

**ADVICE TO:** PIRSA FISHERIES AND AQUACULTURE (PROF. GAVIN BEGG – EXECUTIVE DIRECTOR)

**FROM:** DRS KATHERINE HELDT AND BEN STOBART (SARDI AQUATIC AND LIVESTOCK SCIENCES)

**SUBJECT:** VONGOLE FISHERY – LEGAL MINIMUM SHELL LENGTH CONVERSION TO HEIGHT

**DATE:** 23 FEBRUARY 2023

**KEY ISSUES:**

- Licence holders in the South Australian Vongole fishery are seeking to have a legal minimum height (LMH) instead of a legal minimum length (LML).
- PIRSA Fisheries and Aquaculture have requested advice on: (1) whether there is a proportional relationship between shell length and height for both species of Vongole in the Coffin Bay and West Coast zones of the fishery; and (2) if proportional relationships exist, what would be the appropriate LMH corresponding to the LML, in the Coffin Bay and the West Coast zones of the Vongole Fishery.
- Data confirm there are strong length-height relationships for Vongole of all species and at all locations ( $R^2$  value range 0.80 to 0.94).
- Appropriate approaches to setting LMHs would be:
  - (1) Defining the LMH using the maximum height value below the LML – this approach reduces the risk of harvesting Vongole below the current LML, but also reduces the available harvestable biomass (range of 1 – 52%) by excluding Vongole larger than the LML; or
  - (2) Using the mean height at the LML obtained from the linear relationships between length and height – this approach allows a small proportion of individuals below the LML (but above the size at maturity) to be fished, but this is offset by the exclusion of some Vongole above the LML from fishing (as they do not meet the LMH).
- The LMH using the first approach ranges between 13 mm and 17 mm amongst all species and locations, while for the second approach the LMH range is 12 mm – 14 mm. The second approach has more similar LMH values among species and sites, making setting a single LMH simpler.

**BACKGROUND:**

The Vongole Fishery (*Katelysia* spp.) consists of three fishing zones (Coffin Bay, West Coast and Port River), with three species fished under a single zonal quota (yellows, *K. rhytiphora*; greys, *K. scalarina*; whites, *K. peronii*). Under the current regulations the legal minimum legal (LML) of 30 mm is applied to most species and locations, the exception being for yellows and whites in Coffin Bay that have a LML of 35 mm.

At a meeting of Vongole stakeholders on the 16<sup>th</sup> November 2022, license holders indicated a preference to screening vongole on the basis of shell height because Vongole grading machines are selective on height and can easily adjusted to capture different height limits for each species and zone. Using height to define the legal limit would therefore improve fishing efficiency.

PIRSA F&A have requested an advice note to identify (1) whether there is a proportional relationship between length and height for both species of Vongole in the Coffin Bay and West Coast zones of the fishery; and (2) if proportional relationships exist, what would be the appropriate LMH corresponding to the LML, in the Coffin Bay and the West Coast zones of the Vongole Fishery

**RESULTS/DISCUSSION:***Vongole length – height relationships*

The length-height relationships (see Appendix Figure 1 for measurement specification) for Coffin Bay and the West Coast fishing zones were established by measuring Vongole from a representative sample of transects in each of the primary fishing grounds at these locations (Table 1). Totals of 3,000 and 7,373 Vongole were measured for Coffin Bay and the West Coast, respectively. The quality of the relationships was assessed using the R<sup>2</sup> values from linear fits to the data, where an R<sup>2</sup> value of 1 indicates a perfect relationship.

**Table 1.** Number of Vongole measured for length-height by location and site.

| Location   | Site           | Greys | Yellows | Whites |
|------------|----------------|-------|---------|--------|
| Coffin Bay | Little Douglas | 350   | 584     | -      |
|            | Longbeach      | 301   | 287     | -      |
|            | Oyster Farms   | -     | 867     | -      |
|            | Point Longnose | 316   | 295     | -      |
| West Coast | Smoky Bay      | 1058  | 270     | 3      |
|            | Streaky Bay    | 1856  | 421     | 25     |
|            | Venus Bay      | 1978  | 754     | 1008   |

Significant length-height relationships were obtained for all species and locations, ranging from the highest  $R^2$  value (% of variance in shell height explained by shell length) of 0.94 for yellows at Point Longnose and Long Beach in Coffin Bay to that for yellows at Venus Bay 0.80 (see Appendix Figures 2 and 3).

The mean height of greys at the LML (i.e. the height at which the regression line intersects with the LML), and the maximum height (i.e. the maximum measured height of Vongole below the LML) were lower in Coffin Bay than on the West Coast. For yellows, mean heights and maximum heights were similar (Table 2).

**Table 2.** Mean and maximum height of Vongole at the LML per location and site.

| Location   | Site           | Greys  |       | Yellows |       | Whites |       |
|------------|----------------|--------|-------|---------|-------|--------|-------|
|            |                | Mean h | Max h | Mean h  | Max h | Mean h | Max h |
| Coffin Bay | Little Douglas | 12.2   | 13.3  | 13.5    | 14.4  |        |       |
|            | Longbeach      | 12.3   | 13.4  | 14.4    | 14.5  |        |       |
|            | Oyster Farms   |        |       | 14.4    | 14.7  |        |       |
|            | Point Longnose | 11.8   | 13.0  | 13.3    | 14.1  |        |       |
| West Coast | Smoky Bay      | 13.8   | 16.8  | 12.9    | 14.2  |        |       |
|            | Streaky Bay    | 14.2   | 15.7  | 12.2    | 14.7  | 13.7   | 14.4  |
|            | Venus Bay      | 12.6   | 14.4  | 12.5    | 14.3  | 13.4   | 14.9  |

Appropriate approaches to setting the LMH would be either using 1) the maximum height or 2) the mean height (Figures 2 and 3, Table 2).

The first option would greatly reduce the risk of any Vongole below the current LML being fished, but it would also prevent, in some cases, a significant proportion of Vongole larger than the LML from being harvested. For example, the range of potential loss in harvestable biomass for yellows and greys in Coffin Bay is up to 4% and 24%, respectively, and the range of potential loss for the West Coast is from 12 – 52%.

In contrast, the second approach would allow a small proportion of individuals below the LML, but above the size at maturity (Gorman et al. 2010; Dent et al. 2012), to be fished. The percentage of Vongole harvested below the current LML would be up to 6% and 12% in Coffin Bay and the West Coast, respectively, and these would be offset by the exclusion of some Vongole above the LML from fishing (as they do not meet the LMH; 1 – 12%). The second approach also has more similar LMH values among species and sites, making setting a single LMH for all sites simpler.

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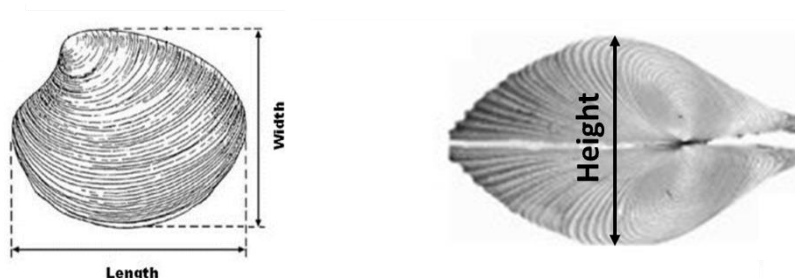
## REFERENCES

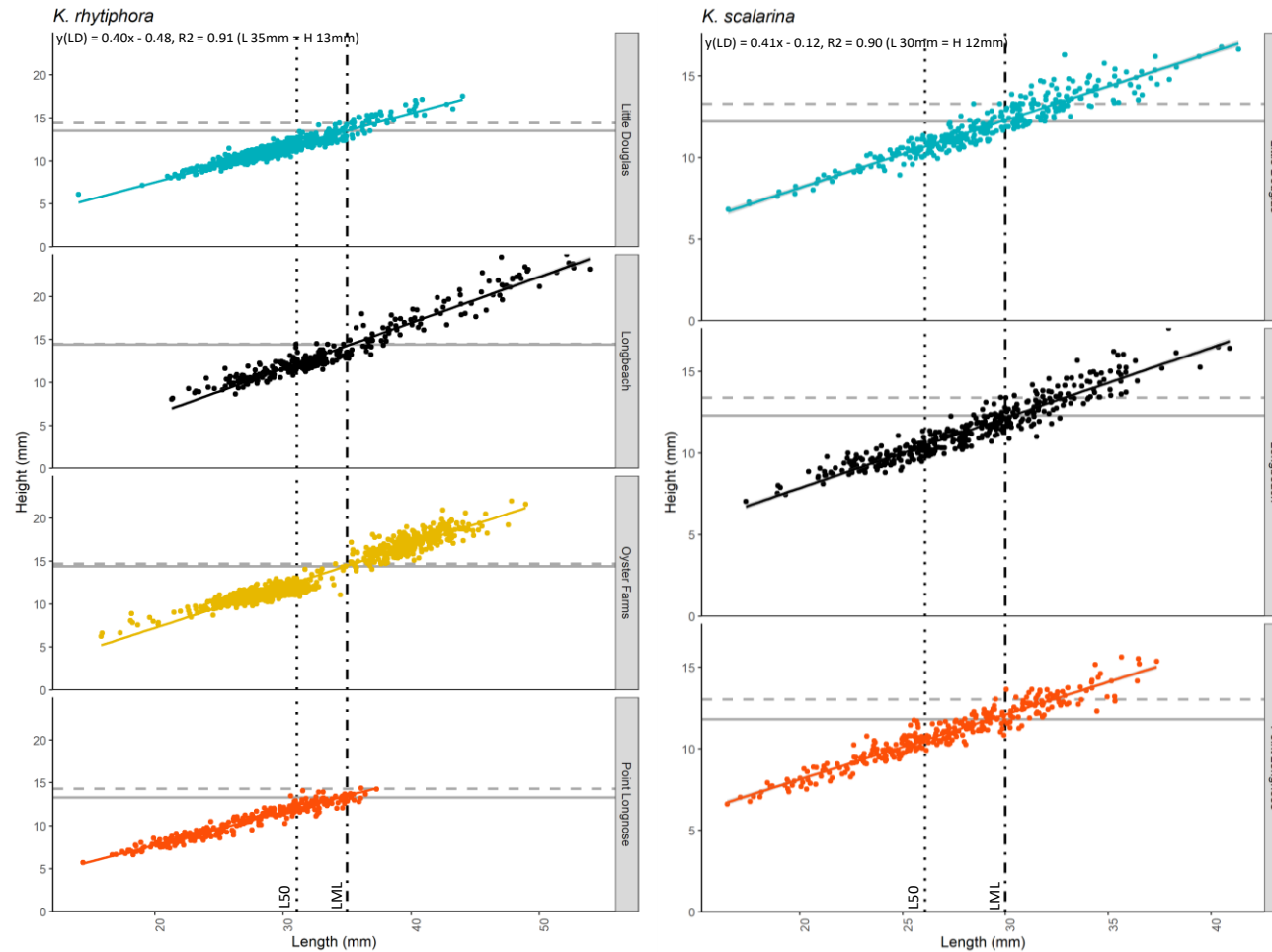
Dent, J., Mayfield, S., Burch, P., Gorman, D. and Ward, T.M. (2012). Distribution, harvestable biomass and fisheries biology of *Katelysia* spp. in the South Australian commercial mud-cockle fishery (PDF 1.7 MB). Report to PIRSA Fisheries and Aquaculture. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2010/000263-2. SARDI Research Report Series No. 595. 23pp.

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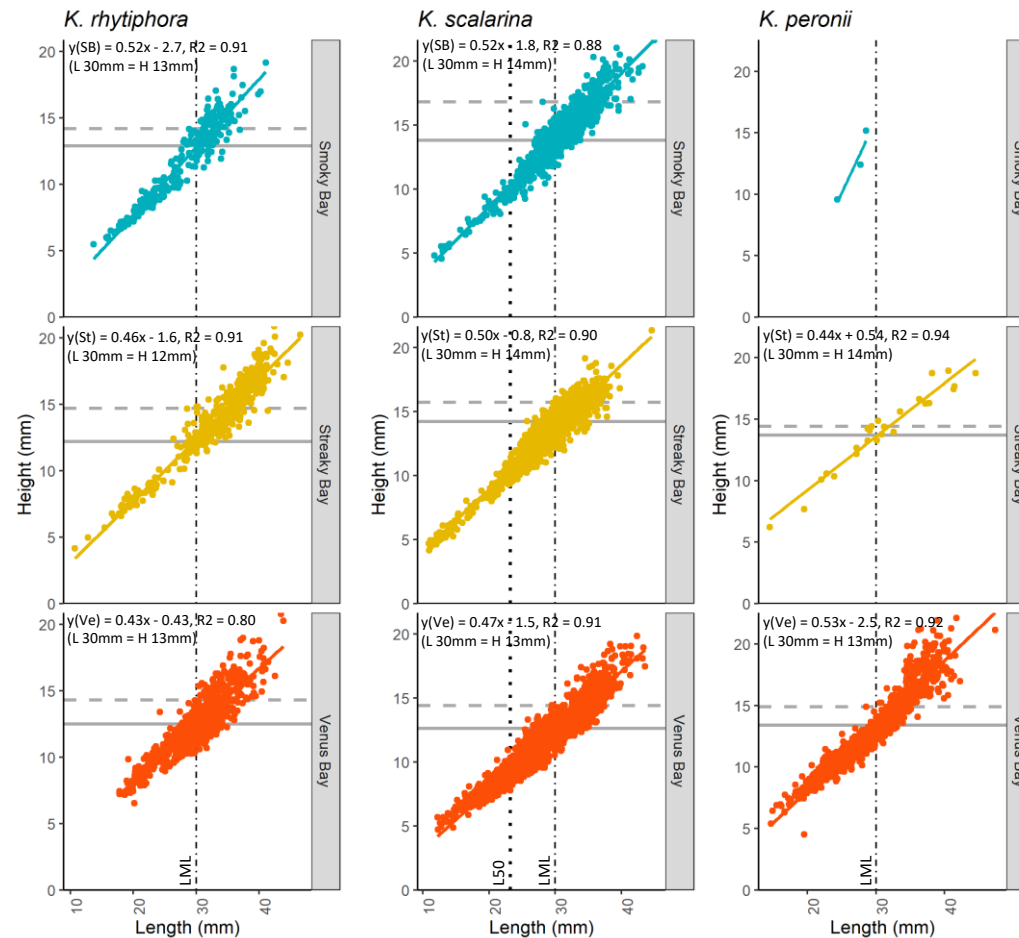
## Appendix

**Figure 1.** Diagram detailing measurement specification for Vongole length, width and height.





**Figure 2.** Length – height relationships for *K. rhytiphora* and *K. scalarina* in Coffin Bay. Colours indicate location also defined on right side of plots. The solid and dashed horizontal gray lines are the mean h and max h, respectively. The dashed, vertical black lines are the L50 and LML.



**Figure 3.** Length – height relationships for *K. rhytiphora*, *K. scalarina* and *K. peronii* from the West Coast bays. Colours indicate location also defined on right side of plots. The solid and dashed, horizontal gray lines are the mean h and max h, respectively. The dashed, vertical black lines are the L50 and LML.