



Australian Government

Australian Fisheries Management Authority

# Status Report for Re-assessment for Export Approval Under the EPBC Act


## Northern Prawn Fishery



**October 2008**

This report has been prepared by AFMA for consideration by the Department of the Environment, Water, Heritage and the Arts in relation to the exemption of the Northern Prawn Fishery from export controls under the *Environment Protection and Biodiversity Conservation Act 1999*.

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# 1. Introduction

This assessment covers the method of trawling in the Northern Prawn Fishery (NPF), as managed by the *Northern Prawn Fishery Management Plan 1995*. The NPF was declared an approved Wildlife Trade Operation (WTO) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 9 August 2003 for a period of 5 years, to expire on 9 January 2008. A copy of the letter to AFMA including conditions and recommendations (Attachment A) can be found at:

<http://www.environment.gov.au/coasts/fisheries/commonwealth/>

# 2. Description of the Fishery

The Northern Prawn Fishery (NPF) occupies an area of 771,000 square kilometres off Australia's northern coast. The Fishery extends from the low water mark to the outer edge of the Australian fishing zone (AFZ) along approximately 6,000 kilometres of coastline between Cape York in Queensland and Cape Londonderry in Western Australia (Figure 1).

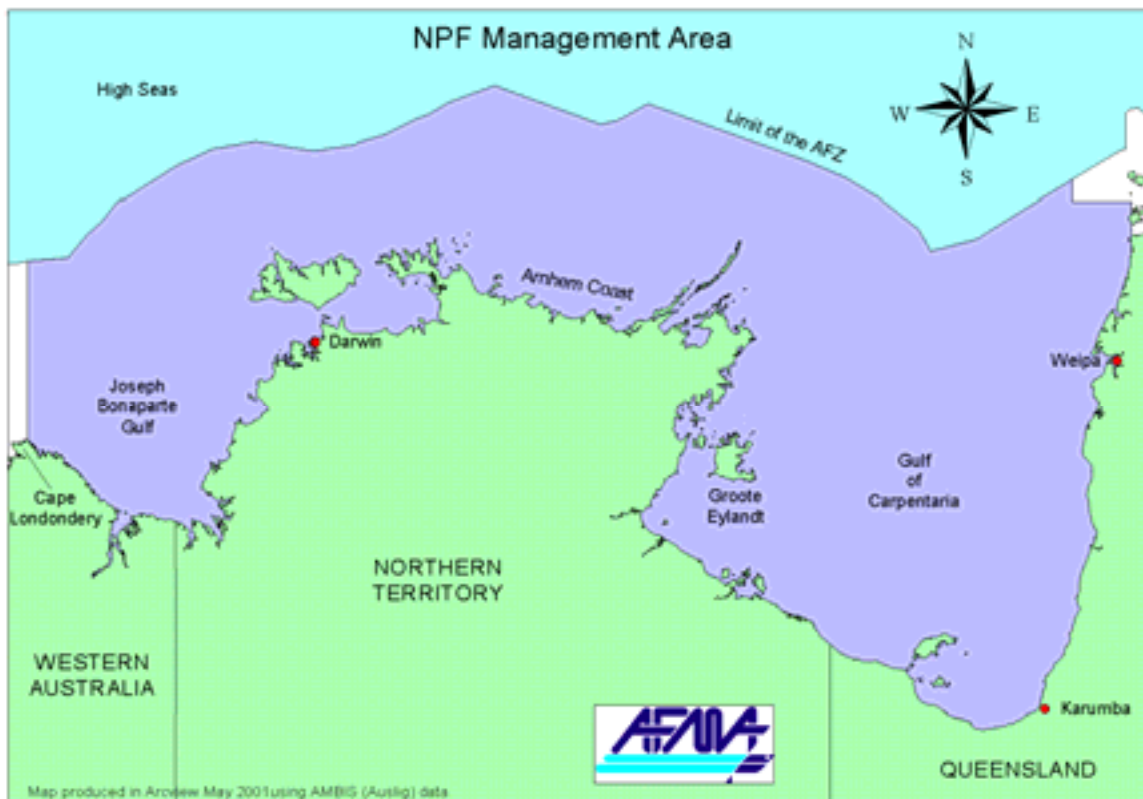


Figure 1. Location of the Northern Prawn Fishery.

Under an Offshore Constitutional Settlement (OCS) agreement between the Commonwealth, Western Australia, Northern Territory and Queensland, originally signed in 1988, prawn trawling in the area of the NPF to the low water mark is the responsibility of the Commonwealth through AFMA.

Data from the AFMA logbook database indicates that fishing effort was reported from 273 grids (6 minute x 6 minute) when the fishery opened in 1973. Effort reached a maximum in 1989 when effort was reported in 1,407 grids and it has decreased since then to be reported from 579 grids in 2007. There are an estimated 7281 grids in the area of the NPF. It is generally accepted that fishing effort was severely under-reported during the 1970's and early 1980's, when completion of logbooks was voluntary. Since the early 1980's logbook coverage of the fishery has been virtually 100%.

The principle reasons that much of the area of the NPF managed area is not trawled are:

- the permanent closure of areas such as all shallow water seagrass beds;
- the unsuitability of areas to trawling due to large reef outcrops; and
- the low density of the target prawn species (eg. central Gulf of Carpentaria).

There are also trawlable grounds closed to prawn trawling both seasonally (6.3% of total area) and permanently (2.1% of the total area). These areas include all known seagrass beds due to their importance as a habitat for turtles and juvenile prawns. The major trawl grounds are in the Gulf of Carpentaria and the area to the north and south-west of Darwin.

The NPF has two distinct fishing seasons. These generally fall between March and June and between August and November. The 2008 season dates were:

- 26 March – 5 June (Banana Prawn Season)
- 1 August - 28 November\* (Tiger Prawn Season)

\*Dependant on catch rates and a reduced season length may be applied.

Most operators remain at sea for the entire season, unless trawlers experience mechanical problems requiring in-port repairs. Trawlers unload to barges, or motherships, which usually rendezvous with the trawlers every two/three weeks. A number of trawlers also unload to ports including Darwin and Cairns. Trawling is banned during daylight hours during the tiger prawn season to reduce bycatch and the catch of gravid (egg-bearing) females.

## 2.1. Target and byproduct species

The NPF is a multi-species fishery with nine species of prawns being taken:

- White banana prawn (*Penaeus merguianus*)
- Red-legged banana prawn (*Penaeus indicus*)
- Grooved tiger prawn (*Penaeus semisulcatus*)
- Brown tiger prawn (*Penaeus esculentus*)
- Blue endeavour prawn (*Metapenaeus endeavouri*)
- Red endeavour prawn (*Metapenaeus ensis*)
- Western king prawn (*Metapenaeus latisulcatus*)
- Red spot king prawn (*Penaeus longistylus*)
- Giant tiger prawn (*Penaeus monodon*)

In commercial catches prawns are categorised into four general groups of banana, tiger, endeavour and king prawns however individual species are not distinguished within those groups. Three species - white banana prawns, brown tiger prawns and grooved tiger prawns - account for almost 80% of the total annual catch from the fishery. The remainder is made up mostly of endeavour prawns and red-legged banana prawns.

Extensive studies by CSIRO Marine Research, including commercial catch sampling and analysis of substrate composition, have shown that the adults of the two commercial species of tiger prawns have different spatial distributions. These are related to type of substrate and depth. This has allowed the commercial catch category of tiger prawns to be approximately split between the two species according to the six minute square grids. Dichmont et al. (2001) updated the species split methodology in 2001 and included the potential for species split shifts over time and area. This was further updated in 2006 to incorporate the results of the Venables et al. (2005) species distribution project.

Banana prawns are split into the two component species. Red-legged banana prawns are caught almost exclusively in deep water (>45 metres) in Joseph Bonaparte Gulf and white banana prawns elsewhere (Dichmont et al. 2001).

Prawn species reach a commercial size at six months, and can live for up to two years. Larger sizes bring the highest price. Growth rates vary considerably between species and sexes, with females generally growing faster and to a larger size than males. Most species are sexually mature at six months, but fecundity increases with age. A twelve-month-old female can produce hundreds of thousands of eggs at a single spawning and may spawn more than once in a season. The eggs sink to the bottom after release, where they hatch into larvae within about 24 hours. Less than 1% of these offspring survive the two to four week planktonic larval phase to reach suitable coastal nursery habitats where they may settle. After one to three months on the nursery grounds, the young prawns move offshore onto the fishing grounds.

In 2007, the catch of prawns was 4152 tonnes, which included 2731 tonnes of banana prawns, 1221 tonnes of tiger prawns and 199 tonnes of endeavour prawns. This level of prawn catch was similar to the previous five years, but is significantly lower than the highest catch recorded in 2000-01 of 9278 tonnes (see Table 4).

The other target species listed in the NPF Management Plan are squid (*Loliginidae sp.*) and scampi (*Nephropidae sp.*). However, given the low volume and the low value of squid and scampi taken by NPF trawlers, they are treated as a byproduct in the NPF Harvest Strategy. Numerous other byproduct species including bugs (*Scyllaridae sp.*), scallops (*Pectinidae sp.*) and various fish species are also taken during trawling operations and managed through size and trip limits.

## 2.2. Management Arrangements

The NPF is managed through a series of input controls, including limited entry to the fishery, gear restrictions, bycatch restrictions and system of seasonal, spatial and temporal closures.

To fish in the NPF operators must hold Statutory Fishing Rights (SFRs), which control fishing capacity by placing limits on the numbers of trawlers and the amount of gear permitted in the fishery.

There are two types of SFRs:

- a Class B SFR, which permits a boat to fish in the NPF; and
- a gear SFR, which limits the headrope length a fisher can use.

There are currently 35,479 gear SFRs issued for the fishery. The total number of Class B SFRs in the fishery is 52. This has reduced significantly following the Commonwealth Government Structural Adjustment Scheme. In 2005, there were 53,844 gear SFRs and 95 Class B SFRs. This significant change in the management of the fishery has not only seen a reduction in bycatch, but has also provided for less swept area by the trawlers.

Operators must hold both a Class B SFR and the appropriate number of gear SFRs for the length of headrope they wish to use to operate in the fishery. There is a minimum holding of 100 gear SFRs for each Class B SFR.

A gear SFR currently represents 7.481 cm of operational headrope for operators towing twin gear and 6.732 cm of headrope for operators towing quad gear or tongue nets.

The fishery currently has assessments for brown and grooved tiger prawns. Assessments are also being developed for the banana and endeavour species. The tiger prawn fishery is the most valuable component of the NPF and endeavour and king prawns are generally caught as byproduct whilst fishing for tiger prawns.

The tiger and banana prawn fishery are managed by fixed length seasons, with some in-season management aimed primarily at extending the length of the seasons to increase the economic return to the fishery in highly productive years. The endeavour and king prawn resources are generally protected by the management measures adopted for the tiger prawn resource, as well as through spatial and temporal closures.

The management mechanisms within the Management Plan and supporting legislative instruments are outlined in Table 1.

Table 1. The structure of the NPF Management Plan.

Management Plan	Supporting instruments
<ul style="list-style-type: none"> <li>• Northern Prawn Fishery Bycatch Action Plan requirements</li> <li>• Granting of SFRs</li> <li>• Gear</li> <li>• Boat nomination and replacement</li> <li>• Transferring of fishing rights</li> <li>• Determination of fishing capacity</li> <li>• Eligible boats criteria</li> <li>• Who may fish in the fishery</li> <li>• Obligations of SFR holders</li> </ul>	<p><b>Regulations</b></p> <ul style="list-style-type: none"> <li>• Prior departure/arrival reporting requirements</li> <li>• Logbook notices</li> <li>• Approval process</li> </ul> <p><b>Determinations</b></p> <ul style="list-style-type: none"> <li>• Gear restrictions               <ul style="list-style-type: none"> <li>- headrope length</li> <li>- footrope length</li> </ul> </li> </ul> <p><b>Directions</b></p> <ul style="list-style-type: none"> <li>• Area and Season Closures</li> <li>• Gear requirements</li> <li>• Prohibition on fishing</li> <li>• Gear trials</li> <li>• Bug size limits</li> <li>• Byproduct limits</li> <li>• Prohibited species</li> </ul> <p><b>Conditions of SFR's</b></p> <ul style="list-style-type: none"> <li>• ICVMS reporting requirements</li> <li>• Carriage and safety standards for observers</li> <li>• Requirement to comply with regulations and fisheries assessment plan.</li> <li>• Reporting requirements (logbooks)</li> <li>• Gear requirements</li> <li>• Navigating in closed areas</li> </ul>

### **2.2.1. Decision rules**

AFMA makes use of in-season management decision rules for both fishing seasons. These rules are in place to determine if a fishing season should be shortened based on reported catch rates. The decision rules adopted are outlined below.

The first season (banana prawn season) extends for a maximum of 10 weeks from the start of the season, unless the following decision rules are triggered:

1st possible season closure (6 week season):

(a) If the average daily catch rate of banana prawns for the 4th week of the first season is less than 500 kg/boat/day.

OR

(b) If the pro-rata total tiger prawn catch (excluding the tiger prawn catch taken in the area referred to as the "Mornington Box") or the whole 4 weeks is more than 26.4 tonnes (6.6 t/week\*4)

THEN

(c) the fishery is closed at the end of the 6th week from the start of the first season.

To facilitate the assessment of whether an extension to the season is appropriate based on the decision rule, a "representative sample" of the catch rates for the season across the fleet is required. This decision rule is applied only if all catch data (kg/day, or total catch and total days) for the whole fleet (or >95% of NORMAC members and advisors) is supplied for the period of the 4th week of season by 3 days after the end of that week.

The second season (tiger prawn season) extends for a maximum of 17 weeks from the start of the season, unless the following decision rule is triggered:

a) If the average prawn catch per boat (fishing in the NPF) per night is LESS than 300 kg for the 12th week of the season; then

b) The fishery will close at the end of the 15th fishing week

To facilitate the assessment of whether an early closure should be applied, a "representative sample" of the catch rates for the season across the fleet is required. This decision rule is applied only if all catch data (kg/day, or total catch and total days) for the whole fleet (or >95% of NORMAC members and advisors) is supplied for the period of the the 12th week of the season by 3 days after the end of that week.

### **2.3. Fishing methods**

Presently there are 52 trawlers that operate in the NPF. Most of the NPF trawlers are purpose-built, steel hulled and range in length from 14 metres to 29 metres. The median age of vessels in the fleet is around 25 years.

All NPF trawlers have modern and sophisticated catch handling, packing and freezing capabilities as well as wet (brine) holding tanks. All use electronic aids such as colour echo sounders and Global Positioning Systems (GPS). Satellite phone and fax equipment is used by more than 95% of trawlers and 95% have introduced on-board computing facilities, this includes the use of electronic logbooks. This provides for analysis of real time data if required. It is envisaged that 100% of the fleet will be using e-logs in the 2009 season. The NPF is currently the only one of two Commonwealth managed fisheries using e-logs. The use of e-logs was an initiative of the NPF SFR holders. All trawlers are required to have a Vessel Monitoring System (VMS).

Prawn trawling is an active fishing method that involves towing a conical-shaped net spread open by two steel or timber otter boards over the seabed (Figure 2). A ground chain skims over the seabed and stimulates prawns into the trawl mouth. The otter boards are located between the trawl and towing bridle and use hydrodynamic forces to spread the trawl open.

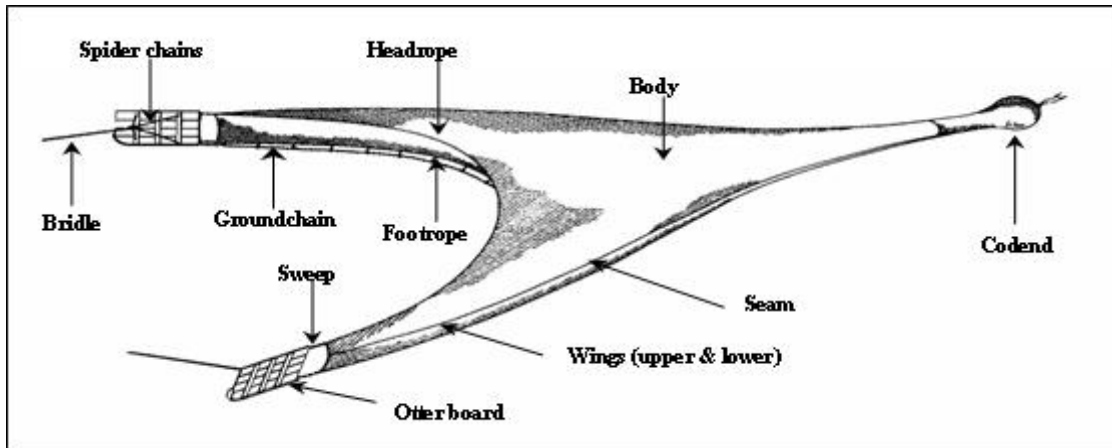


Figure 2. The typical components of an NPF prawn trawl (Illustration by G. Day, AMC).

In the NPF, two nets are towed simultaneously in a double rig configuration (Figure 3), more recently operators have been using the quadruple-rig set-up as a more cost-effective net configuration to trawl for prawns as shown in Figure 4. The nets are typically constructed from small mesh material. As the tapered trawl moves forward through the water, the catch is funnelled into the trailing end of the net and is retained in a mesh bag, or codend, which is constructed from a smaller mesh than the body of the trawl.

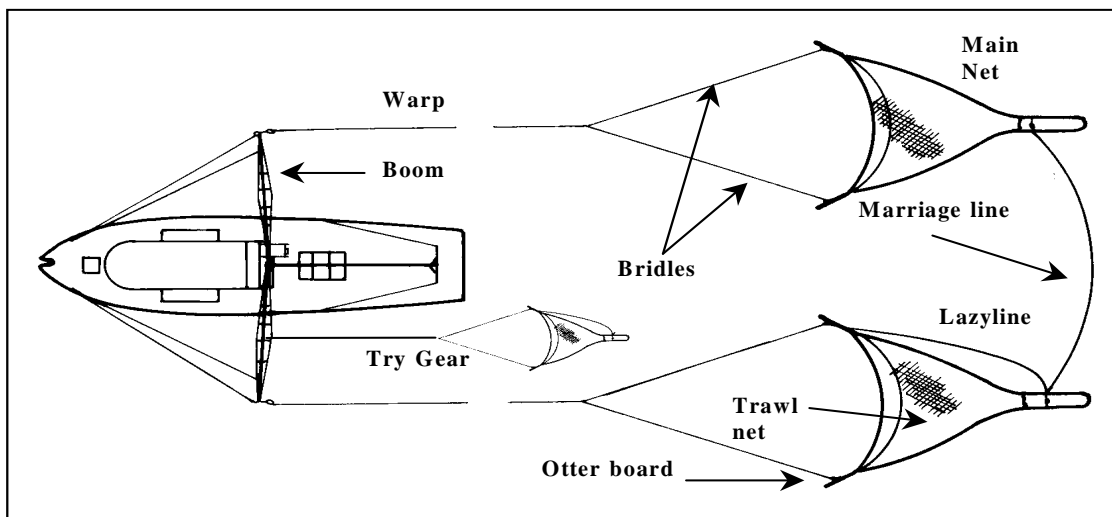


Figure 3. Double rig prawn trawl configuration used in the NPF (Illustration G. Day, AMC).

Note: Each trawl net is towed independently of the other. One pair of otter boards is used to spread each trawl and the try gear is towed independent of the main trawl nets. All vessels use try gear to sample prawn numbers on the seabed and to obtain an indication of catch rates. The try gear is towed separately either off the stern of the vessel or one of the two booms.

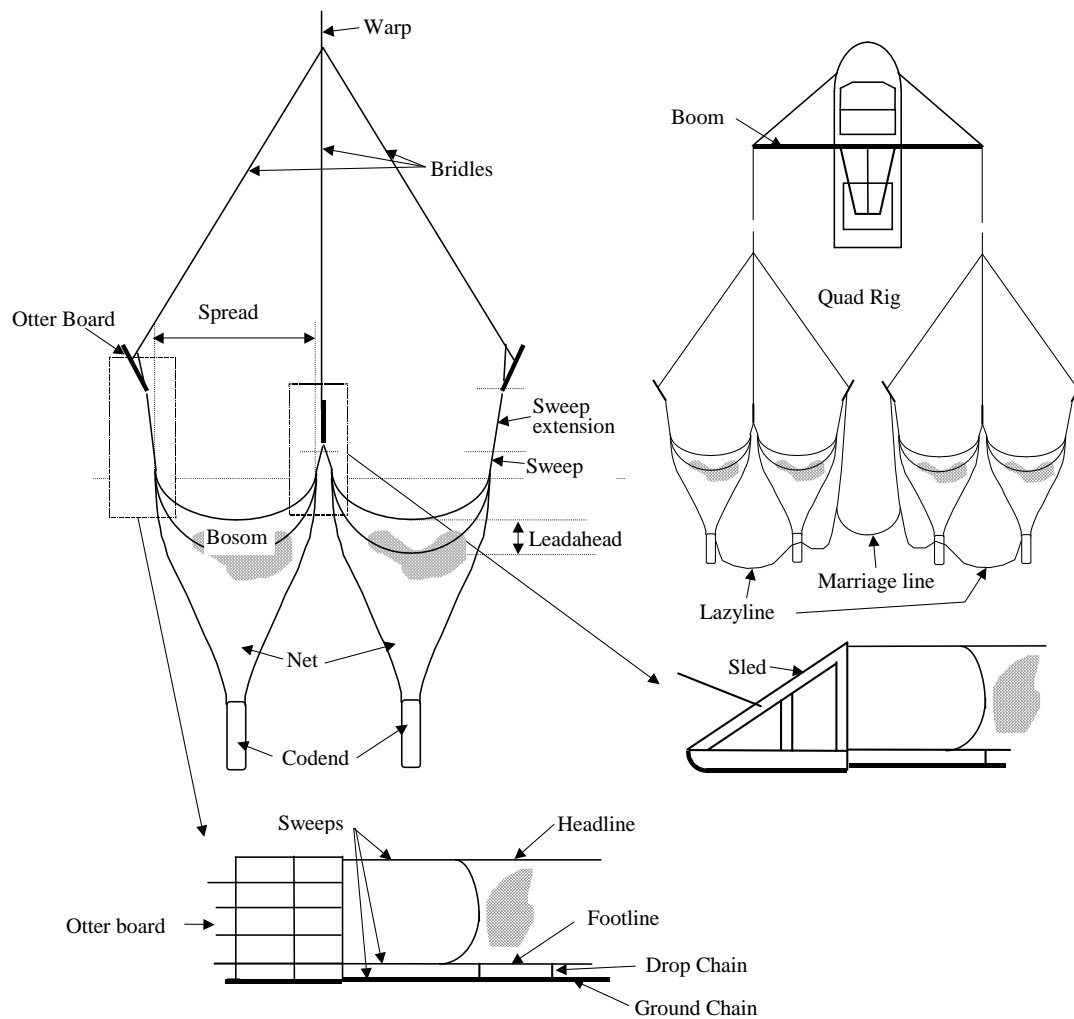


Figure 4. Quadruple rig arrangement for prawn trawling (Source: Sterling 2000).

## 2.4. Turtle Excluder and Bycatch Reduction Devices

All trawl nets in the NPF are required by an AFMA Direction to have an approved Turtle Excluder Device (TED) and Bycatch Reduction Device (BRD) installed. A TED is a device fitted to a net that allows turtles and other larger animals to escape immediately after capture in the net. A BRD allows fish and other animals to escape from the net immediately after capture. These devices are usually fitted in or near the trawl codend (Figure 5). A complete description and specifications of approved TEDs and BRDs are in AFMA Direction: NPFD 107:

[http://www.afma.gov.au/fisheries/northern\\_trawl/northern\\_prawn/mgt/directions/default.htm](http://www.afma.gov.au/fisheries/northern_trawl/northern_prawn/mgt/directions/default.htm)

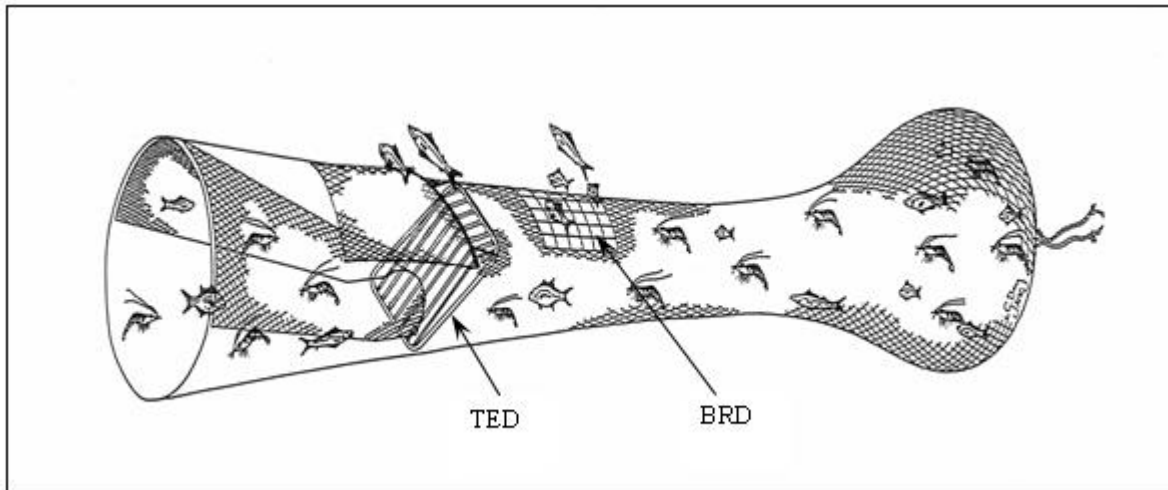


Figure 5. Typical installation of a TED and a BRD in an NPF trawl codend. Pictured is a top opening TED called the NAFTAED and a square mesh window BRD (Illustration by G. Day, AMC).

## 2.5. Fishing in the NPF

Fishing in the NPF can be broken into 6 steps:

### 1. Selection of fishing ground

Selection of fishing grounds is based on past fishing experience, use of try gear, trawler activity in the local area, lunar phase, tidal cycle, echo sounder information and bottom type. Spotter planes assist in the location of schools of banana prawns. See map detailing the area of the fishery: <http://www.afma.gov.au/information/maps/npf.htm> (Figure 1).

### 2. Deployment of trawl gear

The deployment of fishing gear involves releasing sufficient warp wire for the trawl to maintain contact with the seabed and allow the otter boards to spread the trawl open.

### 3. Trawling

The trawl is towed on the seabed for several hours when targeting tiger prawns and generally less than one hour when targeting banana prawns. Operators trawl back and forth over an area of high prawn concentration detected with a try gear. Tow duration can range from a few minutes to several hours depending on the amount of prawn and bycatch caught by the try gear.

### 4. Retrieval of trawl gear

Winches are used to wind the warps back onto the trawler and the fishing gear is brought to the surface.

### 5. Emptying the codends

The codends are hauled onboard using lazy lines, allowing the catch to be emptied (by untying the drawstrings of the codend) into a sorting tray. The codends are then retied, and shot over the side of the trawler for the next tow.

### 6. Streaming the gear

Streaming, or towing the gear at the surface, allows the operator to reposition the trawler over the intended trawling area ready for the next tow.

## 2.6. Closures

As previously stated the fishery has two distinct fishing seasons. The seasons may vary but have generally fallen between April to May/June (Banana Prawn Season) and August to November (Tiger Prawn Season).

Closures of the fishery between seasons generally coincide with spawning and recruitment events. This ensures prawns are at an optimal size when harvesting. Shortening of the season has also been used as a method to reduce effort in the fishery. Other closures include permanent area closures of seagrass beds and communities which are important juvenile habitats and area closures to protect the capture of small prawns.

A daylight trawl closure during the spawning season aims to reduce the capture of gravid prawns, which are more likely to be caught during the day. A total of 2.1% of the fishery management area is subject to permanent closures, with 6.3% subject to seasonal closures.

Seasons and closures in the fishery are implemented through a series of Directions made under section 25 of the *Northern Prawn Fishery Management Plan 1995 (as amended)*.

## 2.7. Allocation between sectors

As the NPF is managed by input controls there is no allocation between sectors and only one sector exists in the fishery.

## 2.8. Governing legislation/fishing authority

All Commonwealth fisheries are managed under the [Fisheries Management Act 1991](#) and their respective management plan *Northern Prawn Fishery Management Plan 1995*. The NPF is continuing to be managed by SFRs.

## 2.9. Status of export approval under the *Environment Protection and Biodiversity Conservation Act 1999*

The NPF was granted export approval/accreditation under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 9 August 2003 for a period of 5 years and is valid until 9 January 2009. A copy of the letter to AFMA and the conditions and recommendations can be found at: <http://www.environment.gov.au/coasts/fisheries/commonwealth/>.

# 3. Socio-economic environment

## 3.1. Value of the fishery

The NPF is the most valuable Commonwealth managed fishery and is one of the most valuable fisheries in Australia. The annual gross value of production (GVP) of the fishery has varied between \$65 million and \$185 million AUD since opening in the 1970s. This can be attributed to the fluctuating annual catch, season lengths, market conditions and foreign exchange rates.

The real GVP of the fishery in 2006-07 was \$64 million. Again, this GVP figure is similar to the previous six years, but significantly lower than the record GVP figure of \$164 million in 2000-01. The majority of the catch from the fishery is exported, predominantly to Japan however, exports to China and countries within the European Union are increasing.

## 3.2. Economic assessment

[ABARE's Fishery Economic Status Report](#) brings together available indicators of the economic performance of each of the diverse fisheries managed by AFMA.

### **3.3. Downstream employment resulting from fishing activity**

The Commonwealth seafood industry is vital to the economy of rural and regional Australia, with direct employment in fisheries production and processing, and a substantial downstream employment effect in supporting industries including the transportation, storage, wholesaling and retailing sectors, and the catering and tourism industries. Operators in the NPF use the significant ports between Cairns and Darwin to land their catch and utilise the processing facilities. This generates employment for cold stores, the processing plant, provisioning for the vessels and aspects of repairs and maintenance. Major ports are located at: Darwin, Cairns and Karumba.

The NPF fleet also uses mothership services that operate in the Gulf of Carpentaria during the banana and tiger prawn seasons. Vessels unload catches to the mothership which are then transported back to port and generally forwarded to cold stores. The mothership also supplies fuel, fresh water and stores to NPF vessels. The mothership employs a crew of approximately ten people, including the Captain, Mate, Chief Engineer, Engineer, Cook and up to five Deck Hands.

### **3.4. Quality assurance and control**

Australian seafood destined for export is subject to Commonwealth regulation under the *Export Control Act 1982* and Export Control (processed food) Orders to ensure compliance with food safety and trade description requirements. All land based processing establishments and vessels which process on board are required to be registered by the Australian Quarantine and Inspection Service (AQIS).

## **4. Management**

### **4.1. Changes to management**

Since it was first accredited in 2003 AFMA has used a flexible management approach to determine the appropriate management arrangements in the NPF. Under this approach, the length of the fishing seasons will depend on whether or not catches meet a predetermined decision rule.

AFMA has recently approved the use of quad gear in the fishery, with a 10 per cent penalty on the value of each gear SFR used in this configuration.

In 2008, the AFMA Board agreed to the Northern Prawn Fishery Management Advisory Committee's (NORMAC) recommendation to a 33% increase in total gear for the 2008 tiger prawn season to help achieve maximum economic yield for the NPF. In effect, this is an increase in the value of each NPF gear SFR from 5.625cm to 7.481cm.

NORMAC advises AFMA on management issues in the NPF and reports that industry is aiming to have the fishery managed by Individual Transferable Quotas (ITQs), at least for some species, in the near future. A full cost benefits analysis (CBA) of management scenarios in the NPF is being undertaken in 2008. The CBA will help determine a preferred management option that would optimise an increase in net economic returns to the Australian community from the fishery, cost-effective management of the fishery and contribute to the ecologically sustainable development of the fishery.

Significant changes that have occurred in the fishery since the accreditation in 2003 are provided in Table 2.

Table 2. Timeline of management changes since 2003.

Year	Event
2004	MEY defined as target level of catch (Roberts 2004).
2005	25% reduction in total allowable headrope length (Roberts 2004). Second season lengthened.
2006	The <i>Northern Prawn Fishery Management Plan 1995</i> was amended in July 2006 to allow for the use of different gear types and provide for the collection of prawn broodstock.
2006	Commonwealth Government Structural Adjustment Package removed 42 B Class SFRs and approximately 30% of the effective effort from the Northern Prawn Fishery.
2008	A 33% increase in total headrope length in the fishery resulting in an increase in the value of each NPF gear SFR from 5.625cm to 7.481cm.

Since accreditation of the NPF in 2003, five amendments have been made to the *Northern Prawn Fishery Management Plan 1995*. They are as follows:

#### January 2005

**Amendment to Schedule 1 – Area of waters.** This amendment was made to remove any misinterpretation of the intent of the Plan. The amendment ensures that the area of waters for the Commonwealth management NPF includes both ‘coast waters’ and the Australian Fishing Zone. The previous plan did not refer to coastal waters.

#### July 2006

**Amendment to subsection 7A (1) and subsection 14 (6).** This amendment allows for trawl gear, other than twin gear, to be used in the fishery. The amendment was reviewed and recommended by both the NPRAG and NORMAC. The intent of the amendment was to allow fishers to use more cost-effective nets to trawl for prawns.

In line with AFMA’s objective of ecologically sustainable development, the precautionary principle and AFMA’s need to have regard to the impact of fishing activities on non-target species, a conversion factor has been developed to ensure that there is no increase in fishing efficiency in the fishery with the implementation of other nets. This conversion factor has been set at a 10% penalty (on gear SFRs) for vessels that convert to quad or tongue nets from existing twin gear.

**Amendment to section 15 and section 23A.** The amendment provides for a brood stock collection permit, it corrected an anomaly where operators had to rely on a scientific permit to collect brood stock for aquaculture. The use of a scientific permit was considered to be inappropriate as the ‘scientific’ or experimental component of brood stock collection has finished.

Under the Commonwealth’s Offshore Constitutional Settlement agreements with the States and Northern Territory, AFMA is obliged to allow the collection of prawn broodstock by suitably licensed State and Northern Territory operators. Up to a maximum of three broodstock permits may be active at any one time.

A number of conditions apply to the broodstock collection permits including restrictions on the number of live prawns that can be retained; required observer coverage; area of operations;

reporting requirements; operational VMS; mandatory use of TEDs and BRDs; restricted trawl duration; and the collection of ancillary target and bycatch information.

## **4.2. Performance of the fishery against objectives, performance indicators and performance measures**

A statement of the performance of the NPF against its objectives, performance indicators and performance measures is made annually in AFMA's annual report. A copy of the current statement can be found on AFMA's [website](#).

## **4.3. Compliance risks present in the fishery and actions taken to reduce these risks**

### **4.3.1. Compliance risks**

The unique and dynamic nature of fisheries presents great challenges to the effective management of risk. In the fisheries compliance context, risk equates to the failure of fishing operators to comply with fisheries management arrangements and/or fishing permit/concession conditions. AFMA compliance conducts a risk assessment each financial year of all risks to compliance across Commonwealth fisheries. This ensures resources are directed towards high risks identified in each fishery.

Specific compliance risks associated with the NPF include:

- *Breaching fishing gear requirements including TED and BRD obligations; and*
- *unauthorised fishing in spatial or temporal closures.*

### **4.3.2. Compliance management tools**

To address these risks AFMA's compliance program integrates a range of tools and activities to monitor non-compliance including:

#### ***1. Integrated Computer Vessel Monitoring System (ICVMS)***

The ICVMS is used to monitor NPF trawling operations and the movement of boats in and out of ports. AFMA monitors the activity of the fleet through ICVMS, at least three times per day during office hours. ICVMS allows AFMA to contact vessels whose reports are overdue within three hours of the missed position report and to ensure that the vessel and ICVMS is working in accordance with conditions imposed on fishing permits. Temporary reporting schedules are to be arranged for a vessel who's ICVMS has stopped working while at sea.

#### ***2. Vessel Inspections***

Random at-sea vessel inspections are to be carried out on active boats in the fishery during the year. These inspections include measuring nets and headrope length to ensure compliance with fishing capacity directions. Additional inspections may be carried out on targeted vessels if intelligence indicates further attention is warranted.

#### ***3. At-Sea Compliance***

AFMA each year determines an appropriate number of sea patrol days to be undertaken in Commonwealth waters.

#### ***4. Aerial Surveillance***

AFMA each year determines an appropriate number of aerial surveillance flights to detect offences particularly related to closures.

## **5. Intelligence reports**

Fisheries officers are required to submit intelligence reports to AFMA outlining any suspected breaches or significant information concerning the fishery that they obtain while working in the field.

## **6. Information Program**

AFMA Compliance keep fisheries officers informed of compliance initiatives in the fishery and vice versa on an as-needs basis. Fisheries officers maintain a client liaison role to gauge operator response to compliance. AFMA Compliance provide fishers and processors with regular feedback on the level of compliance with the management arrangements.”

### **4.4. Consultation processes**

AFMA actively involves a wide range of stakeholders in the process of developing and implementing fisheries management arrangements. This approach is supported by specific consultative processes which are embodied in the Authority’s governing legislation and undertaken as part of effective fisheries management practice

The Plan and associated management arrangements in place were developed in consultation with the Northern Prawn Fishery Management Advisory Committee (NORMAC), the Northern Prawn Resource Assessment Group (NPRAG), NPF Industry Pty Ltd, operators and other stakeholders. The Plan details the objectives for the fishery, measures to achieve these objectives and criteria to assess the Plan’s performance.

NORMAC is the key advisory committee for management of the domestic fishery. The MAC membership is drawn from AFMA (1), scientific agencies (1), a conservation NGO (1) and the industry (4). Representatives from the state fisheries agencies. Agencies such as DAFF, Department of Environment Water Heritage and the Arts (DEWHA) and Bureau of Rural Sciences (BRS) have attended meetings as observers: <http://www.afma.gov.au/information/maps/npf.htm>

NPRAG is the key research and scientific committee for management of the domestic fishery. The RAG membership is drawn from AFMA (1), scientific agencies (3), ABARE (1) and the industry (3). Agencies such as DAFF, DEWHA and BRS have attended meetings as observers. This committee in-part provides advice to the AFMA Board regarding the status of the target species stock in Australia and the Pacific and is the key group in implementing the Harvest Strategy policy.”

### **4.5. Description of cross jurisdictional management arrangements**

Under an Offshore Constitutional Settlement (OCS) agreement between the Commonwealth, Western Australia, Northern Territory and Queensland, originally signed in 1988, prawn trawling in the area of the NPF to low water mark is the responsibility of the Commonwealth through AFMA.

### **4.6. Compliance with threat abatement plans, recovery plans and domestic and international agreements**

The threat abatement plan for seabirds does not apply to the NPF as it is a trawl fishery with extremely low interactions with Marine birds. NPF management is consistent with the DEWHA 2003 Turtle recovery plan and DEWHA shark recovery plans.

### **4.7. Ministerial Direction**

In December 2005 the Minister for Fisheries, Forestry and Conservation issued a Direction to AFMA to take immediate action in all Commonwealth fisheries to cease overfishing and recover overfished stocks, avoid stocks becoming overfished in future and manage the broader environmental impacts of fishing. AFMA responded to the Ministerial Direction<sup>1</sup> with the document

<sup>1</sup> [http://www.mffc.gov.au/releases/2005/afma\\_directions.pdf](http://www.mffc.gov.au/releases/2005/afma_directions.pdf)

Future Operating Environment for Commonwealth Fisheries<sup>2</sup>. The Ministerial Direction has a limited impact on the management of the NPF, as there are currently measures in place which address most of the key issues, as outlined in Table 3.

Table 3. Actions in response to the Ministerial Direction.

Action	Status	Comment
Implementation of harvest strategy policy	√	Harvest strategies adopted by the AFMA Board are in place for the NPF. The harvest strategy was implemented in the NPF on 1 January 2008 and was used to determine the level of effort for the 2008 tiger season.
Managing fisheries using output controls	√	AFMA has recently called for a tender on the cost benefit analysis of future management in the NPF, which includes the analysis of total allowable catches (TACs) and individual transferable quotas (ITQs) for target species. It is expected that a draft report will be considered by NORMAC in February 2009.
Use of boat SFRs	√	No action required – boat statutory fishing rights (SFRs) are already used in the NPF.
Minimise the incentives for discarding	√	Generally there is a no discarding. An AFMA wide policy on this will be considered further by the Commission over the next 12 months
Managing the broader environmental impacts	√	No action required – effective mitigation measures are being used, and modified as necessary
Enhance monitoring activity	√	No action required – ICMMS is mandatory and observers coverage is in the fishery
Use of independent surveys	√	No action required – a random trawl survey is used as the basis to provide a recruitment index, provides comprehensive bycatch composition information and aid in the interpretation of any changes in bycatch during any future monitoring program.
Spatial closures	√	No action required – the NPF have extensive spatial closures in the fishery to provide protection for a number of reasons.

## 5. Research and Monitoring

### 5.1. Collaborative research and results

Research needs of the fishery are reviewed annually by the NPF Research and Environment Committee (NPFREC). This process provides for further research into stock assessment, collection of fishery and biological data as well as providing an ecological and economic assessment of the fishery.

Since commercial fishing began in the area, operators have contributed significantly to research and monitoring through the provision of vessel time, cooperation with the observer program, direct financial contributions and expertise of crew. Operators have worked in collaboration with relevant research organisations such as CSIRO and BRS to undertake extensive bycatch and scientific monitoring programs. Observers also undertake biological sampling of target and bycatch species. As part of its core functions, AFMA also uses the data collected to assess bycatch species and impact of the fishery on the broader marine environment and assessing effectiveness of management measures and commitments under the bycatch action plan.

<sup>2</sup> [http://www.afma.gov.au/information/newsroom/securing\\_the\\_future.htm](http://www.afma.gov.au/information/newsroom/securing_the_future.htm)

This information is then presented to the NORMAC and NPRAG. AFMA calls annually for research applications to address research priorities and gaps in knowledge, as identified in the Research Plan. The NPF REC, NORMAC and the Commonwealth Fisheries Research Advisory Body (COMFRAB) assesses these applications for funding from the AFMA Research Fund, FRDC and the Fisheries Resources Research Fund (FRRF).

Some of the research projects, related to the fishery, that have received funding recently include:

- NPRAG Assessments - (Cathy Dichmont, CSIRO)
- An integrated monitoring program for the Northern Prawn Fishery 2006/08 - (Yimin Ye, CSIRO)
- Developing and testing harvest strategies for the NPF under input and output controls - (Cathy Dichmont, CSIRO)
- NPRAG 2008/09 - (Ian Knuckey, Fishwell Consulting)
- Assessing sustainability of NPF bycatch from annual monitoring data 2008 – (Dave Brewer, CSIRO)
- An integrated monitoring program for the Northern Prawn Fishery 2008/2010 – (Rob Kenyon)
- NPRAG Assessments – commencing 1 July 2009 – (Cathy Dichmont, CSIRO)
- Cost Benefit Analysis of management options for the Northern Prawn Fishery – (Dave Galeano, AFMA – FRDC funded)

Some of the completed research projects in the NPF post-2003 include:

- Documenting the history of and providing protocols and criteria for changing existing and establishing new closures in the NPF – (Rob Kenyon, CSIRO)
- Design, trial and implementation of an integrated, long term bycatch monitoring program, road tested in the Northern Prawn Fishery – (Dave Brewer, CSIRO)
- Designing an integrated monitoring program for the NPF optimising costs and benefits – (Yimin Ye, CSIRO)
- Risk assessment and mitigation for sea snakes caught in the Northern Prawn Fishery – (David Milton, CSIRO)
- Species distribution and catch allocation: data and methods for the NPF – (Bill Venables, CSIRO)
- Designing and implementing and assessing an integrated monitoring program for the NPF – (Yimin Ye, CSIRO)
- Effort trade-offs in the NPF (Bill Venables – CSIRO)
- NPF integrated monitoring program – (Yimin Ye, CSIRO)
- An integrated monitoring program for the NPF 05/06 – (Yimin Ye, CSIRO)
- Designing and implementing and assessing an integrated monitoring program for the NPF – (Yimin Ye, CSIRO)
- Biology, dynamics and management strategy evaluation for byproduct species in the NPF – (David Milton, CSIRO – FRDC funded)
- Assessment of alternative approaches to implementing ITQs in the NPF and identification of the impacts on the fishery of those approaches – (MRAG Limited)
- Bringing economics analysis and stock assessment together in the NPF: a framework for a biological and economically sustainable fishery – (Cathy Dichmont, CSIRO – FRDC funded)

## 5.2. Monitoring programs in the NPF

Fishery information in the NPF is collected mainly through the Northern and Torres Prawn Logbook – NP16, Season Landing Reports (SLR's), observer data, crew member observer program and fishing independent surveys.

The first monitoring of fishing in the NPF was implemented in 1970 with the introduction of logbooks. Bycatch monitoring now occurs in a number of ways in the NPF including:

- Logbooks (NP16) which includes details on interactions with TEP species
- Crew Member Observer program
- AFMA Scientific Observers
- Fishery Independent Surveys

The logbook provides for the recording of information on the location, time, gear and method of fishing as well as the resultant catch for each fishing operation (for information on logbooks see [AFMA's website](#)). In 1995, AFMA ensured further accuracy of catch data through the introduction of the Season Landing Report, which is an accurate record of all the catch landed.

Implementing a range of monitoring programs has increased the capacity to obtain the information required to help understand fishery impacts and design suitable management responses. Table 4 shows that capability of each monitoring program in terms of collecting information on various species and catch components.

Table 4. Monitoring programs utilised in the NPF.

Monitored Bycatch Groups	Logbook	Crew Member Observers	Scientific Observers	Fishery Independent Surveys
Turtles	Yes	Yes	Yes	Yes
Sea Snakes	Count only	Yes	Yes	Yes
Syngnathids	Count only	Yes	Yes	Yes
Sawfish	Yes	Yes	Yes	Yes
Other elasmobranches	No	No	Yes	Yes
ERA identified 'At risk' species	No	Yes	No*	No
Bycatch estimates	No	Yes	Yes	Yes
Bycatch composition	No	No	Yes	Yes

\*Scheduled to be reviewed once the ERM report is completed and considered by NPRAG and NORMAC.

The fishery has a strong scientific basis to its management and it is now one of the best documented and most intensively studied fisheries in Australia. The current monitoring program consists of the 10 Crew Member Observers (CMOs) and a single AFMA scientific observer per season, covering every fishing day as well as Fishery Independent Surveys (FIS). The scientific observer (SO) program provides fishing, catch and bycatch data on 2% of the fishery with additional data from the CMOs on interactions with Threatened, Endangered and Protected (TEP) species.

### 5.2.1. Fishery dependent monitoring

Fishery dependant data from the NPF comes from three sources: Logbooks, the CMO program and the AFMA SO program. Fishers in the NPF are required to complete logbooks that collect

catch and effort data as well as interactions with TEP species. This is an extensive and reliable source of data for fisheries managers and scientific organisations. As part of the NPF's long-term Bycatch Monitoring Program (BMP – FRDC 2002/035) data on TEP species is collected through logbooks and observations by SOs and CMOs. Data on the ERA identified 'At Risk' species is collected by CMOs and data on bycatch species composition and catch and effort data is collected by the AFMA SOs.

### **5.2.2. Fishery independent monitoring**

Two independent surveys are conducted in the NPF each year by CSIRO staff on chartered NPF vessels. The first survey is conducted in February and is designed to provide a recruitment index of the main commercial prawn species in the Gulf of Carpentaria. The second survey conducted in between the Banana and Tiger seasons (usually in July) collects data to create biomass and spawning indices of the main commercial prawn species in the Gulf of Carpentaria. Survey data is used to confirm the results from Fishery Dependant monitoring and provide comprehensive bycatch composition information. Data is collected from high effort regions as well as adjacent deeper regions of low historical effort. The species composition data from the deeper regions has the potential to be used as control regions to aid in the interpretation of any changes in bycatch during any future monitoring program.

### **5.2.3. Observer Program**

The AFMA observer program places observers on domestic and if required, foreign vessels fishing within the Australian Fishing Zone (AFZ) and some adjacent areas under international arrangements. The requirements and priorities for the Observer Program for each fishery are determined by relevant stakeholders and implemented by the AFMA Observer Program.

## **5.3. Bycatch reduction**

Bycatch is described in the *Commonwealth Policy on Fisheries Bycatch* as the part of the catch which is returned to the sea either because it has no commercial value or because regulations preclude it being retained, and the part of the catch that does not reach the deck of the fishing vessel but is affected by the interactions with fishing gear. AFMA established a bycatch and discarding program in February 2007 to provide additional resources and direction for pursuing policy and legislative objectives in relation to bycatch and discarding. The bycatch and discarding program is aimed at assisting fisheries tackle bycatch and discarding issues in a focused and cost-effective way. The implementation strategy for AFMA's bycatch and discarding program is available on AFMA's website at [http://www.afma.gov.au/environment/bycatch/is\\_env\\_bycatch-prog\\_feb08\\_20080417.pdf](http://www.afma.gov.au/environment/bycatch/is_env_bycatch-prog_feb08_20080417.pdf).

The NPF has demonstrated a pro-active approach to reducing the environmental impact of the fishery through supporting collaborative research projects directed at reducing bycatch. For example, in recent years the Fisheries Research and Development Corporation funded a workshop on innovative options for bycatch reduction in November 2006 to provide further impetus for improvements to BRD design in the NPF. The workshop brought gear technologists from Australia and overseas together with industry to investigate and develop new ways of reducing bycatch in trawl fisheries.

The workshop showed that initial reduction in catches of small bycatch, such as fish and crustaceans, using current BRDs in the NPF was minimal (approximately 7%) and highlighted the need to explore innovative options to improve bycatch reductions. This resulted in the approval of funding to trial a new BRD, Popeye Fishbox, (see NHT funded project 2006 – 'Assessment of an Innovative Option to Reduce Bycatch in the NPF'). The Popeye fishbox BRD was developed by Popeye Netmaking and is a variation of the "Fish box" trialled in the United States. The BRD consists of an aluminium frame designed to create an area of low water flow. Fish are attracted to the low water flow and swim out through the adjacent escape hole (Figure 6).

During the 2006 Tiger prawn season, an AFMA scientific observer was deployed to assess the Popeye Fishbox BRD. The Popeye Fishbox BRD was trialled at 70 and 100 meshes from the

codend drawstring and results indicate that it effectively reduces small bycatch by 48% and 28%, respectively. The Popeye Fishbox also reduced the capture of sharks and rays by 35% (70 meshes) and 27% (100 meshes). At 70 meshes, the Popeye Fishbox BRD resulted in an 87% reduction in the number of seasnakes captured (see Raudzens 2007). Catches of prawns between the net with the Popeye Fishbox BRD and the net without were proven to be not statistically different. Following these trials, in 2007 the Popeye Fishbox BRD was approved as one of the accredited BRDs that NPF fishers could use during normal fishing operations.

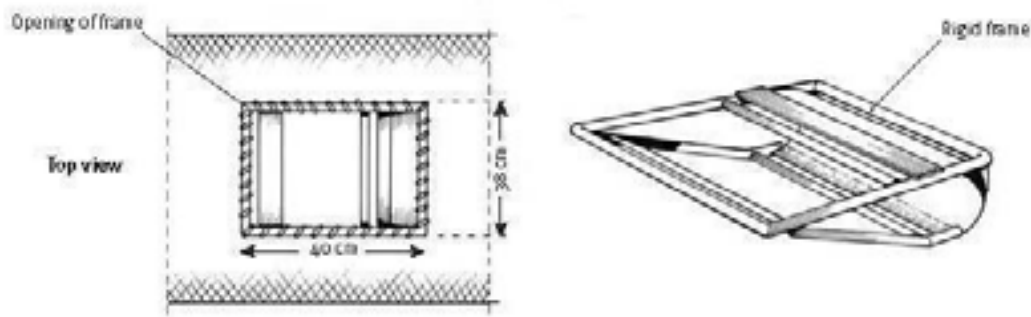


Figure 6. Sketch of Popeye's Fishbox BRD. Source QDPI.

To continue the success of 2006 BRD sea-trials, AFMA received further funding in 2007 from the Natural Heritage Trust (NHT) through the Department of Agriculture Fisheries and Forestry to undertake the project 'Bycatch Reduction Improvement in the Northern Prawn Fishery'. During the 2007 Tiger Prawn Season further trials of the popeye fishbox BRD was conducted onboard a number of NPF vessels. In addition, a new innovative device known as the witch-hat BRD enhancer was also tested at-sea. The objectives of the project included:

1. Flume tank (a water circulation tank used to test the hydrodynamic effect on fishing gear) testing of the Popeye Fishbox and one other developmental BRD, potentially the Witch-Hat BRD Enhancer.
2. Purchase 20 Popeye Fishbox BRDs and a Witch-Hat BRD Enhancer (if successful in flume tank trial) and provide to 20 vessels, to be fitted by gear technologist.
3. Purchase and field test two load cells (electronic weighing devices which can be attached to the gantry for when the net hauled onboard) to quantify total vessel bycatch.
4. Trial legislated BRDs closer to the codend drawstring to improve efficiency – to be quantified by onboard observer.
5. Report from flume tank testing to go to developers and other interested parties.
6. Reports produced and distributed to stakeholders on effectiveness of new and existing BRDs and results of Popeye Fishbox implementation.

The results from the Popeye Fishbox flume tank tests indicated that the BRD was capable of creating a circulation (counter clockwise) in the flow around the depressor plate. This circulation combined with the region of reduced flow downstream of the same plate and above the funnel exit hole, could potentially aid in the escapement of small finfish species. The results from the Witch-Hat BRD Enhancer tests revealed that the BRD was capable of creating a sizeable wake downstream and a relatively strong velocity gradient between the lower part of the codend and the square mesh window (SMW). This velocity gradient combined with the movement of water out through the SMW, could potentially aid in the escape of small finfish species (Figure 7).

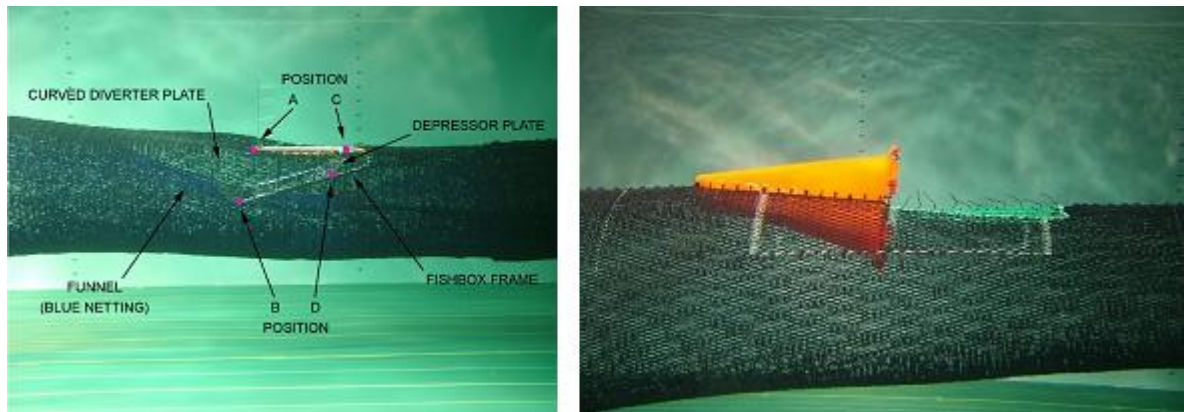


Figure 7. Testing of the popeye fishbox (left) and Witch-Hat BRD Enhancer (right) in the AMC flume tank (Source AMC).

Twenty Popeye Fishboxes and one Witch-Hat BRD Enhancer were purchased following the hydrodynamic trials in the AMC flume tank. Due to time constraints approximately half of the Popeye Fishboxes were distributed directly to vessels prior to the commencement of the 2007 fishing season, while the other half were placed on the 'mothership' to enable the distribution to NPF vessels during the fishing season. A total of 16 NPF vessels received the Popeye Fishbox. The remaining four Popeye Fishboxes were not distributed to vessels during the fishing season as a result of logistical constraints.

The AFMA gear technologist fitted the Popeye Fishbox to the fishing nets of 7 vessels throughout the tiger prawn season. Where necessary the gear technologist modified the vessel's fishing nets to ensure the Popeye Fishbox was operating at peak efficiency. On a number of occasions the Gear Technologist altered the 'funnel' (a funnel of net material sewn into the codend which guides catch beyond the BRD) as the data was indicating that the funnel may have been blocking the escape opening of the Popeye Fishbox. The other alterations made to the Popeye Fishbox involved net material being sewn over the escape opening of the BRD as the data revealed that prawn loss could be occurring.

During the 2007 Tiger Prawn Season a total of 36 BRD position trials were undertaken by an AFMA Observer, onboard two vessels over a two week period. Comparisons were made between BRDs positioned at various meshes from the codend drawstrings; 90 meshes vs 60 meshes, 90 meshes vs 70 meshes, 120 meshes vs 70 meshes and 120 meshes vs 90 meshes. Catches from each net were separated and individually weighed by the AFMA Observer using lug baskets.

As a result of the varying nature of fishing during the voyage i.e. changing fishing gear, the number of samples required to determine the effectiveness of BRD positions outlined in AFMA's 'BRD Trial Protocols', were not able to be gathered. Furthermore, as a result of these tests occurring late in the fishing season, the time available to test BRDs closer to the codend was restricted as was the AFMA's Observer's ability to move throughout the fleet. However, results from the tests indicate that the closer the BRD is to the codend drawstring the greater the bycatch reduction. The results from these preliminary trials will be utilised in BRD development.

A total of 51 shots were trialled with the Witch-Hat BRD located at 70 and 104 meshes from the codend drawstrings with varying configurations. Data from four shots were excluded from the assessment as a result of the BRDs being covered or TEDed (a large organism typically rays or large sponges caught at or in between the TED thus blocking the codend and effecting catch rates). A total of 8 shots were conducted at 104 meshes and 43 shots at 70 meshes from the codend drawstring. There was an average bycatch reduction per shot of 10% and a 2% increase in prawn catch for trials conducted at 104 meshes. While there was an average bycatch reduction per shot of 48% with 8% prawn loss for trials conducted at 70 meshes from the codend drawstring.

In depth analysis of this trial was difficult as several alterations were made to the Witch-Hat BRD Enhancer throughout the trial. Therefore sufficient repetitions of the same BRD configuration and placement to ensure the trial was statistically robust could not be made. However, the trial clearly demonstrated that the Witch-Hat BRD Enhancer is more effective at reducing bycatch than currently legislated BRDs that reduce bycatch by approximately 7%. The trial also revealed that further refinement to the Witch-Hat BRD Enhancer is needed to ensure bycatch exclusion is maximised whilst observing minimal prawn loss.

The NPF continues to foster and encourage innovative thinking in the development and testing of BRDs. The fishery continually strives to maximise bycatch reduction and minimise their impact on the environment. The NPF has also established a Bycatch Subcommittee which meets annually to review previous bycatch commitments, address current bycatch issues and plan future bycatch reduction strategies. The Bycatch Subcommittee also reviews and provides recommendations for the NPF Ecological Risk Assessment and NPF Bycatch Action Plans and Work Plans.

## 6. Catch Data

### 6.1. Total catch of target species

The past five year's logbook catch data for the NPF is provided in Table 5. The reduction in catches of endeavour, tiger and banana prawns in 2007 compared to previous year's is a direct result of the Commonwealth Government's Structural Adjustment Package (SAP) which reduced the total number of Gear Statutory Fishing Rights (SFRs) in the fishery from 53,844 to 35,479. The 2008 Banana prawn catch is the highest since 2001. The tiger prawn season is currently open in the NPF and is set to close in late November 2008, as such it is anticipated that catches of endeavour and tiger prawns will increase.

Table 5. Annual NPF logbook catch data (kg) for 2004-08.

Prawn Species	2004	2005	2006	2007	2008*	Total
Endeavour	404,967	285,525	368,553	199,797	79,167	<b>1,338,008</b>
Tiger	1,766,327	1,756,003	1,860,142	1,221,058	300,451	<b>6,903,981</b>
Banana	3,584,279	2,907,898	3,186,837	2,730,873	5,743,918	<b>18,153,805</b>
Total	<b>5,755,573</b>	<b>4,949,426</b>	<b>5,415,532</b>	<b>4,151,728</b>	<b>6,123,536</b>	

\*Ongoing results

### 6.2. Logbook Effort Data

Total fishing effort expressed as fishing days is provided in Table 6. In 2005 the total Class B SFRs in the fishery were reduced by 25%. The reduction in fishing effort in 2007 compared to previous years is a direct result of the Commonwealth Governments SAP which removed approximately 40% of SFRs from the fishery.

Table 6. Number of fishing days for the banana and tiger prawn seasons by year.

Year	Banana Prawn Season	Tiger Prawn Season
<b>2004</b>	3,842	8,479
<b>2005</b>	3,169	8,530
<b>2006</b>	3,227	7,486
<b>2007</b>	2,111	5,609
<b>2008*</b>	2,622	1,504

\*Ongoing results

The number of vessels recording catch in the NPF has fallen from 134 in 1995-96 to 52 in 2007-08 (Figure 8). This is largely due to the results of the 2006 Commonwealth Structural Adjustment Program whereby 43 Class B SFR were removed from the fishery resulting in 52 Class B SFRs remaining in the fishery (prior to the buyout there were 93 Class B SFRs).

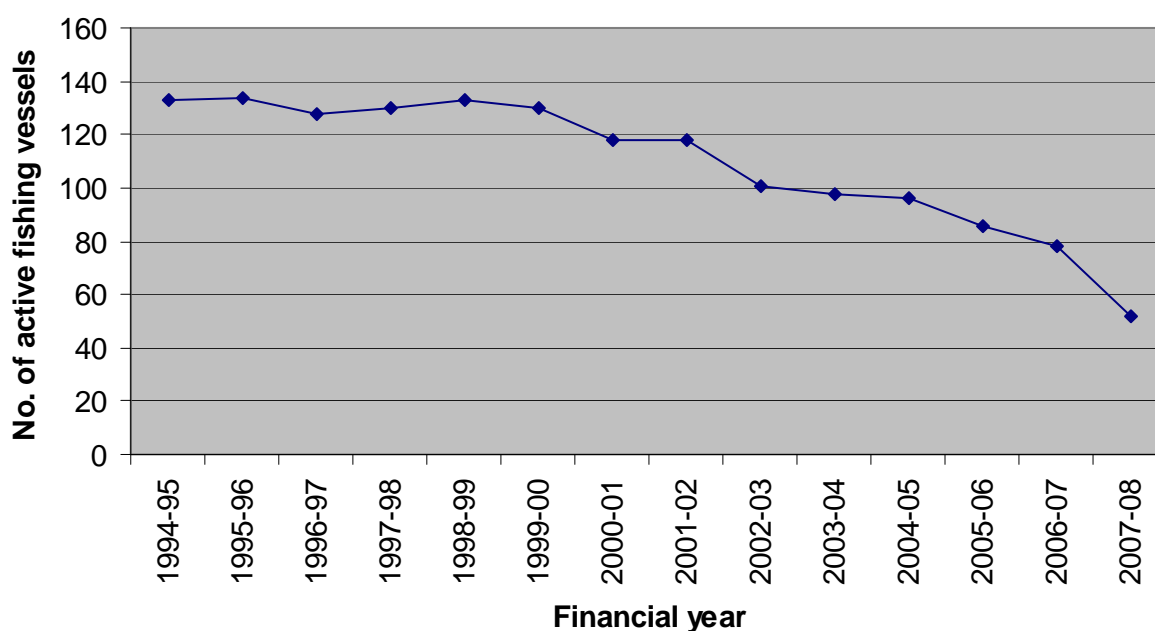


Figure 8. The number of active fishing vessels in the NPF for years 1994 - 2008.

### 6.3. Total catch of byproduct

Between 2004 and 2008 the catches of main by-product species has varied (Table 7). For example, catches of squid increased from 14 t in 2006 to 175 t in 2007. In 2006 a 500 t interim trigger limit was set for squid. If reached in the calendar year it will initiate a review of current management arrangements for the catch of squid in the fishery. Squid and other main byproduct species will be addressed in the harvest strategy development. AFMA is in the process of developing a Non-key Commercial Species (Byproduct) Policy, which will provide the guidelines for the future management of by-product species.

Table 7. Annual NPF logbook by-product catch data (kg) for 2004-08.

By-Product Species	2004	2005	2006	2007	2008*	Total
Cuttlefish	5,420	9,346	4,377	3,408	737	23,288
Squid	22,685	20,287	14,690	175,010	1,667	234,338
Scampi	22,020	15,311	18,399	5,445	18,979	80,154
Bugs	24,040	34,265	17,995	12,482	10,355	99,137
<b>Total</b>	<b>74,165</b>	<b>79,209</b>	<b>55,461</b>	<b>196,345</b>	<b>31,737</b>	

\*Ongoing results

## 6.4. Observer data

Comparison of CMO, SO and logbook recorded interactions with TEP species is detailed in Tables 8 and 9. Recorded interactions with all TEP species per boat day were lowest from logbook data (Table 8). Recorded interactions per boat day for seasnakes, sawfish and turtles were highest from CMO data, whilst syngnathid interactions per boat day were highest from Scientific Observer data (Table 9).

Table 8. Comparison of TEP species interactions reported by Scientific Observers, CMOs and in logbooks in the NPF during the 2007 tiger prawn season.

Form of data collection	Vessel returns	Fishing days**	Sea snakes	Turtles	Syngnathids	Sawfish
Logbook returns	51	4829	6689	25	1726	9
Crew Member Observers	5	362	415	14	22	19
Scientific Observers*	5	118	55	0	148	2

\*Scientific observer results includes data collected during fishing gear trials.

\*\* Days fishing practices were observed.

Table 9. Comparison of TEP species interactions reported by Scientific Observers, CMOs and in logbooks per boat day during in the NPF during the 2007 tiger prawn season.

Form of data collection	Seasnakes per boat day	Turtles per boat day	Syngnathids per boat day	Sawfish per boat day
Logbook returns	1.385	0.005	0.357	0.001
Crew Member Observers	1.146	0.038	0.060	0.052
Scientific Observers*	0.466	0	1.254	0.016

\*Scientific observer results include data collected during gear trials.

## 7. Status of target stock

### 7.1. Resource concerns

In the NPF, daily logbooks are used to record catch and effort data that are validated against landing records. Logbooks contain information on catch, effort, species, size grade, and location and time of fishing, as well as interactions with protected species. The prawn catches are not identified to species level: they are recorded in species groups (banana, tiger, endeavour or king) and by size category. This information is used in the production of stock assessments.

In 2002 the fishery commenced twice-yearly, fishery-independent surveys to provide estimates of prawn recruitment (January - February survey) and adult abundance (July - August). The aim of these surveys is to provide a long-term data series that can be used to facilitate determination of the stock recruitment relationships and other inputs for the stock assessments. These surveys

are also collecting information on the main byproduct species in the NPF. The survey information has been of value to date in NPRAG examination of issues around king prawns and banana prawn catches in the Weipa area.

### 7.1.1. Status of stock

In the 2002-03 BRS status report, Banana prawns and grooved and brown tiger prawns were assessed as either fully fished or overfished. Since 2004, assessments indicate that the stocks of these species have recovered and are no longer overfished or listed as subject to overfishing (see Larcombe and Begg 2008, Table 10). Furthermore, reductions in fishing effort indicate that current effort levels are unlikely to lead to overfishing.

Table 10. BRS Fishery Status Report 2007 results for target species in the NPF.

Species	Status	Reliability of assessment
White and red-legged banana prawns	Not overfished and not subject to overfishing	Poor-Moderate
Brown and Grooved tiger prawns	Not overfished and not subject to overfishing	High
Endeavour prawns	Uncertain	Poor
King prawns	Uncertain	Poor

## 7.2. Stock assessments and recovery strategies

In 2004 AFMA adopted Maximum Economic Yield (MEY) as the overall target for the NPF. The previous target was that the spawning biomass be at or above Biomass Maximum Sustainable Yield (BMSY) with at least 70% probability. Bioeconomic modelling of the tiger prawn fishery at the end of 2003 suggested that the effort and number of boats were much higher than levels needed to achieve MEY. In order to move towards this target, NORMAC agreed to a 25% reduction in the amount of gear represented in SFRs (in terms of headrope length) from the start of the 2005 tiger prawn season.

The long-term yield estimate for endeavour prawns was previously reported as 500 t, but this figure was not based on a rigorous assessment. Catches were variable but lower in 2000–06 (average 568 t) than in previous decades (1990–1999, 1056 t; 1980–1989, 1406 t). The gear and fleet reductions, as well as changes in the length and timing of the fishing season and changes in the spatial distribution of fishing effort, could have contributed to the smaller catches. The catch of king prawns has declined over the last 10 years, raising concerns over the status of these species. The declines could be consequences of reductions in the biomass or changes in the timing and location of fishing effort as many of the king prawn fishing grounds are now closed. The NPRAG examined the data on king prawns, including fine-scale distribution information from the fishery-independent surveys. However, they were not able to determine the most likely explanation for the declines in catches. The NPRAG concluded that seasonal closures in August had been beneficial to the king prawns' status and that they would continue to watch the trend for these species.

The economic climate in 2007–08 continued to present difficulties for NPF operators. The high Australian currency, high fuel prices and increased production of cheap aquaculture prawns resulted in a depressed international and domestic market. In response the NORMAC continued with research into the economics of the fishery. A bio-economic model has been established to optimise the pathway to the fishery's maximum economic yield. This will enable an effort and catch level that maximises profits or fishery returns, creating the largest sustainable difference between total revenues and the total costs of fishing.

The economic climate in which Commonwealth fisheries are operating under today makes it imperative to explore all options and pathways to Maximum Economic Yield (MEY). Economic efficiency is maximised when sustainable catch levels or effort levels are established to enable a catch and effort level that maximises profits or fishery returns, creating the largest sustainable difference between total revenues and the total costs of fishing.

The NPF has continued its commitment of pursuing MEY following the 2006 Commonwealth buyout. Early in 2008, the NPF became one of the first in the world to apply a dynamic MEY approach within a Harvest Strategy Framework (HSF) for the NPF tiger prawn fishery. This resulted in the incorporation of a bio-economic assessment as well as the stock assessment of the two tiger prawns within the HSF.

Applying the harvest strategy for input controls in the NPF enabled the first two years of the economic model effort estimation used to set the 2008 and 2009 fishing effort. The MEY assessment provides both a target value for MEY and a path to obtain this value. There are many possible paths, depending on the rate of discount, current fleet and vessel efficiency and cash-flow constraints facing the industry.

The application of a bio-economic model in the NPF has enabled industry, researchers and management to determine the appropriate effort in terms of fishing gear and days fished in order to increase the efficiency of the NPF fleet. This is consistent with the intention of the NPF structural adjustment program whereby the removal of fishing capacity can allow the efficiency of the remaining vessels to be increased to increase profits.

The NPF is dedicated to pursuing other cost savings within a co-management framework. A full cost benefit analysis (CBA) of management scenarios in the NPF is currently underway to help determine a preferred management option that would optimize the following matters in combination:

- increase net economic returns to the Australian community from the fishery,
- provide a cost-effective management of the fishery; and
- contribute to the ecologically sustainable development of the fishery.

This work is a vital component in the process of shaping a profitable and ecologically sustainable Northern Prawn Fishery in to the future.

### **7.2.1. Reliability of stock assessment**

The deviations in white banana prawn catch from predictions have resulted in an increased focus on the assessment of this species, in particular to address the uncertainty around whether fishing has an impact on recruitment. The tiger prawn assessment has been well developed, incorporating improvements in the modelling of changes in fishing power and the species composition of the catch. In 2001, Dr Richard Deriso commented that the NPF tiger prawn assessments were 'probably the most comprehensive assessments of any prawn populations in the world', but suggested that uncertainty in some aspects should be reduced. The NPRAG has taken up these suggestions. A number of assumptions are required for the parameters in the assessment model. The sensitivity of the outputs to these assumptions is examined through modelling a range of scenarios.

## **8. Interactions with protected species**

### **8.1. Frequency and nature of interactions**

The number of interactions with Threatened, Endangered and Protected (TEP) species reported in the NPF are provided in Table 11.

Seasnake interactions make up the bulk of TEP interactions in the NPF, while the mortality rate of turtles has been shown to be consistently low since the mandatory use of Turtle Excluder Devices (TEDs) was introduced in 2000. Apart from one trip in 2007 that recorded a large number of

juveniles being landed: interactions with Syngnathids are reasonably low. A significant number of elasmobranchs are still being caught and have a high mortality rate once caught.

Table 11. Interactions with Threatened, Endangered and Protected species in the NPF.

<b>Life status</b>	<b>Year</b>	<b>Elasmobranchs</b>	<b>Seasnakes</b>	<b>Syngnathids</b>	<b>Turtles</b>	<b>Total</b>
<b>Alive</b>	2004		9399	1	24	9424
	2005		7111	8	27	7146
	2006		6152	17	44	6213
	2007	207	5180	8	55	5450
	2008*	139	1044	5	8	1196
<b>Alive Total</b>		<b>346</b>	<b>28886</b>	<b>39</b>	<b>158</b>	<b>29429</b>
<b>Dead</b>	2004		1628	6	2	1636
	2005		1252	3	2	1257
	2006		1112	7	1	1120
	2007	84	757	1341		2182
	2008*	54	80		1	135
<b>Dead Total</b>		<b>138</b>	<b>4829</b>	<b>1357</b>	<b>6</b>	<b>6330</b>
<b>Unknown</b>	2004		2935	14	1	2950
	2005		1375	10		1385
	2006		2335	18		2353
	2007	22	1909	398		2329
	2008*	9	736	1		746
<b>Unknown Total</b>		<b>31</b>	<b>9290</b>	<b>441</b>	<b>1</b>	<b>9763</b>
<b>Total</b>		<b>515</b>	<b>43005</b>	<b>1837</b>	<b>165</b>	<b>45522</b>

\*Results reported up to August 2008

## 8.2. Management action to reduce interactions with TEP species

Fishers are required to report all interactions with TEP species in their logbooks and make all attempts to return them to the water alive. Since 2003, the Crew Member Observer and Crew Awareness programs have trained crew members in the handling of TEP species and how to maximise their chances of survival following incidental capture. This has improved the handling techniques for seasnakes and enabled the adoption of the best methods when dealing with turtles and other TEP species that are landed to aid recovery and survival following release.

Since the 1980s an extensive system of spatial and temporal closures has been used to protect critical habitat and reduce the impact of fishing on vulnerable species. The majority of inshore seagrass beds are permanently closed to fishing as they are important feeding grounds for turtles and may help provide sanctuary to many syngnathid species. Temporal closures are timed to prevent fishing in turtle nesting periods and promote fishing in times when prawns are found in large aggregations. This allows them to be caught in short targeted trawls which result in less bycatch. During the second fishing season of the year (the Tiger Prawn Season) trawling is prohibited in daylight hours to reduce bycatch levels and the catch of gravid females.

The use of Turtle Excluder Devices (TEDs) and Bycatch Reduction Devices (BRDs) is mandated in the NPF and has proven very successful in reducing interactions with TEP species, particularly turtles (Brewer et al. 2006). Research is continuing into the most efficient types of BRDs to use and where best to position the BRD within the codend. All TEP species identified in the ERAs will be managed accordingly through the Ecological Risk Management Strategy. Management of TEP species is also outlined in the implementation strategy for AFMAs bycatch and discarding program.

## 9. Impacts of the fishery on the ecosystem

### 9.1. Results of any Ecological Risk Assessments

In 2001, AFMA commissioned CSIRO to conduct an “Ecological risk assessment for Commonwealth fisheries” which included the NPF. One of the objectives of the project was to determine the relative sustainability risks in Commonwealth managed fisheries, considering target, bycatch and broader ecological impacts where possible. The Ecological Risk Assessment for the Effects of Fishing (ERAEF) framework involves a hierarchical approach that moves from a comprehensive but largely qualitative analysis of risk at level 1, through a more focused and semi-quantitative approach at level 2, to a highly focused and fully quantitative “model-based” approach at level 3 (Figure 9).

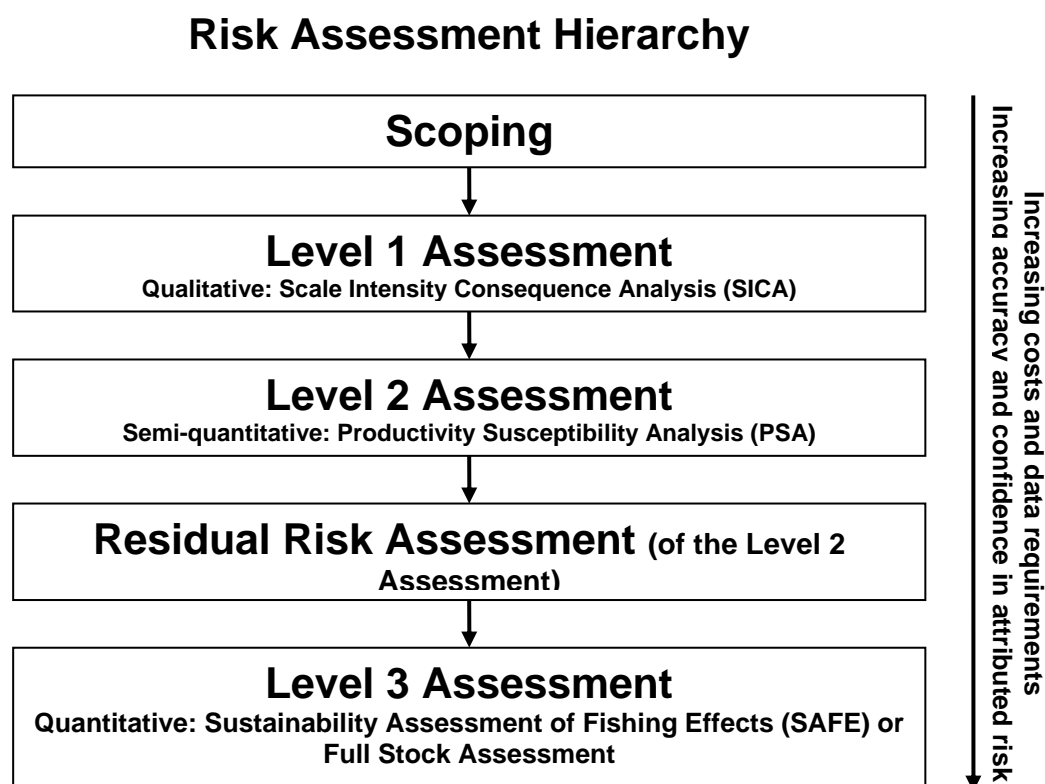


Figure 9. Risk assessment hierarchy.

The NPF has two sub-fisheries which were each assessed in the Ecological Risk Assessment (ERA) process: the banana prawn sub-fishery and the tiger prawn sub-fishery. A level 1 Scale Intensity Consequence Analysis (SICA) was completed in 2005 and identified direct and indirect impacts of fishing, discarding of catch, addition of non-biological material and external impacts as hazards. This level 1 analysis also eliminated communities as a hazard. A level 2 Productivity Susceptibility Analysis (PSA) was completed in 2005 which identified 28 species at ‘High Risk’ including 7 species of seasnake. A Residual Risk Assessment (RRA) on the level 2 High and Medium Risk species was completed in 2007 which reduced two species of cuttlefish from High to Medium risk levels. A level 2.5 Sustainability Assessment for Fishing Effects (SAFE) analysis (FRDC 2002/035) was completed in 2007 which examined 51 elasmobranch species and 478 teleost species. Of the species examined: three elasmobranch species and two teleost species were identified as ‘At risk’. A rapid level 3 analysis (FRDC 2005/051) was completed in 2008 which examined seasnake species found in the NPF and reduced the risk levels of the 7 species of snake identified as ‘High Risk’ in the level 2 PSA to ‘Not at Risk’.

A key component in AFMA’s move towards Ecosystem Based Fisheries Management (EBFM) has been the undertaking of ecological risk assessments (ERA) for all AFMA-managed fisheries.

By assessing the impacts of fishing on all parts of the marine environment, the ERAs encompass an ecosystem-based assessment approach. The ERAs will help to prioritise research, data collection monitoring needs and management actions for fisheries and ensure that they are managed both sustainably and efficiently.

### **9.1.1. Level 2 ERA Results**

The level 2 ERA examines ecological units such as individual species, habitats or communities. The assessment examines each unit based on two factors known as productivity and susceptibility. Productivity is the ability of a unit to recover from anthropogenic impacts, based on factors such as longevity and fecundity. Susceptibility is the likelihood of that unit being affected by the activity based on factors such as habitat and depth overlap.

There were 272 species assessed at Level 2 using the PSA analysis. In the Tiger Prawn Sub-fishery, 25 were assessed to be at high risk, including 16 by-product species, and 9 TEP species. By taxa, the high risk species comprised 8 invertebrates, 8 teleosts, 5 chondrichthyans (sharks and rays), and 4 marine reptiles. In the Banana Prawn Sub-fishery, 27 species were assessed to be at high risk, including 15 by-product species, and 12 TEP species. By taxa, the high risk species comprised 8 teleosts, 7 invertebrates, 7 marine reptiles, and 5 chondrichthyans (sharks and rays).

### **9.1.2. Level 2 ERA Residual Risk Results**

Due to the semi-quantitative nature of the Level 2 risk assessment, the analysis did not take into account all management measures currently in place in fisheries, resulting in a potential over-estimate of the actual risk for some species. To take account of this constraint, the residual risk of the 28 high risk species was quantified using guidelines developed by AFMA, CSIRO and stakeholders. Residual risk is broadly defined as the risk remaining after the implementation of mitigation measures.

Following residual risk assessment there was a change from 28 high risk species to 26 high residual risk species. These included 14 bycatch/byproduct and 12 TEP species including 5 Sawfish and 7 Seasnake species. The reduction in risk for two species was made under Guideline 2 which allowed the reduction in risk if missing data points could be “borrowed” from a closely related species.

### **9.1.3. Level 2.5 and Level 3 SAFE results**

Sustainability Assessment for Fishing Effects (SAFE) is a quantitative assessment carried out on bycatch species. A level 2.5 assessment (FRDC 2002/035) has been completed which reduced the risk level of 8 Invertebrate and 5 Sawfish species. A Level 3 assessment (FRDC 2005/051) has been completed which identified 2 teleost species and 3 elasmobranch species as ‘At Risk’ this assessment also reduced the risk level of the 7 Seasnake species assessed in the Level 2 assessment.

### **9.1.4. Priority Species identified through the ERA process**

The result of the risk assessment process is a priority list identifying the key ecological areas in the fishery that require management attention. The culmination of all 4 levels of assessment (SICA, PSA, Residual Risk, and SAFE) is a list of 11 species that have been identified as ‘At risk’ through the ERA process (Table 12). An update to the ERA was published in 2007 which contained information on the Level 1 SICA and Level 2 PSA results (Griffiths et al. 2007). A report on the RRA of the level 2 PSA is currently being produced by AFMA and is scheduled to be available by the end of 2008. AFMA is also currently producing an Ecological Risk Management (ERM) report which describes the ERA process to date including the results from the level 2.5 SAFE analysis. Both the ERM and RRA reports will be considered by NORMAC and the NPRAG once completed by AFMA staff.

Species that form the priority list for the NPF will be managed either through specific arrangements or under one or more of the following policies or measures:

- Harvest Strategy Policy and Guidelines (implemented);
- Non-key Commercial Species (Byproduct) Policy (in development);
- Bycatch and Discard Program (in implementation);
- Shark Policy and the Chondrichthyan Working Group (in development); and
- TEP species under various international plans of action, recovery plans etc (implemented).

ERM strategies to address those remaining species identified as at medium or low risk will be further considered at a later date. Due to limitations in the ERA methodology, for assessing the impacts of fishing operations on habitats and communities, AFMA will defer the development of an ERM strategy for these components until more refined and meaningful results become available. AFMA, through CSIRO has proposed new research and development that will develop the habitat component of the ERA in 2009-10.

Table 12. Species identified as high risk through the ERA process.

Taxonomic Group	Scientific Name	Common Name	Role in Fishery	Highest Level of Assessment	Risk Score
Chondrichthyan	<i>Orcectolobus ornatus</i>	Banded wobbegong	DI*	SAFE	Extreme High Risk
Chondrichthyan	<i>Taeniura meyeni</i>	Blotched fantail ray	DI	SAFE	Extreme High Risk
Chondrichthyan	<i>Urogymnus asperrimus</i>	Porcupine ray	DI	SAFE	Extreme High Risk
Teleost	<i>Dendrochirus brachypterus</i>	Dwarf lionfish	DI	SAFE	Precautionary Extreme High Risk
Teleost	<i>Scorpaenopsis venosa</i>	Raggy scorpionfish	DI	SAFE	Precautionary Extreme High Risk
Invertebrate	<i>Euprymna hoylei</i>	Cuttlefish	BP**	PSA	High
Invertebrate	<i>Metasepia pfefferi</i>	Cuttlefish	BP	PSA	High
Invertebrate	<i>Solenocera australiana</i>	Prawn	BP	PSA	High
Invertebrate	<i>Photololigo sp. 4</i>	inshore squid 4	BP	PSA	High
Invertebrate	<i>Dictyosquilla tuberculata</i>	mantis shrimp	BP	PSA	High
Invertebrate	<i>Harpisquilla stephensoni</i>	mantis shrimp	BP	PSA	High

\*Discard \*\*Byproduct

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## 11. Acronyms

ABARE	Australian Bureau of Agricultural and Resource Economics
AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
AMC	Australian Maritime College
AQIS	Australian Quarantine and Inspection Service
BAP	Bycatch Action Plan
BMP	Bycatch Monitoring Program
BP	By-Product
BRD	Bycatch Reduction Device
BRS	Bureau of Rural Sciences
CBA	Cost Benefit Analysis
CMO	Crew Member Observer
COMFRAB	Commonwealth Fisheries Research Advisory Body
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry
DEWHA	Department of the Environment, Water, Heritage and the Arts
DI	Discard
EBFM	Ecosystem Based Fishery Management
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ERA	Ecological Risk Assessment
ERAEF	Ecological Risk Assessment for the Effects of Fishing
ERM	Ecological Risk Management
FIS	Fishery Independent Survey
FRDC	Fisheries Research and Development Corporation
GPS	Global Positioning System
GVP	Gross Value of Production
HSF	Harvest Strategy Framework
ICVMS	Integrated Computer Vessel Monitoring System
ITQ	Individual Transferable Quota
JBG	Joseph Bonaparte Gulf
MAC	Management Advisory Committee
MEY	Maximum Economic Yield
MSY	Maximum Sustainable Yield
NORMAC	Northern Prawn Fishery Management Advisory Committee
NGO	Non-Governmental Organisation
NHT	National Heritage Trust
NPF	Northern Prawn Fishery
NPFREC	Northern Prawn Fishery Research and Environment Committee
NPRAG	Northern Prawn Resource Assessment Group
OCS	Offshore Constitutional Settlement
PSA	Productivity Susceptibility Analysis
RRA	Residual Risk Assessment
SAFE	Sustainability Assessment for Fishing Effects
SAP	Structural Adjustment Package
SFR	Statutory Fishing Right
SICA	Scale Intensity Consequence Analysis
SLR	Season Landing Report
SMW	Square Mesh Window
SO	Scientific Observer
TED	Turtle Excluder Device
TEP	Threatened, Endangered and Protected
VMS	Vessel Monitoring System
WTO	Wildlife Trade Operation

## 12. Attachments

### 12.1. Attachment A. Recommendations to the Australian Fisheries Management Authority (AFMA) on the ecologically sustainable management of the Northern Prawn Fishery (NPF).

Table 13. Recommendations to the AFMA on the ecologically sustainable management of the NPF. Wildlife Trade Operation exemption - 9 August 2003 to 9 January 2009.

Performance Criteria	Level of Achievement as at 30 September 2008	Deadline
<p><b>Recommendation 1</b> At the next review of the Management Plan detailed objectives, performance criteria, performance measures and regular review requirements will be formalised and directly linked to the Management Plan.</p>	<p>No The Management Plan has been amended on two occasions since the recommendations were made. These recommendations will be implemented when the plan is next reviewed.</p>	As required
<p><b>Recommendation 2</b> AFMA will continue to inform the Department of the Environment and Water Resources Heritage and Arts (DEWHA) of any significant changes to the Strategic Plan, Management Plan, Bycatch Action Plan, or managerial commitments in the strategic assessment submission.</p>	<p>Yes The Bycatch Action Plan has recently been reviewed and was subsequently approved by the AFMA Board at their August 2007 meeting. This information was provided to DEWHA. The Strategic plan is in the process of being reviewed. Any review will be provided to DEWHA.</p>	As required
<p><b>Recommendation 3</b> At the next review of the Management Plan an amendment will be made to require the assessment of the effectiveness of the Management Plan, including the measures taken to achieve its objectives by reference to the performance criteria mentioned in recommendation (1), at least every five years.</p>	<p>No The Management Plan has been reviewed on two occasions since the recommendations were made. These recommendations will be implemented when the plan is next reviewed.</p>	As required
<p><b>Recommendation 4</b> AFMA will continue to cooperate with other relevant jurisdictions to pursue complementary management and research of shared stocks for all target and by-product species, which may be affected by cross-jurisdictional issues.</p>	<p>Yes Meetings have been held with the relevant State and Territory authorities to ensure complementary management and research of all shared stocks. A State/Territory member participates at NORMAC. Formulation of the Northern Australia Fisheries Committee (NAFC) has resulted in a primary focus on shared shark and red snapper resource management in the immediate short term. This is ongoing.</p>	9 January 2009

Performance Criteria	Level of Achievement as at 30 September 2008	Deadline
<p><b>Recommendation 5<sup>1</sup></b>  AFMA will develop and implement harvest strategies for all target prawn species, scampi, squid and slipper lobsters (bugs) within five years. Harvest strategies should include monitoring systems, suitable biological reference points and management responses with clear timeframes for implementation, to ensure that harvesting is conducted at an ecologically sustainable level. Harvest strategies should also be developed for other species as new market opportunities are detected.</p>	<p>Yes  An ongoing Bycatch Monitoring Project to collect relevant data and biological information to assist in developing harvest strategies has been implemented. A final report has been drafted and is currently been released. In addition, a project has commenced titled '<i>Developing a management strategy for byproduct species in the NPF</i>.'</p> <p>As required under the Ministerial Direction an input controlled harvest strategy has been developed for the NPF for target and byproduct species and was implemented on 1 January 2008. The output controls harvest strategy will not be developed until the outcomes of the Cost Benefit Analysis on the future management of the fishery is completed (March 2009). It is envisaged that a form of ITQs will be introduced during 2010.</p> <p>The Northern Prawn Resource Assessment Group is addressing this issue as part of its work program.</p>	<p>1 January 2008  Completed</p>
<p><b>Recommendation 6<sup>1</sup></b>  AFMA, in cooperation with the Western Australia, Northern Territory and Queensland fisheries management agencies will, within five years, develop and implement a precautionary and biologically meaningful limit for squid harvest based on sound information about the species ability to withstand fishing pressure. Within 12 months, as an interim measure, AFMA will implement more precautionary management arrangements, based on the best available scientific advice, and taking into account historical catch, to limit the harvest of squid species in the NPF.</p>	<p>Commenced  The Northern Australian Fisheries Managers addressed the issue of squid in September 2004. Catch and effort data for each relevant jurisdiction was also collected to support the discussion.</p> <p>In 2006 a 500t interim trigger limit was set for squid. This limit was not reached in 2007. If reached in the calendar year it will initiate a review of current management arrangements for the catch of squid in the fishery. Squid will also be addressed in the harvest strategy development.</p> <p>In addition, the byproduct project (see recommendation 5) will present a final report that will include improved management arrangements for squid.</p>	<p>Not completed</p>
<p><b>Recommendation 7<sup>2</sup></b>  Within 3 years AFMA will identify and implement management responses to fishing impacts identified from the ecological risk assessment process.</p>	<p>Ongoing  AFMA has received the final ERA level 2 PSA reports. In addition AFMA has applied a residual risk analysis of the level 2 PSA to account for existing management arrangements. The Bycatch Subcommittee and NPRAG reviewed the application late 2007 and</p>	<p>December 2008</p>

Performance Criteria	Level of Achievement as at 30 September 2008	Deadline
	<p>the final high risk species are being considered by NORMAC in 2008. AFMA in conjunction with the Bycatch Subcommittee, NPRAG and NORMAC is now identifying appropriate responses for the priority species. This is to be completed by the end of 2008. A draft ERM will be provided to the NPRAG and NORMAC for their consideration in late 2008.</p>	
<p><b>Recommendation 8<sup>2</sup></b>  An assessment of bycatch and biodiversity in prawn trawl fisheries<sup>3</sup> conducted prior to the introduction of Turtle Excluder Devices (TEDs) and Bycatch Reduction Devices (BRDs) identified Pristidae (sawfishes) and Dasyatidae (ray) species as least likely to be sustainable to trawling operations. Within three years, unless the introduction of TEDs and BRDs have been found to significantly reduce the catch of these species to levels that do not place these species at conservation risk, or the ecological risk assessment has determined that these species are not likely to be significantly impacted by operations in the fishery, AFMA will ensure that these species receive ongoing monitoring and attention in future refinements of bycatch mitigation measures. Particular attention should be paid to the Green Sawfish (<i>Pristis zijsron</i>) and Narrow Sawfish (<i>Anoxypristis cuspidate</i>). Relevant information on species found to be at risk should be collected to inform the development of mechanisms to minimise the impacts of trawling on these species</p>	<p>Commenced  The bycatch monitoring project has been completed and the outcomes discussed by the NORMAC Bycatch Subcommittee in February and June 2007. This recommendation remains a high priority for the fishery, with Scientific Observers, Crew Member Observers (CMOs), research cruises and logbooks continuing to be used for monitoring these species.</p> <p>The NPF logbook was amended in April 2007 to include reporting interactions with sawfish. This includes a colour ID guide.</p>	<p>9 January 2009</p>
<p><b>Recommendation 9<sup>1 2</sup></b>  AFMA will continue to pursue reduction in the amount of bycatch taken in the Northern Prawn Fishery through the refinement of bycatch mitigation technology and will investigate methods for increasing the survivability of bycatch species. Any suitable methods</p>	<p>Commenced  The Bycatch Subcommittee reviews progress regularly. Scientific permits have been issued in the fishery to trial a number of BRDs, while CSIRO is continuing trials to reduce the number of sea snakes taken as bycatch in the fishery. CMOs and Scientific</p>	<p>9 January 2009</p>

Performance Criteria	Level of Achievement as at 30 September 2008	Deadline
<p>identified should be implemented in a timely manner.</p>	<p>Observers will be used to monitor levels of bycatch at dusk and dawn. These results may result in management actions to reduce bycatch.</p> <p>A workshop on innovative options for bycatch reduction was held in November 2006 in Cairns to provide further impetus for improvements to BRD design in the Fishery. The workshop brought gear technologists from Australia and overseas together with industry to investigate and develop new ways of reducing bycatch in trawl fisheries. A smaller workshop will be held in Darwin prior to the start of the tiger season in July 2007.</p> <p>In November 2006, an AFMA scientific observer was deployed to assess the Popeye Fishbox BRD. The results were extremely encouraging with a 48% reduction in bycatch. A NHT funded project is intending to implement a number of these 'fishboxes' into the NPF fleet for the 2007 tiger prawn season. During the 2007 tiger prawn season further trials of the popeye fishbox BRD was conducted onboard a number of NPF vessels. In addition, the witch-hat BRD enhancer was also tested at-sea. A draft report outlining the results has been produced.</p> <p>Following these trials AFMA listed the popeye fishbox as a BRD that could be used in the NPF.</p> <p>AFMA is committed to continual improvement in reducing bycatch levels. As a result the NPF will focus on this issue in the short to medium term.</p> <p>A bycatch working group meeting will be held in October 2008 to consider additional methods to reduce bycatch.</p>	

Performance Criteria	Level of Achievement as at 30 September 2008	Deadline
<p><b>Recommendation 10<sup>2</sup></b>  AFMA will ensure that ongoing monitoring of sea snake species taken in the fishery is undertaken to ensure that any future impacts on these protected species can be detected. Within three years, unless the introduction of TEDs and BRDs have been found to significantly reduce the catch of sea snakes to levels that do not place these species at conservation risk, or the ecological risk assessment has determined that these species are not likely to be significantly impacted by operations in the fishery, AFMA will ensure that sea snake bycatch is specifically considered in ongoing monitoring and refinement of bycatch mitigation measures. If necessary, the development of bycatch mitigation measures to significantly reduce the capture of sea snakes should be a priority. Research, monitoring and mitigation measure development should concentrate on <i>Hydrophis pacificus</i> (large headed sea snake) and <i>Disteria kingii</i> (spectacled sea snake) to ensure that impacts on these species are sustainable.</p>	<p>Commenced  Monitoring of sea snakes taken in the Fishery is being carried out using CMOs, Scientific Observers, Logbooks and research surveys. Scientific permits have been issued in the fishery to assess the effectiveness of BRDs in reducing snake catch, while CSIRO is also undertaking studies to reduce the number of sea snakes taken as bycatch in the fishery.</p> <p>A 'Risk assessment and mitigation for sea snakes caught in Northern Prawn Fishery' project has recently been finalised. The results have been provided to FRDC. This work will provide direction in assessing the risk to sea snakes as well as potential options for sea snake mitigation.</p> <p>The encouraging results of the Popeye Fishbox assessment will be pursued, with more testing and modifications to further improve its ability to exclude bycatch and sea snakes.</p>	<p>9 January 2009</p>
<p><b>Recommendation 11<sup>2</sup></b>  AFMA will develop and implement an education program for industry to increase awareness of the importance of sea snake protection, promote sensible handling techniques and improve species identification. AFMA will also ensure that observers are adequately trained in sea snake identification to species level to maximise the use of data collected in monitoring programs.</p>	<p>Yes  The CMO program has proved to be effective in collecting information on snake species and distribution. Over the past 5 years CMOs have been taking photos of sea snakes which are then sent to CSIRO for species identification as identification to species level requires specialised skills. This method has proved to be effective and efficient in the identification of sea snake species and will continue.</p> <p>A crew awareness program was initiated in 2003 to provide crew with information on sea snake handling, identification and reporting. This was held again prior to the first fishing season of 2006, 2007 and in July 2008. It is intended to be an ongoing program.</p> <p>Operators were reminded of the importance of accurately recording captures of sea snakes and proper handling techniques during pre-season briefings by AFMA staff in July 2008.</p>	<p>May 2008</p>

Performance Criteria	Level of Achievement as at 30 September 2008	Deadline
<p><b>Recommendation 12<sup>1</sup></b>  AFMA, in cooperation with the States, will develop and implement a spatial management system within the NPF that takes account of the impacts of fishing on:</p> <ul style="list-style-type: none"> <li>• species and populations identified by the ecological risk assessment process as high risk;</li> <li>• the recovery of overfished stocks;</li> <li>• important feeding/spawning/breeding/refuge grounds for key target, byproduct and protected species; and</li> <li>• benthic habitats</li> </ul> <p>This spatial management system will be integrated with the regional marine planning process for Northern Australia that is already under way to establish a representative system of marine protected areas in the region and will ensure that the entire fishery area is taken into account.</p>	<p>Yes</p> <p>AFMA is working directly with NORMAC on spatial management issues. AFMA is presently looking at expanding the scope of a closures database for the NPF – the database provides a historical record of closures decisions and could have a role in development of new closures.</p> <p>AFMA and NORMAC will look at incorporating the outcomes of several spatial management projects being undertaken by CSIRO, including “Spatial Models”, “Economic MSE” and Seabed Mapping and Characterization”.</p> <p>The NPF is also involved with the DEW Northern Marine Planning Process.</p> <p>AFMA spatial management guidelines have been developed in conjunction with CSIRO.</p>	<p>9 January 2009</p>

<sup>1</sup>also an initiative of the Ministerial Direction

<sup>2</sup>also an initiative of the Bycatch Action Plan

<sup>3</sup> Stobutzki, I., Blaber, S., Brewer, D., Fry, G., Heales, D., Miller, M., Milton, D., Salini, J., Van der Velde, T., Wassenberg, T. (2001) Ecological sustainability of bycatch and biodiversity in prawn trawl fisheries. FRDC Project 96/257.