

Chapter 18

Torres Strait Tropical Rock Lobster Fishery

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FIGURE 18.1 Regional map showing the management area of the Torres Strait Tropical Rock Lobster Fishery

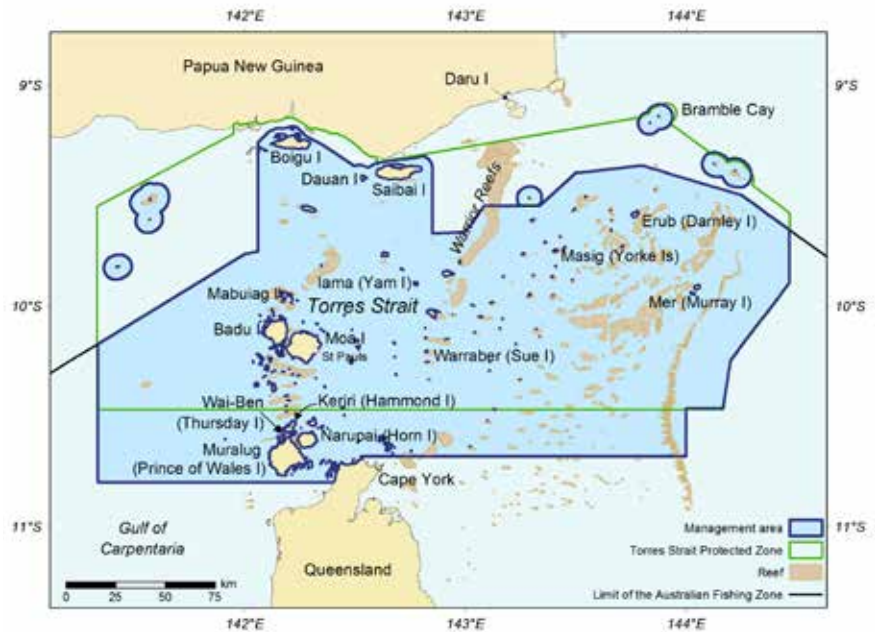


TABLE 18.1 Status of the Torres Strait Tropical Rock Lobster Fishery

Status	2013		2014		Comments
Biological status	Fishing mortality	Biomass	Fishing mortality	Biomass	
Tropical rock lobster (<i>Panulirus ornatus</i>)					Current catches are unlikely to result in substantial biomass declines. Spawning stock biomass is above the target.
Economic status	Net economic returns are likely to have declined in 2013–14 following a proportionally faster increase in fishing effort than gross value of production. The proportion of lower-value tails in the total catch also increased. The fishery is meeting its objective to provide commercial opportunities for Traditional Inhabitants, but it is uncertain whether its objective to optimise value is being met.				

Fishing mortality

Not subject to overfishing

Subject to overfishing

Uncertain

Biomass

Not overfished

Overfished

Uncertain

18.1
Description of the fishery

The Torres Strait Tropical Rock Lobster Fishery (TSTRLF) is commercially fished in the Torres Strait Protected Zone (TSPZ) by Australian and Papua New Guinean nationals; Australians hold Transferable Vessel Holder (TVH) licences or Traditional Inhabitant Boat (TIB) licences (see Chapter 16).

Area fished

The TSTRLF extends from the tip of Cape York to the northern border of the TSPZ (Figure 18.1). The majority of catch comes from the western and south-eastern parts of the fishery, where the densities of tropical rock lobster are highest (AFMA 2013). Access to this fishery is shared by Australia and Papua New Guinea (PNG) under formal arrangements in the Torres Strait Treaty (see Chapter 16).

Fishing methods and key species

The TSTRLF is based on a single species, tropical rock lobster (*Panulirus ornatus*). The fishery is predominantly a dive-based, hand-collection fishery using surface-supplied air (hookah) or free-diving. Divers work from 4 to 6 metre tenders (one diver per tender). Some lobsters are also collected at night on shallow reef flats.

The TVH Sector uses motherships in conjunction with smaller fishing tenders, generally using hookah gear, with a small fleet of TVH vessels undertaking trips to fishing grounds that last from a few days to several weeks. In contrast, the majority of TIB Sector trips last for only a day or two, with divers working from smaller boats that depart from their local island communities. In recent years, however, an increasing number of TIB Sector operators have used motherships in conjunction with fishing tenders and hookah equipment. This has allowed TIB Sector operators to target live rock lobster, which attracts a higher and more consistent market price than frozen rock lobster tails.

Management methods

The TSTRLF is currently managed primarily through effort restrictions (input controls). In 2005, the Protected Zone Joint Authority (PZJA) decided to move to a quota management system (output controls). As a result, the Tropical Rock Lobster Resource Assessment Group (TRLRAG) developed methods to determine a sustainable total allowable catch (TAC) and prioritised research to obtain the necessary data to estimate the TAC (Plagányi et al. 2014a). The transition from input to output-controlled management has not yet occurred.

As part of the transition planning, a harvest strategy is being developed for the TSTRLF, and fishery-specific target and limit reference points are being defined. These include a limit reference point for biomass (40 per cent of unfished spawning biomass $[SB_0] - 0.4SB_0$), a target reference point for biomass ($0.65SB_0$) and a target reference point for fishing mortality rate (F_{TARG}). The proposed harvest control rule uses a constant exploitation rate ($F_{TARG} = 0.15$ per year) while the stock size is at or above the target reference point. The target exploitation rate then declines linearly to zero as the spawning biomass declines from the target to the limit reference point. The harvest strategy is used to determine a nominal (non-binding) TAC. However, since the TAC is currently non-binding, it is not used to control harvest.

Allocations for the TVH, TIB and PNG sectors have been based on agreed shares of the non-binding TAC recommended for the TSPZ by the TRLRAG each year. Currently, shares for the three commercial fishing sectors are approximately 29.35 per cent for the TVH, 38.15 per cent for the TIB and 32.5 per cent for PNG.

The input controls that are currently applied to the TSTRLF include a limited commercial fishing season (from 1 December to 30 September); a ban on the use of hookah gear between 1 October and 31 January; minimum size limits for commercially caught lobsters of 90 mm carapace length or 115 mm tail length; collection of lobsters only by hand or by handheld implements such as snares, nets or spears; and a prohibition on the possession of tropical rock lobster meat that has been removed from any part of a tropical rock lobster on any boat unless that lobster was taken in the course of traditional fishing.

Torres Strait Islanders also fish traditionally (non-commercially) in this fishery, requiring no licence or reporting of catch (reporting of catch is also not mandatory in the TIB commercial fishery). Torres Strait Islanders are entitled to take three lobsters per person per day, or six per vessel per day, at any time of year, with no minimum size limit.

Fishing effort

Between 2008 and 2013, fishing effort, measured as tender-days, has varied from 1281 to 3008 for the TVH, 1457 to 4564 for the TIB, and 524 to 2207 for PNG. For the 2013–14 fishing season, effort in Australian waters was 3795 for the TVH, 2013 for the TIB and 0 for PNG.

TABLE 18.2 Main features and statistics for the TSTRLF, by fishing season

Fishery statistics a		2012–13			2013–14		
Stock	TAC (t)	Catch (t)	Real value (2012–13)	TAC (t)	Catch (t) b	Real value (2013–14)	
Australia (TVH, TIB)	588 (274, 314)	478 (350 c, 128)	\$20.1 million	416 (181, 235)	401 (272, 129)	\$20.9 million	
PNG	283	108	na	200	255	na	
Total fishery	871	586	na	616	656	na	
Fishery-level statistics							
Effort d	TVH: 3 008 tender-days, 1 388 operation-days TIB: 1 457 tender-days PNG: 524 tender-days (in Australian waters)			TVH: 3 795 tender-days, 1 845 operation-days TIB: 2 013 tender-days PNG: 0 tender-days (in Australian waters)			
Fishing permits	TVH: 12 licences, 33 tenders TIB: 215 (on 26 June 2013) PNG: 1 PNG cross-endorsed freezer vessel licence; hundreds of PNG dinghies and canoes fish from coastal villages in PNG waters			TVH: 12 licences, 33 tenders TIB: 291 (on 7 April 2015) PNG: 0 PNG cross-endorsed; hundreds of PNG dinghies and canoes fish from coastal villages in PNG waters			
Active vessels	TVH: 11 TIB: 215 PNG: 1			TVH: 12 TIB: 291 PNG: 0 (cross-endorsed)			
Observer coverage	0			0			
Fishing methods	Handheld implements (snare, net or spear) on shallow reef flats at night; free-diving or use of hookah gear during the day						
Primary landing ports	Thursday Island, Cairns (Queensland), Daru (PNG)						
Management methods	Input controls: gear controls, seasonal closures Output controls: minimum size limit (>115 mm tail length or >90 mm carapace length), traditional land and recreational bag limits						
Primary markets	Domestic: live lobsters and frozen tails International: United States (frozen tails), Hong Kong/China (live lobsters)						
Management plan	None						

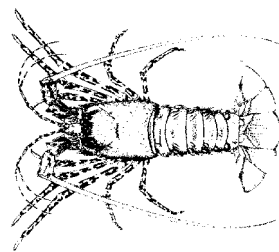
a Fishery statistics are provided by fishing season, unless otherwise indicated. Fishing season is 1 December to 31 September. Real-value statistics are by financial year. **b** Estimate at time of publishing; this figure is preliminary and likely to be updated in future editions of this publication.

c Includes PNG catch of the cross-endorsed freezer vessel fishing in Australian waters. **d** Tender-day is a day of fishing effort using a fishing tender or dory.

Notes: **na** Not available. **PNG** Papua New Guinea. **TAC** Total allowable catch. **TIB** Traditional Inhabitant Boat. **TVH** Transferable Vessel Holder.

18.2 Biological status

Tropical rock lobster (*Panulirus ornatus*)



Line drawing: Karina Hansen

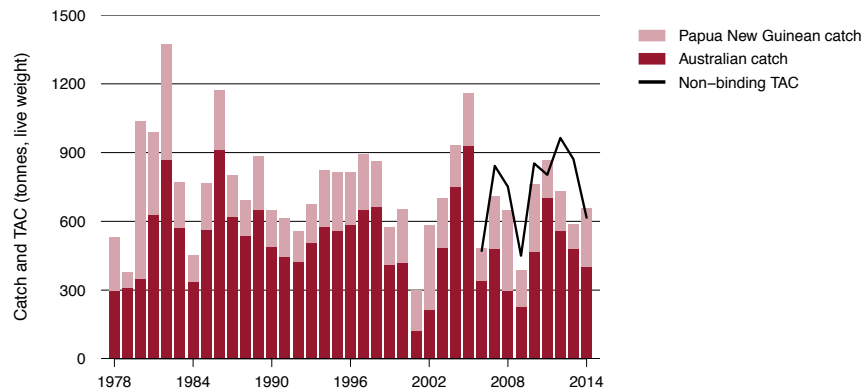
Stock structure

Although post-larval stage lobsters are locally resident, tropical rock lobster populations in Torres Strait (managed under the PZJA), the Coral Sea (managed by the Commonwealth) and Queensland (managed by Queensland) are considered to comprise a single biological stock as a result of the mixing of larvae in the Coral Sea (Pitcher et al. 2005). Assessments presented here relate specifically to the Torres Strait part of the biological stock.

Catch history

Total catch (TVH and TIB) of tropical rock lobster has generally fluctuated between 300 and 900 t per year since 1978 (Figure 18.2). Recent annual catches have been around 600 t, with a catch of 656 t reported in 2014.

FIGURE 18.2 Catch and TAC of tropical rock lobster in the TSTRLF, 1978 to 2014



Note: TAC Total allowable catch.

Source: Torres Strait Protected Zone Joint Authority, Australian Fisheries Management Authority

Stock assessment

The 2014 assessment was updated from the 2013 statistical catch-at-age analysis model using a Beverton–Holt stock–recruitment relationship. The assessment time series of data starts in 1973 and incorporates annual fishery-independent pre-season and mid-season survey results (from 1989), as well as catch-per-unit-effort data from the TVH Sector (from 1994) (Plagányi et al. 2014a).

The finalised assessment estimated the 2014 spawning biomass to be 3841 t (90 per cent confidence interval 2763 to 4918 t), placing the estimated depletion in November 2014 at about 82 per cent of the estimated unfished level ($0.82SB_0$) (Plagányi et al. 2014b). The stock is currently assessed to be above the maximum sustainable yield (MSY) for the fishery (Plagányi et al. 2014a). The MSY-based estimates have associated errors and uncertainties, and are based on a deterministic assumption about the stock–recruitment relationship. However, tropical rock lobsters are short lived, with highly variable stock sizes, so that actual annual sustainable yields can be expected to fluctuate widely about the deterministically predicted estimates. Instead, a (non-binding) TAC is calculated each year, based on the target mortality rate of 0.15 (F_{TARG}), which is estimated to keep the biomass at roughly current levels. For 2014, TRLRAG agreed that a non-binding TAC of 616 t was appropriate because the tropical rock lobster resource was in good condition and the spawning stock biomass was estimated to be above target levels (PZJA 2013a). Based on the most recent model outputs, the preliminary non-binding TAC for 2015 is 894 t (Plagányi et al. 2014b), but is subject to review based on the results of the November 2014 survey.

Stock status determination

The model-estimated biomass in 2014 ($0.82SB_0$) is well above the target ($0.65SB_0$) and limits ($0.40SB_0$) reference point. As a result, this stock is classified as **not overfished**. The total (Australian plus PNG) non-binding TAC for tropical rock lobster in 2013–14 was 616 t (equating to $F = 0.15$), making the total catch of 656 t for that year greater than the non-binding TAC recommended for the fishery. This was due to the PNG share of the non-binding TAC being overcaught by 55 t. While this overcatch is a management concern, the fact that this is an effort-controlled fishery with biomass well above target levels¹ means that the stock is assessed as **not subject to overfishing**.

¹ Although the Commonwealth Harvest Strategy Policy does not apply to PZJA-managed fisheries, the principle for high-biomass fisheries outlined in the broader policy is that 'In situations where the adult biomass of a particular stock is greater than or equal to B_{TARG} , AFMA will have a high degree of discretion in how that stock is managed' (DAFF 2007, p. 6).

18.3 Economic status

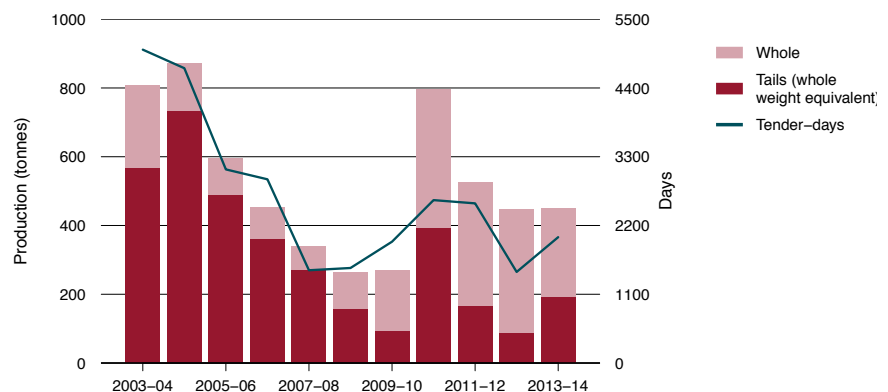
Key economic trends

Catch in the fishery is landed as either whole lobster or lobster tails, with whole lobsters generally being landed live. All catch and value figures discussed here have been converted to whole weight to allow comparisons of catch composition.

Landed catch in the fishery increased by 25 per cent to 559 t in the 2013–14 financial year from 446 t in 2012–13 (Figure 18.3).² The quantity of whole lobster increased from 359 t (whole-weight equivalent) in 2012–13 to 364 t (whole-weight equivalent) in 2013–14. The quantity of tails landed in 2013–14 also increased (122 per cent increase to 195 t [whole-weight equivalent]) compared with the previous year. Effort in the TVH Sector of the fishery increased by 26 per cent between 2012–13 (3008 tender-days) and 2013–14 (3795 tender-days; Figure 18.3). The commercial fishing season runs from 1 December to 30 September and so spans financial years (Table 18.2).

Apart from the slight increase in production in 2013–14, the gross value of production (GVP) increased by 4 per cent between 2012–13 and 2013–14 (Figure 18.4). This was primarily driven by a 6 per cent increase in the value of whole rock lobster, from \$16.8 million in 2012–13 to \$17.9 million in 2013–14, due to the decline in the volume of production (and not due to any significant change in the price per kilogram for live product). Despite the significant increase in the quantity of tails landed, the value of rock lobster tails increased by 110 per cent, from \$1.4 million in 2012–13 to \$3.0 million, in 2013–14 due to significant increase in quantity. The proportionally faster increase in effort rather than GVP indicates that net economic returns to the fishery are likely to have declined. The proportion of lower-value tails in the total catch also increased.

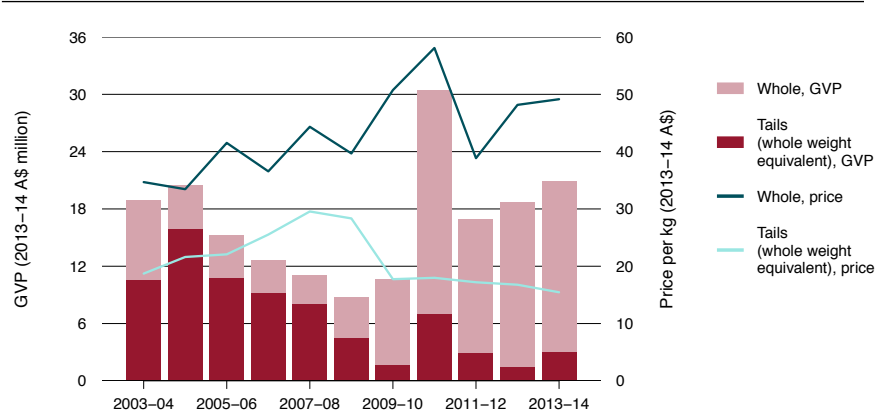
FIGURE 18.3 Production volumes of whole lobster and lobster tails in Torres Strait, and effort levels measured by TVH tender-days, 2003–04 to 2013–14



Note: TVH Transferable Vessel Holder. Lobster tail production has been converted to whole weight. Production data classified by product type were not available before 2003–04.

² Catch weights and gross value of production in this section are given by financial year.

FIGURE 18.4 Real GVP and price for whole lobster and lobster tails (whole-weight equivalent) in the TSTRLF, 2003–04 to 2013–14



Note: GVP Gross value of production.

A management strategy evaluation (MSE) for the TSTRLF was completed in 2012 (Plagányi et al. 2012). The MSE tested a range of management strategies and fishery scenarios, taking into account biological, economic, cultural and social factors. It included a bio-economic model that estimated subsector profit using data collected from fishers, processors and catch logbooks (Hutton et al. 2012). The analysis assumed four subsectors: a full-time, largely non-Indigenous commercial TVH subsector; a full-time commercial TIB subsector (which includes TIB fishers who catch more than 1000 kg per year); a part-time semicommercial TIB subsector (TIB fishers who catch 50 to 1000 kg per year); and a ‘casual’ TIB subsector (TIB fishers who catch less than 50 kg per year).



Tropical rock lobsters
Kate Dunkerley, AFMA

The MSE-generated, model-based scenario estimates of average profit for the subsectors take into account the high variability in characteristics of the mothership fleet. These estimates are computed per calendar year in the final model run for each management strategy and for each scenario. Profitability³ was estimated to vary substantially between fleets, with the TVH subsector being the most profitable. The average TVH boat (representing a mothership: a large catch-storage vessel that supports multiple smaller fishing tender vessels) was estimated to earn \$675 000 in revenue and \$269 000 in profit. This equated to an estimated profit for the entire TVH fleet of about \$3 million (note that these figures are not survey-based estimates as discussed for other fisheries surveyed by ABARES). For the TIB subsectors, model-based estimates of profit were only determined for the full-time commercial TIB subsector, for which profit per boat was estimated at \$25 000 and total fleet profit was estimated at \$1.1 million. For the remaining TIB subsectors, economic returns to owner–operator labour were determined to be a more relevant measure of economic performance, given the livelihood focus of TIB operators and the fact that economic performance reflects the earnings of owner–operators from their input into the fishing business. The sum of commercial profit and returns to owner–operators in the TIB Sector was estimated at around \$6 million.

Management arrangements

The fishery is currently managed under input controls, including seasonal closures, temporal restrictions on the use of hookah equipment and minimum size limits (Table 18.2; AFMA, 2012, pers. comm.; PZJA 2015). A voluntary buyout of fishing licences for non-Traditional Inhabitants commenced in 2011, aimed at increasing the ownership and participation of Traditional Inhabitants in the fishery (PZJA 2013b). The buyback, via an open tender process, resulted in a 2 per cent increase in the Traditional Inhabitants' share of fishery catch to approximately 56 per cent of the Australian share (PZJA 2013b). The buyback was completed in 2012, with the PZJA committed to developing a management plan for the fishery that ensures the sustainability of the resource. The PZJA is currently considering the next steps in view of the buyback outcome (PZJA 2013a), but has acknowledged and agreed to support the aspirations of 100 per cent ownership of Torres Strait fisheries by Torres Strait Islander and Aboriginal traditional owners (PZJA 2014).

The MSE results of the three potential management options predicted that an individual transferable quota system cannot be relied on to accommodate the aim of increasing the TIB share of total Australian catch in the fishery to 70 per cent (Pascoe et al. 2012). Monitoring in a small-scale sector such as the TIB Sector is also difficult with an individual transferable quota system, and successful quota management systems require a substantial investment in science and accurate reporting of catches (van Putten et al. 2013). Pascoe et al. (2012) note that a competitive quota arrangement for the TIB fleet might limit the benefits of quota management if there is a race to fish, although effort in the TIB Sector remains well below the sector's nominal allocation. A community-based arrangement is discussed as a potential option, but van Putten et al. (2013) note that this type of arrangement is associated with a number of challenges, including concerns about potentially undermining the supply chain that all fishers rely on, and concerns about maintaining the principles of equity and continued community access to the resource.

3 In bio-economic assessments, which are part of an MSE, estimates of profit and returns to owner–operators are based on summing average values (whereas individual operations vary considerably); these indices are used as output performance indices to check for relative differences between scenarios.

Performance against economic objective

Like other Torres Strait fisheries, the TSTRLF is managed against objectives that differ from those of solely Australian Government-managed fisheries. The TSTRLF management objectives are relevant to economic performance, but have a broader focus on social and cultural factors that include the following (PZJA 2015):

- To maintain the fishing mortality at a level below that which produces the maximum sustainable yield (F_{MSY}) (accounting for all sources of fishing mortality).
- In accordance with the Torres Strait Treaty, to protect the traditional way of life and livelihood of Traditional Inhabitants, particularly in relation to their traditional fishing for tropical rock lobster.
- To provide for optimal utilisation, cooperative management with Queensland and PNG, and catch sharing with PNG.
- To monitor interactions between the prawn and lobster fisheries.
- To maintain appropriate controls on fishing gear allowed in the fishery so as to minimise impacts on the environment.
- To promote economic development in the Torres Strait area, with an emphasis on providing the framework for commercial opportunities for Traditional Inhabitants, and to ensure that the opportunities available to all stakeholders are socially and culturally appropriate for the Torres Strait, and the wider Queensland and Australian community.
- To optimise the value of the fishery.

18.4 Environmental status

The TSTRLF was reassessed against parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 7 May 2014. Recommendations associated with the recent approvals include improving estimates of tropical rock lobster harvest, developing and implementing long-term management arrangements (management plan), and developing resource-wide assessments of the stock.

The fishery has little direct impact on the marine environment or other fish species, since hand-collection fishing methods allow careful selection of catch. The level 1 ecological risk assessment did not identify any species at medium or high risk, and found that interactions with protected species were negligible or low because of the nature of the fishery (Furlani et al. 2007). Therefore, no further risk assessments were undertaken (AFMA 2009).

The Australian Fisheries Management Authority publishes quarterly summaries of logbook reports of interactions with protected species on its website. No interactions with species protected under the EPBC Act were reported in the TSTRLF in 2014.

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