

Mulloway (*Argyrosomus japonicus*)



Stock Structure and Biology

Mulloway (*Argyrosomus japonicus*) are widely distributed in temperate waters of the Atlantic, Indian and Pacific Oceans. In Australia they are distributed from Bundaberg in Queensland, throughout southern Australia, excluding Tasmania, to North West Cape in Western Australia (Kailola *et al.* 1993).

Mulloway are relatively fast growing, with males reaching 50% maturity in 5 years at 78 cm and females in 6 years at 85 cm respectively (Ferguson *et al.* 2014) but this varies spatially. Mulloway are relatively long lived, living to >40 years of age (Ferguson *et al.* 2014). Mulloway spawn in marine environments from October to January (Ferguson *et al.* 2014; Griffiths, 1996), with evidence suggesting that spawning takes place near the entrance of estuaries that subsequently act as nurseries for the juveniles (Ferguson *et al.* 2014). Juveniles remain in estuaries until they around the size of maturation, after which they predominantly inhabit coastal waters and are capable of relatively large migrations (Griffiths, 1996).

Nothing is known of the stock structure of mulloway in Victorian waters. In South Australia, otolith microchemistry and shape analysis revealed at least two distinct stocks with the central region showing similarities to both the east and western stocks, potentially representing a third stock (Ferguson *et al.*, 2011). Molecular analyses support this notion with two additional separate Australian stocks: the first in New South Wales and another in West Australia. As such, it is reasonable to assume that multiple stocks exist in Victoria with it being most likely that the western part of the state shares a stock with eastern South Australia and the eastern part of the state shares a stock with New South Wales, as is the case for a variety of other species (e.g., Australian salmon, snapper, white sharks). Preliminary results from a study in western Victoria indicated that mulloway in the Glenelg River is likely to be a component of the south-eastern South Australia population, which includes the Coorong (Lauren Brown, unpublished data).

Management/Assessment Unit

Less than 3 t of mulloway (<50 individual catches) has been landed by all Victorian commercial fisheries (predominantly Port Phillip/Western Port Bays and the Gippsland Lakes) during the last 20 years, which is insufficient to facilitate meaningful analyses. The only data with which to assess the status of Victorian mulloway stocks comes from angler diarists fishing in the Glenelg River in western Victoria. As such, this assessment will use catch rates, and length frequency, from those anglers to evaluate the status of this part of the south-eastern South Australia stock likely to also encompass other coastal and estuarine habitats in western Victoria. As a formal stock assessment has been undertaken for the south-eastern South Australian stock (Earl and Ward, 2014), albeit six years ago, this information was used to augment information from the Glenelg River.

Assessment Summary

This assessment found:

- *Fishing pressure* – Less than 3 t of mulloway have been landed in Victorian commercial fisheries in 20 years suggesting there is minimal fishing pressure from commercial fisheries. There is no quantitative information on the fishing pressure of recreational anglers targeting mulloway in Victoria. Anecdotal reports from fishers suggest there has been an increase in recreational fishing pressure in the Glenelg River in recent years, with charter operators also running guided tours in the system.

- **Biomass** – Catch rates of mulloway in the Glenelg River have been variable through time but increased from relatively low levels during the 1990s with a peak from 2012/13 to 2015/16 at over 0.5 fish per angler hour (Figure 121). This was followed by a slight reduction before increasing again in 2018/19. High recent catch rates, along with length frequency data (detailed below), indicate that there has been relatively strong recruitment in recent years. Additionally, anglers report that mulloway have been abundant and the fishery performing well. This is consistent with findings of a stock assessment undertaken in the Coorong, South Australia, in which catch rates of commercial mesh net fishers targeting mulloway has increased from the mid-1980s through until 2013/14 when the study was undertaken (Earl and Ward, 2014). Furthermore, in the Coorong, there was a distinct peak in catch rate in 2012/13 and 2013/14, which corresponds with similarly high catch rates in the Glenelg River.
- **Length compositions** – There is some evidence that a particularly strong year class entered the Glenelg River fishery in 2014 at around 40 cm TL, with individuals growing to around 55 cm over the subsequent two years (Figure 122). During 2018, a wide range of sizes were present in angler diary catches suggesting additional recruitment to the system. The lack of large individuals is not unexpected, or necessarily representative of high fishing mortality, as mature mulloway tend to inhabit oceanic waters.

Stock status summary: A wide range of sizes were observed in angler diary catches in 2018 suggesting there has been regular successful recruitment. However, this alone is insufficient to conclude that recruitment is unimpaired despite the Glenelg being only one small part of a stock that incorporates multiple estuaries and hundreds of kilometres of coastline. Additionally, there is no information available about the adult proportion of the stock and no stock assessment has been undertaken in South Australia for >5 years. While there are positive signs for the Glenelg River mulloway fishery in terms of increasing catch rates and some regular recruitment, there is currently insufficient evidence to reliably assess the status of the stock, therefore, the stock status for Victorian mulloway remains uncertain.

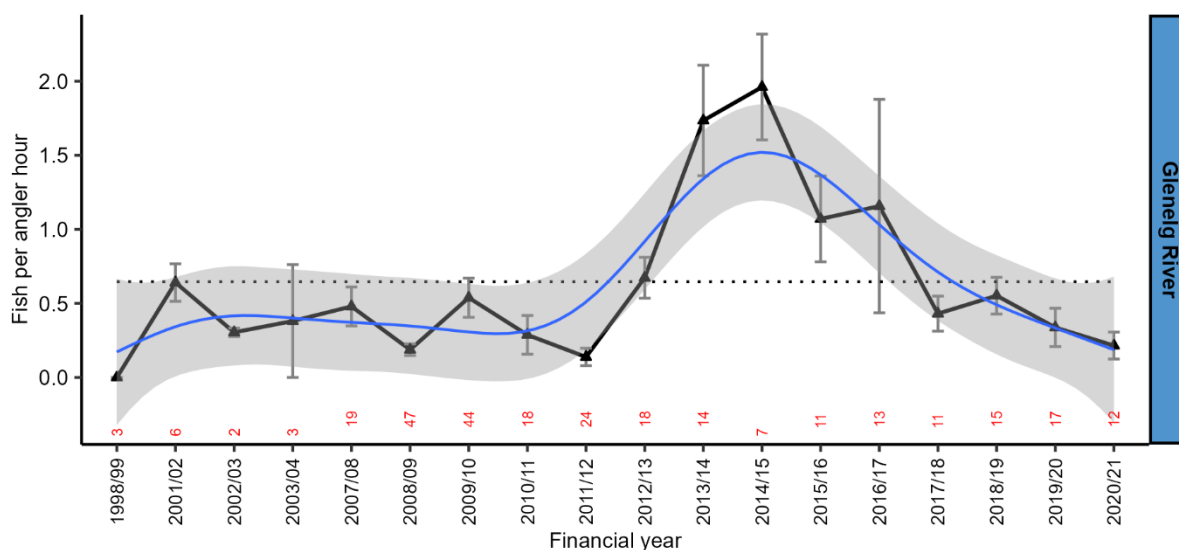
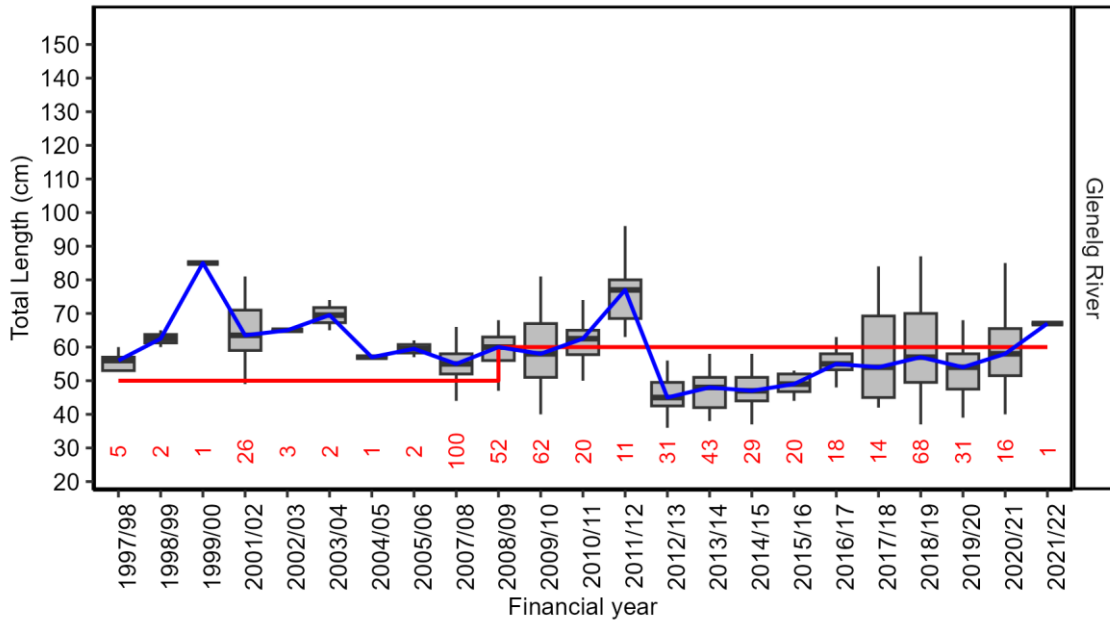


Figure 121 Mulloway nominal catch-per-unit-effort (CPUE) (\pm SE) for a) in the Glenelg River (1998/99–2020/21 financial years). Horizontal dotted black line is the mean CPUE during the reference period (1998 - 2015). Blue line is a generalised additive model (GAM) of the nominal CPUE trend with the shaded grey area representing the 95% confidence interval of the GAM.

(a)



(b)

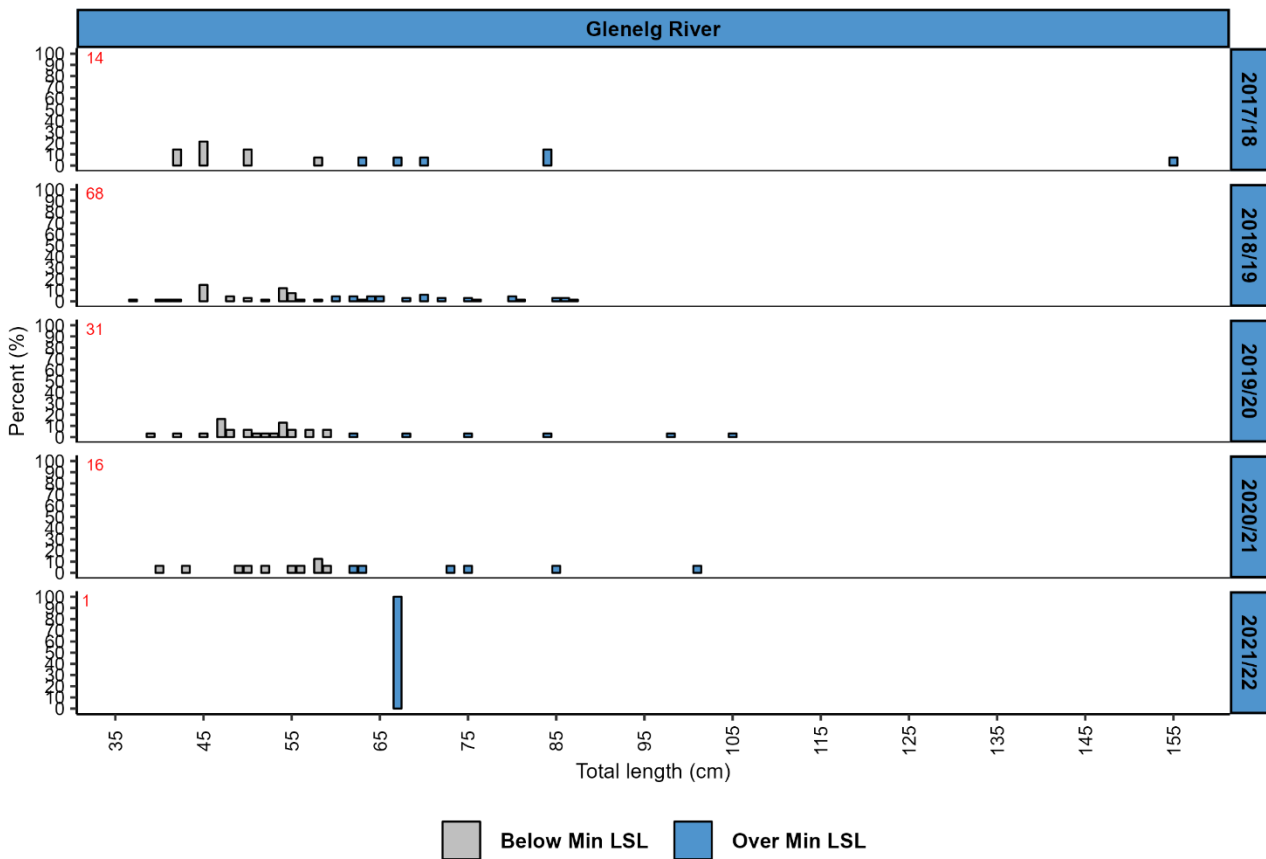


Figure 122 (a) Box-plots of Glenelg River mulloway length composition from diary anglers for financial years 1997/98-2021/22. Red numbers on x-axis indicate numbers of fish sampled. Blue line = median length, red line = LML. (b) Frequency histograms of Glenelg River mulloway length composition from diary anglers for fiscal years 2017/18-2021/22. Red numbers indicate numbers of fish measured.