

# Murray Cod (2020)

*Maccullochella peelii*



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## STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Australian Capital Territory	Australian Capital Territory	Depleted	Fishery-independent surveys
Queensland	Queensland	Undefined	Fishery-independent surveys, recreational fishing surveys
New South Wales	New South Wales	Undefined	Historical fishery catch, fishery-independent surveys, recreational fishing surveys
Victoria	Victoria	Recovering	Historical fishery catch, fishery-independent surveys, recreational fishing surveys
South Australia	South Australia	Depleted	Historical fishery catch, fishery-independent surveys

## STOCK STRUCTURE

Murray Cod is the largest solely freshwater fish in Australia. It occurs throughout most of the Murray–Darling system, except for the upper reaches of some tributaries in Victoria, the Australian Capital Territory, Queensland and southern New South Wales. Throughout most of its distribution in the Murray–Darling Basin there is one large genetically panmictic biological stock [Rourke et al. 2011]. However, genetically distinct populations have been identified in the more isolated Lachlan, Macquarie and Gwydir catchments [Rourke et al. 2011]. This separation appears to be the result of restricted gene flow due to the isolated nature of these catchments [Rourke et al. 2011]. Although genetic studies suggest the existence of one biological stock, there are differences in available information, environmental conditions and management arrangements and objectives across the species' distribution in various jurisdictions. Further,

genetic homogeneity could be a result of low levels of genetic interchange between functionally discrete stocks, and thus it may not be the best approach for stock discrimination to inform management. Therefore, a jurisdictional approach is adopted, which provides the clearest possible view of biological status given current knowledge for Murray Cod.

Murray Cod is the most economically and culturally important freshwater fish species in the Murray–Darling Basin. It supports substantial recreational fisheries and is an important fish to indigenous Australians [Koehn 2005, Lintermans and Phillips 2005]. Since European settlement, populations have declined as a result of a number of threats, including changes to the natural flow regime, habitat loss, barriers to movement, cold-water releases from dams, diseases, and over-harvesting [Rowlands 1989, Koehn 2005, Lintermans and Phillips 2005, National Murray Cod Recovery Team 2010a, 2010b]. Commercial fishing for this species is currently prohibited in the Murray–Darling Basin but recreational fishing is popular and widespread. Take by recreational fishers may influence population structure [Nicol et al. 2004, West et al. 2016, Murphy et al. 2020]. Murray Cod is listed as ‘Vulnerable’ under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth) but a recent International Union for the Conservation of Nature Red List assessment found the species to be no longer threatened and listed it as of least concern [Gilligan et al. 2019]. A national recovery plan has been developed for this species (National Murray Cod Recovery Team 2010a) although this Plan is now 10 years old and needs updating. A cross-jurisdictional Murray Cod Fishery Management Group was established in 2010 to improve collaboration on, and alignment of, recreational fisheries management and research for the species across the Basin [National Murray Cod Recovery Team 2010a, 2010b]. Management strategies, including the closure of commercial fisheries, harvest restrictions, restocking, and seasonal closures to protect spawning populations, have resulted in evidence of recovery in some areas [Harris and Gehrke 1997, Lintermans et al. 2005, Davies et al. 2008, 2012, Barwick et al. 2014]. However, there are still concerns for Murray Cod stocks throughout portions of their range, particularly due to recent impacts by drought, fires and fish kills, and thus basin-wide recovery may take decades.

Here, assessment of stock status is presented at the jurisdictional level—Australian Capital Territory, Queensland, New South Wales, South Australia and Victoria.

## STOCK STATUS

**Australian Capital Territory** Murray Cod have never been commercially harvested in the Australian Capital Territory, but have long been targeted recreationally both in the Murrumbidgee and Molonglo Rivers and in urban lakes. Murray Cod numbers are generally considered to be much lower than pre-European levels. The species declined considerably before 1980, with major declines occurring in the 1960s [Greenham 1981]. A recent compilation of historic newspaper reports of fish catches in the Canberra region identified abundant historical catches compared to present [Kaminskas 2015]. The Australian Capital Territory riverine population is separated from downstream populations by the impassable barrier presented by Burrinjuck Dam. Burrinjuck was constructed in 1928 and has never had a fishway to facilitate connection of upstream and downstream populations, hence populations upstream are a separate management unit. A biennial fish monitoring program in the Murrumbidgee River from 1994–present found little change in adult abundance (Linterman 2000, Malam et al. in prep). Since 2010, boat electrofishing surveys have detected regular natural recruitment and some increases in abundance and range, but mean CPUE of adult fish has remained below 0.2 fish per shot through this period [Malam et al. in prep]. This suggests Murray Cod biomass remains well below the pre-European levels.

A recreational fishing survey in 1999–2001 of the Murrumbidgee River in the Australian Capital Territory identified that Murray Cod were the equal highest species targeted, along with Golden Perch (*Macquaria ambigua*) [McGovern and Lintermans 2003]. In 2016 a survey of Australian Capital Territory and region residents identified Murray Cod were targeted by 63 per cent of anglers, with 29 per cent reporting captures in the past 12 months and only two per cent of anglers reporting harvest [Schirmer and Mylek 2016]. Recent research has

demonstrated the potential for anglers to contribute to stock assessment of Murray Cod in the Australian Capital Territory [Ross-Magee 2018].

Stocking occurs in a number of urban lakes to provide recreational fishing opportunities, as well as to provide an apex predator for these artificial systems [Australian Capital Territory Government 2015, Lintermans 2000]. Approximately 705 500 fingerlings have been stocked into urban lakes since the program began in 1980 [Australian Capital Territory Government 2015], with an average of 25 000 stocked annually since 2000. Stocked populations in urban lakes continue to provide localised and well-regarded recreational fisheries, but are not expected to be self-sustaining. There have been no stockings of the species in riverine environments in the Australian Capital Territory though downstream displacement from the urban lakes occurs and regular natural recruitment is recorded in the Murrumbidgee River [Australian Capital Territory Government 2015]. In recent years range expansion has been observed in the upper Murrumbidgee, with adults and juveniles being regularly recorded upstream of the Australian Capital Territory border. This expansion potentially originated from stocking by the New South Wales Department of Primary Industries upstream of the Australian Capital Territory since 2008. Larval genetic investigations have identified hybridisation between Murray Cod and Trout Cod (*Maccullochella macquariensis*) in the Australian Capital Territory [Couch et al. 2016]. This hybridisation is more likely to be of conservation concern for stocks of the endangered Trout Cod, than Murray Cod. However, the long-term effects of introgressive hybridisation on either species is unknown.

Management measures (size, gear and bag limits, closed seasons) as well as habitat enhancement projects have been implemented. Area closures of no fishing or no take for Murray Cod cover approximately 25% of the Murrumbidgee River in the Australian Capital Territory. Additionally, a Murray Cod Conservation Plan was produced in 2017 and reporting metrics for the species have been included in the Conservation Effectiveness Monitoring Program for aquatic and riparian ecosystems [Malam et. al. in prep]. These measures have not yet resulted in significant measurable improvements in biomass, based on the monitoring results, across the riverine environment.

On the basis of the evidence provided above, Murray Cod in the Australian Capital Territory is classified as a **depleted stock**.

## **New South Wales**

The abundance of Murray Cod is considered to be much-reduced compared to that of pre-European settlement levels in New South Wales [Harris and Gehrke 1997]. Concerns were raised as early as 1880 regarding declines in abundance, based largely on falling catch rates within the commercial fishery [Rowland 1989]. While fishing effort remained at around the same level, annual commercial catches declined from a high in the mid-1950s of around 140 tonnes (t), to less than 35 t by the mid-1960s, indicating a substantial decline in catch per unit effort [Rowland 1989]. The annual catch remained below 35 t in the majority of years until the commercial fishery was closed in New South Wales in 2001 [Rowland 1989].

The recreational fishery for Murray Cod has continued to grow in New South Wales and encompasses two main sectors; impoundment fisheries and riverine fisheries. The 2000–01 national survey estimated that around 161 000 Murray Cod were caught annually by New South Wales residents across New South Wales, with around 26 per cent of these fish harvested [West et al. 2016] and the rest released. A more recent survey in 2013–14 found that angler effort had increased since 2000–01, but total catch remained similar (165 557 fish) [West et al. 2016]. However, harvest had declined considerably, from 26 per cent of the total catch in 2000–01, to 13 per cent in 2013–14. A targeted creel survey undertaken in 2012–13 across 76 km of the Murrumbidgee River estimated annual catches of Murray Cod in this area to be as high as 32 000 fish, with only around five per cent retained [Forbes et al. 2015b]. The results of these more recent surveys suggest that the recreational sector is increasingly targeting the

species, but are also more commonly practising catch-and-release.

A number of management actions have been implemented to facilitate species recovery across New South Wales. This has included restocking, with ~14 million hatchery-reared fry and fingerlings released into many of the State's impoundments and rivers since the late-1970s. Until recently, little was known of the efficacy of these stockings, and it was largely assumed that they were a primary contributor to the recovery of the species in many river systems. An assessment of stocking success was recently undertaken in two rivers in the southern Murray–Darling Basin and one impoundment in north-western New South Wales [Forbes et al. 2015a]. There was a comparatively low proportion of stocked Murray Cod among those sampled in the Murray (seven per cent) and Murrumbidgee (15 per cent) rivers [Forbes et al. 2015a]. In contrast, stocked Murray Cod comprised almost the entire population in Copeton Dam (94 per cent) [Forbes et al. 2015a]. These data suggest that while stocking is helping to enhance Murray Cod populations in impoundments, natural recruitment, potentially driven by other management actions such as closed seasons, size-and-bag regulations and habitat rehabilitation, are also likely contributing to population recovery in rivers. In 2014, in line with Victoria, a State-wide harvest slot of 550–750 mm was introduced, with the daily bag limit of two and possession limit of four, remaining the same. Recent targeted surveys in the Border Rivers region of northern New South Wales have shown a somewhat negative outcome in the overall population structure of Murray Cod in the two rivers sampled pre- and post-slot, with truncation evident at 500–550 mm and no discernible increase in the number of fish above 750 mm.

Anecdotal reports and scientific surveys suggest that Murray Cod numbers are increasing in at least some New South Wales rivers, whilst in others, numbers appear to be stable or may be declining [Rowland 2013, Barwick et al. 2014]. Based on a long-term monitoring program over 17 years at 27 sites across New South Wales, it has been suggested, in those areas experiencing increases, that it could be as high as 740 per cent [Rowland 2013]. However, to-date there has been insufficient research undertaken to validate these estimates, and there has been no or little attempt to estimate total abundance or biomass at the local scale or across the State as a whole. The potential for markedly different demographic trajectories at the catchment scale (or finer), together with a paucity of recent (i.e. within the last five years) data to both validate these trends and estimate recruitment and fishing mortality mean that insufficient information is available to confidently classify the status of this stock.

On the basis of the evidence provided above, Murray Cod in New South Wales is classified as an **undefined stock**.

**Queensland** Anecdotal evidence provided by recreational anglers indicates substantial declines in Murray Cod populations in Queensland. It is generally accepted that native fish populations in the Murray–Darling Basin's rivers have declined to an estimated 10 per cent of the levels before European settlement [Murray–Darling Basin Commission 2004]. The decline is thought to have resulted from a combination of flow regulation, habitat degradation, reduced water quality, barriers to movement, introduced species and overexploitation from illegal fishing [Murray–Darling Basin Commission 2004].

Approximately 100 000 fingerlings have been stocked each year throughout the species' range in Queensland since the mid-1980s. A large proportion of these fingerlings are stocked into impounded waters, where natural recruitment levels are low. The Murray–Darling Basin Authority Sustainable Rivers Audit, fishery-independent monitoring and anecdotal evidence from recreational fishers suggest an increase in numbers in the Border Rivers region, which may be attributed to extensive stocking in this catchment [Butler et al. unpublished data]. The audit and other fishery-independent monitoring have been undertaken in several other rivers and catchments in Queensland. However, the lack of consistency in sampling methodologies and the low numbers of Murray

Cod recorded during the monitoring makes accurate biomass estimates difficult.

The Queensland area of the Murray–Darling Basin has never supported a commercial fishery, although there is a recreational fishery throughout the northern Murray–Darling catchment. The species is mostly targeted within the Dumaresq, Macintyre, Moonie, Condamine, Balonne and Warrego Rivers and their tributaries; fish are also occasionally reported from the Paroo River [Taylor et al. 2012]. A survey of recreational participation and catch was conducted in 2014 [Webley et al. 2015], but harvest estimates for Murray Cod were considered to be unreliable. A recent study in the Border Rivers region suggests that harvest of this species remains high, with most fish being removed from the population within two years of reaching legal size [Butler et al. unpublished data]. While this suggests that fishing pressure is high, fishing mortality cannot be accurately estimated based on existing data. Therefore, there is insufficient information available to confidently classify the status of this stock.

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

## South Australia

In South Australia, previous stock assessments in the Murray River and Lower Lakes noted a significant decline in annual commercial landings from 140 t in the late-1950s, to less than 10 t in the 1970s–80s [Ye et al. 2000, Ye and Zampatti 2007]. Following a moratorium on commercial and recreational fishing from January 1990–December 1993, combined with high flows in the early-1990s, annual catch increased gradually to 28.5 t in 2001–02. The Murray Cod commercial fishery ceased in the South Australian Murray River in July 2003 following restructuring of inland native fisheries. Although Murray Cod is still a ‘permitted species’ to be taken in the commercial Lakes and Coorong Fishery, there is currently a temporary closure (implemented since 2010 under the Fisheries Management Act 2007 [South Australia]) that prohibits commercial harvest. Unlike other states/jurisdictions, Murray Cod had not historically been stocked in the South Australian reaches of the Murray River [Gillanders and Ye 2011]. Since 2016, however, the Department of Primary Industries and Regions and RecFish South Australia, have released about 300 000 fingerlings into different river reaches in the South Australian lower Murray.

Murray Cod is a popular recreational fish species in South Australian inland waters. The 2007–08 South Australian Recreational Fishing Survey estimated that 507 Murray Cod (around 2.1 t) were harvested from the lower Murray River [Jones 2009]. No Murray Cod were reported as caught in the Lower Lakes region. There was little change in the total number of fish caught since the 2000–01 survey [Henry and Lyle 2003], but release rates increased from 48 per cent in 2000–01 to 73 per cent in 2007–08 [Jones 2009], potentially reducing recreational fishing mortality. The 2007–08 figures should only be considered indicative because the precision levels of all estimates were low as a result of low numbers of participants reporting Murray Cod catch, as well as low numbers of Murray Cod harvested. There was a moratorium on recreational fishing for Murray Cod in South Australia in 2009 and 2010. Since 2011, a catch-and-release fishery has been permitted for this species in the South Australian Murray River during the open season, except for a closure area in Chowilla. The most recent South Australian Recreational Fishing Survey in 2013–14 [Giri and Hall 2015] did not report any catch of this species in the lower Murray River.

In the absence of a commercial fishery, or dedicated fishery-independent monitoring programs, the primary measures for biomass and fishing mortality are total catch and catch per unit effort (CPUE) from three long-term (8–11 year) fish assemblage monitoring projects in the lower Murray River from 2002–13 [Zampatti et al. 2014]. During this period, CPUE data from electrofishing and drum netting indicated that relative abundance was low. Length-frequency distributions indicated that fish collected in main channel habitats of the lower Murray River were predominantly large (more than 800 mm total length) and represented a broad range of age classes (8–46 years). Murray Cod recruitment

was minimal in the predominantly still-water main channel habitats during the drought in 2001–10, despite some recruitment in the flowing water habitats of the Chowilla anabranch system [Zampatti et al. 2014]. Nevertheless, some juvenile fish (less than 500 mm total length) were collected in main channel habitats in years following increases in river flow (for example, 2010–11 and 2011–12) [Zampatti et al. 2014]. From 2014–20, some annual recruitment was detected in the main channel of the lower Murray River and these cohorts seem to have persisted in the population during subsequent years [Ye et al. 2021]. Electrofishing CPUE data from 2014–20 indicate similar, albeit slightly increased, abundance of Murray Cod in the main channel of the lower Murray River, relative to 2002–13, reflecting recent recruitment [Ye et al. 2021]. Overall, the data provide an indication of a fairly stable adult population, and periodic successful recruitment, but no evidence of any substantial increase in abundance towards historical levels prior to the mid-1960s.

The above evidence indicates that the biomass of this stock is depleted and that recruitment is likely to be impaired. Current fishing mortality has been reduced by management to a level that should allow the stock to recover with river flow and habitat rehabilitation; however, measurable improvements are yet to be detected.

On the basis of the evidence provided above, Murray Cod in South Australia is classified as a **depleted stock**.

## Victoria

In Victoria, current Murray Cod numbers are much lower than pre-European levels [Cadwallader and Gooley 1984, Rowland 2005]. During the 19th century, Murray Cod were considered abundant in the Loddon, Campaspe and Goulburn Rivers [Wilson 1857], yet by the middle of the 20th century, populations in these rivers had declined [Cadwallader 1977]. Commercial catches were highest between 1954–55 and 1960–61, at approximately 10–15 t per year, but reduced to about 1.5 t per year on average over the next 10 years and were negligible thereafter – a trend attributed to environmental degradation, river modification works, agricultural, urban, and industrial pollution, and overfishing [Ingram and De Silva 2004]. Prohibition of commercial netting post-1999, recreational bag and size limits, and prohibition of set lines, together with considerable stocking of hatchery-reared fish have contributed to some recovery in some rivers. However, no consistent estimates of long-term trends in harvest by anglers or population abundance have been recorded. Currently, there is no information on fishing pressure, biomass and size composition for Murray Cod in impoundments, where populations are largely sustained by stocking rather than natural recruitment. Consequently, this assessment focuses on Murray Cod in Victorian rivers only.

State-wide assessment of Murray Cod abundance was based on catch per unit effort (CPUE) from electrofishing surveys in six indicator rivers (Broken Creek and River, Campaspe River, Goulburn River, Gunbower Creek, Loddon River and Ovens River). Together these rivers represent approximately 44 per cent of the habitat known to have been historically occupied by Murray Cod in Victoria [Murray–Darling Basin Authority 2021]. To provide a benchmark for assessing changes in Murray Cod biomass over recent years (2015 to present), CPUE from these surveys was compared with a reference-level CPUE, calculated as the average CPUE over the period 1990–2015.

Although electrofishing surveys have been infrequent and irregular, since about 2014–2015 CPUE appears to have increased relative to the reference period in most indicator rivers (except the Loddon River) [Conron et al. 2020]. Prior to this, CPUE trends showed abundance was declining in the Broken and Kiewa Rivers [Davies et al. 2012]. During the period 2014–2019, CPUE in the Broken Creek and River, Campaspe River, Goulburn River, Gunbower Creek and Ovens River has shown two to five-fold increases and has been above the reference level [Conron et al. 2020]. CPUE in the Loddon River has remained below the

reference level for most of the last decade [Conron et al. 2020].

Murray Cod have been stocked into Victorian rivers since 1979, enhancing recruitment into these systems. In 2019, 1.85 million Murray Cod were stocked into the state's water bodies, including the Ovens, Goulburn, and Loddon Rivers. Murray Cod less than one year old were present in all rivers indicating either recent natural recruitment (Ovens River) or stocking of hatchery-reared fish [Conron et al. 2020]. Anecdotal reports from anglers also indicate increased recreational catches from waters where stocking has occurred. However, the extent of the contribution made by stocked fish to population trends across the river systems described above is variable and uncertain. For example, although the Broken Creek and River and Goulburn River are stocked annually, otolith microchemistry analyses or presence/absence of hatchery calcein markers showed that most Murray Cod sampled from these rivers were naturally spawned [Tonkin et al. 2019]. These results indicate that CPUE increases in Broken Creek and River, and in the Goulburn River, are primarily due to natural recruitment rather than stocking. In the Ovens River, the CPUE increase is due solely to natural recruitment as no stocking has occurred in that waterway.

The last State-wide recreational catch survey, conducted two decades ago in 2000–01, estimated that 11 943 Murray Cod were harvested, equating to around 27.4 t [Henry and Lyle 2003]. Subsequently, between 2006 and 2008, creel surveys conducted on selected river reaches including the Goulburn, Ovens, Loddon and Murray Rivers [Fulton 2011] estimated total catch at more than 98 000 Murray Cod, of which just over 6 500 were harvested. There is no more recent information on recreational harvest or effort at state level.

Numerous measures are implemented to limit fishing mortality. Murray Cod are protected in Victorian rivers by a fishing slot limit, with a minimum size limit of 55 cm and a maximum size limit of 75 cm between which fish may be legally retained. A closed season applies from 1 September to 30 November inclusive [Victorian Fisheries Authority 2021]. In recent years most Murray Cod were below the minimum legal size limit of the fishing slot [Conron et al. 2020]; mature fish (> 60 cm) were present in all sampled rivers, but in low proportions in most rivers other than the Gunbower River, where 16 per cent of Murray Cod were larger than 60 cm, down from 36 per cent in 2014.

The increasing CPUE trends in five of six indicator rivers suggest that recovery of Murray Cod abundance and biomass has been occurring since at least 2014. Natural recruitment, substantial stocking of hatchery-reared Murray Cod into Victorian waters during the past two decades, and current fishing regulations appear to have facilitated some degree of stock recovery in most rivers. However, there are still low numbers of large mature fish in most rivers.

The above evidence indicates that the biomass of this stock is likely to be depleted and that recruitment is likely to be impaired. However, over the past five years, electrofishing CPUE and studies of the relative contributions made by stocked fish or natural recruitment to the populations indicate that the stock is recovering. The above evidence also indicates that the current level of fishing mortality should allow the stock to continue to recover from its recruitment impaired state.

On the basis of the evidence provided above, Murray Cod in Victoria is classified as a **recovering stock**.

## BIOLOGY

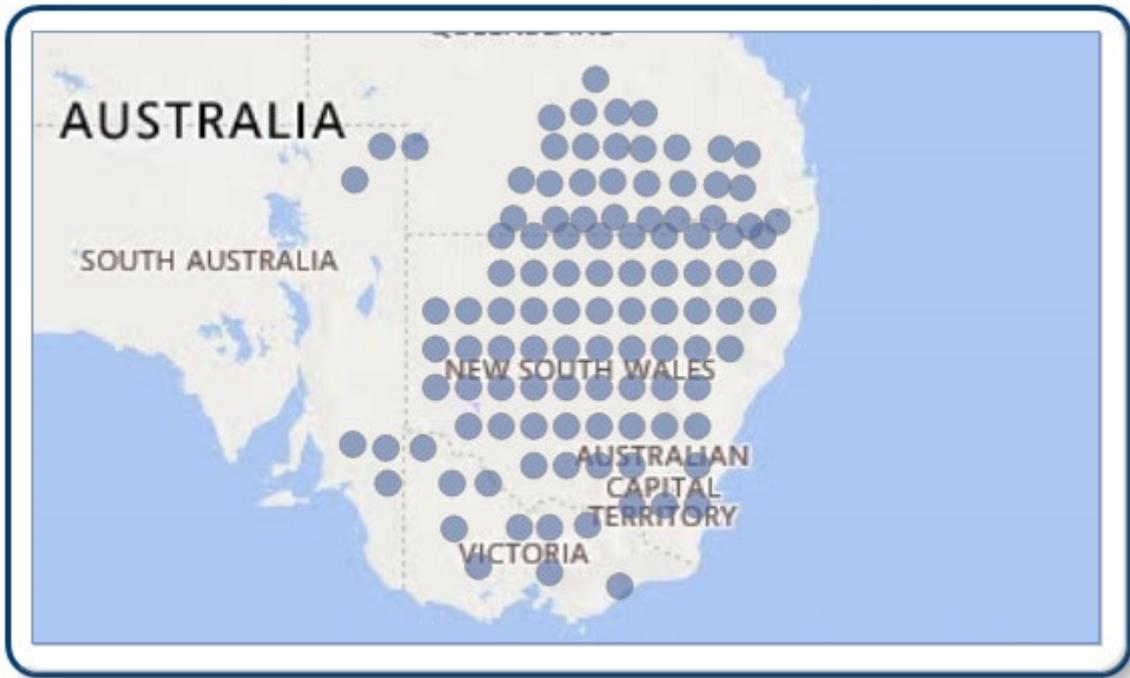
**Murray Cod biology** Information on Murray Cod longevity and size and age at maturity is provided in the Biology Table below [Whitley 1955, Pollard 1966, Lake 1967, Rowland 1985, Anderson et al. 1992, Gooley et al. 1995, Rowland 1998a, King et al. 2009, Butler et al. unpublished data].

Additional summary points on Murray Cod biology and ecology are:

- Murray Cod are a demersal species [Koehn 2009a] that prefer the main channel of rivers, flowing anabranches and creeks [Humphries et al. 1999, King 2004, Koehn 2009b, Leigh and Zampatti 2013], within which both juveniles and adults have an affinity for hydraulically diverse lotic (i.e. flowing) habitats with abundant physical habitat cover, particularly large woody debris [Boys and Thoms 2006; Jones and Stuart 2007; Koehn 2009b; Koehn and Nicol 2013]. Habitat alteration, such as removal of snags from the main channel and anabranches, and loss of fast-flowing water habitats due to river regulation, water extraction or drought will decrease habitat availability and likely have negative impacts on Murray Cod populations.
- Murray Cod spawn in spring at water temperatures > 15°C, with adhesive eggs laid in a nest that is guarded until the larvae leave and drift in the water column [Rowland 1998b, Humphries 2005, Koehn and Harrington 2005, 2006, Koehn et al. 2020].
- Enhanced recruitment of Murray Cod in lowland areas has been linked to increased river flow or flooding [King et al. 2009, Ye and Zampatti 2007]. The exact mechanism driving recruitment is unknown, but it is likely to be linked to flowing water environments [Zampatti et al. 2014] and potentially an increase in food resources for larvae and juveniles following high river flows and floodplain inundation [King et al. 2009].
- In lowland rivers, adult Murray Cod can undertake small- to large-scale movements (up to 120 km) from their home sites within the main river channel and anabranches, and between these habitats [Koehn et al. 2009, Leigh and Zampatti 2013, Koehn and Nicol 2016]. Lateral and longitudinal disconnection (for example, by structures or reduced flow) will alter the movement patterns of the species [Carpenter-Bundoo et al. 2020]. In upland rivers, movements are likely to be limited by natural barriers such as gorges and waterfalls.
- Cold-water pollution, due to low-level releases from dams, can limit spawning and egg and larval survival [Todd et al. 2005, Sherman et al. 2007], affect juvenile growth rates [Whiterod et al. 2018], adult movement behaviour and survival of juvenile fish [Tonkin et al. 2020], and has been deemed responsible for the loss of Murray Cod populations downstream of a number of major impoundments [Lugg and Copeland 2014].
- Anoxic blackwater events in lowland environments that may occur as a result of flooding after prolonged periods of low flow, and other poor water quality events such as the 2019 fish kills in the lower Darling River, can result in considerable mortality of Murray Cod [Koehn 2005, King et al. 2012, Leigh and Zampatti 2013, Thiem et al. 2017, Vertessy et al. 2019].

Species	Longevity / Maximum Size	Maturity (50 per cent)
Murray Cod	At least 48 years, ~1800 mm TL , 83 kg	First maturity at ~4–5 years, ~400–600 mm TL for both sexes. Variable across geographic regions.

## DISTRIBUTION



Distribution of Murray Cod based on reported catch

**TABLES**

<b>Fishing methods</b>					
	<b>Australian Capital Territory</b>	<b>New South Wales</b>	<b>Queensland</b>	<b>South Australia</b>	<b>Victoria</b>
<b>Commercial</b>					
Unspecified	✓		✓	✓	✓
<b>Recreational</b>					
Hook and Line	✓	✓	✓	✓	✓

<b>Management Methods</b>					
	<b>Australian Capital Territory</b>	<b>New South Wales</b>	<b>Queensland</b>	<b>South Australia</b>	<b>Victoria</b>
<b>Charter</b>					
Bag limits			✓		
Seasonal closures			✓		
Size limit			✓		
<b>Recreational</b>					
Area closures	✓	✓		✓	
Bag and possession limits			✓		
Bag limits	✓	✓			✓
Gear restrictions					✓

Licence					✓
Seasonal closures	✓	✓	✓	✓	✓
Size limit	✓	✓	✓		✓

Catch					
	Australian Capital Territory	New South Wales	Queensland	South Australia	Victoria
Commercial		0 t	0 t	0 t	0 t
Indigenous	Unknown	Unknown	Unknown	Unknown	Unknown
Recreational	Unknown	397 941 individual Murray Cod, with ~8 per cent of these harvested.	Unknown	Unknown	Unknown

**Commercial (management methods)** Murray Cod captured by the Lakes and Coorong Fishery are currently protected under South Australian fishing regulations.

**Indigenous (management methods)** Indigenous fishers who can satisfy the requirements of the *Native Title Act 1993* (Cth) in relation to their connection to the specific area or waters may take sufficient Murray Cod to satisfy their customary, non-commercial domestic needs in South Australia and Queensland. Indigenous fishers who do not satisfy these requirements are subject to the standard recreational bag limits, size limits and closures.

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

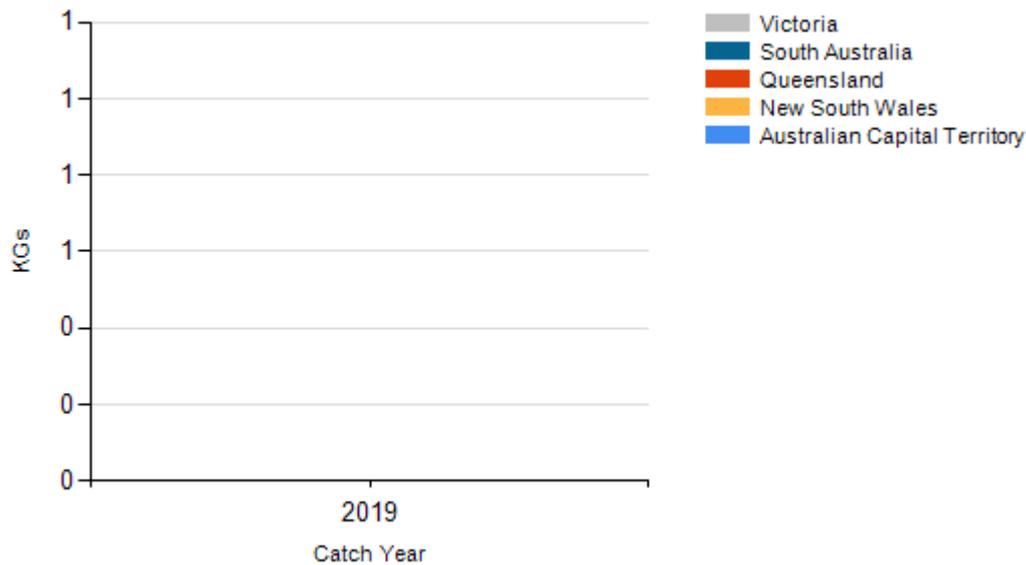
#### Victoria – Indigenous fishing

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*.

#### CATCH CHART



Commercial catch of Murray Cod- note confidential catch not shown

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