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

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Key Findings

- Increasing dredge ring size from 85 mm to 92 mm could help optimise scallop size selectivity in the western English Channel fishery

- 97 mm ring size is too large in the western Channel but may be of benefit in the eastern Channel

Rialtas na hÉireann
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Introduction

The king scallop 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. Foucher et al. (2020) reported that French vessels targeting scallop in the eastern Channel use a ring size of 92 mm with plans to increase the ring size to 97mm.

Evidence supporting the ring size increase was provided by the French SELEDRAG project. The project compared the selectivity of scallop dredges fitted with a ring size of 85, 92 and 97 mm in ICES 7.d (eastern Channel) inside French territorial waters of the Bay of Seine. One beam was fitted with six Newhaven dredges, two of each with each different ring size (Foucher et al., 2020). The experimental design was based on the Bay of Seine stock assessment protocol (Vigneau et al., 2001). Each haul had the following standardised haul characteristics: straight line tow into current, 3 knots towing speed with 10-minute duration equating to 0.5 mile tracks.

The SELEDRAG project concluded: catches of scallop < 110 mm reduced with increasing ring size; and there was no loss of scallops ≥ 110 mm using any of the 85, 92 and 97 mm ring sizes. The report acknowledged that there would be losses where the MCRS is 100 mm in 7.e 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 BIM to conduct a trial in 7.e to provide further information on this issue.

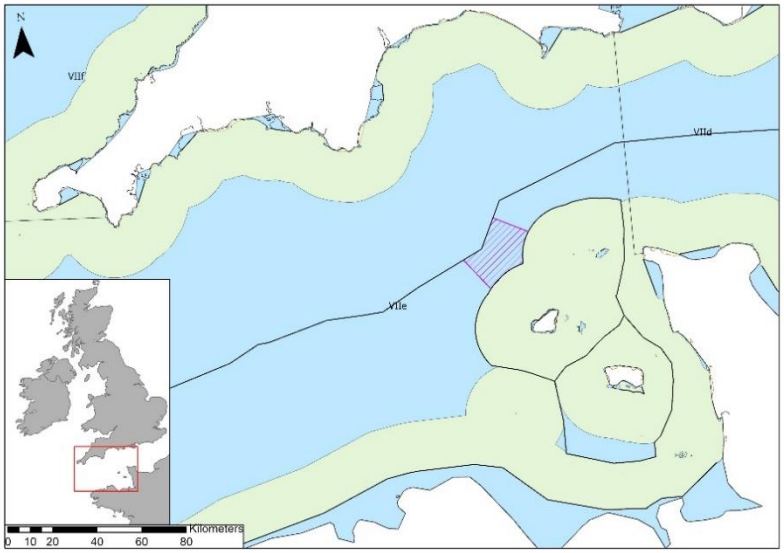

Figure 1. Trial location is indicated by the hatched area

Methods

Fishing operations

The trial was conducted in EU waters of ICES Division 7.e (Figure 1) during November 2023 on board MFV Willie Joe (WD74) (Figure 2), a 23.95 m scallop dredger (DRB gear code), operating from Co.

Wexford in southeast Ireland. 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. Ring sizes of 92 and 97 mm were deployed on 5 alternating dredges on the port side while 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

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. This resulted in four dredges being sampled per haul: 1 x 92 mm, 1 x 97mm and 2 x 85 mm ring sizes. This sampling strategy facilitated matching of different ring sizes to beam position, thereby accounting for potential differences in catch efficiency at different positions along the beam. Total scallop catches and bulk weights relate solely to the four dredges sampled per haul.

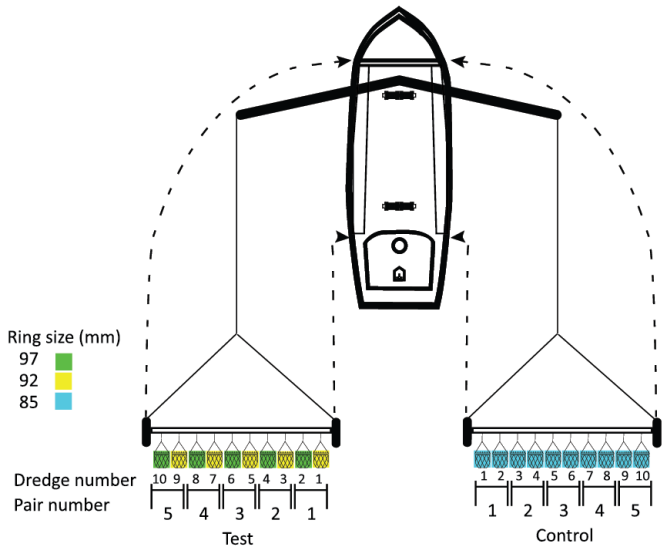

Figure 3. illustration of dredge and ring size layout. Dashed lines indicate the path and orientation of the beam and dredge landing positions.

Bulk catches mostly consisted of scallops, stones, empty shells and echinoderms. 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 36 valid hauls were completed under normal fishing conditions over four days. Mean haul duration, towing speed and depth fished were 00:58hr, 2.5 kt and 37 m. Sea state during the trial ranged from force 6 (Beaufort scale) on day 1 of the trial, moderating to force 3 during day 2 and freshening to force 6 over the final two days of the trial. Wind direction ranged between northerly and westerly. Tidal current is an important factor in the trial area and the tidal range increased over the course of the trial.

Scallop counts and weights in the different ring sizes are outlined in Table 2. Less than 1 % of the total number of scallops retained by all ring sizes measured less than the MCRS of 100 mm (Table 2).

There was no reduction in scallops ≥ 100 mm in 92 mm compared with 85 mm rings (Table 2). There was however a significant reduction in scallops ≥ 100 mm up to ~ 110m in the 97 mm compared with 85 mm rings (Table 2 and Figure 4). Although very few scallops < 100 mm were retained, catch curves demonstrated significant reductions in scallops < 100 mm in 92 and 97 compared with 85 mm rings (Figure 4). No difference in bulk weight occurred across different ring sizes (Table 2).

Table 2. Total scallop counts and catch weights by ring size. Scallop MCRS ≥ 100 mm.

Ring size (mm)	85	92	97	Total
Total scallop count (N)	994	1075	915	2984
Difference from 85 mm (%)		8	-8	
< 100 mm scallop width (N)	10	5	1	16
Difference from 85 mm (%)		-50	-90	
≥ 100 scallop mm width (N)	984	1070	914	2968
Difference from 85 mm (%)		9	-7	
Total scallop catch weight (kg)	277	296	260	833
Difference from 85 mm (%)		7	-12	
Bulk weight (kg)	1991	1994	1993	5978
Difference from 85 mm (%)		-	-	

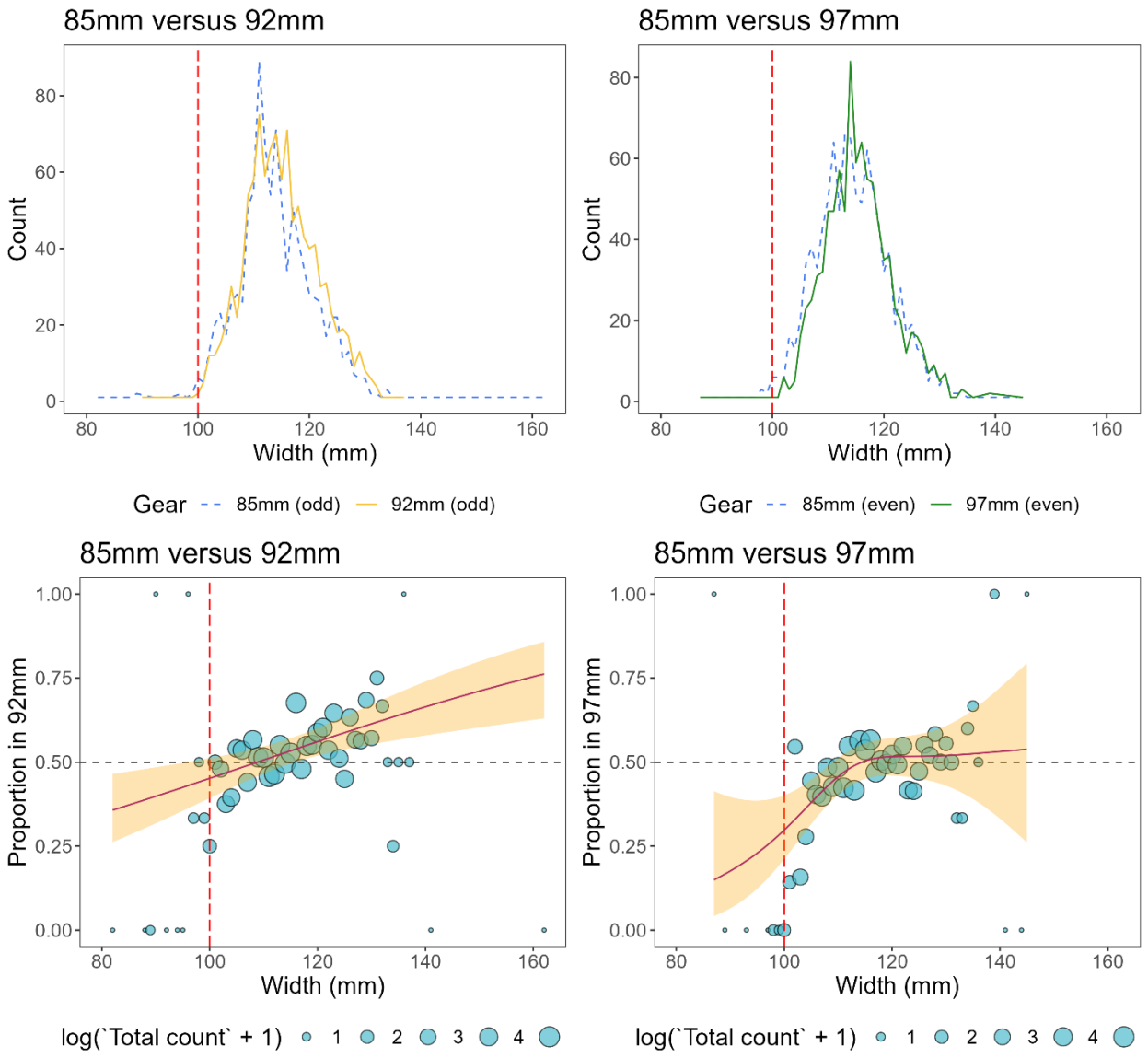

Figure 4. Scallop width-frequency plots by ring size (top) and catch comparison curves (bottom). Overall proportions of scallop catch at width in control and test gears are modelled in the catch curves. Points represent the empirical proportions over all hauls and size is proportional to the count at width. Model fit (solid red line) and confidence intervals (yellow band) come from the GAM. Vertical dashed line represents the MCRS for scallop (≥100 mm).

Discussion

Results from this study suggest that 92 mm rings could be a good option to improve scallop size selectivity in 7e. The 97mm ring size significantly reduced catches below 110 mm while maintaining catches above this size. Loss of scallops above the minimum conservation reference size of 100 mm suggests that this ring size is overly selective in 7.e. The 97 mm ring size may be a useful option in 7.d where the MCRS is 110 mm but further work in 7.d is likely needed to confirm this.

In contrast to the current study, Foucher et al (2020) found differences in bulk weights retained by the different ring sizes. Substantially longer haul durations (mean of 58 mins in the current study compared with 10 mins in the French study) are likely to have resulted in the bags filling up which explains the similarity in bulk weights across ring sizes in the current study. Differences in gear design might also explain differences between studies. Tipping bars are trailed behind dredges by French fishers whereas Irish fishers fix them on top of the dredges (Pers. Comm. trial vessel skipper).

Our sampling protocol attempted to compensate for differences in fishing power related to dredge position on a beam. Initially it was planned to swap the dredges from one side to the other during the trial to account for potential differences in fishing power on each side of the vessel, but this was not possible due to poor weather.

The trial Skipper continued using the 92 mm ring size for approximately four trips in different areas after the trial finished and observed some loss of scallops >100 mm. The Skipper explained that rings can take several trips before they wear in and take their final shape.

These caveats aside, the results generally corroborate findings from the SELEDRAG study (Foucher et al., 2020) and support the introduction of a 92 mm minimum ring size in 7.e.

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