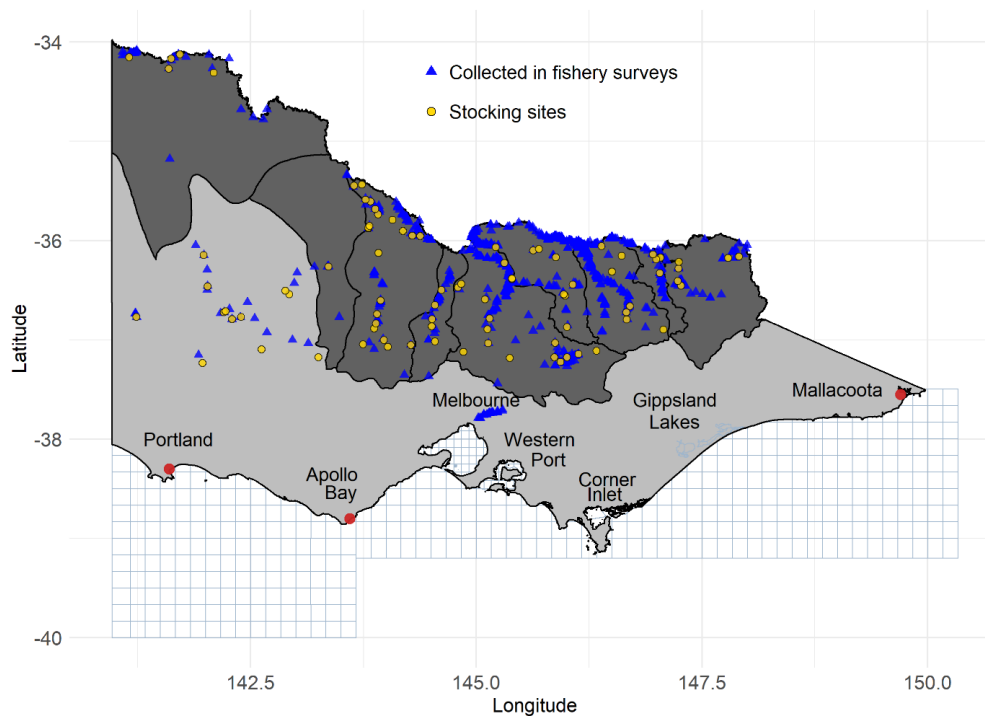


## Murray Cod (*Maccullochella peelii*)



### Stock Structure and Biology

Murray Cod occurs throughout most of the Murray–Darling system of south-eastern Australia, with the exception of the upper reaches of some tributaries. In Victoria, the Murray cod population is considered to comprise a state-wide stock that occurs in the lower sections of river catchments north of the Great Dividing Range (Figure 123). These represent one genetically panmictic biological stock (Rourke *et al.* 2011). Murray cod have been translocated into waters outside their natural range and self-sustaining populations have established in some waters, including the Wimmera and Yarra rivers (Figure 123). Hatchery-bred juvenile Murray cod are also stocked into selected waters, mainly within its natural range and mainly within impoundments, to maintain and enhance the recreational fishery (Figure 123). Murray cod completes its lifecycle exclusively within freshwater. Spawning in Victoria occurs in response to rising temperature from late-September to mid-January. Populations in rivers are mostly self-replenishing, whereas populations in impoundments are sustained by stocking. Maturity occurs at about 4–6 years at a total length (TL) of 40 cm for males and 60 cm for females, although this varies across geographic regions. There is no commercial harvest of Murray Cod in the state, but the species is grown in aquaculture operations for human consumption, and it supports a highly valued and popular recreational fishery. Recreational angling for Murray Cod is managed through strict recreational bag and slot size limits, restrictions on fishing methods such as set lines, and supplementation by stocking hatchery-bred fish.



**Figure 123** Victorian Murray Cod distribution and stocking sites.

## Assessment Summary

In the absence of consistent, long-term estimates of population abundance and harvest by anglers, the status of Victoria's Murray Cod stock and its fisheries was evaluated using:

- Nominal CPUE estimates (fish per machine minute) and length composition (TL) from fishery-independent (electrofishing) surveys of seven indicator riverine populations, three rivers (Goulburn River, Gunbower Creek and Ovens River) from the native fish report card program ([NFRS](#), accessed on 4 June 2024) and four rivers (Broken Creek, Broken River, Campaspe River and Loddon River) from Victorian Environmental Flows Monitoring Assessment Program ([VEFMAP](#), accessed on 4 June 2024). A reference period was selected from first record since 1990–2015. Data were standardised to account for electrofishing selectivity among size classes.

This assessment found:

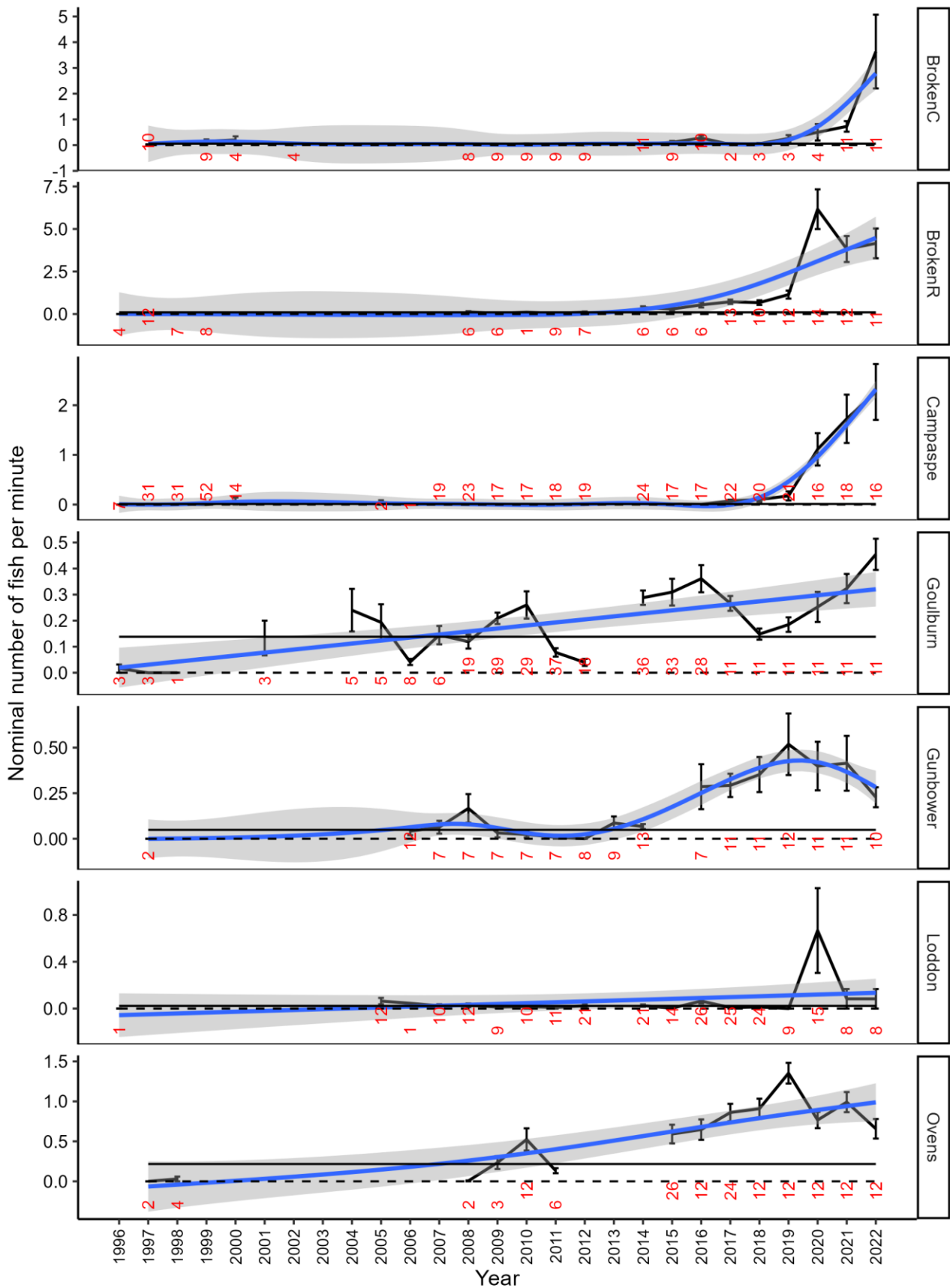
- *Fishing pressure* – commercial harvest of Murray cod in Victoria ceased in 2001. There is no recent information on recreational harvest or effort at state level.
- *Biomass* – Electro-fishing survey CPUE (as fish per machine minute) has generally increased in all indicator rivers and creeks (Figure 124). Since about 2014–2015 CPUE appears to have increased relative to the reference period in most indicator rivers (except the Loddon River). CPUE in the Broken Creek, Broken River, Campaspe River, Goulburn River, Gunbower Creek and Ovens River has shown two to five-fold increases and has been above the reference level [Bell et al. 2023]. However, CPUE in the Loddon River has remained low for most of the last decade.

Murray Cod have been stocked into Victorian rivers since 1979 to enhance populations. During the 1990s and 2000s, 0.06 – 0.4 million were stocked annually but since then the number of fish stocked has increased dramatically and in the last six years (2017-2022) 1.16 – 3.65 million were stocked annually into the state's water bodies, including six of the seven indicator rivers (excluding the Ovens River). Murray Cod less than one year old were present in most rivers in recent years indicating either natural recruitment (Ovens River) or presence of stocked of hatchery-reared fish. Although the Goulburn River is stocked annually with hatchery-bred juveniles, most of the Murray Cod sampled from these streams are naturally spawned (Tonkin *et al.* 2019), suggesting that changes in CPUE are due to natural recruitment rather than stocking. Similar proportions of stocked and naturally spawned Murray Cod have been sampled from the Gunbower Creek (Tonkin *et al.* 2019), indicating that both stocking and natural recruitment have contributed to changes in CPUE.

The increase in the Ovens River CPUE is due solely to natural recruitment as no stocking occurs in this waterway. Note that the minimum CPUE for the reference period is zero for all three rivers due to the presence of zero catch in some years.

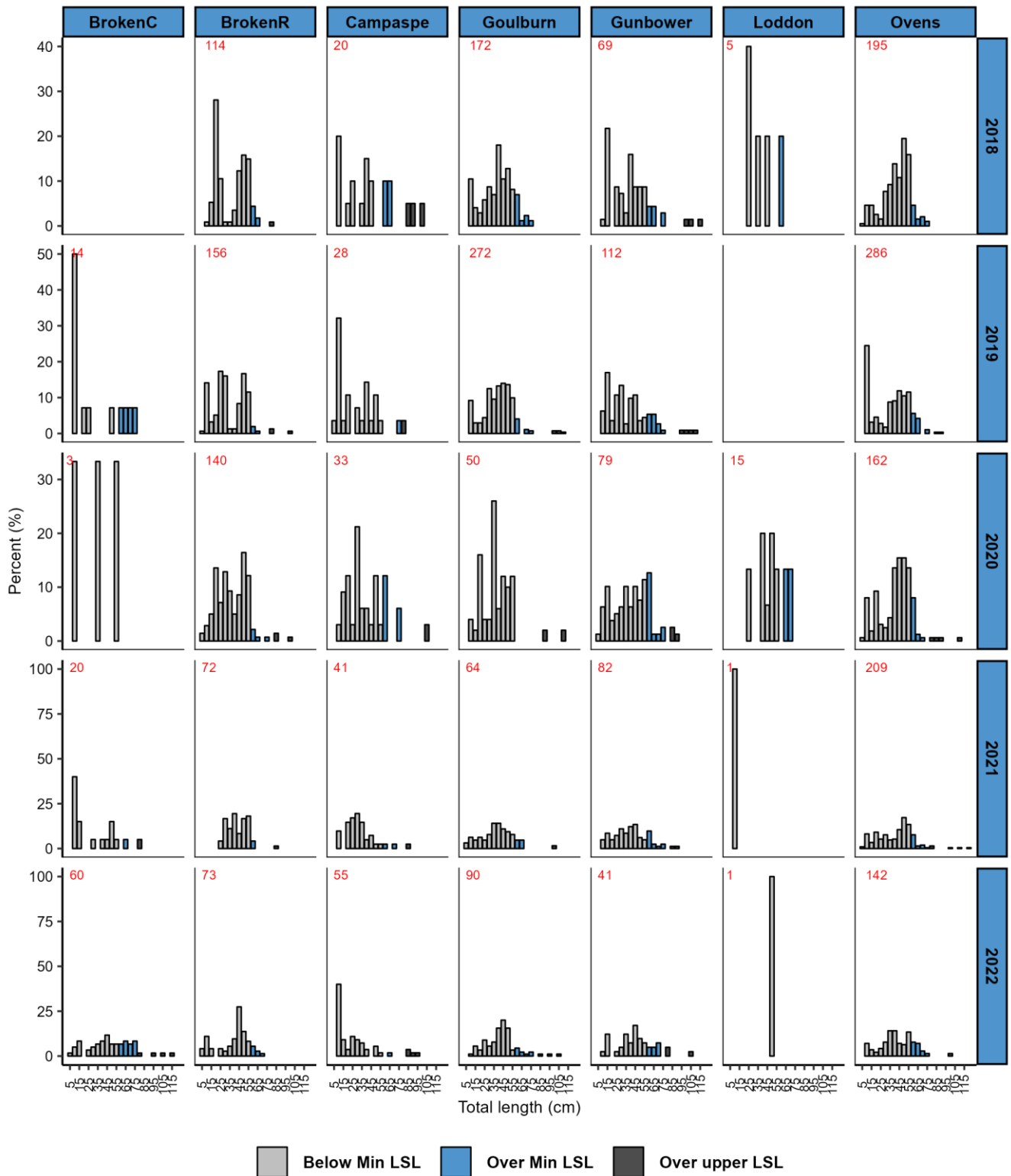
- *Length composition* – Long-term length composition data for electrofishing surveys is limited for much of the assessment (Figure 125). A wide range of fish size were observed in most waterways (except the Loddon river) but in recent years most Murray Cod measured were below the minimum legal-size limit while Murray Cod over the maximum legal-size limit were uncommon but observed in all rivers except for the Loddon River. Small fish (recruits presumed to be less than one year old and <10 cm) were present in all waterways indicating either recent natural recruitment (Ovens River) or recent stockings of hatchery-bred fish to a lesser or greater extent along with natural recruitment (other rivers) (Figure 125). Mature fish (> 55 cm) were present in six of the seven indicator rivers (except the Loddon River), but in low proportions in most rivers. Between 2015-2022, the proportion of fish that were mature was >5 per cent in six rivers, >10 per cent in most years in three rivers and exceeded 20 percent in some years in three rivers.

**Stock status summary:** As there is no consistent, long-term estimates of population abundances and recreational harvest for Murray Cod, state-wide stock status was based on assessment of seven indicator riverine populations (Broken Creek, Broken River, Campaspe River, Goulburn River, Gunbower Creek, Loddon River and Ovens River). Although information from these rivers is limited to infrequent and irregular annual electro-fishing surveys, CPUE appears to be either increasing or well above the reference line in most streams. There is no information on fishing pressure, biomass and size composition for Murray cod in impoundments, but these populations are largely sustained by stocking hatchery-bred fish rather than natural recruitment. On the basis that CPUE appears to be increasing in all seven indicator waterways the Murray Cod stock status has been assessed as recovering.



**Figure 124** Electrofishing fishery survey catch-per-unit-effort (CPUE) (nominal) for Murray cod in seven indicator rivers during 1996–2021. Horizontal black line is the mean nominal CPUE during the reference period (first record since 1990)

to 2015) and the dashed black line is the minimum CPUE within the reference period. Blue line is a generalised additive model (GAM) of the nominal CPUE trend with the shaded grey area representing the 95% confidence interval of the GAM. Red numbers along x-axis are numbers of sites surveyed each year.



**Figure 125** Length (TL) frequency histograms of Murray Cod electro-fishing survey catches from 2018–2022 for seven indicator creeks and rivers. Red numbers indicate quantity of fish measured.