

Crimson Snapper (2023)

Lutjanus erythropterus



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Western Australia	North Coast Bioregion	Sustainable	Catch, indicator species status
Northern Territory	Joseph Bonaparte Gulf	Sustainable	Biomass, fishing mortality
Northern Territory	Timor, Arafura seas	Sustainable	Biomass, fishing mortality
Northern Territory, Queensland	Gulf of Carpentaria	Sustainable	Catch, biomass
Queensland	East Coast Queensland	Sustainable	Biomass, stock assessment (one - sex population model)

STOCK STRUCTURE

Crimson Snapper (*Lutjanus erythropterus*) is a widespread Indo-Pacific species found throughout tropical Australian waters. Research on the biological stock structure of this species in Australian waters has only occurred in northern Australia; including the Timor Sea, the Arafura Sea and the Gulf of Carpentaria [Salini et al. 2006]. A single genetic stock was found across this region. In addition to this Northern Australia biological stock, it is considered that the species has a similar biological stock structure to Saddletail Snapper (*Lutjanus malabaricus*), with a Western Australia (North Coast Bioregion) biological stock and a biological stock off the east coast of Queensland [Salini et al. 2006]. Saunders et al. [2018] used otolith microchemistry and parasitology to identify separate biological stocks of Saddletail Snapper in the Joseph Bonaparte Gulf, Timor and Arafura seas and Gulf of Carpentaria. It is assumed that Crimson Snapper have the same biological stock structure.

Here, assessment of the stock status is presented at the biological stock level for the five identified biological stocks - North Coast Bioregion (Western Australia), Joseph Bonaparte Gulf (Northern Territory), Timor and Arafura Seas (Northern Territory), Gulf of Carpentaria (Queensland and Northern Territory) and the East Coast (Queensland).

STOCK STATUS

East Coast Queensland Crimson Snapper is caught by line in both the commercial and recreational fishing sectors with most harvested from within the Great Barrier Reef Marine Park (GBRMP). The most recent stock assessment [Fox et al. 2021] estimated that biomass in 2021 was 44% of unfished levels (estimate range across scenarios = 21%–45 %). The assessment indicated that biomass declined to 35% (unfished levels) in 2019 before rebuilding to the current level. The stock is not considered to be recruitment impaired.

Crimson Snapper is regionally important to recreational fishers and the sector harvested around 65% of the total annual catch [Teixeira et al. 2021]. The 2019–20 recreational fishing survey estimated that this sector harvested around 19 t of Crimson Snapper. Crimson Snapper make up as much as 2% of retained recreational catch in the GBRMP; making it one of the top ten retained recreational species reported in state wide creel surveys [QDAF 2023]. The appeal of the species is reflected in the charter fishery data where annual catches from the east coast averaged approximately 5 t across the last five years.

Crimson Snapper is generally not targeted within the Queensland Reef Line Fishery (RLF) but is harvested when targeting more valuable species such as Saddletail Snapper and Red Emperor. Crimson Snapper catches in the RLF have declined since 2009–10 (20.6 t) but have stabilised over the last five years at around 12 t. In 2021–22, the RLF retained 13 t of Crimson Snapper with a 10-year average of 14 t. Like other deep-water lutjanids, it can be difficult to determine how regularly this species is targeted in the RLF as it will (likely) vary between operations, vessels and trips. The difficulty of accounting for this aspect of the fishery when standardising catch and effort data has been noted in recent assessments [Sumpter et al. 2022; Campbell et al. 2021; Fox et al. 2021].

Commercial harvest in the RLF is constrained by a multi-species total allowable commercial catch (TACC). The long-term management of the species is also guided by the Reef Line Fishery Harvest Strategy: 2020–2025 [QDAF 2020]. Recreational harvest is controlled through a minimum legal-size limit and a combined possession limit (9 in total) that includes Saddletail Snapper and Crimson Snapper. Saddletail Snapper make up the larger part of the recreational catch as it is targeted with more frequency. The Indigenous catch of Crimson Snapper is unknown but considered to be minor. A portion of the biomass is protected by zoning in the GBRMP, although this has not been quantified.

Overall, the available evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired. While data displays some inter-year variability, current harvest levels are sufficiently low to maintain biomass levels above the biomass limit reference point of 20% unfished levels [Fox et al. 2021; QDAF 2020].

Based on the evidence provided above, the East Coast Queensland biological stock is classified as a **sustainable stock**.

**Gulf of
Carpentaria**

The Gulf of Carpentaria Crimson Snapper stock is mainly harvested by commercial trawl operations within the Gulf of Carpentaria Developmental Fin Fish Trawl Fishery (GOCDFFTF – Queensland) and Northern Territory Demersal Fishery (DF). There is no reliable estimate of recreational, charter or Indigenous harvest of Crimson Snapper within this stock, however, harvest rates are considered to be low given the offshore distribution of this species. This stock was also targeted by foreign fleets from the 1950s to the 1980s [O'Neill et al. 2011] and harvest levels over this period were notably higher (peaked at 513 t).

From 2016–17 to 2019–20, the GOCDFFTF reported limited fishing activities and annual Crimson Snapper harvests declined to < 1 t. Commercial fishing resumed in 2020–21 with operators reporting seasonal Crimson Snapper catches of 101 t (2020–21) and 118 t (2021–22). Gulf of Carpentaria catches in the Northern Territory DF have steadily grown over the last ten years, peaking in 2019–20 at 275 t, before falling to 93 t in 2020–21 and 58 t in 2021–22. The lower catches over the last two years are below the 10-year average catch of 96 t and are reflective of a decrease in effort in this portion of the fishery.

Harvest rates in the GOCDFFTF show considerable variability and, at times, reflect management changes in the fishery. In response to the increases in catch from 2002–13, the multi-species Total Allowable Commercial Catch (TACC) was significantly reduced from 1,250 t to 450 t [O'Neill et al. 2011; Leigh and O'Neill 2016]. In 2020, Crimson Snapper was transitioned to a non-transferrable ITQ and a 169 t species-specific TACC was introduced in response to MSY modelling. The TACC allocated was 6% of the MSY [O'Neill et al. 2011]. These catch totals are below the current TACC, which is considered conservative [Leigh and O'Neill 2016]. This inference is supported by fishery independent surveys conducted in 2021 which provided updated estimates of relative biomass for Crimson Snapper and other GOCDFFTF species [Knuckey et al. 2021].

A fishery independent biomass survey was undertaken in the Northern Territory in 2021. As a result of this work, the biomass of Crimson Snapper in the whole of the Northern Territory was estimated to be 54,828 t, with a coefficient of variation (CV) of 0.15, of which 21,000 t was estimated to be present in the NT portion of the Gulf of Carpentaria. [Knuckey and Koopman 2022]. Current catches represent < 1% of the estimated biomass. This indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. However, it is important to note that the survey is designed to obtain a time-series of consistent and robust relative abundance indices and due to uncertainties around assumptions of catchability, herding and escapement, this one-off estimate of absolute abundance should be used with caution [Knuckey and Koopman 2022]. Regardless, this estimate of biomass can assist in understanding the impact fishing has on this stock, with current evidence suggesting there is a low level of catch relative to biomass size.

On the basis of the evidence provided above, the Gulf of Carpentaria (Queensland and Northern Territory) stock is classified as a **sustainable stock**.

**Joseph
Bonaparte
Gulf**

Crimson Snapper harvest was first reported in this stock in 1988 and the average catch from trap and line vessels in the Demersal Fishery (DF) to 2011 was very small (average < 1 t) compared to the adjacent Timor-Arafura seas stock. From 2012–13 a trawler entered the fishery and catches increased to a peak of 99 t in 2019–20 before declining to 25 t in 2021–22.

A stock assessment was undertaken for the Joseph Bonaparte Gulf biological

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stock of Crimson Snapper utilising a stochastic Stock Reduction Analysis (SRA) model. The results estimated that biomass was between 50% and 90% of unfished levels. This indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. The SRA outputs also indicated that the current fishing mortality was well below the level that could cause the stock to become recruitment impaired [Pazhayamadam 2023]. Overall, the SRA outputs indicates that the biomass of this stock is unlikely to be depleted, recruitment is unlikely to be impaired and the current fishing mortality is unlikely to cause the stock to become recruitment impaired.

A fishery independent survey was undertaken in 2021 to estimate relative biomass of key offshore species in Northern Territory waters, including Crimson Snapper. As a result of this work, the biomass of Crimson Snapper in the Northern Territory was estimated to be 54,828 t, with a coefficient of variation of 0.15. Within this, the biomass of Crimson Snapper in the Joseph Bonaparte Gulf stock was estimated to be 3,327 t [Knuckey and Koopman 2022]. The commercial harvest in this stock has averaged 70 t in the last 10 years, which represents a harvest fraction of around 2%. It is important to note that the survey was designed to obtain a time-series of consistent and robust relative abundance indices and due to uncertainties around assumptions of catchability, herding and escapement, this one-off estimate of absolute abundance should be used with caution [Knuckey and Koopman 2022]. Regardless, this estimate of biomass can assist in understanding the impact fishing has on this stock.

Based on the evidence above, the Joseph Bonaparte (Northern Territory) biological stock is classified as a **sustainable stock**.

North Coast Bioregion Crimson Snapper is caught primarily on the north-west coast of Western Australia as a component of the multispecies Pilbara Demersal Scalefish Fisheries (which includes the Pilbara Fish Trawl (Interim) Managed Fishery, the Pilbara Trap Managed Fishery and the Pilbara Line Fishery) in the Pilbara management region of the North Coast Bioregion; and as a component of the multispecies Northern Demersal Scalefish Managed Fishery (NDSMF) in the Kimberley management region of the North Coast Bioregion of Western Australia. Crimson Snapper is assessed on the basis of the status of several indicator species (including, for example, Red Emperor, Rankin Cod, and Bluespotted Emperor in the Pilbara region, and Red Emperor and Goldband Snapper in the Kimberley region) across the North Coast Demersal Resource (NCDR) that represent the entire inshore demersal suite of species occurring at depths of 30–250 m [Newman et al. 2018]. The indicator species in the Pilbara and Kimberley have been classified as sustainable [Wakefield et al. 2023]. The level of risk associated with the sustainability of Crimson Snapper in the NCDR is assessed as low. This assessment of Crimson Snapper is also supported by the results of a data-limited Catch-MSY assessment, where recent catches are compared to model predictions for maximum sustainable yield (MSY).

The total catch of Crimson Snapper in the NCB over the last 10 years (2013–22) have ranged from 202–305 t, with a mean annual catch of 245 t. This is a decline on the averages catches across the previous 10 years of 282 t. Recreational and charter catch are relatively low compared to the commercial catch, in the past 10 years where reliable catches estimates are available, their contribution of the total catch has averaged < 2%. Analyses using a Catch-MSY model applied to data on annual catches for this species (1993–2022), demonstrated that the annual catches from 1996–2007 were above the median model estimate for maximum sustainable yield (MSY), having gone above the 95% CI in 2001 and 2004–05, but since 2008 have been mainly below MSY. The

predicted values for biomass in recent years increased and remained above BMSY, and fishing mortality remained below FMSY. However, it is important to recognise that Catch-MSY is a data-limited technique with strong assumptions, dependent on user inputs. For this assessment, these included specified ranges for initial depletion (0.4–0.8), based on likely catches from foreign fleets prior to the start of the time series, final depletion (0.15–0.7), based on recent catches relative to the maximum recorded annual catch and the non-targeted nature of commercial fishing for this species, and low resilience ($r = 0.1–0.6$, consistent with species longevity, of approximately 32 years in WA). Given the recent catches of this species across multiple fisheries are less than the predicted MSY, and status of the indicator species for the NCDR, it is considered unlikely that the biomass of Crimson Snapper in the NCB is depleted, and recruitment is unlikely to be impaired. Furthermore, the current fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the North Coast Bioregion biological stock is classified as a **sustainable stock**.

Timor, Arafura seas

Crimson Snapper was one of several tropical snapper species that were heavily exploited in this region by foreign fishing operations from the early 1970s to 1990 [O'Neill et al. 2011]. Catches by this fleet peaked in the late 1980s at 783 t. Domestic harvest was negligible until 1995 when trawl operations began. Since then, catches from this stock have increased steadily to a maximum of 757 t in 2015–16 before declining to 340 t in 2020–21 as operator's targeted effort in other stocks. CPUE declined substantially during 2000–10 but has significantly increased since then [Saunders 2020; Pazhayamadom 2023].

This stock was assessed using data up to 2022 using a stochastic stock reduction analysis (SRA) model [Pazhayamadom 2023]. Biomass was estimated to be 75% to 98.6% of unfished levels, well above the limit reference point. The above evidence indicates that the biomass of this stock is unlikely to be recruitment impaired. The SRA outputs also indicated that the current fishing mortality was well below the level that could cause the stock to become recruitment impaired.

A fishery independent survey was undertaken in 2021 to estimate relative biomass of key offshore species in Northern Territory waters, including Crimson Snapper. As a result of this work the biomass of Crimson Snapper in the NT was estimated to be 54,828 t, with a coefficient of variation of 0.15. Within this, the biomass of Crimson Snapper in the Timor, Arafura sea's stock was estimated to be approximately 30,534 t [Knuckey and Koopman 2022]. The commercial harvest in this stock has averaged 410 t in the last 10 years, which represents a harvest fraction of < 2%. It is important to note that the survey was designed to obtain a time-series of consistent and robust relative abundance indices and due to uncertainties around assumptions of catchability, herding and escapement, this one-off estimate of absolute abundance should be used with caution [Knuckey and Koopman 2022]. Regardless, this estimate of biomass can assist in understanding the impact fishing has on this stock, with the low level of catch relative to biomass size indicating the level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the Timor-Arafura seas (Northern Territory) biological stock is classified as a **sustainable stock**.

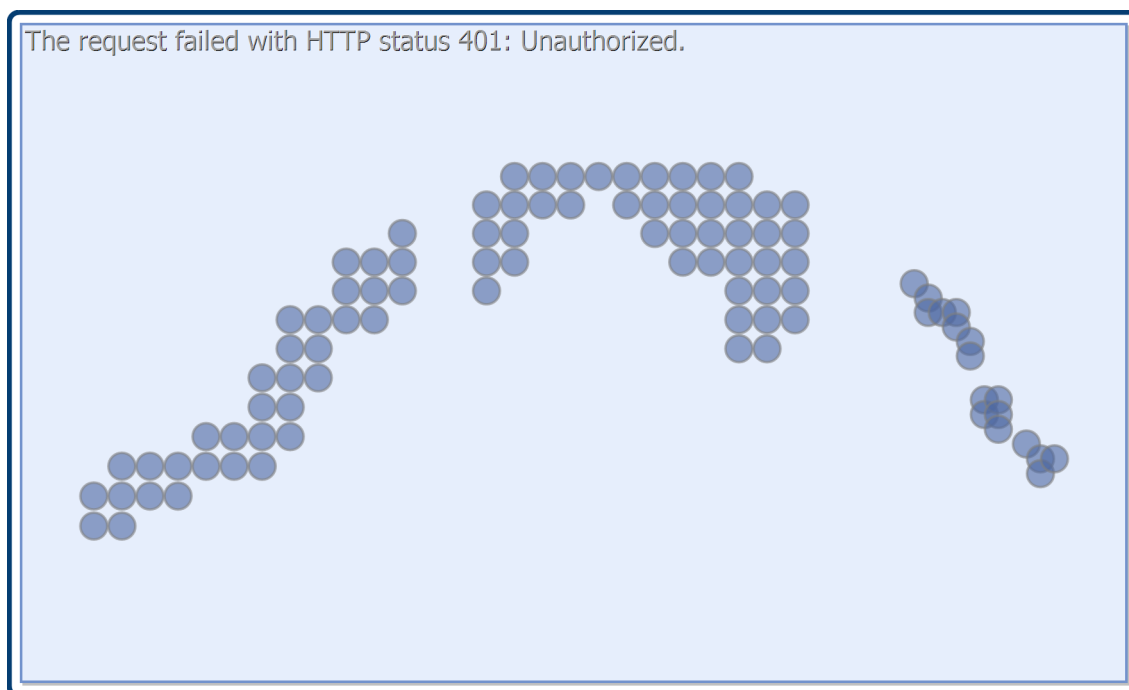
BIOLOGY

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Crimson Snapper biology [DAF unpublished data; Fry and Milton 2009; Fry et al. 2009; McPherson et al. 1992; McPherson and Squire 1992; Newman et al. 2000; Fox et al 2021]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Crimson Snapper	Northern Australia: 42 years, 470 mm SL East Coast Queensland: 32 years, 790 mm FL	Northern Australia: Males 270 mm SL, Females 350 mm SL East Coast Queensland: Females 485 mm (+/- 1.7) FL

DISTRIBUTION



Distribution of reported commercial catch of Crimson Snapper

TABLES

Fishing methods	Northern Territory	Queensland	Western Australia
Charter			
Handline		✓	✓
Hook and Line	✓	✓	✓
Spearfishing		✓	
Commercial			
Bottom Trawls	✓		
Fish Trap	✓		✓

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Hand Line, Hand Reel or Powered Reels			✓
Line		✓	
Midwater Trawl		✓	
Otter Trawl			✓
Unspecified	✓		
Recreational			
Handline	✓	✓	✓
Hook and Line	✓	✓	
Spearfishing		✓	

Management Methods			
	Northern Territory	Queensland	Western Australia
Charter			
Bag limits			✓
Bag/possession limits		✓	
Gear restrictions	✓	✓	
Limited entry	✓		✓
Passenger restrictions			✓
Possession limit	✓		
Processing restrictions		✓	
Seasonal or spatial closures		✓	
Size limits		✓	
Spatial closures	✓		✓
Spatial zoning			✓
Commercial			
Effort limits			✓
Gear restrictions	✓	✓	✓

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Harvest Strategy		✓	
Individual transferable quota		✓	
Limited entry		✓	✓
Processing restrictions		✓	
Seasonal or spatial closures		✓	
Size limits		✓	
Spatial closures	✓		✓
Spatial zoning	✓		✓
Total allowable catch	✓	✓	
Total allowable effort			✓
Vessel restrictions		✓	✓
Recreational			
Bag/possession limits		✓	
Gear restrictions	✓	✓	
Licence (Recreational Fishing from Boat License)			✓
Possession limit	✓		✓
Processing restrictions		✓	
Seasonal or spatial closures		✓	
Size limits		✓	
Spatial closures	✓		✓

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Catch	Northern Territory	Queensland	Western Australia
Charter	0.98 t	6 t	1.97 t
Commercial	493.356 t	12.8982 t	243.286 t
Indigenous	Unknown	Unknown	Unknown
Recreational	< 2 t (in 2019)	19 t [2019-20]	1.6 t (2020/21)

Western Australia – Active Vessels. Data are confidential as there were fewer than three vessels in the Pilbara Fish Trawl Interim Managed Fishery (Western Australia) and Pilbara Trap Managed Fishery (Western Australia).

Western Australia – Recreational (Catch). Boat-based recreational catch is from 1 September 2020–31 August 2021. These data are derived from those reported in [Ryan et al. 2022].

Western Australia – Recreational (management methods). A Recreational Fishing from Boat License is required for the use of a powered boat to fish or to transport catch or fishing gear to or from a land-based fishing location.

Western Australia – Indigenous (management methods). Subject to application of Section 211 of the *Native Title Act 1993* (Cth), and the exemption from a requirement to hold a recreational fishing licence, the non-commercial take by Indigenous fishers is covered by the same arrangements as that for recreational fishing.

Northern Territory – Recreational (catch). Saddletail Snapper, Crimson Snapper and Indonesian Snapper catch were combined during the Northern Territory 2018–19 recreational fishing survey. Crimson Snapper was assumed to be a proportion of that catch [West et al. 2022].

Northern Territory – Charter (management methods). In the Northern Territory, charter operators are regulated through the same management methods as the recreational sector but are subject to additional limits on license and passenger numbers.

Northern Territory – Indigenous (management methods).

The *Fisheries Act 1988 (NT)*, specifies that: “Unless expressly provided otherwise, nothing in this Act derogates or limits the right of Aboriginal people who have traditionally used the resources of an area of land or water in a traditional manner to continue to use those resources in that area in that manner.”

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

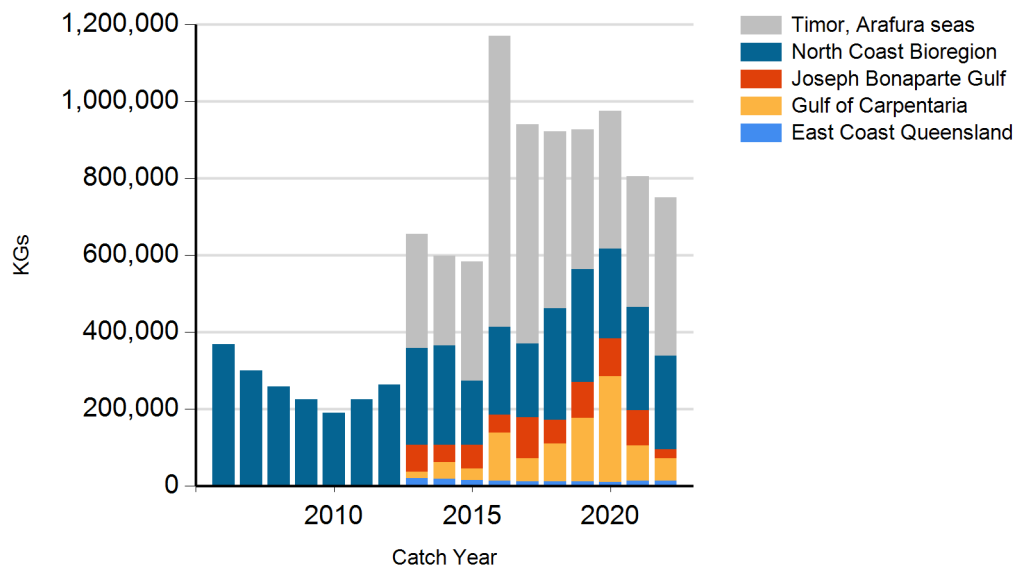
Queensland – Recreational Fishing (Catch). Data are based at the whole of Queensland level and derived from statewide recreational fishing surveys. Estimates have been converted to weight (tonnes) using best known conversion multipliers. Conversion factors may display regional or temporal variability.

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

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

CATCH CHART

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Commercial catch of Crimson Snapper - note confidential catch not shown

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