees for the Estuary Prawn Trawl Fishery, irrespective of their level of access.*

*From 2005, recovery of the costs that have been identified as attributable to industry will be progressively introduced over a further three year period. Accordingly, operators need to be in a position, by 2008, to afford to pay for the full attributable costs of management from their fishery revenue. A cost recovery framework needs to be developed in order that fishers pay according to their level of access in the fishery. The cumulative impacts of any increases in management costs on fishing businesses operating in the Estuary Prawn Trawl Fishery and other fisheries will be considered in developing the cost recovery framework.*

Contributing to Goals	Timeframe	Responsibility	Authority
5,6	By November 2005	NSW Fisheries and ACCF	Ministerial determination

**Objective 5.3 To provide secure fishing entitlements for estuary prawn trawl fishers**

Other important responses: 2.1a,h; 2.3b,d; 2.4a,b; 2.5b; 4.2d; 6.2a

- (a) Implement the share management provisions of the *Fisheries Management Act 1994 (FM Act)*.

*Background: The category 2 share management provisions allow for the allocation of shares with a 15 year term to eligible persons, and with a statutory right to compensation if the Government cancels the shares during their term. A category 2 share management fishery may be converted to a category 1 share management fishery in accordance with the Fisheries Management Act 1994.*

*A share management plan must be prepared and that plan must be reviewed within 10 years after commencement, or at other times as provided for by the plan.*

Contributing to Goals	Timeframe	Responsibility	Authority
5,6	By December 2003	NSW Fisheries	FM Act

**Objective 5.4 To appropriately manage food safety risks in the harvesting of shellfish and finfish in the fishery**

Other important responses: 2.3d; 6.1d; 6.4a; 8.3a

- (a) Co-operate with Safefood Production NSW in the development and implementation of food safety programs relevant to the fishery.

*Background: Safefood Production NSW is currently in the process of developing food safety plans for harvest and post-harvest seafood industry, and the plans may impose statutory requirements on fishers to comply with the approved standards. Supporting food safety programs is a responsible way of promoting consumer confidence in fish product harvested by the fishery and protecting viability of the industry.*

<b>Contributing to Goals</b>	<b>Timeframe</b>	<b>Responsibility</b>	<b>Authority</b>
5,6	Current and ongoing	EPT Fishers	FP Act

- (b) Continue the prohibition on the processing or mutilation of shellfish and finfish taken in this fishery on, or adjacent to, water.

*Background: This management response is part of the current rules operating in the fishery. The term processing as used here does not include the cooking of shellfish and finfish.*

<b>Contributing to Goals</b>	<b>Timeframe</b>	<b>Responsibility</b>	<b>Authority</b>
2,5,6,8	Current and ongoing	NSW Fisheries	Regulatory

## GOAL 6. To ensure cost-effective and efficient management and compliance in the Estuary Prawn Trawl Fishery

Compliance programs that effectively support the management rules are important to the successful implementation of the fishery management strategy. As full cost recovery is phased in to the Estuary Prawn Trawl Fishery in the coming years, it is important that programs are conducted in an efficient and cost-effective manner. This goal can be achieved through the cooperation of estuary prawn trawl fishers, ongoing communication and consultation between NSW Fisheries and industry through the Estuary Prawn Trawl MAC, and by promoting complementary management programs in other States and the Commonwealth.

### Objective 6.1 To maximise compliance with the fishery management strategy for the Estuary Prawn Trawl Fishery

Other important responses: 1.1a; 2.3d; 5.3a; 5.4b; 6.2a,b; 6.3a; 7.1a-c; 8.2a,b; 8.3a

- (a) Develop, implement and monitor, in consultation with the Estuary Prawn Trawl MAC, a compliance audit scheme and operational plans for each estuary and encourage voluntary compliance through educational programs.

*Background: To assist in delivering regionally focussed compliance and advisory services, there are currently 19 Fisheries Offices along the NSW coast. Each of these offices provides services for a range of programs, one of which is the Estuary Prawn Trawl fishery. The level and focus of services targeted towards the Estuary Prawn Trawl fishery varies in each district, and is determined by the nature of the activities in that area. Fisheries officers in each office operate under a district compliance plan to ensure appropriate compliance coverage across all programs. District compliance plans are subject to fortnightly review to consider any changed circumstances and are also subject to an annual review.*

*Each district compliance plan is developed to be consistent with the compliance strategic plan for NSW Fisheries. This plan is an overarching framework that identifies priorities and objectives for compliance throughout the State. The Estuary Prawn Trawl MAC will be consulted over priorities relevant to the fishery prior to each review of the compliance strategic plan. The compliance strategic plan is subject to a review every three years*

*Under this management strategy a compliance audit will be conducted with all operators in the fishery prior to the commencement of each prawn trawling season, and in the case of Hawkesbury River operators each September. The compliance audit will be carried out by Fisheries Officers on board trawlers. The purpose of the audit is to check prawn trawl nets and associated fishing gear for compliance with mesh size and other legal requirements, and give operators an opportunity to replace or modify illegal gear without penalty before commencing operations for the season.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,6,8	By December 2003 and ongoing	NSW Fisheries and EPT MAC	Policy

- (b) Implement an endorsement suspension scheme and share forfeiture scheme based on a demerit point scale for serious offences and habitual offenders.



*Note: "serious offences" need to be defined in consultation with the Estuary Prawn Trawl MAC and/or the Advisory Council on Commercial Fishing and could include offences such as interfering with set fishing gear..*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,6,8	By December 2003	NSW Fisheries	Policy

- (c) Publish, where appropriate, successful prosecution results for nominated offences in relevant publications and media to discourage illegal activity.

Contributing to Goals	Timeframe	Responsibility	Authority
6,7,8	Current and ongoing	NSW Fisheries	Policy

- (d) Continue the requirement that shellfish and finfish taken in this fishery are marketed through a registered fish receiver or a restricted fish receiver as outlined in the Regulation.

*Background: This management response is part of the current rules operating in this fishery and all other NSW commercial fisheries.*

Contributing to Goals	Timeframe	Responsibility	Authority
5,6,8	Current and ongoing	NSW Fisheries	Regulatory

#### **Objective 6.2 To encourage cooperation between fishers and compliance officers in detecting offences**

Other important responses: 2.3d; 2.5b-d; 4.3a; 5.3a; 6.1a; 6.3a; 7.1a-c; 8.3a

- (a) Continue using regulatory conditions, including conditions on fishing licences, endorsements and permits to ensure that the authority conferred by the authorisation is consistent with the goals and objectives of the management strategy.

*Background: This management response is part of the current rules operating in this fishery and in all other fisheries of NSW.*

Contributing to Goals	Timeframe	Responsibility	Authority
2,5,6	Current and ongoing	NSW Fisheries	Various

- (b) Continue the requirement that fishers comply with directives given by Fisheries Officers, including to allow officers to board fishing boats to inspect catch, and to produce "authorities to fish" when requested.

*Background: This management response is part of the current rules operating in this fishery and in all other fisheries of NSW.*

Contributing to Goals	Timeframe	Responsibility	Authority
6	Current and ongoing	NSW Fisheries	FM Act

**Objective 6.3 To provide effective and efficient communication and consultation mechanisms in relation to the Estuary Prawn Trawl Fishery**

Other important responses: 1.3c; 2.3d; 2.4b; 2.5b-d; 2.6a,b; 4.2d; 4.3a; 5.2b; 5.4a; 6.1a,c; 7.1a-c; 7.2a; 8.1d; 8.2a,b; 8.3a

(a) Continue to recognise the Estuary Prawn Trawl MAC as the primary consultative body for issues affecting the fishery.

Contributing to Goals	Timeframe	Responsibility	Authority
4,6	Current and ongoing	NSW Fisheries	-

(b) Continue to use the services of a Chair in the Estuary Prawn Trawl MAC who is not engaged in the administration of the *Fisheries Management Act 1994*, nor engaged in commercial fishing.

Contributing to Goals	Timeframe	Responsibility	Authority
4,6	Current and ongoing	NSW Fisheries	FM Act

**Objective 6.4 To implement this fisheries management strategy in a manner consistent with related Commonwealth and State endorsed programs aimed at protecting aquatic environments, and achieving the objects of the Act and the principles of ecological sustainable development**

Other important responses: 1.3e; 1.4a; 2.3d; 2.4b; 2.5d; 2.6a-c; 3.1a,b,d; 4.3a; 8.1c

(a) Manage the Estuary Prawn Trawl Fishery consistently with other jurisdictional or natural resource management requirements, such as the marine parks program, aquatic biodiversity strategy, threatened species program and others.

*Background: This management strategy will be operating alongside other programs relating to the management of marine resources, and must be consistent with those programs. The management strategy must be adaptive and able to be modified if inconsistencies between the programs become apparent. This response provides for a whole-of-government approach to the management of the estuarine ecosystem.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,3,4,5,6	Current and ongoing	NSW Fisheries	Policy

## **GOAL 7. To improve the knowledge of the community about the operations and management of the Estuary Prawn Trawl Fishery**

There are many in the community who perceive trawling to be a wasteful practice because they consider that much of the catch is discarded and the environment damaged through the fishing process. It is important that the community is informed about how the Estuary Prawn Trawl Fishery operates and the actions taken to minimise any impact of the fishery on the ecosystem. In this way the unfavourable views of the community about trawling may be minimised as the community becomes more informed about the fishery.

### **Objective 7.1 To improve the community's understanding and public perception of the Estuary Prawn Trawl Fishery**

Other important responses: 1.2a,b; 1.3a,f; 2.1h; 2.4b; 2.5a,b,d; 3.1b; 5.2a; 6.1c; 7.2a; 8.1a,d; 8.2b

(a) Develop a strategic approach for disseminating information on the Estuary Prawn Trawl Fishery, including making the Fishery Management Strategy and Environmental Impact Statement and other relevant documentation widely available to the public by:

- (i) placing them on the NSW Fisheries website
- (ii) providing copies at Fisheries Offices throughout the State
- (iii) targeted mail outs to key stakeholders

*Background: This would include key public documents relevant to the performance review of the management strategy, such as reviews arising from exceeded trigger points.*

<b>Contributing to Goals</b>	<b>Timeframe</b>	<b>Responsibility</b>	<b>Authority</b>
4,6,7,8	Ongoing	NSW Fisheries	-

(b) Produce or contribute to the production of brochures, newsletters, and signs and do targeted advisory and educational programs, as considered appropriate by NSW Fisheries.

*Background: This education strategy needs to be developed in consultation with the different communities within NSW so that it is designed to most effectively communicate within each community.*

<b>Contributing to Goals</b>	<b>Timeframe</b>	<b>Responsibility</b>	<b>Authority</b>
4,6,7,8	Ongoing	NSW Fisheries and EPT fishers	-

Respond to inquiries by industry or the public with respect to this fishery management strategy or the fishery generally.

Contributing to Goals	Timeframe	Responsibility	Authority
4,6,7,8	Current and ongoing	NSW Fisheries	-

**Objective 7.2 To promote community awareness as to the importance of shellfish and finfish habitat to shellfish and finfish stocks**

Other important responses: 1.1f; 1.2a-d; 1.3e; 2.4b; 2.5a-d; 8.2b; 8.3a

(a) Publish educational information concerning the protection of fish habitat on the NSW Fisheries website and in other publications and media that NSW Fisheries considers relevant.

Contributing to Goals	Timeframe	Responsibility	Authority
4,6,7,8	Current and ongoing	NSW Fisheries	-

## **GOAL 8. To improve the knowledge about the Estuary Prawn Trawl Fishery and the resources upon which the fishery relies**

By their very nature, fish stocks and marine ecosystems are very complex and costly to study. There is a general lack of information and knowledge about many of the species taken in the Estuary Prawn Trawl Fishery and about the impacts of fishing on the general environment. This situation is not unique to NSW. Management decisions need to be made using the best available information at the time and need to be precautionary where there are uncertainties in the information and threats of serious or irreversible environmental damage from the activity.

A major issue for management for many species is the current reliance on catch and effort information reported by the commercial fishery as the main indicator of stock abundance. Apart from stock assessments of target species, other basic areas of research needed in the fishery are: (i) quantification and reduction of the bycatch and discarding of non target species; (ii) effects of fishing methods on habitats; (iii) effects of habitats on finfish and shellfish populations; (iv) importance of ecological processes to finfish and shellfish populations; (v) impacts of fishing on trophic interactions and ecosystems; and (vi) impacts of fishing on threatened species.

### **Objective 8.1 To promote appropriate scientific research and monitoring to collect information about target, byproduct and bycatch species**

Other important responses: 1.3b-e; 2.1a-c,h; 3.1a,b; 4.1a; 4.2a,b,d 5.4b; 8.2a,b

(a) Design and implement an industry-funded scientific observer program to:

- (i) collect information on the quantity and composition of retained and discarded species, and interactions with threatened and protected species
- (ii) provide quality control information on commercial catch and effort data.

*Background: Periodic observer surveys will collect information to:*

- (i) *help assess the impact of gear modifications upon fish "populations"*
- (ii) *provide information to determine whether the levels of incidental catch ratios are adequate*
- (iii) *help determine whether the targeted reduction in incidental catch is realistic*
- (iv) *validate whether threatened species are caught in the fishery*
- (v) *help verify levels of annual reported landings*
- (vi) *provide information for stock assessment purposes.*

*The observer program will be designed and costed in full consultation with the Estuary Prawn Trawl MAC. The MAC may present alternative schemes and investigate competitive service delivery.*

*The scientific observer surveys are discussed further in section 6 of the fishery management strategy.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4,7,8	By July 2004 and ongoing	NSW Fisheries	Various

- (b) Design and implement in consultation with the estuary general and ocean prawn trawl fisheries an industry funded program to conduct fishery independent surveys of the school and eastern king prawn, and squid resources of the Estuary Prawn Trawl Fishery.

*Background: Fishery independent surveys will provide less biased information than that from fishery dependent surveys (e.g. fishers returns and observer surveys). These will provide information about distribution and abundances of species, sizes and sex composition of individuals in the populations, occurrence of threatened and protected species and samples that may be used to collect biological information on the various bycatch species in the Estuary Prawn Trawl Fishery and so contribute towards understanding species interactions and the impact of trawling upon the ecosystem.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,3,5,8	Pilot study 2003-2004 and full scale July 2006	NSW Fisheries	Various

- (c) Provide for the issue of permits under section 37 of the *Fisheries Management Act 1994 (FM Act)* authorising modified fishing practices to assist research programs or for any other purpose consistent with the vision and goals of this fishery management strategy.

*Background: Permits are required to work outside parameters specified in this management strategy or elsewhere in the FM Act. The techniques required to investigate new approaches to using fishing gear may require formal approval. Such approval is also commonly given to industry members who are participating in research to provide a formal exemption from prosecution.*

Contributing to Goals	Timeframe	Responsibility	Authority
6,8	Current and ongoing	NSW Fisheries	Regulatory

- (d) determine, in consultation with stakeholder groups identified by NSW Fisheries, the priorities for research for the fishery, taking into account the research needs identified in this strategy and the Environmental Impact Statement.

*Background: NSW Fisheries has commenced consultation with a broad range of stakeholder groups over the development of research priorities relating to the State's fisheries resources, including the Estuary Prawn Trawl Fishery. This is done primarily through the NSW Fisheries Research Advisory Committee (FRAC), which advises funding agencies on fisheries research priorities for the state. Further information on the role of FRAC can be found on the NSW Fisheries website at: [www.fisheries.nsw.gov.au](http://www.fisheries.nsw.gov.au). This process will need to incorporate feedback from the stakeholder groups on the research needs identified in the management strategy. The priority setting process will identify the research priorities (including priorities for stock assessments) for the Estuary Prawn Trawl Fishery by June 2003 and will be done annually thereafter. It is also critically important to provide feedback from new research programs, such as the observer study, into this priority setting framework.*

Contributing to Goals	Timeframe	Responsibility	Authority
6,7,8	Current and ongoing	NSW Fisheries and EPT MAC	-

- (e) allocate research resources and where appropriate make grant applications to support research relevant to the fishery in accordance with the priorities identified from the process described in management response 8.1d.

*Background: Research into the Estuary Prawn Trawl Fishery is currently funded through a combination of NSW Fisheries core expenditure and external grants from State and Commonwealth research and development programs. Shareholders will contribute to the costs of research programs in accordance with the cost recovery policy outlined in management response 5.2b.*

Contributing to Goals	Timeframe	Responsibility	Authority
8	Ongoing from 2003	NSW Fisheries, EPT fishers and EPT MAC	-

- (f) Develop an objective system for defining and setting trigger points to detect concerning trends in landings of species taken in the Estuary Prawn Trawl Fishery

*Background: Unlike annual trigger points which are designed to detect dramatic changes over short periods, these trigger points will be designed to detect patterns in landings that are of sufficient concern to require a review (e.g. a downward or upward trend over several years). The assistance of a statistical expert will be sought to develop the system for setting this type of trigger point. The system will be tested during the first nine months following the commencement of the management strategy and applied to all species landed in the fishery at the first annual review. (See section 9 for a more detailed discussion on setting trigger points for monitoring changes in commercial landings). If the application of these trigger points for all species shows concerning trends for any conditional target species, the management strategy has provision to allow for increased monitoring or management controls for those species.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,8	Annually from 2003	NSW Fisheries	-

**Objective 8.2 To improve the quality of the catch and effort information collected from endorsement holders.**

Other important responses: 2.1a,c; 2.3d; 3.1a; 4.1a; 4.2b; 6.1a,b,d; 8.1b; 8.3a

- (a) Periodically review, in consultation with the Estuary Prawn Trawl MAC, the mandatory catch and effort return forms submitted by estuary prawn trawl fishers and implement changes if:
- (i) the data collected is perceived to be of poor quality or insufficient for monitoring and assessment purposes.
  - (ii) the forms are found to be exceedingly complex for fishers to complete, ensuring an emphasis on the quality rather than quantity of information collected.

*Background: NSW commercial fishers are required to report their catches to NSW Fisheries. These records are a vital part of fisheries assessments and understanding of the activities of fishers. It may be necessary under the management strategy for fishers of the Estuary Prawn Trawl Fishery to complete a daily log sheet.*

*A working group of commercial fishers and fisheries staff is reviewing catch and effort returns used by fishers. The working group will help to improve the quality of data collected. Any proposed changes will be discussed with the Estuary Prawn Trawl MAC.*

*The intention of the management strategy is to move from the grouping of species on catch returns to recording individual species to enhance the accuracy of recorded information (see also management response 8.2b).*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4,6,8	Current and ongoing	NSW Fisheries and EPT MAC	-

(b) Determine accuracy of current recording of species identification in catch records and provide advice to industry to make needed changes (may need to wait for results from observer study).

*Background: Correct species identification is critical to many areas of the performance of this strategy. Most species in the fishery are clearly and easily identified and accurately reported. However, it is not unequivocally clear whether terms like whitebait, octopus, squid and trumpeter relate in each case to the correct species. The observer study will assist in implementing this management response. Observers will provide first hand information on what common names are used to identify what species and any patterns in the use of terms. This will be of particular importance in educating fishers on the identification of protected and threatened species. This information will be used to make certain that industry advice and education is appropriately targeted.*

Contributing to Goals	Timeframe	Responsibility	Authority
1,2,4,6,7,8	By December 2004 and ongoing	NSW Fisheries and EPT MAC	-

### **Objective 8.3 To train new entrants to the fishery**

Other important responses: 6.1c; 7.1a-c; 7.2a;8.1a, 8.2b

(a) Implement a “Basic Skills Course” for new entrants to the Estuary Prawn Trawl Fishery.

*Background: Industry wishes to begin, in conjunction with a tertiary institution, a “Basic Skills Course” for new entrants to the fishery. This 3-4 day course would teach the new entrants stewardship of the environment, water safety, occupational health and safety issues, first aid and the basic seamanship skills required to operate a trawler. The costs to run the course would be fully covered by the participants. This course would become a prerequisite to operating an endorsement in the Estuary Prawn Trawl Fishery.*

Contributing to Goals	Timeframe	Responsibility	Authority
4,6,7,8	By June 2005	EPT MAC	-



**Objective 8.4 To improve knowledge of social and economic aspects of the fishery**

Other important responses: 5.2a-c; 5.3a; 7.1a

- (a) Consult with the Estuary Prawn Trawl MAC on development of a strategy for improving the understanding of economic and social information relating to the Estuary Prawn Trawl Fishery, taking into account the information gaps outlined in the economic and social assessment in the Environmental Impact Statement for the fishery

*Background: An economic and social survey conducted as part of the environmental assessment process has provided some limited information on economic and social issues in the Estuary Prawn Trawl Fishery. The Environmental Impact Statement identified a number of information gaps and provided recommendations for further investigation of economic and social issues.*

Contributing to Goals	Timeframe	Responsibility	Authority
4,5,7	By July 2005	NSW Fisheries	-

- (b) Assess, in consultation with the Estuary Prawn Trawl MAC, the feasibility of gathering additional information on social and/or economic aspects of the Estuary Prawn Trawl Fishery including:
- modifying the existing catch returns or fishing licence renewal application forms
  - undertaking targeted social and economic surveys
  - any other methods of gathering the desired information

*Background: The gathering of social and economic information will aid in understanding the implications of changes to fishing rules over time. Some information gathering methods may be relatively simple and inexpensive to implement whilst others, like targeted surveys, are likely to be more resource intensive. Consideration will need to be given to the quality of information likely to be received through different information gathering techniques.*

Contributing to Goals	Timeframe	Responsibility	Authority
4,5,7	By July 2005	NSW Fisheries EPTMAC	-



## **9. Performance Monitoring and Review**

### **a) Performance monitoring**

Many of the management responses assist in achieving multiple goals. Therefore, rather than examining the performance of each individual response or objective, it is more efficient and appropriate to measure the performance of the management strategy against the eight goals (i.e. the major objectives). An annual report will, however, be prepared (as outlined later in this section) detailing the progress made in implementing each of the management responses.

In addition to the performance monitoring process outlined below, a share management plan will be prepared for the fishery and include goals and performance indicators consistent with those specified in this management strategy. The *Fisheries Management Act 1994* provides that the share management plan must specify at what point a review of the management plan is required when a performance indicator is not being satisfied. Accordingly, when the share management plan for the fishery is prepared the plan will need to provide for a review process that is complementary to the review process described in this management strategy. Additional information on share management plans can be found in section 1(e) of this fishery management strategy.

### **i) Performance indicators**

The performance indicators provide the most appropriate indication of whether the management goals are being attained. A number of monitoring programs will be used to gather information to measure performance indicators. These monitoring programs are detailed later in this section in Tables 14 to 21.

With the implementation of the new research proposals for the fishery outlined in section 6(a), a broader information base relating to the fishery and its impacts may allow for more precise performance indicators to be developed.

### **ii) Monitoring Programs**

Monitoring programs provide the information used to measure the performance of the fishery and associated management. Monitoring programs can be specific to the fishery (e.g. a review of the number and extent of closures within estuaries) or encompass cross-fishery interactions such as the catch of a species by several commercial fisheries or harvest sectors. The management strategy may use other systems for monitoring (e.g. monthly catch returns). In some cases, the monitoring of the performance measure is part of the annual reporting on all performance (e.g. number of MAC meetings annually). Tables 14 to 21 give an overview of what information sources and monitoring programs are used as part of the performance monitoring and review for the Estuary Prawn Trawl Fishery.

### **iii) Trigger points**

The trigger points specify when a performance indicator has reached a level that suggests there is a problem with the fishery and a review is required.

Some performance indicators vary naturally from time to time and the trigger point levels chosen have been selected to be conservative in light of that natural change. That is, trigger points are chosen to be well within the expected range of variation. This has the effect that the trigger will be

exceeded more frequently because of natural variation in the performance indicator than because of a problem in the fishery. If the natural variation of the performance indicator is known, then the trigger level will be set such that the performance indicator must be outside the range in which 80% of observations occur to trigger a review.

Tables 14 to 21 outline the performance indicators, monitoring programs and trigger points that will be used to measure whether each of the management goals described in section 8 of this management strategy are being attained.

## **b) Predetermined review of performance indicators and trigger points**

It is likely that changes to the activities authorised under the management strategy will evolve over time. It is also likely that better performance indicators will become apparent over the course of the next few years and it would then be an inefficient use of resources to continue monitoring the performance indicators that appear in this management strategy. If new information becomes available as a result of research programs, more appropriate performance indicators and trigger points can be developed and the management strategy amended by the Minister for Fisheries accordingly.

A comprehensive review of the appropriateness of all performance indicators and trigger points will be carried out not more than two and a half years from the commencement of the management strategy, in consultation with the Estuary Prawn Trawl MAC. This will occur in addition to the preparation of the annual performance report that reports on whether performance indicators have breached corresponding trigger points. If the performance report identifies an inappropriate performance indicator prior to the two and half year review it can be addressed accordingly at this stage.

As new or improved guidelines for fishery reporting become available, such as those being considered in the *'National ESD Reporting Framework for Australian Fisheries – the how to guide for wild capture fisheries report'*, they will be taken into account to promote continuous improvement in the management of the fishery.

**Table 14.** Performance indicators monitoring programs and trigger points for Goal 1 of the management strategy

<b>GOAL 1. To manage the Estuary Prawn Trawl Fishery in a manner that promotes the conservation of biological diversity in the estuarine environment.</b>					
	<b>Performance indicator</b>	<b>Monitoring program</b>	<b>Timeframe</b>	<b>Trigger point</b>	<b>Comments</b>
1	Quantity (by weight) of incidental catch	Observer surveys to start by July 2004 (management response 8.1a) will provide information about the quantities and sizes of individual species in the catch. These data will be reviewed annually and will be compared to data from surveys done during 1989-92. These comparisons will provide information about whether the fishery will meet the target of at least a 40% reduction in incidental catch by 2007 or whether the target needs to be increased or decreased	Observer surveys will be used to collect information about the levels of incidental catch since BRDs became mandatory. These survey years will then become the baseline years to monitor further reductions in incidental catch. Surveys will begin in 2003 and then be ongoing on an annual basis	If five years after the start of the management strategy, the quantity of incidental catch in the estuary prawn trawl fishery is not reduced by at least 40% of that of the baseline years 1989 to 1992	The baseline years will be those of 1989 to 1992 when surveys of catches were last done. Note: that different baseline years will be used for the Hunter River. The progress in reducing incidental catch, and need to change the achievable level, will be reviewed annually as part of the review of management responses. The Estuary Prawn Trawl MAC and Environment Australia will be consulted over the design of the observer program
2	Identify and map areas of key habitat and/ or environmental sensitivity (at the ecosystem level) that are currently opened to trawling and closures in those areas	Under management response 1.2(a), areas will be identified through consultation with EPT fishers and by externally funded studies. Maps will be produced using a GIS mapping system	Mapping will begin by July 2003 and closures will be implemented by July 2006	Closures in identified areas are not implemented by July 2006	If closures are not in place by the agreed date, a review will be undertaken

**Table 14 (Cont.).** Performance indicators, monitoring programs and trigger points for Goal 1 of the management strategy.

GOAL 1. To manage the Estuary Prawn Trawl Fishery in a manner that promotes the conservation of biological diversity in the estuarine environment.					
	Performance indicator	Monitoring program	Timeframe	Trigger point	Comments
3	Response of the fishery to marine pest and disease incursions	Reports on results of monitoring marine pests and diseases will be provided to the Estuary Prawn Trawl MAC through the marine pest management program	Ongoing	The Director, NSW Fisheries, determines that the fishery does not respond appropriately to marine pest and disease management programs that recommend that estuary prawn trawl fishing be modified as a result of marine pest or disease incursions	The marine pest and disease management program is responsible for monitoring marine pests and diseases (ie. noxious fish), and developing contingency plans in the event of new incursions. Section 210 of the <i>Fisheries Management Act 1994</i> provides an offence for selling fish that are or have been declared noxious. This performance indicator and trigger point ensures that the fishery is responsive to existing or threatening marine pest or disease incursions
4	Incidental Catch Ratios	Observer surveys will provide information that can be used to determine the Incidental Catch Ratios (ICR) operating in the fishery. Quality inspections by fisheries officers will provide information about the number of times fishers breach the ICR levels in management response 1.3a	Implemented by December 2003	Incidental Catch Ratios have not been implemented to the satisfaction of the Director, NSW Fisheries	Incidental Catch ratios should be working in the fishery to the satisfaction of the Director, NSW Fisheries by December 2003
5	[A performance indicator will be developed to monitor biodiversity impacts at the species, community and ecosystem levels]			[No trigger point set at this stage]	There are no available performance indicators to measure the impact of this fishery on biodiversity. As such, surrogate indicators (below) will be used until a suitable indicator is developed. Species composition and abundance in samples from fishery independent surveys may also assist in monitoring this indicator

**Table 15.** Performance indicators, monitoring programs and trigger points for Goal 2 of the management strategy.

<b>GOAL 2. To maintain primary and byproduct species harvested by the Estuary Prawn Trawl Fishery at sustainable levels.</b>					
	<b>Performance indicator</b>	<b>Monitoring program</b>	<b>Timeframe</b>	<b>Trigger point</b>	<b>Comments</b>
1	Stock assessments available for target species	A desk top study is required to improve the population model for eastern king prawns. A project to collect the information necessary to do stock assessments of school prawns will begin in July 2002 (see management response 2.1e) and be completed in July 2006. A study on squid in the Hawkesbury River is scheduled to be completed in July 2003. This will provide some information that can be used in stock assessments, and together with the information collected during a review of the status of the squid resources of NSW (see management response 2.1b) will be used to set the direction of research for the purposes of improving the stock assessments on squid. (see management responses 2.1 f,h)	School prawns - July 2006. Eastern king prawns - July 2004. Squid - July 2003. Follow up studies will then be done at times determined by the Director, NSW Fisheries in consultation with the Estuary Prawn Trawl MAC	Stock assessments are not available for each species from the following dates: - school prawns by July 2006 - eastern king prawns by July 2004 - squid by July 2003	A desk top study is required to improve the population model for eastern king prawns. The stock assessments on school prawns and squid will rely upon information collected during research projects that are scheduled to finish in December 2005 and December 2002, respectively
2	Total annual reported landings of byproduct species in each estuary of the estuary prawn trawl fishery	Data will be provided from the fisher's monthly return forms or a revised reporting system (see management responses 8.2a,b). Annual analysis of data by NSW Fisheries' scientists, in consultation with the Estuary Prawn Trawl MAC. These data will also be used to ascertain whether the annual reported landings for the estuary prawn trawl fishery have exceeded the levels in Table 23	Begin 2004 and ongoing subject to annual review	An analysis for assessing long term trends will be determined before December 2003, until this time a single year trigger will be used (Table 23).	The byproduct species permitted to be landed in the estuary prawn trawl fishery are those listed in Table 4. Some species have been grouped in Table 23. Section 10 explains how the trigger point for this performance indicator based upon a time series of data will be developed. Until the new trigger is determined, analyses will be done using a single year trigger (see section 10 and Table 23)

**Table 15.** Performance indicators, monitoring programs and trigger points for Goal 2 of the management strategy.

<b>GOAL 2. To maintain primary and byproduct species harvested by the Estuary Prawn Trawl Fishery at sustainable levels.</b>					
	<b>Performance indicator</b>	<b>Monitoring program</b>	<b>Timeframe</b>	<b>Trigger point</b>	<b>Comments</b>
3	Relative abundance of target species (including spawner biomass) in each estuary. Target species include school and eastern king prawns in all four estuaries and includes squid in the Hawkesbury River	Data will be provided from (1) the fisher's monthly return forms or a revised reporting system (see management responses 8.2a,b), (2) observer-based sampling program (management response 8.1a and (3) fishery independent surveys (management response 8.1b).	Analysis of (1) fisher monthly return data by July 2004 and then ongoing, (2) observer-based data by July 2004 and then ongoing, and (3) fishery independent data from July 2006 and then ongoing	Relative abundance of spawner biomass does not fall below a proportion of virginal spawner biomass or against a range of reference years. Bench marks for level of spawner biomass to be available within five years of the commencement of this management strategy	Maintain spawning populations The applicability (i.e. whether a stock-recruitment relationship is prevalent) of this performance indicator for each species will be determined over the next five years Reference years have yet to be determined
4	[A trigger point based upon relative abundance of target species will be developed ]			An analysis for assessing long term trends will be determined before December 2003 (see section 10 and Table 22)	Use as an index of the size of the populations of school prawns and squid in each estuary of the fishery



**Table 16.** Performance indicators, monitoring programs and trigger points for Goal 3 of the management strategy.

GOAL 3. To promote and support the conservation of threatened species, populations and ecological communities associated with the operation of the Estuary Prawn Trawl Fishery.					
	Performance indicator	Monitoring program	Timeframe	Trigger point	Comments
1	Number of incidental captures related to listed threatened species, population or ecological community	Data will be provided from (1) the fisher's monthly return forms or a revised reporting system (see management responses 3.1a and 8.2a,b), (2) observer-based sampling program (management response 8.1a and (3) fishery independent surveys (management response 8.1b). Annual analysis of data by NSW Fisheries' scientists.	Analysis of (1) fisher monthly return data to be ongoing, (2) observer-based data as data becomes available and then ongoing, and (3) fishery independent data from July 2006 and then ongoing	[No trigger point has been set at this stage]	Data will be sourced from the scientific observer program, fishery independent surveys and catch return records
2	Response of the fishery to threatened species declarations	Reports will be provided to the Estuary Prawn Trawl MAC containing recommendations from the Director, NSW Fisheries and/or the Director-General of the National Parks and Wildlife Service where appropriate actions may be needed to conserve threatened species (management response 3.1b). Monitoring the response of the fishery will be through the scientific, management and compliance services provided by NSW Fisheries	Ongoing	A threatened species recovery plan or threat abatement plan requires a modification to estuary prawn trawl fishing which the Director, NSW Fisheries considers is not adequately provided for in this management strategy	The NSW Fisheries Office of Conservation and the NSW National Parks and Wildlife Service monitor sightings of threatened species and develop threatened species recovery plans as required

**Table 17.** Performance indicators, monitoring programs and trigger points for Goal 4 of the management strategy.

GOAL 4. To appropriately share the resource and carry out fishing in a manner that minimises the social impacts.					
	Performance indicator	Monitoring program	Timeframe	Trigger point	Comments
1	Estimates by NSW Fisheries of the catch of target species for all sectors (including recreational and Indigenous)	Data will be provided from the fisher's monthly return forms or a revised reporting system (see management responses 8.2a,b) and from any appropriate recreational fishing surveys and compliance reports arising from "quality inspections" (see management responses 4.1a and 6.1a)	To begin in 2005 and ongoing	Estimates not available within three years from the commencement of the management strategy	This information is also needed for stock assessments as outlined in Goal 2
2	Annual reported landings from the commercial sector compared to estimates of unreported annual catch by the recreational and Indigenous sectors (excluding catches attributable to Recreational Fishing Havens)	Data will be collected from any appropriate recreational fishing surveys and compliance reports arising from "quality inspections" (see management responses 4.1a and 6.1a) and compared with data provided from the fisher's monthly return forms or a revised reporting system (see management responses 8.2a,b). Annual analysis of data by NSW Fisheries, scientists, in consultation with the Estuary Prawn Trawl MAC.	Begin 2005 and ongoing subject to review every five years	After estimates become available, the shift in relative landings and catch levels between sectors is on average 25% or more over five years	This relates primarily to the objective of evaluating and managing equitable allocations between fishing sector groups and refers to the percentage of total catch taken by each sector
3	Annual reported landings of target species taken in the estuary prawn trawl fishery relative to those from the same estuary by other commercial fisheries	Data will be provided from the fisher's monthly return forms or a revised reporting system (see management responses 8.2a,b). Annual analysis of data by NSW Fisheries' scientists, in consultation with the Estuary Prawn Trawl MAC.	Begin 2004 and then ongoing. Subject to annual review	Relative landings levels between commercial fisheries shifts on average by 25% or more over five years	This relates primarily to the objective of evaluating and managing equitable allocations between commercial fisheries

**Table 18.** Performance indicators, monitoring programs and trigger points for Goal 5 of the management strategy.

<b>GOAL 5. To promote a viable commercial fishery (consistent with ecological sustainability).</b>					
	<b>Performance indicator</b>	<b>Monitoring program</b>	<b>Timeframe</b>	<b>Trigger point</b>	<b>Comments</b>
1	Codend counts (number of individuals per half kilogram) for eastern king or school prawns	Observer studies will provide information that can be used to determine the codend counts in the fishery. Quality inspections by fisheries officers will provide information about the number of times fishers are found in breach of the codend counts determined in management responses 5.1a, b	Implemented by July 2007	Codend counts for prawns have not been implemented to the satisfaction of the Director, NSW Fisheries	Codend counts should be working in the fishery to the satisfaction of the Director, NSW Fisheries by July 2007
2	Median fishery wide gross return to estuary prawn trawl fishers derived from commercial fishing in NSW	Part of the annual review will involve calculating the median gross return to fishers endorsed in the estuary prawn trawl fishery, by multiplying their monthly catches with respective average Sydney Fish Market price and prices provided by the Estuary Prawn Trawl MAC	Ongoing	No trigger point set at this stage	Trigger will depend upon economic analyses and will be determined by NSW Fisheries in consultation with industry
3	Average market value of estuary prawn trawl shares	The market value of shares will be collected and recorded by the Share Registrar upon each share transfer. The average market value will be calculated each year as part of the annual review	Ongoing	No trigger point set at this stage	It is not possible to predict how the value of shares will change during the first few years of share trading. However, in the long term average share value may be a good indicator of economic health of the fishery
4	Viability of the estuary prawn trawl fishery and its contribution to businesses of fishers therein	Performance indicator and associated monitoring to be developed (see management response 5.2a)	By December 2005	No trigger point set at this stage	Trigger will depend upon economic analyses and will be determined by NSW Fisheries in consultation with industry

**Table 19.** Performance indicators, monitoring programs and trigger points for Goal 6 of the management strategy.

<b>GOAL 6. To ensure cost-effective and efficient management and compliance in the Estuary Prawn Trawl Fishery.</b>					
	<b>Performance indicator</b>	<b>Monitoring program</b>	<b>Timeframe</b>	<b>Trigger point</b>	<b>Comments</b>
1	Rate of compliance of the estuary prawn trawl fishery in respect to (i) overall and (ii) "share forfeiture offences" under the share management plan.	The compliance rate will be calculated using the outcomes of quality inspections conducted as part of the compliance program for the fishery (see management response 6.1a)	To begin in 2003 and ongoing subject to annual review	Overall rate of compliance with quality inspections as estimated by the Director, NSW Fisheries, is less than 85%.	Quality inspections will result in a more comprehensive evaluation of compliance by fishers than the previous measure used and previous compliance rates may decrease as a result. Trigger points for "share forfeiture" offences will be determined by NSW Fisheries in consultation with the Estuary Prawn Trawl MAC by July 2004 and will provide a more stringent trigger for measuring compliance relating to more serious offences.
2	Number of Estuary Prawn Trawl MAC meetings held each year	The number of Estuary Prawn Trawl MAC meetings held will be determined as part of the annual review based on the records held by NSW Fisheries	Ongoing	Less than two meetings held in a calendar year, unless otherwise agreed by the Estuary Prawn Trawl MAC	Holding two MAC meetings per year is a requirement of the Regulation
3	Occasions when this management strategy is in direct conflict with other approved Commonwealth or State programs	Any major concurrent Government programs will be considered during the annual review, however other programs considered by the Director, NSW Fisheries to be in conflict with this management strategy will be reported to the Estuary Prawn Trawl MAC on a case by case basis	Ongoing	Any occasion when the Director, NSW Fisheries determines that the management strategy is inconsistent with other approved Commonwealth and State programs	This includes programs such as the Indigenous Fisheries Strategy, Aquatic Biodiversity Strategy, Marine Parks and Aquatic Reserves Program
4	[Cost of managing the fishery]			To be determined	

**Table 20.** Performance indicators, monitoring programs and trigger points for Goal 7 of the management strategy.

<b>GOAL 7. To improve the knowledge of the community about the operations and management of the Estuary Prawn Trawl Fishery.</b>					
	<b>Performance indicator</b>	<b>Monitoring program</b>	<b>Timeframe</b>	<b>Trigger point</b>	<b>Comments</b>
1	Dissemination of information to the public	List of publications for public information relevant to the estuary prawn trawl fishery to be reviewed annually in consultation with the Estuary Prawn Trawl MAC	To begin 2003, and ongoing	Less than two pieces of information material for the public (eg pamphlets, information kit, posters etc) is published every three years	The Estuary Prawn Trawl MAC is to be consulted prior to the material being released
2	Level of community awareness	A survey every three years to collect information about the community's awareness of management and its knowledge and perceptions of the estuary prawn trawl fishery	To begin in 2006, subject to funding being provided by industry	Less than 50% of those surveyed are aware of the operation and management of the estuary prawn trawl fishery	To be part of a survey done every three years to assess the awareness of fishing communities and approval of these communities for the management of the estuary prawn trawl fishery. Survey to be paid for by financial contributions from industry

**Table 21.** Performance indicators, monitoring programs and trigger points for Goal 8 of the management strategy.

GOAL 8. To improve the knowledge about the Estuary Prawn Trawl Fishery and the resources upon which the fishery relies.					
	Performance indicator	Monitoring program	Timeframe	Trigger point	Comments
1	Total level of funding committed to research projects that the Director, NSW Fisheries determines provide a flow of benefits to the estuary prawn trawl fishery of 25% or more	Annual review by the Director, NSW Fisheries of total research funding from consolidated and external funds that are being spent on the estuary prawn trawl fishery	Begin 2004	To be determined	Part of the annual reporting on the FMS will include expenditure on research for the fishery. The trigger point will be determined by NSW Fisheries in consultation with the Estuary Prawn Trawl MAC
2	Number of research grant applications submitted to external funding agencies annually relating to the estuary prawn trawl fishery	After consultation with the Estuary Prawn Trawl MAC, submit at least one grant application that relates to the fishery to external funding agencies annually (see management response 8.1e)	Begin 2003	To be determined	
3	Accuracy of catch return data (measured annually) for target and byproduct species	Data will be provided from the fisher's monthly return forms or a revised reporting system (see management responses 2.1a and 8.2a,b) and from the records of the Fish Receivers. Data from these sources will be compared by NSW Fisheries' scientists, in consultation with the Estuary Prawn Trawl MAC. Data from the observer based survey will be useful in ascertaining whether the annual reported landings of species determined from fishers catch return records is reliable and whether species are being correctly identified by fishers	Begin 2004 and subject to review every two years thereafter	The total annual reported landings as calculated from the monthly return forms of endorsement holders is 20% greater or less than the landings data from market records.	Accuracy can be measured from either (i) the total annual reported landings of all endorsement holders calculated from their monthly catch return forms or (ii) from the monthly returns forms of a sample of endorsement holders scaled up to give a total value. If a sample of endorsement holders is used then a precision of 20% of the mean value is to be applied. Precision is to be calculated as the standard error of a sample divided by the mean of that sample. Extrapolations will also be made from data from the observer program

## c) Reporting on the performance of the management strategy

There are two types of reports to be prepared under this management strategy. The first of these reports on each of the performance indicators specified for each management goal. The other type of report is reporting on the progress in implementing the provisions of the management strategy. Both types of reports are discussed in further detail below.

### (i) *Review report in response to trigger points*

If the trigger point for a performance indicator is breached, a review is to be undertaken of the likely causes for the breach. Any such review is to include consultation with the Estuary Prawn Trawl MAC. In some circumstances, the breach may be related to a performance indicator that measures broader cross-fishery issues and will require consultation with other management advisory committees or the Ministerial advisory councils. Cross-fishery issues are most likely to involve catch levels of a species that is harvested in more than one fishery.

NSW Fisheries will collect and analyse information relevant to the performance of the fishery, such as compliance rates, economic data, catch data and other statistics as the information becomes available and prior to preparation of reports relating to performance monitoring in the management strategy. This does not, however, prevent a review from being conducted at any other time should it become apparent that a performance indicator has breached a trigger point.

Once the relevant information is obtained an initial analysis against the trigger points will be undertaken by NSW Fisheries. Where the data or information indicate that a trigger point has been breached, details will be provided to the relevant fishery MACs and the relevant Ministerial advisory councils. Consultation will then occur with the Estuary Prawn Trawl MAC and other relevant advisory bodies either through a meeting or out of session. During this consultation, advice will be sought on performance indicators that have been breached and the suspected reasons for any breaches. During this consultation the MAC will also be able to provide advice on the preparation of any review reports that are required.

A review report outlining the remedial actions recommended in response to trigger point breaches is to be provided to the Minister for Fisheries.

Reviews arising from landings data exceeding trigger points should consider (but not be limited to) the following factors:

- changes in the relative reported landings levels among harvest sectors (including those beyond NSW jurisdiction)
- new biological or stock information (from any source) available since the most recent review of the species
- changes in the activities or effectiveness of fishing businesses targeting the species
- changes in principal markets or prices for the species
- environmental factors.

Review reporting should include whether the suspected reasons for the trigger point being breached are the result of a fishery effect or an influence external to the fishery, or both.

If a review concludes that the reasons for the trigger point being breached are considered to be due to the operation of the fishery, or if the fishery objectives are compromised if the fishery

continued to operate unchanged, management action should be taken (e.g. by introducing new fishing regulatory controls) with the aim to return the performance indicator to within an acceptable range within a specified time period. The review will need to consider and report on whether the breached trigger point should continue to be the limit of the acceptable range or whether the environmental conditions have been modified to the extent that the acceptable range is different to the 'safe' levels initially defined by the management strategy. The objective of any remedial action proposed would vary depending on the circumstances that have been identified as responsible for the trigger point being reached.

A review relating to reported landings levels of a species may recommend modifications to any fishery management strategy that allows harvesting of that species. This approach to the review process will avoid triggering multiple reviews for a species which is caught in multiple fisheries.

There may be circumstances where no change to management arrangements or the management strategy is deemed necessary following the review. For example, a review could be triggered because the landed catch of a species declines. However, there would be little cause for concern over the performance of the management strategy if the decline in landed catch of a species was clearly caused by a drop in market prices or a fall in rainfall and subsequent river discharge. Any price fluctuations can result in fishers adjusting their activities, and river discharges often determine the availability of prawns in an estuary.

If a review considers that the management objectives or the performance monitoring provisions are inappropriate and need to be modified, the management strategy itself may be amended by the Minister for Fisheries. If the reasons are considered to be due to impacts on the resource from factors external to the fishery, these factors should be identified in the review and referred to the relevant managing agency for action.

All review reports will be publicly available.

## ***ii) Annual performance report***

An annual performance report assessing the performance of the fishery will be submitted to the Minister for Fisheries each year following the review of trigger points by the MAC. This is to commence in 2004 and the report is to be submitted to the Minister for Fisheries within six months of the Estuary Prawn Trawl MAC being consulted over the development of the report. The annual performance report is the formal mechanism for reporting on performance indicators and trigger points, and will be made publicly available. This report will also include a review of progress made in implementing each of the management responses. The annual performance report will be submitted to the Minister for Fisheries in conjunction with performance reports for other relevant fishery management strategies.

The vast majority of management responses in the management strategy are linked to specified implementation timeframes. Some of these management actions are subject to specific trigger points that ensure reviews and appropriate remedial actions if the target timeframes are not met.

If the performance report identifies that any specified target timeframe has not been met, a review will be undertaken and any necessary remedial measures recommended to the Minister<sup>4</sup>.

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<sup>4</sup> In some circumstances a required action may be completed outside the scheduled timeframe, but prior to the commencement of the review (e.g. an action was due for completion by September 2003,



The fishery will continue to be regarded as being managed within the terms of the management strategy whilst any remedial measures associated with breaches in timeframes or triggering of performance indicators are being considered through the review process and/or by the Minister for Fisheries.

#### **d) Contingency plans for unpredictable events**

In addition to the circumstances outlined above, the Minister for Fisheries may order a review and/or make a modification to the management strategy in circumstances declared by the Minister as requiring contingency action, or upon the recommendation of the Estuary Prawn Trawl MAC. In the case of the former, the Minister must consult the Estuary Prawn Trawl MAC on the proposed modification or review.

These circumstances may include (but are not limited to) food safety events, environmental events, results of research programs or unpredictable changes in fishing activity over time. The Minister may also amend this fishery management strategy if matters identified during the finalisation of any other fishery management strategy indicate that a modification is necessary.

Notwithstanding the above, the Minister for Fisheries may make amendments to this management strategy that the Minister considers to be minor in nature at any time.

#### **e) Monitoring performance of stock assessment**

Stock assessment involves the use of various statistical and mathematical calculations to make quantitative predictions about the reactions of fish populations to alternative management choices (Hilborn and Walters, 1992). These calculations can vary from simple graphical presentations of commercial landings to sophisticated computer models that predict the biomass of the stock under various harvest regimes. The data and the scientific expertise required to apply these methods varies enormously. Stock assessment processes for the Estuary Prawn Trawl Fishery need to be defined to suit the resources available. To achieve this outcome, short-term and long-term approaches will be applied. The short-term approach will be to use landings of target species to monitor the performance of this fishery. The long term approach will be to develop a process for doing stock assessments of the target species, and having the stock assessment methods peer reviewed.

The long-term approach will involve undertaking the following science and reassessing the future direction of research as stock assessments improve and information needs are highlighted through the stock assessment process. A desktop study of the information available for eastern king prawns will be completed by July 2004. A study to collect information on the growth and mortality of school prawns is underway and a stock assessment on the species completed by July 2006. The University of Sydney will complete a preliminary stock assessment for the squid fishery in the Hawkesbury River by July 2003. The future needs for a stock assessment for squid will be assessed once these studies have been completed and as part of the review of the exploitation status of the squid resources of NSW (management response 2.1b).

Two principles will apply to the long-term proposal for stock assessments:

- assessment methods will be consistent with the data (i.e. the assessment program design will not rely on data sources that are not funded)

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but it is actually completed in October 2003). When this occurs, it is not necessary to proceed with a review.

- assessment methods will be at least equivalent to approaches for fisheries of similar value in other Australian jurisdictions.

## **f) Setting trigger points for monitoring changes in annual reported landings**

A system to detect undesirable trends in catch per unit of effort (CPUE; weight per fisher day) will be used while stock assessments are being developed for target species. Once stock assessments are available, more sensitive biological reference points will be developed. Some of the byproduct species are the target species of other commercial fisheries and will therefore be the subject of formal stock assessments under the management strategy for that fishery. Where necessary, the stock assessments for these species will be integrated into the management strategy for the Estuary Prawn Trawl Fishery. The status of the stocks of the byproduct species of the Estuary Prawn Trawl Fishery that are not subject of a formal stock assessment in the short term, will be determined by assessing patterns in annual reported landings. The species to be assessed in this manner will change between estuaries because the list of byproduct species changes between estuaries of the Estuary Prawn Trawl Fishery.

Catch per unit of effort data must be used with caution in stock assessments. Most stock assessment models assume that CPUE is directly proportional to stock abundance. This can only be the case if fishing effort is randomly distributed, and we know that this is seldom the case. Some fisheries (including prawn fisheries) target aggregations of shellfish and finfish, which can mean that CPUE stays high, even as total abundance drops because the remaining shellfish and finfish continue to aggregate.

The correct use of fishing effort data requires a good knowledge about the biology of each species that it is applied to, so that its spatial distribution can be adequately considered. Information about fishers' behaviour and gear is also important so that effort units can be standardised and changes over time can be accounted for. Catch per unit of effort has been used as an index of relative abundance in the Estuary Prawn Trawl Fishery because fishers during a single fishing day will usually target a single species within each estuary of the fishery and the fishing gear and vessels have remained relatively standard through time. In the longer term once a sufficient database on numbers of each species caught during the fishery independent surveys provided for in this management strategy has been accumulated, there will be less reliance upon fishery dependent data and some of the risks associated with the biases mentioned above will be diminished.

The aim of trigger points based on changes in landings or CPUE is to force a review of a species' circumstance when the indicators go beyond a reasonable expected range. Trigger points must be set at a level where they are sensitive enough to be likely to register a real problem but not so sensitive that they constantly trigger when there is no need for a review.

Trigger points will be set in a precautionary manner to be within the known range of past variation in landings or CPUE. This is desirable insurance that ensures reviews will be done when management action is needed.

There are a number of factors that must be considered when selecting a trigger level based on performance of fishery or species landings or CPUE:

- level of variation in recorded historic annual reported landings or CPUE
- management changes over time that may affect levels of annual reported landings or CPUE

- changes in the catch recording system that limit interpretation of annual reported landings or CPUE data
- relevant environmental events
- changes in activities by important harvesters of that species.

All these factors have and will continue to influence how changes in landings and CPUE can be interpreted.

The trigger points are designed to measure different types of changes in annual reported landings and CPUE of the target species.

Firstly, a review should commence when the levels of annual reported landings or CPUE change dramatically from one year to the next – the “single year trigger”. The change that triggers a review is not an unprecedented rate of change but rather a rate of change that was expected (perhaps) once every five to ten years. The single year triggers are based on the variation in year-to-year changes in the historical reported landings and effort data. The trigger points are set at a level of change that occurs less than 20% of the time. In other words, changes larger than the greatest 20% of historical changes will trigger a review. This level of change is chosen to ensure that there will be a review if there is a dramatic change in the circumstances of the fishery over a short period. The reference level for this short term trigger will be the level of annual reported landings or CPUE from the previous year.

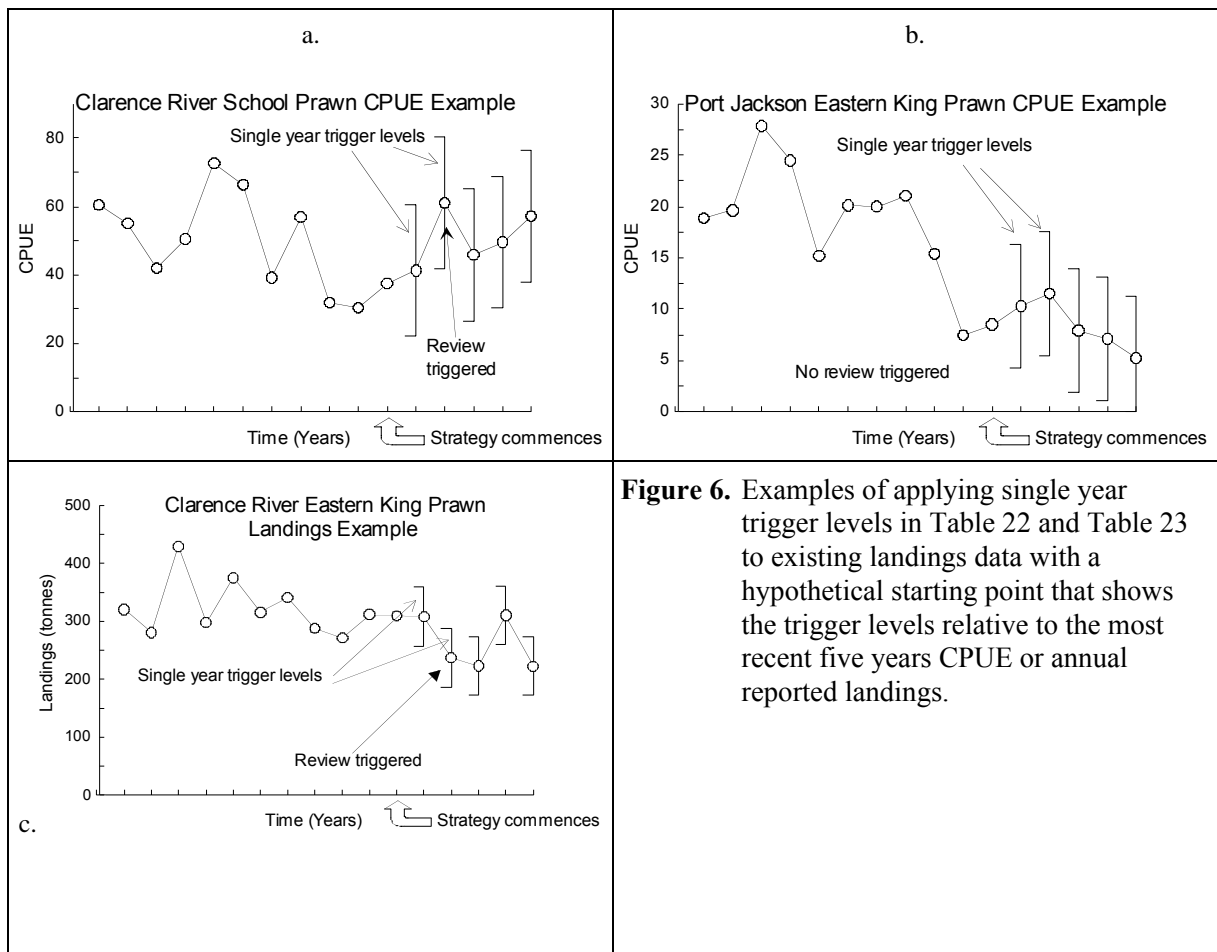
The second type of trigger point is designed to detect long term patterns in annual reported landings or CPUE that are of sufficient concern to require a review (e.g. a downward or upward trend over several years). An objective system for defining these types of trigger points will be developed and tested during the first nine months of the management strategy and applied to all target species at the first annual review. Time series of annual reported landings or CPUE for any commercial species are likely to be correlated from one year to the next (i.e. the level of annual reported landings or CPUE one year is related to the level of annual reported landings or CPUE in one or more previous years.). This type of data structure will complicate the analysis of trends in annual reported landings or CPUE. It is not a trivial exercise to devise an objective system to force a review when annual reported landings or CPUE data exhibit certain patterns. For example, downward trends in annual reported landings or CPUE should cause concern but the monitoring system must consider the importance of the rate of decline and the time period over which the decline occurs. The analysis must address the likelihood of relationships between data points and any relevant biological considerations (e.g. does the species come from a group that is known to be relatively long- or short-lived?).

The assistance of a statistical expert has been sought to develop an objective system for defining trigger points that detect concerning trends in annual reported landings or CPUE. The system will be developed and tested during the first nine months of the management strategy and applied to all species taken in the fishery when the first performance report is prepared. The system may involve several different measures, including the steepness of the trend and the period over which the trend occurs.

### **g) How trigger points based on landings will be applied**

The single year trigger is explained in the examples shown in Figure 6. These examples explain how the single year trigger points will work with a hypothetical starting point (five years ago), trigger levels and existing reported landings data. For school prawns from the Clarence River (a) the

accepted range in variability in Year 2 of the management strategy is higher than the level of CPUE for Year 1 and the trigger is set off. Similarly, the trigger is set off in Year 2 for eastern king prawns in the Clarence River (c). Note that in the Clarence River eastern king prawns are considered as a byproduct species of the Estuary Prawn Trawl Fishery and so the trigger is based upon annual reported landings rather than CPUE. Contrast this with patterns in CPUE for eastern king prawns from Port Jackson where the species is targeted. Whilst showing a downward trend in CPUE, the ranges in variability overlap with the previous year's level of CPUE and so the trigger is not set off. It is most likely though that the analysis being developed to detect unacceptable long-term trends in patterns of CPUE or annual reported landings (the second type of trigger point) would have a trigger that was set off for this data set.



**Table 22.** Levels of trigger points for single year trigger to detect large change in CPUE for target species, from one year to the next.

Species Common Name	Clarence River		Hunter River		Hawkesbury River		Port Jackson	
	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit
School prawn	76.6	40	44.1	25.9	30.2	14.1	byproduct	byproduct
Eastern king prawn	byproduct	byproduct	65.8	8	16.5	5.9	8.8	0
Squid	byproduct	byproduct	byproduct	byproduct	18.4	13.6	byproduct	byproduct

**Note:** These levels will apply for the first year of the fishery management strategy. At each annual review the trigger levels for the next year will be calculated, using the most recent year of landings data as the new reference level. The average annual change was calculated over the 27 years commencing in 1973-74 for the target species of the Clarence and Hunter Rivers and for the 16 years commencing 1984-85 for the other categories. All CPUE values are kilogram per fisher day.

“byproduct”- This is a byproduct species in this estuary and therefore a landing limit applies (see Table 22).

**Table 23.** Levels of trigger points for single year trigger to detect large change in annual reported landings for byproduct species from one year to the next. All values in the table are in tonnes.

Species Common Name	Clarence River		Hunter River		Hawkesbury		Port Jackson	
	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit
Prawn, eastern king	273.2	171.5	-	Target	-	Target	-	Target
Prawn, school	-	Target	-	Target	-	Target	2.4	0
Prawn, greasy back	2.7	0.2	2.9	0	1.3	0.3	0.9	0
Prawn, tiger	4.8	0.2	0.2	0	0.5	0	0.2	0
Octopus	na	na	na	na	4.6	0.1	5.5	0.7
Squid	31.3	5.4	16.9	0	-	Target	11.7	0
Crab, Blue Swimmer	7.1	2.3	na	na	10.8	0	3.1	0.1
Crab, Mud	6.3	0	na	na	8.9	0.0	1.1	0
Crab, Sand	na	na	na	na	na	na	2.8	0
Mantis Shrimp	na	na	na	na	0.8	0.4	0.4	0
Whiting, Trumpeter	1.2	0	na	na	20.6	13.7	10.9	6.7
Flounder	na	na	na	na	3.0	0.9	2.4	1.0
Sole	na	na	na	na	0.3	0	na	na
Silver biddy	3.2	0	na	na	0.02	0.01	17	0.2
Trumpeter	na	na	na	na	na	na	1.6	0.9
Whitebait (Glass fish & sandy sprat)	na	na	na	na	19.5	0	na	na
Catfish	28.7	17.6	3.2	1.1	0.8	0	1.4	0.2
John Dory	na	na	na	na	na	na	9.8	0
Bullseyes	na	na	na	na	0.2	0	na	na
Hairtail	na	na	na	na	2.6	0	na	na
Yellowtail	na	na	na	na	38.7	27.0	na	na

**Note:** These levels will apply for the first year of the fishery management strategy. At each annual review the trigger levels for the next year will be calculated, using the most recent year of landings data as the new reference level. The average annual change was calculated over the 27 years commencing in 1973-74 for the target species of the Clarence and Hunter Rivers and for the 16 years commencing 1984-85 for the other categories.

“na”- This species or group of species is not a byproduct species and cannot be retained in this estuary.

“Target”- This is a target species in this estuary and therefore has a CPUE trigger instead of a catch limit.

The values are calculated from the reported landings from all commercial fisheries combined within the ‘reporting zone’ of the estuary.

## 10. Estuary specific details

### a) Clarence River

#### i) Species

The target species is the school prawn *Metapenaeus macleayi* (see Table 3) and some byproduct species are also caught (see Table 4), but under this management strategy only certain quantities of byproduct species can be landed annually (see Table 13).

#### ii) Landings levels and value

Annual total reported landings have remained relatively stable over the past three years and averaged around \$ 2.3 million (see Table 24). Patterns in the reported landings and value of individual species in the catch of the fishery in the Clarence River can be found in NSW Fisheries (2002).

**Table 24.** Weight (kg) and value (\$) of the reported landings of catch for the Estuary Prawn Trawl Fishery on the Clarence River in 1998-99, 1999-2000 and 2000-2001.

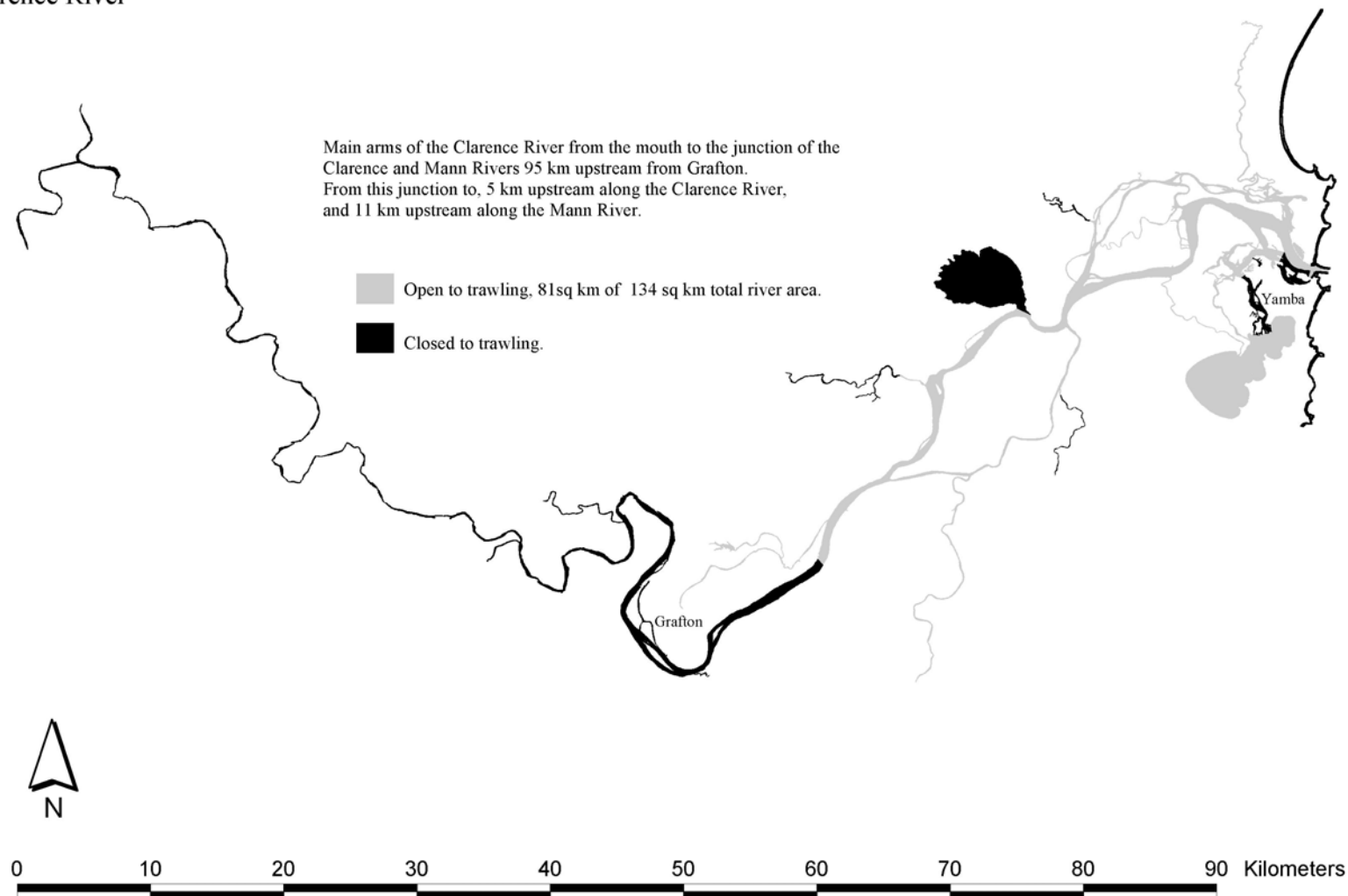
Common Name	1998-1999		1999-2000		2000-2001	
	Weight (kg)	Value (\$)	Weight (kg)	Value (\$)	Weight (kg)	Value (\$)
Eastern king	4,124	170,967	749	15,137	5,303	122,631
School	288,927	*2,043,612	334,640	*2,279,752	301,573	*2318012
Tiger	317	4,874	-	-	-	-
Blue swimmer crab	28	124	2	14	53	696
Mud crab					-	-
Squid	31	80	-	-	-	-
Octopus	10	28	-	-	-	-
Other invertebrates					15	53
Finfish	6,928	30,140	1,861	7,881	532	2,245
<b>Total</b>	<b>300,365</b>	<b>2,249,825</b>	<b>337,252</b>	<b>2,302,784</b>	<b>307,476</b>	<b>2,443,636</b>

NOTE: Values were calculated using the average price provided by industry members on the Estuary Prawn Trawl MAC. Values not marked with a \* were calculated using the average monthly price paid for the species at auction at the Sydney Fish Market.

#### iii) Area of operation.

Trawling for prawns is permitted between the mouth of the estuary and the wires of the vehicular ferry at Ulmarra and is also permitted in Lake Wooloweyah, which lies to the south of the river entrance (see Figure 7). Table A2 in Appendix 3 lists closures within these boundaries.

### Clarence River



**Figure 7.** The areas of operation of the Estuary Prawn Trawl Fishery in the Clarence River.

### iii) Management controls specific to Clarence River

#### *Limited entry*

Restrictions on the number of entitlements to operate on the Clarence River will apply under the management strategy. No additional entitlements will be issued, and any new entitlements will only be issued if they are replacing existing entitlements.

#### *Boat replacement policy*

Clarence River prawn trawlers are subject to specific vessel and engine capacity restrictions. A Clarence River prawn trawler may be replaced, but the length, depth or breadth must not increase by more than 10% within any ten year period. Similarly, the engine must not be replaced or modified so as to increase the power rating by more than 10% within any ten year period.

#### *Fishing gear*

Table 7 outlines the restrictions placed upon the design of the otter trawl net and Appendix 1 provides the regulations regarding the prawn trawl net. Fishers are limited to one net with a headrope length of 11 metres or two nets each with a headrope length of 7.5 metres.

#### *Time and area closures*

The fishery is restricted to waters seaward of the vehicular ferry at Ulmarra and some tributaries, including the Broadwater are closed to trawling (see Figure 7). Table 25 and Table A2 in Appendix 3 outline the time closures that occur during those periods.

**Table 25.** Times when prawn trawling will be permitted in the Clarence River.

(The following table is a summary of the closures to prawn trawling and is to be used as a guide only. The local fisheries office should be consulted for the most recent closure notices as these are frequently modified).

<b>Area</b>	<b>Periods when trawling may occur</b>
Clarence River	From 8 a.m. to 6 p.m. on Monday, and 7 a.m. to 6 p.m. on each of the days Tuesday to Friday (inclusive), excluding public holidays, in each week from the Monday nearest to 1 December in each year (inclusive) to the Friday nearest to 31 May in each succeeding year.
Lake Wooloweyah	From 8 a.m. to 6 p.m. on Monday, and from 7 a.m. to 6 p.m. on each of the days Tuesday to Friday (inclusive), excluding public holidays, in each week from the first Tuesday on/or after 1 October in each year (inclusive) to the Friday nearest to 31 May in each succeeding year.

Note: Contingent upon discussions with the EPT MAC it may be that periodic closures occur throughout the season when incidental catch ratios or the count of prawns exceeds agreed to levels.

#### *Limits on landings*

Table 13 sets out the quantities of byproduct species that may be landed. Section 9 lists trigger points and allowable commercial landings levels for target and byproduct species for the fishery in this estuary. The upper landings level for the commercial catch of each of these species has been determined using the upper trigger point range and recorded landings.



## Counts on prawns

The Juvenile Prawn Summit Working Group recommended to the Minister for Fisheries that maximum counts for school and eastern king prawns taken for sale be implemented. These counts are currently under discussion by the working group and once consensus is reached the Minister will be advised of its recommendations. These will be implemented once approved by the Minister.

## Incidental catch ratio

The management strategy provides for the use of a level of incidental catch to be controlled by a ratio of incidental species relative to the weight of target species. This system is to be developed by December 2003.

## b) Hunter River

### i) Species

The target species are the school prawn *Metapenaeus macleayi* and the eastern king prawn *Penaeus plebejus* (see Table 3). Some byproduct species are also caught (see Table 4), but under this management strategy only certain quantities of byproduct species can be landed annually (see Table 13).

### ii) Landings levels and value

Annual total reported landings increased in 2000-01 because of greater landings of school prawns (Table 26). Corresponding to this, the value of the fishery on the Hunter River also increased and has averaged \$0.49 million over the past three years. Patterns in the reported landings and value of individual species in the catch of the fishery in the Hunter River can be found in NSW Fisheries (2002).

**Table 26.** Weight (kg) and value (\$) of the reported landings of catch for the Estuary Prawn Trawl Fishery on the Hunter River in 1998-99, 1999-2000 and 2000-2001.

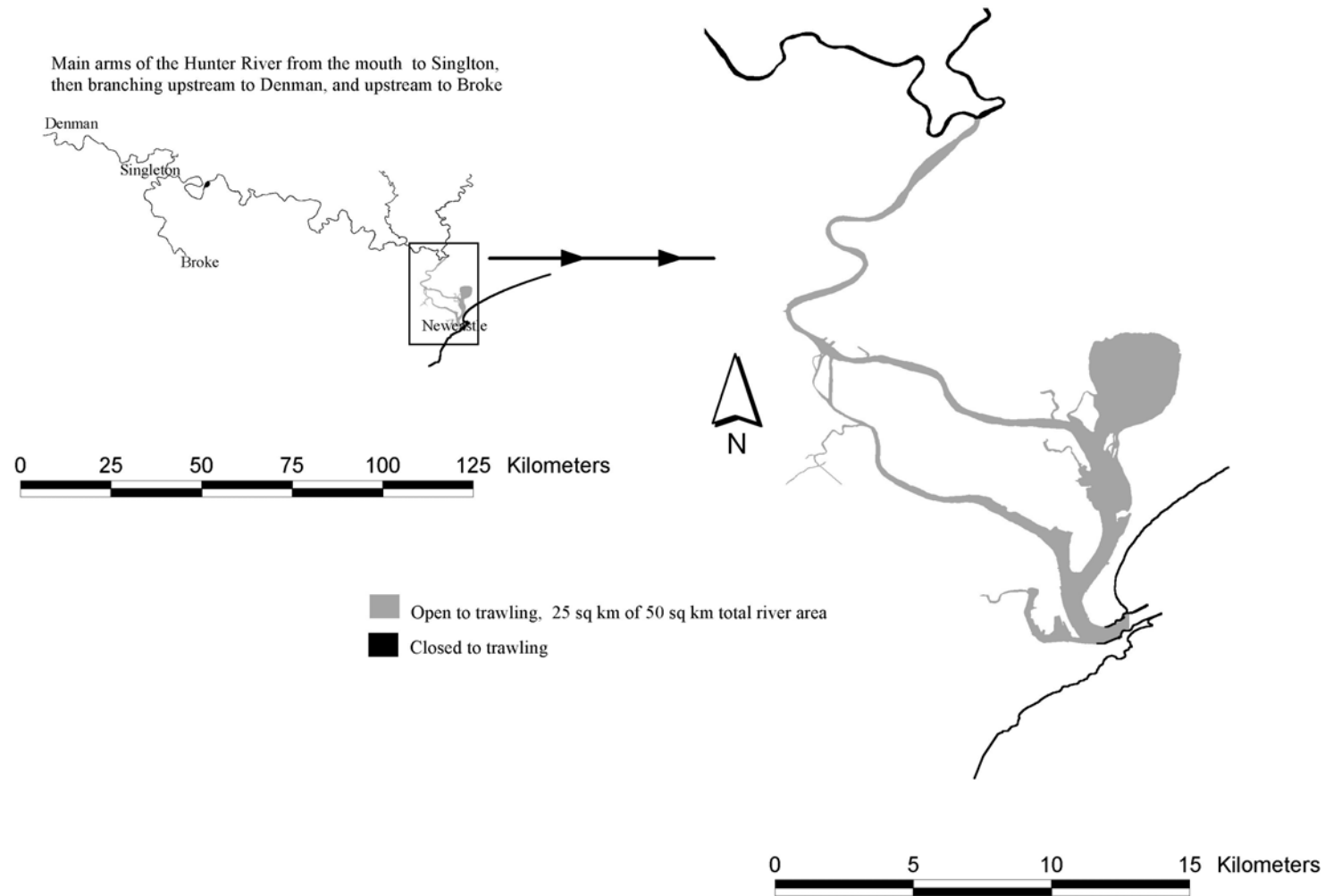
Common Name	1998-1999		1999-2000		2000-2001	
	Weight (kg)	Value (\$)	Weight (kg)	Value (\$)	Weight (kg)	Value (\$)
Eastern king	-	-	3,453	68,207	2,665	57,540
School	37,110	*324,713	40,406	*353,525	75,849	*663,627
Greasyback	-	-	-	-	-	-
Tiger	-	-	-	-	-	-
Blue swimmer crab	-	-	-	-	6	41
Mud crab	-	-	-	-	2	35
Squid	-	-	-	-	6	11
Octopus	-	-	-	-	1	4
Other invertebrates	-	-	-	-	-	-
Finfish	228	302	252	981	229	1,483
<b>Total</b>	<b>37,338</b>	<b>325,015</b>	<b>44,111</b>	<b>354,506</b>	<b>78,758</b>	<b>722,741</b>

NOTE: Values were calculated using the average price provided by industry members on the Estuary Prawn Trawl MAC. Values not marked with a \* were calculated using the average monthly price paid for the species at auction at the Sydney Fish Market.

**ii) Area of operation**

Trawling for prawns is permitted between the mouth of the estuary and the junction of the Williams and Hunter Rivers (see Figure 8). Table A3 in Appendix 3 lists closures within these boundaries





**Figure 8.** The areas of operation of the Estuary Prawn Trawl Fishery in the Hunter River.

### iii) Management controls specific to Hunter River

#### *Limited entry*

Restrictions on the number of entitlements to operate on the Hunter River will apply under the management strategy. No additional entitlements will be issued, and any new entitlements will only be issued if they are replacing existing entitlements.

#### *Boat replacement policy*

Vessels 5.8 metres and less may be replaced with boats up to 5.8 metres in length. Boats that are greater than 5.8 metres in length may only be replaced with boats that are no more than 10% or one metre greater in length, whichever is lesser. The 10% tolerance continues to relate to the original boat length to avoid a progressive increase in length over time. There is no restriction on vessel engine power.

#### *Fishing gear*

Table 7 outlines the restrictions placed upon the design of the otter trawl net and Appendix 1 provides the regulations regarding the prawn trawl net. Fishers are limited to one net with a headrope length of 11 metres.

**Table 27.** Times when prawn trawling will be permitted in the Hunter River.

(The following table is a summary of the closures to prawn trawling and is to be used as a guide only. The local fisheries office should be consulted for the most recent closure notices as these are frequently modified).

Area	Periods when trawling may occur
Subdivisions 1 and 2	1. from 6a.m. to 6p.m. weekdays only, during the period 2 December 2002 to 17 April 2003 (inclusive), excluding each public holiday.
Sbdvisions 3 to 7	from 6a.m. to 6p.m. weekdays only, during the period 2 December 2002 to 30 May 2003 (inclusive), excluding each public holiday.

Note: Contingent upon discussions with the EPT MAC it may be that periodic closures occur throughout the season when incidental catch ratios or the count of prawns exceeds agreed to levels.

#### *Time and area closures*

This fishery is restricted to the Hunter River estuary downstream of the junction of the Williams and Hunter Rivers (see Figure 8). The area of the river open to trawling is divided into seven subdivisions (see Table A3 in Appendix 3) for the purposes of closing sections of the river when counts of prawns exceeds 150 in half a kilogram. Codend counts are used in determining these numbers. In the future these same subdivisions will be used to control the quantities of incidental catch being caught. Table 27 and Table A3 in Appendix 3 outlines the time closures that occur.

#### *Limits on landings*

Table 13 sets out the quantities of byproduct species that may be landed. Section 9 lists trigger points and allowable commercial landings levels for target and byproduct species for the fishery in this estuary. The upper landings levels for the commercial catch of each of these species has been determined using the upper trigger point range and recorded landings.

## Counts on prawns

The Juvenile Prawn Summit Working Group has recommended to the Minister for Fisheries that maximum counts for school and eastern king prawns taken for sale be implemented. These counts are currently under discussion by the working group and once consensus is reached the Minister will be advised of its recommendations. These will be implemented once approved by the Minister.

## Incidental catch ratio

The management strategy provides for the use of a level of incidental catch to be controlled by a ratio of incidental species relative to the weight of target species. This system is to be developed by December 2003.

## c) Hawkesbury River

### i) Species

The target species are the school prawn *Metapenaeus macleayi* and the eastern king prawn *Penaeus plebejus* and species of squid (see Table 3). Some byproduct species are also caught (see Table 4), but under this management strategy only certain quantities of byproduct species can be landed annually (see Table 13).

### ii) Landings levels and value

Annual total reported landings of school prawns were greater and those of squid less in 2000-01 than in the previous two years. The value of the fishery increased to around \$1.5 million in 2000-01 and has averaged \$1.2 million over the past three years (Table 28). Patterns in the reported landings and value of individual species in the catch of the fishery in the Hawkesbury River can be found in NSW Fisheries (2002).

**Table 28.** Weight (kg) and value (\$) of the reported landings of catch for the Estuary Prawn Trawl Fishery on the Hawkesbury River in 1998-99, 1999-2000 and 2000-2001.

Common Name	1998-1999		1999-2000		2000-2001	
	Weight (kg)	Value (\$)	Weight (kg)	Value (\$)	Weight (kg)	Value (\$)
Eastern king	2,621	57,636	3,742	82,358	3,916	98,308
School	31,823	*333,187	44,596	*445,068	104,975	*1,047,651
Greasyback	103	465	702	3,375	-	-
Tiger	38	606	80	1,275	25	434
Blue swimmer crab	3,804	23,017	1,847	12,844	2,135	17,373
Mud crab					103	1,299
Squid	46,982	*522,909	30,865	*383,035	19,754	*245,147
Octopus	210	919	223	1,608	360	2266
Other invertebrates					401	1931
Finfish	27,702	80380	31,655	94,428	29766	94303
<b>Total</b>	<b>113,283</b>	<b>1,019,119</b>	<b>113,710</b>	<b>1,023,991</b>	<b>161435</b>	<b>1,508,712</b>

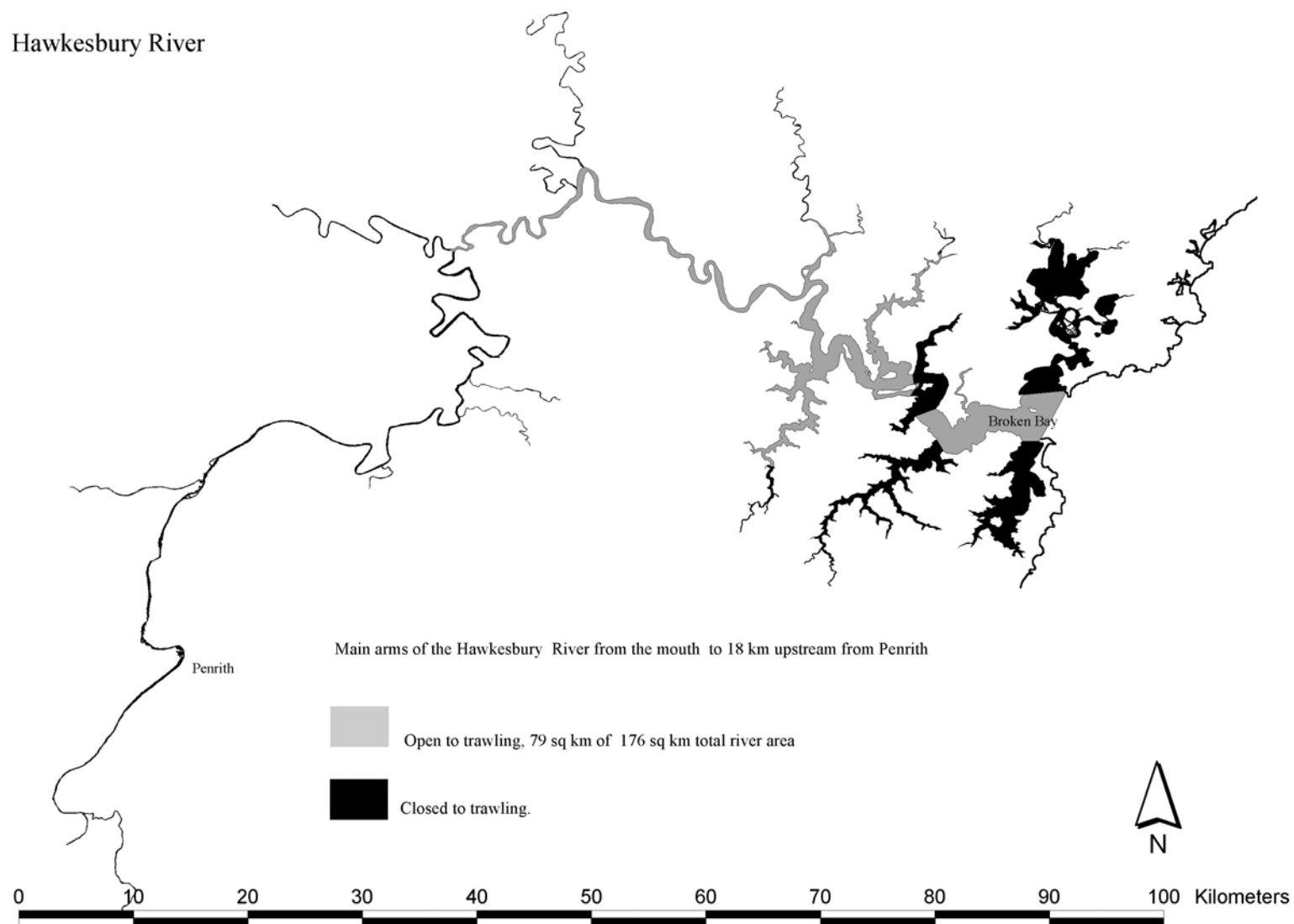
NOTE: Values were calculated using the average price provided by industry members on the Estuary Prawn Trawl MAC. Values not marked with a \* were calculated using the average monthly price paid for the species at auction at the Sydney Fish Market.

**ii) Area of operation**

Trawling is permitted between a line drawn from the southern extremity of Box Head to the northern extremity of Barrenjoey Head, upstream to the vehicular ferry crossing at Lower Portland. Within this area many tributaries are closed to trawling (see Figure 9). Table A6 in Appendix 3 lists closures within these boundaries.







**Figure 9.** The areas of operation of the Estuary Prawn Trawl Fishery in the Hawkesbury River.

### **iii) Management controls specific to Hawkesbury River**

#### ***Limited entry***

Restrictions on the number of entitlements to operate on the Hawkesbury River will apply under the management strategy. No additional entitlements will be issued, and any new entitlements will only be issued if they are replacing existing entitlements.

#### ***Boat replacement policy***

Vessels 5.8 metres and less may be replaced with boats up to 5.8 metres in length. Boats that are greater than 5.8 metres in length may only be replaced with boats that are no more than 10% or one metre greater in length, whichever is lesser. The 10% tolerance continues to relate to the original boat length to avoid a progressive increase in length over time. There is no restriction on vessel engine power.

#### ***Fishing gear***

Table 7 outlines the restrictions placed upon the design of the otter trawl net and Appendix 1 provides the regulations regarding the prawn trawl net. Fishers are limited to one net with a headrope length of 11 metres upstream of a line drawn between Juno Bluff and Eleanor Bluff or no more than two nets with a total combined headrope length of 11 metres downstream of this line. Although two nets may be used in this downstream area which includes Broken Bay most vessels only use one net.

**Table 29.** Times when prawn trawling will be permitted in the Hawkesbury River.

(The following table is a summary of the closures to prawn trawling and is to be used as a guide only. The local fisheries officer should be consulted for the most recent closure notices as these are frequently modified).

Area	Periods when trawling may occur
The waters of the Hawkesbury River upstream from a line drawn from the south-eastern corner of Middle Head to the north-eastern corner of West Head, to a line drawn across the river from the south-eastern most corner of Juno Point to the north-eastern most corner of Eleanor Bluff, and from that point to the north western most corner indicated by the Port Hand marker on Challenger Head.	From midnight Sunday to midnight Friday in each week, excluding public holidays.
The following waters of the Hawkesbury River and its tributaries: <ul style="list-style-type: none"> <li>• upstream from a line drawn across the river from the south-eastern most corner of Juno point to the north-eastern most corner of Eleanor Bluff, to a line drawn from the most westerly point of Croppy Point to the most northerly point of Green Point;</li> <li>• upstream from the rail bridge at Brooklyn to the downstream vehicular ferry crossing at Wiseman's Ferry but excluding Berowra Creek, Marra Marra (or Mother Marr's) Creek and Coba Bay, together with their tributary creeks and bays upstream from the most southwesterly point of Morgan Point to the most southeasterly point of Murrion Point;</li> <li>• Mangrove Creek together with its tributary creeks and bays, upstream to Oyster Shell Road Bridge; and</li> <li>• Upstream of the Wiseman's Ferry vehicular ferry crossing, but excluding MacDonald River, Colo River (upstream of the West Portland Road bridge approximately 250 metres from its junction with the Hawkesbury River), and Webbs Creek, and their tributaries, to the vehicular ferry crossing at Lower Portland.</li> </ul>	From midnight Sunday to 6pm Friday in each week, excluding public holidays.
The waters of Marra Marra (or Mother Marr's) Creek and Coba Bay, upstream from a line drawn from the most southeasterly point of Murrion point to the most southwesterly point of Morgan Point and then to the northeastern point of entry to Coba Bay.	From sunrise to sunset in each of the days Monday to Thursday (inclusive), and from sunrise to 6pm Friday in each week, excluding public holidays.
The waters of the Hawkesbury River upstream from its entrance to the South Pacific Ocean, to a line drawn from the south-eastern corner of Middle Head to the north-eastern corner of West Head, but excluding Pittwater, south of a line drawn from Shark (or Warners) Rock to the north-eastern corner of West Head.	From midnight Sunday to midnight Friday in each week, excluding public holidays.

Note: Contingent upon discussions with the EPT MAC it may be that periodic closures occur throughout the season when incidental catch ratios or the count of prawns exceeds agreed to levels.

### ***Time and area closures***

The fishery is restricted to waters downstream of the vehicular ferry crossing at lower Portland to the entrance of the South Pacific Ocean. However within this area there are many area closures and these area detailed in Table A6 in Appendix 3.

Trawling is permitted all year in the Hawkesbury River and this management strategy introduces a closure on weekends and public holidays across the entire estuary. Table 29 and Table A6 in Appendix 3 outlines the time closures that occur.

A review to assess the need for a seasonal closure for this estuary of the fishery will be done within three years of this strategy being implemented. This review will take into account the ecological, social and economic impacts of such a closure.

### ***Limits on landings***

Table 13 sets out the quantities of byproduct species that may be landed. Section 9 lists trigger points and allowable commercial landings levels for target and byproduct species for the fishery in this estuary. The upper landings level for the commercial catch of each of these species has been determined using the upper trigger point range and recorded landings.

### ***Counts on prawns***

The Juvenile Prawn Summit Working Group has recommended to the Minister for Fisheries that maximum counts for school and eastern king prawns taken for sale be implemented. These counts are currently under discussion by the working group and once consensus is reached the Minister will be advised of its recommendations. These will be implemented once approved by the Minister.

### ***Incidental catch ratio***

The management strategy provides for the use of a level of incidental catch to be controlled by a ratio of incidental species relative to the weight of target species. This system is to be developed by December 2003.

## **d) Port Jackson**

### **i) Species**

The target species is the eastern king prawn *Penaeus plebejus* (see Table 3) and some byproduct species are also caught (see Table 4), but under this management strategy only certain quantities of byproduct species can be landed annually (see Table 13).

### **ii) Landings levels and value**

Annual total reported landings have remained stable whilst the value of the fishery has increased because of higher prawn prices (see Table 30). Value has averaged \$0.11 million over the past three years. Patterns in the reported landings and value of individual species in the catch of the fishery in Port Jackson can be found in NSW Fisheries (2002).

**Table 30.** Weight (kg) and value (\$) of the reported landings of catch for the Estuary Prawn Trawl Fishery on Port Jackson in 1998-99, 1999-2000 and 2000-2001.

Common Name	1998-1999		1999-2000		2000-2001	
	Weight (kg)	Value (\$)	Weight (kg)	Value (\$)	Weight (kg)	Value (\$)
Eastern king	3,340	64,987	2,470	50,951	4,134	88,328
School	250	2,218	653	4,102	2,936	21,211
Greasyback	191	1,251	142	695	578	854
Tiger	73	1,000	17	266		
Blue swimmer crab	725	4,541	702	4,769	244	1,851
Mud crab					32	411
Squid	346	877	1,012	1,751	1,537	3,164
Octopus	167	666	474	2,964	71	350
Other invertebrates					205	741
Finfish	6,207	20,923	11,903	35,994	6,029	19,286
<b>Total</b>	<b>11,299</b>	<b>96,463</b>	<b>17,373</b>	<b>101,492</b>	<b>15,766</b>	<b>136,196</b>

NOTE: Values were calculated using the average price provided by industry members on the Estuary Prawn Trawl MAC. Values not marked with a \* were calculated using the average monthly price paid for the species at auction at the Sydney Fish Market.

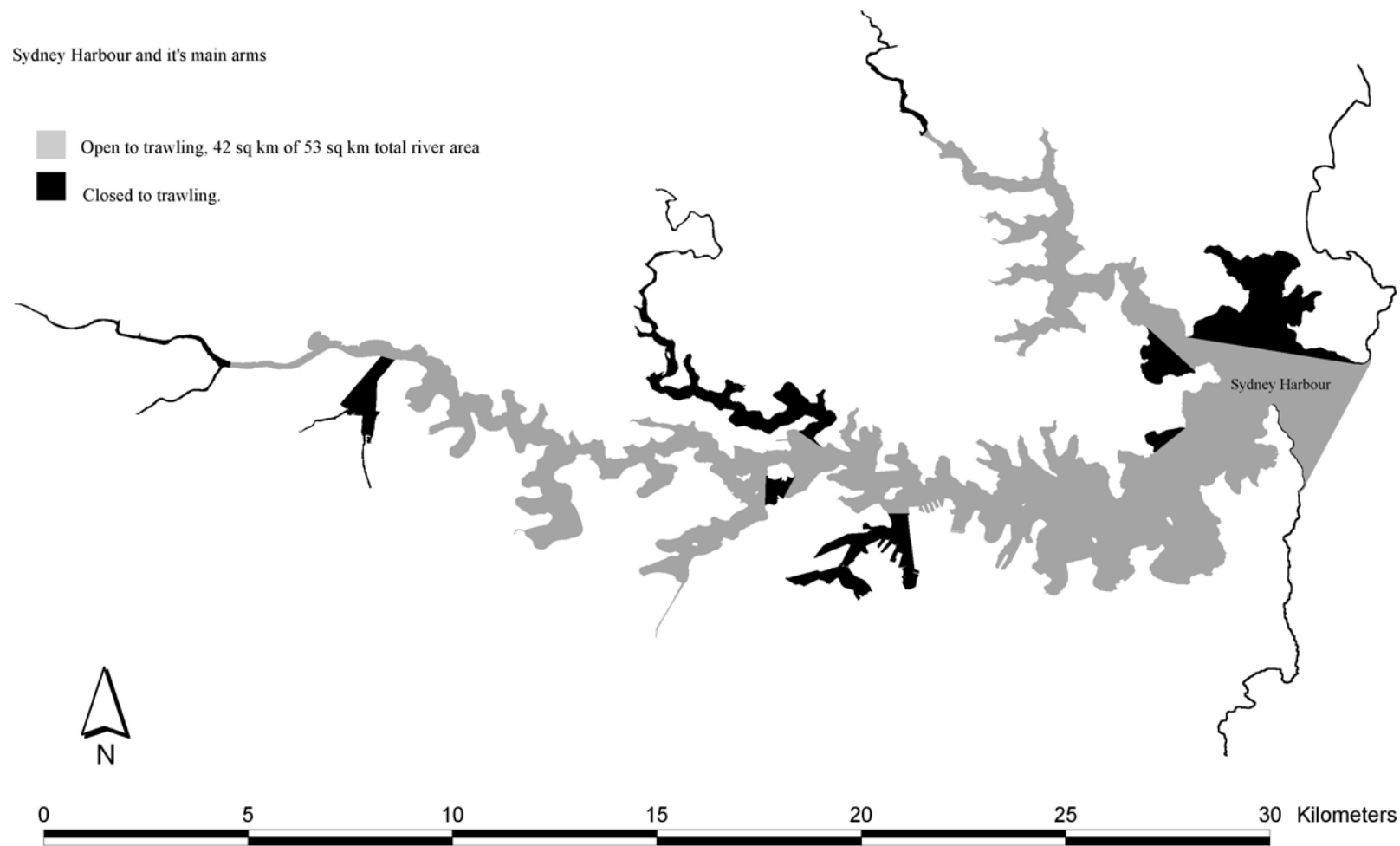
## ii) Area of operation

Trawling for prawns is permitted throughout Port Jackson but Manly Cove and Lane Cove River are closed to trawling together with parts of Middle Harbour (see Figure 10). Table A8 in Appendix 3 lists closures within these boundaries.



### Port Jackson

Sydney Harbour and it's main arms



**Figure 10** Areas of operation of the Estuary Prawn Trawl Fishery in Port Jackson.





### iii) Management controls specific to Port Jackson

#### *Limited entry*

Restrictions on the number of entitlements to operate in Port Jackson will apply under the management strategy. No additional entitlements will be issued, and any new entitlements will only be issued if they are replacing existing entitlements.

#### *Boat replacement policy*

Vessels 5.8 metres and less may be replaced with boats up to 5.8 metres in length. Boats that are greater than 5.8 metres in length may only be replaced with boats that are no more than 10% or one metre greater in length, whichever is lesser. The 10% tolerance continues to relate to the original boat length to avoid a progressive increase in length over time.

The following restrictions also apply upon any engine replacement:

- (1) boats with engines rated under 60 kW may replace the existing engine with one rated up to a maximum of 60 kW
- (2) boats with engines rated over 60 kW are restricted to a maximum 10% increase in power. In the case that a vessel with an engine rated over 60 kW needs to have its engine replaced a second time at some stage in the future the original engine rating shall apply.

\*Note: An example of this would be a boat with an engine rated at 100kw may replace it with an engine up to 110kw in the first instance but should subsequent engine replacements be required the maximum rating allowed will remain at 110kw.

#### *Fishing gear*

Table 7 outlines the restrictions placed upon the design of the otter trawl net and Appendix 1 provides the regulations specifying the prawn trawl net. Fishers are limited to no more than two nets each of a headrope length of 11 metres. Although permitted to tow two nets, fishers tow only one net.

**Table 31.** Times when prawn trawling will be permitted in Port Jackson.

(The following table is a summary of the closures to prawn trawling and is to be used as a guide only. The local fisheries officer should be consulted for the most recent closure notices as these are frequently modified).

Area	Periods in which trawling may occur
The waters of Port Jackson together with all its rivers, bays and tributaries which are not closed to netting under any other schedule or Notification.	<ol style="list-style-type: none"> <li>1. From 5 p.m. Mondays to Thursdays (inclusive) to 9 a.m. the following day, and from 5pm Friday to midnight Friday in each week in the period between 5pm Monday 21 October 2002 and midnight Thursday 17 April 2003, excluding public holidays.</li> <li>2. From 5 p.m. Mondays to Thursdays (inclusive) to 9 a.m. the following day, and from 5pm to midnight Friday in each week, excluding public holidays, in a period as determined by the District Fisheries Officer, Sydney North, as detailed in the conditions of this Schedule.</li> </ol>

Note: Contingent upon discussions with the EPT MAC it may be that periodic closures occur throughout the season when incidental catch ratios or the count of prawns exceeds agreed to levels.

### ***Time and area closures***

The fishery is restricted to waters of Port Jackson, Middle Harbour and the Parramatta River, with several closures in place within this area (see Table A8 Appendix 3).

Trawling is permitted from November to Easter each year with provisions for an earlier opening to the season during October and/or a later finish to the season in April if a catch rate criterion is met. Table 31 and Table A8 in Appendix 3 outlines the time closures that occur.

### ***Limits on landings***

Table 13 sets out the quantities of byproduct species that may be landed. Section 9 lists trigger points and allowable commercial landings levels for target and byproduct species for the fishery in this estuary. The upper landings level for the commercial catch of each of these species has been determined using the upper trigger point range and recorded landings.

### ***Counts on prawns***

The Juvenile Prawn Summit Working Group has recommended to the Minister for Fisheries that maximum counts for school and eastern king prawns taken for sale be implemented. These counts are currently under discussion by the working group and once consensus is reached the Minister will be advised of its recommendations. These will be implemented once approved by the Minister.

### ***Incidental catch ratio***

The management strategy provides for the use of a level of incidental catch to be controlled by a ratio of incidental species relative to the weight of target species. This system is to be developed by December 2003.

## REFERENCES

Articles that have not been externally peer reviewed are denoted \*

- Bell, J.D. and Pollard, D.A. (1989). Ecology of fish assemblages and fisheries associated with seagrasses. In: *Biology of Seagrasses* (eds. Larkum, A.W.D., McComb, A.J. and Shepherd, S.A.) pp. 565-609. Elsevier, Amsterdam.
- Broadhurst, M.K. and Kennelly, S.J. (1994). Reducing the by-catch of juvenile fish (mulloway *Argyrosomus hololepidotus*) using square-mesh panels in codends in the Hawkesbury River prawn-trawl fishery, Australia. *Fisheries Research* **19**, 321-331.
- Broadhurst, M.K. and Kennelly, S.J. (1995). A trouser-trawl experiment to assess codends that exclude juvenile mulloway (*Argyrosomus hololepidotus*) in the Hawkesbury River prawn-trawl fishery. *Marine and Freshwater Research* **46**, 953-958.
- Broadhurst, M. K. and Kennelly, S. J. (1996). Rigid and flexible separator panels in trawls that reduce the by-catch of the small fish in the Clarence River prawn-trawl fishery, Australia. *Marine and Freshwater Research* **47**, 991-998.
- Broadhurst, M.K., Kennelly, S.J. and Isaken, B. (1996). Assessments of modified codends that reduce the by-catch of fish in two estuarine prawn-trawl fisheries in New South Wales, Australia. *Fisheries Research* **27**, 89-111.
- Broadhurst, M.K., Kennelly, S.J., Watson, J.W. and Workman, I.K. (1997). Evaluations of the Nordmore grid and secondary bycatch-reducing devices (BRD's) in the Hunter River prawn-trawl fishery, Australia. *Fishery Bulletin* **95(2)**, 209-218.
- Coles, R.G. and Greenwood, J.G. (1983). Seasonal movement and size distribution of three commercially important Australian prawn species (Crustacea: Penaeidae) within an estuarine system. *Australian Journal of Marine and Freshwater Research* **34**, 727-743.
- Courtney, A. J., Montgomery, S. S., Die, D. J., Andrew, N. L., Cosgrove, M. G. and Blount, C. (1995). Maturation in the female eastern king prawn *Penaeus Plebjus* from coastal waters of eastern Australia, and considerations for quantifying egg production in penaeid prawns. *Marine Biology* **122**: 547-556.
- Ferrell, D.J. and Bell, J.D. (1991). Differences among assemblages of fish associated with *Zostera capricorni* and bare sand over a large spatial scale. *Marine Ecology Progress Series* **72**, 15-24.
- Fletcher, W. and McVea, T. (eds) (2000). NSW Fisheries 1998/99 Status of Fisheries Resources. NSW Fisheries Research Institute. 219 pp.
- Glaister, J.P. (1977). Ecological Studies of *Metapenaeus macleayi* (Crustacean, Decapoda, Penaeidae) in the Clarence River Region, Northern New South Wales. MSc Thesis, University of New England. 80 pp.
- Glaister, J.P. (1978a). Impact of river discharge on distribution and production of the school prawn *Metapenaeus macleayi* (Haswell) (Crustacea: Penaeidae) in the Clarence River region, northern New South Wales. *Australian Journal of Marine and Freshwater Research* **29**, 311-323.

- Glaister, J.P. (1978b). Movement and growth of tagged school prawns *Metapenaeus macleayi* (Haswell)(Crustacea:Penaeidae) in the Clarence River region, northern New South Wales. *Australian Journal of Marine and Freshwater Research* **29**, 645-657.
- Glaister, J. P. (1983). Dynamics of the Eastern Australian King Prawn Population. PhD Thesis, University of NSW. 208pp.
- Glaister, J.P., Montgomery, S.S. and McDonnall, V.C. (1990). Yield-per-recruit analysis of eastern king prawns *Penaeus plebejus* Hess, in eastern Australia. *Australian Journal of Marine and Freshwater Research* **41(1)**, 175-197.
- Gordon, G.N.G., Andrew, A.L. and Montgomery, S.S. (1995). A deterministic compartmentalised model for the eastern king prawn, *Penaeus plebejus* (Hess). *Australian Journal of Marine and Freshwater Research* **46**, 793-807.
- Gray, C.A. and McDonall, V.C. (1993). Distribution and growth of juvenile mullocky, *Argyrosomus hololepidotus* (Pisces: Scianidae), in the Hawkesbury River, south-eastern Australia. *Australian Journal of Marine and Freshwater Research* **44(3)**, 401-409.
- Gray, C.A., McDonall, V.C. and Reid, D.D. (1996). By-catch from prawn trawling in the Hawkesbury River, New South Wales: species composition, distribution and abundance. *Australian Journal of Freshwater Research* **41**, 13-26.
- Gray, C.A., McElligott, D.J. and Chick, R.C. (1996). Intra- and inter-estuary difference in assemblages of fishes associated with shallow seagrass and bare sand. *Journal of Marine and Freshwater Research* **47**, 723-735.
- Hall, S.J. (1999). *The Effects of Fishing on Marine Ecosystems and Communities*. Blackwell Science Ltd. Carlton, Victoria. 274 pp.
- Hilborn, R. and Walters, C.J. (1992). *Quantitative Fisheries Stock Assessment: Choice, Dynamics and Uncertainty*. Chapman and Hall, New York. 563 pp.
- Kailola, P. J., Williams, M. J., Stewart, P. C., Reichelt, R. E., McNee, A. and Grieve, C. (1993). *Australian Fisheries Resources*. Bureau of Resource Sciences and the Fisheries Research and Development Corporation. Commonwealth of Australia. 422 pp. (and references contained therein).
- Kaiser, M.J. and de Groot S.J. (2000). *The Effects of Fishing on Non-target Species and Habitats: Biological, Conservation and Socio-economic Issues*. The European Commission Fisheries, Agriculture and Agroindustrial Research Program (FAIR). 399 pp.
- Liggins, G.W. and Kennelly, S.J. (1996). By-catch from prawn trawling in the Clarence River estuary, New South Wales, Australia. *Fisheries Research* **25**, 347-367.
- Liggins, G.W., Kennelly, S.J. and Broadhurst, M.K., (1996). Observer-based survey of by-catch from prawn trawling in Botany Bay and Port Jackson, New South Wales. *Marine Freshwater Research* **47**, 877-888.
- \*McDonall, V.C. and Thorogood C.A. (1988). The Hawkesbury River. **In:** *A Summary of the Research Conducted on Estuarine Prawn Trawl Fisheries in New South Wales and Recommendations for their Future Management*. (eds. Montgomery, S.S. and McDonall, V.C.) pp. 88-106. NSW Fisheries.
- \*Marine Parks Authority (2000). Draft Framework for Establishing a System of Marine Protected Areas in NSW. NSW Fisheries and National Parks and Wildlife Service, June 2000. 64 pp.

- \*Montgomery, S.S. (1993). Preliminary stock assessment of *P. plebejus* in waters off New South Wales. *NSW Fisheries Research Institute Internal Report* **51**, 58pp.
- \*Montgomery, S.S. (2000). Status of eastern king and school prawn stocks. **In:** *Proceedings of Juvenile Prawn Summit June 26-27*. NSW Fisheries Publication. Sydney. pp. 28-47.
- \*Montgomery, S.S. and Reid, D.D. (1995). Assessment of Recreational Fishing of Prawn Stocks on the Commercial Fishery for Prawns off New South Wales. Final report to the Fisheries Research and Development Corporation. Project 91/88. NSW Fisheries, Sydney.
- \*Montgomery, S.S. and McDonall, V.C. (1988). A Summary of Research Conducted on Estuarine Prawn Trawl Fisheries in New South Wales and Recommendations for their Future Management. Fisheries Research Institute Internal Report, **46**, 177 pp.
- \*NSW Fisheries (1996). Licencing Policy. NSW Fisheries, Sydney. November, 1996.
- \*NSW Fisheries (2001a). Status of Fisheries Resources 2000. Internal report. Cronulla Fisheries Centre, Sydney. 306 pp.
- \*NSW Fisheries (2002). Charter Boat Monitoring Program Database. Cronulla Fisheries Centre, Sydney.
- \*NSW Fisheries (2002). Environmental Impact Statement on the Estuary Prawn Trawl Fishery. NSW Fisheries, Sydney, Vol 3 218 pp.
- \*NSW Fisheries. Pilot Data. (Unpublished).
- \*Racek, A.A., (1959). Prawn investigations in eastern Australia. *Research Bulletin State Fisheries, New South Wales* **6**, 1-57.
- \*Ruello, N.V. (1969). Hunter region prawn fishery. *Fisherman* **3(5)**, 20-24.
- \*Ruello, N.V. (1971). Some Aspects of the Ecology of the School Prawn *Metapenaeus macleayi* in the Hunter region of New South Wales. MSc Thesis, University of Sydney. 145 pp.
- Ruello, N.V. (1973a). Burrowing, feeding and spatial distribution of the school prawn *Metapenaeus macleayi* (Haswell) in the Hunter River region, Australia. *Journal of Experimental Marine Biology and Ecology* **13**, 189-206.
- Ruello, N.V. (1973b). Influence of rainfall on the distribution and abundance of the school prawn *Metapenaeus macleayi* (Haswell) in the Hunter River region, Australia. *Marine Biology* **23**, 221-228.
- Ruello, N.V. (1977). Migration and stock studies on the Australian school prawn *Metapenaeus macleayi*. *Marine Biology* **41**, 185-190.
- \*Tanner, M. and Liggins, G.W. (2000). New South Wales Commercial Fisheries Statistics 1998/99. Fisheries Centre Cronulla. 21 pp.
- \*West, R.J., Thorogood, C., Walford, T. and Williams, R.J. (1985). An estuarine inventory for New South Wales, Australia. Fisheries Bulletin 2. Department of Agriculture New South Wales, Division of Fisheries, Sydney. 140 pp.
- Williams, R.J., Watford, F.A., Taylor, M.A. and Button, M.L. (1998). New South Wales Coastal Aquatic Estate. *Wetlands (Australia)* **18**, 25-48.

- Young, P.C. and Carpenter, S.M. (1977). Recruitment of postlarval Penaeid prawns to nursery areas in Moreton Bay, Queensland. *Australian Journal of Marine and Freshwater Research* **28**, 754-773.
- Young, P.C. (1981). Temporal changes in the vagile epibenthic fauna of two seagrass meadows (*Zostera capricorni* and *Posidonia australis*). *Marine Ecology Progress Series* **5**, 91-102

## APPENDIX 1. Net Regulations

### 38 Otter trawl net (prawns)

(1) It is lawful to use an otter trawl net for taking prawns in the waters specified in the Table to this clause if the net complies with the description as set out in relation to those waters in that Table and the following conditions are complied with:

- (a) the net is used only by the method of trawling,
- (b) not more than 2 nets are used at any one time in the Hawkesbury River downstream from a line drawn between Juno Point and Eleanor Bluff, Clarence River, Port Jackson, Jervis Bay or Coffs Harbour,
- (c) not more than 1 net is used at any one time in the Hunter River or in the Hawkesbury River upstream from a line drawn between Juno Point and Eleanor Bluff to the ferry crossing at Lower Portland,
- (d) no string, rope, wire, cord, netting or other material is fixed to any meshes that are within 25 meshes of the draw or closing string of the cod-end of the net,
- (e) the net is not used in the estuary prawn trawl restricted fishery at either of the following times:
  - (i) between midnight on any Friday and midnight on the immediately following Sunday,
  - (ii) between midnight on a day immediately preceding a public holiday and midnight on the public holiday.

(2) Despite subclause (1) (d), an otter trawl net may have attached to it any of the following:

- (a) a draw or closing string at the end of the cod-end,
- (b) a frill of netting material, if the frill is not attached more than 5 meshes from the last row of meshes of the cod-end,
- (c) a chafing piece, in accordance with clause 56 (2).

(3) It is also lawful to use an otter trawl net to take other fish which are taken by the net when it is being lawfully used for taking prawns if:

- (a) the fish are not a prohibited size class of fish and are not of a species the taking of which is prohibited, or
- (b) the fish are a prohibited size class of fish (other than abalone or crustaceans), are not of a prohibited size and are taken in waters north of a line drawn due east from the lighthouse situated at Smoky Cape (excluding inland waters, the Clarence River and Lake Woollooweyah), or
- (c) the fish are a prohibited size class of fish (being crustaceans other than rock lobster) and are not of a prohibited size.

(4) For the purposes of this Regulation or any other instrument under the Act, a net described in this clause may be referred to as an otter trawl net (prawns).

### Table Otter trawl net (prawns)

(a) *Waters*—Port Jackson, Hawkesbury River, Hunter River and all ocean waters.

(b) *Description of net*—Total length not exceeding 11 metres (except in respect of a net used in ocean waters, in which case the total length of the net is not to exceed 33 metres or, if a maximum length for otter trawl nets (prawns) is specified in the boat licence for the boat from which the net is used, the length so specified); mesh of cod-end (or portion of the net capable of being used as a cod-end) not less than 40 mm nor more than 50 mm; mesh of net (other than cod-end or the portion of the net capable of being used as a cod-end) not less than 40 mm nor more than 60 mm; length of sweep attached to net (being the distance between the point of attachment to the otter boards and the net) not exceeding 5 metres or the distance from the trawl gallows to the stern of the boat (whichever is the greater); sweep to be secured to the net and the otter board so that it cannot exceed 5 metres in length or the distance from the trawl gallows to the stern of the boat (whichever is the greater).

(a) *Waters*—Clarence River and Lake Woollooweyah.

(b) *Description of net*—Total length of net (when towed as single gear) not exceeding 11 metres, total length of either net (when towed as twin gear) not exceeding 7.5 metres; mesh of cod-end (or portion of the net capable of being used as a cod-end) not less than 40 mm nor more than 50 mm; mesh of net (other than cod-end or the portion of the net capable of being used as a cod-end) not less than 40 mm nor more than 60 mm; length of sweep attached to net (being the distance between the point of attachment to the otter boards and the net) not exceeding 5 metres or the distance from the trawl gallows to the stern of the boat (whichever is the greater); sweep to be secured to the net and the otter board so that it cannot exceed 5 metres in length or the distance from the trawl gallows to the stern of the boat (whichever is the greater).

## 48. Hand-hauled prawn net

(1) It is lawful to use a hand-hauled net for taking prawns in the waters specified in the Table to this clause if the net complies with the description as set out in relation to those waters in that Table and the following conditions are complied with:

- (a) The net is not staked or set, or joined or placed together with any other net
- (b) The net is continuously and manually propelled and not used as a stationary net
- (c) The net is not attached to a hauling line.

(2) It is also lawful to use a hand-hauled net to take other fish (other than a prohibited size class of fish) that are taken by the net when it is being lawfully used for taking prawns.

(3) For the purposes of this Regulation or any other instrument under the Act, a net described in this clause may be referred to as a hand-hauled prawn net.

### Hand-hauled prawn net.

- (a) Waters - Any waters (other than inland waters).
- (b) Description of net - Total length not exceeding six metres; mesh throughout not less than 30 mm nor more than 36 mm.



#### **49. Push or scissors net (prawns)**

- (1) It is lawful to use a push or scissors net for taking prawns in the waters specified in the Table to this clause if the net complies with the description as set out in relation to those waters in that Table and the following conditions are complied with:
  - (a) The net is used only as a hand implement and is not staked or set, or joined or placed together with any other net
  - (b) The net is continuously propelled and not used as a stationary net
  - (c) The net is operated only by 1 person without assistance from any other person
  - (d) Only 1 net is used by a person at any one time.
- (2) It is also lawful to use a push or scissors net to take other fish (other than a prohibited size class of fish) that are taken by the net when it is being lawfully used for taking prawns.
- (3) For the purposes of this Regulation or any other instrument under the Act, a net described in this clause may be referred to as a push or scissors net (prawns).

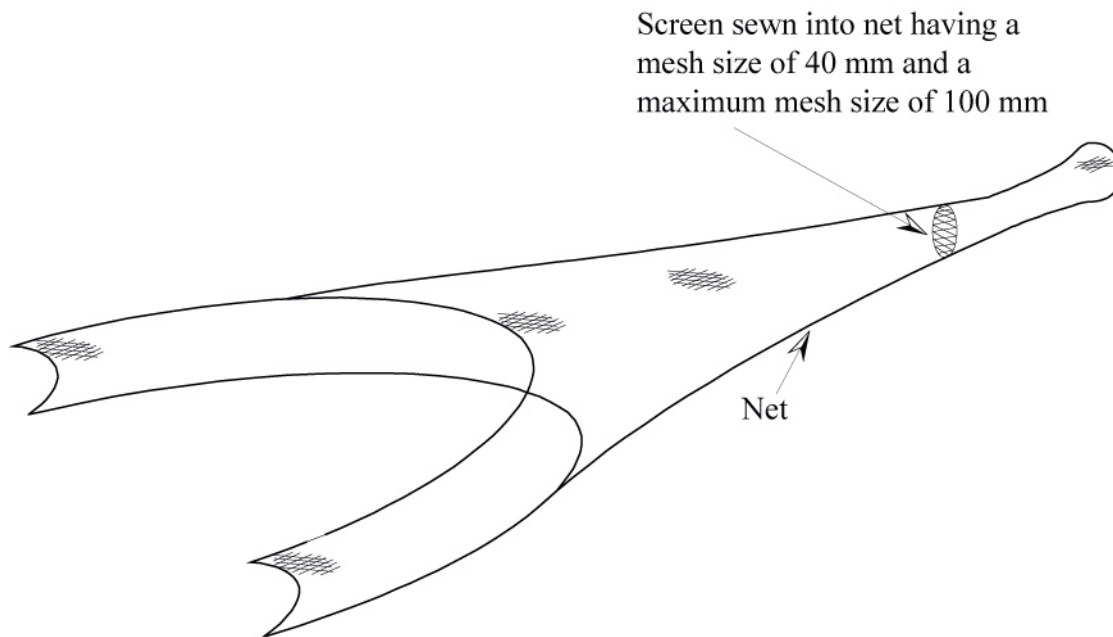
##### **Push or scissors net (prawns).**

- (a) Waters - Any waters (other than inland waters).
- (b) Description of net - Net attached to a scissors-type frame; length of lead or bottom line between the lower extremities of the poles not exceeding 2.75 metres; mesh not less than 30 mm nor more than 36 mm.

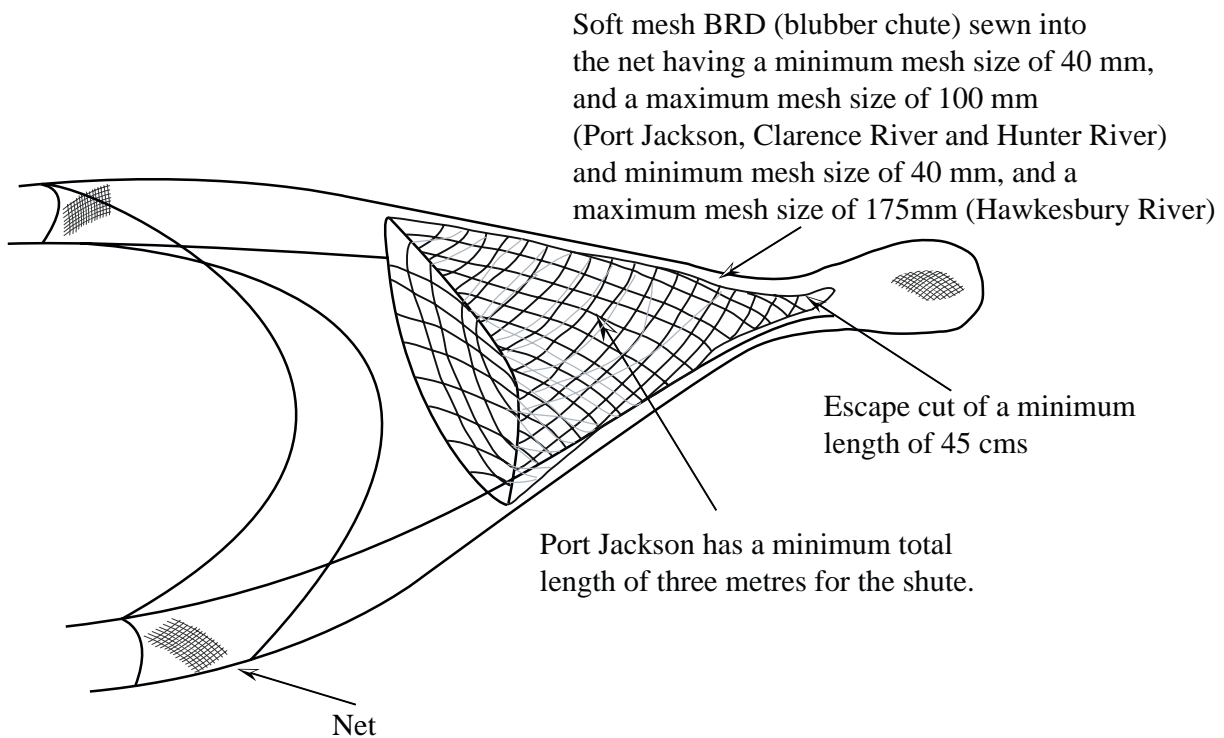
#### **50. Dip or scoop net (prawns)**

- (1) It is lawful to use a dip or scoop net for taking prawns in the waters specified in the Table to this clause if the net complies with the description as set out in relation to those waters in that Table and the following conditions are complied with:
  - (a) The net is used as a hand implement only and not staked or set, or joined or placed together with any other net
  - (b) Only 1 net is used by a person at any one time.
- (2) It is also lawful to use a dip or scoop net to take other fish that are taken by the net when it is being lawfully used for taking prawns.
- (3) For the purposes of this Regulation or any other instrument under the Act, a net described in this clause may be referred to as a dip or scoop net (prawns).

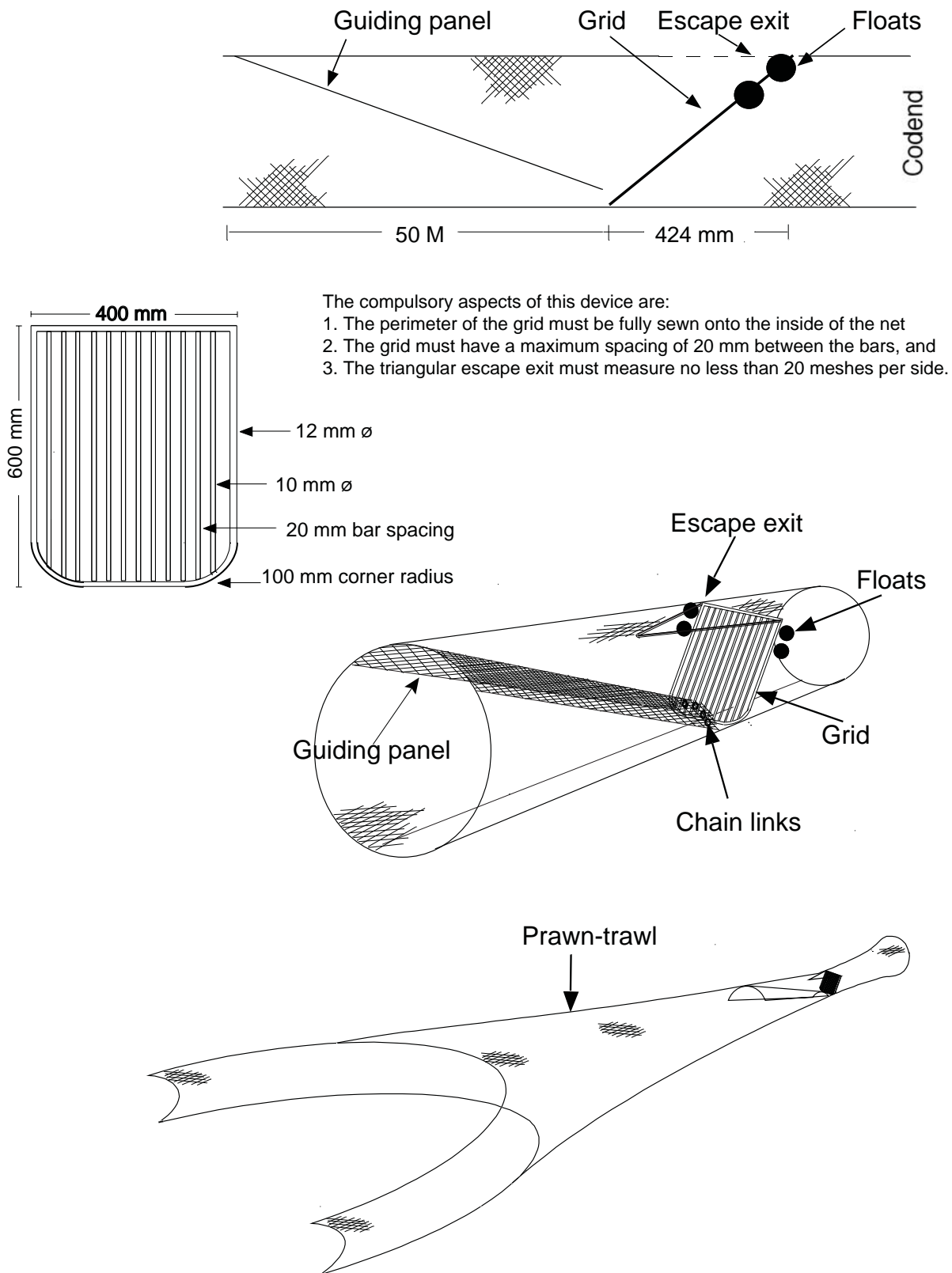
## APPENDIX 2. Descriptions of Bycatch Reduction Devices



**Figure A1.** Port Jackson Screen



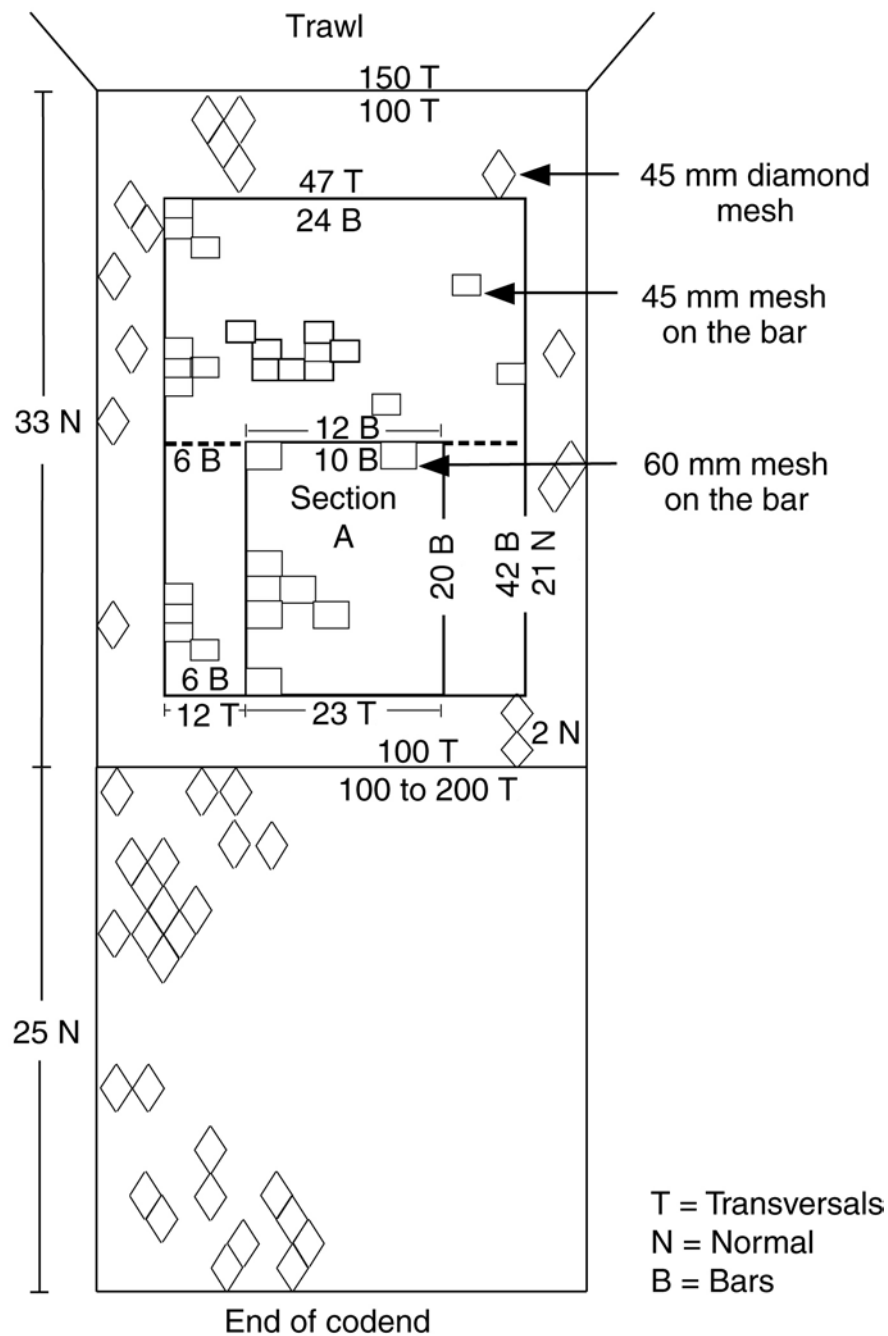
**Figure A2.** Softmesh BRD (blubber chute)



The compulsory aspects of this device are:

1. The perimeter of the grid must be fully sewn onto the inside of the net
2. The grid must have a maximum spacing of 20 mm between the bars, and
3. The triangular escape exit must measure no less than 20 meshes per side.

**Figure A3.** Nordmore Grid

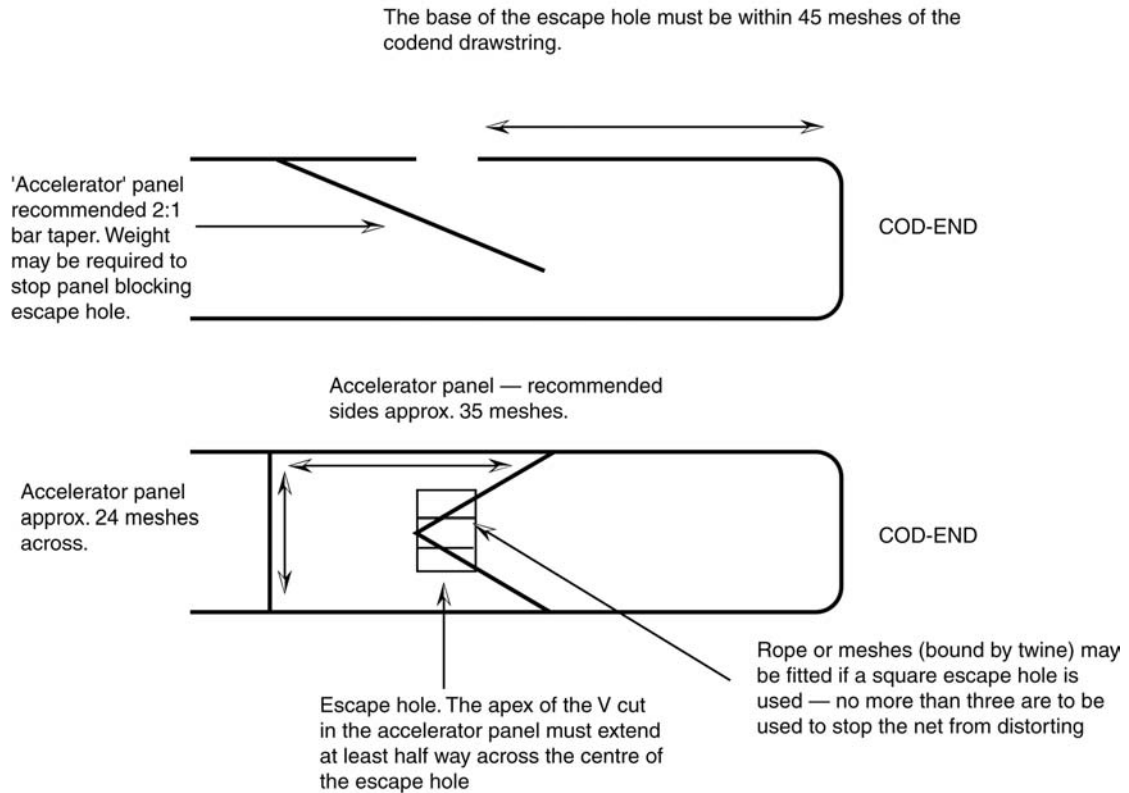


The compulsory aspects of this device are:

1. The panel is sewn into the top of the codend, with its base a maximum length of 37 meshes from the codend drawstring
2. The dimensions of the main square mesh panel (section A) must be a minimum of 60 cm by 30 cm wide

**Figure A4.** Square Mesh Panel

## The 'Quality Clarence Panel' BRD



The escape hole may be either a square or a diamond shape.

If using a square escape hole, the hole must be a minimum of 15 meshes across and a minimum of 5 meshes up the net.

If using a diamond shaped escape hole, each side of the diamond must be at least 10 bars long. It is recommended that the diamond is cut out of a separate panel of net (approx. 15 meshes across and 11 meshes long) that is then sewn into the net. It is also recommended that 2 points on the net are sewn to each point on the panel to prevent the escape hole from closing.

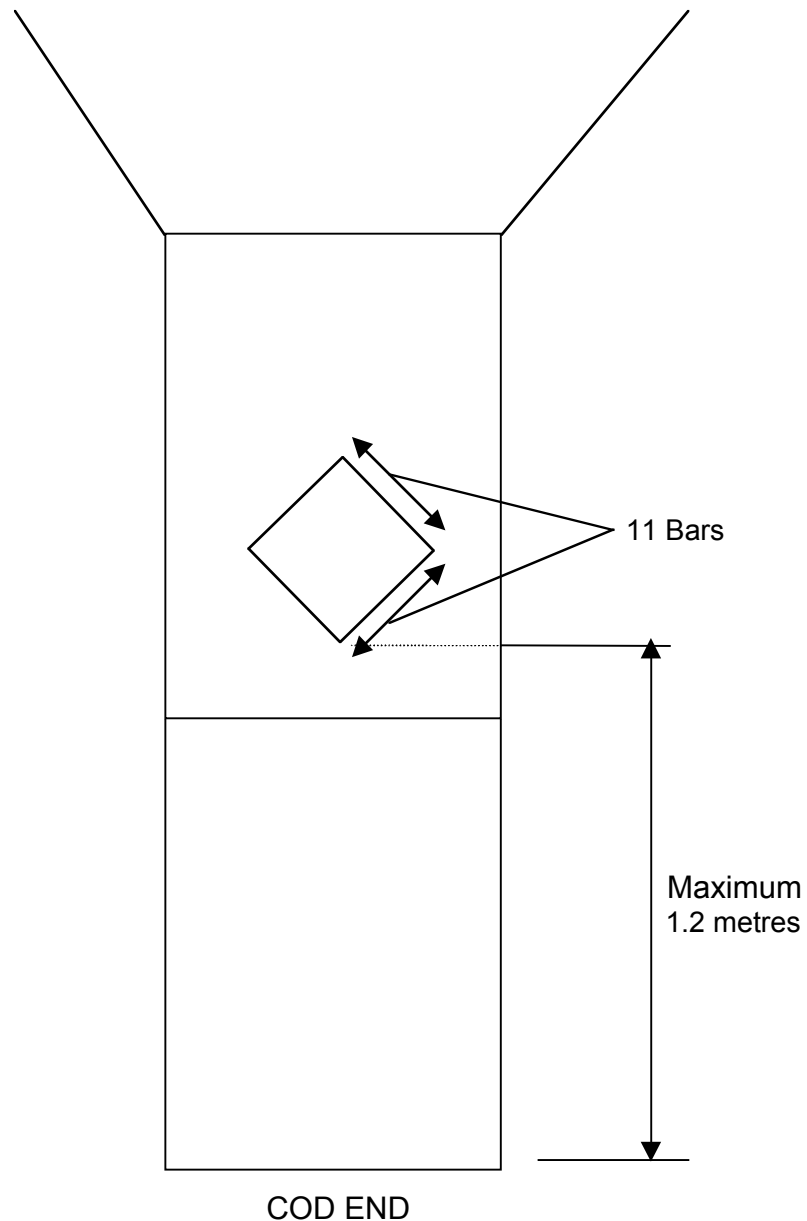
A rigid frame may be fitted around the escape hole (i.e. diamond or square).

**Figure A5.** Quality Clarence Panel BRD

## 'DIAMOND' BYCATCH REDUCTION DEVICE

**Compulsory aspect of the Diamond BRD:**

1. Each side of the diamond must be a minimum of 11 bars long.
2. The diamond escape hole must not be covered by netting or otherwise be obstructed.
3. The base of the diamond must be within 1.2m of the cod-end drawstring.

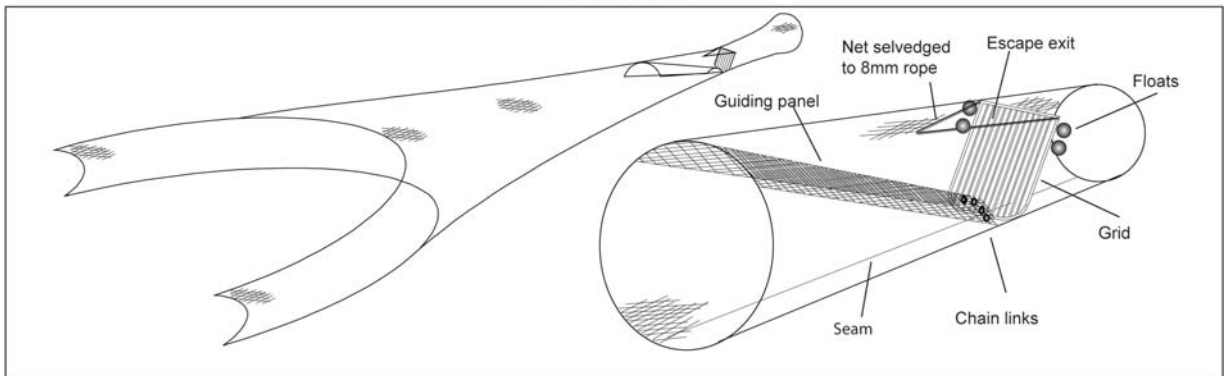


STEVE DUNN  
Director of Fisheries

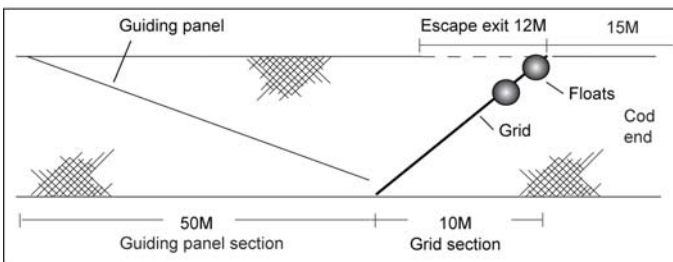
Figure A6. Diamond BRD

Modified Nordmore Grid

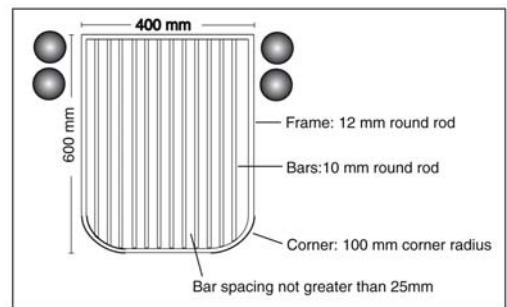
Clarence River



Assembled Nordmore grid



Side view



Aluminium grid dimensions and float position

The compulsory aspects of this device are:

1. The perimeter of the grid must be fully sewn onto the inside of the net
2. The grid must have a maximum spacing of 25 mm between the bars, and
3. The escape exit must be;
  - a) a triangle of not less than 20 bars per side (base - 25 meshes across),
  - b) a single cut of not less than 25 meshes across the top of the net immediately forward of the uppermost edge of the grid.

Figure A7. Modified Nordmore Grid





## APPENDIX 3. Time and Area Closures in the estuary prawn trawl fishery

**Table A1.** Times when prawn trawling will be permitted in NSW estuaries

(The following table is a summary of the current closures to prawn trawling and is to be used as a guide only. The local fisheries officer should be consulted for the most recent closure notices as these are frequently modified).

Estuary	Periods when trawling is permitted
<b>Clarence</b>	From 8 a.m. to 6 p.m. on Monday, and 7 a.m. to 6 p.m. on each of the days Tuesday to Friday (inclusive), excluding public holidays, in each week from the Monday nearest to 1 December in each year (inclusive) to the Friday nearest to 31 May in each succeeding year.
<b>Lake Wooloweyah</b>	From 8 a.m. to 6 p.m. on Monday, and from 7 a.m. to 6 p.m. on each of the days Tuesday to Friday (inclusive), excluding public holidays, in each week from the first Tuesday on/or after 1 October in each year (inclusive) to the Friday nearest to 31 May in each succeeding year.
<b>Hunter</b>	Subdivisions 1 and 2 - from 6a.m. to 6p.m. weekdays only, during the period 2 December 2002 to 17 April 2003 (inclusive), excluding each public holiday. Subdivisions 3 to 7 - from 6a.m. to 6p.m. weekdays only, during the period 2 December 2002 to 30 May 2003 (inclusive), excluding each public holiday.
<b>Hawkesbury</b>	The waters of the Hawkesbury River upstream from a line drawn from the south-eastern corner of Middle Head to the north-eastern corner of West Head, to a line drawn across the river from the south-eastern most corner of Juno Point to the north-eastern most corner of Eleanor Bluff, and from that point to the north western most corner indicated by the Port Hand marker on Challenger Head. - From midnight Sunday to midnight Friday in each week, excluding public holidays.  The following waters of the Hawkesbury River and its tributaries: - upstream from a line drawn across the river from the south-eastern most corner of Juno point to the north-eastern most corner of Eleanor Bluff, to a line drawn from the most westerly point of Croppy Point to the most northerly point of Green Point; - upstream from the rail bridge at Brooklyn to the downstream vehicular ferry crossing at Wiseman's Ferry but excluding Berowra Creek, Marra Marra (or Mother Marr's) Creek and Coba Bay, together with their tributary creeks and bays upstream from the most southwesterly point of Morgan Point to the most southeasterly point of Murrion Point; - Mangrove Creek together with its tributary creeks and bays, upstream to Oyster Shell Road Bridge; and - Upstream of the Wiseman's Ferry vehicular ferry crossing, but excluding MacDonald River, Colo River (upstream of the West Portland Road bridge approximately 250 metres - From midnight Sunday to 6pm Friday in each week, excluding public holidays.
<b>Port Jackson</b>	1. From 5 p.m. Mondays to Thursdays (inclusive) to 9 a.m. the following day, and from 5pm Friday to midnight Friday in each week in the period between 5pm Monday 21 October 2002 and midnight Thursday 17 April 2003, excluding public holidays.

	2. From 5 p.m. Mondays to Thursdays (inclusive) to 9 a.m. the following day, and from 5pm to midnight Friday in each week, excluding public holidays, in a period as determined by the District Fisheries Officer, Sydney North, as detailed in the conditions of this Schedule.
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Note: Estuaries will be closed to trawling on weekends and public holidays. The times for these closures are to be discussed with the EPT MAC. Contingent upon discussions with the EPT MAC it may be that periodic closures occur throughout the season when incidental catch ratios or the count of prawns exceeds agreed to levels.

**Table A2** Clarence River Closure and Schedules

**FISHERIES MANAGEMENT ACT 1994**  
**Section 11 and Section 8 Notification - Fishing Closure**  
**Clarence River, its lakes, lagoons, inlets, channels, creeks and tributaries**  
County of Clarence

I, Edward Obeid, revoke the closure notification “Clarence River, its lakes, lagoons, inlets, channels, creeks and tributaries” published in Government Gazette Number 159 of 8 December 2000 and all amendments thereto.

I do now, by this notification, prohibit the taking of fish by the methods of fishing specified in Column 1 of Schedules 1 to 16 of this notification, from the waters shown opposite in Column 2, respectively, of those schedules, with the exception of schedules 7, 8B, 8C and 8D. Fishing will be further subject to the ‘conditions’ or ‘time periods’ as specified in, for, and with respect to, any schedule of this notification.

This notification will be in effect from 17 January 2003 to 7 December 2005, inclusive.

The word ‘Regulation’, where appearing in this notification, refers to the *Fisheries Management (General) Regulation 2002*.

**The Hon Edward Obeid OAM, MLC**  
**Minister for Mineral Resources**  
**Minister for Fisheries**

**Schedule 1**

Clarence River and the Broadwater - Mesh Netting

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
<p>By means of <b>meshing nets</b> (as prescribed by cl 41 of the Regulation), except by the following method:</p> <ol style="list-style-type: none"> <li>1) The net shall be shot in a ring or semi-circle from one or two boats.</li> <li>2) After the net has been set, drawing in of the net shall commence within 45 minutes.</li> <li>3) Fish shall be removed from the net during drawing in of the net.</li> <li>4) No more than two fishers shall operate the net. These fishers shall remain with the net throughout the operation.</li> </ol>	<p><b>Clarence River</b> - all waters including all bays, inlets, creeks and tributaries upstream of a line drawn across the River at its entrance between the eastern extremities of the northern and southern breakwaters, upward, to a line drawn across the River from the southern most extremity of Paddy’s Point south-easterly to the north-western corner of portion 166 at Taloumbi, together with Oyster Channel, Romiaka Channel, Micalo Channel and Palmer’s Channel.</p> <p><b>Clarence River (North Arm)</b> - all waters including all bays, inlets, creeks and tributaries upstream from its junction with the main Clarence River to a line drawn from the western point of entrance to the Esk southerly to the north western corner of portion 151 at Harwood, including Esk or Fresh Water River.</p> <p><b>The Broadwater</b> - the whole of the waters of the Broadwater area within the Clarence River, northwards from a line between a post marked FD1 on the foreshore of Emerald’s Point generally westerly to a post marked FD2 located on Neddy’s Point.</p>

**Schedule 2**

## Wooloweyah Estuary - Mesh Netting

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
By means of <b>meshing nets</b> (as prescribed by cl 41 of the Regulation), except by the following method: 1) The net shall be shot in a ring or semi-circle from one or two boats. 2) After the net has been set drawing in of the net shall commence within 45 minutes. 3) Fish shall be removed from the net during drawing in of the net. 4) No more than two fishers shall operate the net. These fishers shall remain with the net throughout the operation.	The whole of the waters of the Wooloweyah Estuary.
<b>Time period: This closure will only apply from 1 September each year to 31 May each ensuing year, all dates inclusive.</b>	

**Schedule 3**

## Orara River- Netting

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
By means of nets of every description, except the <b>landing net</b> , as prescribed by cl 53 of the Regulation.	The whole of the waters of the Orara River, its creeks, tributaries and inlets, upstream to its source from a line drawn across the river approximately 11km upstream from its junction with the Clarence River at a point known as Jacky's Creek.

**Schedule 4**

## Clarence River at Copmanhurst, Mitchell (Mann) River and Nymboida River - Netting

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
By means of nets of every description, except the <b>landing net</b> , as prescribed by cl 53 of the Regulation.	The whole of the waters of the Clarence River together with all its lakes, lagoons, inlets, channels, creeks and tributaries, upward to its source from a line drawn across the river at the power lines above the rapids approximately 0.5km from the township of Copmanhurst, including the Mitchell or Mann River and Nymboida River and their tributaries.

**Schedule 5**

## Yamba Bay and McKittrick's Channel -Trawl Nets

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
By means of <b>trawl nets</b> of every description, as prescribed by Regulation.	The whole of the waters of that part of the Clarence River being the whole of Yamba Bay and that part of McKittrick's Channel between the old viaduct to Freeburn Island and a line drawn from the eastern extremity of the Middle Training Wall to the Public Wharf at Yamba.

## Schedule 6 - Clarence River - Weekend Netting

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
By means of nets of every description, except the <b>dip</b> or <b>scoop net</b> , the <b>push</b> or <b>scissors net</b> , <b>hoop</b> or <b>lift net and hand hauled prawn nets</b> , when used for the capture of prawns only, and the <b>landing net</b> , as prescribed by Regulation, with the exception that fish may be taken by the method of fishing described in Column 1 of Schedule 7 of this Notification.	The whole of the waters of the Clarence River together with all its lakes, lagoons, inlets, channels, creeks and tributaries, upstream to its source from its confluence with the South Pacific Ocean.
<b>Time period:</b> This closure will only apply from 8 a.m. Saturday to 8 a.m. Monday in each week.	

Schedule 7

## Clarence River - Weekend Hauling

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
By means of <b>general purpose hauling nets</b> , as prescribed by cl 26 of the Regulation.	The whole of the waters of the Clarence River together with all its lakes, lagoons, inlets, channels, creeks and tributaries from its confluence with the South Pacific Ocean upwards to its source to a line from the western point of entrance to Palmer's Channel north-westerly to the northern point of Mororo Bridge in North Arm, but excluding the waters of Palmer's Channel and Wooloweyah Estuary.
<b>Time period:</b> This closure will only apply from 1 April to 31 August each year.	
<b>Condition:</b> This schedule permits hauling on weekends as an exception to Schedule 6 of this notification.	

Schedule 8 PART A

## Clarence River -Traps

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
By means of <b>traps</b> of every description, for the use of taking fish of every description with the exception that fish may be taken by the method of fishing described in Column 1 of Schedule 8 PART B, Schedule 8 PART C, and Schedule 8 PART D of this Notification.	The whole of the waters of the Clarence River together with all its lakes, lagoons, inlets, channels, creeks and tributaries from a line drawn across the entrance from the southern extremity of the Iluka training wall to the north-eastern extremity of the Yamba training wall upwards to its source.

**Schedule 8 PART B**

## Clarence River - Traps

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
Fish traps prescribed by cl 59 of the Regulation.	The whole of the waters of the Clarence River together with all its lakes, lagoons, inlets, channels, creeks and tributaries from a line drawn across the entrance from the southern extremity of the Iluka training wall to the north-eastern extremity of the Yamba training wall upwards to a line drawn south-westerly from the north-western extremity of Goodwood Island training wall to the south-western extremity of Freeburn Island, and produced to meet the south-western foreshore of Clarence River, but excluding the whole of Yamba Bay and that part of McKittrick's Channel between the old viaduct to Orogandiman or Freeburn Island and a line drawn from the eastern extremity of the Middle training wall to the Public Wharf at Yamba.
<b>Time period: This closure will only apply from 1 May to 31 August each year.</b>	

**Schedule 8 PART C**

## Clarence River -Eel Traps

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
<b>Eel traps</b> (as prescribed by cl 65 of the Regulation), no part of the trap shall be more than 5m from the shore irrespective of tidal position, such distance being measured horizontally, are permitted in the waters shown in Column 2 of this Schedule.	The whole of the waters of the Broadwater area of the Clarence River, and in all swamps, creeks and flood mitigation channels which feed into the River between its mouth and the Grafton Railway Bridge and the main part of the Clarence River and its tributaries (including the Orara River upstream to the Gwydir Highway Road Bridge) between the Ulmarra Ferry wire and the Copmanhurst power line, with the exception of that area between a line drawn due west from the southern extremity of Carrs Peninsula and a line drawn from the northern end of portion 28 at Ulmarra to the north eastern end of portion 44 at Great Marlow.

**Schedule 8 PART D**

## Clarence River -Crab Traps

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
<b>Crab traps</b> (as prescribed by cl 61 of the Regulation).	The whole of the waters of the Clarence River together with all its lakes, lagoons, inlets, channels, creeks and tributaries upward to the Old Ashby Ferry crossing at Maclean from its confluence with the South Pacific Ocean.

**Schedule 9**

## Clarence River -Prawn Hauling

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
By means of prawn hauling nets, as prescribed by the Regulation.	The whole of the waters of the Clarence River together with all its lakes, lagoons, inlets, channels, creeks and tributaries, upward to its source from its confluence with the South Pacific Ocean.

**Schedule 10**

## Clarence River -Estuarine Trawling Closure

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
By means of trawl nets of every description with the exception of the <b>otter trawl net</b> (prawns), fitted with a by-catch reduction device approved by the Director of Fisheries, as prescribed by cl 38 of the Regulation, operated from a licensed fishing boat such licence having an endorsement authorising the boat to operate, within the time period below.	The whole of the waters of the Clarence River together with all its lakes, lagoons, inlets, channels, creeks and tributaries, excluding the waters of the Wooloweyah Estuary together with its creeks and tributaries, from its junction with the South Pacific Ocean upwards to the Vehicular ferry crossing at Ulmarra, which are not closed to netting under any other Notification.
<b>Time period: From 8 a.m. to 6 p.m. on Monday, and 7 a.m. to 6 p.m. on each of the days Tuesday to Friday (inclusive), excluding public holidays, in each week from the Monday nearest to 1 December in each year (inclusive) to the Friday nearest to 31 May in each succeeding year.</b>	

**Schedule 11**

## Wooloweyah Estuary -Estuarine Trawling Closure

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
By means of trawl nets of every description with the exception of the otter trawl net (prawns), as prescribed by cl 38 of the Regulation, and fitted with a by-catch reduction device approved by the Director of Fisheries, operated from a licensed fishing boat such licence having an endorsement authorising the boat to operate, within the time period below.	The whole of the waters of the Wooloweyah Estuary.
<b>Time period: From 8 a.m. to 6 p.m. on Monday, and from 7 a.m. to 6 p.m. on each of the days Tuesday to Friday (inclusive), excluding public holidays, in each week from the first Tuesday on/or after 1 October in each year (inclusive) to the Friday nearest to 31 May in each succeeding year.</b>	

**Schedule 12**

## Oyster Channel -Estuarine Trawling Closure

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
The use of <b>trawl nets</b> of every description, or by the method of trawling by means of nets of every description for the use of taking fish and prawns.	The whole of the waters of the Oyster Channel from Yamba Road bridge upstream to its junction with the Wooloweyah Estuary determined by a line drawn from the eastern extremity of Joss Island to the eastern extremity of Corokos Island.

**Schedule 13**

## The Broadwater (Clarence River) -Estuarine Trawling Closure

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
The use of <b>trawl nets</b> of every description, or by the method of trawling by means of nets of every description for the use of taking fish and prawns.	The whole of the waters of the Broadwater area within the Clarence River, northwards from a line between a post marked FD1 on the foreshore of Emerald's Point generally westerly to a post marked FD2 located on Neddy's Point.

**Schedule 14**

## The Crystal Bay (Clarence River) - Net Closure

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
By means of nets of every description.	That piece of water known as Crystal Bay, south and east of a line drawn from the centre of the turning circle of Westringa Place to the northern most point of Witonga Drive.

**Schedule 15**

## The Sportsman's Creek (Clarence River) - Net Closure

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
By means of nets of every description.	The whole of the waters of that part of Sportsman's Creek together with its creeks, tributaries and inlets from the weir above Lawrence upwards to its source.

**Schedule 16**

## Set Mesh Net Closure

<i>Column 1</i> <b>Methods</b>	<i>Column 2</i> <b>Waters</b>
By means of <b>meshing nets</b> , except when such nets are used by the method of ' <b>splashing</b> ' (that is, shooting the net, splashing the water in the vicinity and retrieving the net as a continuous operation), as prescribed by cl 41 of the Regulation.	<ol style="list-style-type: none"> <li>1) All waters of the <b>Clarence River</b> and tributaries, upstream from the Koolkhan Power Station.</li> <li>2) The whole of the waters of <b>Sportsman's Creek down stream of the weir above Lawrence</b>, and the whole of the waters of <b>Shark Creek</b> and the <b>Esk River</b>.</li> <li>3) <b>Coldstream</b> All waters of the Coldstream River, upstream of the Tucabia road bridge.</li> </ol>
<b>Time period: This closure will only apply from 15 May to 31 August in each year.</b>	



**Table A3.** Hunter River Closure

**FISHERIES MANAGEMENT ACT 1994**  
**Section 8 Notification – Fishing Closure**  
**Hunter River Prawn Trawl Closure 2002/2003**

I, Edward Obeid, by this notification, prohibit the taking of prawns and fish by means of trawl nets of every description, and by the method of trawling by means of nets of every description, from all waters of the Hunter River together with all its creeks, tributaries and inlets, from its confluence with the South Pacific Ocean, upstream to its junction with the Williams River.

This prohibition does not extend to the taking of prawns and fish by a licensed commercial fisher exercising the authority of an endorsement to operate in the Estuary Prawn Trawl Restricted Fishery; operating from a licensed fishing boat which has a S4 (Hunter River) Prawn Trawl endorsement; and using an otter trawl net (prawns) fitted with a by-catch reduction device approved by the Director, NSW Fisheries; subject to the provisions of this notification.

**The Hon Edward Obeid OAM, MLC**  
**Minister for Mineral Resources**

**Minister for Fisheries**

Prawn trawling period:

In Subdivisions 1 and 2, from 6a.m. to 6p.m. weekdays only, during the period 2 December 2002 to 17 April 2003 (inclusive), excluding each public holiday.

In Subdivisions 3 to 7, from 6a.m. to 6p.m. weekdays only, during the period 2 December 2002 to 30 May 2003 (inclusive), excluding each public holiday.

A prawn trawling trial may be undertaken to establish an earlier commencement date for the prawn trawling period. The trial is to be undertaken in accordance with conditions approved by the Director, NSW Fisheries. The first trial shot will be on 8 November 2002. If the trial criteria is reached, the season will open on 11 November. If the trial criteria is not reached, the next trial shot will be on 15 November and if the trial criteria is reached, then the season will open on 18 November. Otherwise the period will commence on 2 December 2002.

### Conditions and Subdivisions

## Conditions for periodic closing and opening of prawn trawling between 2 December 2002 and 30 May 2003

A prawn trawling trial may be undertaken to establish the size of prawns available or the abundance of prohibited size class of fish by-catch. The trial is to be undertaken in a manner agreed between the District Fisheries Officer, Hunter, and the elected Management Advisory Committee (MAC) representative for the Hunter River.

The size of prawns is to be indirectly established by a random count of prawns from a vessel's unsorted catch, which shall be weighed and counted to establish the number of prawns per 500 grams. This process is hereafter referred to as 'the count'. For the purposes of this notification the count must be equal to or less than 150 prawns before a subdivision may be opened to prawn trawling.

Any subdivision may be closed by a Fisheries Officer where the count at any time is more than 150 prawns per 500g. Once a count of prawns has been completed, a further trial may not be undertaken for at least 7 days.

Where a subdivision is closed due to a prawn count, subdivisions upstream of that closure are also closed unless a trial is undertaken that meets the relevant criteria. Such further trials are only to be undertaken at the request of the elected MAC representative.

Subdivision 6 may be closed by a Fisheries Officer where the number of any prohibited size class of fish by-catch exceeds 50 fish per shot. Once a prohibited size class of fish by-catch has been completed, a further trial may not be undertaken for at least 3 days.

The opening of any subdivision shall be notified by a notice displayed in the Newcastle Fishermen's Co-operative, the NSW Fisheries Office at Newcastle and other prominent locations as agreed between the District Fisheries Officer and representatives of persons entitled to prawn trawl in the Hunter River. The closing of a subdivision shall be notified by a public notice in the Newcastle Herald newspaper and notices displayed in the Newcastle Fishermen's Co-operative and the NSW Fisheries Office at Newcastle.

A notice must provide the following information:

Date of trial and location of trial.

Prawn count details.

Prohibited size class of fish by-catch.

Area of closure.

Period of closure.

Proposed date and location of next trial.

A sub-divisional closure is to take effect immediately after the count has occurred, if there are more than 150 prawns per 500 grams.

### Subdivisions

For the purposes of this notification, the following subdivisions of the Hunter River may be closed and opened subject to the conditions of this notice.

#### *Subdivision 1*

The waters of the Hunter River downstream of it's junction with the Williams River to it's junction with Scotch Creek inclusive.

#### *Subdivision 2*

The waters of the Hunter River downstream of the junction of Scotch Creek to the Hexham road-bridge, inclusive.

#### *Subdivision 3*

The waters of the Hunter River (North Channel) downstream of the Hexham road-bridge to the junction with Mosquito Creek inclusive.

#### *Subdivision 4*

The waters of the Hunter River north channel and Mosquito Creek downstream to the Stockton road-bridge, inclusive, but excluding Fern Bay.

#### *Subdivision 5*

The waters of Fern Bay (Fullerton Cove) from a line at the southern end of Smiths Island and Sandy Island located at the deep northern channel of the Hunter River, inclusive.

#### *Subdivision 6*

The waters of the Hunter River (North Channel) downstream of the Stockton road-bridge to a line drawn south-westerly from the point of intersection of the south-westerly prolongation of the northwest side of Punt road, Stockton, with the high water mark to the most south-eastern point of the State dockyard Wharf. Also, the South Channel to the Tourle Street Bridge inclusive.

#### *Subdivision 7*

The waters of the Hunter River (South Channel) upstream of the Tourle Street Bridge, to the junction of the Hunter River (South Channel) and the Hunter River (North Channel) inclusive, at Hexham.

**Table A5.** Brisbane Water/Broken Bay Closure

**Hawkesbury River Prawn Trawling**  
**SCHEDULE 2, Fisheries Management (General) Regulation 2002**  
**Waters in which net and trap fishing are prohibited**  
**(Clause 18)**  
**Brisbane Water/Broken Bay**  
**Brisbane Water or any of its tributaries; Broken Bay north of a line drawn**  
**from Little Box Head to Green Point.**  
**FISHERIES MANAGEMENT ACT 1994**  
**Section 11 and Section 8 Notification - Fishing Closure**  
**General Estuarine Prawn Trawling Closure**  
**Hawkesbury River**

I, Edward Obeid, revoke the notification, and all amendments thereto, which prohibits the taking of fish and prawns by means of trawl nets of every description, and by the method of trawling by means of nets of every description, from all waters of the Hawkesbury River together with all its creeks, tributaries and inlets, from its confluence with the South Pacific Ocean, upstream to the vehicular ferry crossing at Lower Portland, as published in the New South Wales Government Gazette Number 109 of 10 October 1997.

I do now, by this notification, prohibit the taking of fish and prawns by means of trawl nets of every description, and by the method of trawling by means of nets of every description, from all waters of the Hawkesbury River together with all its creeks, tributaries and inlets, from its confluence with the South Pacific Ocean, upstream to the vehicular ferry crossing at Lower Portland.

Prawn trawling conditions:

This prohibition does not extend to the taking of fish (including prawns) by a licensed commercial fisher exercising the authority of an endorsement to operate in the Estuary Prawn Trawl Restricted Fishery, operating from a licensed fishing boat which has a S3 (Hawkesbury River) Prawn Trawl endorsement, and using an otter trawl net (prawns) in the waters described in schedule 1, subject to the provisions of this notification

This prohibition does not extend to the taking of fish (including prawns) by a licensed commercial fisher exercising the authority of an endorsement to operate in the Estuary Prawn Trawl Restricted Fishery, operating from a licensed fishing boat which has a S3 (Hawkesbury River) Prawn Trawl endorsement, and using an otter trawl net (prawns), fitted with a bycatch reduction device approved by the Director of Fisheries in the waters described in schedules 2 to 6, subject to the provisions of this notification

**The Hon Edward Obeid OAM, MLC**  
**Minister for Mineral Resources**  
**Minister for Fisheries**

**Table A6.** Hawkesbury River Closure Schedules

**FISHERIES MANAGEMENT ACT 1994**  
**Section 11 and Section 8 Notification - Fishing Closure**  
**General Estuarine Prawn Trawling Closure**  
Hawkesbury River

I, Edward Obeid, revoke the closure notification “General Estuarine Prawn Trawling Closure - Hawkesbury River” published in Government Gazette Number 141 of 27 October 2000 and all amendments thereto.

I do now, by this notification, prohibit the taking of fish and prawns by means of trawl nets of every description, and by the method of trawling by means of nets of every description, from all waters of the Hawkesbury River together with all its creeks, tributaries and inlets, from its confluence with the South Pacific Ocean, upstream to the vehicular ferry crossing at Lower Portland.

Prawn trawling conditions:

This prohibition does not extend to the taking of fish (including prawns) by a licensed commercial fisher exercising the authority of an endorsement to operate in the Estuary Prawn Trawl Restricted Fishery, operating from a licensed fishing boat which has a S3 (Hawkesbury River) Prawn Trawl endorsement using an otter trawl net (prawns), subject to the provisions of this notification including the following:

In the waters described in Schedule 1 the use of the net without a by-catch reduction device is permitted between sunrise and sunset if any prawns taken are returned immediately to the water alive.

In the waters described in Schedule 1 when the net is fitted with a by-catch reduction device approved by the Director of Fisheries.

In the waters described in Schedules 2, 3 and 4 when the net is fitted with a by-catch reduction device approved by the Director of Fisheries.

This notification will be in effect from 17 January 2003 to 26 October 2005, inclusive.

**The Hon Edward Obeid OAM, MLC**  
**Minister for Mineral Resources**  
**Minister for Fisheries**

**Schedule 1**

<b>Column 1</b> <i>Waters in which prawn trawling is permitted</i>	<b>Column 2</b> <i>Periods during which prawn trawling is permitted</i>
The waters of the Hawkesbury River upstream from a line drawn from the south-eastern corner of Middle Head to the north-eastern corner of West Head, to a line drawn across the river from the south-eastern most corner of Juno Point to the north-eastern most corner of Eleanor Bluff, and from that point to the north western most corner indicated by the Port Hand marker on Challenger Head.	From midnight Sunday to midnight Friday in each week, excluding public holidays.

**Schedule 2**

<b>Column 1</b> <i>Waters in which prawn trawling is permitted</i>	<b>Column 2</b> <i>Periods during which prawn trawling is permitted</i>
<p>The following waters of the Hawkesbury River and its tributaries:</p> <ul style="list-style-type: none"> <li>- upstream from a line drawn across the river from the south-eastern most corner of Juno point to the north-eastern most corner of Eleanor Bluff, to a line drawn from the most westerly point of Croppy Point to the most northerly point of Green Point;</li> <li>- upstream from the rail bridge at Brooklyn to the downstream vehicular ferry crossing at Wiseman's Ferry but excluding Berowra Creek, Marra Marra (or Mother Marr's) Creek and Coba Bay, together with their tributary creeks and bays upstream from the most southwesterly point of Morgan Point to the most southeasterly point of Murrone Point;</li> <li>- Mangrove Creek together with its tributary creeks and bays, upstream to Oyster Shell Road Bridge; and</li> <li>- upstream of the Wiseman's Ferry vehicular ferry crossing, but excluding MacDonal River, Colo River (upstream of the West Portland Road bridge approximately 250 metres from its junction with the Hawkesbury River), and Webbs Creek, and their tributaries, to the vehicular ferry crossing at Lower Portland.</li> </ul>	From midnight Sunday to 6pm Friday in each week, excluding public holidays.

**Schedule 3**

<b>Column 1</b> <i>Waters in which prawn trawling is permitted</i>	<b>Column 2</b> <i>Periods during which prawn trawling is permitted</i>
<p>The waters of Marra Marra (or Mother Marr's) Creek and Coba Bay, upstream from a line drawn from the most southeasterly point of Murron point to the most southwesterly point of Morgan Point and then to the northeastern point of entry to Coba Bay.</p>	<p>From sunrise to sunset in each of the days Monday to Thursday (inclusive), and from sunrise to 6pm Friday in each week, excluding public holidays.</p>

**Schedule 4**

<b>Column 1</b> <b>Waters in which prawn trawling is permitted</b>	<b>Column 2</b> <i>Periods during which prawn trawling is permitted</i>
<p>The waters of the Hawkesbury River upstream from its entrance to the South Pacific Ocean, to a line drawn from the south-eastern corner of Middle Head to the north-eastern corner of West Head, but excluding Pittwater, south of a line drawn from Shark (or Warners) Rock to the north-eastern corner of West Head.</p>	<p>From midnight Sunday to midnight Friday in each week, excluding public holidays.</p>

**Table A7** Port Jackson Closure Schedules

**FISHERIES MANAGEMENT ACT 1994**  
**Section 8 and 11 Notification - Fishing Closure**  
**General Estuarine Prawn Trawling Closure**  
Port Jackson

I, Edward Obeid, revoke the closure notification "General Estuarine Prawn Trawling Closure – Port Jackson" published in Government Gazette Number 172 of 11 October 2002.

I, do now by this notification prohibit the taking of fish and prawns by means of trawl nets of every description, or by the method of trawling by means of nets of every description, from all waters of Port Jackson.

This notification will be in effect from 17 January 2003 to 30 October 2003, inclusive.

This prohibition does not extend to the taking of prawns and fish by a licensed commercial fisher exercising the authority of an endorsement to operate in the Estuary Prawn Trawl Restricted Fishery; operating from a licensed fishing boat which has a S2 Port Jackson Prawn Trawl endorsement; using an otter trawl net (prawns) fitted with a by-catch reduction device approved by the Director, NSW Fisheries for the waters of Port Jackson; and when fishing in the waters described in Column 1 of the schedule below, during the period shown opposite in Column 2 of that Schedule; subject to the provisions of this notification.

**The Hon Edward Obeid OAM, MLC**  
**Minister for Mineral Resources**  
**Minister for Fisheries**

**Schedule**

<i>Column 1</i> <i>Waters</i>	<i>Column 2</i> <i>Periods during which prawn trawling is permitted</i>
The waters of Port Jackson together with all its rivers, bays and tributaries which are not closed to netting under any other schedule or Notification.	<ol style="list-style-type: none"> <li>1. From 5 p.m. Mondays to Thursdays (inclusive) to 9 a.m. the following day, and from 5pm Friday to midnight Friday in each week in the period between 5pm Monday 21 October 2002 and midnight Thursday 17 April 2003, excluding public holidays.</li> <li>2. From 5 p.m. Mondays to Thursdays (inclusive) to 9 a.m. the following day, and from 5pm to midnight Friday in each week, excluding public holidays, in a period as determined by the District Fisheries Officer, Sydney North, as detailed in the conditions of this Schedule.</li> </ol>

**Conditions:**

**Late closing trial criteria for Port Jackson prawn trawling:**

1) A prawn trawling trial may be undertaken to establish the late closing of the Port Jackson prawn trawling season. The trial is to be undertaken in a manner agreed between the District Fisheries Officer, Sydney North, and representatives of persons entitled to prawn trawl in Port Jackson.

2) Five 40 minute shots at different locations of which at least one shot yields a minimum of 1



kilogram of prawns, as determined by the District Fisheries Officer, Sydney North, will allow the late closing of the Port Jackson estuarine prawn trawling season.

**3)** The closing date of the Port Jackson prawn trawling season shall be notified by a public notice in the Sydney Morning Herald newspaper and notices displayed at the Sydney Fish Markets and the NSW Fisheries Office at Wollstonecraft.

**4)** The first closing trial shall commence 5 p.m. Wednesday 16 April 2003. If the trial criteria is reached the prawn trawling season shall be extended to 9 a.m. Friday 2 May 2003. A second closing trial shall commence 5 p.m. Wednesday 30 April 2003. If this trial criteria is reached the prawn trawling season shall be extended to 9 a.m. Friday 16 May 2003.

**FISHERIES MANAGEMENT (AQUATIC RESERVES) REGULATION 1995**

under the

**FISHERIES MANAGEMENT ACT 1994**

UPDATED 1 MARCH 1999

**PART 5—NORTH HARBOUR****The Reserve**

16. In this Part:

“Reserve” means the North Harbour Aquatic Reserve declared by notification published in Gazette No. 46 of 26 March 1982, at page 1336, being the land described in Schedule 4 together with the waters within the Reserve.

**Taking of fish or marine vegetation prohibited**

17. (1) A person must not:

- (a) take, or attempt to take, fish from the Reserve or
- (b) gather, or attempt to gather, marine vegetation from the Reserve.

Maximum penalty: 100 penalty units in the case of a corporation, 50 penalty units in any other case.

(2) A person must not:

- (a) wilfully disturb, injure or interfere with fish in the Reserve or
- (b) wilfully damage, destroy or interfere with marine vegetation in the Reserve.

Maximum penalty: 100 penalty units in the case of a corporation, 50 penalty units in any other case.

(3) This clause is subject to the other provisions of this Part.

**General exemption**

18. A person:

- (a) may, by means of a hook and line, take, or attempt to take, fish that have fins and
- (b) may, in accordance with the written consent of the Director, do anything else prohibited by clause 17(1) or (2).

**Exemption for commercial fishers**

19. A commercial fisher:

- (a) may take, or attempt to take, a rock lobster by means of a pot manufactured or adapted for the purpose of taking rock lobsters and

(b) may, on a weekday, take, or attempt to take, fish by means of a hauling net, but only from the part of the Reserve north of Cannae Point and east of a line drawn from Cannae Point to Manly Point.