

Grey Mackerel (2023)

Scomberomorus semifasciatus



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Western Australia	Western Australia	Sustainable	Catch, indicator species
Northern Territory	North West Northern Territory	Sustainable	Biomass, fishing mortality, catch, catch rate
Northern Territory, Queensland	Gulf of Carpentaria	Sustainable	Catch-MSY modelling, nominal catch rate, effort distribution, risk profile
Queensland	North East Queensland	Sustainable	Quantitative stock assessment (age-structured model), biomass, fishing mortality, catch, effort
Queensland	South East Queensland	Sustainable	Quantitative stock assessment (age-structured model), biomass, fishing mortality, catch, effort

STOCK STRUCTURE

Grey Mackerel (*Scomberomorus semifasciatus*) are found in southern Papua New Guinea and northern Australia from Shark Bay, Western Australia, to northern New South Wales. At least five Grey Mackerel stocks have been identified for management purposes across northern Australia as determined by otolith stable isotopes chemistry and parasite abundance: Western Australia, North West Northern Territory, Gulf of Carpentaria, East Coast North and East Coast South. Four of these stocks have been confirmed as genetically distinct biological stocks: Western Australia, North West Northern Territory, Gulf of Carpentaria and the East Coast of

Queensland. Research suggests that a sixth stock potentially occurs in the north-east Gulf of Carpentaria [Welch et al. 2009; Charters et al. 2010; Newman et al. 2010; Broderick et al. 2011; Welch et al. 2015]. However, the presence of this stock has yet to be confirmed; therefore, it was not included in the assessment.

Here, assessment of stock status is presented at the biological stock level—Western Australia, North West Northern Territory, Gulf of Carpentaria, and at the management unit level for North East Queensland and South East Queensland.

STOCK STATUS

Gulf of Carpentaria Grey Mackerel in the Gulf of Carpentaria is primarily a commercial gillnet-caught species. Over 90% of the reported catch was captured by Queensland operations (2021–22 data). The majority of the remaining catch is reported from the Northern Territory by operators in the Offshore Net and Line Fishery (ONLF).

In Queensland, the 2021–22 Grey Mackerel catch of 987 tonnes (t) was the highest recorded and exceeded the 10-year average of 657 t (2011–12 to 2020–21). However, effort in the Queensland region has shown a decreasing trend from 2017–18, dropping from 1,276 to 827 annual fishing days in 2021–22, the lowest recorded since 1995–96. The nominal catch rate has shown an increasing trend, however due to difficulties in distinguishing effort from co-targeted species, the trend is uncertain. The Queensland Grey Mackerel effort footprint appears to have contracted over 2017 to 2021 with operations focusing more on northern Gulf regions. Although some effort may have shifted in response to the introduction of marine park closures in 2018 [Parks Australia 2018], the reasons behind the recent shift northward are not certain and it is difficult to ascertain if this is driven by operational/economic considerations or due to changes in regional biomass levels. However, it is notable that this region is a possible additional management unit (distinct adult stock) due to differences in parasite abundance [Welch et al. 2015], which suggests that concentrated fishing in this area could contribute to localised depletion in the long term. Particularly noting that grey mackerel aggregating behaviour makes them more susceptible to targeted fishing pressure [Pidd et al. 2021].

Outside of commercial fishing, the fishing pressure exerted on Grey Mackerel by other sectors in the Gulf of Carpentaria is limited. Recreational catch for this stock is likely to be low, with the species registering combined state-wide catch of 16 t [Teixeira et al. 2021]. Grey Mackerel catch rates in the charter sector are unknown but thought to be low in Queensland. Charter vessels in the Northern Territory recorded less than 1 t of Grey Mackerel catch in 2021–22.

While there is no recent assessment of the risk of the fishery on Grey Mackerel in the Gulf of Carpentaria, a 2021 Ecological Risk Assessment (ERA) assessed Grey Mackerel as medium risk on the east coast of Queensland and aspects of the assessment such as life history traits would apply to all stocks [Pidd et al. 2021]. The ERA suggested grey mackerel have life history traits that are highly productive, including low age at maturity, high fecundity, and a broadcast spawning reproductive strategy [Pidd et al. 2021]. Productive species may be more resilient to higher fishing pressure; however Grey Mackerel on the east coast of Queensland are susceptible to hyperstability due to predictable aggregating behaviour [GBRMPA 2012], which may make this species more susceptible to targeted fishing pressure in the Gulf of Carpentaria.

Grey Mackerel catch in the Gulf of Carpentaria (Queensland and Northern

Territory data) was subject to a catch-MSY model-assisted catch-only assessment based on catch data to 2021 [Martell and Froese 2013]. This analysis detected a declining trend in regional Grey Mackerel biomass. However, the model also indicated that biomass levels were more than likely above the reference limit point in 2021 [Northern Territory Government, unpublished]. The analysis also suggests fishing mortality is more likely to be below the limit reference point, although mortality was estimated to show an increasing trend [Northern Territory Government, unpublished]. This indicates that the current level of fishing is unlikely to cause the stock to become recruitment impaired in the short-term. However, the assessment estimated that recent harvests have exceeded FMSY and are beyond that which would be considered sustainable in the long term. The notable caveat being that catch-MSY modelling has a higher degree of uncertainty and should not be solely relied on to make inferences about long-term biomass trends. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

On the basis of the evidence provided above the Gulf of Carpentaria biological stock is classified as a **sustainable stock**.

North East Queensland The North East Queensland management unit is managed as part of the East Coast Inshore Fishery (ECIF) and is primarily targeted using commercial gillnets [Bessell-Browne et al. 2019]. The take of Grey Mackerel in this fishery is primarily managed through the 250 t total allowable commercial catch (TACC) limit for the Queensland east coast and Individual Transferable Quotas (ITQs). ITQs were introduced on 1 September 2021 and are applied at a regional level. The ECIF has five management regions [Queensland Department of Agriculture and Fisheries 2022].

The most recent stock assessment (using 2018 data) did not detect any trend in Grey Mackerel abundance that might indicate overfishing on the Queensland east coast-wide and/or evidence to support a downward amendment of the TACC. The assessment did recommend a slightly lower equilibrium MSY for the east coast [227 t; Bessell-Browne et al. 2019]. The stock assessment indicated that the North East Grey Mackerel stock was at or around 48% (range 37–58%) of unfished biomass.

Current harvest levels (33 t) are below the equilibrium MSY level and the longer-term target of 60% of unfished biomass for each stock. Of notable importance, the North East stock has been fished at lower levels since the introduction of the ECIF-wide 250 t TACC. Prior to the introduction of the TACC, nominal fishing effort (days when Grey Mackerel were caught) in the North East averaged 1,020 annual net fishing days between 2004–05 and 2008–09. This average decreased to 516 annual net fishing days between 2009–10 and 2018–19. In 2021–22 annual net fishing days reduced further to 207 days. The reduction in effort may be associated with the introduction of ITQs. The above evidence indicates that the biomass of this stock is unlikely to be recruitment depleted and that recruitment is unlikely to be impaired.

Outside of commercial fishing, the fishing pressure exerted on regional Grey Mackerel stocks is more limited. Recreational catch for this stock is likely to be low, with the species registering combined state-wide catch of 16 t [Teixeira et al. 2021]. Grey Mackerel catch rates in the charter sector are unknown. Charter catch levels though are likely to be low.

On the basis of the evidence provided above, the North East Queensland

biological stock is classified as a **sustainable stock**.

**North West
Northern
Territory**

Grey Mackerel in the North West Northern Territory stock are primarily taken in the NT Offshore Net and Line Fishery (ONLF) using pelagic gillnets. Grey Mackerel harvest in the ONLF is restricted within a species-specific total allowable catch limit, which is managed through an individual transferable quota system.

Previous assessments of this biological stock included historic catch attributed to the Taiwanese gillnet fleet that operated in Northern Australia from 1974 to 1986. This historic catch was excluded from the most recent assessment, as it is unlikely the Taiwanese fleet encountered this species due to the offshore nature of the fleet's operations and the coastal nature of Grey Mackerel populations.

The most recent assessment using data to 2021 estimates that the biomass in 2021 was 74% of the unfished level and that the harvest rate was 54% of that required to achieve MSY [North Territory Government, unpublished]. The stock is not considered to be recruitment overfished and 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 North West Northern Territory biological stock is classified as a **sustainable stock**.

**South East
Queensland**

The South East Queensland management unit is managed as part of the East Coast Inshore Fishery (ECIF) and is primarily targeted using commercial gillnets [Bessell-Browne et al. 2019]. The take of Grey Mackerel in this fishery is primarily managed through the 250 t TACC limit for the Queensland east coast and ITQs. ITQs were introduced on 1 September 2021 and are applied at a regional level. The ECIF has five management regions [Queensland Department of Agriculture and Fisheries 2022].

The most recent stock assessment (using 2018 data) did not detect any trend in Grey Mackerel abundance that might indicate overfishing on the Queensland east coast and/or evidence to support a downward amendment of the 250 t TACC [Bessell-Browne et al. 2019]. However, the report did recommend a slightly lower equilibrium MSY for the east coast of 227 t. This stock assessment indicated that the South East Grey Mackerel stock was at or around 51% (range 40–61%) of unfished biomass.

Current harvest levels (36 t) for the 2021–22 season are below the equilibrium MSY level and the longer-term target of 60% of unfished biomass for each stock. This reduction in fishing pressure is attributed to the introduction of regional ITQs. Fishing pressures for this stock though have been lower since the introduction of the ECIF-wide 250 t TACC. Prior to the introduction of the TACC, nominal fishing effort (days when Grey Mackerel were caught) in the south east averaged 1,427 annual net fishing days between 2004–05 and 2008–09, after which it decreased to an average of 792 annual net fishing days between 2009–10 and 2018–19. In 2021–22 nominal effort reduced to 346 annual net fishing days, a reduction which may be associated with the introduction of ITQs. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

Outside of commercial fishing, the fishing pressure exerted on regional Grey Mackerel stocks is more limited. Recreational catch for this stock is likely to be low, with the species registering combined state-wide catch of 16 t [Teixeira et

al. 2021]. Grey Mackerel catch rates in the charter sector are unknown. Charter catch levels though are likely to be low.

On the basis of the evidence provided above, the South East Queensland biological stock is classified as a **sustainable stock**.

**Western
Australia**

Grey Mackerel is exploited as a component of the Mackerel Managed Fishery (MMF) in Western Australia. The primary target species of the MMF is Spanish Mackerel (*Scomberomorus commerson*) and catches of Grey mackerel are low [Newman et al. 2023]. As such there has been no formal higher level stock assessment of Grey Mackerel in Western Australia and the species is assessed on a weight of evidence basis of catch only examining catch and effort data, biological information, biomass and stock reduction analysis [Lewis 2020]. Since significant management changes in 2006, the catch and effort in the MMF have remained stable. Grey Mackerel are fast growing and attain sexual maturity relatively early in life (less than two years of age) [Cameron and Begg 2002; Welch et al. 2009; GBRMPA 2011]. The minimum legal size limit for Grey Mackerel in Western Australia exceeds length at first maturity, which helps with sustainability by potentially providing some resilience to fishing pressure pending information regarding post-release survival.

Annual Grey Mackerel catch levels by the MMF from 2000–21 have been low, ranging between 3.5 and 24 tonnes (t), and was only 8.8 t in 2021 with the vast majority of recent catches taken by only two vessels from a small area of their range [Lewis 2020]. This level of catch is well below the TACC; 60 t for each of the three management areas) for Grey Mackerel in WA and very low in comparison with other states. The low levels of catch are likely reflective of the low demand and limited targeting of the species by the MMF line only fishery. In addition, there is low annual charter boat catch of less than 1 t and recreational catch of the species is estimated, with high uncertainty at less than 3 t by the five boat-based surveys between 2011 and 2021 [Ryan et al. 2022] which is also likely due to low targeting and release rates of greater than 50%. Catch-MSY analysis of Grey Mackerel in WA infers that the biomass in 2021 was 60% of the unfished biomass; recent catches were below the MSY and that the harvest rate was at 40% of that required to achieve MSY. Thus, based on the catch history it is likely that the level of stock depletion is minimal and the level of risk is estimated to be low. The above evidence indicates that the biomass of this stock is unlikely to be depleted and the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

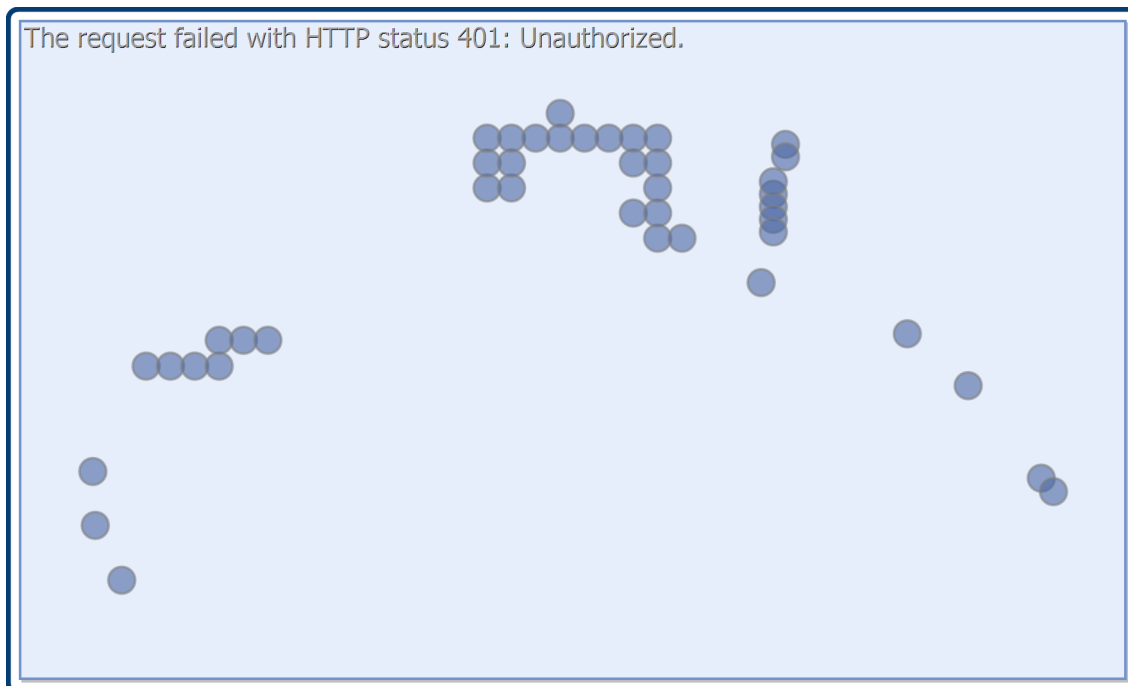
On the basis of the evidence provided above, the Western Australia biological stock is classified as a **sustainable stock**.

BIOLOGY

Grey Mackerel biology [Cameron and Begg 2002]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Grey Mackerel	14 years, 1,200 mm FL	Females 2 years, 650–700 mm FL Males 1–2 years, 550–600 mm FL

DISTRIBUTION



Distribution of reported commercial catch of Grey Mackerel

TABLES

Fishing methods	Northern Territory	Queensland	Western Australia
Charter			
Hook and Line	✓	✓	✓
Spearfishing			✓
Commercial			
Gillnet	✓		
Hand Line, Hand Reel or Powered Reels			✓
Line		✓	✓
Net		✓	
Trolling			✓
Unspecified	✓		
Recreational			
Hook and Line	✓	✓	✓
Spearfishing		✓	✓

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Management Methods	Northern Territory	Queensland	Western Australia
Charter			
Bag limits			✓
Bag/possession limits		✓	
Boat limits		✓	
Gear restrictions	✓	✓	
Limited entry			✓
Passenger restrictions			✓
Possession limit	✓		✓
Seasonal or spatial closures		✓	
Size limits		✓	✓
Spatial closures	✓		
Spatial zoning			✓
Commercial			
Bag/possession limits		✓	
Fishery spatial closures	✓		
Gear restrictions	✓	✓	✓
Harvest Strategy		✓	
Individual transferable quota		✓	
Limited entry		✓	✓
Processing restrictions		✓	
Quota	✓		
Seasonal or spatial closures		✓	
Size limits		✓	✓

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Spatial zoning	✓		✓
Total allowable catch	✓	✓	✓
Vessel restrictions	✓	✓	✓
Recreational			
Bag limits			✓
Gear restrictions	✓	✓	
Licence			✓
Possession limit	✓	✓	✓
Size limits		✓	✓
Spatial closures	✓		
Spatial zoning		✓	

Catch			
	Northern Territory	Queensland	Western Australia
Charter	1.4 t in FTO	Unknown	< 0.5 t
Commercial	488.64 t	1052.68 t	9.11398 t
Indigenous	Unknown	Unknown	Unknown
Recreational	11 t (3,722 fish, se +/- 1,436; 2018–2019)	16 t (2019–20)	2.0 t (se +/- 1.2 t; 2020–21)

Western Australian – Recreational (catch). Western Australian boat-based recreational catch survey from 1 Sep 2017–30 Aug 2018 [Ryan et al. 2022]. Shore based recreational catch (if any) largely unknown.

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

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.”

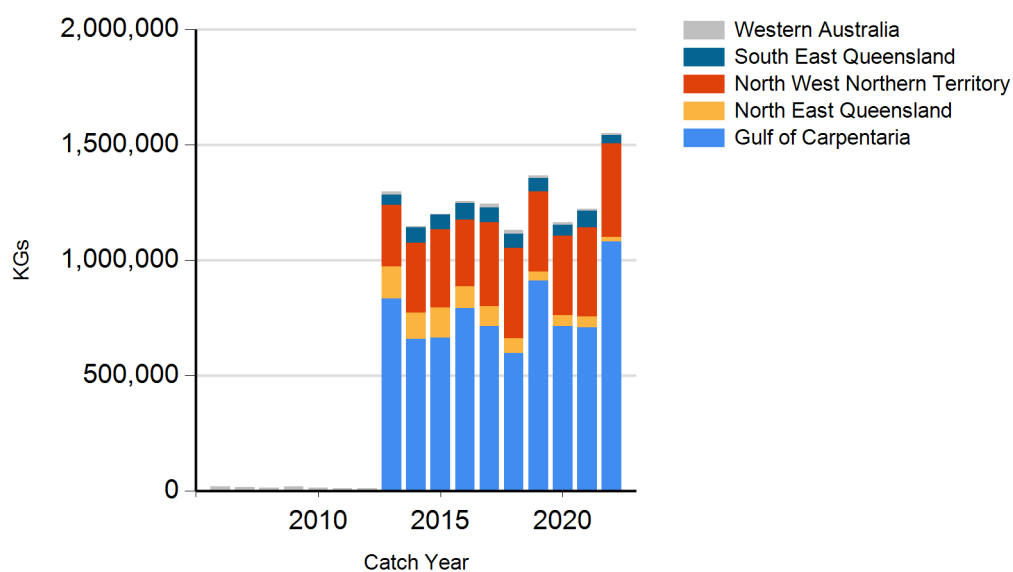
Queensland – Indigenous (management methods). For more information see: <https://www.daf.qld.gov.au/business-priorities/fisheries/traditional-fishing>

Queensland – Recreational Fishing (Catch). Data based at the whole of Queensland level and derived from state-wide 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 at: <https://www.daf.qld.gov.au/business-priorities/fisheries/monitoring-research/data/queensland-fisheries-summary-report>

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

CATCH CHART



Commercial catch of Grey Mackerel - note confidential catch not shown

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References	
Broderick et al. 2011	Broderick, D, Ovenden, J, Buckworth, R, Newman, S, Lester, R and Welch, D 2011, Genetic population structure of grey mackerel <i>Scomberomorus semifasciatus</i> in northern Australia, <i>Journal of Fish Biology</i> , 79: 633–661.
Charters et al. 2010	Charters, R, Lester, R, Buckworth, R, Newman, S, Ovenden, J, Broderick, D, Kravchuk, O, Ballagh, A and Welch, D 2010, The stock structure of grey mackerel <i>Scomberomorus semifasciatus</i> in Australia as inferred from its parasite fauna, <i>Fisheries Research</i> , 101: 94–99.
Newman et al. 2010	Newman, S, Wright, I, Rome, B, Mackie, M, Lewis, P, Buckworth, R, Ballagh, A, Garrett, R, Stapley, J, Broderick, D, Ovenden, J and Welch, D 2010, Stock structure of grey mackerel, <i>Scomberomorus semifasciatus</i> (Pisces: Scombridae) across northern Australia, based on otolith isotope chemistry, <i>Environmental Biology of Fishes</i> , 89: 357–367.
Welch et al. 2009	Welch, D, Buckworth, R, Ovenden, J, Newman, S, Broderick, D, Lester, R, Ballagh, A, Stapley, J, Charters, R and Gribble, N 2009, Determination of management units for grey mackerel fisheries in northern Australia, Fisheries Research and Development Corporation project 2005/010, Fishing and Fisheries Research Centre Technical Report 4, Fishing and Fisheries Research Centre, James Cook University, Townsville, Australia.
Welch et al. 2015	Welch, D, Newman, S, Buckworth, R, Ovenden, J, Broderick, D, Lester, R, Gribble, N, Ballagh, A, Charters, R, Stapley, J, Street, R, Garrett, R and Begg, G 2015, Integrating different approaches in the definition of biological stocks: A northern Australian multi-jurisdictional fisheries example using grey mackerel <i>Scomberomorus semifasciatus</i> , <i>Marine Policy</i> , 55:73-80.
Newman et al. 2023	Newman, SJ, Wise, BS, Santoro, KG and Gaughan, DJ (eds) 2023, Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/22: The State of the Fisheries, Department of Primary Industries and Regional Development, Western Australia.
Cameron and Begg 2002	Cameron, D and Begg, G 2002, Fisheries biology and interaction in the northern Australian small mackerel fishery, final report to Fisheries Research and Development Corporation, projects 92/144 and 92/144.02, Department of Primary Industries, Queensland.
Ryan et al. 2022	Ryan, KL, Lai, EK and Smallwood, CB 2022, Boat-based recreational fishing in Western Australia 2020/21, Fisheries Research Report 327, Department of Primary Industries and Regional Development, Western Australia.
Northern Territory Government 2012	Northern Territory Government 2012, Fishery Status Reports 2011, Fishery Report 111, Northern Territory Government.
Northern Territory Government 2017	Northern Territory Government 2017, Fishery Status Reports 2015, Fishery Report 118, Northern Territory Government Department of Resources, Darwin, Northern Territory.
Bessell-Browne et al. 2019	Bessell-Browne, P, Lovett, R, Leigh, G, O'Neill, MF and Campbell, A, 2019, Stock assessment of the Australian east coast grey mackerel (<i>Scomberomorus semifasciatus</i>) fishery, Technical Report, State of Queensland.
GBRMPA 2011	Great Barrier Reef Marine Park Authority, 2011, A vulnerability assessment for the Great Barrier Reef - Grey mackerel.
Queensland Department of Agriculture and Fisheries 2016	Queensland Department of Agriculture and Fisheries 2016. Grey Mackerel Update.
Lewis 2020	Lewis PD, 2020, Statewide Large Pelagic Resource in Western Australia, Resource Assessment Report No 19, Department of Primary Industries and Regional Development Western Australia, 145pp.
Teixeira et al. 2021	Teixeira, D, Janes, R and Webley, J, 2021, 2019–20 statewide recreational fishing survey - Social and attitudinal results, Department of Agriculture and Fisheries, Queensland
Pidd et al. 2021	Pidd, A, Jacobsen, I, Walton, L and Lawson, A 2021, East Coast Inshore Large Mesh Net Fishery Level 2 Ecological Risk Assessment, Target & Byproduct Species, Technical Report, State of Queensland, Brisbane, Queensland.
GBRMPA 2012	Great Barrier Reef Marine Park Authority, 2012, A vulnerability assessment for the Great Barrier Reef: Grey Mackerel, Vulnerability Assessments for the Great Barrier Reef, Ecosystems, Great Barrier Reef Marine Park Authority.
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(4), pp 504-514.
Queensland Department of Agriculture and Fisheries 2022	Queensland Department of Agriculture and Fisheries 2022, Harvest Strategies.
Parks Australia 2018	Parks Australia 2018, Gulf of Carpentaria Marine Park, Commonwealth of Australia.

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