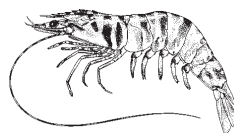


Torres Strait Prawn Fishery



Main features

STATUS

Tiger prawns **not overfished**; endeavour prawns **uncertain** but probably not overfished; king prawns **uncertain**

RELIABILITY OF THE ASSESSMENT

Good for tiger prawns; there is no assessment for endeavour or king prawns

CURRENT CATCH (2004)

Total 1373 t, value A\$20.4m; endeavour prawns 689 t, tiger prawns 606 t and king prawns 74 t

LONG-TERM POTENTIAL YIELD

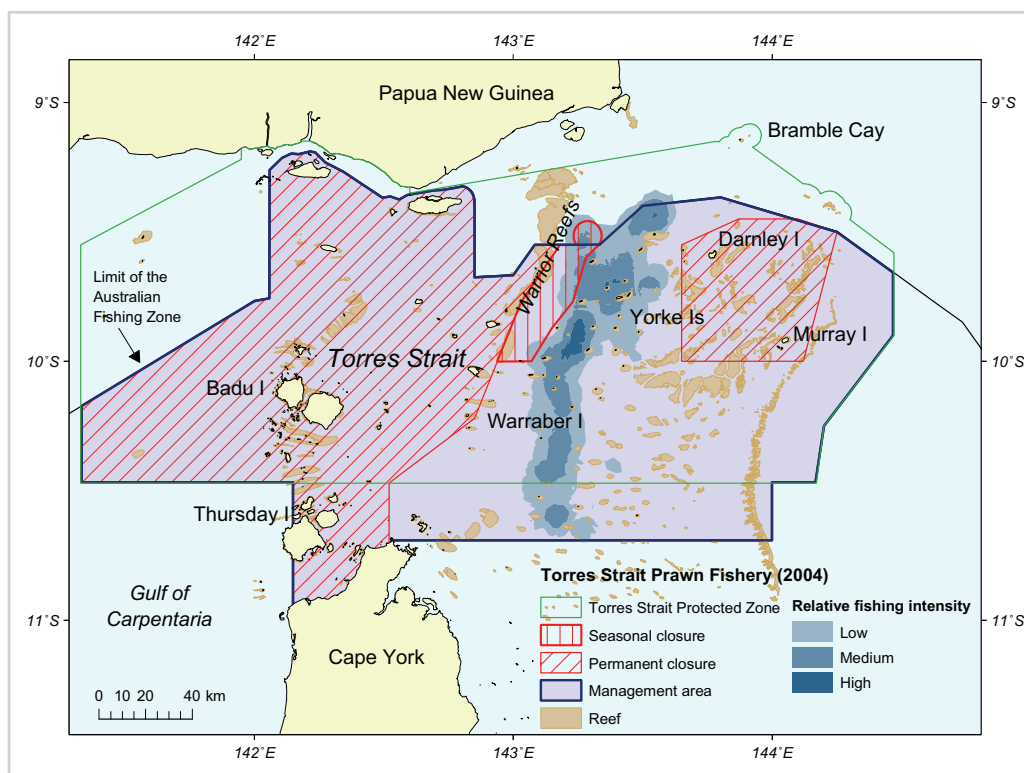
Around 1900 t a year

MAIN MANAGEMENT OBJECTIVE

To control effort in the fishery and provide for catch sharing to occur with Papua New Guinea; and to achieve a level of fishing effort consistent with conservation and optimum use of the Torres Strait prawn resource

MANAGEMENT METHODS

Input controls: limited entry, gear restrictions, time and area closures. In 2006, to prevent potential overfishing there will be a cap on the total number of boat days available



Highlights

- The Torres Strait Prawn Fishery is the most valuable fishery in Torres Strait.
- The catch in 2004 was 1373 t: 44.3% brown tiger prawns, 50.3% blue endeavour prawns and 5.4% red-spot king prawns.
- The total prawn catch in 2004 was below average because of reduced total effort caused by lower product prices and higher fuel costs.
- Although recent effort has been at sustainable levels, there is unutilised effort that has the potential to lead to overfishing. A cap of 9197 fishing days has been announced for 2006, in line with scientific advice for tiger prawn sustainability.
- A package of management arrangements is to be developed in 2006 to introduce a system of access based on units that are a proportion of the total allowable fishing effort in the fishery.
- Season and area closures prevent fishing at times and in areas where small, newly recruited prawns dominate the population.

Background

History of the fishery

The main prawn-trawling ground in Torres Strait is to the east of the Warrior Reef complex, centred around Yorke Islands. Yorke and Kodall islands are also the main anchorages for the fleet. Australian-licensed trawlers can remain in the Torres Strait fishing grounds for extended periods because they are supported by mother-ships and fuel-barges in several anchorages around the strait.

Trawlers up to 20 m long tow two pairs of nets (mesh size of 45 mm, combined headrope and footrope not longer than 88 m). They work at night over areas of flat seabed, with vessel skippers using previous experience to select grounds where they can target the best catches of the different prawn species. Few vessels fish in Torres Strait exclusively, as most have Queensland east coast licences and some are licensed for the Northern Prawn Fishery. The vessels move between fisheries, attempting to maximise profits.

The prawn-trawl fishery in Torres Strait began in the mid-1970s, extending northward from the prawn fishery off the Queensland east coast. At the time, all east-coast prawn trawlers were entitled to fish in Torres Strait, which effectively gave access to all 1500 east-coast licensed vessels. This changed after the Torres Strait Treaty was ratified in 1985: the Torres Strait Prawn Fishery became separate from the east-coast fishery, and an effort-reduction strategy was adopted. Further arrangements to reduce effort were introduced in 1993 when each prawn trawler was allocated a quota of transferable access-days that limited the vessel's total time in the fishery in a season⁵. The restructuring of the fleet resulting from this arrangement was consistent with the Treaty's aim of conserving

Torres Strait prawn stocks and allowing for catch sharing with Papua New Guinea to occur. These arrangements resulted in the number of licensed vessels decreasing from 108 in 1993 to 77 at the start of 2005.

Effort increased steadily in the 1980s and peaked in 1992, before the access-day limits were introduced in 1993. Immediately afterwards, total effort declined, but increased in subsequent years. Effort stabilised at around 10 000 nights fished from 1997 until 2002 but then declined to 9000 nights fished in 2003 and about 7000 in 2004. Efficiency of vessels has been estimated to have increased by an average of about 1.4% per year between 1998 and 2003. In 2002, turtle-excluder devices became compulsory and net size was reduced to 80 m. Total net size was restored to 88 m in 2004.

Papua New Guinea is also entitled under the treaty to 25% of the catch⁶. To give effect to this entitlement, Australia agreed to endorse up to seven Papua New Guinea trawlers to fish in the Australian area for a full season. Additionally, three licences have been allocated for Torres Strait Islander participation in the fishery and although they have not been activated they have had the potential to increase the overall level of effort.

Biology

The brown tiger prawn (*Penaeus esculentus*) and blue endeavour prawn (*Metapenaeus endeavouri*) are endemic to tropical and subtropical Australia. They are highly fecund, fast growing, sexually mature by about six months old, and have a life span of one or two years. The fishery targets adult prawns under management arrangements that combine seasonal and area closures to reduce the take of juveniles. Tiger prawn catches are typically taken on fine-grained mud bottom, and endeavour prawn catches on coarser, sandy sediments, but there is overlap in both

⁵ Vessels then had to log their entry into, and their exit from, the Torres Strait fishing zone with the Queensland Boating and Fisheries Patrol. The use of VMS is now mandatory.

⁶ More precisely, PNG is entitled to 25% of the catch in the area of jurisdiction in the Protected Zone south of the fisheries jurisdiction line and 50% of the catch in the Australian Territorial Seas north of the jurisdiction line.

species' use of these habitats. Red-spot king prawns (*Melicertus longistylus*) have an Indo-west Pacific distribution and in Torres Strait they are generally found on harder bottom near reefs.

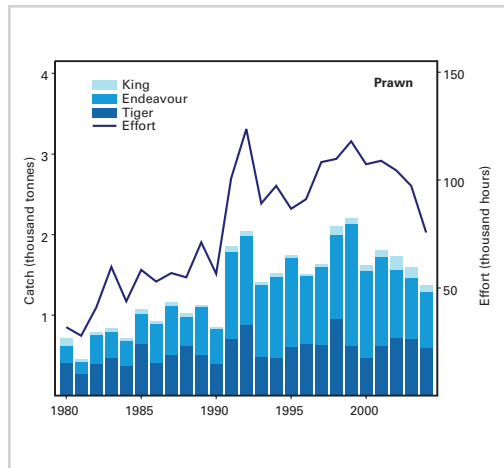
The 2004 fishery

The total catch of brown tiger prawns in 2004 (606 t) was again within 10% of the ten-year average catch of 660 t, despite a significant reduction in total effort for the year. Total fishing effort was about 7000 days, compared with a ten-year average of 9582 days.

Industry sources attribute the reduced effort figure to low world prawn prices brought about by competition from cheaper prawns such as Asian farmed *Penaeus vannamei*, and higher fuel costs. The endeavour prawn catch was also lower in 2004 (689 t), below both the ten-year and long-term averages, despite higher catch rates. The reduced red-spot king prawn catch (74 t) followed the trend of the two major species.

Total effort among existing Australian licences is limited by the availability of access-days per individual vessel. At the beginning of 2004, the available allocation was 13 454 fishing days to be used by up to 77 Australian-licensed vessels, an average of 175 days per vessel. The Protected Zone Joint Authority (PZJA)⁷ is currently exploring ways to further reduce total effort in the fishery by removing the latent effort that has existed in the fishery since the advent of the time-quota system.

Future management of the fishery will include a reduction of total potential effort to the level estimated to produce the maximum sustainable yield (MSY) of tiger prawns. However, issues concerning the level of the reduction and how to achieve it across the Australian commercial fishing industry, traditional inhabitants of Torres Strait, and



Papua New Guinea, have held up its implementation. The intended effect of the reduction is to ensure that the fishery is conducted in a sustainable manner and, combined with action to manage the fishery's bycatch, complies with the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Current monitoring and research

Catch and effort of the Torres Strait trawler fleet is monitored through a mandatory logbook that is the same as that used in the Northern Prawn Fishery and similar to the Queensland East Coast Fishery logbook, making data collection compatible throughout these fisheries. A Queensland-based biological research programme provides fishery-assessment data and evaluates the effectiveness of management measures. An important component of this work is examination of changes in fishing gear and vessel configuration so that fishing power can be estimated.

⁷ The Protected Zone Joint Authority—with a membership of the Australian Government Minister for Agriculture, Fisheries and Forestry, and the Queensland Minister for Primary Industries and Rural Communities—is responsible for managing commercial and traditional fishing in the Australian area of the Torres Strait Protected Zone and designated adjacent Torres Strait waters.

The effectiveness of the December–August area-closure east of Warrior Reefs has been evaluated from fishery-independent survey data. The study indicated that most small brown tiger prawns, and higher densities of small endeavour prawns, were inside the closure area in those months. Furthermore, it confirmed that tiger and endeavour prawns migrate out of the closed area and into the fishery as they increase in size during the fishing season.

Industry and researchers reviewed this evaluation, taking into account comments by fishers and analyses of recent catch records. Fishers report that when the seasonal-closure area re-opens they catch mainly smaller prawns there. Also, because the commercial catches of endeavour prawns increased after the closure, most industry members believe that the closure protects small prawns effectively until they reach a more profitable size.

Status of stocks

Previous assessments

The first formal assessment of Torres Strait prawn stocks was made in 1991. An update in 1994, using a simulation model and an assumed natural-mortality rate of about 20% per month, estimated the long-term sustainable yield for the fishery to be 1900 t per year: 680 t of tiger prawns, 1035 t of endeavour prawns and 185 t of king prawns. The catch varies from year to year because of variable recruitment and changes in fishing effort.

Standardised and unstandardised catch-and-effort data for the years 1980 to 2000 were fitted to a dynamic stock-production model of tiger prawn stocks in 2001. The model estimated MSY for tiger prawns to be about 700 t (range 560–960 t) using unstandardised data, and about 665 t (range 629–711 t) using standardised data. The average annual catch of tiger prawns in Torres Strait for the ten years from 1994 to 2003 (660 t) approximates the MSY estimates quite closely. The effort required to achieve MSY

(E_{MSY}) was estimated from standardised data to be about 10 300 boat days (range 9131–13 256 days).

Current assessment

The 2003 tiger prawn assessment, which was internationally reviewed, indicated that current tiger prawn catches are close to MSY and that tiger prawn stock biomass varied around the level needed to produce the maximum sustainable yield (B_{MSY}). This assessment was based on a delay-difference model using both the Ricker and Beverton–Holt forms of the stock-recruitment relationship. The review made several recommendations to improve the assessment, and recent research has focused on addressing these recommendations. One of the recommendations was that E_{MSY} should be considered a limit reference point for fishing effort for the fishery and that an appropriate target reference point might be 75% or 80% of E_{MSY} .

In 2004, the tiger prawn assessment was updated, taking into account most of the review recommendations and including 2003 catch and effort data. The results from the Ricker and Beverton–Holt forms of the model estimated MSY at 606 and 676 t, with corresponding E_{MSY} values of 8245 and 9197 boat days, respectively.

A workshop was held in July 2005 to allow fishers, scientists and managers to examine alternative management strategies for the fishery, especially evaluating strategies that would sustain tiger prawns while permitting additional fishing of endeavour prawns. The main strategy considered involved using trigger points to control the allowable effort in the fishery. The first trigger point would activate a spawning-area closure aimed at reducing the impact of further fishing on the tiger prawn spawning stock. Fishing for endeavour and tiger prawns could then continue in the remainder of the fishery until a second trigger point was reached that would close the entire fishery.

Reliability of the assessment

Sustainable yields estimated in the current stock assessments are based primarily on data from Australian vessels fishing in Torres Strait Protected Zone waters. A full-time fishery has not developed in the Papua New Guinea area of the jurisdiction but some fishing has been undertaken and the available data were incorporated into the latest assessment. However, the assessment is mainly for the exploited stock in the Australian area of jurisdiction in the Protected Zone and the “outside but near area” to the south of the Protected Zone. Development of a full time fishery in the Papua New Guinea area of jurisdiction could, for example, have an impact on the stocks on the Australian side by reducing recruitment to the fishery. It is therefore possible that the present assessment could be optimistic, but this will not be known until a fishery develops in the PNG area of jurisdiction.

The process of standardising effort in the Torres Strait fishery needs to allow for spatial differences in the fishery. The southern area produces a higher proportion of endeavour prawns, so the influence of data from the south on the mean catch-rate index for tiger prawns must be down-weighted. A generalised linear model that accounts for month, region, lunar phase and bycatch of endeavour prawns was developed, and data from this model are incorporated into the 2003 and 2004 assessments.

The high annual variability of prawn recruitment, which results from the large influence of environmental factors on such a short-lived species, hinders stock assessments. Also, the natural mortality—an important parameter in estimating sustainable yield—is difficult to determine accurately for the main commercial species.

Future assessment needs

The Torres Strait fisheries assessment group and the 2003 international review identified ways of improving the future assessment of the fishery: indicators of the health of the fishery need developing and refining; monitoring of fishery catch and effort with logbooks should continue; the spatial-closure and seasonal-closure models that seek to enhance the yield of the fishery need to be further refined; and both annual indices of spawning and recruitment, and regular surveys to provide independent estimates of stock sizes, are needed. Future assessments will continue to provide estimates of the appropriate effort cap for the fishery and further work will be required to develop appropriate reference points.

Environmental issues

Prawn trawling in Torres Strait is not selective—trawlers sweep large areas of seabed with demersal trawls to catch sparsely distributed prawns. They take a range of commercial byproduct species, including Moreton Bay bugs (*Thenus orientalis*), scallops (*Amusium pleuronectes*), and species of squid, finfish and shark. There are limits on the amount of byproduct that can be retained, for example, the take, processing and carrying of sharks and rays is limited to the lesser of five specimens or 30 kgs. There is also a ban on the carrying of fins from sharks and rays.

A study in 1988 of a comparable tiger prawn trawl-fishery in Northern Territory waters showed that commercial prawns comprised 4–11% of the catch, sharks and rays 1–14%, and other fish species 67–88%. Target species accounted for about 60% of the prawns.

Since 1996, some vessels have recorded their bycatch of sea turtles. The rate of capture suggested a total fleet catch of 300–1050 turtles a year. As most are returned to the sea alive (96% alive when released) only 12–42 turtles are expected to have died

per year. In July 1999, the Torres Strait PZJA endorsed a bycatch action plan for the Torres Strait Prawn Fishery, and in late 2001 agreed to mandate the use of turtle-excluder devices from the start of the 2002 season. An observer programme commenced in 2005 and is collecting information on the current level of turtle interactions.

In 2004, the use of bycatch reduction devices (BRDs) became mandatory in the fishery. Designs for the BRDs were developed in the Queensland East Coast and Northern Prawn fisheries, and by fishers operating in the Torres Strait. A number of Torres Strait fishers collaborated with researchers from the Queensland Department of Primary Industries Southern Fisheries Centre to trial the devices. Six designs are recognised as BRDs in the fishery. Despite the use of BRDs, the fishery still takes a wide range of by-catch species. The observer programme is collecting

information on the current level of bycatch, as well as on interactions with protected species.

Otter trawling, which includes prawn trawling in Torres Strait, was listed in 2001 as a Key Threatening Process in relation to sea turtles under the EPBC Act. In recommending the listing, the Threatened Species Scientific Committee, which advises the Australian Government Minister for the Environment and Heritage on nominations, stated: 'The incidental catch (bycatch) of sea turtles during coastal otter-trawling operations in Australian waters north of 28°S ... adversely affects two or more listed threatened species'. However, the committee did not consider that a threat abatement plan would be a feasible, effective or efficient way to abate the threatening process at this stage. Actions specified in a recovery plan for sea turtles released by the Australian Government Department of Environment and Heritage in



Torres Strait prawn trawler

2003 were accepted by the Committee as the preferred mechanism for further reducing the bycatch of sea turtles.

The fishery has been strategically assessed and accredited under the EPBC ACT (subject to the PZJA accepting several recommendations from the assessment made to enhance management of the fishery). The fishery has also been approved as a Wildlife Trade Operation until November 2008.

Further reading

- Kung, J.P., Turnbull, C., Murphy, R., Taylor, S. and Marrington, J. (2005) *Torres Prawn Handbook 2005*. Australian Fisheries Management Authority, Canberra. 130 pp.
- O'Neill, F.M. and Turnbull, C.T. (2006) *Stock Assessment of the Torres Strait Tiger Prawn Fishery* (*Peneus esculentus*). Department of Primary Industries and Fisheries, Queensland. 86 pp.

Management performance

The main objectives of fishery management in the Torres Strait Prawn Fishery are to control effort in the fishery; provide for catch sharing with Papua New Guinea; and to achieve a level of fishing effort consistent with conservation and optimum use of the Torres Strait prawn resource.

The total catch of the Torres Strait Prawn Fishery has remained close to target levels for the past three years. However, some 40% of the maximum nominal effort in the fishery remains available, but has not been activated by the existing Australian fleet. Action to limit effort among the existing Australian operators is required, as the current situation poses a risk to the achievement of the PZJA's management objectives, and complicates Australia's obligations to share catches under the Torres Strait Treaty.

It was announced in November 2005 that there would be a cap of 9197 boat days for 2006, based on the number of days to achieve maximum sustainable yield of tiger prawns. Further, a unitised system to be developed for implementation in 2007 will base fishing access on a proportion of the total allowable fishing effort in the fishery. The Australian Government has also agreed to purchase entitlements from Australian commercial fishers equivalent to the level required to meet its obligations under the Treaty with Papua New Guinea. This is to be implemented in 2006 and the effort cap will be reviewed annually in the light of current assessment information.

Over the past decade, bycatch in demersal trawl fisheries—from prawn trawling in particular—has been of great concern to the public, researchers and conservation groups. In response, management has introduced a Bycatch Action Plan, which aims to eliminate the catch of large animals such as turtles, sharks and stingrays, and substantially reduce the ratio of bycatch to prawns. The plan includes the compulsory use of turtle-excluder devices, and continuing research into bycatch-reduction devices. Size limits have been introduced for Moreton Bay bugs, and there are shark and finfish bycatch limits.