

# Mulloway (2016)

*Argyrosomus japonicus*



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## STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Western Australia	Western Australia	GDSMF, JASDGLMF, SBBSNMNF, SBPMF, SCEMF, WCDGLIMF, WCDSIMF, WL (SC)	Sustainable	Catch, <u>CPUE</u>
Queensland	Queensland	ECIFFF	Undefined	Catch
New South Wales	New South Wales	EGF, OHF, OTF, OTLF	Overfished	Catch, <u>CPUE</u> , length and age composition, mortality rates
South Australia	South Australia	LCF, MSF	Sustainable	Catch, <u>CPUE</u> , age structure

EGF Estuary General Fishery (NSW), OHF Ocean Hauling (NSW), OTF Ocean Trawl Fishery (NSW), OTLF Ocean Trap and Line (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), SBBSNMNF Shark Bay Beach Seine and Mesh Net Managed Fishery (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 (SC) Open Access in the South Coast (WA)

## STOCK STRUCTURE

Mulloway are widely distributed in estuaries and near-shore coastal waters (less than 200 m) of the Pacific and Indian Oceans, including subtropical and temperate waters of Australia[1]. The species occurs along the entire southern seaboard of mainland Australia, from North West Cape in Western Australia to Burnett River in Queensland[2,3].

Attempts to understand the biological stock structure of Mulloway in Australia have yielded differing results. It has been suggested that a single panmictic population occurs in Australia[3], but this is not supported by studies that suggest sub-structuring between populations in New

South Wales, South Australia and Western Australia[4,5]. Biological stock delineation for Mulloway in Australia remains uncertain.

Here, assessment of stock status 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 commercial landings have been less than 100 t per year since the mid-1990s. In 2015, the total State-wide commercial catch was 74 t. The recreational catch for Mulloway was estimated to be 351 t in 2000–01[9] and has declined to 103 t in 2013–14[10]. Nominal commercial catch rates for Mulloway have declined during the past 20 years in ocean and estuarine fisheries (unpublished data, New South Wales Department of Primary Industries). The average lengths of Mulloway landed by the commercial fishery have declined since the mid-1990s, but have been stable since the mid-2000s[11–13]. The 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 size at maturity for female Mulloway in New South Wales)[11–13]. Fishing mortality is estimated to be several times greater than natural mortality[13]. The current spawning potential ratio for Mulloway is estimated to be between 16 and 25 per cent[13], which is below the threshold reference point of 25 per cent. This indicates that there may be a high risk of recruitment failure[14,15]. The above evidence indicates that the stock is likely to be recruitment overfished.

In 2013, a recovery program for Mulloway was introduced in New South Wales to arrest the decline in commercial and recreational Mulloway fisheries. Management changes to the recreational fishery included an increase in legal minimum size from 450–700 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 size (with bycatch limits for the estuarine mesh net fishery) and a 500 kg trip limit for the beach-hauling net sector. This level of fishing pressure is expected to allow the stock to recover from its recruitment overfished state; however measurable improvements in biomass are yet to be detected.

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

**Queensland** Mulloway are predominantly taken by recreational anglers in Queensland, who harvested an estimated 72 t (16 000 fish) in 2013–14[8]. The species is a minor component of the commercial East Coast Inshore Fin Fish Fishery, with around 9 t taken by this fishery in 2015, and a 5-year annual average catch of 10 t. The legal size limit for Mulloway in Queensland was raised from 450–750 mm total length in 2009, which likely reduced fishing-related mortality, especially for juveniles. However, 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** In South Australia, Mulloway supports commercial and recreational fisheries. The total state-wide commercial catch of 78 t in 2015 was the second highest since 2002, and higher than the most recent estimate of total state-wide recreational catch of 60 t in 2013–14[16]. The Lakes and Coorong Fishery (LCF) has

traditionally been the most important of the South Australian commercial fisheries for Mulloway, accounting for 95 per cent of the state's total commercial catch since 2009, with the remaining catch taken by the Marine Scalefish Fishery. From 2003–11, annual catches by the LCF were relatively low (21–45 t), reflecting low levels of targeted effort and low catch per unit effort (CPUE). Since that period, catch increased to 115 t in 2013 and was 77 t in 2015, while CPUE has been at historically high levels[17].

Interactions between Lakes and Coorong fishers and Long-nosed Fur Seals (*Arctocephalus forsteri*) have increased in recent years, with seal depredation on Mulloway caught in mesh nets likely to have resulted in reduced catches and catch rates for this species. Nonetheless, the presence of several strong age classes in the spawning biomass[18], regular recruitment of juveniles to the fishable biomass in recent years[19], and high annual catches and catch rates over the past 4 years indicate that the biomass of this stock is unlikely to be recruitment overfished, and that the current level of fishing pressure is unlikely to cause the stock to become recruitment overfished.

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 60 tonnes (t) in 2002 to less than 30 t in 2015. This reduction is associated with a reduction in fishing effort by the main demersal species fisheries that land Mulloway. This is due to 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[6], which have been achieved. Recreational and charter catches of Mulloway have remained low[6,7].

At the bioregion and smaller scale management area level, catch rates in the key fisheries that land Mulloway (the West Coast Demersal Scalefish (Interim) Managed Fishery and Gascoyne Demersal Scalefish Managed Fishery) are highly variable, reflecting the low level of targeting of this species. However, at the overall Western Australian stock level, catch rates have been stable since 1999 at approximately 1–3 kg per day and increased to almost 5 kg per day in both 2014 and 2015. The recent increase in catch rate is thought to be primarily due to overall reductions in effort in the demersal fisheries that primarily target snapper. The above evidence indicates that the biomass of this stock is unlikely to be recruitment overfished, and that the current level of fishing pressure is unlikely to cause the stock to become recruitment overfished.

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

### BIOLOGY

Mulloway biology[2,20,21]

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

### DISTRIBUTION



Distribution of reported commercial catch of Mulloway

**TABLES**

Commercial Catch Methods	New South Wales	Queensland	South Australia	Western Australia
Coastal, Estuary and River Set Nets	✓		✓	
Gillnet		✓		
Hand Line, Hand Reel or Powered Reels	✓			
Haul Seine	✓			
Line		✓		
Mesh Net	✓		✓	
Various			✓	✓

Fishing methods	New South Wales	Queensland	South Australia	Western Australia
<b>Commercial</b>				
Coastal, Estuary and River Set Nets	✓		✓	
Gillnet		✓		
Hand Line, Hand Reel or Powered Reels	✓			
Haul Seine	✓			

Line		✓		
Mesh Net	✓		✓	
Various			✓	✓
<b>Indigenous</b>				
Gillnet			✓	
Hand Line, Hand Reel or Powered Reels	✓	✓	✓	
Spearfishing	✓			
Traditional apparatus		✓	✓	✓
<b>Recreational</b>				
Gillnet			✓	
Hand Line, Hand Reel or Powered Reels	✓	✓	✓	✓
Spearfishing	✓	✓		
<b>Management Methods</b>				
	<b>New South Wales</b>	<b>Queensland</b>	<b>South Australia</b>	<b>Western Australia</b>
<b>Commercial</b>				
Bycatch limits	✓			
Catch limits	✓			✓
Effort limits	✓		✓	✓
Gear restrictions	✓	✓	✓	✓
Limited entry	✓	✓	✓	✓
Size limit	✓	✓	✓	✓
Spatial closures	✓	✓	✓	✓
Temporal closures			✓	
Vessel restrictions	✓			✓
<b>Indigenous</b>				
Bag limits	✓		✓	✓
Gear restrictions	✓	✓	✓	✓
Licence	✓			
Section 31 (1)(c1), Aboriginal cultural	✓			

<b>fishing authority</b>				
<b>Size limit</b>	✓		✓	✓
<b>Spatial closures</b>	✓		✓	✓
<b>Temporal closures</b>	✓		✓	✓
<b>Recreational</b>				
<b>Bag limits</b>	✓		✓	✓
<b>Gear restrictions</b>	✓	✓	✓	
<b>Licence</b>	✓			✓
<b>Possession limit</b>	✓	✓		✓
<b>Size limit</b>	✓	✓	✓	✓
<b>Spatial closures</b>	✓	✓	✓	✓
<b>Temporal closures</b>		✓	✓	

<b>Active Vessels</b>	<b>New South Wales</b>	<b>Queensland</b>	<b>South Australia</b>	<b>Western Australia</b>
	234 License in EGF, 12 License in OHF, 40 License in OTF, 66 License in OTLF,	55 License in ECIFFF,	23 license in LCF, 19 license in MSF,	16 License in GDSMF, 21 License in JASDGDMF, 7 License in SBBSMNMF, 18 License in SBPMF, 27 License in SCEMF, 5 License in WCDGDLIMF, 37 License in WCDSCMF, 69 License in WL (SC),

**EGF** Estuary General Fishery(NSW)

**OHF** Ocean Hauling(NSW)

**OTF** Ocean Trawl Fishery(NSW)

**OTLF** Ocean Trap and Line(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)

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

**SBBSMNMF** Shark Bay Beach Seine and Mesh Net Managed Fishery(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 Deep Sea Crustacean Managed Fishery(WA)

**WL (SC)** Open Access in the South Coast(WA)

Catch	New South Wales	Queensland	South Australia	Western Australia
<b>Commercial</b>	61.7616t in EGF, 0.7176t in OHF, 0.87086t in OTF, 11.0788t in OTLF,	8.81525t in ECIFFF,	76.9039t in LCF, 1.3138t in MSF,	8.1135t in GDSMF, 2.75769t in JASDGLMF, 0.314t in SBBSMNMF, 3.0154t in SBPMF, 0.38t in SCEMF, 3.41863t in WCDGDLIMF, 8.9799t in WCDSIMF, 0.052t in WL (SC),
<b>Indigenous</b>	Unknown	Unknown	Unknown	Unknown
<b>Recreational</b>	103 t (in 2013–14)	72 t (in 2013–14)	60 t (in 2013–14)	8 t (in 2013–14)

EGF Estuary General Fishery (NSW), OHF Ocean Hauling (NSW), OTF Ocean Trawl Fishery (NSW), OTLF Ocean Trap and Line (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), SBBSMNMF Shark Bay Beach Seine and Mesh Net Managed Fishery (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 (SC) Open Access in the South Coast (WA),

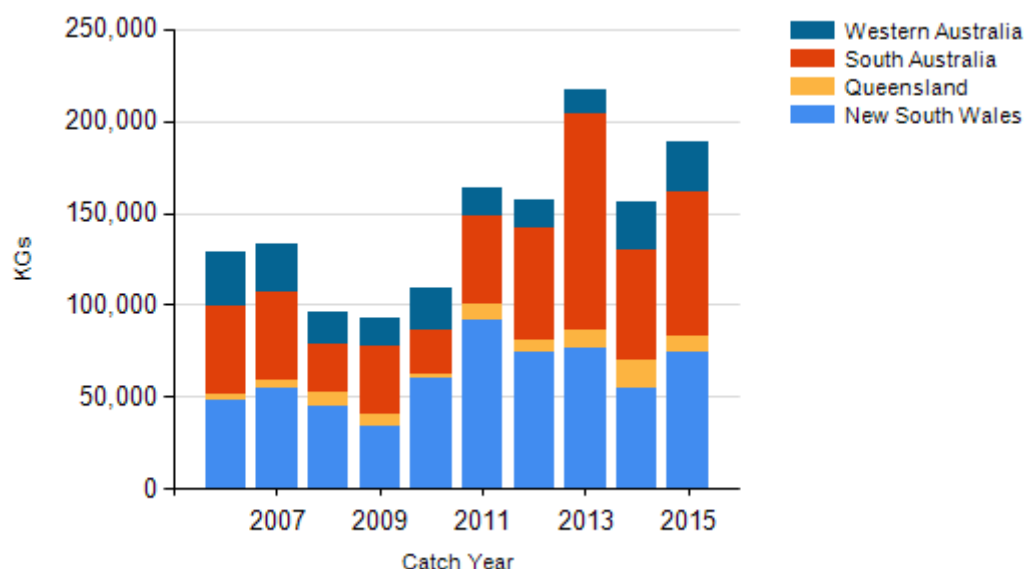
**a New South Wales – Commercial (management methods)** Fishers using mesh nets in the New South Wales commercial Estuary General Fishery are permitted a bycatch allowance of 10 Mulloway between 450 and 700 mm per day. Fishers using haul nets in the New South Wales commercial Ocean Hauling Fishery are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

**b 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.

**c New South Wales – Indigenous (management methods)** Aboriginal Cultural Fishing Interim Access Arrangement - 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.

**d Western Australia – Indigenous** In Western Australia, 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.

**CATCH CHART**



Commercial catch of Mulloway - note confidential catch not shown

**EFFECTS OF FISHING ON THE MARINE ENVIRONMENT**

- Mulloway are targeted by commercial fisheries using mainly mesh gillnets and hauling nets. These activities are considered to pose a low risk to the environment[22].
- Some bycatch and discard mortality may be expected from mesh gillnets used to target Mulloway, including the capture of small individuals of some species[23,24]. However, these nets are highly selective in their ability to capture target species[22].

**ENVIRONMENTAL EFFECTS on Mulloway**

- Estuaries are important nursery areas for Mulloway[20]. The availability of suitable habitat and trophic resources for Mulloway in estuaries is largely dependent on the magnitude, frequency and timing of freshwater inflows, which can affect recruitment and the availability of Mulloway to estuarine-based fisheries[18,19].

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