

Mangrove Jack (2023)

Lutjanus argentimaculatus



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Western Australia	Western Australia	Sustainable	Catch, indicator species status
Northern Territory	Northern Territory	Sustainable	Spawning stock biomass, fishing mortality
Northern Territory, Queensland	Gulf of Carpentaria	Sustainable	Catch, effort, MSY, Spatial Overlap
Queensland	East Coast Queensland	Undefined	Catch, effort
New South Wales	New South Wales	Negligible	

STOCK STRUCTURE

Mangrove Jack are a long lived (more than 50 years), late maturing species that can reach a length of over 1 m [Russell et al. 2003]. They are broadly distributed throughout the tropical and sub-tropical Indo-West Pacific [Allen 1985] and exhibit a biphasic life history pattern, where juveniles spend several years in freshwater and estuarine habitats before migrating offshore as they near sexual maturity and have been reported to a depth of at least 175 m [Pradella et al. 2013].

The distribution of this species within Australian waters extends from approximately Perth, Western Australia, around the north of the continent to Sydney, New South Wales [Pember et al. 2005; Russell et al. 2003]. Genetic analyses indicate that Mangrove Jack consist of a single biological stock across its Australian range [Russell et al. 2003]. This level of mixing is

consistent with a life history that involves offshore spawning by adults. Juvenile fish have been shown to migrate from freshwater and estuarine habitats to offshore reef environments, sometimes moving up to 335 km [Russell et al. 2003]. Once these ontogenetic movements have occurred there have been no reports of adult fish undertaking extensive movements, although studies are limited. As such, limited evidence of adult movement in combination with evidence of varying stock status in different regions indicates that Mangrove Jack likely comprise separate management units.

Here, assessment of stock status is presented at the management unit level—East Coast Queensland and the Gulf of Carpentaria (Northern Territory and Queensland); and at the jurisdictional level—Western Australia, Northern Territory and New South Wales.

STOCK STATUS

East Coast Queensland Mangrove Jack is taken as a minor by-product species in Queensland commercial line and net fisheries the Reef Line Fishery (RLF) and the East Coast Inshore Fishery (ECIF). Catch of Mangrove Jack in the commercial line (1.7 tonnes (t) in 2021–22) and net (0.6 t in 2021–22) fisheries is stable and combined has averaged 2.3 t in total since 2010–11. Catch rates for the commercial net and line fishery are not considered to be reliable indicators of biomass because this species is not commercially targeted within this management unit.

There is a significant recreational fishery for this species, with a reported harvest of over 41 t from Queensland (includes the Gulf of Carpentaria) (medium confidence) in the 2019–20 statewide recreational fishing survey [Teixeira et al. 2021]. Indigenous catch is unknown, though is probably low. Mangrove Jack is a popular recreational species in all habitats they occupy but can be difficult to target. The Minimum Legal Size is less than the size at maturity and preliminary fishery-dependent monitoring has documented a majority (more than 90% in 2017) of recreationally caught fish are less than the size at maturity (L50 for females) [Unpublished, QDAF 2023]. The impact on the stock of harvesting these immature individuals is unknown. A portion of the biomass is not available to the fishery because of state marine parks and the Great Barrier Reef Marine Park (GBRMP) zoning, although the proportion protected has not been quantified. There is insufficient information available to confidently classify the status of this stock.

On the basis of the evidence provided above, the management unit is classified as an **undefined stock**.

Gulf of Carpentaria Mangrove Jack were exposed to foreign trawling activity between 1950 and 1990 [O'Neill et. al. 2011] with catches being slightly lower than contemporary harvests. This species is retained within the Gulf of Carpentaria Developmental Fin Fish Trawl Fishery (GOCDFFTF) and is managed using Individual Transferable Quota (ITQ) and Total Allowable Catch (TAC). During 2002–11 the GOCDFFTF harvest averaged approximately 50 t, which was considered higher than the 30 t MSY identified in a previous assessment [O'Neill et al. 2011]. Little or no fishing effort occurred in the GOCDFFTF from 2012–13 until 2021–22, when fishing resumed after new developmental fishing permits were issued in October 2020. Catches peaked at 41 t in the Northern Territory Demersal Fishery (DF) in 2019–20, but have subsequently dropped to around 10 t, which is similar to the long-term average catch in the Gulf of Carpentaria for this fishery. Outcomes reported in the 2021 update, using a modified catch-MSY model (developed by Martell and Froese [2013] and modified by Haddon et al.

[2018]) estimated that the 2019 biomass of Mangrove Jack in the Gulf of Carpentaria was above the target reference point, with the mean estimated biomass exceeding the target and 95% confidence intervals positioned above the limit reference point [Saunders and Roelofs 2020]. This suggests that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Similarly, the model estimated that the fishing mortality (0.1) in 2019 was well below the limit point indicating that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired. Since this assessment, catches have decreased, further reducing the risk posed by fishing. In addition, within the Gulf of Carpentaria this species is afforded some refuge beyond commercial operations throughout juvenile life stages. Inhabiting inshore environments and estuaries, Mangrove Jack typically migrate to offshore waters between 324 mm and 430 mm standard length [Russell et al. 2003]. While maturing and adult individuals likely interact with the GOCDFFTF, significant areas within the known range are probably not subject to trawling activities, offering adults areas of protection. The above evidence indicates that the current level of fishing effort for this species is unlikely to lead to depleted stocks within the Gulf of Carpentaria.

On the basis of the evidence provided above, the management unit is classified as a **sustainable stock**.

**New South
Wales**

Stock status for the New South Wales stock is reported as Negligible due to historically low catches in this jurisdiction and the stock has generally not been subject to targeted fishing. The New South Wales commercial catch in 2018–22 averaged approximately 0.19 t per annum, and Mangrove Jack is not a major component of recreational landings. Fishing is unlikely to be having a negative impact on the stock.

**Northern
Territory**

Mangrove Jack is a highly regarded fish in the Northern Territory but is one of the less common lutjanids in this jurisdiction. Almost all Mangrove Jack caught by recreational fishers in the Northern Territory are harvested from estuarine and inshore habitats [West et al. 2022], whereas the majority of the commercial harvest (by the multi-species Timor Reef and Demersal Fisheries) occurs offshore.

The magnitude of the recreational harvest of this species is around 8% of the commercial catch (derived from West et al. [2022] and contemporary commercial catch data). There are no estimates of the Indigenous harvest of Mangrove Jack in the Northern Territory.

The average annual commercial catch of Mangrove Jack in the Northern Territory for the decade spanning 2012–13 to 2021–22 was 29 t. An assessment using catch data applied to a modified catch-MSY model (developed by Martell and Froese [2013] and modified by Haddon [2018]), estimated that the 2019 biomass of Mangrove Jack exceeded the target reference point, with the mean estimated biomass exceeding the target and 95% confidence intervals positioned above the limit reference point [Saunders 2020]. This suggests that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Similarly, the model estimated that the fishing mortality (0.08) in 2019 was well below the limit point indicating that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired. Since this assessment, catches have reduced, averaging 17 t over the last three years, meaning the risk posed by fishing has reduced since the last assessment.

On the basis of the evidence provided above, Mangrove Jack in the Northern Territory is classified as a **sustainable stock**.

Western Australia

Most of the commercial catch of Mangrove Jack in WA is landed in the Pilbara Fish Trawl Managed Fishery. This species has also been landed in small quantities in the Gascoyne Demersal Scalefish Managed Fishery, Northern Demersal Scalefish Managed Fishery, Pilbara Line Fishery, and the Pilbara Trap Managed Fishery. Mangrove Jack are 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). These indicator species 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 based on the performance measures identified in the harvest strategy [Wakefield et al. 2023]. The level of risk associated with the sustainability of Mangrove Jack in the NCDR is assessed as low. This assessment of Mangrove Jack 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).

Total catch of Mangrove Jack across WA over the last 10 years (2013–22) have ranged from 13.8–19.7 t, with a mean annual catch of 16.6 t. This is consistent with average catches across the previous 10 years being 17.9 t. For the last 10 years when reliable catch estimates for Mangrove Jack are available for both the recreational and charter sectors, these have been relatively low compared to commercial catches (i.e., comprising approximately 21% of the total catch). Results of analyses using a Catch-MSY model applied to data on annual catches for this species (1993–2022), showed that the annual catches since 2002 have fluctuated around the median model prediction for maximum sustainable yield (MSY), after having been above the 95% CI of MSY between 1997 and 2001. These results are also consistent with the predicted values for biomass in recent years being above BMSY, and fishing mortality remaining below FMSY. However, it is important to recognise that Catch-MSY is a data-limited technique with relatively strong assumptions, dependent on user inputs. For this assessment, these included specified ranges for initial depletion (0.4–0.8), based on likely catch levels from foreign fleets prior to the start of the time series, final depletion (0.15–0.7), based on recent catches relative to 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 52 years in WA). Given the low level of overall landings of Mangrove Jack across multiple fisheries in Western Australia, recent catches of this species being less than the predicted MSY, and status of the indicator species for the NCDR, it is considered that the biomass of Mangrove Jack in Western Australia is unlikely to be depleted and that current levels of fishing mortality is unlikely to be sufficiently high to cause the stock to become recruitment overfished. On the basis of the evidence provided above, Mangrove Jack in Western Australia is classified as a **sustainable stock**.

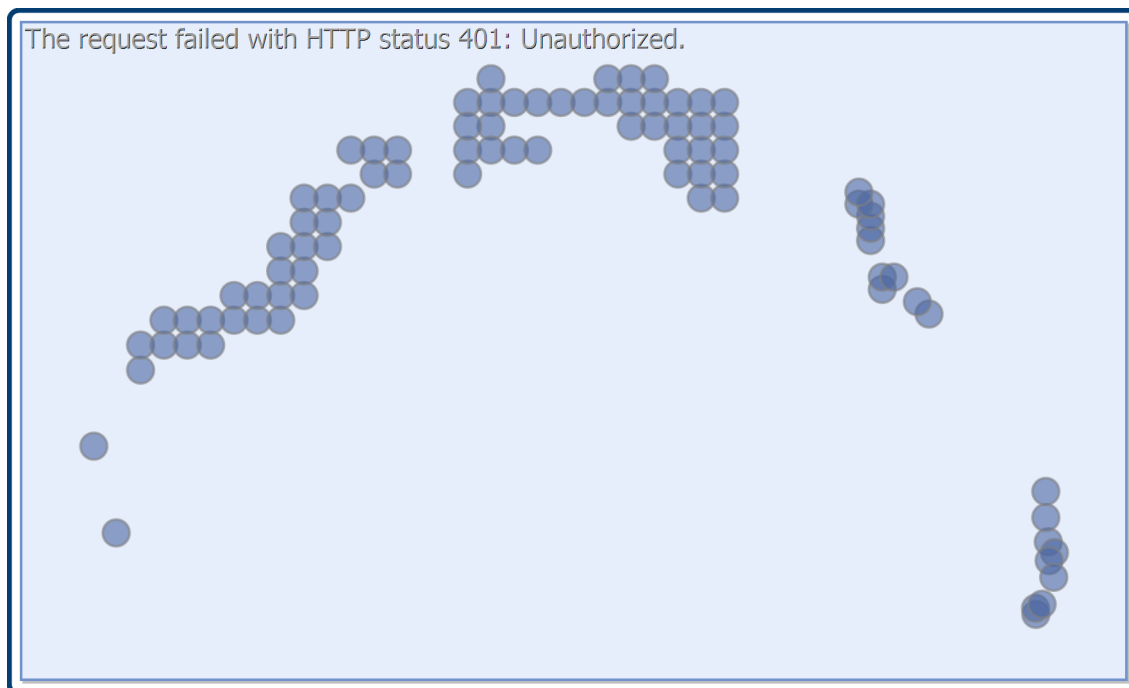
BIOLOGY

Mangrove Jack biology [Russell et al. 2003; Pember et al. 2005; Piddocke et al. 2015]

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Species	Longevity / Maximum Size	Maturity (50 per cent)
Mangrove Jack	57 years, 1,019 mm FL	Male: approximately 7 years, 450 mm FL Female: approximately 8 years, 510 mm FL

DISTRIBUTION



Distribution of reported commercial catch of Mangrove Jack

TABLES

Fishing methods	New South Wales	Northern Territory	Queensland	Western Australia
Charter				
Hook and Line	✓	✓	✓	✓
Spearfishing			✓	✓
Commercial				
Bottom Trawls		✓		
Fish Trap				✓
Hand Line, Hand Reel or Powered Reels				✓

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Hook and Line	✓			
Line			✓	
Mesh Net	✓			
Midwater Trawl			✓	
Net			✓	
Otter Trawl	✓			✓
Unspecified		✓		
Various	✓			
Recreational				
Hook and Line	✓	✓	✓	✓
Spearfishing	✓		✓	

Management Methods				
	New South Wales	Northern Territory	Queensland	Western Australia
Charter				
Bag/possession limits	✓	✓	✓	✓
Gear restrictions	✓	✓	✓	
Licence	✓			
Limited entry				✓
Marine park closures	✓			
Passenger restrictions				✓
Seasonal or spatial closures			✓	
Size limit		✓	✓	✓
Spatial closures		✓		
Spatial zoning				✓
Vessel limits		✓		
Commercial				
Gear restrictions	✓	✓	✓	✓
Harvest Strategy			✓	

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

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Catch	New South Wales	Northern Territory	Queensland	Western Australia
Charter	Unknown	< 1 t	1.04 t 2021–22	1.9 t
Commercial	0.1861 t	25.4882 t	2.3193 t	12.7113 t
Indigenous	Unknown	Unknown	Unknown	Unknown
Recreational	Unknown	3 t (2019)	41 t QLD (2019–20)	1.77 t ± 0.51 se

Western Australia. Active Vessels data is unreportable as there were fewer than three vessels operating in Pilbara Fish Trawl Interim Managed Fishery and Pilbara Trap Managed Fishery.

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]. Shore based catches of Mangrove Jack are not known.

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). Recreational Catch from West et al. [2022].

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

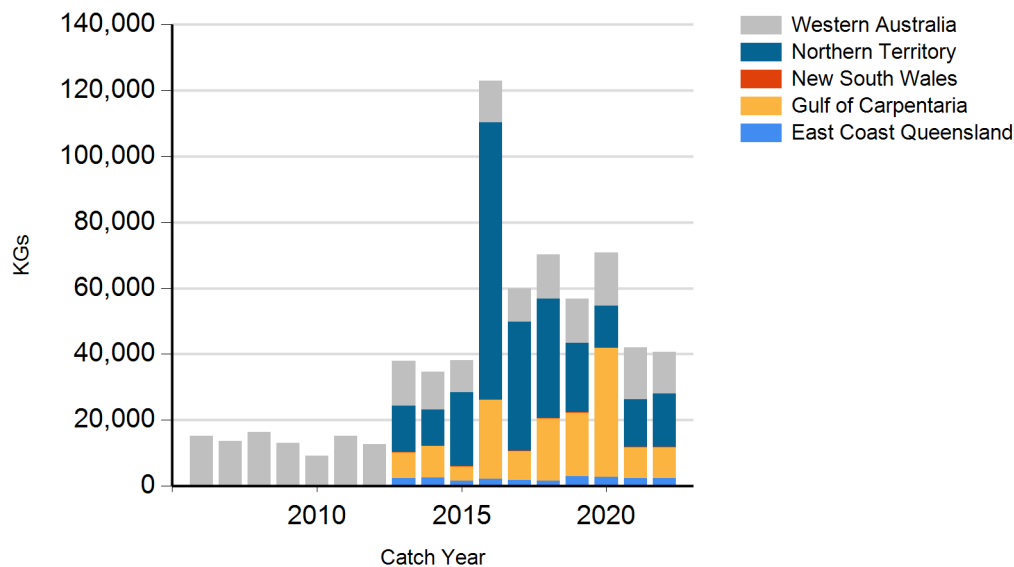
Queensland – Recreational Fishing (Catch). Data are based at the whole of Queensland level and derived from statewide recreational fishing surveys. Where possible, estimates have been converted to weight (tonnes) using best known conversion multipliers. Conversion factors may display regional or temporal variability. In the absence of an adequate conversion factor, data presented as number of fish.

Queensland – Commercial (Catch). Queensland commercial and charter data has been sourced from the commercial fisheries logbook program. Further information available through the Queensland 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 available at: <https://www.daf.qld.gov.au/business-priorities/fisheries/sustainable/harvest-strategy>

CATCH CHART

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Commercial catch of Mangrove Jack - note confidential catch not shown

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