Goldband Snapper (2020)

Pristipomoides multidens

Thor Saunders: Department of Industry, Tourism and Trade, Northern Territory, **Fabian Trinnie**: Department of Primary Industries and Regional Development, Western Australia, **Lisa Walton**: Department of Agriculture and Fisheries, Queensland, **Corey Wakefield**: Department of Primary Industries and Regional Development, Western Australia, **Stephen Newman**: Department of Primary Industries and Regional Development, Western Australia

STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Western Australia	Gascoyne	Sustainable	Age structure, catch, fishing mortality
Western Australia	Kimberley	Sustainable	Biomass, age structure, catch, fishing mortality, CPUE
Western Australia	Pilbara	Sustainable	Age structure, catch, fishing mortality
Northern Territory	Arafura Sea	Sustainable	Biomass, Fishing Mortality
Northern Territory	Joseph Bonaparte Gulf	Undefined	Catch
Northern Territory	Timor Sea	Sustainable	Biomass, Fishing Mortality
Northern Territory, Queensland	Gulf of Carpentaria	Undefined	Catch
Queensland	East Coast Queensland	Undefined	Catch

STOCK STRUCTURE

Goldband Snapper is widely distributed throughout northern Australia and the tropical Indo–West Pacific. Ovenden et al. [2002] examined the genetic connectivity of Goldband Snapper using mitochondrial DNA from samples collected at six Australian locations (four in Western Australia: Exmouth, Pilbara, Broome, Northern Kimberley; two in the Northern Territory: Timor Sea, Arafura Sea) and three south east Asian locations (Kupang, Irian Jaya, Madang). The mitochondrial DNA data for Goldband Snapper did not differ genetically among Australian locations, except for the northern Kimberley location that exhibited restricted gene flow. Ovenden et al. [2002] reported that samples taken from locations in Southeast Asia were genetically distinct from those sampled from Australian locations. This study indicated that

within the region sampled, Goldband Snapper are likely to form a single biological stock.

Newman et al. [2000] examined otolith stable isotopes in each of three management regions in Western Australia (Kimberley, Pilbara and Gascoyne), and across northern Australia. Significant differences in stable isotope ratios provided evidence that there was limited mixing of adult Goldband Snapper between all sites sampled in Australia, Indonesia and Papua New Guinea. Therefore, each of these broad locations could be treated separately for the purposes of fishery management, if management arrangements were mediated in a way that harmonized with the spatial patterns of exploitation. Recently, Saunders et al. [2018] used otolith microchemistry and parasitology to identify separate biological Goldband Snapper stocks in the Joseph Bonaparte Gulf, Timor Sea, Arafura Sea and Gulf of Carpentaria.

Here, assessment of stock status is presented at the management unit level—Kimberley, Pilbara, Gascoyne (Western Australia) and East Coast Queensland and at the biological stock level for the Joseph Bonaparte Gulf, Timor Sea, Arafura Sea and Gulf of Carpentaria.

STOCK STATUS

Arafura Sea

Goldband Snapper has been primarily harvested in this stock using finfish trawl gear. Before three additional trawlers entered the fishery in 2012 the average catch over the previous ten years was steady at approximately 55 tonnes (t) annually. The catches increased substantially to a peak of 211 t in 2016 before declining to 105 t in 2019 as vessels moved to other areas in the fishery. CPUE during this increasing period of catch has also substantially increased [Saunders 2020a]. This stock was assessed using data up to 2019 using a stochastic stock reduction analysis (SRA) model [Saunders 2020a]. Biomass levels were estimated to be 91 % 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. The above evidence indicates that the current level of fishing pressure is unlikely to cause the stock to become recruitment impaired.

While this biomass estimate appears overly optimistic, a trawl survey conducted in 1990 indicated a total biomass of approximately 3 700 t of Goldband Snapper [Ramm 1994]. Therefore, the peak harvest in this stock only represents a 6 per cent harvest fraction of the total biomass which is highly unlikely to have had a significantly negative impact on the stock.

On the basis of the evidence provided above, the Arafura Sea biological stock is classified as a **sustainable stock.**

East Coast Queensland

Species level reporting in commercial logbooks began in 2007 and has helped to quantify catch as an indicator of fishing pressure. Commercial harvest of Goldband Snapper in Queensland is constrained by a multi-species TACC, in addition to species-specific harvest control rules as part of the newly implemented Reef Line Fishery Harvest Strategy [QDAF 2020]. For secondary target and by-product species like Goldband Snapper, this includes catch reference points that trigger stock assessments and implementation of a species-specific TACC. Since 2007, catch peaked in 2017 (59 t) but has since declined to 45 t in 2019. No formal stock assessments have been undertaken to quantify biomass levels of Goldband Snapper on the east coast of Australia. There is insufficient information available to confidently classify the status of this stock.

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

Gascoyne

The stock assessment for Goldband Snapper in the Gascoyne management unit is based on an assessment of fishing mortality derived from catch curve analysis of representative samples of the age structure in the Gascoyne Demersal Scalefish Managed Fishery (GDSMF, Western Australia). These fishing mortality-based assessments use reference levels that are based on ratios of natural mortality for each species: such that Ftarget = 2/3M, Fthreshold = M and Flimit = 3/2M [DPIRD 2017]. An assessment of fishing mortality for Goldband Snapper was undertaken in the GDSMF in 2017. The fishing mortality based assessment and associated uncertainty ranges indicated that the fishing levels on Goldband Snapper in this management unit were less than the fishing mortality target level. This indicates that, on average, the level of exploitation experienced by Goldband Snapper in the Gascoyne has been low. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Goldband Snapper catches from the GDSMF (Gascoyne management unit) ranged from 240–311 tonnes (t) between 2002 and 2004 [Gaughan and Santoro 2018]. Catch levels from 2005–09 were lower, ranging between 105 and 144 t. Goldband snapper catches in the GDSMF over the last 10 years (2010–19) have ranged from 33–97 t. The catch of Goldband Snapper in 2010 reduced to 33 t, then the catch remained low and stable for the next seven years (2011–17), ranging from 48–78 t, with a mean annual catch of 62.5 t. In the past 2 years (2018–19) catches have increased and have ranged from 84–97 t, with a mean of 90.5 t. 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 Gascoyne (Western Australia) management unit is classified as a **sustainable stock**.

Gulf of Carpentaria

Goldband Snapper is mostly harvested by trawlers in the Gulf of Carpentaria Developmental Fin Fish Trawl Fishery) (GOCDFFTF - Queensland) and Demersal Fishery (DF- Northern Territory). There is no reliable estimate of recreational or Indigenous harvest of Goldband Snapper in the Gulf of Carpentaria, but it is expected to be minor given the offshore nature of the fishery. This stock was also exposed to historical fishing from foreign fleets during the 1950s to the 1980s [O'Neill et al. 2011] but these catches were negligible (1945–1980 average; 2 t) compared to the current catches. Total catch from the GOCDFFTF has historically been relatively low, reaching a peak of 35 t in 2011. This fishery has been inactive for several years however, and no catch has been recorded since 2016 [QFISH 2020]. The DF only recorded small catches of Goldband Snapper (2006–2014 average; 4.6 t), before effort in this stock area increased significantly with the total catch rising to 49 t in 2019. This catch is low compared to the other Goldband Snapper stocks, however, the historical trawl survey in this region [Sainsbury et al. 1991] did not record high abundances of this species compared to other stocks (e.g. Timor and Arafura seas) so it is unknown what the impact of these catches are on the biomass of this stock. Consequently, there is insufficient information available to confidently classify the status of this stock.

On the basis of the evidence provided above, the Gulf of Carpentaria biological stock is classified as an **undefined stock**.

Joseph Bonaparte Gulf

Goldband Snapper in this stock have been primarily harvested by the Demersal Fishery finfish trawl gear. This area was only opened to trawling in 2012 so catches have been historically low (20 year average, 0.5 t). Since this time, catches have increased to 27 t in 2019. A trawl survey conducted in this region in 1990 [Ramm 1994], estimated the biomass of Goldband Snapper in this stock to be approximately 320 t. Consequently, the current harvest represents an 8 per cent harvest fraction of this species. This evidence suggests that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely

to be impaired. Similarly, the harvest in 2019 is only a small fraction of the estimated biomass 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, Goldband Snapper in the Joseph Bonaparte Gulf is classified as a **sustainable stock**.

Kimberley

Goldband Snapper is exploited throughout its distribution in Western Australia. It is one of the indicator species used to assess the status of the demersal scalefish resources in the Kimberley subregion of the North Coast Bioregion of Western Australia [Newman et al. 2018]. The major performance measures for Goldband Snapper in the Kimberley management unit are estimates of spawning stock levels and fishing mortality in the Northern Demersal Scalefish Managed Fishery (Western Australia) (NDSMF) using an integrated age-structured stock assessment. The target reference level of spawning biomass is 40 per cent of the unfished (1980) level, with a threshold reference level of 30 per cent and limit reference level of 20 per cent [DPIRD 2017]. The spawning biomass of Goldband Snapper was estimated to be approximately 30 per cent of the unfished level in the Kimberley management unit (i.e. at the threshold reference level) in 2017 (the year the last integrated assessment was undertaken) [Newman et al. 2020]. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

The fishing mortality based assessments utilise the fishing mortality rate reference levels defined for the Gascoyne management unit. The level of fishing mortality on Goldband Snapper in this management unit is at or below the limit reference level (F=3/2M) in 2017. However, these estimates remain highly uncertainty due to data limitations [Newman et al. 2020]. Goldband Snapper catches from the NDSMF (Kimberley management unit) over the last 10 years (2010–19) have ranged from 400–602 t, with a mean annual catch of 490 t. 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 Kimberley (Western Australia) management unit is classified as a **sustainable stock**.

Pilbara

A stock assessment for Goldband Snapper in the Pilbara management unit was undertaken in 2009, based on an assessment of fishing mortality derived from catch curve analysis of representative samples of the age structure in the Pilbara demersal scalefish fisheries (Pilbara Fish Trawl Interim Managed Fishery, Pilbara Line Fishery and Pilbara Trap Managed Fishery). These fishing mortality based assessments utilise the reference levels defined for the Gascoyne management unit. The fishing mortality based assessments indicated that the estimated fishing level on Goldband Snapper in this management unit was either below the fishing mortality target level, or between the target and threshold levels in 2008, depending on the area of the fisheries [Newman et al. 2020]. This indicates that fishing at that time was not having an unacceptable impact on the age structure of the population. Subsequently, assessment of the overall demersal fish resource in the region has been based on indicator species selected from the suite of demersal scalefish taken (based on their inherent vulnerability and overall risk to sustainability) [Newman et al. 2020]. The levels of fishing mortality on the indicator species, Red Emperor, Rankin Cod and Bluespotted Emperor in the Pilbara subregion of the North Coast Bioregion of Western Australia [Newman et al. 2018] overall, were either less than the target level or between the target and the threshold level. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Goldband Snapper catches from the Pilbara demersal scalefish fisheries (Pilbara management unit) over the last 10 years (2010–19) have ranged from 113–217 t. The catch of Goldband Snapper in the Pilbara demersal scalefish fisheries

has been consistent and stable for the past five years (2015–19), ranging from 192–217 t, with a mean annual catch of 206 t. 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 Pilbara (Western Australia) management unit is classified as a **sustainable stock**.

Timor Sea

Goldband Snapper has been primarily harvested in this stock by trap and line gear. Line fishing rarely occurs now and a reduction in trap effort since 2013 has resulted in a decrease in the total catch from a peak of 625 t in 2009 to 246 t in 2019. CPUE has remained highly variable, but generally has had a flat trajectory during this time [Saunders 2020b] suggesting that the decline of effort has not been related to a decline in the stock. This stock was assessed using data up to 2019 using a stochastic stock reduction analysis (SRA) model [Saunders 2020b]. Biomass levels were estimated to be 82 per cent 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 indicating that the current level of fishing pressure is unlikely to cause the stock to become recruitment impaired.

While the biomass estimates for this stock appear overly optimistic, a trawl survey conducted in 1990 indicated a total biomass of approximately 4 800 t of Goldband Snapper (Ramm 1994). Therefore, the peak harvest in this stock only represents a 13 per cent harvest fraction of the total biomass which is highly unlikely to have had a significantly negative impact on the stock.

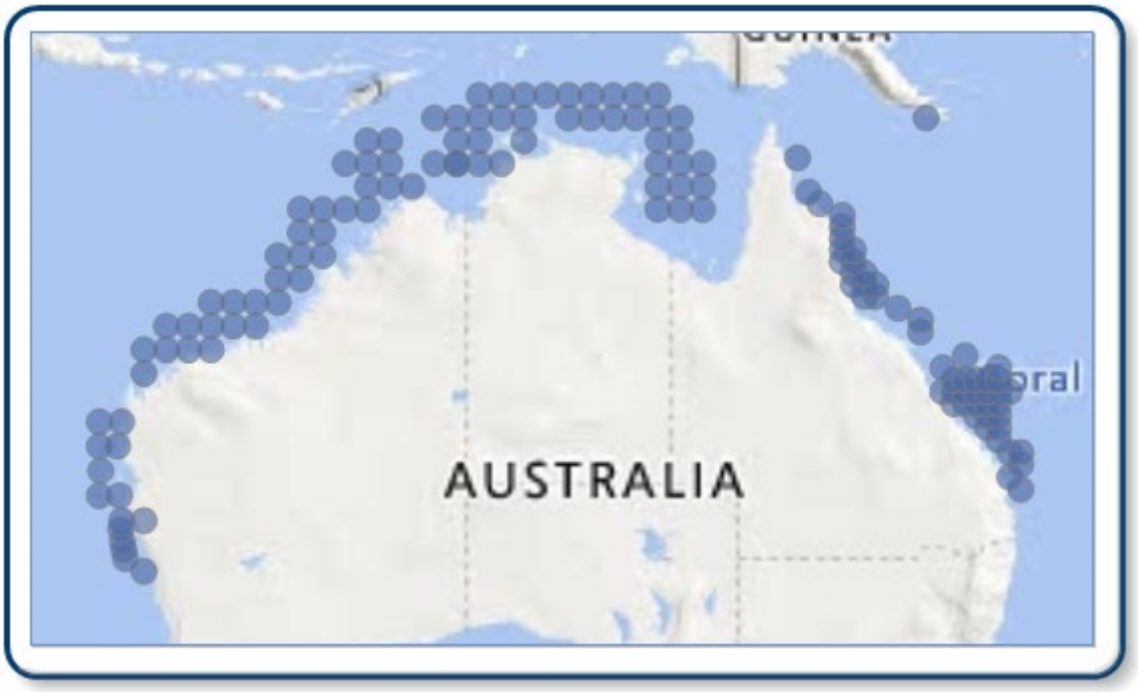
On the basis of the evidence provided above, the Northern Australia management unit is classified as a **sustainable stock.**

BIOLOGY

Goldband Snapper biology [Newman et al. 2001, Newman and Dunk 2003, Wakefield et al. unpublished data]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Goldband Snapper	30 years, 700 mm FL, 810 mm TL	4.6 years, 417 mm FL , 526 mm TL

DISTRIBUTION



Distribution of reported commercial catch of Goldband Snapper

TABLES

Fishing methods			
	Northern Territory	Queensland	Western Australia
Charter			
Hook and Line	✓	✓	✓
Commercial			
Bottom Trawls	✓		
Fish Trap	✓		✓
Hand Line, Hand Reel or Powered Reels			✓
Line		✓	
Otter Trawl			✓
Trawl		✓	
Recreational			
Hook and Line	✓	✓	✓

Management Methods			
	Northern Territory	Queensland	Western Australia
Charter			
Bag limits			✓
Gear restrictions	✓	✓	
Limited entry	✓		✓

Passenger restrictions			✓
Possession limit	✓	✓	
Size limit		✓	✓
Spatial closures	✓	✓	✓
Spatial zoning			✓
Temporal closures		✓	
Commercial			
Effort limits			✓
Gear restrictions	✓	✓	✓
Limited entry		✓	✓
Size limit		✓	
Spatial closures		✓	✓
Spatial zoning	✓		✓
Temporal closures		✓	
Total allowable catch	✓	✓	✓
Total allowable effort			✓
Vessel restrictions		✓	✓
Recreational			
Bag limits			✓
Gear restrictions	✓	✓	
Licence (Recreational Fishing from Boat License)			✓
Possession limit	✓	✓	✓
Size limit		✓	✓
Spatial closures	✓	✓	✓
Temporal closures		✓	

Catch			
	Northern Territory	Queensland	Western Australia
Charter	1.1 t	2.2 t	15 t

Commercial	427.01 t	38.1261 t	806.925 t
Indigenous	Unknown	Unknown	Unknown
Recreational	< 1 t (in 2015)	Unknown	15 t (2017/18)

Western Australia – Commercial (catch) Goldband Snapper forms part of the combined Total Allowable Commercial Catch for other mixed demersal species in the GDSMF.

Western Australia – **Active Vessels** Data is confidential 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 2017–31 August 2018. These data are derived from those reported in Ryan et al. [2019].

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.

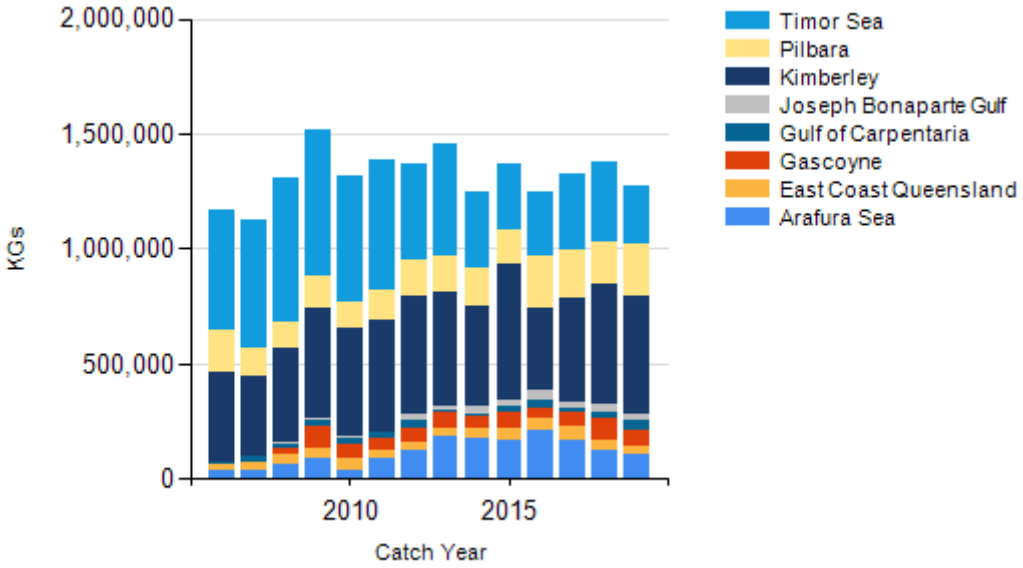
Western Australia – Indigenous (management methods) Subject to application of Section 211 of the *Native Title Act 1993* (Cth), and the exemption from a requirement to hold a recreational fishing licence, the non-commercial take by Indigenous fishers is covered by the same arrangements as that for recreational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

Northern Territory – 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 Goldband Snapper - note confidential catch not shown

References

DPIRD 2017	DPIRD 2017, North Coast demersal scalefish resource harvest strategy 2017–2021. Version 1.0. Fisheries Management Paper No. 285. Department of Primary Industries and Regional Development, Government of Western Australia, Perth, Australia. 35p.
Gaughan and Santoro 2018	Gaughan, DJ and Santoro, K (eds.) 2018, Status Reports of the Fisheries and Aquatic Resources of Western Australia 2016/17: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia, Perth, Australia. 237p.
Newman and Dunk 2003	Newman, SJ and Dunk, IJ 2003, Age validation, growth, mortality and additional population parameters of the goldband snapper (Pristipomoides multidens) off the Kimberley coast of northwestern Australia, Fishery Bulletin, 101(1): 116–128.
Newman et al. 2000	Newman, SJ, Steckis, RA, Edmonds, JS and Lloyd, J 2000, Stock structure of the goldband snapper, Pristipomoides multidens (Pisces: Lutjanidae) from the waters of northern and western Australia by stable isotope ratio analysis of sagittal otolith carbonate, Marine Ecology Progress Series, 198: 239–247.
Newman et al. 2001	Newman, SJ, Moran, MJ and Lenanton, RCJ 2001, Stock assessment of the outer-shelf species in the Kimberley region of tropical Western Australia, final report to the Fisheries Research and Development Corporation, project 97/136, Fisheries Western Australia, Perth.
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 2018/19: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia, Perth, Australia. 291p.
Newman et al. 2018	Newman, SJ, Brown, JI, Fairclough, DV, Wise, BS, Bellchambers, L.M, Molony, BW, Lenanton, RCJ, Jackson, G, Smith, KA, Gaughan, DJ, Fletcher, WJ, McAuley, RB and Wakefield, CB 2018, A risk assessment and prioritisation approach to the selection of indicator species for the assessment of multi-species, multi-gear, multi-sector fishery resources. Marine Policy 88: 11–22.
Ovenden et al. 2002	Ovenden, JR, Lloyd, J, Newman, SJ, Keenan, CP and Slater, LS 2002, Spatial genetic subdivision between northern Australian and southeast Asian populations of Pristipomoides multidens: a tropical marine reef fish species, Fisheries Research, 59(1–2): 57–69.
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.
QDAF 2020	Queensland Department of Agriculture and Fisheries (2020) Reef line fishery harvest strategy: 2020–2025. Brisbane, Queensland.
QFISH 2020	QFish, Department of Agriculture and Fisheries, www.qfish.gov.au
Saunders 2020b	Saunders, T 2020a Stock Status Summary - 2020 Goldband Snapper (Pristipomoides multidens) Timor Sea Stock Reduction Analysis. Unpublished Fishery Report.
Saunders 2020a	Saunders, T 2020b, Stock Status Summary - 2020 Goldband Snapper (Pristipomoides multidens) Arafura Sea Stock Reduction Analysis. Unpublished Fishery Report.
Sainsbury et al. 1991	Sainsbury, KJ, Campbell, R, Brewer, DT, Harris, AN, McLoughlin, K, Ramm, DC, Staples, DJ,

	Xiao, Y and Knuckey, I 1991, Northern Fisheries Research Committee Trawl Fisheries Assessment Working Group.
O'Neill et al. 2011	O'Neill, MF, Leigh, GM, Martin, JM, Newman, SJ, Chambers, M, Dichmont, CM, Buckworth, RC 2011, Sustaining productivity of tropical red snappers using new monitoring and reference points, Fisheries Research and Development Corporation Project Number 2009/037.
Ramm 1994	Ramm DC, 1994, Assessment of the status, composition and market potential of the demersal trawl fish resources in northern Australian waters. Final report the Fisheries Research and Development Corporation on project number 90/15.
Saunders et al. 2018	Saunders, T, Barton, D, Crook, D, Hearnden, M and Newman, S 2018, Stock/management unit division in the Northern Territory Offshore Snapper Fishery. Unpublished Fishery Report.