Black Bream (2020)

Acanthopagrus butcheri

Victorian Fisheries Authority: Victorian Fisheries Authority, **Matt Broadhurst**: New South Wales Department of Primary Industries, **Jason Earl**: South Australian Research and Development Institute, **Rodney Duffy**: Department of Primary Industries and Regional Development, Western Australia, **Nils Krueck**: Institute for Marine and Antarctic Studies, University of Tasmania

STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Western Australia	Western Australia South Coast Estuaries	Sustainable	Catch, estimated biomass, harvest rate
Western Australia	Western Australia West Coast Estuaries	Sustainable	Catch
New South Wales	Southern New South Wales	Undefined	Catch, CPUE
Victoria	The Gippsland Lakes	Depleting	Catch, CPUE, size composition
Victoria	Victoria Eastern Estuaries	Undefined	CPUE, size composition
Victoria	Victoria Western Estuaries	Undefined	CPUE, size composition
Tasmania	Tasmania Scalefish Fishery	Sustainable	Catch
South Australia	Lakes and Coorong Fishery	Depleted	Catch, targeted effort, age composition
South Australia	South Australia Marine Scalefish Fishery	Sustainable	Catch, CPUE

STOCK STRUCTURE

Black Bream have a wide distribution in the estuaries of southern Australia from central New South Wales to the central Western Australian coast, including Tasmania [Kailola et al. 1993]. Black Bream are estuarine-dependent, completing much of their life cycle within a single estuary [Chaplin et al. 1997, Conron et al. 2016, Earl et al. 2016]. Genetic studies of Black Bream in Victoria and Western Australia have indicated that, while there has been gene flow between adjacent estuaries, there is evidence of isolation by distance between populations [Chaplin et al. 1997, Farrington et al. 2000, Burridge et al. 2004, Burridge and Versace 2007]. Results of tagging studies conducted in the Swan River [Norriss et al. 2002], Gippsland Lakes [Butcher and Ling 1962, Hindell et al. 2008] and the Coorong estuary [Hall 1984] found limited or no evidence of coastal migration or emigration between estuaries. This indicates that estuarine Black Bream populations should be managed as distinct biological stocks. However, for most fisheries management agencies this is not practical.

Black Bream and the closely related Yellowfin Bream, *Acanthopagrus australis*, also exhibit considerable levels of hybridisation where their distributions overlaps in south-eastern Australia [Farrington et al. 2000, Roberts et al. 2009, 2010, 2011, Ochwada-Doyle et al. 2012], further complicating status determination.

Furthermore, Black Bream growth, size- and age-at-maturity and recruitment are strongly influenced by environmental conditions, particularly fresh water influx into estuaries [Norriss et al. 2002, Cottingham 2008]. It is therefore likely that over local scales at least, annual recruitment strength depends on environmental conditions, with substantial inter-annual variation in recruitment affecting individual stock demographics and biomasses. These environmental drivers complicate management across multiple catchments.

Here, assessment of stock status is presented at the management unit level—Western Australia West Coast Estuaries, Western Australia South Coast Estuaries (Western Australia); Southern New South Wales (New South Wales); Victoria Western Estuaries, The Gippsland Lakes, Victoria Eastern Estuaries (Victoria); Tasmania Scalefish Fishery (Tasmania); Lakes and Coorong Fishery and South Australia Marine Scalefish Fishery (South Australia).

STOCK STATUS

Lakes and Coorong Fishery

The Lakes and Coorong Fishery (LCF) has historically been the most important of South Australia's commercial fisheries for Black Bream, consistently accounting for around 85 per cent of the state's total commercial catch of the species since the 1980s. The Lakes and Coorong Black Bream stock encompasses the populations in the Coorong estuary and Lower Lakes at the southern end of the Murray River [Earl et al. 2016]. The most recent stock assessment of Black Bream in the Coorong estuary and Lower Lakes was completed in 2016 and used a weight-of-evidence approach that considered fishery data and fishery age structure data to 30 June 2015 [Earl et al. 2016]. The primary measures used to monitor biomass and fishing mortality are total catch and targeted effort from commercial gillnet fishers, and fishery age structures.

Total catch of Black Bream in the LCF peaked at around 72 tonnes (t) in 1980–81 and remained above 45 t per year (t.yr[-1])[ ]until 1985–86. Catch abruptly declined in the late 1980s and averaged 4.2 t.yr[-1] from 1990–91 to 2018–19. The total catch of <1 t in 2018–19 was the lowest on record. Low catches since the 1980s have been associated with low targeted effort. Given the high wholesale value of Black Bream, the low levels of targeted effort and catch since the 1980s likely reflect low fishable biomass. The state-wide recreational catch was estimated at approximately 4.5 t in 2013–14 [Giri and Hall 2015], although the proportion of the catch taken from the Coorong estuary is not known.

Annual age structures of Black Bream taken in the commercial fishery from 2008–09 to 2018–19 showed catches comprised mostly fish 4–17 years of age

[Earl et al. 2016; Ye et al. 2020]. Fish older than 10 years were rare, despite the potential for this species to reach 32 years of age [Ye et al. 2018]. Within any year, few age classes contributed most to the catch, reflecting the relative strength of these year classes. This variation in year-class strength relates to inter-annual variation in recruitment. Larger year classes appear to be linked to freshwater releases to the Coorong estuary in 1997–98, 2003–04, 2006–07, 2009–10 and 2012–13, confirming that environmental conditions associated with freshwater inflow are important for the successful reproduction of local Black Bream. The recruitment of these year classes to the fishable biomass since the mid 1990s indicates that environmental conditions in the Coorong estuary supported successful spawning in those years. Despite this recruitment, fishery production has remained low compared to historical levels. Recruitment levels over the past 25 years have not been strong enough to support recovery of the stock. In 2018, successful recruitment of Black Bream in the Coorong estuary was evident by the detection of higher than average abundances of young-of-year [Ye et al. 2018]. Recruitment of these juveniles to the fishable biomass is expected to take at least several years. The above evidence indicates that the biomass of this stock has been reduced through fishing mortality, such that recruitment is impaired. In 2018 and 2019, management measures were implemented to recover the stock, but have not yet resulted in measurable improvements.

On the basis of the evidence provided, the Lakes and Coorong Fishery management unit is classified as a **depleted** stock.

South Australia Marine Scalefish Fishery

Black Bream is considered a tertiary species in South Australia's commercial multispecies, multi-gear and multi-sectoral Marine Scalefish Fishery (MSF). The MSF Black Bream stock encompasses the populations in marine waters of South Australia, outside the Coorong Estuary and Lower Lakes [Earl et al. 2016]. The most recent assessment of Black Bream in the MSF was completed in 2020 [Steer et al. 2020] and incorporated data collected until the end of December 2018. The primary measures of biomass and fishing mortality are total catch, total effort and nominal catch rate from commercial fishers. Total annual catch in the MSF was historically low (<1.5 t.yr[-1]) from 1983–84 to 2005–06, as a result of low targeted effort. Between 2014–15 and 2018–19, catches were marginally higher (1.7–3.2 t.yr[-1]) and estimates of annual catch rate were, on average, around 80 per cent higher than the long-term average catch rate for the sector. The total catch of 2.8 t in 2018–19 was the second highest catch recorded in the fishery. The most recent estimate of total state-wide recreational catch of Black Bream was 4.5 t in 2013–14 [Giri and Hall 2015]. The above evidence indicates that the biomass of this stock is unlikely to be depleted, that recruitment is unlikely to be impaired and that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

On the basis of the evidence provided, the South Australia MSF management unit is classified as a **sustainable stock**.

Southern New South Wales

Black Bream are known to occur in estuaries and coastal lagoons in New South Wales south of ~32[o] latitude, but there is substantial hybridization with Yellowfin Bream [Roberts et al. 2009, 2010, 2011, Ochwada-Doyle et al. 2012]. Genetic analyses of 688 juvenile fish from five coastal lagoons in southern New South Wales by Roberts et al. [2010] found that 50 per cent were Yellowfin Bream, 45 per cent were Yellowfin/Black Bream hybrids and only 5 per cent were Black Bream. Ochwada-Doyle et al. [2012] observed no differences with hybrids in terms of their growth, population structure or maturity, but excessive introgression has negative implications for the persistence of Black Bream as a species in this region.

Difficulty in visually separating both species of bream and hybrids means that all have been historically amalgamated with Yellowfin Bream for reporting

purposes, confounding inter-specific estimates of commercial and especially recreational catches [Murphy et al. 2020]. Nevertheless, since 2009, commercial fishers have recorded 'Black Bream' as a separate species (mostly south of 31[o] S), where approximately 80 per cent of their catches are landed using mesh nets and 17 per cent using haul seines. Estimated catches remained fairly stable at approximately 20 t each year from 2010 to 2015, and then decreased to 14 t in 2017 and 10 t in 2019, but with simultaneous reductions in fishing effort. While the lower effort has resulted in stable nominal catch rates, additional data are required to determine the exact compositions of Black Bream in catches.

On the basis of the evidence provided above, the Southern New South Wales management unit is classified as an **undefined stock**.

Tasmania Scalefish Fishery

The sale of Black Bream from Tasmanian State waters has been prohibited since 1998, resulting in a cessation of significant harvest of the species for commercial purposes. Prior to 1998, Black Bream were harvested commercially using seine nets (including beach seine) and gillnets and, to a lesser extent, hand lines. Maximum commercial catches of 9.9 t were recorded in 1996–97. In the years following 1998, catches remained below 1 t, averaging only 38 kg over the last 10 years.

Black Bream are a popular target for recreational fishers in Tasmania. Recreational fishers target the species primarily in estuaries using lines with bait or lures. Catches have remained fairly stable over time, but dropped by about 50 per cent between the last two surveys in 2012–13 and 2017–18 [Lyle et al. 2009, Lyle et al. 2014, Lyle et al. 2019]. Release rates have increased markedly since 2001, reflecting a documented change in fisher ethic towards catch-and-release sports fishing [Lyle et al. 2009, Lyle et al. 2014, Lyle et al. 2019]. The estimated total recreational catch in 2012–13 was 59 000 fish, with an estimated 40 000 of these released [Lyle et al. 2014]. In 2017–18, total recreational catch was estimated at 27 000, with about 18 000 released and 9 000 kept [Lyle et al. 2019]. Post-release survival of Black Bream is considered to be high, but known to vary with hooking depth [Conron et al. 2010].

The above evidence indicates that the biomass of this stock is unlikely to be depleted, recruitment is unlikely to be impaired, and the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired. On the basis of this assumption, the Tasmanian Scalefish Fishery management unit is classified as a **sustainable stock**.

The Gippsland Lakes

The Gippsland Lakes are a series of temperate coastal lagoons almost 70 km long in eastern Victoria that are connected to the sea by a single permanent narrow entrance at Lakes Entrance. Three main rivers, the Mitchell, Nicholson and Tambo, discharge into this system.

Commercial harvests had dropped considerably since the 1980s, and standardised catch rates from mesh nets declined from 2011–12 to 2018–19 to a level below the lowest point estimated for a reference period of 1986–2015 [Conron et al. 2020] and more recently decreased substantially in response to declining netting effort due to licence attrition [Conron et al. 2020]. Declining catch rates have also been observed during creel surveys and an angler diary program. Standardised catch rates estimated from the creel surveys have remained low compared to historical levels since the early 2000s, and below the reference period (1978–2015) average to only just above the reference period lowest point during 2016–2018 [Conron et al. 2020]. Angler diarist catch rates declined from 2013 to 2016 but have increased in the most recent year to be just below the reference period average in 2018 [Conron et al. 2020].

Length composition data for creel surveys has been stable over the last 15 years with signs of an increase in the median size of fish harvested from 2009 to 2018 [Conron et al. 2020]. There has been an increase in proportions of smaller fish

in angler diarist catches in 2017 and 2018 and recruitment of 0-age black bream has been relatively stronger for the last three years [Conron et al. 2020].

The estimated fishing mortality rate experienced by the stock from 2015–2019 was in the order of 0.2 (95% CLs = 0.1–0.3) which is not overly high within the bounds of a species with the life history characteristics of Black Bream, provided that recruitment is relatively consistent.

The above evidence indicates that on balance the stock is unlikely to be depleted based on the fact that higher recruitment has occurred since 2017. However, there is a long history of relatively poor Black Bream recruitment in the Gippsland Lakes which resulted in the decline in abundance of the species.

Given that the current levels of fishing mortality are unlikely to cause the stock to become recruitment impaired in the short-term it is likely that the reduction in biomass of Black Bream is primarily a result of negative environmental drivers since ~2012 (see discussion in Williams et al. [2012]). Consequently, the Black Bream biomass is considered to be depleting based this evidence.

Further management measures have been undertaken through the Gippsland Lakes Recovery Plan including the buy-out of all commercial netting licences in March 2020, re-stocking, changes to Black Bream catch limits to reduce recreational catch and for cross-agency habitat improvement [VFA 2020].

On the basis of the evidence provided above, the Gippsland Lakes management unit is classified as a **depleting stock**.

Victoria Eastern Estuaries

The status of stock biomass and impact of fishing pressure was evaluated using catch per unit effort (CPUE) and size composition data from fishers participating in an angler diary program. There is now no commercial fishery for Black Bream in Lake Tyers and Mallacoota Inlet with commercial fishing being removed from these estuaries in 2003 [Conron et. al. 2010].

Changes in the levels of fishing pressure on Black Bream stocks following the removal of commercial fishing were investigated using data collected by volunteer angler diarists targeting Black Bream in Mallacoota Inlet and Lake Tyers [Conron et. al. 2010]. Total mortality rate estimates of legal-sized Black Bream, from age-based cohort analysis of catch data, indicated that the annual mortality declined from 57 per cent to 31–36 per cent following the removal of commercial fishing from Mallacoota Inlet. Data collected in Lake Tyers after the removal of commercial fishing indicated an annual mortality rate of 24 per cent.

There is no recent information about the amount of fishing pressure on the Black Bream populations in Lake Tyers and Mallacoota Inlet and natural mortality has not been estimated. Size composition data show that larger fish (>35 cm TL) are consistently recorded in catches [Conron et al. 2020] suggesting fishing mortality is still likely to be relatively low. Black Bream below the minimum legal size (28 cm) are also regularly caught in both locations, suggesting recent spawning success. Diary angler targeted CPUE has declined to below its average in recent years but in 2018 was above the minimum for the period Conron et al. 2020]. Reduced participation in the angler diary program has increased the uncertainty of recent diary angler CPUE (i.e. recent declines in CPUE, but there is uncertainty to whether these reflect declines in biomass or unreliability of angler-diarist data). Overall, there is insufficient information available to confidently classify the status of this stock.

On the basis of the evidence provided above, the Victoria Eastern Estuaries management unit is classified as an **undefined stock**.

Victoria Western

Black Bream predominantly occur in the estuarine reaches of rivers in western Victoria and Port Phillip Bay. The main indicators used for assessment of the

Estuaries

Victoria Western Estuaries management unit are catch per unit effort (CPUE) of harvests by the recreational and commercial sectors. Information on recruitment and fishing pressure is also obtained from size composition data measured by anglers participating in an ongoing angler fishing diary program [Conron and Oliveiro 2016], but these data do not provide estimates of total recreational catch.

There is no direct information on the amount of fishing pressure on the Black Bream population in the Glenelg River. Size composition data shows that larger fish (>35 cm) are consistently recorded in the catches [Conron et al. 2020] suggesting fishing mortality is likely to be relatively low. There have been also consistent catches of undersize fish suggesting recent spawning success with the exception of 2018. The lack of undersize fish recorded by angler diarists in 2018 is unexpected given their prevalence in previous years and this may be due to changes in the fishing gear used or the locations fished. Diary angler targeted CPUE (number of fish per angler hour) in 2018 was just below its long-term average (1997–2015) and mostly well above its minimum during other years [Conron et al. 2020].

Similarly, in the Hopkins River there is also no direct information about the amount of fishing pressure on the Black Bream population. Size-composition data shows that larger fish (>35 cm TL) are consistently recorded in catches [Conron et al. 2020] suggesting fishing mortality is likely to be relatively low. There have also been consistent catches of undersize fish suggesting recent spawning success. Diary angler targeted CPUE has fluctuated in recent years above or just below the reference period average with a small number of sampling trips being recorded [Conron et al. 2020]. Reduced participation in the angler diary program has increased the uncertainty of recent angler diarist CPUE. Overall, there is insufficient information available to confidently classify the status of this stock.

On the basis of the evidence provided above, the Victoria Western Estuaries management unit is classified as a **undefined stock**.

Western Australia South Coast Estuaries

The Black Bream stock status assessment is currently presented at the management unit level (Western Australia South Coast Estuaries). The current assessment of Black Bream in this management unit is primarily based on estimates of biomass and fishing mortality from a data-limited Catch-Maximum Sustainable Yield (MSY) assessment model, compared periodically to reference levels relating to estimates of MSY. The estimated biomass expected to achieve MSY (BMSY) is considered as the threshold reference level for the stock, and 50 per cent of BMSY is set as the limit reference level. The target level is considered as any stock levels above BMSY.

Annual commercial catch of Black Bream taken in the South Coast Bioregion since 1976 has been increasing, with occasional large fluctuations between years, particularly noticeable in the early 1990s. The estimated fishing mortality experienced by the stock in 2019 was 0.18 year-1, with very broad 95 per cent confidence levels (CLs) ranging from 0.09 to 0.57 year-1. Acknowledging the uncertainty inherent in Catch-MSY analyses, this point estimate of F is similar to FMSY (0.16 year-1). While not providing immediate cause for concern, the fishing mortality experienced by this stock should be monitored carefully to avoid the potential for depletion to a level at which the risk of recruitment impairment increases.

The point estimate for relative stock biomass in 2019 was at 0.52 of the unfished level (95 per cent CLs = 0.24–0.8). As the current value of this performance indicator is above the threshold, the stock is considered not to be depleted to a level at which recruitment could be impaired.

On the basis of the evidence provided above, the Western Australia South Coast

Estuaries management unit is classified as a **sustainable stock**.

Western Australia West Coast Estuaries

The Black Bream stock status assessment is currently presented at the management unit level, the West Coast Bioregion. The current assessment of Black Bream in the West Coast Bioregion is primarily based on estimates of biomass and fishing mortality from a data-limited Catch-Maximum Sustainable Yield (Catch-MSY) assessment model, compared periodically to reference levels relating to estimates of MSY. The estimated biomass expected to achieve MSY (BMSY) is considered as the threshold reference level for the stock, and 50 per cent of BMSY is set as the limit reference level. The target level is considered as any stock levels above BMSY.

The point estimate for relative stock biomass in 2019 was low at 0.32 of the unfished level (95 per cent CLs = 0.08–0.57, but has recovered from below the limit. As the current value of this performance indicator is below the threshold but above the limit, the stock may be depleted to a level at which there is an increased risk of recruitment impairment, so careful monitoring will be required.

The estimated fishing mortality experienced by the stock in 2019 was 0.11 year[-1], with very broad 95 per cent CLs ranging from 0.07 to 0.73 year[-1]. As the current value of this performance indicator is the same (within uncertainty limits) as the level of FMSY (0.1 year[-1]), the stock is expected to be maintained around BMSY. However, because F is around FMSY, the stock needs to be monitored closely to check that fishing mortality does not increase which might otherwise lead to a stock issue. In summary, while careful monitoring is required, the above evidence indicates that the biomass of this stock is unlikely to be depleted, recruitment is unlikely to be impaired, 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 West Coast Estuaries management unit is classified as a **sustainable stock**.

BIOLOGY

Black Bream biology [Kuiter 1993, Sarre and Potter 2000, Walker and Neira 2001, Cheshire et al. 2013]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Black Bream	37 years, 600 mm TL	180–340 TL mm

DISTRIBUTION

Distribution of reported commercial catch of Black Bream

TABLES

Fishing methods					
	New South Wales	South Australia	Tasmania	Victoria	Western Australia
Charter					
Diving				✓	
Hook and Line				✓	
Commercial					
Beach Seine					✓
Fish Trap					✓
Gillnet		✓			✓
Hand Line, Hand Reel or Powered Reels					✓
Handline		✓			
Haul Seine	✓				✓
Hook and Line		✓			
Mesh Net	✓				
Net				✓	
Seine Nets		✓			
Unspecified		✓	✓		
Various	✓				
Recreational					
Diving				✓	

Gillnet		✓	✓		✓
Handline	✓	✓	✓		✓
Hook and Line		✓		✓	
Spearfishing	✓				

Management Methods					
	New South Wales	South Australia	Tasmania	Victoria	Western Australia
Charter					
Bag limits				✓	
Gear restrictions				✓	
Licence				✓	
Size limit				✓	
Spatial restrictions				✓	
Commercial					
Effort limits		✓		✓	
Fishing gear and method restrictions	✓				
Gear restrictions		✓		✓	✓
Licence				✓	
Limited entry	✓	✓		✓	✓
Size limit	✓	✓		✓	✓
Spatial closures	✓	✓		✓	✓
Temporal closures	✓	✓			
Recreational					
Bag and possession limits			✓		
Bag limits	✓	✓	✓	✓	✓
Gear restrictions		✓	✓	✓	✓
In possession limits	✓				
Licence	✓		✓	✓	
Licence (boat-based sector)					✓
Possession limit					✓
Size limit	✓	✓		✓	✓
Spatial	✓	✓		✓	✓

closures					
Temporal closures		✓			

Catch					
	New South Wales	**South Australia**	**Tasmania**	**Victoria**	**Western Australia**
Commercial	9.867 t	0.6408 t	0 t	34.3905 t	57.529 t
Indigenous	Unknown	Unknown	Unknown	Unknown (No catch under permit)	Unknown
Recreational	Unknown	4.5 t (in 2013–14)	16.7 t (in 2012–13)	Unknown	4 t (2017/18)

New South Wales – Recreational (catch) Murphy et al. [2020].

New South Wales – https://www.dpi.nsw.gov.au/fishing/aboriginal-fishing.

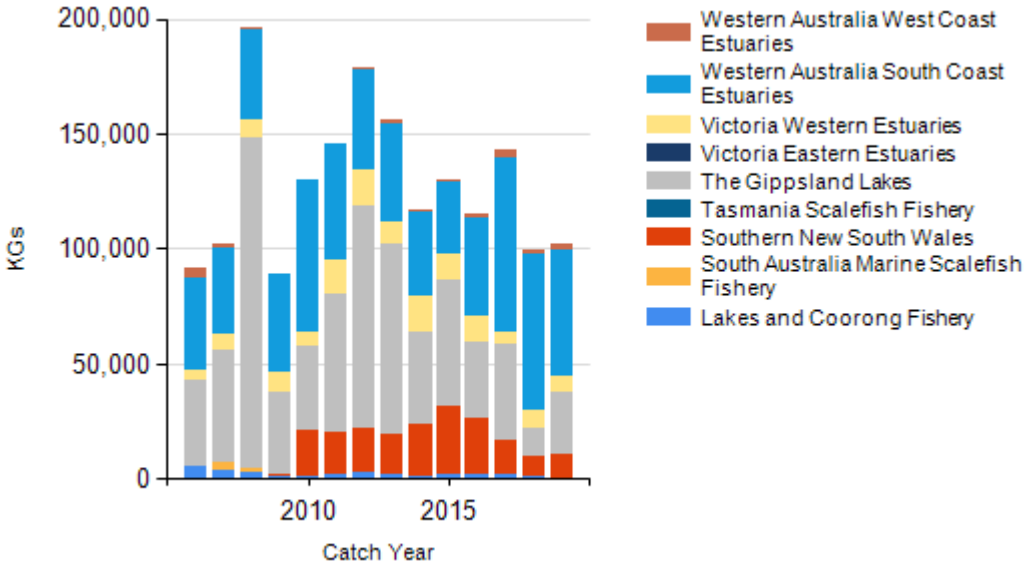
Victoria – Indigenous (Management Methods) A person who identifies as Aboriginal or Torres Strait Islander is exempt from the need to obtain a Victorian recreational fishing licence, provided they comply with all other rules that apply to recreational fishers, including rules on equipment, catch limits, size limits and restricted areas. Traditional (non-commercial) fishing activities that are carried out by members of a traditional owner group entity under an agreement pursuant to Victoria's *Traditional Owner Settlement Act 2010* are also exempt from the need to hold a recreational fishing licence, subject to any conditions outlined in the agreement. Native title holders are also exempt from the need to obtain a recreational fishing licence under the provisions of the Commonwealth's *Native Title Act 1993*.

Tasmania – Recreational (management methods) In Tasmania, a recreational licence is required for fishers using dropline or longline gear, along with nets, such as gillnet or beach seine. The species is subject to a minimum size limit of 250 mm. A bag limit of five individuals and a possession limit of ten individuals is in place for recreational fishers fishing in marine waters.

Tasmania – Indigenous (management methods) In Tasmania, Indigenous persons engaged in traditional fishing activities in marine waters are exempt from holding recreational fishing licences, but must comply with all other fisheries rules as if they were licensed. If using pots, rings, set lines or gillnets, Indigenous fishers must obtain a unique identifying code (UIC). The policy document "Recognition of Aboriginal Fishing Activities" details application procedures for issuing a UIC.

Western Australia – Recreational (Management methods) In Western Australia a recreational fishing licence is only required for fishing from a boat. Black Bream are subjected to a minimum size limit of 250 mm TL and a bag limit of six(of which only two fish may be over 400 mm TL if fishing in the Swan and Canning rivers).

CATCH CHART



Commercial catch of Black Bream - note confidential catch not shown

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