

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

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**SUBJECT:** VONGOLE FISHERY – ALTERNATIVE METHOD TO DEFINE THE PRESENCE AND ABSENCE OF PRE-RECRUITS

**DATE:** 23 February 2024

**KEY ISSUES:**

- The harvest strategy (HS) for the Coffin Bay and West Coast Vongole Fisheries is under review, and pre-recruit densities have been identified as the secondary performance indicator.
- On 23 February 2023, SARDI provided an Advice Note to support the development of the new vongole harvest strategy, including differentiation between the presence or absence of pre-recruits, based on the mean density of pre-recruits for each of the zones of the fishery. However, mean density may be strongly influenced by a small number of transects containing very large numbers of pre-recruits.
- PIRSA is therefore seeking additional scientific advice from SARDI on whether alternative methods to define the presence or absence of pre-recruits in the respective zones of the fishery may be applicable to the harvest strategy.
- An alternative definition of the presence of pre-recruits can be based on a minimum percentage of sampled transects that contain a predefined number of pre-recruits. This may better reflect the presence of pre-recruits across the fishing ground while mitigating the influence of small numbers of transects with very high values that occurred when presence of pre-recruits was based on mean density.
- For Coffin Bay, pre-recruits could be defined as present when  $\geq 10$  pre-recruits occur in  $\geq 20\%$  of transects for *K. scalarina* and when  $\geq 10$  pre-recruits occur in  $\geq 10\%$  of transects for *K. rhytiphora*. The different thresholds reflect differences in spatial patchiness between the two species.
- For the West Coast, high temporal variability in the spatial distribution of pre-recruits between species, and among and within bays, complicates the assignment of a robust pre-recruit index. Given this variability, and the historically conservative harvest fractions, a secondary indicator of pre-recruit density may not be required. The potential risk of not using a secondary indicator can be mitigated by maintaining conservative harvest fractions including consideration of when catches from the three bays comprising the West Coast Zone should be managed independently.

**BACKGROUND:**

The Vongole Fishery (*Katelysia* spp.) consists of three fishing zones (Coffin Bay, West Coast and Port River), with three species fished under quota in each zone (yellows, *K. rhytiphora*; greys, *K. scalarina*; whites, *K. peronii*). The Port River Zone has been closed since 2011/12.

The harvest strategy (HS) for the Vongole Fishery is currently under review with the HS framework for Pipi (*Donax deltoides*; PIRSA 2022) used as a template. Vongole harvestable biomass and pre-recruit presence/absence have been identified as the primary and secondary performance indicators (PI's), respectively. Including an indicator of recruitment success is important because Vongole populations, like those for Pipi, are characterised by episodic recruitment with the risk that recruitment may not occur in all years (Ferguson et al. 2021, 2022).

On 23 February 2023, SARDI provided an Advice Note to support the development of the new vongole HS that proposed differentiation between the presence and absence of pre-recruits based on the average density of pre-recruits for each of the respective species and fishery zones. At meetings with industry, industry raised the possibility that the average density of pre-recruits, and thus the level at which presence/absence is determined, may be influenced by large numbers of pre-recruits occurring in a small number of transects.

Given this potential bias, PIRSA Fisheries and Aquaculture are seeking additional scientific advice from SARDI on whether alternative methods to define the presence and absence of pre-recruits may be applicable for the harvest strategy. This Advice Note provides an alternative method to define the presence and absence of pre-recruits for the Coffin Bay Fishing Zone. For the West Coast bays, no alternative definition of pre-recruit presence/absence is provided due to their high spatial and temporal variability.

**RESULTS/DISCUSSION:***Coffin Bay*

In Coffin Bay, pre-recruits were defined as individuals smaller than the minimum legal length (MLL; i.e. <30 mm shell length (SL) for *K. scalarina* and <35 mm SL for *K. rhytiphora*).

Only those transects to be surveyed for Coffin Bay under the proposed new HS (excluding Kelliedie Bay that had not yet been surveyed at the time of drafting this advice note, and noting that not all transects were sampled in each survey year) were used to explore alternative methods to define pre-recruit presence and absence, including counts of pre-recruits per transect.

For Coffin Bay, the historic data (Figure A1) provided evidence that pre-recruit presence could reasonably be defined for *K. scalarina* and *K. rhytiphora*. Low abundance prevented definition of pre-recruit presence for *K. peronii*.

From 2013–2021, the percentage of transects that contained  $\geq 10$  pre-recruits of *K. scalarina* ranged from 24–34%. Consequently, in all years, more than 20% of transects contained  $\geq 10$  pre-recruits of *K. scalarina*. For *K. rhytiphora*, over the same time, the percentage of transects that contained  $\geq 10$  pre-recruits ranged from 11–38%. Consequently, in all years more than 10% of transects contained  $\geq 10$  pre-recruits of *K. rhytiphora* (Figure A1). The lower threshold percentage of transects for *K. rhytiphora* is consistent with the available data for these species, as the percentage of transects with *K. rhytiphora* pre-recruits was generally lower than that observed for *K. scalarina*.

As the stocks have not been classified as depleted or recovering (i.e. recruitment impaired), the combined (i.e. the thresholds are met for both species for pre-recruits to be defined as present) lowest values in the available time-series are suggested as the threshold to differentiate between presence/absence of pre-recruits.

Thus, for pre-recruit presence (Table 1):

- $\geq 20\%$  of transects have  $\geq 10$  *K. scalarina* (Greys) pre-recruits; **and**
- $\geq 10\%$  of transects have  $\geq 10$  *K. rhytiphora* pre-recruits

and, for pre-recruit absence (Table 1):

- $< 20\%$  of transects have  $\geq 10$  *K. scalarina* (Greys) pre-recruits; **or**
- $< 10\%$  of transects have  $\geq 10$  *K. rhytiphora* pre-recruits

Under this alternative proposed threshold, pre-recruits would be considered present in Coffin Bay for surveys conducted from 2009 to 2021 (Figure A1).

**Table 1.** Alternative proposed method under which pre-recruits would be considered “present” in the Vongole Harvest Strategy for Coffin Bay. Pre-recruits are present when both *K. scalarina* and *K. rhytiphora* exceed the threshold value. For Coffin Bay, there is no definition of pre-recruit presence/absence provided for *K. peronii* (Whites) due to low abundance of this species. For West Coast bays, no definition of pre-recruit presence/absence due to their high spatial and temporal variability.

Fishing Zone	Species	Common name	Pre-recruit size	Pre-recruits present (% transects with $\geq 10$ pre-recruits/transect)
Coffin Bay	<i>K. scalarina</i>	Greys	<30 mm	$\geq 20\%$ , <b>and</b>
	<i>K. rhytiphora</i>	Yellows	<35 mm	$\geq 10\%$
West Coast				Pre-recruits not defined

### West Coast

For the West Coast Zone, pre-recruits of all species were defined as individuals smaller than the MLL of 30 mm SL. Only those transects to be surveyed for the West Coast under the proposed new HS (noting that not all transects were sampled in each survey year) were used to explore alternative methods to define pre-recruit presence and absence, including counts of pre-recruits per transect.

For the West Coast, high temporal variability in the spatial distribution of pre-recruits between species and among and within bays, complicates the assignment of a robust pre-recruit index (Figure A2). Because of this, temporal and spatial variability of the percentage of transects attaining a threshold level of pre-recruits was also high. Given this variability, and the historically conservative harvest fractions, a secondary indicator of pre-recruit density may not be required. The potential risk of not using a secondary indicator can be mitigated by maintaining conservative harvest fractions including consideration of when catches from the three bays comprising the West Coast Zone should be managed independently.

An indicator of pre-recruit presence/absence may become feasible as the time-series of pre-recruit data for the West Coast Zone is extended with future surveys.

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## REFERENCES

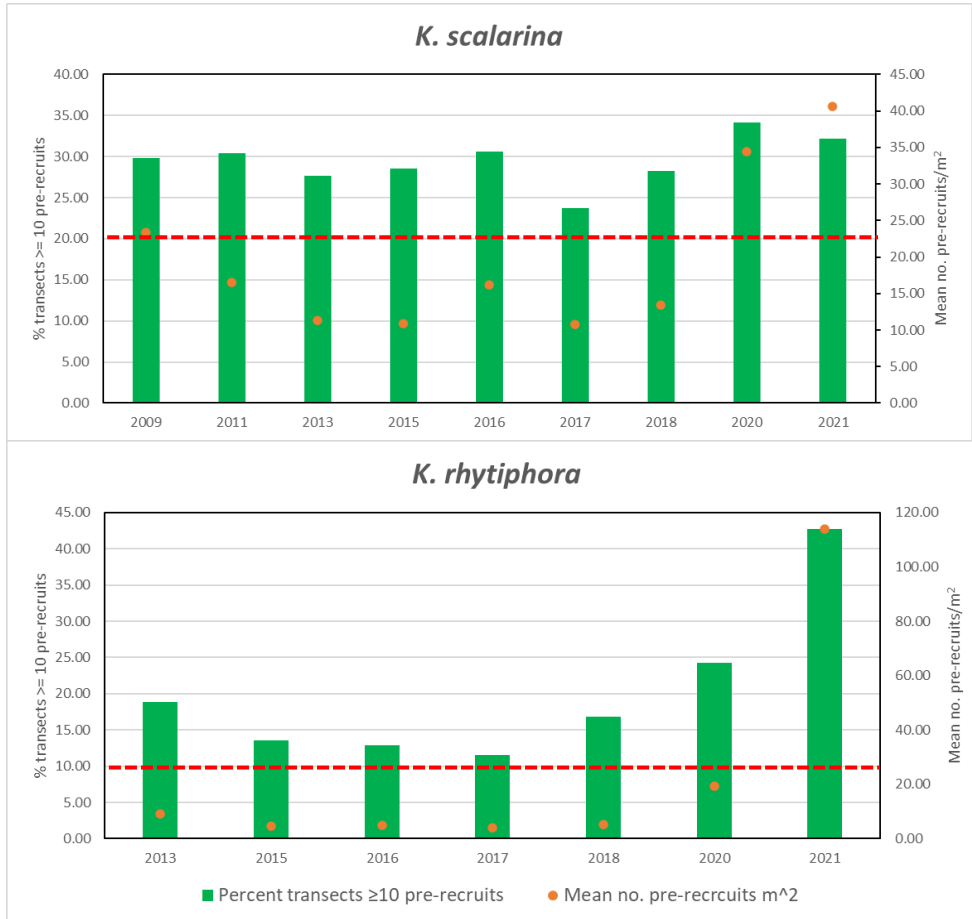
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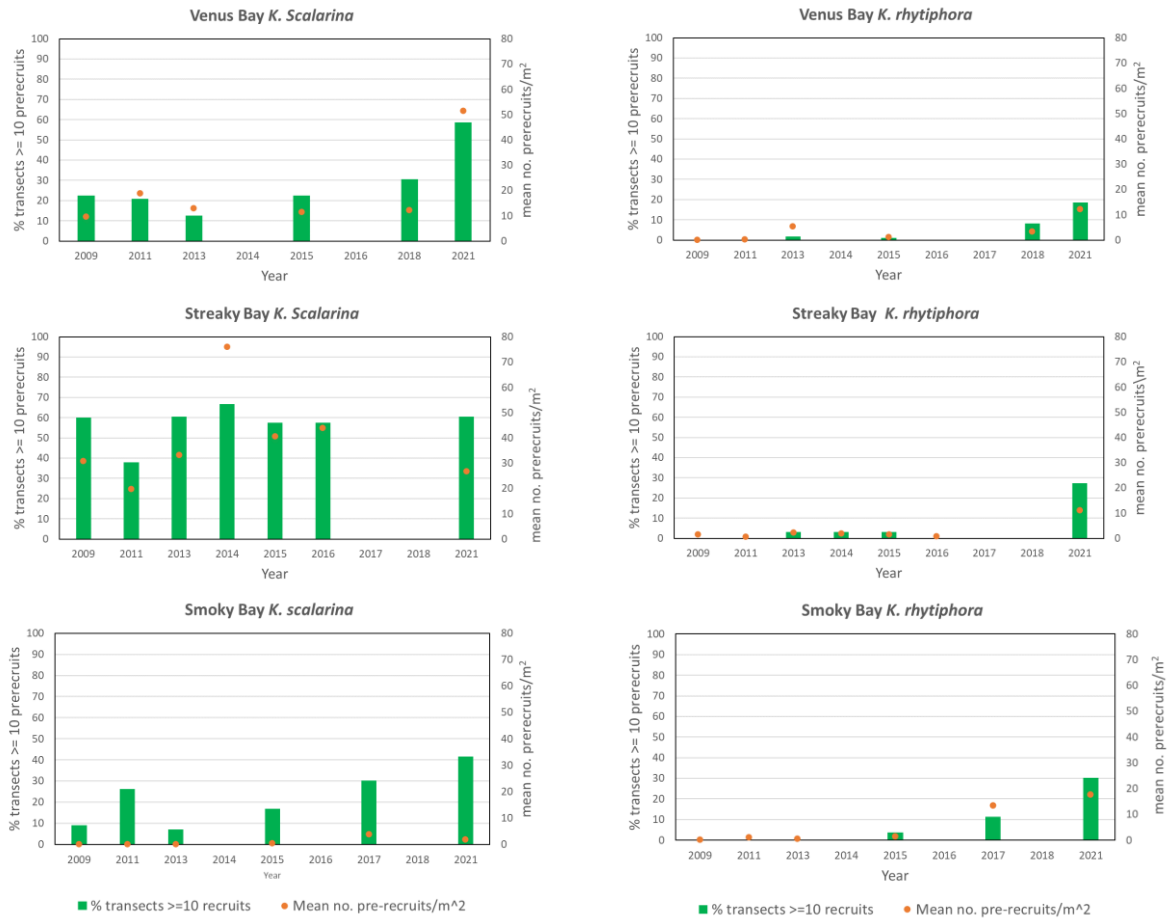
Appendix. Percentage of transects with pre-recruits present.

Coffin Bay



**Figure A1:** Annual percentages of transects with 10 or more pre-recruits and mean number of pre-recruits per m<sup>2</sup> for *K. scalarina* and *K. rhytiphora* (see legend). The red-dashed, horizontal line indicates years when:  $\geq 20\%$  of transects contained  $\geq 10$  *K. scalarina* pre-recruits (top panel), and years when  $\geq 10\%$  of transects contained  $\geq 10$  *K. rhytiphora* pre-recruits (bottom panel). Data were not available for 2009–2011 for *K. rhytiphora* because of changes to the minimal legal length and the sampling method used. Note that the axes vary among figures. Mean density (number per m<sup>2</sup>) of pre-recruits, the previously proposed indicator, is added for comparison.

West Coast



**Figure A2.** Percentage of transects with 10 or more pre-recruits per m<sup>2</sup> for *K. scalarina* and *K. rhytiphora* in Venus, Streaky and Smoky bays. Mean density (number per m<sup>2</sup>) of pre-recruits, the previously proposed indicator, is added for comparison. Note that bays were not always surveyed in the same years.