



Bord Iascaigh Mhara
Irish Sea Fisheries Board

Assessment of a 300 mm square-mesh panel in the Irish Sea *Nephrops* fishery

Key Findings

- Results are in line with a Northern Irish assessment of cod catches in the 300 mm square mesh panel
- Major reductions in catches of whiting and haddock and no reduction of *Nephrops* catches in the 300 mm square mesh panel



MFV Stella Nova

Introduction

The Irish Sea cod management planⁱ promotes the use of highly selective gears to reduce cod catches by exempting users from effort restrictions. Under Article 11(2), exemptions can be applied once the percentage of cod catches does not exceed 1.5% and available data on this issue receives favorable assessment from the Scientific Technical and Economic Committee for Fisheries (STECF). Currently the Swedish grid and the Seltra trawl are the only approved exempted gears for Irish trawlers targeting *Nephrops* in the Irish Sea. Previous trials carried out by BIM on the Seltra trawl yielded poor results due to unacceptably high losses of *Nephrops* suggesting there is a need for more user friendly selective gears to be considered for exemption.

One such gear, the 300 mm Square-mesh Panel (SMP) has been comprehensively tested in the Irish Sea *Nephrops* trawl fishery by Northern Ireland's Department of Agriculture and Rural Development (DARD). STECF evaluated that work and found that the catches of cod using the 300 mm SMP were less than or equal to 1.5% by weight of total catch (STECF, 2013). Following industry feedback on the results of the Seltra trials, a gear trial of the 300 mm SMP was arranged at relatively short notice to assess the panel in an Irish context. Potential benefits in relation to Landing Obligation requirementsⁱⁱ are also discussed.

Methods

The trial was carried out onboard the MFV Stella Nova, a 23.5 m trawler from Clogherhead, County Louth. Fishing gear consisted of a Quad-rig trawl set up using a triple warp and centre clump arrangement. A 300 mm SMP was deployed on one trawl and compared with a control trawl with no SMP. The mesh in the cod-ends measured 70 mm and was constructed with single 5.5 mm diameter twine. The mesh size behind the headlines in the top and bottom panels was 80 mm while meshes as large as 120 mm were employed in the wing ends of both nets. Deployed 9 m from the cod-line, the 300 mm SMP was 20 meshes long and stretched across the top sheet to at least 2 open meshes from the selvages. The size and position of the panel was based on legal requirements and practicalities: SMPs must be at least 3 m in length on larger vesselsⁱⁱⁱ and no more than 9 m from the cod-line in the Celtic Sea^{iv}. Adopting the same minimum distance from the cod-line in the Irish Sea would simplify transition between the two areas.

Table 1. Gear specification

| | |
|------------------------|------------------|
| Trawl type | Quad-rig |
| Trawl manufacturer | Thyboron |
| Head-line length (m) | 31 |
| Foot- line length (m) | 38.4 |
| Fishing circle (mm) | 70 x 386 |
| Sweep length (m) | 50 + 20 |
| Warp diameter (mm) | 20 |
| Door spread (m) | 91.4 |
| Door type | Thyboron Type II |
| Door weight (kg) | 500 |
| Clump weight (kg) | 920 |
| Cod-end mesh size (mm) | 70 |

The trial took place in the Western Irish Sea in ICES Division VIIa (Figure 1). A total of 23 hauls were carried out over a 4 day period commencing August 18th 2014. Haul duration, towing speed and depth of ground fished averaged 1:08 hours, 2.9 knots and 84 m respectively.



Figure 1. Gear trial location (striped area)

Total catches were separated to species level, weighed to the nearest kg and compared. All commercial fish species were measured to the nearest cm below. Total catches of *Nephrops* were weighed and representative subsamples were chosen at random at haul level. Subsamples were weighed and measured to the nearest mm below (carapace length (CL)). A total of 17,540 *Nephrops* sampled at haul level were raised to a total catch of 181,208 individuals for the two test gears.

Length frequency charts were constructed for the main species. A Generalised Linear Mixed Model (GLMM) which provides comparisons of fish catch at length by the two gears through a continuous curve with a realistic confidence band (Holst and Revill, 2009) was applied using R version 3.02 (R_Core_Team, 2013).

Results

Details of the total weights of commercial species caught in each of the test gears are outlined in Table 2. Catches of whiting and haddock were reduced by 52 and 70% respectively in the 300 mm SMP compared to the control haul. Very low numbers of cod caught during the trial precluded robust comparisons between the two test gears. Cod catch composition was, however, less than 0.01% for both gear types. *Nephrops* catches were 14% higher in the 300 SMP. Catches of witch and plaice were also reduced by 34 and 55% respectively.

Length frequency charts for the top three commercial species caught during the trial are presented in Figure 2. Over 80 % of whiting and haddock were below their respective minimum landings sizes of 27 and 30 cm. Substantially lower numbers of whiting and haddock in the 300 mm SMP appear to be consistent across length classes. Some 94 % of the *Nephrops* catch was above the minimum landing size of 20 mm CL. Other than a slight deviation between 23 – 28 mm CL the size distributions of *Nephrops* across the two test gears were similar.

Table 2. Total catch weight comparison

| Species | Control (kg) | 300 mm SMP (kg) | Difference (%) |
|-----------------|--------------|-----------------|----------------|
| Whiting | 136 | 66 | -52 |
| Haddock | 214 | 65 | -70 |
| <i>Nephrops</i> | 1106 | 1262 | 14 |
| Cod | 2 | 1 | -50 |
| Witch | 116 | 76 | -34 |
| Monk | 27 | 25 | -7 |
| Plaice | 26 | 12 | -55 |
| Bulk catch | 2043 | 1800 | -12 |

Catch comparison curves presented in Figure 3 are in line with other findings with significantly lower proportions of whiting and haddock and little deviation across length classes in the 300 SMP compared to the control ($P < 0.05$ in both cases). The GLMM also showed significant differences in the proportions of *Nephrops* retained by the two test gears.

Discussion

The results of this study are broadly in line with the Northern Irish study on the 300 mm SMP. A similar reduction in bulk catch of 10% was observed as part of a dedicated trip onboard a Northern Irish twin-rigger. The low number of cod encountered during our study is also consistent with the Northern Irish trial: No cod catches were observed in the majority of 54 observer trips carried out on Northern Irish *Nephrops* vessels. The total percentage cod catch for all observed trips was 0.51% (STECF, 2013).

The characteristics of the Irish fleet targeting *Nephrops* are very similar to the Northern Irish fleet. One exception is that since 2012, a considerable number of larger Irish vessels have replaced twin-rigs with quad-rigs. Quad-rig trawls have been shown to catch significantly less cod (~60%) than twin-rig trawls in *Nephrops* fisheries (BIM, 2014; Revill *et al.*, 2009). Hence, it is highly likely that uptake of the 300 SMP by the Irish fleet would produce a cod catch composition of less than 1.5% by weight of the total catch, as was the case for the Northern Irish fleet.

Substantial reductions in catches of whitefish species in the 300 mm SMP, particularly whiting, a key choke species in the Irish Sea *Nephrops* trawl fishery (Poseidon, 2013), can greatly assist in meeting Landing Obligation requirements.

Substantially lower catches of witch and plaice suggest that flatfish species may also be capable of escapement through the 300 SMP. SMPs are unlikely to affect catch rates for *Nephrops* (Catchpole and Revill, 2008) so differences observed in the present study may be due to other factors affecting the performance of the test trawls.

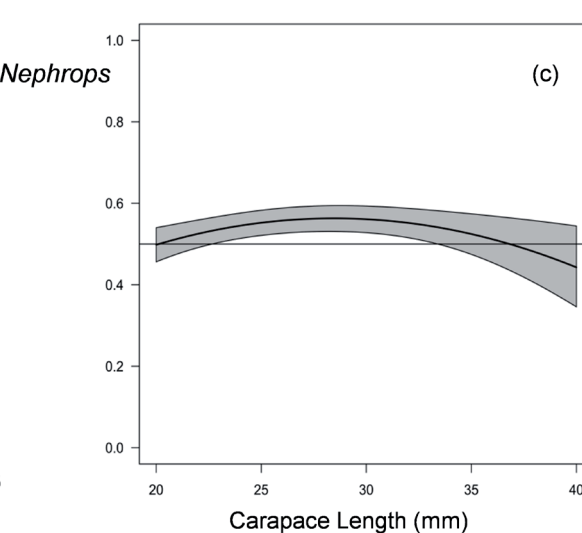
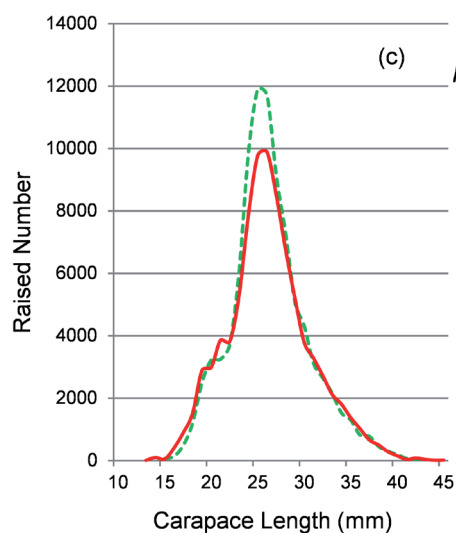
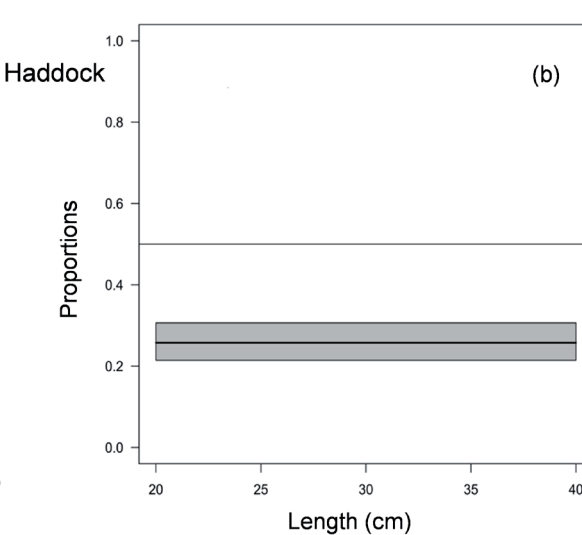
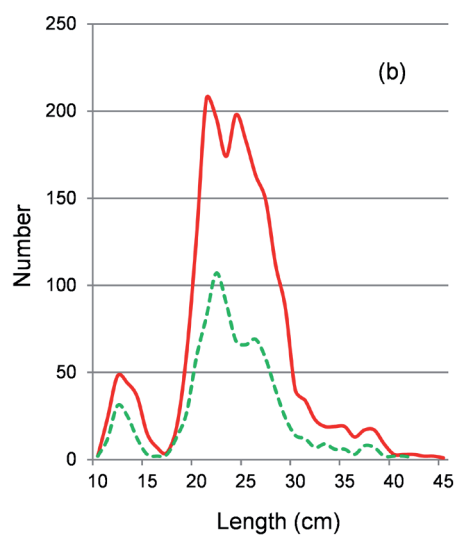
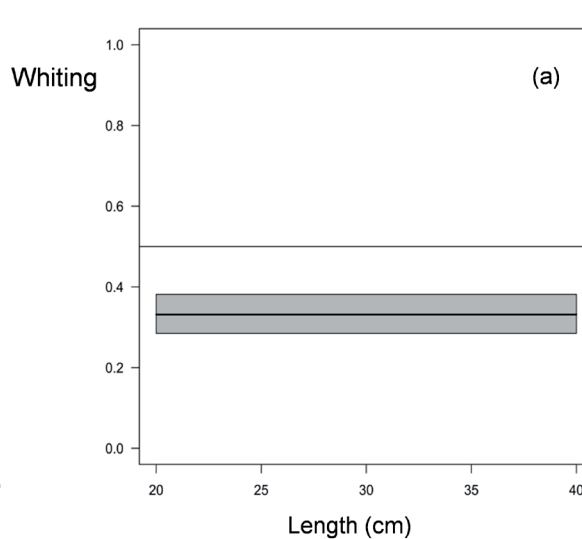
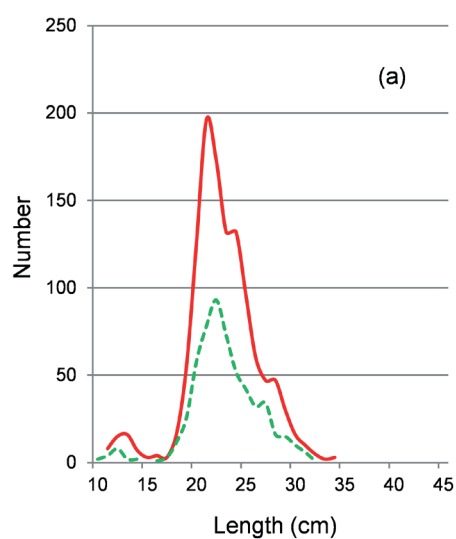


Figure 2. Length frequency charts for (a) whiting (b) haddock and (c) *Nephrops*. The dashed green line indicates the 300 mm SMP and the solid red line indicates the control trawl.

Figure 3. Catch comparison curves for (a) haddock (b) whiting and (c) *Nephrops*. Observations above the line show that more fish are caught in the 300 mm SMP and observations below the line show that more fish are caught in the control trawl. Grey shaded areas either side of the curve illustrate the 95% confidence limits.



Acknowledgements

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References

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Regulations

- i Council Regulation (EC) No 1342/2008 of 18 December 2008 establishing a long-term plan for cod stocks and the fisheries exploiting those stocks and repealing Regulation (EC) No 423/2004.
- ii Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC.
- iii Council Regulation (EC) No 850/98 of 30 March 1998 for the conservation of fishery resources through technical measures for the protection of juvenile organisms.
- iv Commission Implementing Regulation (EU) No 737/2012 of 14 August 2012 on the protection of certain stocks in the Celtic Sea.