

# Golden Snapper (2020)

*Lutjanus johnii*



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## STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Western Australia	Western Australia	Sustainable	Catch
Northern Territory	Darwin Region	Depleted	Catch, biomass, fishing mortality
Northern Territory	Regional Northern Territory	Sustainable	Catch, biomass, fishing mortality
Northern Territory, Queensland	Gulf of Carpentaria	Sustainable	Catch, biomass, fishing mortality
Queensland	Eastern Australia	Sustainable	Catch, biomass, fishing mortality

## STOCK STRUCTURE

Golden Snapper is a moderately long-lived (i.e. 30 years), late-maturing species that can reach a length of one metre [Cappo et al. 2013]. They are broadly distributed throughout the tropical and sub-tropical Indo-West Pacific with juveniles spending several years in estuarine and inshore reef habitats before migrating to nearshore reef environments (to a depth of at least 80 m) as they near sexual maturity [Allen 1985, Kiso and Mahyam, 2003, Tanaka et al. 2011].

The distribution of this species within Australian waters extends from the Kimberley region in Western Australia, around the north of the continent to the southern Great Barrier Reef (around Rockhampton) [Travers et al. 2009]. A study of the stock structure of Golden Snapper across this range suggests that many functionally separate adult populations are present at a scale of tens of kilometres, although boundaries are unknown [Saunders et al. 2016].

Golden Snapper experience moderate to high harvest rates in some Australian fisheries (particularly those targeting adults of this late-maturing species), which can cause localised depletion. However, it is extremely difficult to collect relevant biological and catch-and-effort

information to assess each adult population unit.

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

## STOCK STATUS

### **Darwin Region**

The Darwin Region represents the area within a radius of approximately 300 km of this population centre. Within this region, Golden Snapper is primarily caught by recreational fishers. Of the total Golden Snapper catch within the Darwin Region management unit, 70 per cent is taken by recreational anglers, 19 per cent by fishing tour operators, and 5 per cent by commercial fishers (predominantly in the Coastal Line Fishery). No estimates of the Indigenous harvest of Golden Snapper are available for this region.

The most recent assessment [Saunders 2018] was an update of the 2014 Stock Reduction Analysis model [Grubert et al. 2013] including data up to and including 2017. The results indicate that the Greater Darwin Region remained overfished in 2017 (99 per cent probability) and existing fishing pressure will likely maintain the level of overfishing. The assessment estimated that biomass and egg production were 23 per cent of the unfished biomass (1970), indicating this stock is recruitment overfished. Given the recent information on the stock structure of this species [Saunders et al. 2016], it is likely that the assessment incorporates several populations. As the model is driven by the populations that receive the highest harvest rates in the Northern Territory the assigned status can be assumed to be representative of these heavily fished areas, with other less accessible areas being more lightly fished. The above evidence indicates that the stock is likely to be depleted and that recruitment is likely to be impaired.

In the Darwin Region, abundance, catch and catch rate have substantially declined over the past 10 years [NTG 2017]. The fisheries accessing these exploited stocks operate inshore and include the Coastal Line Fishery, the Barramundi Fishery, Fishing Tour Operators and recreational fishers. Catch limits and fishery area closures were implemented in 2015 to reduce harvest by an estimated 50 per cent to allow for the biomass of Golden Snapper stocks to recover [Grubert et al. 2013]. Given the species' relatively slow growth rate, the management measures introduced in 2015 are unlikely to have yet supported measurable stock recovery. Furthermore, the results of the stock assessment indicate the stock continues to be overfished and the harvest rate is expected to prevent the stock from recovering from its recruitment impaired state. This level of fishing mortality is expected to prevent the stock from recovering from its recruitment impaired state.

On the basis of the evidence provided above, Golden Snapper in the Darwin Region (Northern Territory) management unit is classified as a **depleted stock**.

### **Eastern Australia**

Golden Snapper is mainly harvested by the recreational sector on the Queensland east coast, and no stock assessment has been undertaken to estimate current biomass in relation to unfished biomass in this management unit. Estimated recreational landed catch remained stable between 2000 (about 31 tonnes (t)) and 2010 (about 33 t), but then declined to around 13 t in 2013–14 [Teixeira et al. 2021]. The most recent recreational angler survey (2019–20) estimates a substantial jump in harvest to 61 t. According to this survey, close to two-thirds of recreationally caught fish were released [Webley et al. 2020].

However, given that this species suffers substantial post-release mortality from barotrauma [Welch et al. 2014], it is likely that total fishing mortality by this sector is higher than indicated by landed catch. The Indigenous harvest from this management unit is unknown. The species is taken as by-product in the East Coast Inshore Fin Fish Fishery (Queensland), predominantly by set mesh net. Annual commercial catches increased from less than one t per year from 2000–08 to a peak of 10 t in 2011. Catches from 2012 declined from this peak, and in 2019 the catch was around 13 t.

A preliminary assessment using catch data from all commercial fisheries applied to a modified catch-MSY model (developed by Martell and Froese [2013] and modified by Haddon et al. [2018]), estimated that the 2019 biomass of Golden Snapper on the East Coast was 51 per cent of unfished levels [Saunders and Roelofs 2020a] suggesting that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. The model estimated the fishing mortality in 2019 was equal to the limit reference point of 0.2. Harvest in recent years has been above the estimated MSY. The current level of fishing mortality is unlikely to cause the stock to become recruitment impaired, however, should high fishing pressure continue, there is an increased risk of overfishing occurring.

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

### **Gulf of Carpentaria**

In the Gulf of Carpentaria management unit, Golden Snapper is mainly harvested by trawl vessels in the commercial Gulf of Carpentaria Developmental Fin Fish Trawl Fishery (GOCDFTF—Queensland) and Demersal Fishery (DF—Northern Territory). There is no reliable estimate of recreational harvest. Harvest from the adjacent Northern Territory jurisdiction has been low in recent years. Golden Snapper were also fished by foreign fleets between the 1950s and 1980s [O'Neill et al. 2011], and these catches (annual peak of 60 t) were higher than contemporary levels.

In the Queensland portion of this management unit commercial catches remained stable at 20–35 t annually from 2001–2011. Fish trawl effort from the GOCDFTF declined markedly from 2012–14 as a result of trawl effort being transferred onto other management units. In 2019, there was no catch in the trawl sector and the catch by other fisheries was below 4 t. However, in the Northern Territory portion of this management unit an increase in the targeting of Saddletail Snapper by the DF in 2019 led to an increase of the catch (19 t) of Golden Snapper.

A preliminary assessment using catch data from all commercial fisheries applied to a modified catch-MSY model (developed by Martell and Froese [2013] and modified by Haddon [2018]), estimated that the 2019 biomass of Golden Snapper was 47 per cent of unfished levels [Saunders and Roelofs 2020b] suggesting that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Similarly, the fishing mortality in 2019 was 0.12 which approximated the target level and was well below the limit reference point indicating 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 Gulf of Carpentaria management unit is classified as a **sustainable stock**.

### **Regional Northern Territory**

Regional Northern Territory Region encompasses all waters outside of approximately 300 km from Darwin. Catch in this region is dominated by the finfish trawl vessels in the Demersal Fishery (DF). Additionally, foreign trawlers harvested substantial amounts (peak of 140 t) of Golden Snapper when they operated in this area in the 1970s and 1980s [Saunders 2020]. Catches by the domestic trawlers have been significantly lower and in 2019 was 22 t. Given the

fine-scale stock structure of this species [Saunders et al. 2016], it is likely that this management unit incorporates several populations. Consequently, the assessments will be driven by the populations that receive the highest harvest rates in this management unit and the assigned status can be assumed to be representative of these heavily-fished areas, with other less accessible areas being more lightly-fished.

A preliminary assessment using catch data from all fishing sectors applied to a modified catch-MSY model (developed by Martell and Froese [2013] and modified by Haddon [2018]), estimated that the 2019 biomass of Golden Snapper was 76 per cent of unfished levels [Saunders 2020] suggesting that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Similarly, the fishing mortality in 2019 was 0.06 which was well below the limit reference point indicating 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, Golden Snapper in the Regional Northern Territory management unit is classified as an **sustainable stock**.

**Western  
Australia**

Golden Snapper are not a target species in the demersal fisheries of Western Australia, but are landed in small quantities as byproduct [Newman et al. 2020]. The total commercial catch of Golden Snapper in Western Australian demersal fisheries has been low and stable over the last 10 years (2010–2019), ranging from <100 kg–1.7 t per year, with a mean annual catch of 560 kg. Golden Snapper are also landed by recreational (~2 t annually) and charter fishers (~5 t annually), primarily in the Kimberley region of Western Australia. The catch of recreational and charter fishers is greater than the commercial catch of this species. The low catches of Golden Snapper in Western Australia are derived from a limited area compared to the wider distribution of the species. The above evidence indicates that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired. The above evidence also indicates that the biomass of Golden Snapper in Western Australia unlikely to be depleted and that recruitment is unlikely to be impaired.

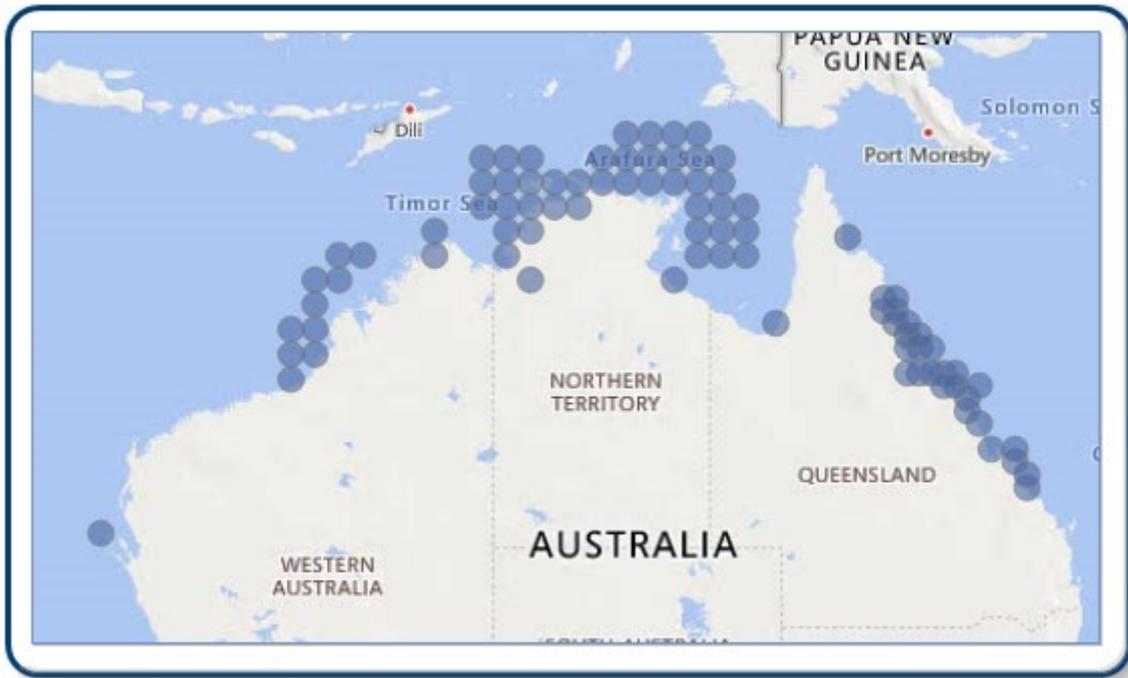
On the basis of the evidence provided above, Golden Snapper in Western Australia is classified as a **sustainable stock**.

**BIOLOGY**

**Golden Snapper biology** [Hay et al. 2005, Cappo et al. 2013, Welch et al. 2014]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Golden Snapper	30 years, 990 mm FL, 15 kg	Varies by location and sex: Males 4–9 years and ~400–600 mm FL, Females 6–10 years and 400–650 mm FL

**DISTRIBUTION**



Distribution of reported commercial catch of Golden Snapper

**TABLES**

<b>Fishing methods</b>	<b>Northern Territory</b>	<b>Queensland</b>	<b>Western Australia</b>
<b>Charter</b>			
Hook and Line		✓	
Rod and reel			✓
<b>Commercial</b>			
Bottom Trawls	✓		
Dropline	✓		
Fish Trap	✓		✓
Gillnet	✓		
Hand Line, Hand Reel or Powered Reels			✓
Handline	✓		
Line		✓	
Net		✓	
Trawl		✓	
<b>Recreational</b>			
Hook and Line	✓	✓	
Spearfishing	✓	✓	✓
<b>Management Methods</b>			

	Northern Territory	Queensland	Western Australia
<b>Charter</b>			
Bag limits			✓
Gear restrictions	✓	✓	✓
Licence			✓
Limited entry	✓	✓	✓
Passenger restrictions			✓
Possession limit	✓	✓	✓
Size limit		✓	✓
Spatial closures	✓	✓	✓
Spatial zoning			✓
Vessel limits	✓		
<b>Commercial</b>			
Effort limits			✓
Gear restrictions	✓	✓	✓
Limited entry	✓	✓	✓
Size limit		✓	
Spatial closures	✓	✓	✓
Spatial zoning			✓
Total allowable catch	✓	✓	✓
Total allowable effort			✓
Vessel restrictions	✓	✓	✓
<b>Recreational</b>			
Bag limits			✓
Gear restrictions	✓	✓	✓
Licence (Recreational Fishing from Boat License)			✓
Possession limit	✓	✓	✓
Size limit		✓	✓
Spatial closures	✓	✓	✓

Catch	Northern Territory	Queensland	Western Australia
Charter	18.1 t	2.4 t	6 t
Commercial	61.8722 t	12.8381 t	0.3448 t
Indigenous	Unknown	Unknown	Unknown
Recreational	48.3 t (2016, Darwin Region)	60.9 t (2019-20 survey)	2 t (2017/18)

**Western Australia – Active Vessels** Data is unreportable as there were fewer than three vessels operating in the PFTIMF, PTMF and WL.

**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 – Recreational (Catch)** Boat-based recreational catch is from 1 September 2017–31 August 2018. These data are derived from those reported in Ryan et al. 2019.

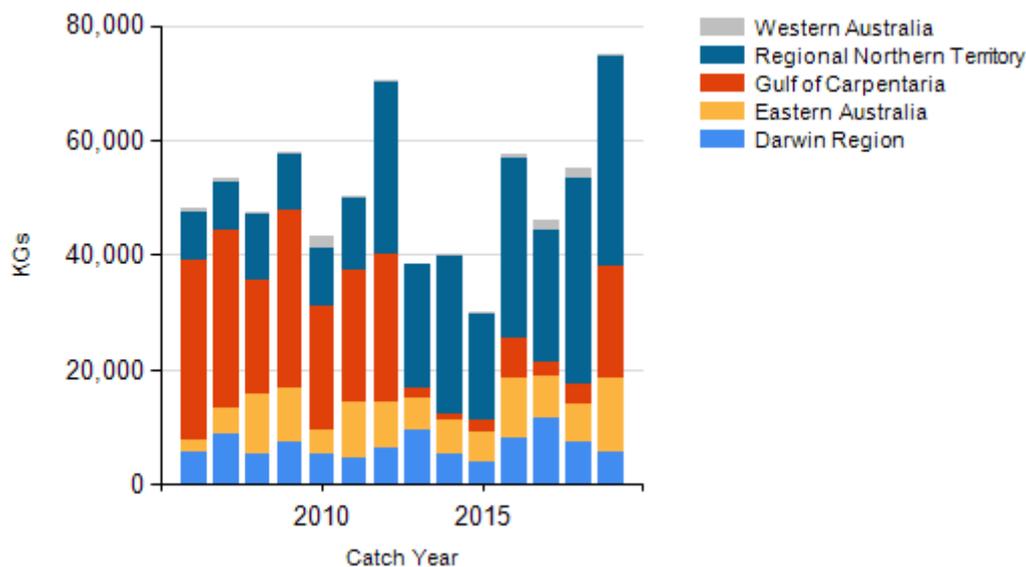
**Western Australia – Indigenous (management methods)** Subject to application of Section 211 of the *Native Title Act 1993* (Cth), and the exemption from a requirement to hold a recreational fishing licence, the non-commercial take by Indigenous fishers is covered by the same arrangements as that for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

**Northern Territory – 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 "...without derogating from any other law in force in the Territory, nothing in a provision of this Act or an instrument of a judicial or administrative character made under it limits the right of Aboriginals who have traditionally used the resources of an area of land or water in a traditional manner from continuing 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>

## CATCH CHART



Commercial catch of Golden Snapper - note confidential catch not shown

References	
Allen, GR 1985	Allen, GR 1985, FAO species catalogue, volume 6, snappers of the world. FAO Fisheries Synopsis 125.
Cappo et al. 2013	Cappo, M, Marriott, RJ and Newman, SJ 2013, James's rule and causes and consequences of a latitudinal cline in the demography of John's Snapper ( <i>Lutjanus johnii</i> ) in coastal waters of Australia, <i>Fishery Bulletin</i> , 111(4): 309–324.
Grubert et al. 2013	Grubert, MA, Saunders, TM, Martin, JM, Lee, HS and Walters, CJ 2013, Stock assessments of selected Northern Territory fishes, <i>Fishery report 110</i> , Northern Territory Department of Primary Industries and Fisheries, Darwin.
Hay et al. 2005	Hay, T, Knuckey, I, Calogeras, C and Errity, C 2005, Population and biology of the Golden Snapper, <i>Fishery report 21</i> , Northern Territory Government, Darwin.
Kiso and Mahyam 2003	Kiso, K and MI Mahyam 2003, Distribution and feeding habits of juvenile and young John's snapper <i>Lutjanus johnii</i> in the Matang mangrove estuary, west coast of Peninsular Malaysia. <i>Fisheries Science</i> , 69: 563–568.
Newman et al. 2020	Newman, SJ, Wakefield, C, Skepper, C, Boddington, and Blay, N 2020, North Coast Demersal Resource Status Report 2019. pp. 159-168. In: Gaughan, D.J. and Santoro, K. (eds.) 2020. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2017/18: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia, Perth, Australia. 291p.
NTG 2017	Northern Territory Government (NTG) 2017, Status of key Northern Territory Fish Stocks Report 2015, Northern Territory Government Department of Resources, fishery report 118.
O'Neill et al 2011	O'Neill, MF, Leigh, GM, Martin, JM, Newman, SJ, Chambers, M, Dichmont, CM and Buckworth, RC 2011, Sustaining productivity of tropical Red Snappers using new monitoring and reference points, Fisheries Research and Development Corporation project 2009/037, Queensland Department of Employment, Economic Development and Innovation, Brisbane.
Ryan et al. 2019	Ryan, KL, Hall, NG, Lai, EK, Smallwood, CB, Tate, A, Taylor, SM, Wise, BS 2019, Statewide survey of boat-based recreational fishing in Western Australia 2017/18. Fisheries Research Report No. 297. Department of Primary Industries and Regional Development, Government of Western Australia, Perth.
Saunders et al. 2016	Saunders, TM, Welch, D, Barton, D, Crook, D, Dudgeon, C, Hearnden, M, Maher, S, Ovenden, J, Taillebois, L and Taylor J 2016, Optimising the management of tropical coastal reef fish through the development of Indigenous capability. FRDC final report 2013/017.
Tanaka et al. 2011	Tanaka, K, Hanamura, Y, Chong, VC, Watanabe, S, Man, A, Kassim, FM, Kodama, M and Ichikawa, T 2011, Stable isotope analysis reveals ontogenetic migration and the importance of a large mangrove estuary as a feeding ground for juvenile John's snapper <i>Lutjanus johnii</i> . <i>Fisheries Science</i> 77: 809–816.
Travers et al. 2009	Travers, MJ, Potter, IC, Clarke, KR, Newman, SJ and Hutchins, JB 2009, The inshore fish faunas over soft substrates and reefs on the tropical west coast of Australia differ and change with latitude and bioregion. <i>Journal of Biogeography</i> , 37: 148–169.
Webley et al. 2015	Webley, J, McInnes, K, Teixeira, D, Lawson, A and Quinn, R 2015, Statewide Recreational Fishing Survey 2013-14, Queensland Department of Agriculture and Fisheries, Brisbane.
Welch et al. 2014	Welch, DJ, Robins, J, Saunders, T, Courtney, T, Harry, A, Lawson, E, Moore, BR, Tobin, A, Turnbull, C, Vance, D and Williams, AJ 2014, Implications of climate change impacts on

	fisheries resources of northern Australia, part 2: Species profiles, final report to the Fisheries Research and Development Corporation, project 2010/565, James Cook University, Townsville.
Teixeira et al. 2021	Teixeira, D, Janes, R and Webley, J 2021, 2019/20 Statewide Recreational Fishing Survey Key Results, Project Report. State of Queensland, Brisbane.
Saunders 2018	Saunders, T (2018), Stock assessment of Golden Snapper ( <i>Lutjanus johnii</i> ) in the 'Darwin Region' of the Northern Territory. Unpublished Fishery Report.
Saunders 2020	Saunders, T (2020), Regional NT Golden Snapper Stock Status Summary - 2020. Unpublished Fishery Report.
Saunders and Roelofs 2020b	Saunders, T and Roelofs, A (2020b), Gulf of Carpentaria Golden Snapper Stock Status Summary - 2020. Unpublished Fishery Report.
Saunders and Roelofs 2020a	Saunders, T and Roelofs, A (2020a), East Coast Queensland Golden Snapper Stock Status Summary - 2020. Unpublished Fishery Report
Martell and Froese 2013	Martell, S and Froese, R 2013, A simple method for estimating MSY from catch and resilience. <i>Fish and Fisheries</i> 14: 504–514.
Haddon et al. 2018	Haddon, M, Punt, A and Burch, P 2018, simpleSA: a package containing functions to facilitate relatively simple stock assessments. R package version 0.1.1.18