Bord Iascaigh Mhara
Irish Sea Fisheries Board

# A Comparison of the Quad-rig and Twin-rig Trawl in the Nephrops Fishery

# Introduction

Twin-rig trawling for Nephrops is the most common form of multi-rig trawl gear employed in Irish fisheries. Other forms of multi-rig gear such as triple-rigs and quad-rigs have been tested but rarely used commercially in Ireland. The reasons as to why uptake of these gears has been slow are unclear. Rising fuel costs, however, mean that fishermen are constantly seeking new ways to improve the efficiency of their gear and use of quad-rig trawls may be one way of achieving this.

In addition to fuel efficiency, discards composed of low or non quota species such as cod, juvenile and non marketable fish is an ongoing issue in Nephrops trawl fisheries. A combination of a range of technical measures including gear modifications is the best way of achieving reductions in discards in these fisheries. A lower headline employed in the quad-rig compared to twin-rig could be effective in reducing discards and indeed fishermen already using this gear have indicated that this is the case.

In late 2012 BIM was approached by the fishing industry to carry out a short trial using the quad-rig to examine efficiencies in catching Nephrops and levels of discards associated with this gear.

# Methods

A quad-rig trawl designed and manufactured by a company in Denmark was tested onboard the 20m MFV Stella Nova from Clogherhead. The gear was rigged with 4 identical cod ends with mesh size measuring 75mm ± 2mm and tested against a standard twin-rig prawn net with the same cod end mesh size (Figure 1).

The trial was carried out in the Smalls fishing grounds in the Celtic Sea (Figure 2) with technical staff from BIM and the MI sampling catches from alternate hauls using each gear type. Average haul duration was 5 hours and 23 minutes. Raising factors of 3 – 6 were used to raise catch samples to total catches presented below. Analysis of variance (Anova) was conducted on raised samples to test if differences in catch compositions were statistically significant.

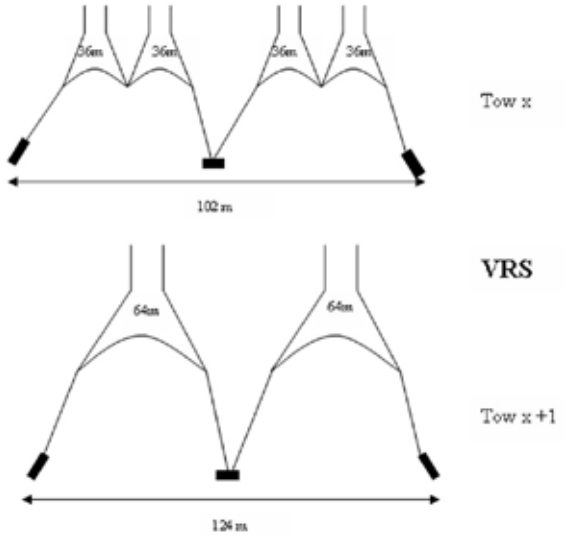


Figure 1. Catch comparison set-up


Figure 2. Smalls Fishing Grounds

# Results

A total of 8 valid hauls, 4 using each gear type, were carried out from 16 – 18 January 2013. In terms of the top four species landed, total catches in the quad-rig for all hauls were 29% higher for Nephrops but lower by 20% for cod, 14% for lesser spotted dogfish and 31% for Norway pout (Table 1 & Figure 3).

Table 1. Species catch composition

| Catch Composition (kg) | Quad-rig | Twin-rig |
|---|---|---|
| Nephrops | 781 | 604 |
| Cod | 315 | 392 |
| Lesser Spotted Dogfish | 314 | 367 |
| Norway Pout | 193 | 280 |
| Mixed flatfish | 111 | 78 |
| Monkfish | 53 | 99 |
| Ling | 32 | 8 |
| Hake | 25 | 19 |
| Haddock | 24 | 47 |
| Whiting | 15 | 11 |
| Pollack | 8 | |
| Squid | 7 | |
| Herring | 4 | 5 |
| **Totals** | **1934** | **1910** |

Mean values across hauls in relation to the top four species followed a similar trend to total catches. A high level of variability associated with low sample size, however, demonstrated that the differences observed in catch composition of the two gear types were not statistically significant (P>0.05 in all cases) (Table 2).

# Conclusions

More trials need to be conducted to provide sufficient sample size to achieve significant results. Preliminary results do suggest however that the quad-rig is more efficient at catching Nephrops. Irish fishermen have reported increases to catches of Nephrops of the order of 20 – 25% using the quad-rig and the results of these trials support these claims.

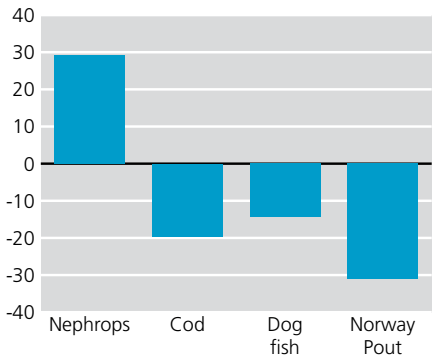


Figure 3. % change in catch composition in quad-rig

Preliminary results also suggest that catches of cod and unmarketable species such as lesser spotted dogfish and Norway pout may be lower. Haddock and whiting which typically form a major component of commercial discards on Nephrops vessels were also lower in the quad-rig but sample sizes were very low due to a lack of abundance of these species on the grounds during the trial.

The quad-rig trawl was observed to work well with no major foul ups despite poor weather conditions for the duration of the trial. Results of this trial suggest that the quad-rig has major potential to increase operational efficiency while reducing impacts on non targeted species in Irish Nephrops trawl fisheries.

Table 2. Mean catch composition, standard deviations and one way Anova results for the top four species

| | Quad-rig | | Twin Rig | | One way anova | |
|---|---|---|---|---|---|---|
| **Species** | **Mean** | **SD** | **Mean** | **SD** | **P-value** | **Adj. R2 (%)** |
| Nephrops | 195.30 | 87.70 | 151.00 | 119.30 | 0.570 | <0.01 |
| Cod | 78.75 | 20.42 | 90.00 | 105.30 | 0.730 | <0.01 |
| Lesser spotted dogfish | 78.50 | 70.57 | 91.75 | 60.78 | 0.786 | <0.01 |
| Norway pout | 48.25 | 6.24 | 70.00 | 24.49 | 0.136 | 21.89 |

# Conclusions

**Due to the fact that these trials were only carried out over a 3 day period the results are by no means definitive as regards the efficiencies of the gear.**

1. **The quad-rig caught 29% more Nephrops than the standard commercial twin rig set up which is similar to fishermen's estimates of 20 -25%.**

2. **The quad-rig caught less non marketable fish and less cod compared to the twin rig gear.**

3. **The quad-rig was observed to work well during the trial with no major foul ups despite poor weather**

4. **These results should be treated as preliminary.**