

Discard collection study comparing
the SFIA designed nephrops trawl
against commercial trawls

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Marine Technology

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Introduction

Targeted Nephrops trawling frequently involves high catch rates of finfish. These are often unmarketable because of their size, quality or quota availability. Unmarketable fish should not be targeted but fishing mortality is often significant.

In 1997/98 Seafish started a programme of work to investigate ways of improving whitefish selectivity through the more effective use of technical conservation measures.

Interest focussed on UK Nephrops fisheries, some of which are generally recognised as having significant discard problems.

The latest exercise conducted under this programme has concentrated on a slightly different approach to the preceding work on by-catch reduction devices. Up to this stage, effort has been directed at developing ways and means of reducing discarding by releasing the unwanted by-catch after it has been caught. This has often raised questions about the ultimate survival of escapees. This latest work places the emphasis on avoiding the capture of unwanted by-catch in the first place, thus precluding the question of survival.

The aim of the project was to design a trawl with attributes that reduced the potential for catching certain finfish species, whilst at the same time maintaining Nephrops catching performance. In other words, making the gear design more species-specific.

The gear is aimed at those Nephrops fisheries in which the by-catch of species such as haddock and whiting is of no commercial value and is even seen as a nuisance factor.

Further commercial trials were needed in order to fine tune the trawls performance to enable it to compete commercially.

To this end the Discard Unit at the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) Laboratory Lowestoft sponsored 15 days of trials aboard two vessels in return for discard data being gathered on their behalf

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Aims and Objectives

As with all the work within this programme, the overall aim is to reduce the level of discarding and wastage. A significant part of the discarded catch from the Nephrops fishery is made up of non-target species. Some of this by-catch is unavoidable. However, there are some species of finfish which, because of their behaviour, could be avoided.

The technical measures developed to date all rely on releasing the unwanted elements of the catch once they have entered the net. The objective of this exercise is to determine ways of changing the design, construction and rigging of the Nephrops trawl so as to exclude the unwanted roundfish by-catch prior to it entering the net. This has to be achieved in a commercially acceptable manner without any detrimental effect on the Nephrops catching capability of the gear.

To achieve this overall objective a number of aims were set as criteria for judging the outcome, one of which was to compare the catching performance of the new designs with that of an unmodified net of comparable dimensions for both target (Nephrops) and by-catch species.

In the process of redesigning the trawl to avoid roundfish capture, the aim was to at least maintain, if not improve, the Nephrops catching capabilities of the new designs. In this way, any short-term losses attributable to the loss of roundfish by-catch could be offset by improved Nephrops catches. If successful, the positive benefits could then be used to encourage commercial acceptance and uptake of the new designs in other Nephrops fisheries.

A successful outcome could then lead to the development of technical guidelines on the modifications required to alter existing prawn trawl designs to achieve the desired level of by catch avoidance.

This net, originally tested in the NE coast of England fishery, performed poorly with respect to the prawn catch (32% of the commercial catch). The improvements made prior to the Clyde exercise needed to be verified in the NE coast fishery for which this design was originally intended. This could be achieved by following the same catch comparison procedures using two vessels operating in partnership, (ideally the same two vessels that conducted the initial trials).

Commercial fishing trials

The fishing trials were conducted as catch comparison exercises using a two-vessel arrangement.

Two similar vessels, using similar sized prawn trawls were selected to operate in partnership for the duration of the trials (~15 days of fishing).

The initial arrangement was for one vessel (chartered), to work with the experimental net and the other vessel to use their own standard prawn trawl for comparison. During these periods

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the vessel operating the experimental trawl was instructed to 'shadow' the partner vessel to try and sample similar populations of target and bycatch species.

The limitations of this type of comparative exercise were accepted on the understanding that the results were only expected to provide an indication of the relative performance of the experimental gear.

Each of the trials vessels carried a Seafish representative to record catch data and monitor the performance of the gear. Catch sampling entailed haul by haul quantification of the target species (Nephrops) and round fish bycatch species of cod, haddock and whiting and for the latter stages of the trials, flat fish. Additionally, samples of the bycatch were measured to provide length/frequency data.

Fishing trials commenced in December 2002, operating from the port of Blyth in Northumberland using the vessels Oceana (BF 840) and Osprey III (BF 500).

These vessels are of similar size and power, (9.95m, 199Kw and 9.9m, 194Kw respectively), general design and layout and regularly operate together in various prawn fisheries around the UK. Both vessels were using the same size and style of prawn trawls and associated rigging arrangements. The nets were spread by Dunbar style 'V' doors (~1.8m) and 73m (40 fathom) of combination wire sweeps attached to 18m (10 fathom) of rubbered wire 'legs'. These sweeps were attached to the nets by 3.6m(2 fathom) of wire bridles and a spreader bar.

Because of the problems experienced in the previous trials as a result of not chartering both of the vessels selected for the work, it was decided to modify the working arrangements to ensure more control over the operations of both vessels.

The fishing trials were split with each vessel operating with the experimental net as the 'shadow' vessel before swapping over to use a standard prawn trawl as the 'lead' vessel. All operations took place on commercial fishing grounds.

Both vessels were of similar design and deck layout, which enabled the same catch sampling procedures to be followed on each vessel.

When the vessels hauled, the catch was emptied into the hoppers. All discarded fish and assorted debris were quantified and recorded. This was done by filling the waste chute running outboard with baskets (and part baskets) of discarded material and recording how much was required. This waste chute was filled with varying discard content a number of times to obtain an average amount needed to fill it. The chute was then filled and emptied during the catch sorting process and the number of times that this took place was recorded. This figure was multiplied by the number of baskets required to fill the chute.

Sample baskets were taken away for measurement at a number of stages throughout the catch sorting operation. One was taken from the start, one near the middle and one towards the end to enable a good profile of discarded fish to be obtained.

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The marketable fish (bycatch) being kept in the fishroom was sampled by measuring either all of the fish, or a representative amount of each species if large quantities were being caught. The live weight of Nephrops sorted for retention was also recorded after the catch was sorted.

During the last week of the trials discarded nephrops were retained to enable a count per kilogram to be carried out. This would enable a check to be made on the crews both retaining the same sizes of nephrops.

Seafish personnel on both vessels used the same methods of sampling for consistency. Observations on general gear performance were also recorded.

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Materials and Methods

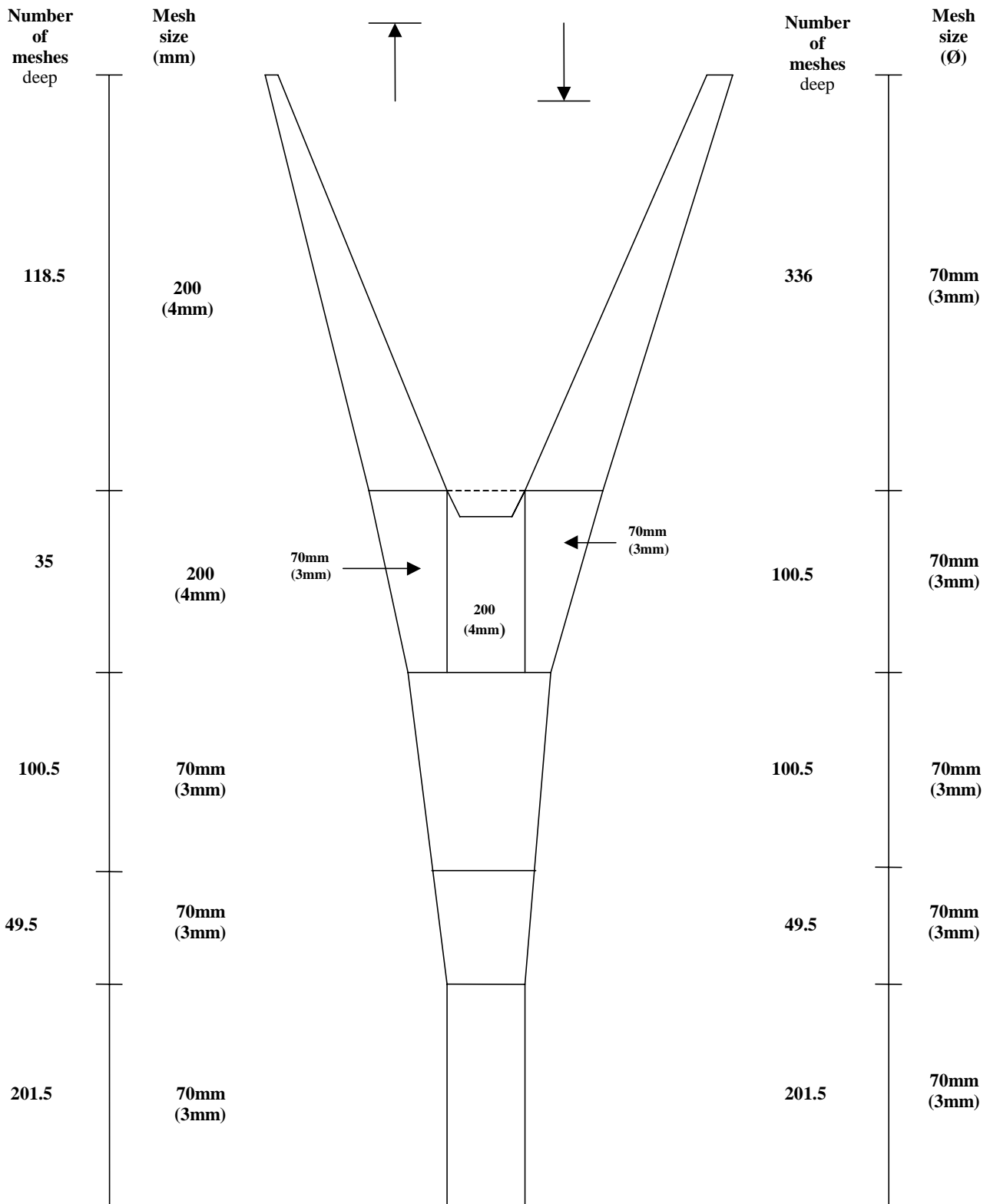


Figure (1): Schematic diagram of the Stuart Nets modified final version of the new prawn trawl design

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Sea Trials – NE Coast of England

The indicators for evaluating the performance of the new trawl designs for the commercial sea trials were as follows:

- The quantity of prawns (*Nephrops norvegicus*) caught
- The quantity of principal bycatch species (i.e. haddock and whiting) retained in the experimental trawl as compared to the standard trawl.

The catch details for these trials are summarised in Table1.

Table 1: Catch summary for NE Coast UK Trials

Species	Total No of fish caught		Percentage reduction in catch observed in experimental trawl
	Standard Trawl	Experimental trawl	
Haddock	3,500	1,339	63%
Whiting	3,7739	13,240	65%
Cod	1,789	1,597	11%
Nephrops	950 Kg	1,213 Kg	+20%

As well as quantifying the catches of haddock, whiting and cod the data includes Length/Numbers plots showing the size range of fish encountered during the trials. These are shown in Figures 2, 3 and 5 for haddock, whiting and cod respectively.

Figure 2 Length/Numbers plot for Haddock (North East Coast trials)

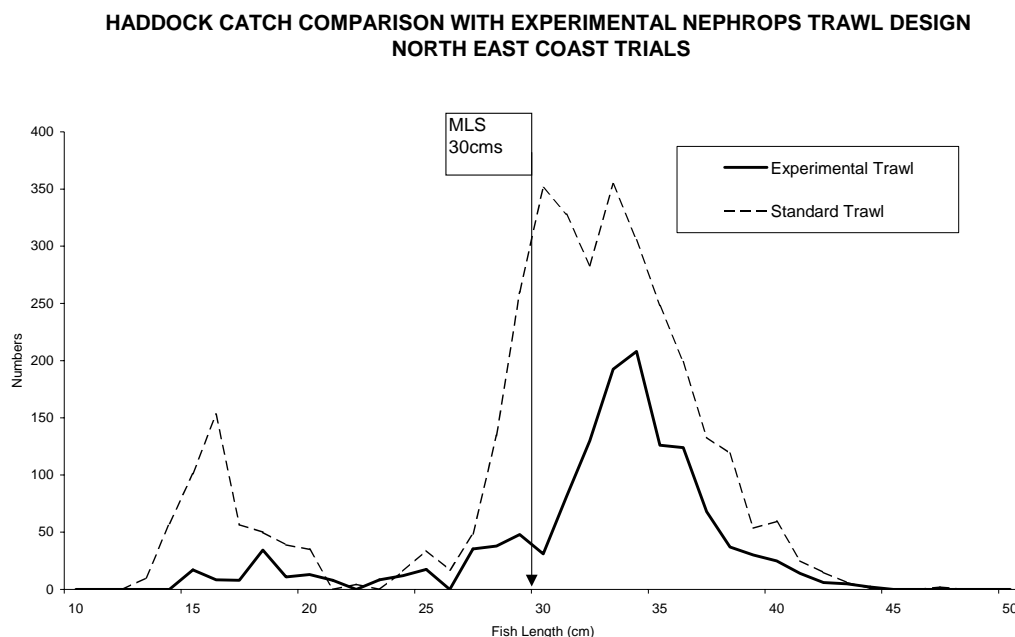


Figure 2 : Length/Numbers plot for Haddock (North East Coast trials)

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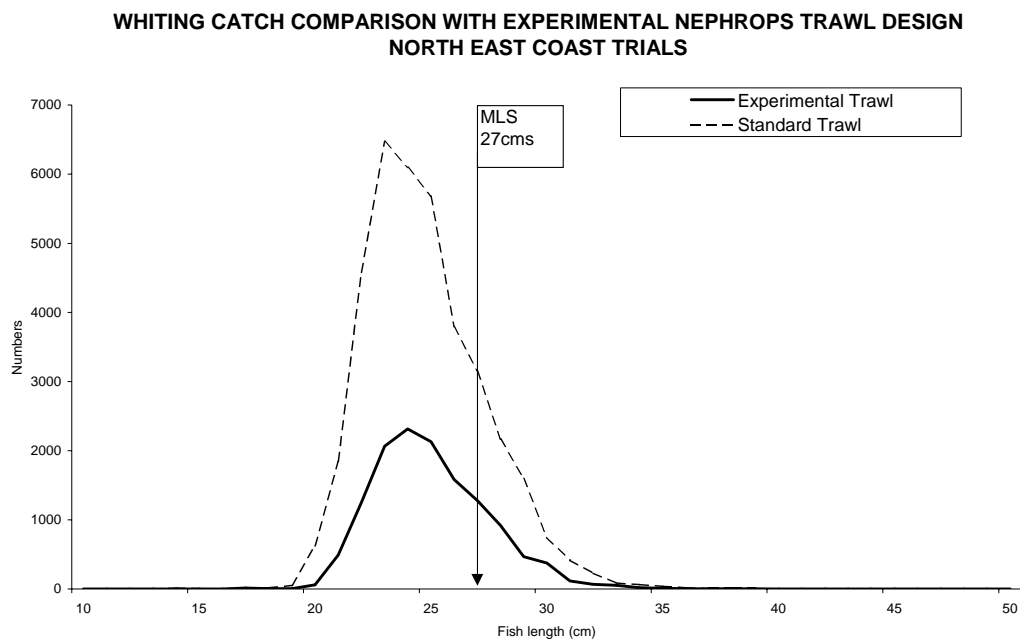


Figure 3: Length/Numbers plot for Whiting (North East Coast trials)

The quantity of by-catch species retained

The experimental Nephrops trawl demonstrated effective by-catch reduction properties in respect of the two principal by-catch species encountered (i.e. whiting and haddock). The experimental trawl was observed to significantly reduce the retention of both of these species across all observed length classes (i.e. 20-50cm).

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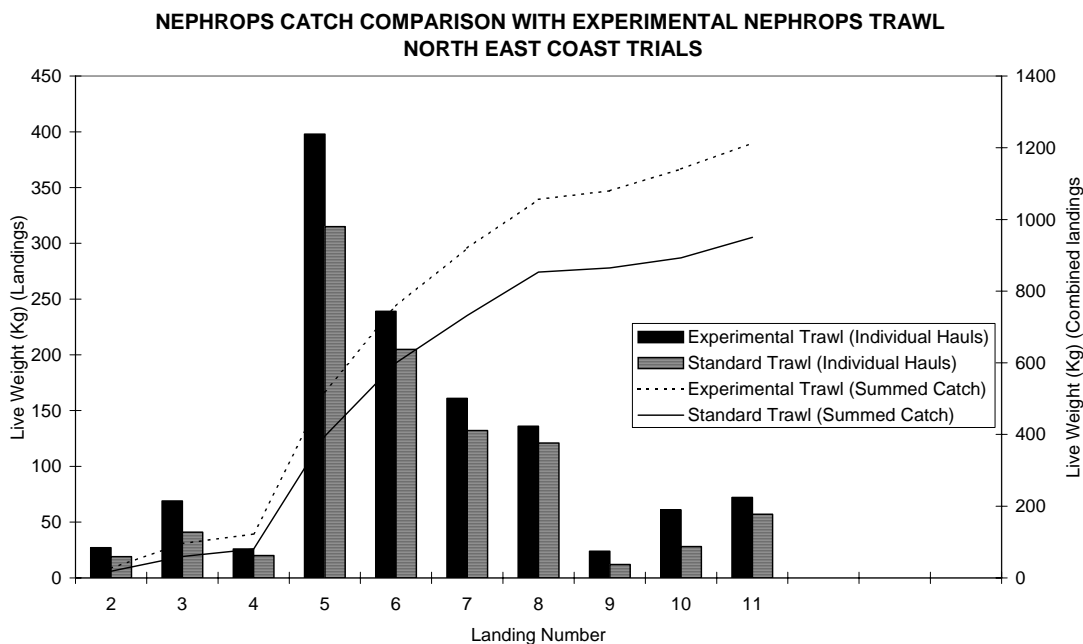


Figure 4: Comparison of Nephrops catches (North East Coast trials)

The quantity of target species (*Nephrops norvegicus*) caught

There were no observed losses of the target species (*Nephrops norvegicus*) and infact a significant increase was observed of 20%. The experimental trawl therefore increased catches of the target species when directly compared to that of the standard trawls.

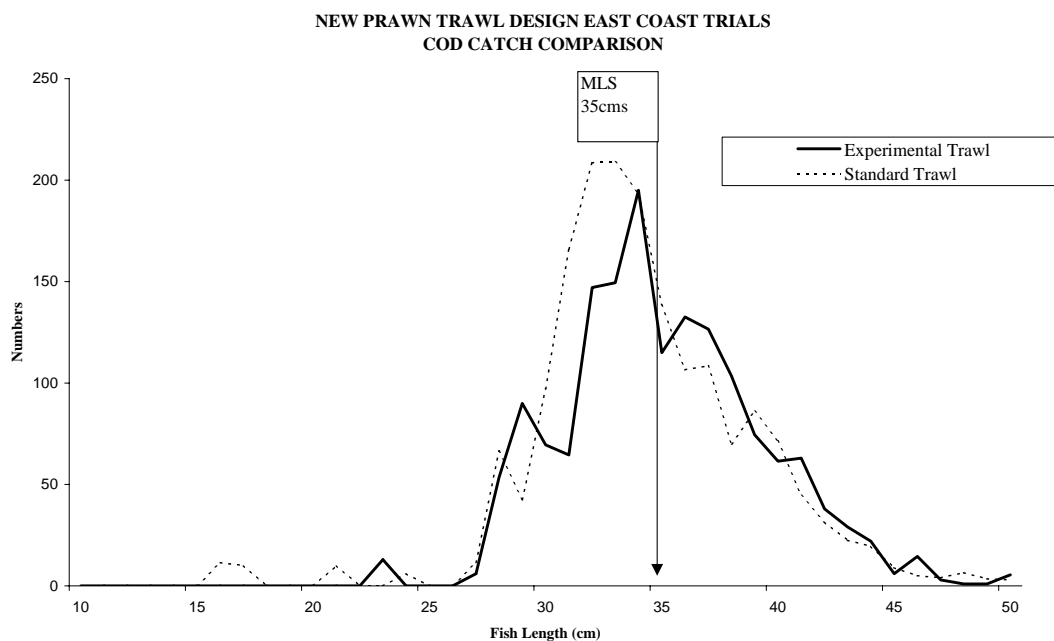


Figure:5 Length/Numbers plot for Cod (North East Coast trials)

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The experimental trawl reduced the retention of whiting in the cod end by 65%, whilst the retention of haddock in the experimental trawl cod end was reduced by a factor of 63%. The experimental trawl also appeared to reduce the retention of cod by 11% mainly in the smaller size classes (15 to 30cms) These figures were based on the combined totals from the summed hauls from these sea trials.

Counts carried out on discarded nephrops showed that the commercial trawls averaged 74 nephrops per kilogram, whilst the new trawl design averaged discarded nephrop counts of 78.

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ACKNOWLEDGEMENTS

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