



Grey Mackerel – Gulf of Carpentaria Stock

Biological Monitoring Update for Wren Fishing

Sampling Overview

A fishery-dependent biological monitoring program commenced in 2024 to collect length, sex, and age data across the main Queensland’s Gulf of Carpentaria grey mackerel fishery. The program is supported by commercial fishers and processors who donate samples and allow access to DPI staff to collect data. Wren Fishing is a major operator in the fishery and the major contributor to the monitoring program. This update summarises Wren Fishing’s contribution to the data and the preliminary outputs of the program.

Data collection methods were successful during 1st year of implementation. Sampling occurred across all key fishing regions and months when the fishery operated. In 2025 fishery intel information revealed no significant fishing occurred until March (fishery opens 1 February). March is an earlier start than 2024 but within the usual pattern of the fishery. Wet season flooding restricted access, during periods of 2024 and 2025, during these times samples were transported to Cairns for processing.

Monitoring milestones achieved

- 2025 program underway
- 2024 otolith read completed and passed all quality control measures
- pattern of otolith edge type per month compared with previous studies
- 2024 data checking complete
- Birth date (used for assigning age) has been assigned as 1 Nov - based on September to December spawning (Welsch et al 2009)
- Length-length conversion equations established and implemented
- Age-Length key produced for 2024
- Preliminary length and age frequencies produced for 2024
- Northern Territory 2024 samples accessed and stored via the Northern Fisheries Centre in Cairns – samples processed by NT staff (NT data and not included in this update)

Sampling Year		2024	2025 (year to date 17/04/2025)
Wren Fishing	Catches subsampled	31	8
	Representative lengths measured	1496	400
All Samples	Multiple length measurements	to establish length-length conversions: Total length to Fork Length: 534 Jaw length to Fork Length: 525	samples received so far have yet to be processed
	Sex determination	<4% of all samples with missing or degraded gonads	
	Fish aged	598	Ageing occurs in 2026

Next phases

- Conduct sample size analysis to assess efficiency of the program for remainder of 2025 sampling year. Length frequency to be weighted by regional commercial catch when 2024 logbook data entry complete
- Further investigate monthly pattern of otolith edge-type to convert increment count to estimated age
- Continue collaboration with Northern Territory
 - retention of samples by commercial fleet from NT waters
 - data collaboration on timing of increment formation to convert increment counts to age

Results

A time series of data is needed for better understanding of the fishery, however preliminary data indicate a well-represented size and age structure. This data will give better certainty in future stock status determinations and stock assessment modelling. We look forward to continued collaboration with Wren Fishing and other harvesters of this resource. A range of key preliminary data outputs from 2024 are included below.

Conversion Equations

Multiple length measures were taken from individual fish to produce length-length conversion equations to:

- convert alternative measurements to the preferred length measure (fork length) when damage or product processing prevents fork length from being measured accurately.
- enable data display in different forms – such as total length which is the legal measure of size and more often used by fishers.
- support other applications, such as converting legal size limits to alternative length measures or applying selectivity constraints in a model.

Jaw length to fork length and total length to fork length (Figure 1) have now been implemented to produce length frequencies from all measured fish. Multiple measures will continue to be collected, particularly for less common size classes, to refine these equations.

Length Frequency

A preliminary length frequency is presented in Figure 2. This shows minimal variation in this trend observed across regions and no evidence of truncation in length distribution. Once the commercial logbook data entry is finalised for 2024, the length data will be weighted by the commercial catch in each monitoring region to ensure appropriate spatial representation. This step helps account for differences in catch across regions and avoids over or under-representing length trends in the results. We anticipate completing this during 2025.

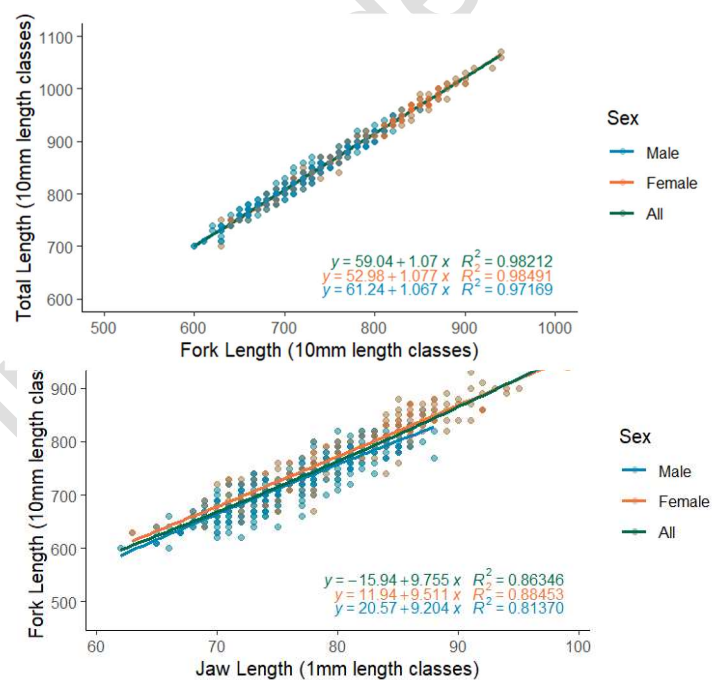


Figure 1 A and B. - 2024 Gulf Grey Mackerel measurements and conversion equations.

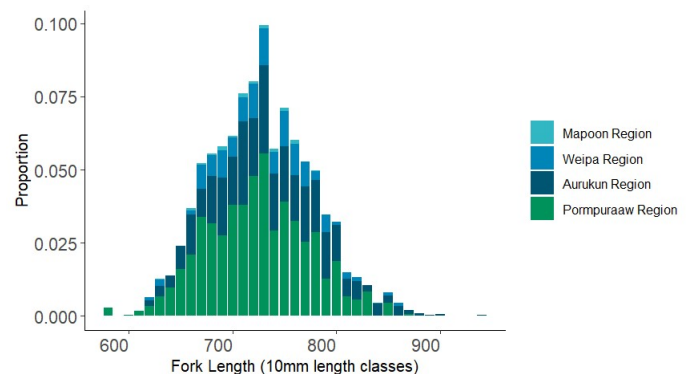


Figure 2. Gulf Grey Mackerel preliminary 2024 length frequencies – Catches have been scaled by the percentage sampled from each catch however data is not weighted by regional catch

Fish Age

A fish's age is estimated by counting increments (annual rings) and considering the completeness of increment that was forming when it was caught (edge type). The observed pattern of otolith edge type per month (Figure 3) is similar to that reported in Welch *et al* (2009) although a 4-level category system was used in that research. Otolith samples were well distributed across the months during which the fishery operates. The pattern is strong and suggests age can be adjusted to be more accurate. Further analysis is needed to establish what adjustment is required to convert increment count to age.

An age-length-key is a method of converting fish length to fish ages, allowing better program efficiency by aging a subset of fish. The occurrence of each age cohort in each length class can be seen in Figure 4. A preliminary age frequency for 2024 and been created (Figure 5) using the unweighted length frequency and age-length. The fish were fully recruited (all fish of that cohort were able to be caught by the fishing gear) when their otoliths had 2 increments.

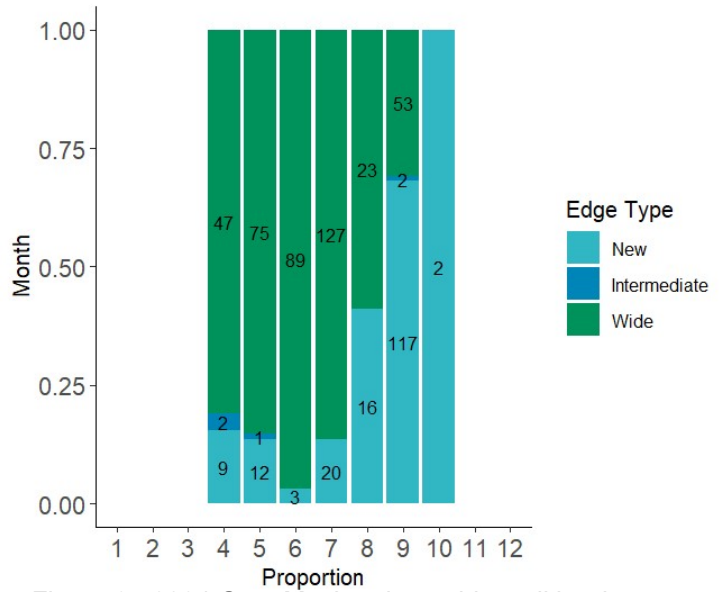


Figure 3. 2024 Grey Mackerel monthly otolith edge type classification. 'New' – increment visible on edge, 'Intermediate' - up to $\frac{2}{3}$ increment formed, 'Wide' - more than $\frac{2}{3}$ of increment formed.

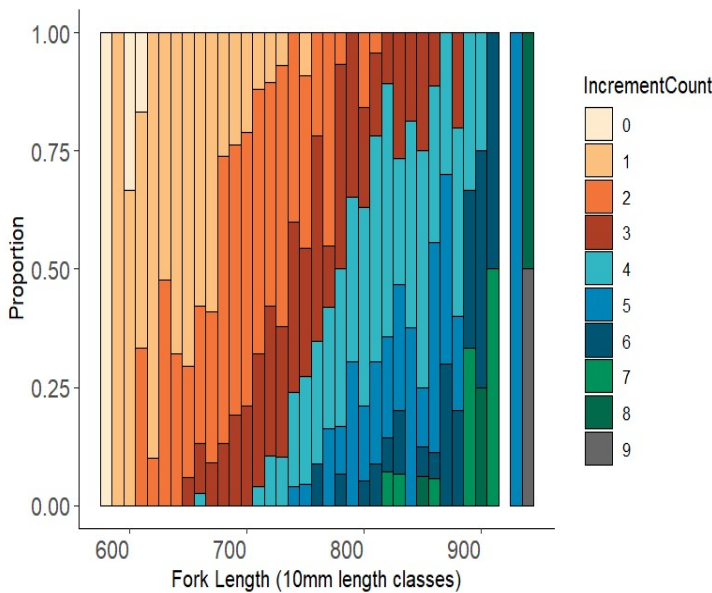


Figure 4. 2024 Gulf Grey Mackerel Age-Length Key (ALK), shown as raw increment count as a proxy for age.

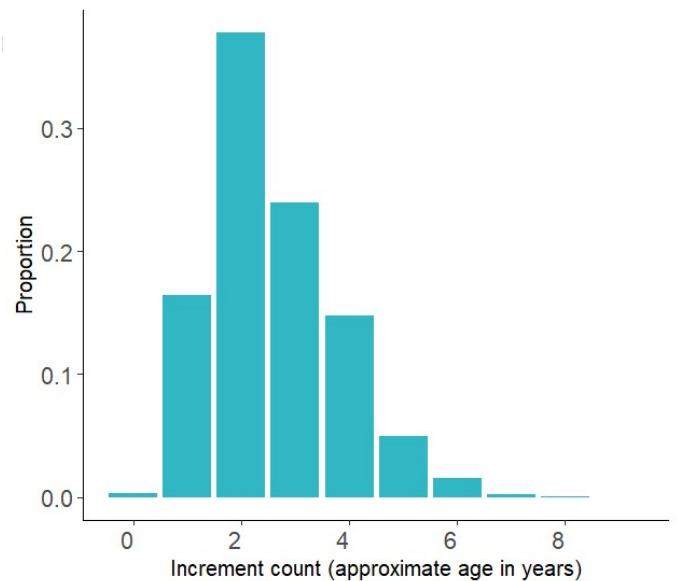


Figure 5. 2024 Gulf Grey Mackerel age (increment count) frequency of commercial catch created using the length frequency (which is not currently scaled to regional catch) and the age length key

Growth and Sex

Differences in growth, and longevity between males and females can be seen in Figure 6 and 7. This data will be critical in determining fecundity and growth parameters in population models.

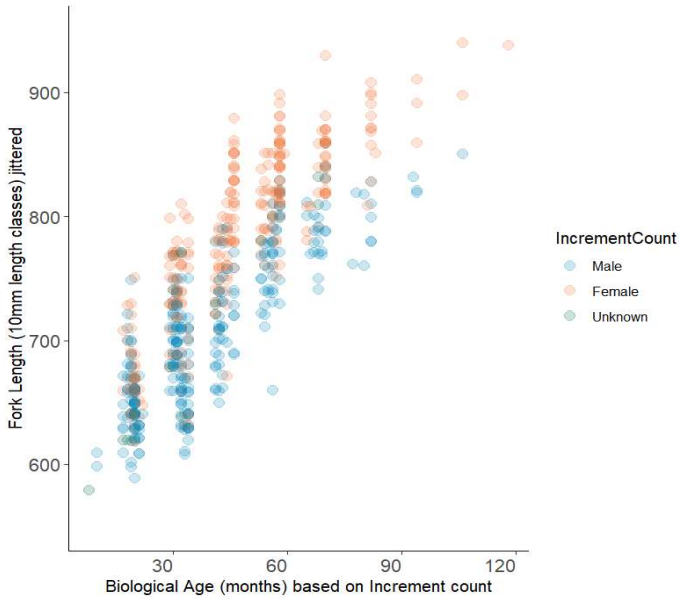


Figure 6. Length-at-age by sex for Gulf Grey Mackerel (2024). Note: Biological age is a continuous proxy for fish age. It is determined by estimating the number of months that have elapsed between a fish's birth month and capture.

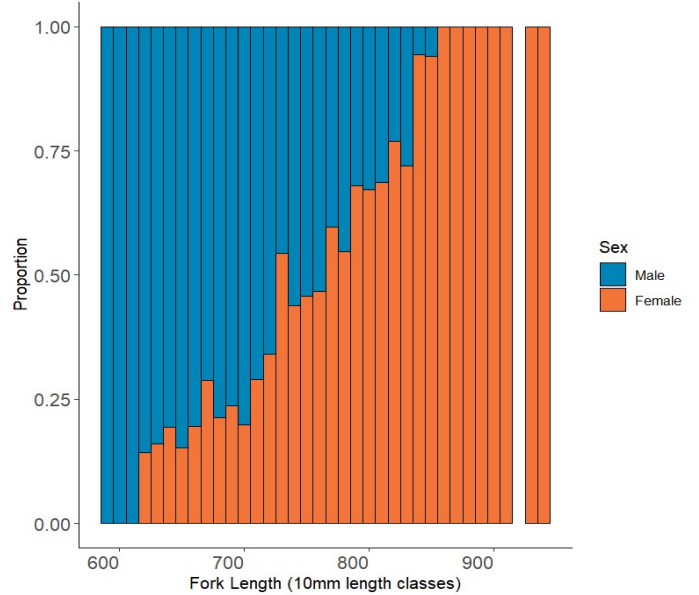


Figure 7. 2024 Gulf Grey Mackerel sex ratio per size class.