

Mulloway (2018)

Argyrosomus japonicus



Jason Earl: South Australian Research and Development Institute, **David Fairclough:** Department of Primary Industries and Regional Development, Western Australia, **Jonathan Staunton-Smith:** Department of Agriculture and Fisheries, Queensland, **Julian Hughes:** Department of Primary Industries, New South Wales

STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Western Australia	Western Australia	GDSMF, GDSMF JASDGDLMF SBPMF SCEMF WCDGDLIMF WCDSIMF WL (NC, GC, WC), JASDGDLMF, SBPMF, SCEMF, WCDGDLIMF, WCDSIMF, WL (NC GC WC)	Sustainable	Catch, CPUE
Queensland	Queensland	ECIFFF	Undefined	Catch
New South Wales	New South Wales	EGF, N/A, OHF, OTF, OTLF	Depleted	Catch, CPUE, length/age composition, yield-per-recruit, mortality rates, spawning potential ratio
South Australia	South Australia	LCF, MSF	Sustainable	Catch, CPUE

EGF Estuary General Fishery (NSW), N/A Not Applicable (NSW), OHF Ocean Hauling Fishery (NSW), OTF Ocean Trawl Fishery (NSW), OTLF Ocean Trap and Line Fishery (NSW), ECIFFF East Coast Inshore Fin Fish Fishery (QLD), LCF Lakes and Coorong Fishery (SA), MSF Marine Scalefish Fishery (SA), GDSMF Gascoyne Demersal Scalefish Managed Fishery (WA), JASDGDLMF Joint Authority Southern Demersal Gillnet and Demersal Longline Managed Fishery (Zone 1 & Zone 2) (WA), SBPMF Shark Bay Prawn Managed Fishery (WA), SCEMF South Coast Estuarine Managed Fishery (WA), WCDGDLIMF West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery (WA), WCDSIMF West Coast Demersal Scalefish (Interim) Managed Fishery (WA), WL (NC || GC || WC) Open Access in the North Coast, Gascoyne Coast and West Coast Bioregions (WA), GDSMF || JASDGDLMF || SBPMF || SCEMF || WCDGDLIMF || WCDSIMF || WL (NC, GC, WC) Various Fisheries combined due to 3 boat rule (WA)

STOCK STRUCTURE

Mulloway has a wide distribution in Australia, from the Gascoyne region on the west coast of Western Australia, around the southern coasts of the continent, and up to the Wide Bay–Burnett region on the east coast of Queensland [Kailola et al. 1993]. Within this broad distribution, Mulloway occur in nearshore coastal waters (less than 100 m depth) and are often abundant in estuaries and the lower reaches of rivers.

Biological stock structure for Mulloway in Australia is uncertain. It has been suggested that a single panmictic population occurs in Australia [Archangi 2008]. However, regional differences in genetics, and otolith morphology and chemistry suggest sub-structuring between populations in New South Wales, South Australia and Western Australia [Barnes et al. 2015, Ferguson et al. 2011].

Here, assessment of stock status for Mulloway is presented at the jurisdictional level—Western Australia, Queensland, New South Wales and South Australia.

STOCK STATUS

New South Wales Commercial landings of Mulloway in New South Wales steadily declined from almost 400 t in the mid-1970s to a historic low of 37 t in 2008–09, and have been less than 100 t per year since the mid-1990s. In 2016–17, the total State-wide commercial catch was 59 t. No trends are evident in commercial CPUE for the two main fishing methods, estuary mesh netting and ocean line fishing since 2009. The recreational catch for Mulloway was estimated to be 351 t in 2000–01 [Henry and Lyle 2003] and has declined to 103 t in 2013–14 [West et al. 2015]. The annual average lengths of Mulloway landed by the commercial fishery have declined since the mid-1990s, but have been stable since the mid-2000s except for the effect of increasing the legal minimum length in 2013 [Silberschneider and Gray 2005, Silberschneider et al. 2009, New South Wales Department of Primary Industries (DPI) unpublished data]. The New South Wales commercial Mulloway fishery continues to be based largely on juveniles, and the truncated length composition of fish in commercial landings since the early-2000s is indicative of a heavily fished stock (around 80 per cent of catch is less than 700 mm, the approximate length at maturity for female Mulloway in New South Wales) [Silberschneider and Gray 2005, Silberschneider et al. 2009, NSW DPI unpublished data]. Mulloway in New South Wales are harvested at an average length that is considerably smaller than the length that would produce the maximum yield per recruit (“growth overfished”) [NSW DPI unpublished data]. Fishing mortality has been consistently estimated to be several times greater than natural mortality over the past 10 years [NSW DPI unpublished data]. Since the early-2000s, the spawning potential ratio (SPR) for Mulloway in New South Wales has been consistently estimated to be below the threshold reference point of 20 per cent indicating that there may be a high risk of recruitment failure [Goodyear 1993, Mace and Sissenwine 1993] and is currently estimated to be between seven and 17 per cent [NSW DPI unpublished data]. This SPR estimate (less than 20 per cent virgin level) infers low spawning stock biomass. The above evidence indicates that the biomass of the part of the stock that occurs in New South Wales waters is likely to be depleted and that recruitment is likely to be impaired.

In 2013, a recovery program for Mulloway was introduced in New South Wales designed to arrest the decline in commercial and recreational Mulloway fisheries. Management changes to the recreational fishery included an increase in legal minimum length from 450 to 700 mm and a 60 per cent reduction in the daily bag limit. Management changes to the commercial fishery included the above increase in legal minimum length (with bycatch allowances of fish between 450 and 700 mm TL for the estuarine mesh net fishery) and a 500 kg trip limit for the beach-hauling net sector. The above evidence indicates that current fishing mortality is constrained by management to a level that should allow the stock to recover from its recruitment impaired state; however measurable improvements are yet to be detected.

On the basis of the evidence provided above, Mulloway in New South Wales is classified as a **depleted stock**.

Queensland Mulloway are predominantly taken by recreational anglers in Queensland, who harvested an estimated 16,000 fish in 2013–14 (around 98 t based on a mean weight of 6.1 kg) [Webley et al. 2015]. The species is a minor component of the commercial East Coast Inshore Fin Fish Fishery (ECIFFF), with around 8.4 t taken by net and line fishing in this fishery in 2017, and a five year annual average catch of 10.5 t. The legal minimum length for Mulloway in Queensland was raised from 450 to 750 mm total length (TL) in 2009, which likely reduced fishing-related mortality, especially for juveniles. There is insufficient information available to confidently classify the status of this stock.

On the basis of the evidence provided above, Mulloway in Queensland is classified as an **undefined stock**.

South Australia The multispecies and multi-gear Lakes and Coorong Fishery (LCF) has traditionally been the most important of South Australia's fisheries for Mulloway, accounting for around 95 per cent of the state's total commercial catch since 2007, with the remainder taken by the Marine Scalefish Fishery (MSF). The most recent assessment for Mulloway in the LCF was completed in 2014, and used data to the end of June 2014 [Earl and Ward 2014]. Interactions between Lakes and Coorong fishers and Long-nosed Fur Seals (*Arctocephalus forsteri*) have increased in recent years [Mackay 2017], with seal depredation on Mulloway caught in gillnets likely to have resulted in reduced catches and lower CPUE for this species.

The primary indicators for biomass and fishing mortality are total catch and targeted catch per unit effort from commercial gillnet fishers. Commercial landings of Mulloway in South Australia peaked at 169 t in 2001 and then progressively declined to 24 t in 2010. This decline was associated with a decline in targeted gillnet effort in the LCF during the Millennium Drought (2002–10) and likely reflected a decline in fishable biomass in the Coorong estuary [Earl and Ward 2014]. Since then, higher catches by the LCF have contributed most to peaks in state-wide landings of 117 t and 111 t in 2013 and 2017, respectively. The recent high catches have been associated with historically high CPUE for LCF gillnet fishers. The state-wide recreational catch of Mulloway was estimated at approximately 60 t in 2013–14 [Giri and Hall 2015]. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, 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 provide above, Mulloway in South Australia is classified as a **sustainable stock**.

Western Australia Commercial catches of Mulloway in Western Australia have declined from around 56 tonnes (t) in 2002, but remained steady between 2008 and 2017 at 13–27 t. The recent reduced catch levels have been associated with reductions in fishing effort by the main demersal fisheries that catch Mulloway (the West Coast Demersal Scalefish (Interim) Managed Fishery (WCDSIMF) and Gascoyne Demersal Scalefish Managed Fishery (GDSMF). This is a result of management changes during the 2000s to reduce effort and thus retained catches of all demersal species in those fisheries (and of the recreational sector) to sustainable levels [Gaughan and Santoro 2018], which have been achieved. Recreational and charter catches of Mulloway remain low, i.e. < 15 t yr⁻¹ [Gaughan and Santoro 2018, Ryan et al. 2017].

At the bioregion and smaller scale management area level, catch per unit effort (CPUE) in the WCDSIMF and GDSMF have been highly variable, reflecting the

low level of targeting of this species. At the Western Australia stock level, CPUE has remained stable and very low since 2008 (after the management changes) at approximately 2–4 kg per fishing day. The above evidence indicates that the biomass of this stock is unlikely to be depleted and that recruitment is unlikely to be impaired. Furthermore, 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, Mulloway in Western Australia is classified as a **sustainable stock**.

BIOLOGY

Mulloway biology [Farmer 2008, Ferguson et al. 2013, Silberschneider and Gray 2008]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Mulloway	42 years, 2000 mm TL	2–6 years, 510–1070 mm TL

DISTRIBUTION



Distribution of reported commercial catch of Mulloway

TABLES

Commercial Catch Methods	New South Wales	Queensland	South Australia	Western Australia
Beach Seine				✓
Demersal Longline			✓	
Dropline				✓
Gillnet			✓	✓
Hand Line, Hand Reel or Powered Reels				✓
Haul Seine	✓			✓

Haul Seine/Beach Seine	✓			
Hook and Line	✓	✓	✓	✓
Longline (Unspecified)				✓
Mesh Net	✓			
N/A	✓			
Net		✓		
Otter Trawl	✓			✓
Pole and Line			✓	
Seine Nets			✓	
Unspecified	✓		✓	✓

Fishing methods				
	New South Wales	Queensland	South Australia	Western Australia
Charter				
Hook and Line	✓			✓
Commercial				
Demersal Longline			✓	
Dropline				✓
Gillnet			✓	✓
Hand Line, Hand Reel or Powered Reels				✓
Haul Seine	✓			✓
Hook and Line	✓	✓	✓	✓
Mesh Net	✓			
Net		✓		
Otter Trawl	✓			✓
Pole and Line			✓	
Seine Nets			✓	
Unspecified	✓			✓
Indigenous				
Gillnet			✓	
Hook and Line	✓	✓	✓	
Spearfishing	✓			
Traditional apparatus		✓	✓	✓
Recreational				
Gillnet			✓	
Hook and Line	✓	✓	✓	✓
Spearfishing	✓	✓		

Management Methods				
	New South Wales	Queensland	South Australia	Western Australia
Charter				
Bag limits	✓			✓
Gear restrictions	✓	✓		
Licence	✓			✓
Limited entry				✓
Marine park closures				✓
Passenger restrictions				✓
Possession limit	✓	✓		✓
Size limit	✓	✓		✓
Spatial closures	✓	✓		
Temporal closures		✓		
Commercial				
Bycatch limits	✓			
Catch limits	✓			✓
Effort limits	✓		✓	✓
Gear restrictions	✓	✓	✓	✓
Limited entry	✓	✓	✓	✓
Size limit	✓	✓	✓	✓
Spatial closures	✓	✓	✓	✓
Temporal closures			✓	
Vessel restrictions	✓			✓
Indigenous				
Bag limits	✓		✓	✓
Gear restrictions			✓	✓
Native Title	✓			
Section 37 (1d)(3)(9), Aboriginal cultural fishing authority	✓			
Size limit			✓	✓
Spatial closures			✓	

Temporal closures			✓	✓
Recreational				
Bag limits	✓		✓	✓
Gear restrictions	✓	✓	✓	
Licence	✓			
Licence (boat-based sector)				✓
Marine park closures				✓
Possession limit	✓	✓		✓
Size limit	✓	✓	✓	✓
Spatial closures	✓	✓	✓	
Temporal closures		✓	✓	

Active Vessels	New South Wales	Queensland	South Australia	Western Australia
	199 Fishing Business in EGF, 8 Fishing Business in OHF, 27 Fishing Business in OTF, 66 Fishing Business in OTLF,	64 in ECIFFF,	20 Licences in LCF, 21 Licences in MSF,	12 in GDSMF, 7 in JASDGLMF, 7 in SBPMF, 6 in SCEMF, 4 in WCDGDLIMF, 18 in WCDSIMF, 23 in Charter, &3 in WL (NC GC WC),

EGF Estuary General Fishery(NSW)

OHF Ocean Hauling Fishery(NSW)

OTF Ocean Trawl Fishery(NSW)

OTLF Ocean Trap and Line Fishery(NSW)

ECIFFF East Coast Inshore Fin Fish Fishery(QLD)

LCF Lakes and Coorong Fishey (SA)

MSF Marine Scalefish Fishery(SA)

GDSMF Gascoyne Demersal Scalefish Managed Fishery(WA)

JASDGLMF Joint Authority Southern Demersal Gillnet and Demersal Longline Managed Fishery (Zone 1 & Zone 2)(WA)

SBPMF Shark Bay Prawn Managed Fishery(WA)

SCEMF South Coast Estuarine Managed Fishery(WA)

WCDGDLIMF West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery(WA)

WCDSIMF West Coast Demersal Scalefish (Interim) Managed Fishery(WA)

Charter Tour Operator(WA)

WL (NC || GC || WC) Open Access in the North Coast, Gascoyne Coast and West Coast Bioregions(WA)

Catch				
	New South Wales	Queensland	South Australia	Western Australia
Charter				1.88 t in Tour Operator
Commercial	51.586t in EGF, 1.926t in N/A, 7.114t in OHF, 0.401t in OTF, 13.268t in OTLF,	8.405t in ECIFFF,	105.787t in LCF, 5.56514t in MSF,	15.6206t in GDSMF JASDGLMF SBPMF SCEMF WCDGLIMF WCDSIMF WL (NC, GC, WC),
Indigenous	Unknown	Unknown	Unknown	Unknown
Recreational	103 t (in 2013–14)	98 t (in 2013–14)	60 t (in 2013–14)	5 t (in 2015–16)

EGF Estuary General Fishery (NSW), N/A Not Applicable (NSW), OHF Ocean Hauling Fishery (NSW), OTF Ocean Trawl Fishery (NSW), OTLF Ocean Trap and Line Fishery (NSW), ECIFFF East Coast Inshore Fin Fish Fishery (QLD), LCF Lakes and Coorong Fishery (SA), MSF Marine Scalefish Fishery (SA), GDSMF Gascoyne Demersal Scalefish Managed Fishery (WA), JASDGLMF Joint Authority Southern Demersal Gillnet and Demersal Longline Managed Fishery (Zone 1 & Zone 2) (WA), SBPMF Shark Bay Prawn Managed Fishery (WA), SCEMF South Coast Estuarine Managed Fishery (WA), WCDGLIMF West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery (WA), WCDSIMF West Coast Demersal Scalefish (Interim) Managed Fishery (WA), WL (NC || GC || WC) Open Access in the North Coast, Gascoyne Coast and West Coast Bioregions (WA), GDSMF || JASDGLMF || SBPMF || SCEMF || WCDGLIMF || WCDSIMF || WL (NC, GC, WC) Various Fisheries combined due to 3 boat rule (WA),

Western Australia – Recreational (Catch totals) Shore based catches are unknown, thus landings are likely to be underestimated.

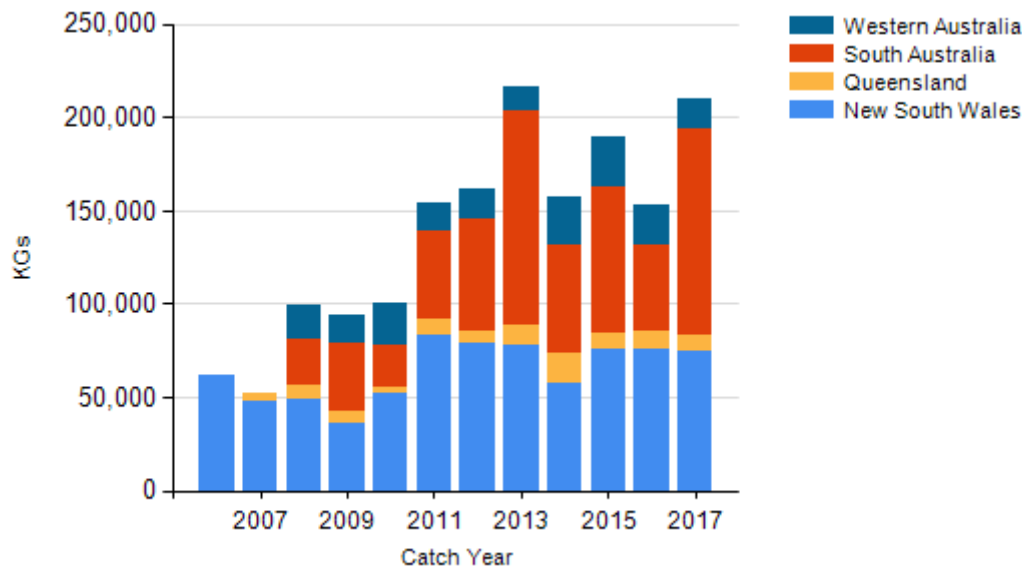
Western Australia – Indigenous (Management methods) Subject to the defence that applies under Section 211 of the *Native Title Act 1993* (Cth), and the exemption from a requirement to hold a recreational fishing licence, the non-commercial take by Indigenous fishers is covered by the same arrangements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

Queensland – Indigenous (Management methods) In Queensland, under the *Fisheries Act 1994* (Qld), Indigenous fishers are able to use prescribed traditional and non-commercial fishing apparatus in waters open to fishing. Size and possession limits, and seasonal closures do not apply to Indigenous fishers. Further exemptions to fishery regulations may be applied for through permits.

New South Wales – Commercial (Management methods) Fishers using mesh nets in the New South Wales commercial Estuary General Fishery are permitted a bycatch allowance of 10 Mulloway between 450 and 700 mm per day. Fishers using haul nets in the New South Wales commercial Ocean Hauling Fishery are permitted a bycatch allowance of 500 kg of Mulloway per day.

New South Wales – Indigenous (Management methods) (a) Aboriginal fishing interim compliance policy (increased bag limits) - allows an Aboriginal fisher in New South Wales to take in excess of a recreational bag limit in certain circumstances, for example, if they are doing so to provide fish to other community members who cannot harvest themselves; (b) The Aboriginal cultural fishing authority is the authority that Indigenous persons can apply to take catches outside the recreational limits under the Fisheries Management Act 1994 (NSW), Section 37 (1d)(3)(9), Aboriginal cultural fishing authority; (c) In cases where the *Native Title Act 1993* (Cth) applies fishing activity can be undertaken by the person holding native title in line with S.211 of that Act, which provides for fishing activities for the purpose of satisfying their personal, domestic or non-commercial communal needs. In managing the resource where native title has been formally recognised, the native title holders are engaged with to ensure their native title rights are respected and inform management of the State's fisheries resources.

CATCH CHART



Commercial catch of Mulloway - note confidential catch not shown

EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

ENVIRONMENTAL EFFECTS on Mulloway

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