

School Mackerel (2020)

Scomberomorus queenslandicus



Alice Pidd: Department of Agriculture and Fisheries, Queensland, **Julian Hughes:** Department of Primary Industries, New South Wales, **Paul Lewis:** Department of Primary Industries and Regional Development, Western Australia, **Grant Johnson:** Department of Primary Industry and Resources, Northern Territory, **Thor Saunders:** Department of Primary Industry and Resources, Northern Territory

STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Western Australia, Northern Territory, Queensland	Northern Australia	Negligible	Catch, Effort, Current and historical fishing pressure
Queensland	Central Eastern Australia	Negligible	Catch, Effort, Current and historical fishing pressure
Queensland	North Eastern Australia	Undefined	Catch and catch rate, Effort
Queensland, New South Wales	South Eastern Australia	Sustainable	Age structured surplus production model, Catch and catch rate, Effort, Fishery-dependent length frequency

STOCK STRUCTURE

School Mackerel occur in continental shelf waters, often associated with coastal embayments, across the northern and eastern coasts of Australia [Collette and Russo 1984]. Concurrent spawning of fish in geographically dispersed locations may indicate reproductive isolation. In addition, hydrological conditions within embayments may reduce mixing of pelagic eggs and larvae along the coastline. These characteristics result in a complex stock structure for School Mackerel [Begg et al. 1997, Begg et al. 1998a,b, Begg and Sellin 1998]. Off the east Australian coast, genetic dissimilarity, restricted movement patterns, concurrent spawning at multiple locations and regional differences in growth and otolith composition indicate the presence of at least two stocks between 16°S and 28°S [Begg et al. 1997, Begg et al. 1998a,b, Begg and Sellin 1998]. East coast stocks are considered to occupy the following latitudinal ranges: North Eastern Australia – Townsville (19°30'S) to Coen (14°00'S); Central Eastern Australia – Mackay (20°30'S) to Townsville (19°30'S); and South Eastern Australia – Tweed (28°00'S) to Mackay (20°30'S). Stock boundaries for the Northern Australia stock are less certain, spanning jurisdictions from Northern Queensland, across the Northern Territory, to Northern Western Australia.

Here, the assessment of stock status is presented at the biological stock level—Northern Australia, North Eastern Australia, Central Eastern Australia and South Eastern Australia.

STOCK STATUS

Central Eastern Australia

Stock status for the Central Eastern Australia biological stock is reported as Negligible due to historically low catches and because the stock has generally not been subject to targeted fishing. The Central Eastern Australia stock likely occupies a mixing zone between the Northern and South Eastern Australia stocks. This stock has produced historically low catches averaging <3 tonnes (t) per year for 10 years [QFISH 2020]. This low level of fishing is unlikely to be having a negative impact on the stock.

North Eastern Australia

Total commercial harvest of the North Eastern stock is small (<4 t in 2018–19) [QFISH 2020]. Nominal catch rates for the commercial net and line fishery components are within historical ranges and are below the 10-year average in 2018–19 [QFISH 2020]. Harvest levels and catch rates may be influenced by under-reporting in this stock. There is therefore insufficient biomass information available to confidently classify the status of this stock.

Although there may be some under-reporting of the commercial harvest, this stock is predominantly targeted by the recreational sector. Recreational fishing pressure is limited by a minimum legal size limit (MLS > size at maturity) and possession limits [Litherland et al. 2018]. Statewide recreational harvest estimates have increased since 2014 (22 000 fish in 2013–14, 38 859 fish in 2019–20) [Webley et al. 2015, Teixeira et al. 2021]. Indigenous harvest of this stock is considered to be negligible. 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 North Eastern Australia biological stock is classified as an **undefined stock**.

Northern Australia

School Mackerel is broadly distributed across northern Australia with components of this stock occurring in Western Australia, Northern Territory and Queensland [Begg et al. 1998a]. However, School Mackerel is not a major component of commercial or recreational landings. Stock status for the Northern Australia biological stock is reported as Negligible due to historically low catches across all jurisdictions, and the stock has not been the subject of targeted fishing.

The Western Australian Mackerel Managed Fishery predominantly targets Spanish Mackerel (*Scomberomorus commerson*) with gear, and in locations, not conducive to catching School Mackerel. Western Australian commercial and charter boat catches of School Mackerel in 2008–19 averaged less than 0.3 t and 0.5 t per year respectively. School Mackerel is not a major component of Western Australian recreational landings, with an estimated retained catch of 1.4 t (± 0.4 t se) in 2017–18 [Ryan et al. 2019]. In the Northern Territory there has been no reported recreational catch in recent years [Matthews et al. 2019] and the commercial catch has averaged 50 kg per year over the last 10 years, with a maximum harvest of 305kg in 2016. In Queensland Gulf of Carpentaria waters there is limited recreational catch and commercial catches have been <0.1 t per year for the last three years [QFISH 2020, Teixeira et al. 2021]. This low level of fishing is unlikely to be having a negative impact on the stock.

South Eastern

This cross-jurisdictional biological stock has components in Queensland and New South Wales. The status presented here for the entire biological stock has been

Australia established using evidence from both jurisdictions.

The majority of the fishery occurs in Queensland waters with the commercial sector dominating harvest in the south-eastern stock (80 per cent commercial, 20 per cent recreational) [Lovett et al. 2019]. Results from a recent stock assessment indicate the stock was at 65 per cent of unfished biomass in 2017–18 [Lovett et al. 2019]. It should be noted that, due to limited data, results reflect a low level of confidence and precautionary interpretations are warranted. Standardised catch rates for the Queensland commercial net and line fisheries are within historical ranges and correspond to the long-term average in a 25-year time series [Lovett et al. 2019]. Fishery-dependent length composition data collected from the Queensland recreational sector indicates a broad range of lengths are present, with similar length composition observed in previous years [Lovett et al. 2019]. This indicates stable age composition and recruitment. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired.

In Queensland the commercial harvest effort (number of active licences and number of fishing days) is below historical peaks for the net and line fisheries [QFISH 2020]. The Queensland commercial net harvest has been relatively stable between 2011 and 2019 but was below the 10-year average in 2018–19 at 77 t, while the commercial line harvest remains variable within historical bounds, but low (12.5 t, 2018–19) [QFISH 2020]. Recreational fishing pressure in Queensland is limited by size and possession limits. The Queensland recreational harvest estimate has shown variation between 2010 and 2019 (38 081 fish in 2010–11, 22 000 fish in 2013–14, 38 859 fish in 2019–20) [Taylor et al. 2012, Webley et al. 2015, Teixeira et al. 2021]. Indigenous harvest of this stock is considered to be negligible.

New South Wales has historically reported very low catches of School Mackerel and the part of stock in this jurisdiction has not been subject to targeted fishing. The New South Wales commercial catch in 2012–19 averaged less than 0.15 t per year, and School Mackerel is not a major component of recreational landings [West et al. 2015, Murphy et al. 2020]. 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 South Eastern Australia biological stock is classified as a **sustainable stock**.

BIOLOGY

School Mackerel biology [Begg 1996, Begg 1998, Begg and Hopper 1997, Begg and Sellin 1998, Begg et al. 1998a, Collette and Russo 1984, Munro 1943]

Species	Longevity / Maximum Size	Maturity (50 per cent)
School Mackerel	10 years, 1 180 mm TL, 11.2 kg	Females 1–2 years, 60–510 mm TL Males 1–2 years, 410–460 mm TL

DISTRIBUTION



Distribution of reported commercial catch of School Mackerel

TABLES

Fishing methods				
	New South Wales	Northern Territory	Queensland	Western Australia
Charter				
Hook and Line	✓	✓	✓	✓
Spearfishing				✓
Commercial				
Gillnet		✓		
Line	✓		✓	
Net			✓	
Trolling				✓
Various	✓			
Recreational				
Hook and Line	✓	✓	✓	

Management Methods				
	New South Wales	Northern Territory	Queensland	Western Australia
Charter				
Bag and possession limits	✓			
Bag limits	✓			
Gear restrictions	✓	✓	✓	

Licence	✓			
Limited entry		✓		
Marine park closures	✓		✓	
Possession limit		✓	✓	
Size limit	✓		✓	✓
Spatial closures	✓	✓	✓	✓
Spatial zoning				✓
Temporal closures			✓	
Commercial				
Gear restrictions	✓		✓	
Limited entry	✓	✓	✓	✓
Marine park closures	✓			
Quota				✓
Size limit	✓		✓	✓
Spatial closures	✓	✓	✓	✓
Temporal closures			✓	
Vessel restrictions	✓		✓	✓
Recreational				
Bag and possession limits	✓			
Bag limits	✓			✓
Gear restrictions	✓	✓	✓	
Licence	✓			
Licence (Recreational Fishing from Boat License)				✓
Marine park closures	✓		✓	
Possession limit		✓	✓	✓
Size limit	✓		✓	✓
Spatial closures	✓	✓	✓	✓
Temporal closures			✓	

Catch	New South Wales	Northern Territory	Queensland	Western Australia
Charter		<0.1 t		< 0.5 t
Commercial	0.3852 t	0.001 t	92.4755 t	0 t
Indigenous	Unknown	Unknown	Unknown	
Recreational	Unknown	0	77.72 t (2019–20)	1 t (2017–18)

Queensland – recreational (catch) Estimated from Teixeira et al. [2021] (38 859 fish retained by QLD residents) and an average weight of 2 kg.

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]

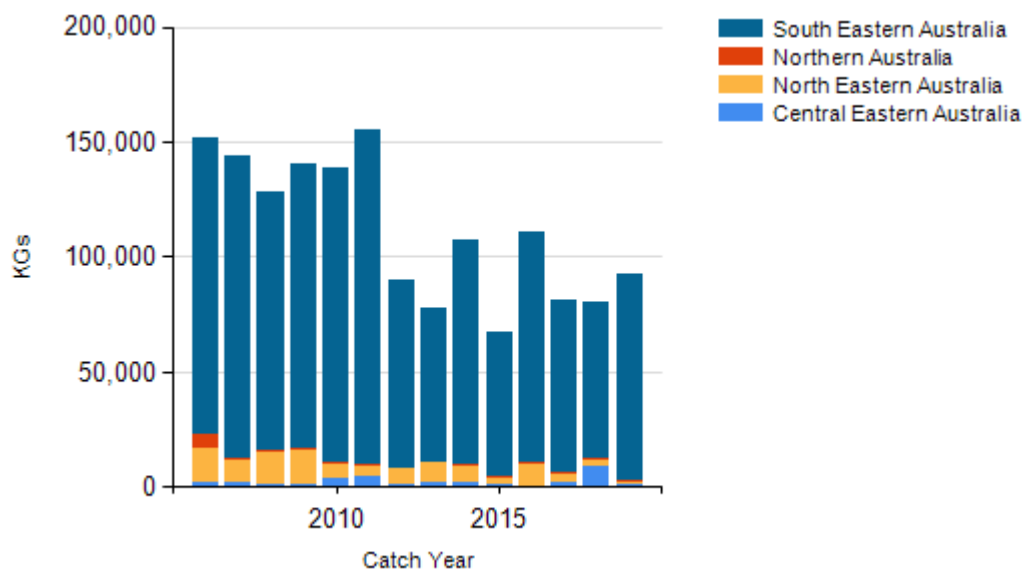
New South Wales – Indigenous (management methods)
<https://www.dpi.nsw.gov.au/fishing/aboriginal-fishing>

Western Australia – Recreational (Catch) Statewide survey of boat-based recreational fishing in Western Australia 2017–18 [Ryan et al. 2019]. Shore-based catch (if any) largely unknown.

Western Australia – Recreational (Management methods) Boat-based recreational fishing licence required.

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

CATCH CHART



Commercial catch of School Mackerel - note confidential catch not shown

References

Begg et al. 1998a	Begg, GA, Cappo, M, Cameron, DS, Boyle, S, and Sellin, MJ 1998, Stock discrimination of school mackerel, <i>Scomberomorus queenslandicus</i> , and spotted mackerel, <i>Scomberomorus munroi</i> , in coastal waters of eastern Australia by analysis of minor and trace elements in whole otoliths, <i>Fishery Bulletin</i> , 96(4): 653–666.
Begg and Sellin 1998	Begg, GA and Sellin, MJ 1998, Age and growth of school mackerel (<i>Scomberomorus queenslandicus</i>) and spotted mackerel (<i>S. munroi</i>) in Queensland east-coast waters with implications for stock structure, <i>Marine and Freshwater Research</i> , 49(2): 109–120.
Begg et al. 1997	Begg, GA, Cameron, DS and Sawynok, W 1997, Movements and stock structure of school mackerel (<i>Scomberomorus queenslandicus</i>) and spotted mackerel (<i>S. munroi</i>) in Australian east-coast waters, <i>Marine and Freshwater Research</i> , 48(4): 295–301.
Begg 1998	Begg, GA 1998, Reproductive biology of school mackerel (<i>Scomberomorus queenslandicus</i>) and spotted mackerel (<i>S. munroi</i>) in Queensland east-coast waters', <i>Marine and Freshwater Research</i> , 49(3): 261–270.
Collette and Russo 1984	Collette, BB and Russo, JL 1984, Morphology, systematics, and biology of the Spanish mackerels (<i>Scomberomorus</i> , <i>Scombridae</i>), <i>Fishery Bulletin</i> , 82: 545–689.
Munro 1943	Munro, ISR 1943, Revision of Australian species of <i>Scomberomorus</i> , <i>Memoirs of the Queensland Museum</i> , vol. 12, pp. 65–95.
Begg and Hopper 1997	Begg, GA and Hopper, GA 1997, Feeding patterns of school mackerel (<i>Scomberomorus queenslandicus</i>) and spotted mackerel (<i>S. munroi</i>) in Queensland east-coast waters', <i>Marine and Freshwater Research</i> , 48(7): 565–571.
Begg 1996	Begg, G 1996, Species coexistence, stock structure and fisheries management of School (<i>Scomberomorus queenslandicus</i>) and Spotted mackerel (<i>S. munroi</i>) in Queensland east coast waters. Doctoral Thesis, University of Queensland, Brisbane, Australia.
Webley et al. 2015	Webley, J, McInnes, K, Teixeira, D, Lawson, A and Quin, R 2015, Statewide Recreational Fishing Survey 2013-2014. Fisheries Queensland, Department of Agriculture and Fisheries.
Begg et al. 1998b	Begg, GA, Keenan, CP and Sellin, MJ 1998, Genetic variation and stock structure of school mackerel and spotted mackerel in northern Australian waters, <i>Journal of Fish Biology</i> , 53(3): 543–559.
Punt et al. 1995	Punt, AE, Butterworth, DS and Penney, AJ 1995, Stock assessment and risk analysis for the South Atlantic population of albacore <i>Thunnus alalunga</i> using an age structured production model' <i>South African Journal of Marine Science</i> , 16(1): 287–310.
West et al. 2012	West, LD, Lyle, JM, Matthews, SR, Stark, KE and Steffe, AS 2012, Survey of Recreational Fishing in the Northern Territory, 2009–.10. Department of Primary Industry and Fisheries. Darwin
West et al. 2015	West, LD, Stark, KE, Murphy, JJ, Lyle, JM and Ochwada-Doyle, FA 2015, Survey of recreational fishing in New South Wales and the ACT, 2013–14, Fisheries final report series 149, NSW Department of Primary Industries, Wollongong.
Ryan et al. 2019	Ryan, KL, Hall, NG, Lai, EK, Smallwood, CB, Tate, A, Taylor, SM and Wise, BS 2019, State-wide survey of boat based recreational fishing in Western Australia 2017/18, Fisheries Research Report 297, Department of Primary Industries and Regional Development, Western Australia.
QFISH 2020	QFish, Department of Agriculture and Fisheries, www.qfish.gov.au
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.
Lovett et al. 2019	Lovett, R, Bessell-Browne, P, Litherland, L, Leigh, G, Campbell, A, O'Neill, MF 2019, Stock assessment of Queensland east coast school mackerel (<i>Scomberomorus queenslandicus</i>). Department of Agriculture and Fisheries, Queensland Government, Brisbane, Queensland
Taylor et al. 2012	Taylor, S, Webley, J, McInnes, K 2012, 2010 Statewide Recreational Fishing Survey. Fisheries Queensland, Department of Agriculture and Fisheries.
Murphy et al. 2020	Murphy, JJ, Ochwada-Doyle, FA, West, LD, Stark, KE and Hughes JM, 2020, The Recreational Fisheries Monitoring Program. Survey of recreational fishing in 2017–18, Fisheries final report series 158, NSW Department of Primary Industries, Wollongong.
Litherland et al. 2018	Litherland, L, Lewis, P, Johnson, G, Hughes, J, 2018, School Mackerel <i>Scomberomorus queenslandicus</i> , in Carolyn Stewardson, James Andrews, Crispian Ashby, Malcolm Haddon, Klaas Hartmann, Patrick Hone, Peter Horvat, Stephen Mayfield, Anthony Roelofs, Keith Sainsbury, Thor Saunders, John Stewart, Simon Nicol and Brent Wise (eds) 2018, Status of Australian fish stocks reports 2018, Fisheries Research and Development Corporation, Canberra.

