

MORETON BAY BUGS (2023)

Thenus parindicus, *Thenus australiensis*, *Thenus spp.*



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Commonwealth	Northern Prawn Fishery	Sustainable	Catch
Commonwealth	Torres Strait Prawn Fishery	Sustainable	Catch
Western Australia	Western Australia	Sustainable	Catch
Queensland	East Coast Otter Trawl Fishery	Sustainable	Catch, CPUE

STOCK STRUCTURE

Reef Bug (*Thenus australiensis*) and Mud Bug (*Thenus parindicus*) are known collectively as 'Moreton Bay Bugs'. Moreton Bay Bugs are distributed along the tropical and subtropical coast of Australia from northern New South Wales to Shark Bay in Western Australia [George and Griffin 1972]. The two species have overlapping distributions but display relatively strong habitat partitioning. Reef Bugs typically prefer deeper areas with coarser sediments, while Mud Bugs inhabit mainly shallow inshore areas with finer sediments [McMillan et al. 2023]. In the Queensland East Coast Otter Trawl Fishery (ECOTF), where around 80% of total landings occur, the two species have been differentiated in the catch since 2021. Modelling of species distributions combined with harvest locations indicated that the proportion of Reef Bugs comprising total landings increased from around 67% of landings in the ECOTF in 1988 (at the beginning of logbook records) to 93% in 2021 [McMillan et al. 2023]. This reflects a shift to targeted fishing for the larger, more valuable Reef Bugs, while Mud Bugs remain an incidentally caught species in the ECOTF. In other fisheries, both species are undifferentiated in the catch and are assessed together. Genetic population structure of Reef Bugs, which dominate landings in the ECOTF, supports a single biological stock on Queensland's east coast [McMillan

et al. 2024]. No studies have been carried out on the biological stock structure of Moreton Bay Bugs in other fisheries.

Given the uncertainty in biological stock structure, here assessment of stock status is presented at the management unit level—Northern Prawn Fishery (Commonwealth), Torres Strait Prawn Fishery (Commonwealth) and East Coast Otter Trawl Fishery (Queensland); and the jurisdictional level—Western Australia.

STOCK STATUS

East Coast Otter Trawl Fishery East Coast Otter Trawl Fishery (Queensland) (ECOTF) management unit, one fleet north of 22° S trawling for prawns and one fleet south of 22° S trawling for scallops. However, due to depletion of the Saucer Scallop stock and closure of that fishery since 2021 in the Hervey Bay-Gladstone region, the southern fleet has shifted to increased targeting of co-located Reef Bugs. Increasing market value has also seen a shift to periodic targeting of Reef Bugs by the northern fleet in waters of Townsville. These two areas (Hervey Bay-Gladstone and Townsville) contribute approximately 80% of Moreton Bay Bug landings in the ECOTF. The trend toward increased targeting of Reef Bugs is reflected in catch rate analyses [Helidoniotis 2020; McMillan et al. 2023]. Mud Bugs remain an incidentally caught species landed mostly by the northern fleet when targeting Tiger Prawns.

The first stock assessment of Moreton Bay Bugs in the ECOTF estimated that in 2021 the Reef Bug stock was at approximately 78% of unfished biomass. [Wickens et al. 2023]. The Mud Bug stock was not assessed due to uncertainties assessing non-target species. Standardised catch rates for Reef Bugs increased from 35 kg/day in 1988 (when logbook records began) to a peak of 46 kg/day in 2013 before stabilising to 36 kg/day by 2021 [McMillan et al. 2023]. Mud Bug catch rates followed a similar trend, increasing from 7 kg/day in 1988 to a peak of 11 kg/day in 2013 before stabilising to 7 kg/day in 2021 [McMillan et al. 2023]. Management measures leading to reduced overall fishing effort and a smaller fleet since the early 2000s as well as the closure of large areas to fishing within the Great Barrier Reef Marine Park (GBRMP) since 2004, where large spawning populations are now protected, are likely responsible for the similarity in catch rates between 1988 and 2021 despite increased targeted fishing for Reef Bugs.

Biophysical modelling estimated that in 2005 significant parts of the biomass (54 per cent of Reef Bugs; and 45 per cent of Mud Bugs) were within GBRMP trawl closures [Pitcher et al. 2007a]. It is likely that spawning adults in areas closed to fishing within the GBRMP contribute recruits to other areas open to trawling via pelagic larval dispersal, facilitated by the approximately 45-day pelagic larval phase of Moreton Bay Bugs [Jones 1988]. Ecological risk assessments have reported a low risk of the stock being recruitment overfished in the GBRMP [Pears et al. 2012], where harvesting pressure on the stock is greatest, and an intermediate risk of being classified as recruitment overfished south of the GBRMP [Jacobsen et al. 2018].

The number of days on which Moreton Bay Bugs were caught and the number of boats catching Moreton Bay Bugs declined between 2000 and 2014 before stabilising between 2015 and 2022. Relatively stable effort in high abundance grids since 2014 indicates that fishing mortality in high biomass areas has not increased substantially. Based on yield-per-recruit analysis, capture at ≥ 75 mm CW allows Moreton Bay Bugs to spawn before they enter the fishery [Courtney

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1997]. Square-mesh cod end bycatch reduction devices (BRDs) were made mandatory in the Scallop Fishery in 2015, allowing juvenile Moreton Bay Bugs to escape trawl capture and reducing incidental fishing mortality [Courtney et al. 2008]. Moreton Bay Bugs are also known to survive discarding well [Hill et al. 1998]. The above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the East Coast Otter Trawl Fishery (Queensland) management unit is classified as a **sustainable stock**.

**Northern
Prawn
Fishery**

Northern Prawn Fishery (Commonwealth) trawl surveys were used to estimate the biomass of Moreton Bay Bugs in the Gulf of Carpentaria, from which an estimate of acceptable biological catch was derived [Milton et al. 2010]. This assessment estimated the annual sustainable biological catch for Moreton Bay Bugs in the fishery at 1,887 tonnes (t) (95% confidence interval 1,716–2,057 t). Annual commercial catches have remained well below this (catch peaked at 120 t in 1998). Catches were 65 t in the 2020–21 financial year and 40 t in the 2021–22 financial year. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Fishing mortality has been low in recent years, and ecological risk assessments [Griffiths et al. 2007] have indicated that the risk of stock depletion of Moreton Bay Bugs is low. A trigger catch limit of 100 t is also in place. If this limit is reached, then additional analysis will be conducted to ensure that there are no sustainability concerns with the harvest level. Fishing mortality of juveniles is reduced by regulating the size at which Moreton Bay Bugs may be retained, and spawning potential is protected through prohibiting retention of egg bearing females. Catches have been low in recent years compared to estimates of acceptable biological catch. The above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the Northern Prawn Fishery (Commonwealth) management unit is classified as a **sustainable stock**.

**Torres
Strait
Prawn
Fishery**

No formal stock assessment exists for Moreton Bay Bugs in the Torres Strait Prawn Fishery (TSPF) management unit. Assessment of seabed and associated biodiversity in the Torres Strait [Pitcher et al. 2007b; Turnbull and Rose 2007] estimated the 2007 Moreton Bay (Reef) Bug biomass at 124 t, only 19% of which was located within the area exposed to prawn trawling (based on the 2005 footprint of the fishery using vessel monitoring system data). The biomass of Mud Bugs was estimated to be 151 t with only 18% of biomass being located in areas exposed to prawn trawling. With the decline in fishing effort in recent years, fishing mortality is also likely to have declined. Fishing mortality of juveniles is reduced by regulating the size at which Moreton Bay Bugs may be retained, and spawning potential is protected through prohibiting retention of egg bearing females. Research has found that Mud Bug egg production is maintained at the minimum size limit of 75 mm carapace width [Courtney 2002]. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

The Torres Strait assessment of seabed and associated biodiversity [Pitcher et al. 2007b] indicated that Moreton Bay Bugs are unlikely to have been exposed to high levels of fishing pressure in the Torres Strait Protected Zone. In 2021–22 the annual catch of Moreton Bay Bugs was 13 t, which is estimated to be less

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than 5% of available biomass, most of which inhabits extensive areas outside of fished areas. Trawl operations in the TSPF cover only a small proportion—approximately 20% [Turnbull and Rose 2007]—of the Torres Strait Protected Zone. Lower fishing effort has resulted in further reduction in spatial coverage of the fishery in recent years. The above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the Torres Strait Prawn Fishery (Commonwealth) management unit is classified as a **sustainable stock**.

**Western
Australia**

No formal stock assessment exists for Moreton Bay Bugs in Western Australia. Moreton Bay Bugs are not targeted in Western Australia but are landed occasionally as a by-product species of prawn and scallop trawl fisheries, so directed fishing effort is low. In 2022, the combined Western Australian fisheries landings of Moreton Bay Bugs was 6 t, which is low but within the historical catch range. Combined fishery landings have been at or below 10 t in nine out of the last 10 years. The spatial coverage of Western Australian fisheries that retain Moreton Bay Bugs is limited compared with the large area across which Moreton Bay Bugs are distributed in north-western Western Australia. Substantial Moreton Bay Bug biomass is protected within the extensive network of fishery closures in place from Shark Bay to Napier Broome Bay [Newman et al. 2023]. The above evidence indicates that the biomass of this stock is unlikely to be depleted, and that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the Western Australian jurisdictional stock is classified as a **sustainable stock**.

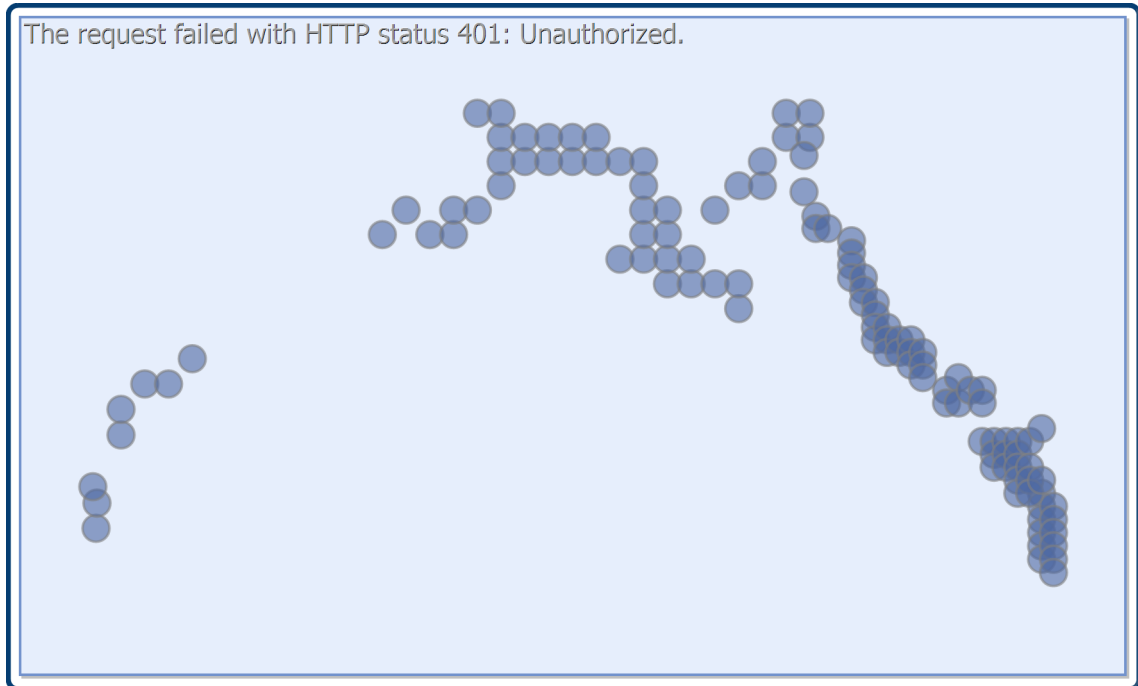
BIOLOGY

Moreton Bay Bug biology [Courtney 1997; Jones 1988]

Species	Longevity / Maximum Size	Maturity (50 per cent)
MORETON BAY BUGS	7 years T. australiensis: Males 106 mm CW, Females 124 mm CW T. parindicus: Males 87 mm CW, Females 103 mm CW	T. australiensis: Female 82 mm CW T. parindicus: Female 75 mm CW

DISTRIBUTION

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Distribution of reported commercial catch of Moreton Bay Bugs

TABLES

Fishing methods	Commonwealth	Queensland	Western Australia
Commercial			
Otter Trawl	✓	✓	✓
Recreational			
Diving		✓	
Traps and Pots		✓	
Unspecified			✓

Management Methods	Commonwealth	Queensland	Western Australia
Commercial			
By-catch reduction devices		✓	
Effort limits	✓		✓
Effort limits (individual transferable effort)		✓	

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Gear restrictions		✓	
Harvest Strategy		✓	
Limited entry	✓	✓	✓
Processing restrictions		✓	
Retention of females with eggs prohibited	✓		
Seasonal or spatial closures		✓	
Size limit	✓		
Size limits		✓	
Spatial closures	✓		✓
Vessel restrictions	✓	✓	✓
Recreational			
Gear restrictions		✓	
Processing restrictions		✓	
Seasonal or spatial closures		✓	
Size limits		✓	

Catch	Commonwealth	Queensland	Western Australia
Commercial	53.329 t	281.241 t	6.35328 t
Indigenous		No catch	No catch
Recreational	No catch	Unknown	No catch

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Commonwealth – Recreational. The Australian government does not manage recreational fishing. Recreational fishing in Commonwealth waters is managed by the states or territory immediately adjacent to those waters, under their management regulations.

Commonwealth – Indigenous. The Australian government does not manage non-commercial Indigenous fishing (with the exception of the Torres Strait). In general, non-commercial Indigenous fishing in Commonwealth waters is managed by the states or territory immediately adjacent to those waters. In the Torres Strait, both commercial and non-commercial Indigenous fishing is managed by the Torres Strait Protected Zone Joint Authority (PZJA) through the Australian Fisheries Management Authority (Commonwealth), Department of Agriculture Fisheries and Forestry (Queensland) and the Torres Strait Regional Authority. The PZJA also manages non-Indigenous commercial fishing in the Torres Strait.

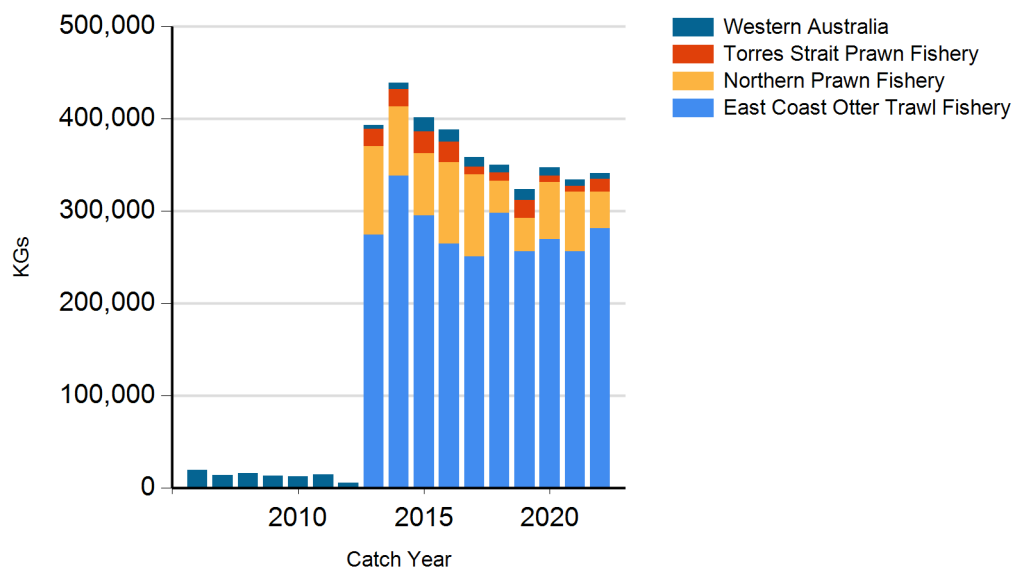
Commonwealth – Commercial (Management Methods/Catch). Data provided for the Commonwealth align with 2021–22 financial year.

Queensland – Indigenous (Management Methods). For more information see <https://www.daf.qld.gov.au/business-priorities/fisheries/traditional-fishing>

Queensland – Commercial (Catch) Commercial data have been sourced from the commercial fisheries logbook program. Further information available through the Fisheries Summary Report <https://www.daf.qld.gov.au/business-priorities/fisheries/monitoring-research/data/queensland-fisheries-summary-report>

Queensland – Commercial (Management Methods). Harvest strategies are available at: <https://www.daf.qld.gov.au/business-priorities/fisheries/sustainable/harvest-strategy>

CATCH CHART



Commercial catch of MORETON BAY BUGS - note confidential catch not shown

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