

# Spanish Mackerel (2020)

*Scomberomorus commerson*



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## STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Commonwealth	Torres Strait Spanish Mackerel Fishery	Sustainable	Biomass, fishing mortality, catch and effort
Western Australia	Mackerel Managed Fishery	Sustainable	Catch, catch rate, SimpleSA
Northern Territory	Northern Territory	Sustainable	Stock assessment, biomass, fishing mortality, catch, catch rate
Queensland	Gulf of Carpentaria	Depleting	Stock assessment, catch, effort, catch rate, length and age structure
Queensland, New South Wales	East Coast	Sustainable	Stock assessment, biomass, fishing mortality, catch, effort, catch rate, length and age structure, TAC

## STOCK STRUCTURE

Genetic evidence indicates that there are three biological stocks of Spanish Mackerel across northern Australia [Moore et al. 2003]; however, evidence from otolith microchemistry, parasite analysis and limited adult movement (at scales greater than 100 km) indicates that there are likely to be a number of smaller biological stocks with limited interaction [Buckworth et al. 2007, Lester et al. 2001, Moore et al. 2003]. Each jurisdiction is likely to have multiple biological stocks within its boundaries; however, the difficulty in obtaining relevant biological, and catch and effort, information to assess each stock individually has meant that not all assessments are undertaken at the biological stock level. Those that are, are based on the populations that

receive the highest harvest rates; their status can be assumed to be representative of the highest level of exploitation that occurs on any population within each management unit or jurisdiction.

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

## STOCK STATUS

**East Coast** This cross-jurisdictional stock has components in Queensland and New South Wales [Ovenden and Street 2007]. Stock status for the entire East Coast biological stock has been established using combined information from these jurisdictions.

The most recent stock assessment [O'Neill et al. 2018] estimated that spawning biomass in 2015–16 was at 40 per cent (range 30 to 50 per cent) of the unfished (1911) level. This is above the limit reference point of 25–30 per cent of unfished biomass recommended in the assessment. The majority of the commercial line catch across both jurisdictions (279 t in 2018–19) is taken within Queensland waters (96 per cent) [QFISH 2020] with a smaller catch during late summer–autumn in northern New South Wales waters [Stewart et al. 2015]. In 2018–19, 39 per cent of the total commercial catch was taken from a very small area off Townsville (North Queensland) during a few months [QFISH 2020], indicating continued high localised fishing pressure. Recreational catch in Queensland was estimated at 171 t in 2019–20 [Teixiera et al. 2021]. This was lower than the previous recreational catch estimate [Webley et al. 2015]. In Queensland, a total allowable catch (TAC) and individual transferable quotas (ITQs), introduced in 2004 for the commercial fishery, substantially reduced participation to the lowest levels recorded for the previous 25 years. Fishing effort has varied since 2004 with up to 13 500 tender vessel days, and was at 9 831 days in 2018–19 [QFISH 2020]. Standardised catch rates in 2015–16 were estimated to have been 50 per cent below 1990 levels for the fishery as a whole and 65 per cent below 1990 levels on the main spawning rounds [O'Neill et al. 2018]. Nominal catch rates in Queensland have remained high since 2016–17 [QFISH 2020]. The nominal catch rates in New South Wales varied but showed no overall trends during the past 20 years [Stewart et al. 2015, NSW DPI unpublished data]. Fishery-dependent sampling indicated that fish length and age frequencies in Queensland were annually variable, but continuous, recruitment into the fishery [Langstreth et al. 2018]. The stock is not considered to be recruitment impaired.

Fishing pressure has been concentrated on a very small area of important spawning grounds off the coast of Townsville [Tobin et al. 2013, Tobin et al. 2014]. Fishing pressure was near a point equivalent to fully-fished [O'Neill et al. 2018] with fishing mortality rates between 2011–12 and 2015–16 at or below the limit reference point FMSY [O'Neill et al. 2018]. In 2018–19 total estimated landings for Queensland and New South Wales were approximately 464 t which was well below the MSY calculated in O'Neill et al. 2018. This 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 biological stock is classified as a **sustainable stock**.

**Gulf of Carpentaria** The Gulf of Carpentaria (Queensland) management unit for the Spanish Mackerel fishery has both commercial line and net components—the Gulf of Carpentaria Line Fishery and the Gulf of Carpentaria Inshore Fin Fish Fishery, respectively. The recreational fishery for this management unit is considered

minor [Webley et al. 2015, Langstreth et al. 2018] and the Indigenous catch considered negligible. Harvests by sector are approximately 97 per cent commercial, 2 per cent recreational and 1 per cent charter [Bessell-Browne et al. 2020]. Of the reported commercial harvest, approximately 80 per cent is taken by line, the remaining 20 per cent by nets. A stock assessment of Spanish Mackerel in the Gulf of Carpentaria (based on 2018 data) estimated the stock was between 29 and 40 per cent unfished spawning biomass (median 32 per cent)[Bessell-Browne et al. 2020]. Model results suggested that biomass declined between 1940 and 1995 to 60 per cent of unfished spawning biomass and, although variable, has continued to decline. The downward trend in biomass since 2011 has been particularly steep prompting concerns for the stock. O'Neill et al [2018] recommended a more precautionary limit reference point (25–30 per cent of unfished spawning biomass, rather than the commonly used 20 per cent) for Spanish Mackerel on Queensland's east coast to account for risks associated with reduced spawning potential due to harvesting of large mature fish, and catch hyperstability. The lower estimate of spawning biomass of Spanish Mackerel in the Queensland Gulf of Carpentaria in 2018 reached the biological limit suggested by O'Neill et al [2018] and biomass was trending downwards. Standardised and nominal catch rates from 2011 to 2019 also indicate a declining trend.

Length and age frequencies from routine fishery-dependent monitoring of commercial line catches from 2007 to 2019 indicated relatively consistent recruitment and length and age compositions in the fishery in most years, with the majority of catches since 2007 comprising fish between 2–6 years of age [Langstreth et al. 2018]. However length and age structures in 2019 suggest limited recruitment into the fishery in 2018 and 2019. The Gulf of Carpentaria experienced a series of extreme ocean warming events during 2015 and 2016 [Benthuisen et al. 2018]. Extreme increases in water temperature can negatively impact the reproductive output of many tropical fish species [Pankhurst and Munday 2011]. The extreme climatic conditions observed in 2015-2016 may have exacerbated declines in biomass post 2017 once fish spawned in those years became vulnerable to fishing.

The most recent stock assessment [Bessell-Browne et al. 2020] estimates that biomass in 2018 was between 29 and 40 per cent of the unfished (1940) level. For the period (2011 to 2018) biomass declined, but the stock is not yet considered to be recruitment impaired.

The latest stock assessment model estimated that the overall population size of Spanish mackerel in the Queensland Gulf of Carpentaria is small (unfished biomass between 1150 to 1350 t), and only relatively small harvests are able to be sustainably maintained through time [Bessell-Browne et al. 2020]. The model results suggest an equilibrium maximum sustainable yield (MSY) biomass of 29 per cent of unfished spawning biomass at a harvest of 228 t per year (all sectors). Commercial harvests were above the estimated MSY for ten of the past 15 years (since 2005) [QFISH 2020]. From 2008 to 2018 there was a gradual decline in total commercial harvest, dropping to 176 t in 2018 and slightly increasing to 195 t in 2019. The majority of Spanish Mackerel harvest is taken by line. Participation (number of licences), effort (days fished) and catch rates in the line sector have shown a declining trend since the mid 1990s. Effort in the net sector has been generally increasing since 2013 however nominal catch rates have declined overall. The current level of fishing mortality is likely to cause the stock to become recruitment impaired.

On the basis of the evidence provided above, the Gulf of Carpentaria (Queensland) management unit is classified as a **depleting stock**.

### **Mackerel Managed Fishery**

The most recent full assessment of Spanish Mackerel in Western Australia was during 1999–2002 [Mackie et al. 2003]. The assessment, conducted when catches were higher than current levels, used catch and effort, biological information, age structure and yield-per-recruit modelling, and indicated the

stock was sustainable. Recent Catch-MSY analysis (SimpleSA package) indicated the Western Australia stock is likely to be above the target biomass and is stable at current catch levels. Catch and fishing effort throughout the Mackerel Managed Fishery (Western Australia) have been relatively stable since 2006, following the introduction of quotas and reductions in vessels due to management changes, with total catches within the target range (246–430 t) [Gaughan and Santoro 2018]. The catch rates for the two main northern fishery areas (Kimberley and Pilbara, covering Onslow to the Northern Territory border), have declined over recent years but remain above historical levels, indicating a relatively high abundance of Spanish Mackerel in these management areas. Catch rates in the southern (Gascoyne–West Coast) area have declined in recent years, after the influence of the 2011 'heatwave' apparently increased abundance of Spanish mackerel for a period in southern WA [Pearce et al. 2011]. Thus, based on the available information the weight of evidence assessment [DPIRD 2020] determined it is possible that there is an acceptable moderate depletion of the stock. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

The total commercial catch of Spanish Mackerel in Western Australia for 2019 was 291 t, and, apart from a low catch in 2018, has been within target range of 246–430 t since management changes in 2006. However, the estimated boat based recreational fishing harvest weights of Spanish Mackerel have declined from 62–86 t to 35–54 t (95 per cent confidence intervals), between the 2011–12 to 2017–18 boat based surveys, respectively [Ryan et al. 2019]. The charter catch has been stable between 14–20 t since 2008. The lower recent recreational catch estimate can be attributed in part to declining recreational effort levels in the northern bioregions and also to a likely lower abundance associated with lower water temperatures in the West Coast Bioregion, as is reflected in the lower commercial catches and catch rates. The minimum size limit for Spanish Mackerel in Western Australia (900 mm TL) is similar to the size at maturity for this species [Mackie et al. 2003], which helps with sustainability as commercial line fishers avoid areas with undersize fish and means the spawning stock is essentially the same as the exploited stock. Thus, the weight of evidence assessment concluded the current management settings are maintaining risk to the stock at acceptable, medium levels. 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 Mackerel Managed Fishery (Western Australia) management unit is classified as a **sustainable stock**.

## Northern Territory

The harvest of Spanish Mackerel in the Northern Territory is managed through a catch-sharing arrangement between all user groups [NTG 2009]. This agreement aims to maintain the cumulative harvest of Spanish Mackerel within a precautionary allowable catch of 450 tonnes (t) per annum. The proportion of the allowable catch allocated to each user group was based on historical logbook data and catch estimates from the National Recreational and Indigenous Fishing Survey [Henry and Lyle 2003] as follows: 76% (342 t) to Spanish Mackerel Fishery licensees, 3% (13.5 t) to Offshore Net and Line Fishery licensees, 1% (4.5 t) to Demersal Fishery licensees, 3% (13.5 t) to Fishing Tour Operator licensees, 16% (72 t) to recreational fishers and 1% (4.5 t) to Indigenous fishers.

The cumulative catch by all sectors averaged ~370 t for the five years spanning 2010–2014, with the proportion of the catch caught by each sector similar to the allocations described above (i.e. 71%, 6%, <1%, 5%, 16% and 2%, respectively). However, the average cumulative catch over the last five years (2015–2019) has risen to over 500 t, primarily due to an increase in catch by Spanish Mackerel Fishery licensees, who harvested 79% of the resource during this period.

The most recent assessment of the Spanish Mackerel resource in the Northern Territory (using data to 2019) indicated that stocks are unlikely to have dropped below 68% of the unfished biomass and that the biomass at the conclusion of 2019 was 72% of the unfished (1973) level [Grubert et al., unpublished]. This being the case, the biomass of the Northern Territory stock of Spanish Mackerel is not considered to be recruitment impaired.

The same assessment indicated that the current (2019), relative fishing mortality rate (i.e.  $U_{2019}/U_{MSY}$ ) for the Northern Territory stock of Spanish Mackerel was 0.43, less than half of the rate required to achieve MSY (i.e. there is scope to increase the harvest of this species, noting that there is spatial concentration of fishing effort that needs to be monitored and managed). The current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

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

**Torres Strait Spanish Mackerel Fishery**

An updated stock assessment for Spanish mackerel was completed in 2019 using data to 2018–19 (AFMA 2019). In total, 40 models were run that included combinations of the four CPUE series, five natural mortality rates (0.25, 0.3, 0.35, 0.4 and 0.44) and two historical catch time series, one of which incorporated an annual harvest of 100 t between 1979 and 1986 to account for the presumed unreported catches by Taiwanese gillnet vessels.

Some model runs, particularly where natural mortality was high and a historical Taiwanese gillnet catch was assumed, failed to converge, and were not included in the final grid of 35 models. The median estimated spawning biomass in 2018–19 across the grid of 35 models was 0.23SB0 (ranging from 0.14 to 0.37SB0), with approximately 80% of models estimating spawning biomass above the limit reference point of 0.2SB0

The median estimated harvest rate (F) in 2017–18 across the models was 0.27, which was below the estimated harvest rate at maximum sustainable yield (FMSY) of 0.32. Total catch in 2018–19 was 64.3 t (73.2 t in 2017–18) and below the TAC (115 t).

Declining CPUE and the potential for hyperstability in catch rates is cause for some concern and will need to be monitored closely in coming years. However, spawning biomass continues to remain above the limit reference point which indicates that biomass is not overfished and fishing mortality continues to remain below MSY, which suggests that overfishing is not taking place.

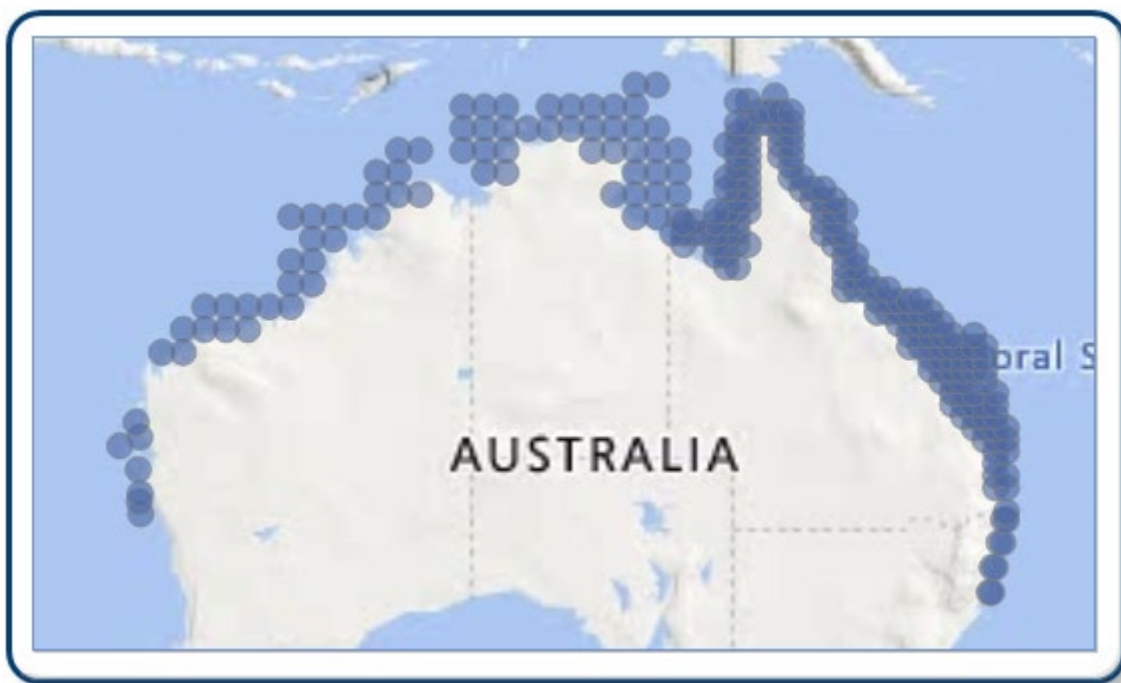
On the basis of the evidence provided above, the Torres Strait Spanish Mackerel Fishery biological stock is classified as a **sustainable stock**.

**BIOLOGY**

**Spanish Mackerel biology** [McPherson 1992, McPherson 1993, QDAFF 2013]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Spanish Mackerel	26 years, 2400 mm FL	~2 years, 800 mm FL

**DISTRIBUTION**



Distribution of reported commercial catch of Spanish Mackerel

**TABLES**

<b>Fishing methods</b>	<b>Commonwealth</b>	<b>New South Wales</b>	<b>Northern Territory</b>	<b>Queensland</b>	<b>Western Australia</b>
<b>Charter</b>					
Hook and Line		✓	✓	✓	✓
Spearfishing					✓
<b>Commercial</b>					
Bottom Trawls			✓		
Gillnet			✓		
Hand Line, Hand Reel or Powered Reels					✓
Line		✓		✓	✓
Net				✓	
Trolling			✓		✓
Unspecified	✓				
Various		✓			
<b>Recreational</b>					
Hook and Line			✓	✓	
Spearfishing		✓	✓	✓	✓

<b>Management Methods</b>	<b>Commonwealth</b>	<b>New South Wales</b>	<b>Northern Territory</b>	<b>Queensland</b>	<b>Western Australia</b>

<b>Charter</b>					
Bag and possession limits		✓			
Bag limits		✓			
Gear restrictions		✓	✓	✓	
Licence		✓			
Limited entry			✓		
Marine park closures		✓			
Passenger restrictions			✓		
Possession limit			✓	✓	
Size limit		✓		✓	✓
Spatial closures		✓	✓	✓	✓
Spatial zoning					✓
<b>Commercial</b>					
Catch restrictions			✓		
Gear restrictions		✓	✓		
Individual transferable quota				✓	
Limited entry	✓	✓	✓	✓	✓
Marine park closures		✓			
Quota					✓
Size limit	✓	✓		✓	✓
Spatial closures	✓	✓	✓	✓	✓
Total allowable catch				✓	
Vessel restrictions	✓	✓	✓	✓	✓
<b>Recreational</b>					
Bag and possession limits		✓			
Bag limits		✓			✓
Gear restrictions		✓	✓	✓	
Licence		✓			✓
Marine park closures		✓			
Possession			✓	✓	✓

<b>limit</b>					
<b>Size limit</b>		✓		✓	✓
<b>Spatial closures</b>		✓	✓	✓	✓

<b>Catch</b>	<b>Commonwealth</b>	<b>New South Wales</b>	<b>Northern Territory</b>	<b>Queensland</b>	<b>Western Australia</b>
<b>Charter</b>			14.4 t		14 t
<b>Commercial</b>	64.3088 t	11.4844 t	422.551 t	434.488 t	231.636 t
<b>Indigenous</b>	Unknown	Unknown	Unknown	Negligible	Unknown
<b>Recreational</b>		2,820 fish (2017–18)	27 t (in 2010)	172 t (in 2019–20)	48 t (2017–18)

**Commonwealth – Commercial (active vessels)** Total number of TIB licences; this is not an indicator of licence activity.

**Commonwealth – Recreational** The Australian Government does not manage recreational fishing, including charter fishing, in Commonwealth waters. Recreational and charter fishing in Commonwealth waters is managed by the state or territory immediately adjacent to those waters, under its management regulations.

**Commonwealth – Indigenous** (a) The Australian Government does not manage non-commercial Indigenous fishing in Commonwealth waters, with the exception of the Torres Strait. In general, non-commercial Indigenous fishing in Commonwealth waters is managed by the state 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); the 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; and (b) Subject to the defence that applies under 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.

**Western Australia – Recreational (catch)** Western Australian boat-based recreational catch surveys from 1 Sept 2017–30 Aug 2018 [Ryan et al 2019]. Shore-based recreational catches are largely unknown.

**Western Australia – Recreational (Management Methods)** Western Australian boat-based recreational licence required.

**Western Australia – Charter (catch)** is an estimate based on numbers of fish caught multiplied by their average weight.

**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".

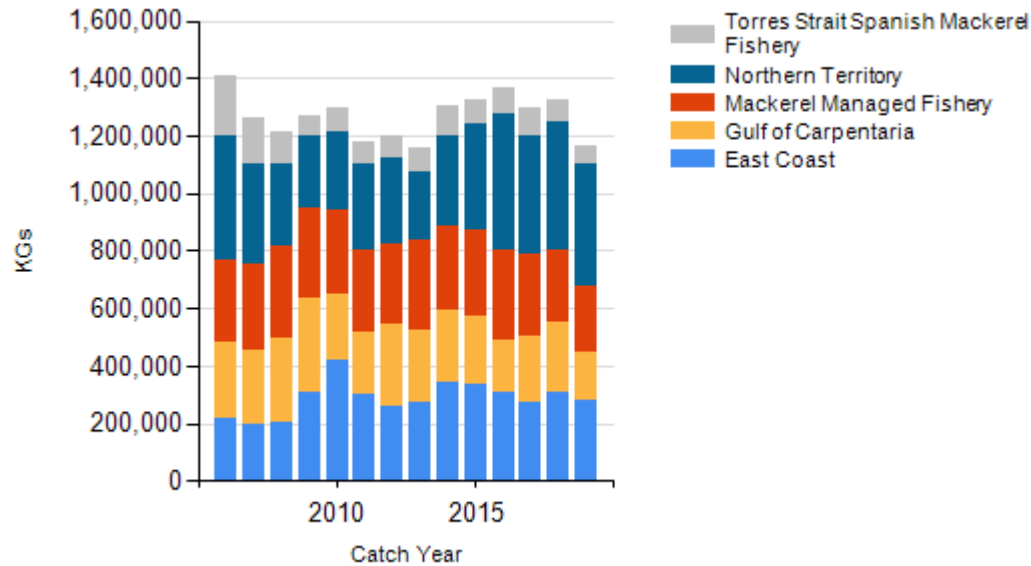


**Queensland – Indigenous (management methods)** for more information see <https://www.daf.qld.gov.au/business-priorities/fisheries/traditional-fishing>

**New South Wales – Recreational (Catch)** Murphy et al. [2020].

**New South Wales – Indigenous (management methods)**  
(<https://www.dpi.nsw.gov.au/fishing/aboriginal-fishing>)

### CATCH CHART



Commercial catch of Spanish Mackerel - note confidential catch not shown. Years shown on this graph are Australian financial years (e.g. 2015 refers to the financial year beginning 01 July 2014 and ending 30 June 2015).

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