Assessment of scallop dredge ring size selectivity in the eastern English Channel fishery

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Assessment of scallop dredge ring size selectivity in the eastern English Channel fishery

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Key Findings:

- Significant reductions in scallops below the 110 mm minimum conservation reference size (MCRS) in both the 92 and 97 mm compared with the standard 85 mm ring size
- No loss in scallops above MCRS in either the 92 or 97 mm compared with the standard 85 mm ring size.
- Both the 92 and 97 mm ring sizes could help optimise scallop size selectivity in the eastern English Channel fishery
- Previous research has shown that the 92 mm ring size also optimises selectivity in the western English Channel where the MCRS is 100 mm

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Introduction

The king scallop (*Pecten maximus*) fishery in the English Channel/ la Manche is economically important to the Irish scallop dredge fishing fleet. The area encompasses ICES division 7.d (eastern Channel) and 7.e (western Channel). EU technical measures are in place in both ICES Divisions including closed areas and different minimum conservation reference sizes (MCRS): 110 mm in 7.d; and 100 mm in 7.e. Irish vessels currently utilise a ring size of 85 mm attached aft of the dredges in these areas. French vessels targeting scallop in the eastern Channel used a ring size of 92 mm with plans to change the ring size to 97mm (Foucher et *al*., 2020).

Evidence to support the French ring size increase was provided by the SELEDRAG project (Foucher *et al*., 2020), carried out in the eastern Channel. The Authors concluded that catches of scallop < 110 mm reduced with increasing ring size and there was no loss of scallops ≥ 110 mm using 85, 92 and 97 mm ring sizes. The authors acknowledged that there would be losses where the MCRS is 100 mm, in the western Channel, and that further trials under commercial fishing conditions could be useful.

The Irish South and East Fish Producers Organisation (ISEFPO), which represents scallop dredge fishermen operating in the area, requested that BIM conduct a trial in the western Channel to provide further information on this issue. The key findings off that trial were that increasing dredge ring size from 85 mm to 92 mm could help optimise scallop size but that the 97 mm ring size significantly reduced scallops above the 100 mm MCRS in the western Channel (Browne et *al*., 2024).

The Irish fishing Industry was keen to further assess the effect of 85, 92 and 97 mm ring sizes on scallop selectivity in the eastern Channel fishery. Here, we report on a further BIM trial which address that issue.

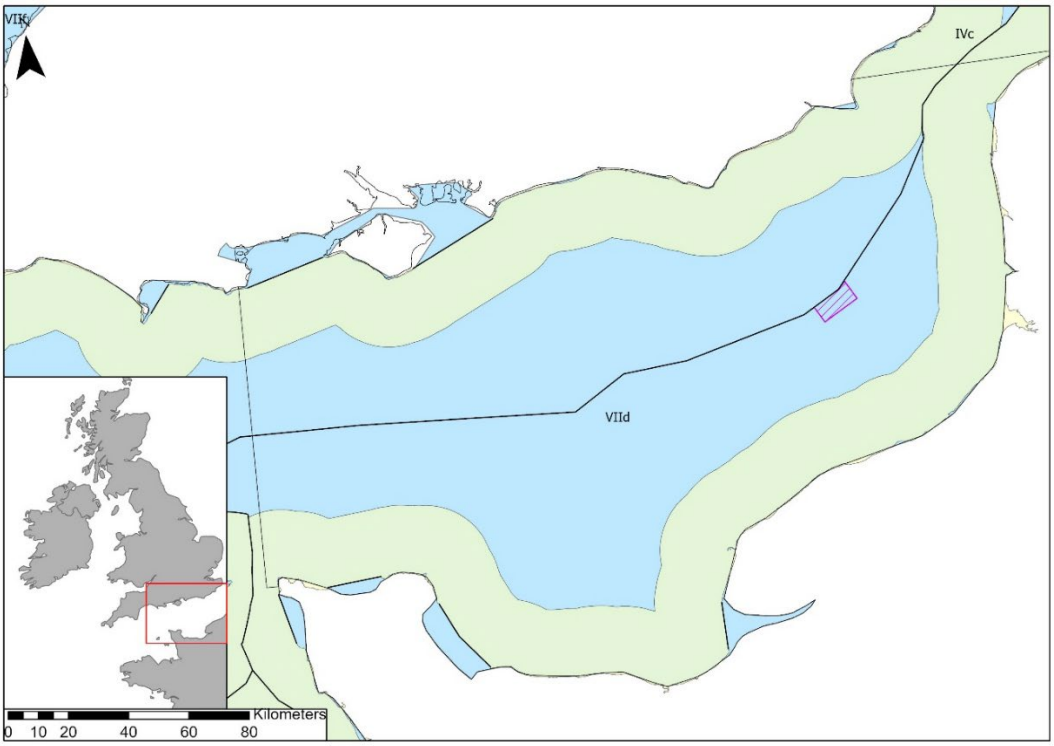

Figure 1. Trial location indicated by the hatched area.

Methods

Fishing operations

The trial was carried in EU waters of ICES Division 7.d (Figure 1) during October 2024 on board MFV Willie Joe (WD74) (Figure 2), a 23.95 m scallop dredger (DRB gear code), operating from Co. Wexford in the southeast of Ireland. Following vessel selection, BIM met with the Skipper of the trial vessel to discuss and agree the trial plan in advance of fishing operations.

Figure 2. MFV Willie Joe (WD74).

The trial vessel deployed a total of 20 Newhaven-style dredges (Table 1), with 10 dredges attached to each of two beams deployed from port and starboard derricks. Test ring sizes of 92 and 97 mm were deployed on 5 alternating dredges on the port side while the standard ring size of 85 mm was deployed on all 10 dredges on the starboard side (Figure 3).

Table 1. Fishing gear characteristics

Beam length (m)	10
No. of dredges per beam	10
Tooth bar length (mm)	820
No. of teeth per dredge	8
Spacing between teeth (mm)	85
Tooth length (mm)	135
Tooth width (mm)	10
Tipping bar location	Top of dredges

Sampling and analysis

To facilitate comparison, the experimental design used during the previous trial was employed. Dredges from both sides were numbered 1 to 10, 1 being the dredge furthest aft and 10 being the dredge furthest forward when the dredges were in landing position (Figure 3). Pairs of dredges were numbered 1 to 5 (Figure 3) and for a given haul the same pair of dredges was sampled from each side. Dredge pairs were selected at random and four dredges were sampled per haul: 1 x 92 mm, 1 x 97mm and 2 x 85 mm ring sizes. This sampling strategy facilitated matching of equivalent test and standard gears, thereby accounting for potential differences in fishing power related to dredge locationalong the beam. Total scallop catches and bulk weights relate solely to the four dredges sampled per haul.

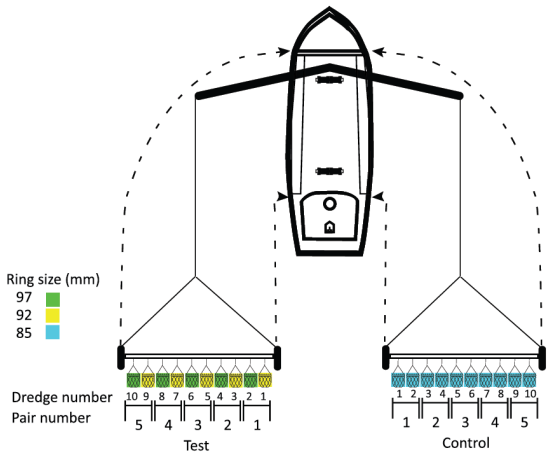

Figure 3. illustration of dredge and ring size layout. Dashed lines indicate the path and orientation of the beam during hauling and arrows inidcate the dredge landing positions.

Bulk catches and total scallop catches were weighed for each sampled dredge. All scallops were measured to the nearest millimetre below. We plotted scallop size frequency histograms and statistically assessed proportional differences in scallop catch at width using a generalised additive model (GAM) and catch curve outputs. We also estimated proportional differences in total catch weights across ring sizes using mean catch weights from the two 85 mm dredges in each pair.

Results

A total of 20 valid hauls were completed under normal fishing conditions over three days. Mean haul duration, towing speed and depth fished were 01:04hr, 2.5 kt and 36 m. Sea state during the trial ranged from force 3 (Beaufort scale) to force 5. Wind direction ranged between south westerly and south easterly. Tidal current is an important factor in the trial area and the tidal range decreased over the course of the trial.

All scallops caught in the sampled dredges were measured i.e., no sub-sampling occurred. Substantial reductions in scallops < 110 mm occurred in both the 92 and 97 mm ring sizes compared with the 85 mm ring size. There was no reduction in the number of scallops ≥ 110 mm in either the 92 or 97 compared with 85 mm rings (Table 2, Figure 4, Appendix 1).

Modeled catch curves demonstrated significant reductions in scallops < 110 mm in 92 and 97 compared with 85 mm rings (Figure 4).

Bulk catch weight and total scallop weight was slightly higher in the 85 compared with 92 and 97 mm rings (Table 2). Bulk catches mostly consisted of scallops, stones, empty shells and echinoderms.

Table 2. Total scallop counts and catch weights by ring size. Scallop MCRS ≥ 110 mm.

Ring size (mm)	**85**	**92**	**97**	**Total**
Total scallop count (N)	2567	2331	2270	7168
Difference from 85 mm (%)		-9	-12	
< 110 mm scallop width (N)	546	290	210	1046
Difference from 85 mm (%)		-47	-62	
≥ 110 mm scallop width (N)	2021	2041	2060	6122
Difference from 85 mm (%)		1	2	
Total scallop catch weight (kg)	454	437	426	1317
Difference from 85 mm (%)		-4	-6	
Bulk catch weight (kg)	622	565	532	1719
Difference from 85 mm (%)		-9	-14	

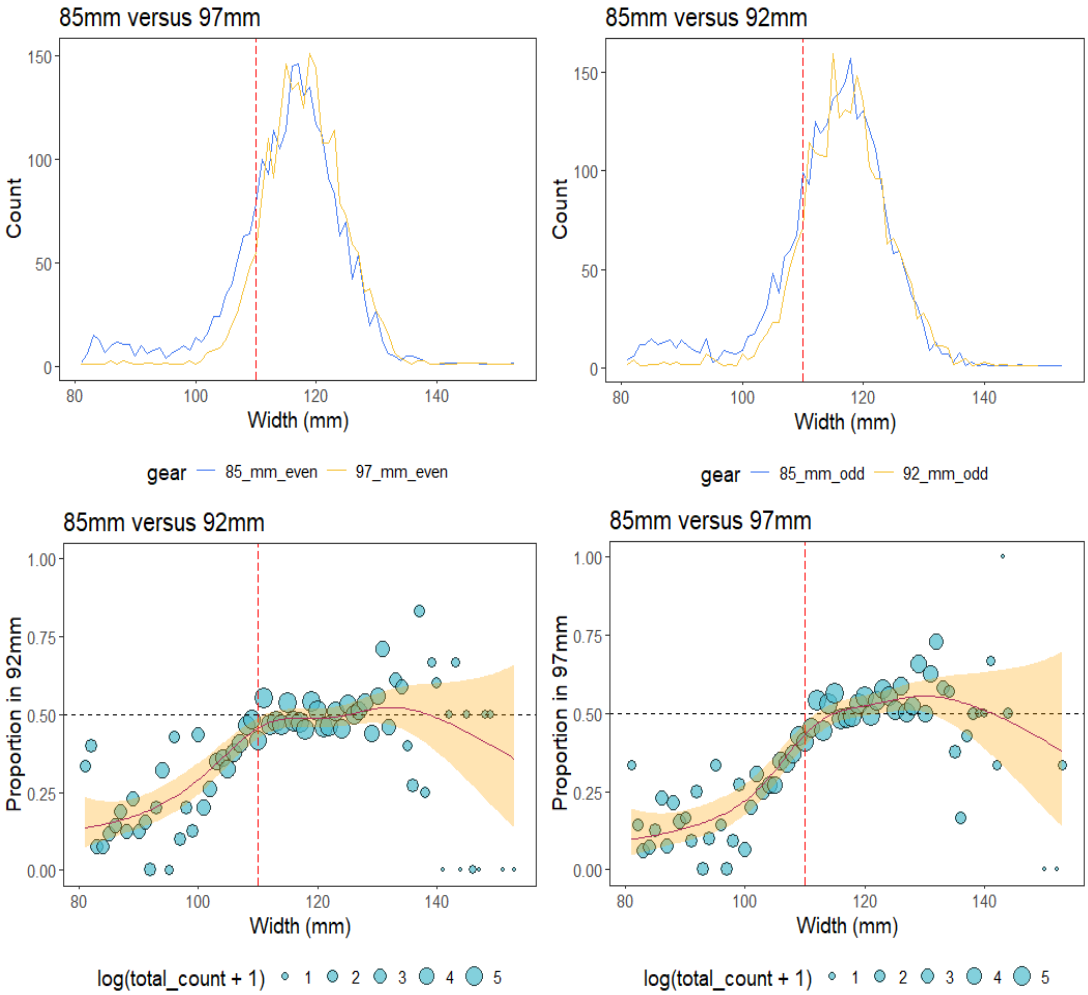

Figure 4. Scallop size-frequency plots by ring size (top) and catch comparison curves (bottom). Overall proportions of scallop catch at width in control and test gears are modelled in the catch curves. Points represent the empirical proportions over all hauls and size is proportional to the count at width. Model fit (solid red line) and confidence intervals (yellow bands) come from the GAM. Vertical dashed red line represents the MCRS for scallop (≥ 110 mm).

Discussion

Both the 92 and 97 mm ring sizes could help optimise scallop size selectivity in the eastern English Channel fishery where the MCRS is 110 mm. Previous research has shown that the 92 mm ring size also optimises slectivity in the western English Channel where the MCRS is 100 mm (Browne *et al.*, 2024).

Irish scallopers currently use 85 mm ring sizes in both the eastern and western Channel. They are concerned about potentially having to use multiple ring sizes in different areas. It is not possible to safely change ring sizes at sea so vessels would have to come ashore to change gear which would substantially reduce their operational efficiency and commercial viability. Irish scallopers remain concerned about the enlargement of ring size due to ring wear from bottom contact. Gear modifications which raise belly rings off the bottom using skids have been shown to reduce

bottom contact and ring wear (Sciberras *et al*. (2022) but would need to be tested in an Irish context.

Acknowledgements

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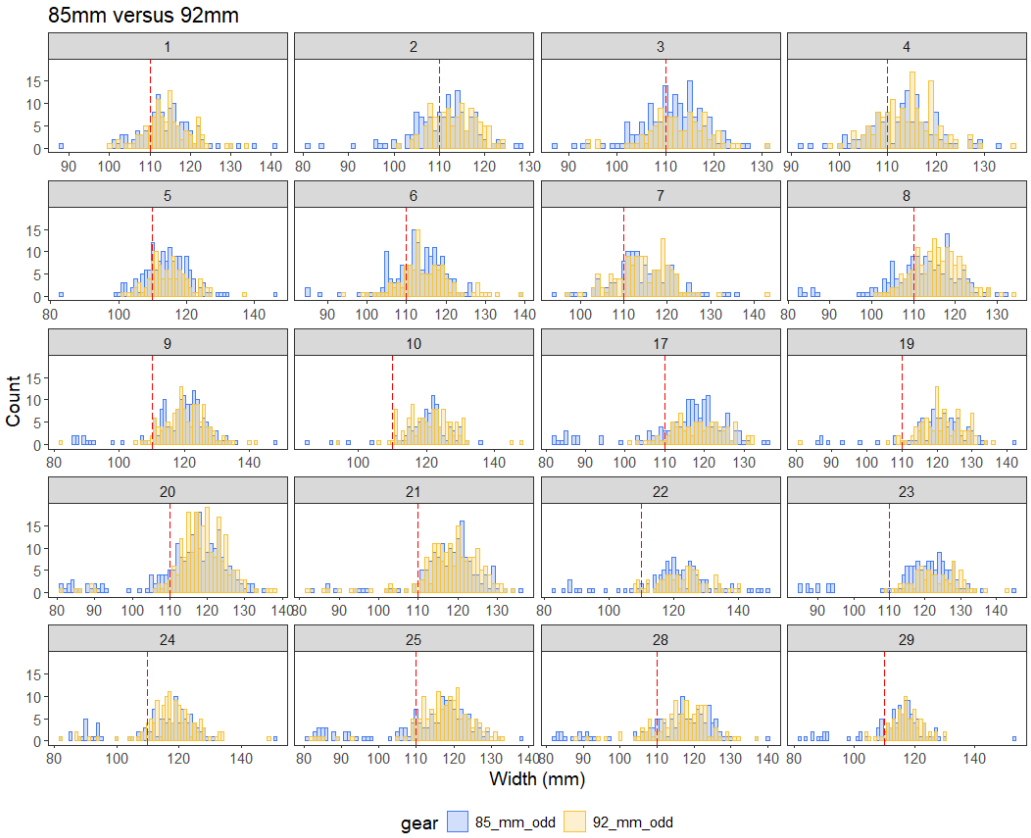
Appendix I

Size-frequencies by haul

85mm versus 92mm



85mm versus 97mm