



Newsletter No. 4

MULLOWAY RESEARCH ANGLER PROGRAM

Welcome to the fourth edition of the Mulloway Research Angler Program Newsletter. The purpose of this newsletter is to provide anglers with feedback on the information we are gaining from the frames you are donating to research. Thank you to all anglers for their continued involvement in the research. A reminder that the research project is on-going until the end of this year so please keep them coming. If you have any comments or questions, feel free to get in touch by email lauren.veale@ngt.org.au or phone 0439 034 390.

Donations

To date, we have had over 150 anglers involved in the program who have collectively donated almost 750 Mulloway frames. Whether you have donated only a single frame or more, your contribution has been highly valued and has assisted us in advancing our knowledge on the species.

Since the last newsletter in winter 2017, we have received well over 200 additional frames from anglers, where the large majority have come from the Glenelg River. In fact, over the past 12 months, we have received more frames from the Glenelg River than we have throughout the first three years of the research program (see Figure 1). The estuary remained open during the summer-autumn period which may have contributed to higher numbers of Mulloway in the system. A number of frames have also been donated from the Barwon, Hopkins and Moyne rivers, along with coastal waters of South East SA and Victoria. Anglers that regularly fish the Patterson and Yarra rivers have had it tough the past 12 months, which left us a little baffled as to where the Mulloway were residing. The tide has turned however, with several anglers having success over the past couple of weeks.

Figure 2 shows a breakdown of the number of frames donated in each month. While there is a clear trend for more Mulloway to be caught and donated during spring and summer, the Glenelg River has produced a relatively consistent number frames throughout the year.

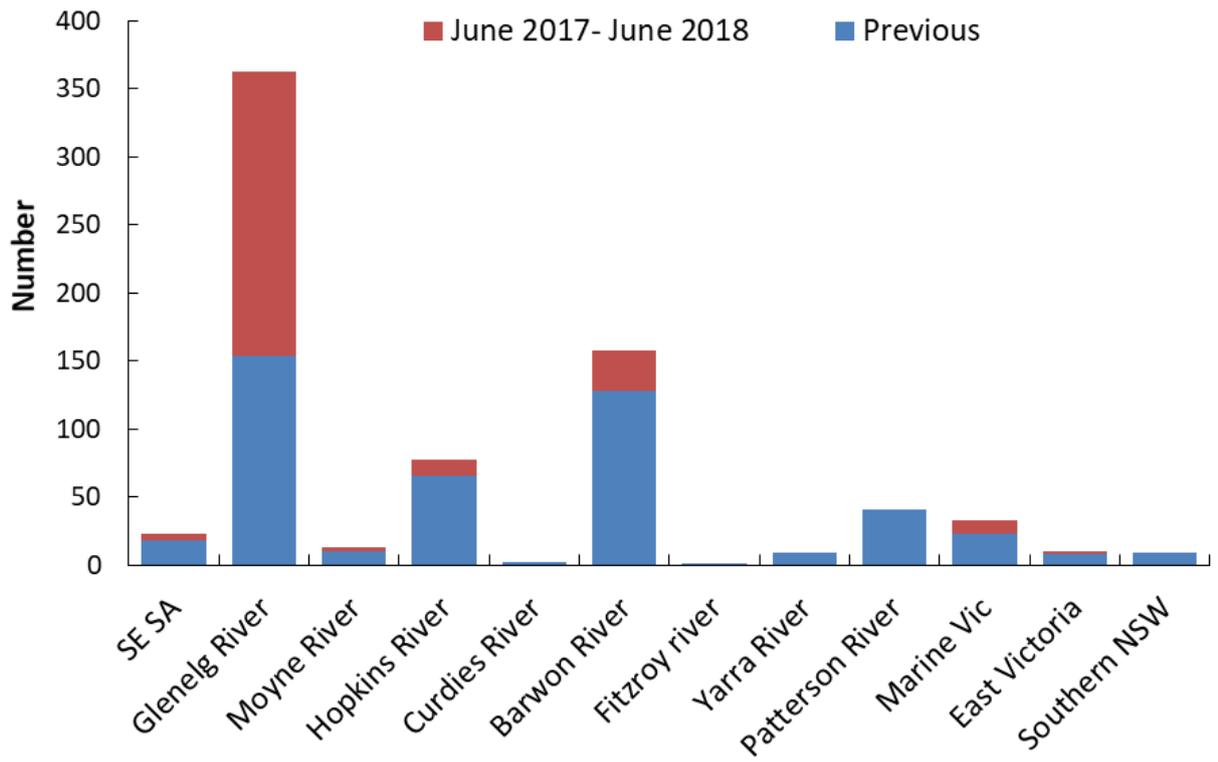


Figure 1. Number of Mulloway frames donated by recreational anglers from the various regions.

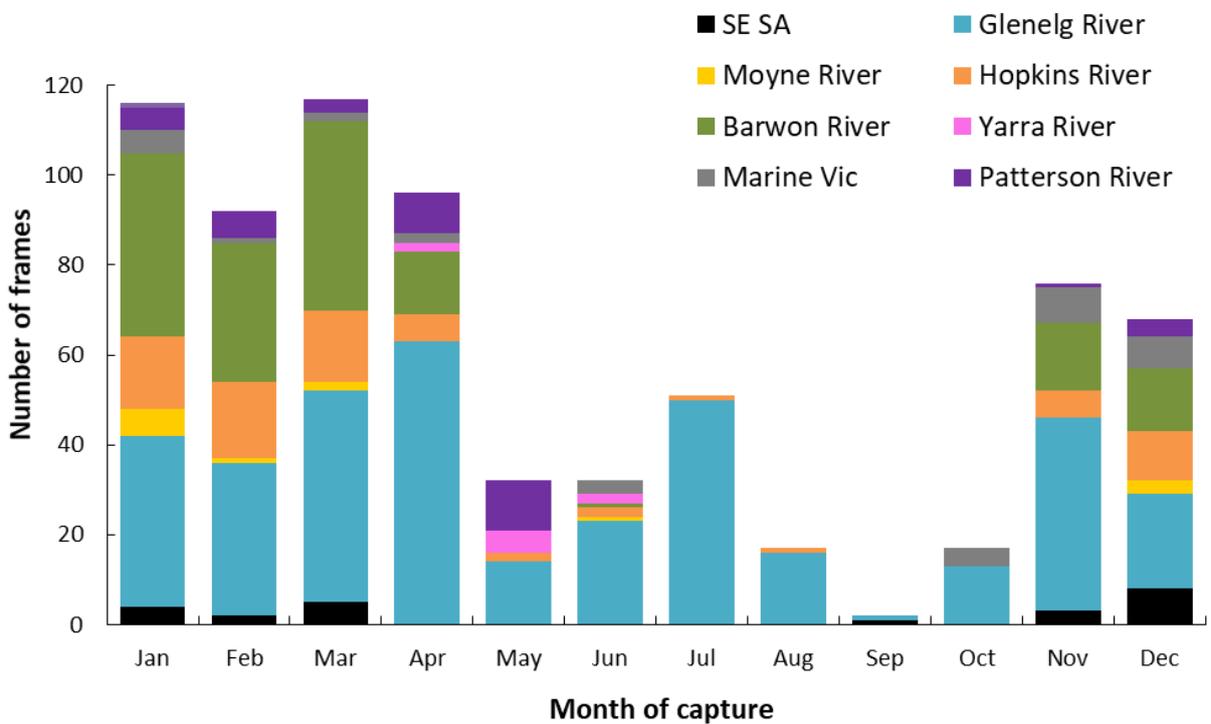


Figure 2. Numbers of Mulloway frames donated by recreational anglers in each month from the various regions.

Top overall donators

Angler	Number of frames
Glenn Mitchell	117
Paul & Buck Ford	56
Michael Gordon	51
Daryl Beavis	41
David Moulden	32
Allan & Dean Unwin	31
Ray Bertrum	27
Brad Spiden	26
Shane Murphy	21

A big thank you to our overall top donators and the 150 others across the state who have been involved in the program over the past 4 years.

Collecting a sufficient number of samples from each of the main river systems and coastal marine areas is crucial in developing the age composition data required to assess Mulloway stocks. While we know the odds are against us, we are still eager to collect Mulloway frames from central and eastern parts of Victoria (e.g. Yarra River, Patterson River, Mallacoota, and Gippsland Lakes) and from marine waters across the state. Collecting Mulloway from marine waters is crucial in learning more about their reproductive behaviour, including their spawning locations and

estimated lengths and ages at maturity. If you know of anyone catching Mulloway in these areas, we would love to hear from you.

When donating frames, ideally we like to receive the whole carcass including the guts and reproductive organs (see below). This allows us to determine the sex of the fish (male/female) and look at whether their reproductively active.



Donated Mulloway frame with guts and reproductive organs attached.

What do we do with your frames?

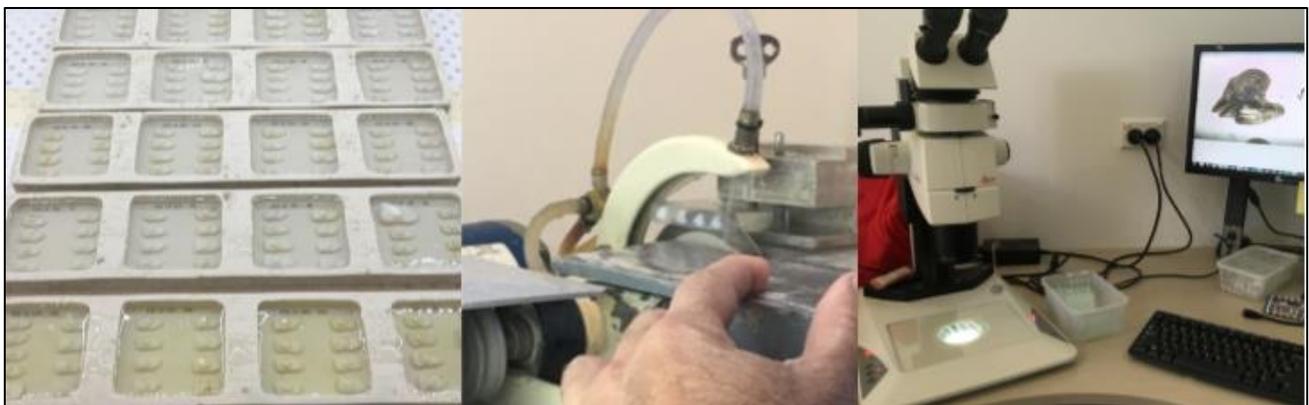
With each frame, we record the total length, sex and reproductive condition of the fish. Ear bones or 'jewels' are extracted from their skull and used to determine the age the fish. The length and age data of each fish is perhaps the most crucial as it allows us to carry out length and age-based monitoring of the stock. Age estimates are collated and used to assess how the demographics of a population change over time. The relationship between length and age is also used to look at growth rates (see later). The sex and reproductive condition of each fish is recorded by examining the reproductive organs.

Largest fish donated from each region (as of June 2018)

Region	Angler	Total length	Estimated age
South East SA (marine)	Aaron Saunderson	137 cm	13 years
Glenelg River	Glenn Fry	123 cm	9 years
Moyne River	Scott Gray	84 cm	6 years
Hopkins River	Adam Brown	100 cm	6 years
Curdies River	Jodie Baillie	100 cm	5 years
Victorian marine waters	Adrian Lieutier	170 cm	22 years
Barwon River	Jarryd McDowall	102 cm	7 years
Patterson River	Brad Spiden	95 cm	5 years
Mallacoota	Rory Brackley	138 cm	9 years

The largest fish tally board remains the same, with only two fish over 100 cm donated in the past 12 months. However, it appears that anglers have been catching slightly larger Mulloway from our estuaries. The length frequency plot for 2014-2016, show most Mulloway from western Victorian estuaries (i.e. Glenelg, Hopkins, Moyne rivers) and the Barwon River were 60-70 cm. While these size classes were still abundant in 2017-2018, there has been a larger proportion of donated fish above 70 cm (Figure 3). Mulloway above 85 cm in our estuaries are still rare however, and therefore the theory of these systems providing an important nursery habitat remains.

All donated fish were aged between 3 and 25 years of age, with the oldest still being a 142 cm Mulloway caught from Western Port Bay. The age frequency plots show that the Victorian Mulloway fishery was supported mainly by a single year class between 2014 and 2016 (Figure 4). In 2014, this cohort was 3+ years, and remained dominant in 2015 (when 4+ years) and 2016 (when 5+ years). In 2017, this cohort, which is now 6+ years has become less abundant, coinciding with the near onset of maturity and presumably their movements to the ocean for breeding. There is also a highly dominant 5+ cohort in 2017, which remains dominant in 2018 (now 6+ years). This data indicates that there was a significant spawning and recruitment event in the spring-summer of 2010-11 and 2011-2012, a likely response to high freshwater flows. Mulloway display highly episodic spawning and recruitment and therefore the status of populations and the fishery are dependent on the regularity of favourable environmental conditions.



Ageing process: otoliths are embedded in resin blocks (left), cut into thin sections (middle) and then mounted onto slides and viewed under a microscope (right).

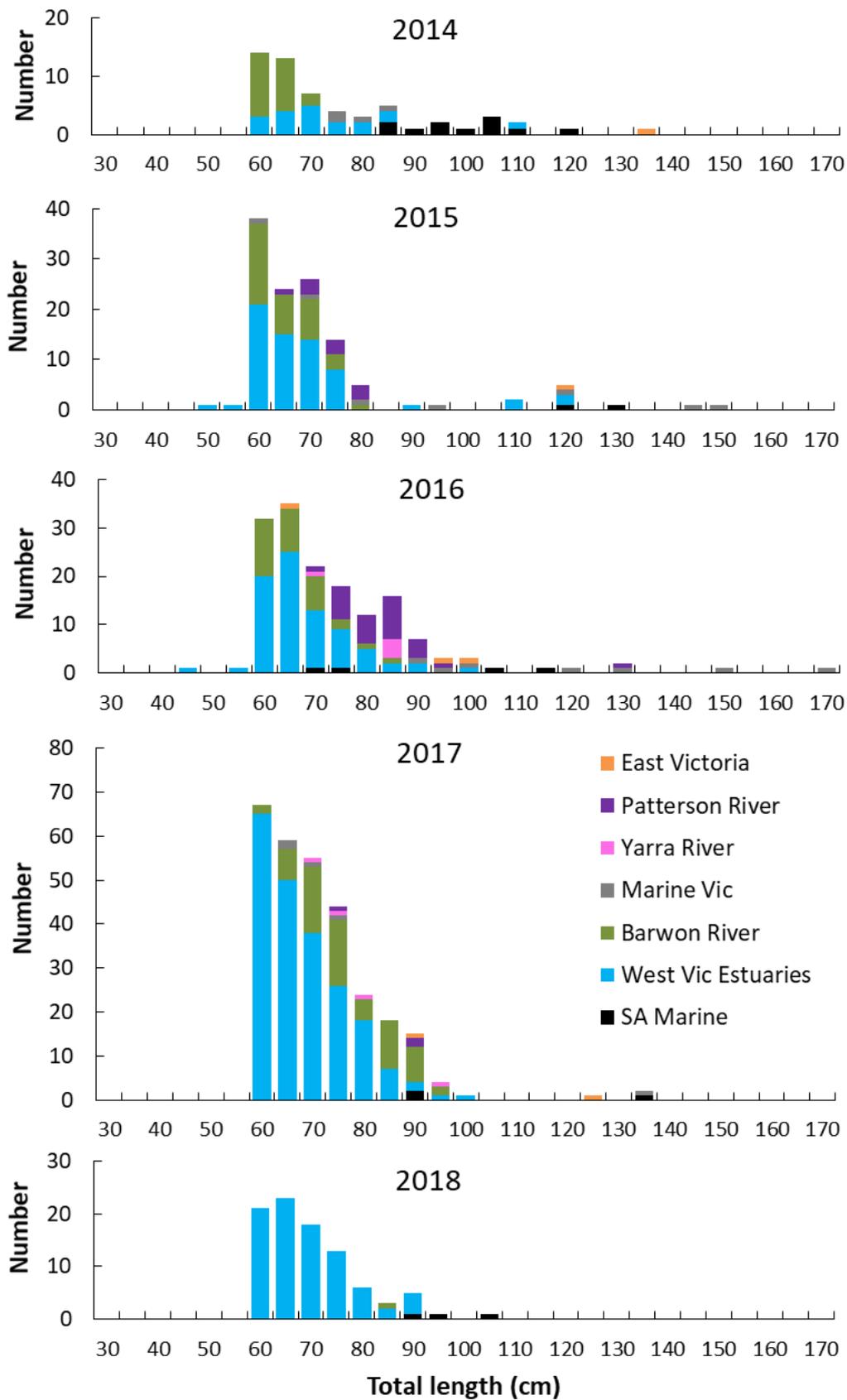


Figure 3. Overall length frequencies of Mulloway donated by recreational anglers from the various regions in 2014 (August onwards), 2015, 2016, 2017 and 2018 (Jan-June), including a small number of fish (<60 cm) caught by research scientists under a Fisheries Exemption Permit.

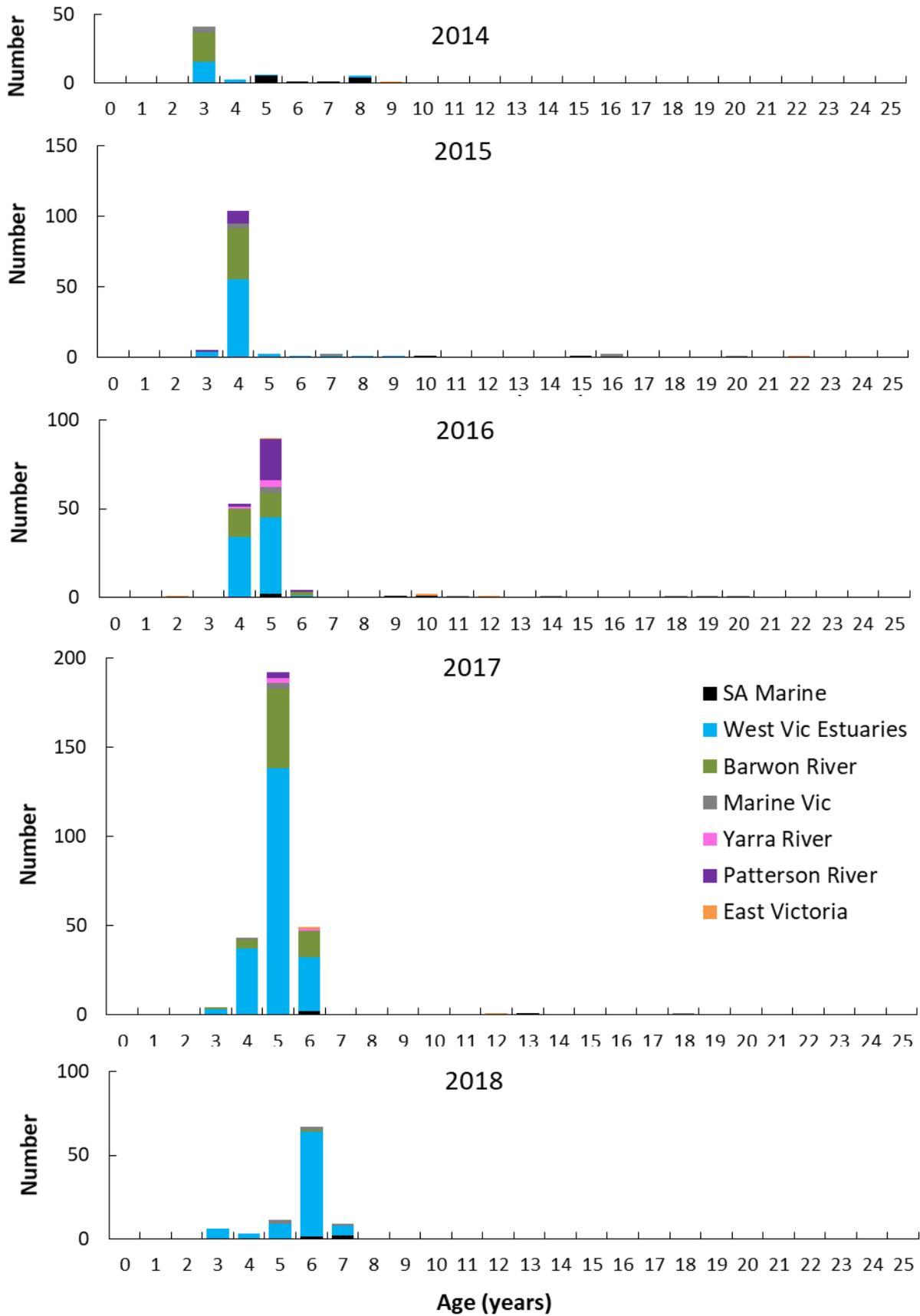


Figure 4. Overall age frequencies of Mulloway donated by recreational anglers from the various regions in 2014 (August onwards), 2015, 2016, 2017 and 2018 (Jan-June), including a small number of fish (<60 cm) caught by research scientists under a Fisheries Exemption Permit.

Growth rates

Figure 5 below shows the total lengths and corresponding ages of Mulloway samples donated by anglers from Victoria and South East SA. Further samples collected from the Glenelg River by Fisheries Victoria's Research Anglers have kindly been provided by Simon Conron. This extra data has helped 'fill the gaps' for particularly the younger aged classes. A growth curve (black line) has been developed to describe the change in length at age for Mulloway in Victoria and South East SA.

Through calculating the growth curve, an overall value for growth is determined. With the addition of samples collected over the past 12 months, the growth coefficient for Mulloway in Victoria (and South East SA) is estimated to be 0.14 year^{-1} . This is almost identical to the overall growth coefficient calculated by South Australian scientists for Mulloway in South East SA (0.136 year^{-1}). This is to be expected, since our genetic analyses revealed that Mulloway in Victoria are part of the same subpopulation as those in South East SA.

The spread of lengths at any given age clearly demonstrate that Mulloway growth is highly variable. For example, at 4 years of age, Mulloway can be anywhere between 50-96 cm in length, while a 6 year old fish can be between 61 and 114 cm! Environmental variables (e.g. water temperature, river flows) differ from year to year especially in our estuaries, and are known to have both direct and indirect effects (e.g. prey availability) on the growth rates of fish.

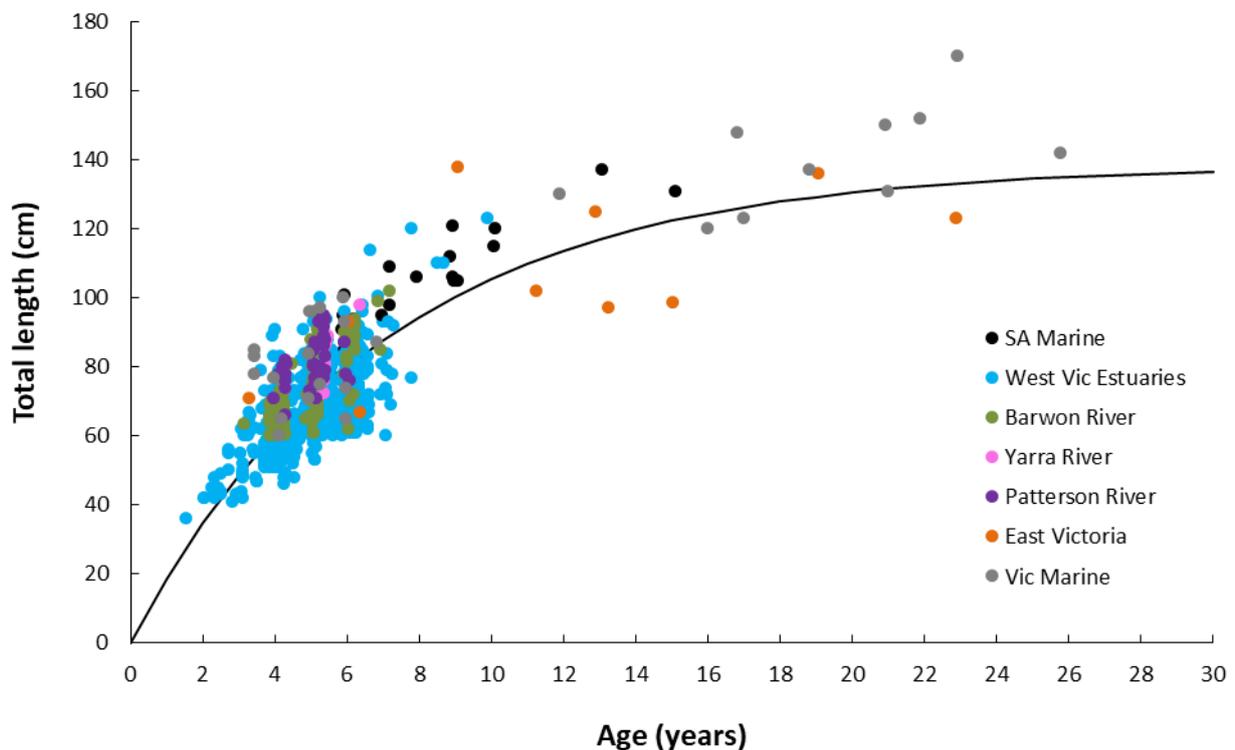


Figure 5. Size-at-age plot and growth curve (black line) for Mulloway donated by recreational anglers from Victoria and South East SA since 2014, including some fish below the legal limit caught by research scientists and research anglers under a Fisheries Exemption permit.

The relative distance the opaque (dark) and translucent (light) bands on the otolith sections can provide some interesting insight into the annual growth patterns of fish. For example, otolith sections from a number of samples from the Glenelg River reveal shorter distances between their 4th and 5th opaque bands (see Figure 6). This corresponds to slower growth rates between winter-spring 2015 and winter-spring 2016. Low rainfall and therefore reduced river flows (see Figure 7) during this period, may have influenced the slower growth rates in Mulloway (and potentially other species).



Figure 6. Otolith section of a Mulloway from the Glenelg River aged 5+ years, showing differences in seasonal growth, i.e. variable distances between bands 4 and 5.

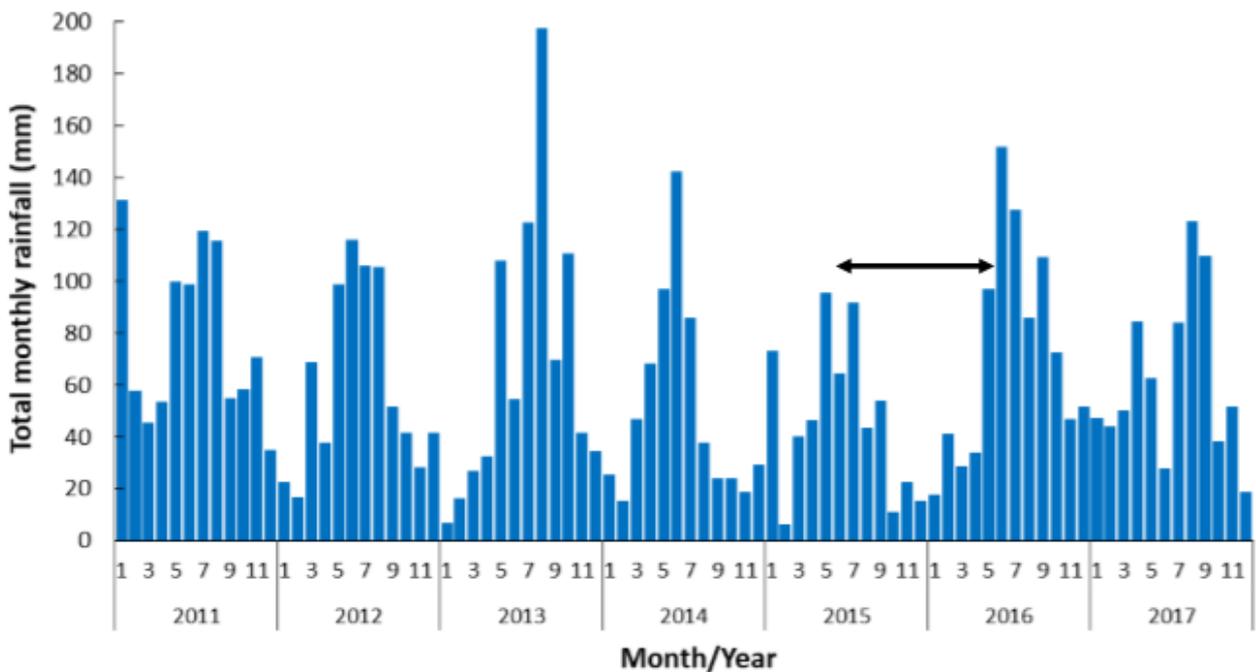


Figure 7. Monthly rainfall recorded at Dartmoor, Victoria between 2011 and 2017 (BOM).

How to donate samples?

Place each individual frame (ideally with organs attached) in a bag and attach a label to it with the:

1. Total length & weight of the fish
2. Date and location of capture
3. Name and contacts of fisher

If you can't donate the whole frame you can simply donate the head or an otolith. Make sure you include all the information above.



Please drop off at your nearest drop-off point or call Lauren (0439 034 390) to arrange collection. For a full list of drop-off points and more information about the program, please go to:

<https://www.facebook.com/groups/mullowaycitizenscience/>

Tagging project update

Our new Mulloway tagging project is well underway across the state. This citizen science project, funded by the Victorian State Government using Recreational Fishing License Fees, is investigating Mulloway movement patterns across Victoria and interstate. Over the past 6 months of the project, we have already recorded 9 recaptures! You can read all about it in our Tagging Newsletter (email Lauren for a copy lauren.veale@ngt.org.au).

A reminder to anglers to be on the lookout for tagged mulloway. You can stay updated on the project by joining our Facebook Page:

<https://www.facebook.com/groups/MullowayTaggersVictoria/>



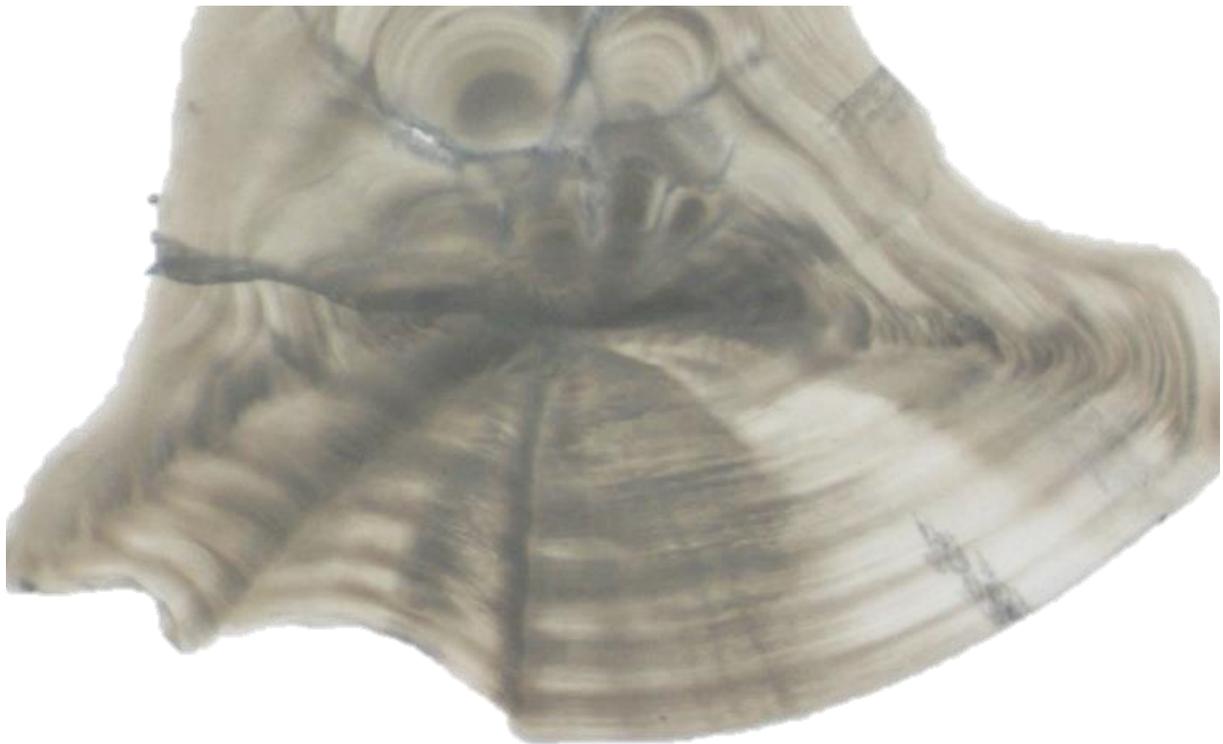
Fishy Files!



Flynn Thomas caught this 94 cm Mulloway from Browns Bay in South East SA in March this year. This fish was aged at 6.1 years, showing relatively fast growth.

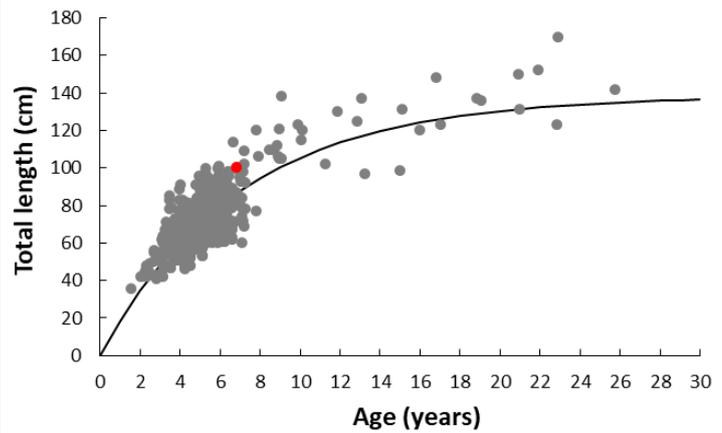


Mary Spencer was pretty stoked to catch her first Mulloway in May last year. The fish was caught from the Glenelg River, and was aged at 5.4 years. Now to catch another one...





It's not too often you see a Mulloway over the metre mark caught from the Hopkins River! **Adam Brown** caught this 100 cm fish last November, which was aged at just 6.8 years. As you can see on the plot below, this fish showed above average growth rates.



This Mulloway is one of the few fish caught from our estuaries that have been sexually mature. The male had developing gonads (reproductive organs) indicating it would have soon after spawned (at sea).





At 18.8 years, **Dom Gillot's** 137 cm Mulloway is the oldest fish to be aged in the past 12 months. Dom caught the fish from Western Port Bay in October last year. The fish was a sexually mature male, with developing gonads (reproductive organs), indicating the fish was preparing to breed.



Scott Gray is one of the few anglers that have success targeting Mulloway in the Moyne River. He landed this beautiful 82 cm female fish in December last year, which was aged at 5.9 years.

