

Cobia (2020)

Rachycentron canadum



Anthony Roelofs: Department of Agriculture and Fisheries, Queensland , **Thor Saunders:** Department of Industry, Tourism and Trade, Northern Territory, **Julian Hughes:** New South Wales Department of Primary Industries, **Fabian Trinnie:** Department of Primary Industries and Regional Development, Western Australia, **Stephen Newman:** Department of Primary Industries and Regional Development, Western Australia, **Lee Georgeson:** Australian Bureau of Agricultural and Resource Economics and Sciences

STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Commonwealth, Queensland, New South Wales	Eastern Australia	Sustainable	Catch
Commonwealth, Western Australia, Northern Territory, Queensland	Northern Australia	Sustainable	Catch

STOCK STRUCTURE

Cobia have an almost worldwide distribution in tropical and sub-tropical waters, except in the Eastern Pacific Ocean [Fry and Griffiths 2010]. In Australia, Cobia are found from Cape Naturaliste in Western Australia, across and around northern Australia to Botany Bay in NSW [Hoese et al 2006].

The stock structure of Cobia across Australia, is not known and the determination of population subdivision in large mobile marine pelagic fish species is often challenging due to a range of factors including large effective population sizes, high dispersal capacities, and lack of apparent physical barriers to gene flow.

In the wider Indo-Pacific, Joy et al. (2016), described panmixia of Cobia populations in Indian waters based on mt DNA markers. In contrast, Divya et al. (2019) using more powerful microsatellite and mitochondrial markers indicated three separate populations or management units within Indian waters. Genetic differentiation of species such as Cobia is often low, but significant among populations resulting from several evolutionary forces, such as random genetic drift, migration, mutation (and their mutual interactions), that act on the wild populations and influence pattern of genetic subdivision. Significant genetic differentiation of Cobia has also been detected on relatively small spatial scales. For example, Salari Aliabadi et al. (2008) reported three different populations of Cobia in the northern coasts of the Persian Gulf and Oman that were separated by short distances of 140– 310 kms. Additionally, Gold et al. (2013) reported population separation of Cobia from the Northern Gulf of Mexico, the US western Atlantic, and Taiwan waters using both nuclear encoded microsatellite and mt DNA analysis.

In Australia, Cobia are not commonly encountered in large numbers and are not currently a specific target species in any state or Commonwealth fishery. It is therefore difficult to collect the relevant biological, and catch and effort information to assess any putative individual stocks. Consequently, we have taken the conservative step of separating Cobia into two functional management units. This is based on a parsimonious separation at Torres Strait, based on the separation of populations of pelagic species at the Torres Strait biogeographic barrier, resulting from the Torres Strait land bridge between continental Australia and New Guinea that persisted through much of the late Pleistocene and separated Indian and Pacific Ocean taxa (e.g. Spanish mackerel [Moore et al. 2003], grey mackerel [Broderick et al. 2011]).

In addition, fishing mortality is fairly equivalent across each management unit (low), therefore undertaking an assessment at the management unit scale is justified.

Here, assessment of stock status is presented at the management unit level—Northern Australia (Western Australia, Northern Territory, QLD Gulf of Carpentaria, and Commonwealth North West Slope Trawl Fishery and Western Deepwater Trawl Fishery) and Eastern Australia (Queensland East Coast, NSW, and Commonwealth Coral Sea Fishery and Torres Strait Finfish Fishery).

STOCK STATUS

Eastern Australia The Queensland East Coast Inshore Finfish Fishery (ECIFFF) comprises the largest catches in the Eastern Australia stock. It is a popular recreational species in Queensland with estimated catches generally higher than the commercial sector [Webley et al. 2015, Teixeira et al. 2021]. Historical catch trends in Queensland reached a maximum combined catch of 123 tonnes (t) in 2006 and then a subsequent decline to 45 t in 2019. The New South Wales commercial catch from 2012 to 2019 averaged approximately 2 t per annum, and Cobia is not a major component of recreational landings [West et al. 2015, Murphy et al. 2020]. Only minor catches of Cobia (<0.05 t per annum) have been reported from the Commonwealth Eastern Tuna and Billfish Fishery. There have been no significant catches by Victorian fisheries, not surprising given this species is at the end of its southern range in this jurisdiction. The last reported catch in Victoria was in 2013–14, and less than 0.05 t was taken in any preceding year.

A preliminary assessment using Queensland recreational, commercial and charter catch data 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 Cobia was 76 per cent of unfished levels [Saunders et al. 2020a] 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, Cobia in Eastern Australia is classified as a **sustainable stock**.

Northern Australia Cobia within Western Australia are not a specific target species in any fishery, but are landed as by-product in multi-species fisheries. The majority of the commercial catch is landed in the Pilbara Fish Trawl Managed Fishery. They have also been landed in small quantities in the Gascoyne Demersal Scalefish Managed Fishery, Northern Demersal Scalefish Managed Fishery, Pilbara Line Fishery, the Pilbara Trap Managed Fishery, West Coast Demersal Gillnet and Demersal Longline Fishery, and the West Coast Demersal Scalefish Interim Managed Fishery. The catch of Cobia in Western Australia has been low and stable for the past 10-years (2010–19), ranging from 11.5–20.4 t, with a mean annual catch of 14.9 t [Gaughan and Santoro 2020].

Cobia are also not targeted by any fisheries in the Northern Territory and the

majority of catch being landed as by-product in the Demersal Fishery trawl sector. The catch in this jurisdiction has been steadily increasing over the past 20 years peaking at 18 t in 2016 before declining to 9 t in 2019.

Queensland commercial (net and line) catches of Cobia in 2019 were minor (3.2 t), and similar to the previous 20-year annual average of 3.7 t [QFISH 2020]. There are no reliable estimates of recreational or indigenous harvest of Cobia in the Queensland component of the stock.

Low catches of Cobia (<100 kg per annum) have been reported from the Commonwealth Coral Sea Fishery, North West Slope Trawl Fishery, Torres Strait Finfish Fishery and Western Deepwater Trawl Fishery.

While Cobia are caught by recreational fishers they generally represent < 1 per cent of the total catch of this species in this stock [e.g. West et al. 2012, Matthews et al. 2019, Ryan et al. 2019].

An assessment using catch data from Western Australia, Northern Territory and Queensland commercial fisheries applied to a modified catch-MSY model (developed by Martell and Froese [2013] and modified by Haddon [2018]). The model estimated that the 2019 biomass of Cobia was 57 per cent of unfished levels [Saunders et al. 2020b], suggesting that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. There is high uncertainty in the estimates of biomass depletion, harvest rate and MSY using a catch-MSY model, which tends to have difficulty in estimating the model parameters with this sort of catch history. The estimated fishing mortality level in 2019 was 0.12, and was well below the limit reference point of 0.2 indicating that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

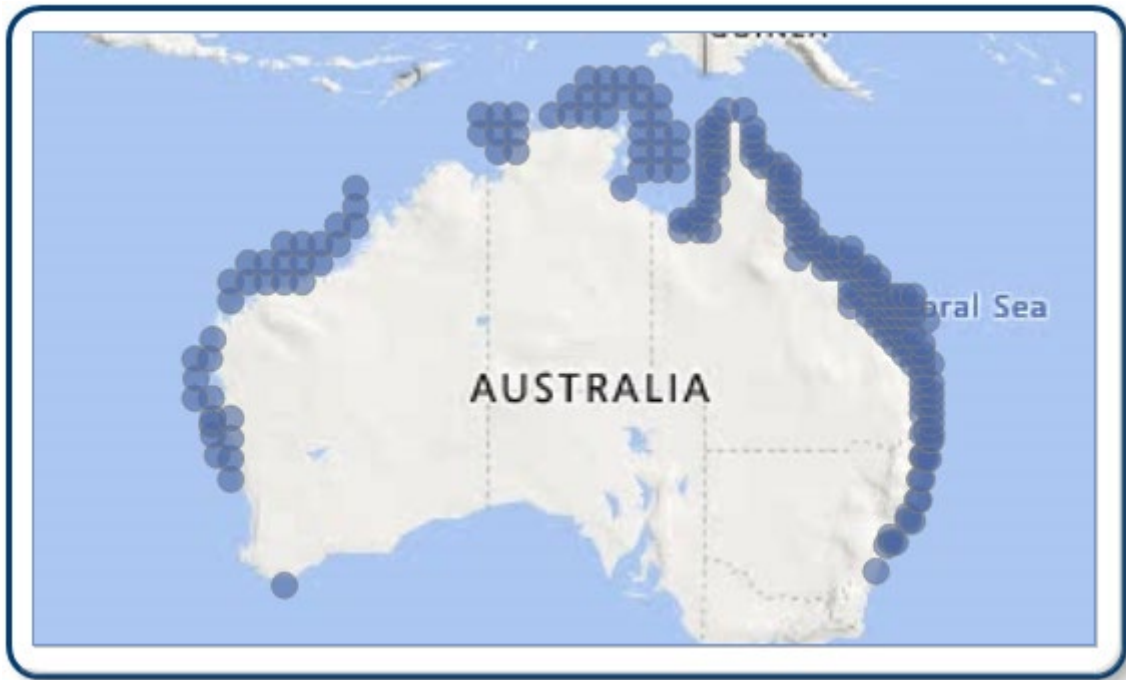
On the basis of the evidence provided above, Cobia in Northern Australia management unit is classified as a **sustainable stock**.

BIOLOGY

Cobia biology [van der Velde et al. 2009, Fry and Griffiths 2010]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Cobia	Northeastern Australia: 7 yrs, max 1800 mm FL	Northeastern Australia: female length at 50% maturity (784 mm FL); female age at 50% maturity (1.5 years)

DISTRIBUTION



Distribution of reported commercial catch of Cobia.

TABLES

Fishing methods	Commonwealth	New South Wales	Northern Territory	Queensland	Western Australia
Charter					
Hook and Line		✓	✓	✓	✓
Spearfishing				✓	
Commercial					
Bottom Trawls			✓		
Demersal Longline	✓				
Dropline					✓
Fish Trap					✓
Gillnet			✓		✓
Hand Line, Hand Reel or Powered Reels					✓
Handline			✓		
Line				✓	✓
Net				✓	
Otter Trawl		✓			✓
Trawl				✓	
Various		✓			
Recreational					
Hook and Line		✓	✓	✓	

Spearfishing		✓		✓	
Management Methods					
	New South Wales	Queensland	Western Australia		
Charter					
Bag limits	✓			✓	
Gear restrictions	✓	✓			
Licence	✓				
Limited entry				✓	
Marine park closures	✓				
Passenger restrictions				✓	
Possession limit	✓	✓			
Size limit		✓		✓	
Spatial closures				✓	
Spatial zoning	✓	✓		✓	
Commercial					
Effort limits				✓	
Gear restrictions	✓	✓		✓	
Limited entry	✓			✓	
Limited entry (licensing)		✓			
Size limit		✓			
Spatial closures	✓			✓	
Spatial zoning		✓		✓	
Total allowable effort				✓	
Vessel restrictions	✓	✓		✓	
Recreational					
Bag limits	✓			✓	
Gear restrictions	✓	✓			
Licence	✓				
Licence (Recreational Fishing from Boat License)				✓	
Marine park closures	✓				

Possession limit	✓	✓	✓
Size limit		✓	✓
Spatial closures	✓		✓
Spatial zoning		✓	

Catch					
	Commonwealth	New South Wales	Northern Territory	Queensland	Western Australia
Charter			< 1 t	10 t (2019–20)	2 t
Commercial	0.016 t	1.84019 t	8.90944 t	20.5561 t	19.5817 t
Indigenous		Unknown	Unknown	Unknown	
Recreational		2 105 (± 970) individuals in 2017–18	< 1 t (2015)	19 t (2019–20)	8 t (2017–18)

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

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].

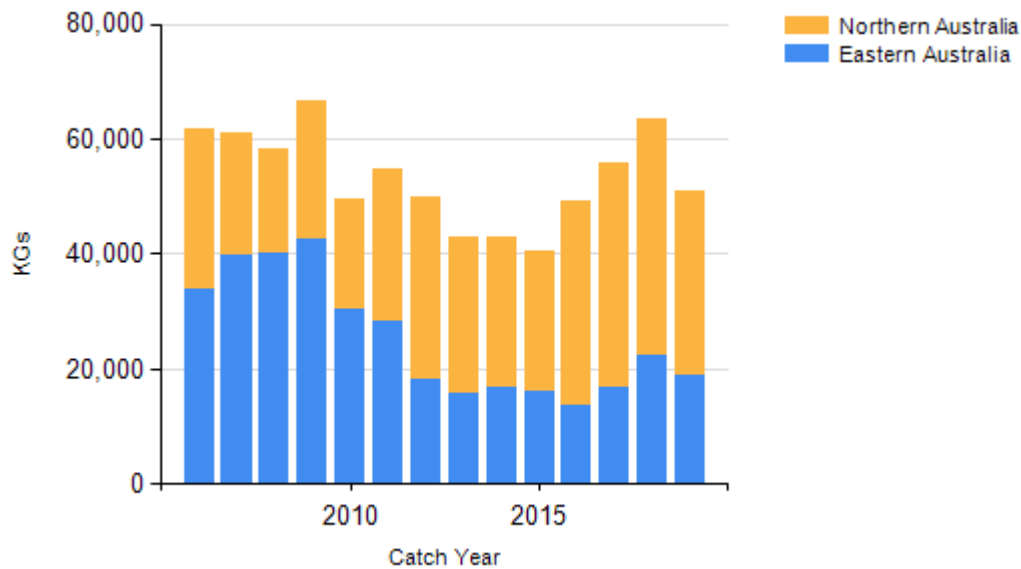
Western Australia – Recreational (management methods) A Recreational Fishing from Boat License is required for the use of a powered boat to fish or to transport catch or fishing gear to or from a land-based fishing location.

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.

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 Cobia

References	
van der Velde et al. 2009	van der Velde, TD, Griffiths, SP, and Fry GC 2009 Reproductive biology of the commercially and recreationally important cobia <i>Rachycentron canadum</i> in northeastern Australia, <i>Fisheries Science</i> 76: 33–43
Fry and Griffiths 2010	Fry, GC, and Griffiths, SP 2010 Population dynamics and stock status of cobia, <i>Rachycentron canadum</i> , caught in Australian recreational and commercial coastal fisheries, <i>Fisheries Management and Ecology</i> 17(3): 231–239
Hoese et al 2006	Hoese, DF, Bray, DJ, Paxton, JR, Allen, GR (2006). <i>Fishes</i> . In, Beesley, PL and Wells A (eds) <i>Zoological Catalogue of Australia</i> . Volume 35. ABRIS & CSIRO Publishing: Australia Part 1, pp. xxiv 1-670; Part 2, pp. xxi 671-1472; part 3, pp. xxi 1473-2178
Gaughan and Santoro 2020	Gaughan, DJ and Santoro K (eds.) 2020. <i>Status Reports of the Fisheries and Aquatic Resources of Western Australia 2018/19: The State of the Fisheries</i> . Department of Primary Industries and Regional Development, Western Australia, Perth, Australia. 291p.
Ryan et al. 2019	Ryan, KL, Hall, NG, Lai, EK, Smallwood, CB, Tate, A, Taylor, SM, Wise, BS 2019, <i>Statewide survey of boat-based recreational fishing in Western Australia 2017/18</i> . Fisheries Research Report No. 297. Department of Primary Industries and Regional Development, Government of Western Australia, Perth.
QFISH 2020	QFish, Department of Agriculture and Fisheries, www.qfish.gov.au
Webley et al. 2015	Webley, J, McInnes, K, Teixeira, D, Lawson, A and Quinn, R 2015, <i>Statewide Recreational Fishing Survey 2013–14</i> . Department of Agriculture and Fisheries, Brisbane.
Murphy et al. 2020	Murphy, JJ, Ochwada-Doyle, FA, West, LD, Stark, KE and Hughes JM, 2020, <i>The Recreational Fisheries Monitoring Program. Survey of recreational fishing in 2017–18</i> , Fisheries final report series 158, NSW Department of Primary Industries, Wollongong.
West et al. 2015	West LD, Stark KE, Murphy JJ, Lyle JM, Ochwada – Doyle F, 2015, <i>Survey of Recreational Fishing in New South Wales and the ACT, 2013/14</i> , Fisheries Final Report Series.
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 0.1.18.
Teixeira et al. 2021	Teixeira, D, Janes, R, and Webley, J 2021, <i>2019–20 Statewide Recreational Fishing Survey Key Results</i> . Project Report. State of Queensland, Brisbane.
Matthews et al. 2019	Matthews, SR, Penny, SS, Steffe A, (2019). <i>A Survey of Recreational Fishing in the Greater Darwin Area 2015</i> . Northern Territory Government, Australia. Fishery Report No 121.
Saunders et al. 2020a	Saunders, T, Roelofs, A, Newman, S, 2020, <i>Eastern Australia Cobia Stock Status Summary—2020—unpublished fishery report</i> .
West et al. 2012	West LD, Lyle JM, Matthews SR, Stark KE, Steffe AS, 2012, <i>Survey of recreational fishing in the Northern Territory, 2009/10</i> . Northern Territory Fisheries. Department of Resources, Northern Territory. 128 pp.

Saunders et al. 2020b	Saunders, T, Roelofs, A, Newman, S, 2020, Northern Australia Cobia Stock Status Summary—2020—unpublished fishery report.
-----------------------	--