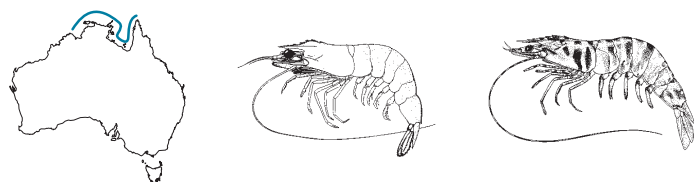# Northern Prawn Fishery

Main features

STATUS

Banana prawns are **not overfished** (catches are probably sustainable, but fluctuate considerably from year to year, reflecting variable stock size); brown tiger prawns and grooved tiger prawns are **not overfished** and current levels of effort will not lead to overfishing; the status of endeavour prawns and king prawns is **uncertain**

RELIABILITY OF THE ASSESSMENT

High for tiger prawns, though the impact of possible changes in distribution of brown and grooved tiger prawns over time is being examined; moderate for banana prawns; poor for endeavour and king prawns

CURRENT CATCH (2004)

Total 5686 t, banana prawns 3520 t, tiger prawns 1767 t, endeavour prawns 396 t; total value A$74m (2003–04). 2005 banana prawn season catch was approximately 2550 t
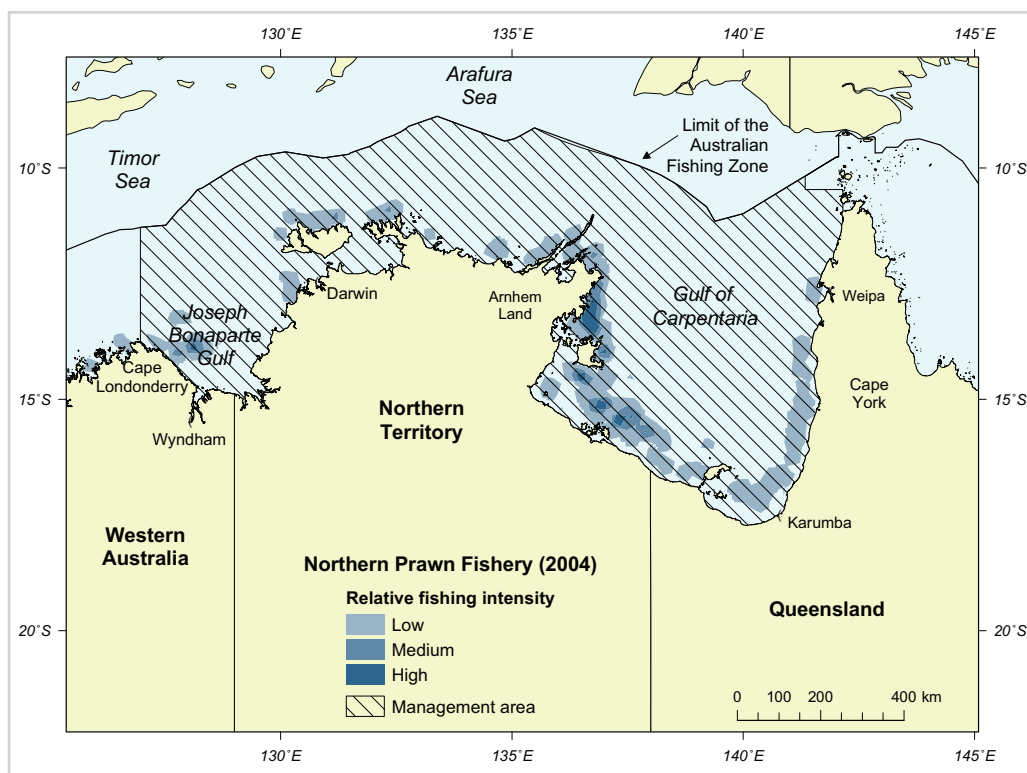
LONG-TERM POTENTIAL YIELD

Around 4000 t a year for banana and 3300 t a year for tiger prawns

MAIN MANAGEMENT OBJECTIVE

In 2004 it was agreed the overall target for the fishery is maximum economic yield. Previously, the agreed objective was to maintain fishing effort such that the tiger prawn spawning stock was at or above the level that produced the maximum sustainable yield. Measures to reduce effort on tiger prawns by 40% were introduced in 2002 and retained in 2003. In 2005, a 25% reduction in allowable net length was implemented on economic grounds—at the same time there was an extension to the tiger prawn season for the first time in six years. No formal management reference point has been adopted for banana prawns

MANAGEMENT METHODS

Input controls that include limited entry, gear restrictions, daylight closures, and other time and area closures; continual review of management arrangements in line with annual stock assessments and other research

Northern Prawn Fishery (2004) — Relative fishing intensity map showing the Northern Territory, Western Australia, Queensland coastlines, the Arafura Sea, Timor Sea, Gulf of Carpentaria, and management area.

Highlights

- The Northern Prawn Fishery (NPF) is the most valuable fishery managed by the Australian Government. Production has declined from A$135m in 2001–02 to A$74m, in part due to lower catches but also due to lower prices.

- The total prawn catch for the fishery in 2004 was 5686 t (5898 t in 2003 and 6936 t in 2002). Tiger prawn catches and effort were the lowest for more than 25 years.

- The two species in tiger prawn catches—grooved tiger prawn and brown tiger prawn—have previously been assessed as overfished. Recent assessments conclude stocks of both species have recovered and are now not overfished. Furthermore, current levels of fishing effort are considered to be unlikely to lead to overfishing.

- Bycatch-reduction and turtle-excluder devices were introduced in 2000. Ongoing monitoring indicates that they are effectively reducing the capture of turtles and other large animals, including sharks and rays. The introduction of these devices enabled the fishery to be certified to export prawns to the United States. The industry initiated a ban on the fishery retaining any shark product from the start of 2001.

- The NPF has been approved for accreditation under the *Environment Protection and Biodiversity Conservation Act 1999*, ensuring that fishers can continue to export their catch for the next five years, although recommendations for management improvement must be implemented before the next review in 2008.

Background

History of the fishery

The Northern Prawn Fishery (NPF) extends from Cape Londonderry in Western Australia to Cape York in Queensland. It was established in the late 1960s. The NPF is a multispecies trawl fishery targeting prawns but also landing some bugs (*Thenus* spp.), scallops (*Amusium* spp.) and squid (*Photololigo* spp.). The white banana prawn (*Fenneropenaeus merguiensis*) and the two tiger prawns (grooved, *Penaeus semisulcatus*, and brown, *P. esculentus*) account for about 80% of the landed catch. The other prawn species taken are the red-legged banana prawn (*F. indicus*), two species of endeavour prawns (*Metapenaeus endeavouri* and *M. ensis*) and king prawns (*Melicertus latisulcatus* and *M. longistylus*). The bulk of the NPF catch is exported, chiefly to Japan.

The fishery has two components: a banana prawn fishery that operates mainly in the eastern waters of the Gulf of Carpentaria, on isolated grounds along the Arnhemland coast and in Joseph Bonaparte Gulf; and a tiger prawn fishery that is concentrated near coastal seagrass beds in the southern and western Gulf of Carpentaria and along the Arnhemland coast. Endorsed vessels can operate in both components. Most vessels are 13–25 m and are restricted to fishing with no more than two main trawl nets.

White banana prawns form dense aggregations ('boils') that can be seen by 'spotters' in planes, who direct trawlers to them. These prawns are fished mainly during the day. They comprise more than 80% of the NPF banana prawn catch. The highest catches are taken in the eastern and southern Gulf of Carpentaria near to the mangrove forests that are juvenile nursery areas. The fishing season, which starts around April, usually lasts only a few weeks before catch rates decline to unprofitable levels. Annual catches of banana prawns vary: since 1971 they have ranged from around 2200 t to 12 711 t, but have averaged 4300 t per year. The highest catches have generally followed higher-than-average rainfall in the summer before.

Red-legged banana prawns are taken mostly in the Joseph Bonaparte Gulf. They can be fished during the day and night throughout the year, but with the high tidal range in that gulf, they are mostly fished around the neap tides, when the species is more easily caught. Catches have averaged about 800 t per year since the early 1980s or about 20% of the yearly NPF banana prawn catch. In the past, Joseph Bonaparte Gulf was generally fished more intensively only when catches in other parts of the NPF were low, but a group of vessels now fish more regularly in the region.

Tiger prawns are fished at night on fishing grounds that are often close to those for banana prawns, but are discrete because the juveniles have different habitat requirements. Highest catches are taken in the southern and western Gulf of Carpentaria—regions adjacent to coastal seagrass beds. Trawlers switch to tiger prawns when catch rates in the banana prawn fishery decline, with most of the effort in August–September. Since fishing-effort restrictions were introduced in 1987, annual catches in the tiger prawn fishery, which include byproduct catches of king and endeavour prawns, have ranged from 2145 t to about 5300 t.

The Australian Fisheries Management Authority (AFMA) is advised by the Northern Prawn Fishery Management Advisory Committee (NORMAC), which is made up of representatives from industry, management and research. The annual assessments are undertaken by the Northern Prawn Resource Assessment Group (NPRAG), which reports directly to the AFMA Board. The management approach in the NPF is to control inputs: a limited-entry regime with seasonal and area closures, and gear restrictions. In 1984, vessels were "unitised" to reduce capacity and control fishing effort. These units were based on hull volume and engine power. A buy-back scheme operating between 1987 and 1993 reduced the number of vessels fishing from about 230 to 125. An April opening date for the fishery was introduced to increase the

value of banana prawns by letting them grow to a good market size before being fished. A mid-season closure, in force since 1987, was introduced to restrict effort on tiger prawns before they spawn. Daylight trawling closures during the tiger prawn fishing season are intended to increase efficiency by preventing fishing when catchability is low and spawning females may be more vulnerable.

A new management plan came into effect in 1995 and statutory fishing rights (SFRs) were issued. These SFRs were based on existing units in the fishery. Despite reductions in the size of the fleet, the ability of industry to adopt new technology led to concerns that effective effort levels were too high. As early as 1991 there were suggestions that effort controls should be gear-based, i.e. on the amount of fishing net used. The NPRAG advised in the latter half of the 1990s that effective effort directed at tiger prawns was well above that required to take the maximum sustainable yield (MSY) and should be reduced by 25–30%. In 1997, NORMAC supported the idea of a change to the use of gear-based units, but this was not implemented for several more years. The lengths of the closed seasons were changed to reduce fishing effort in 1999 and 2000, making them the shortest NPF fishing seasons in 20 years, and there have been further reductions since. In July 2000, the change from managing fishing effort through units based on engine size and vessel-hull volume to gear-units based on the headrope-length of fishing nets came into effect. AFMA considered that headrope length would represent a vessel's fishing power more accurately than engine and vessel size, so would provide a better control of effort. The new system will not prevent future increases in efficiency, but if fishing effort must be reduced in the future, reducing the amount of fishing gear an operator can use is expected to be a more direct and simplified way of doing so. The degree to which fishers will be able to increase the efficiency of their gear will need to be evaluated to ensure there are reductions in effective effort.
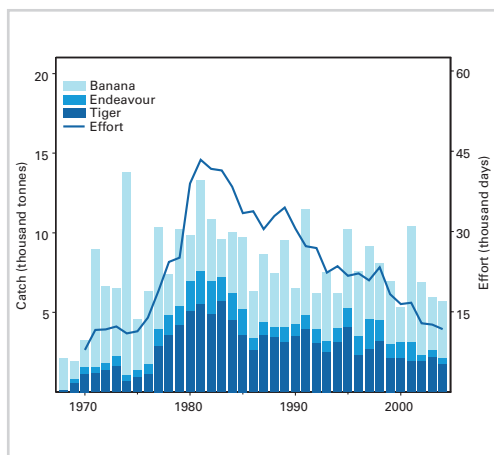
Biology

The commercial prawn species in the NPF have a life span of up to two years, though growth rates vary considerably between species and sexes. Juvenile prawns live in coastal and estuarine areas in beds of seagrass or mangrove-lined creeks and rivers. Although most species are sexually mature at six months, 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. Eggs sink to the bottom after release, and hatch into larvae within about 24 hours. Fewer than 1% of these offspring survive the two-to-four-week planktonic larval phase to reach coastal nursery habitats where they settle. After one to three months on the nursery grounds, the young prawns move offshore onto the fishing grounds.

Adult white banana prawns are found mainly over muddy sediments in depths of less than 20 m, but can be found at depths of up to 45 m. They reach commercial size before 6 months of age (the market, however, prefers larger tiger prawns, 9–12 months old). White banana prawns spawn throughout much of the year, but the two main spawning periods are associated with monsoons in the region (March–May and then September–November). The prawns from the latter spawning dominate the commercial fishery in April–May the following year.

The life cycles of grooved and brown tiger prawns are similar. Before settling on inshore nursery grounds, the planktonic larvae are found in less than 50 m of water. Juvenile tiger prawns remain in nursery areas for several months before migrating. In the Gulf of Carpentaria, brown tiger prawns move offshore between November and February, whereas grooved tiger prawns move between January and April. Adult brown tiger prawns can be found in depths to 200 m, but are trawled mostly in 10–20 m over coarse sediments. Grooved tiger prawns are taken mostly from fine mud sediments in the Gulf of Carpentaria at depths to 130 m.

Adult red-legged banana prawns are found offshore in depths from 45 m to 85 m, and though they are known to aggregate, they do not form the large schools typical of the white banana prawn. A recent survey of the Joseph Bonaparte Gulf to establish and compare the nursery habitats of these two banana prawn species found that juvenile red-legged banana prawns predominated in the rivers in the eastern Joseph Bonaparte Gulf, while juvenile white banana prawns predominated on the western side. Juvenile red-legged banana prawns were found in numbers in small, mangrove-lined creeks in estuaries, similar to the nursery habitats for white banana prawns in the Gulf of Carpentaria. The highest catches of red-legged banana prawns are taken from the northwestern area of the Joseph Bonaparte Gulf. This implies that the larvae of red-legged banana prawns move large distances from the spawning grounds in the fishing zone to the nursery grounds in the south and east, and that the juvenile stages must move large distances from the mangroves, across shallow sand, into the deeper, muddier substrate where the fishery operates.

The 2004 fishery

Measures to reduce fishing effort on tiger prawns by 40% were introduced in 2002. The seasons were shortened—the first season ran from 1 April to 13 May (43 days, compared with 57 in 2001); the second ran from 1 September to 1 December (91 days, compared with 98 in 2001). In addition, gear units were reduced by 25% from 24 August 2002. The 2003 season openings and gear allowances were the same as in 2002. In 2004 fishing was permitted for the same number of days as in 2002 and 2003, but the first season was changed to 15 April to 27 May.

Effort attributed to the banana prawn season in 2004 was 3985 days (4114 days in 2003). Tiger prawn effort in 2004 was 7793 days (8503 in 2003). A total of 96 vessels fished during the year, down from 97 in 2003 and 114 in 2002. The average headrope length used was 40.8 m.

The fishery reported total landings of 5686 t of prawns in 2004: banana prawn 3520 t (compared with 3238 t in 2003, 4577 t in 2002 and the 20-year high of 7245 t in 2001); tiger prawn 1767 t (compared with 2222 t in 2003); and endeavour prawn 396 t (compared with 435 t in 2003 and substantially less than the 1157 t in 2001). King prawn annual catches averaged 103 t in the 1980s and 55 t in the 1990s. However, they have become a relatively minor bycatch in recent years, with only 3 t caught in 2004.

Catches in the 2005 banana prawn season (9 April to 21 May) were lower than average, at approximately 2550 t.

Current monitoring and research

Operators of commercial vessels in the NPF record catch, effort, species, size grade, and location and time of fishing, as well as interactions with protected species, in daily logbooks (prawn catches are recorded as banana, tiger, endeavour or king prawn catches and are not identified to the species

level). This information is analysed and interpreted by research agencies to make stock assessments.

The highest-priority research issues for the NPF are: monitoring and assessing the status of the fishery; reducing bycatch and discards; examining the effects of fishing; and improving knowledge of environmental factors of importance to the fishery. Recent research has included:

- stock assessment and stock–recruitment relationships of tiger prawns
- at-sea surveys to improve information available for assessment
- fishery catch-and-effort analysis, including evaluation of effort creep (increased effectiveness of vessels and operations)
- risk analysis and sustainability indicators for prawn stocks in the NPF
- examination of the spatial distribution of brown and grooved tiger prawns
- biology and nursery habitats of red-legged banana prawns
- monitoring the catch of turtles and other bycatch in the NPF.

It is important that stock assessment of the major species continues in coming years, but there is also a need to monitor the status of endeavour and king prawns, as well as to undertake broader ecosystem research.

Status of stocks

Previous assessments

The annual productivity of banana prawns has been linked to rainfall levels, although the effect varies from area to area. Expected catches estimated on the basis of rainfall are compared with observed catches to give an assessment of the banana prawn fishery. Deviations from expected catches, especially in the southeastern Gulf of Carpentaria, are assumed to signal a possible change in the status of the stock. The sustainable long-term average annual catch for banana prawns in the NPF is thought to be around 4000 t (approximately the average annual catch for

the last 10 years, although it has ranged from around 2000 to 12 000 t).

Brown and grooved tiger prawns have been the focus of assessment efforts in the NPF since the early 1990s. Initially the two species were treated as a single species and stock throughout the fishery. In 1993, the long-term potential yield of the two tiger prawn species was estimated to be between 3800 and 4300 t annually, with each species contributing about half of the total. After the fleet was restructured, which ended by 1993, the catch rate for tiger prawns was expected to improve markedly. This did not happen. Rather, the subsequent assessments indicated that tiger prawns were overfished. By mid-1997, the data were separately analysed for the two species of tiger prawns. Their status was estimated from a dynamic model that used all the data from 1970 onwards to calculate a stock–recruitment relationship, and used historical fishing-effort data to predict the catches for comparison with actual catches. Fishing power or effective effort was assumed to be increasing at 5% per year due to factors such as improvements in technology. The updated assessment gave a combined long-term annual yield estimate of around 4000 t, but indicated that effective effort in the fishery should be reduced.

The 1999 assessment concluded that the effective fishing effort on grooved tiger prawns had decreased by 15% and on brown tiger prawns by 40%. The decreases were largely a result of the extended seasonal closure in that year. The effective catch per unit of effort for both species of tiger prawn declined between 1998 and 1999 to well below the average for the previous seven years. In 2001, AFMA contracted an international expert (Richard Deriso, Inter-American Tropical Tuna Commission, USA) to review the NPF tiger prawn assessment. His review supported the assessment's conclusion that brown and grooved tiger prawns were overfished. He also suggested that levels of fishing effort were too high to promote recovery. This assessment indicated that brown tiger prawn stocks were at

42–54% and grooved tiger prawn stocks were at 66–86% of target levels. Stock status is presented in terms of MSY, the spawning stock that produces this yield (S_{MSY}) and the fishing effort that produces MSY (E_{MSY}). A target reference point—that by the end of 2006 and with at least 70% certainty, spawner levels will be at or above S_{MSY}—was adopted in August 2001.

The assessment of status at the end of 2002 indicated that brown tiger prawns were overfished, whereas most assumptions resulted in a conclusion that grooved tiger prawns were not overfished, due to increases in recruitment. A further assessment incorporating data to the end of 2003 showed further recovery and suggested that, under most scenarios examined, neither brown nor grooved tiger prawns were overfished.

No assessments of the potential yield of endeavour and king prawns have been made.

2004 update

A major change in recent tiger prawn assessments has been the use of several fishing-power series based on a combined engineering and statistical model, rather than an assumed 5% per year increase in the effectiveness of fishing effort. There has been little change in total fleet fishing power between 2002 and 2004. Other changes to the model were made as a result of the recommendations of the external review in
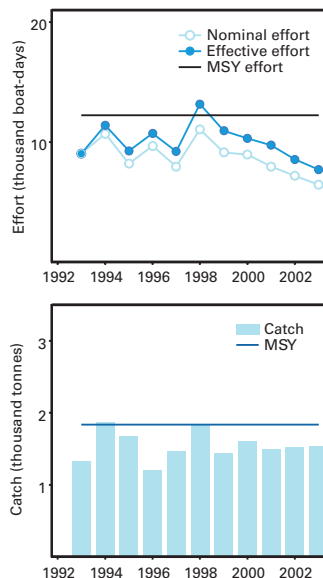

Measuring tiger prawn

Brown tiger prawn Base case low Catchability q
$S_{2003}/S_{MSY} = 167\%$
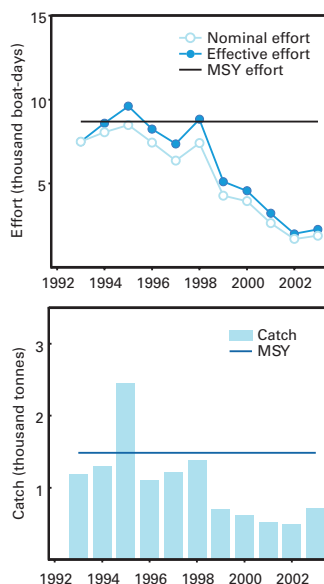
Grooved tiger prawn Base case low Catchability q
$S_{2003}/S_{MSY} = 135\%$

(figures prepared from information in NPFAG[2004])

2001. Assessment incorporating data to the end of 2004 again suggests both tiger prawn species are not overfished and effective effort is below the level of fishing effort that produces MSY.

No biological reference points have been decided for banana prawns. The resource is considered to be not overfished. In recent years, actual catches of banana prawns in the southeastern Gulf of Carpentaria have not matched predictions well. The catch in 2000 was close to the lowest on record, despite good rainfall before the season, whereas the catch in 2001 was considerably higher than expected, as was the 2002 catch. Banana prawns have historically dominated catches off Weipa, but there have been several consecutive years of poor catches in this region. The preliminary results of an age-structured model of the white banana prawn fishery suggest that, at least in some regions, there may be a relationship between stock size and subsequent recruitment. Although fishing mortality is high, there is no firm evidence of recruitment overfishing. The relationship between stock size, fishing effort and environmental factors will be the subject of further research.

On the basis of tagging data, exploitation rates for the red-legged banana prawn were found to be lower than for the white banana prawn in the Gulf of Carpentaria; however, there was insufficient information to decide whether these exploitation rates were sustainable. Population estimates from the study suggested that the fishery for red-legged banana prawns depends on a considerably smaller stock than previously thought.

The long-term yield estimate for endeavour prawns was previously reported as 500 t, but this figure was not based on a rigorous assessment. In view of the high 1997 catch (1870 t) and subsequent lower catches (as low as 396 t in 2004), a higher priority must be placed on assessing the status of this resource. Changes to the length and timing of fishing seasons, reductions in the amount of gear used, and changes in the spatial

distribution of fishing effort, might all contribute to smaller catches.

Similarly, declining catches and catch rates of king prawns over the last 10 years have begun to raise concern over their status. There might be a decline in biomass, but there are other possible explanations, such as changes in fishing patterns and restrictions on tiger prawn effort. NPRAG recently examined the data on king prawns, but could not conclude which was the most likely explanation for the declines in catches, although NPRAG concluded that seasonal closures in August had been beneficial to the king prawns' status.

Reliability of the assessment

Recent annual catches of banana prawns in the southeastern Gulf of Carpentaria have not matched predictions well, and the fishing industry has expressed concern over their status. Despite good pre-season rainfall, the catch in 2000 was close to the lowest on record. In the Karumba region it was substantially less than predicted, but the industry was particularly concerned about poor catches in the Weipa region. Nonetheless, the very good catches of banana prawns in 2001 and 2002 reinforced the perception that the size of the banana prawn stock is naturally highly variable in response to environmental conditions. An age-structured model developed for the white banana prawn suggests that recruitment is dependent on spawning-stock size as well as environmental factors.

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 the uncertainty in some aspects should be reduced. He recommended calculating indices of abundance that took into account changes in the spatial distribution of fishing, and noted the need for additional data to improve estimates of the species composition of the catch. The method used to determine species composition has been updated in recent assessments. A current research programme is re-examining the

distribution of the two tiger prawn species and how this is accounted for in the assessment. Preliminary results suggest a change in distribution may have a major impact on future assessments. Although there will continue to be a heavy reliance on logbook data, the survey programme established to obtain data independently will greatly benefit future assessments.

Changes in the efficiency of trawling over the years are a potential source of error in NPF assessments. The latest tiger prawn assessments use a combined engineering and statistical model with a range of fishing power assumptions to define an envelope of optimistic and pessimistic values.

The 2004 assessment concludes that, under most scenarios, brown tiger prawns are not overfished; projections of future status using 2004 effort levels suggest that abundance will continue to increase. The conclusions for grooved tiger prawns are less clear. Pessimistic scenarios suggest the spawning stock biomass is below the level that would produce MSY, whereas optimistic scenarios suggest the opposite. Low abundance in 2004 was mainly caused by lower recruitment than

in 2003. Projections indicate the stock will continue to increase under the 2004 effort levels and the overall conclusion is that grooved tiger prawns are not overfished.

Future assessment needs

Although the rainfall model for predicting banana prawn catches has correctly predicted above- or below-average catches in most years, it needs reassessing and updating. Research is needed into banana prawn stocks and the links between their abundance in inshore areas, their movement to offshore grounds and their abundance on those grounds.

Refinement of the understanding of the tiger prawn stock–recruitment relationship continues to be a high priority. There is a need to update information on the distribution of brown and grooved tiger prawns and examine the impact of this information on the assessment. There is also a need for greater understanding of prawn movements, aggregating behaviour of adult prawns, nursery areas, predator–prey interactions, and other factors affecting the long-term productivity and sustainability of prawn

Grading the catch

stocks. Much of the uncertainty in the assessments relates to the reliance on fisheries logbook data. A programme of surveys has been initiated to collect data that should help to reduce these uncertainties. Further research into bycatch and the ecosystem effects of fishing is also a high priority.

In July 2000, a gear-unit system was adopted as the main means of controlling effort, replacing the system based on vessel and engine size. As this affects the catch-and-effort series used in the assessments, it will be essential to monitor the results of this change in order to standardise fishing-effort data for comparison with historic effort data.

Environmental issues

The bycatch action plan for the NPF was updated in 2003 and will be revised in 2006. The high level of bycatch, typical of prawn-trawl fisheries, continues to be a major issue for the NPF, and efforts to reduce bycatch are a major focus of the action plan. The fishery adopted the compulsory use of turtle-excluder devices (TEDs) and fish bycatch-reduction devices (BRDs) from April 2000. Research is continuing on the effectiveness of TEDs and BRDs and their impact on fishing power. A turtle-monitoring project, funded by the Fisheries Research and Development Corporation, demonstrated that the introduction of TEDs substantially reduced the catch of sea turtles. In 1999, before the introduction of TEDs, 780 turtles were reported in logbooks as captured and released alive and a further 96 as perished. Only 27 turtle captures were reported in logbooks in 2004—24 of these reported as being released alive. Fishers report that the introduction of TEDs has markedly reduced the take of larger bycatch species such as sharks and rays. The AFMA Board responded to concerns over shark stocks by implementing an industry-initiated ban on the retention of any shark products in the NPF from the start of the 2001 fishing season. Research into the effectiveness of BRDs in reducing other

bycatch is ongoing. There are a number of projects underway assessing the cost effectiveness of the various data-collection strategies. These include the Crew Member Observer Programme, the Directed Industry Collection Programme, scientific observers, logbooks and research surveys.

In recent years fishers have fitted hoppers on vessels to replace traditional sorting trays. The hoppers are designed to improve the quality of the retained catch by maintaining it in seawater during sorting. They have the added advantage of allowing bycatch to be quickly sorted and returned to the sea, increasing its chance of survival. A total of 77 t of byproduct was reported for 2004 (including 23.5 t of bugs and 22.5 t of squid). AFMA has introduced a trigger limit of 500 t for squid catch, i.e. if catches exceed 500 t, this will trigger a review.

The NPF has been approved for accreditation under the *Environment Protection and Biodiversity Conservation Act*

TED fitted to trawl net

1999. This accreditation ensures that fishers can continue to export their catch for the next five years, although a number of recommendations must be implemented to further improve management of the fishery before its next review in 2008.

Further reading

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Management performance

AFMA has been endeavouring to reduce fishing effort in the NPF for some years. A change from managing fishing effort through units based on engine size and vessel-hull volume to gear-units based on the headrope-length of fishing nets was implemented in July 2000 to provide a better control of effort. This system will not prevent future increases in efficiency, but reducing the amount of fishing gear an operator can use is a more direct and simplified way of reducing overall effort. The degree to which fishers will be able to increase the efficiency of their gear to compensate for reductions in headrope length will need to be evaluated to ensure that the necessary reductions in effective effort are achieved.

AFMA has adopted biological reference points for tiger prawns against which their status is monitored. Although there is not a formal recovery plan with pre-defined management strategies, there has been a strong management response to the overfished status of tiger prawns. The significant effort reductions needed for tiger prawns have been pursued by reducing headrope length and shortening fishing seasons. The 1999 and 2000 NPF fishing

seasons were the shortest in 20 years. In 2002 the season was again shortened, and there was a 25% reduction in the total available headrope length. The 2003 and 2004 seasons were the same duration as for 2002. Assessments using data to the end of 2000 and 2001 continued to show that both species of tiger prawn were overfished. Effort levels in 2003–2004 were held well below target levels and assessment in the last two years suggest that this has had a positive impact. Recruitment has increased in recent years and both tiger prawn species are not overfished. However, assumptions about the distribution of the two tiger prawn species have an important effect on the assessment and there are indications that this distribution has changed over time. A current research project is examining this issue.

In 2004, AFMA agreed that the overall target for the fishery should be maximum economic yield. It is not clear how this is to be implemented, although in 2005 a further 25% gear reduction was implemented on economic grounds. This gear reduction will obviously have further biological benefits. In 2005, it was decided that the tiger prawn stocks had recovered sufficiently to allow an extension of the tiger prawn season for the first time in six years (1 August to November 15).

It is important that stock assessment of banana and tiger prawns continues, but there is a need to examine the status of endeavour and king prawns, which show marked declines in catches. NPRAG has recently examined king prawn data, but was unable to conclude whether catch declines had resulted from stock biomass declines or changes in fishing patterns and seasons.

As well as ensuring the sustainability of target species, AFMA is required to address the impacts of fishing on non-target species and the marine environment. The NPF has the highest ratio of bycatch to target catch in Australian Government-managed fisheries, but AFMA has tackled this problem by making it the first such fishery to develop and implement a bycatch action plan. The use of TEDs and BRDs became mandatory in the fishery in April 2000, and an industry-initiated ban on the retention of shark product was introduced in 2001. The bycatch action plan was updated in 2003 and will be revised in 2006.

Prawn trawler boats, Darwin Harbour